INFORMATION HANDOUT

For Contract No. 11-0223U4
At 11-SD-5-R29.1/R30.5

Identified by
Project ID 1112000102

PERMITS

Regional Water Quality Control Board: 401 Water Quality Certification (June 1, 2012)

United States Army Corps of Engineers: 404 Nationwide Permit (June 21, 2012) and Extension (June 5, 2014)

California Department of Fish and Wildlife: 1602 Streambed Alteration Agreement (May 4, 2012)

Coastal Development Permit (CDP) (June 21, 2012/signed December 12, 2013), Extension (March 20, 2014), CDP Substantial Conformance (June 13, 2014)

U.S. Fish and Wildlife Service: Biological Opinion (March 23, 2011) and Amendment (February 6, 2012)

AGREEMENTS

UCSD License Agreement Exhibit "B"

Stipulation for Judgment in Condemnation

MATERIALS INFORMATION

Revised Geotechnical Design Report, Dated March 28, 2014

Genesee Avenue Overcrossing (OC) Foundation Report, Dated April 10, 2012

Genesee Avenue OC Revised Foundation Report, Dated May 2, 2012

Genesee Avenue OC Seismic Design Recommendations, Dated December 5, 2011

Genesee Avenue Pedestrian OC Foundation Report, Dated May 24, 2012

Genesee Avenue Pedestrian OC Revised Foundation Reports, Dated May 30, 2012; July 2, 2012 and January 28, 2013

Genesee Avenue Pedestrian OC Seismic Design Recommendations, Dated March 27, 2012

Retaining Wall 3 Revised Foundation Report, Dated March 21, 2014

Retaining Wall 4 Revised Foundation Report, Dated March 21, 2014

Retaining Wall 8 Foundation Report, Dated March 8, 2012

Retaining Wall 8 Foundation Report Addenda, Dated June 21, 2012

Retaining Wall 11 Foundation Report, Dated December 14, 2012

Retaining Wall 13 Foundation Report, Dated March 28, 2014

Retaining Wall 14 Foundation Report, Dated March 28, 2014

Retaining Wall 15 Foundation Report, Dated March 28, 2014

Section 77 Approved Materials List

City of San Diego Water Source Letters

Battery Backup System

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

California Regional Water Quality Control Board, San Diego Region

June 1, 2012

Certified Mail – Return Receipt Requested
Article Number: 7011 0470 0002 8961 5582

Mr. Arturo Jacobo
Project Manager
California Department of Transportation
4050 Taylor Street
San Diego, CA 92110

In reply refer to / attn:
Place ID 779849 / mporter

Subject: Clean Water Act Section 401 Water Quality Certification No. 12C-033 for the Interstate-5 / Genesee Interchange Project

Mr. Jacobo:

Enclosed is the Clean Water Act Section 401 Water Quality Certification for discharges to waters of the U.S. and acknowledgment of enrollment under State Water Resources Control Board Order No. 2003-017-DWQ for the Interstate-5/Genesee Interchange Project (project). A description of the project and project location can be found in the project information sheet, location map, and site maps which are included as Attachments to this Certification.

Any petition for reconsideration of this Certification must be filed with the State Water Resources Control Board within 30 days of certification action (23 CCR § 3867). If no petition is received, it will be assumed that you have accepted and will comply with all the conditions of this Certification.

Failure to comply with all conditions of this Certification may subject the California Department of Transportation to enforcement actions by the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), including administrative enforcement orders requiring you to cease and desist from violations, or to clean up waste and abate existing or threatened conditions of pollution or nuisance; administrative civil liability in amounts of up to $10,000 per day per violation; referral to the State Attorney General for injunctive relief; and, referral to the District Attorney for criminal prosecution.

In the subject line of any response, please include the requested "**In reply refer to:**" information located in the heading of this letter. For questions pertaining to the subject matter, please contact Mike Porter at 858-467-2726 or mporter@waterboards.ca.gov.

Respectfully,

DAVID W. GIBSON
Executive Officer

Enclosure:

Clean Water Act Section 401 Water Quality Certification No. 12C-033 for the Interstate-5/Genesee Interchange Project, with four attachments.

DWG:jgs:cc:mgp

cc: Ms. Stephanie Hall
Environmental Protection Specialist/Senior PM
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Tech Staff Info & Use	
Certification No.	12C-033
Party (GT/CIWQS) ID	7222
File No.	12C-033
WDID	9 000002398
NPDES No.	None
Reg. Measure ID	384327
Place ID	779849
Person ID	526363
Inspection ID	None

California Regional Water Quality Control Board, San Diego Region

Action on Request
for
Clean Water Act Section 401 Water Quality Certification
and
Waste Discharge Requirements
for
Discharge of Dredged and/or Fill Materials

PROJECT: I-5/Genesee Interchange Project
Water Quality Certification No. 12C-033

APPLICANT: Mr. Arturo Jacobo
Project Manager
California Department of Transportation
4050 Taylor Street
San Diego, CA 92110

WDID	9000002398
Reg. Meas.	384327
Place	779849
Party	7222
Person	526363

ACTION:

☐ Order for Low Impact Certification	☐ Order for Denial of Certification
☑ Order for Technically-conditioned, Programmatic Certification	☐ Waiver of Waste Discharge Requirements
☑ Enrollment in SWRCB GWDR Order No. 2003-017 DWQ	☐ Enrollment in Isolated Waters Order No. 2004-004 DWQ

PROJECT DESCRIPTION:

The project consists of improvements to Interstate-5 (I-5) and Genesee Avenue to improve traffic flow and provide a connection for bicyclists between two, existing bicycle paths. The project will occur in two phases. The first phase of construction will include the reconstruction of I-5/Genesee interchange, the addition of auxiliary lanes north of Genesee Avenue, construction of a bicycle path, and improvement to Sorrento Valley on-ramps and off-ramps. The second phase of construction will include the addition of auxiliary lanes south of Genesee Avenue, replacement of the Voigt Drive overcrossing, and realignment of Gilman Drive.

Permanent impacts to 0.11-acre (1,290-linear feet) of non-wetland waters of the U.S. and/or State will be caused by highway improvements and related facilities. There are no proposed temporary impacts.

Unavoidable impacts will be mitigated through the offsite establishment of 3.36-acres (2,250-linear feet) of Southern willow scrub, consisting of willows (4 species), Fremont's cottonwood, Coast live oak, and Western sycamore, Mulefat, and herbaceous understory at the Deer Canyon Mitigation site. Mitigation will also be implemented for 1.01-acres of impacts to California Department of Fish and Game Jurisdictional areas.

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I. STANDARD CONDITIONS

The following three standard conditions apply to all Certification actions, except as noted under Condition C for denials.

A. This Certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to section 13330 of the California Water Code and section 3867 of Title 23 of the California Code of Regulations (23 CCR).

B. This Certification action is not intended and must not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent Certification application was filed pursuant to 23 CCR subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

C. The validity of any non-denial Certification action must be conditioned upon total payment of the full fee required under 23 CCR section 3833, unless otherwise stated in writing by the certifying agency.

II. ADDITIONAL CONDITIONS: GENERAL

A. Water Quality Certification No. 12C-033 (Certification) is only valid if the project begins no later than 5 (five) years from the date of issuance. If the project has not begun within 5 years from the date of issuance, this Certification expires.

B. The California Department of Transportation must comply with the requirements of State Water Resources Control Board adopted Order No. 99-06-DWQ, NPDES No. CAS000003 Permit *Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California Department of Transportation.*

C. The California Department of Transportation must comply with the requirements of State Water Resources Control Board Water Quality Order No. 2003-0017-DWQ, *Statewide General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification.* These General Waste Discharge Requirements are accessible at: http://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/generalorders/go_wdr401regulated_projects.pdf.

D. The California Department of Transportation must, at all times, fully comply with the engineering plans, specifications and technical reports submitted to the California Regional Water Quality Control Board San Diego Region (San Diego Water Board), to support this Certification and all subsequent submittals required as part of this Certification and as described in Attachment 1. The conditions within this Certification must supersede conflicting provisions within such plans submitted as part of this Certification action.

E. The California Department of Transportation must permit the San Diego Water Board or its authorized representative at all times, upon presentation of credentials:

1. Entry onto project premises, including all areas on which fill or mitigation is located or in which records are kept.

2. Access to copy any records required to be kept under the terms and conditions of this Certification.

3. Inspection of any treatment equipment, monitoring equipment, or monitoring method required by this Certification.

4. Sampling of any discharge or surface water covered by this Order.

F. In the event of any violation or threatened violation of the conditions of this Certification, the violation or threatened violation must be subject to any remedies, penalties, process or sanctions as provided for under State law. For purposes of section 401(d) of the Clean Water Act, the applicability of any State law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this Certification.

G. In response to a suspected violation of any condition of this Certification, the San Diego Water Board may require the holder of any permit or license subject to this Certification to furnish, under penalty of perjury, any technical or monitoring reports the San Diego Water Board deems appropriate, provided that the burden, including costs, of the reports must bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.

H. In response to any violation of the conditions of this Certification, the San Diego Water Board may add to or modify the conditions of this Certification as appropriate to ensure compliance.

III. ADDITIONAL CONDITIONS: CONSTRUCTION BEST MANAGEMENT PRACTICES

A. Construction BMPs must be implemented as described in the *California Department of Transportation Appendix E Long Form Storm Water Data Report*, dated May 9, 2012. Proposed construction BMPs must include, but not be limited to:

1. Sediment Control.
2. Erosion Control.
3. Material Delivery ad Storage.
4. Material Use.
5. Stockpile Management.
6. Spill Prevention and Control.
7. Solid Waste Management.
8. Hazardous Waste Management.
9. Sanitary/Septic Waste Management.
10. Water Conservation Practices.
11. Dewatering Operations.
12. Paving and Grinding Operations.
13. Vehicle and Equipment Cleaning.
14. Vehicle and Equipment Fueling.
15. Vehicle and Equipment Maintenance.
16. Concrete Curing.
17. Concrete Finishing.

B. The California Department of Transportation must enroll in and comply with the requirements of State Water Resources Control Board Water Quality Order No. 2009-0009-DWQ, NPDES No. CAS000002, *General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.*

C. Prior to the start of the project, and annually thereafter, the California Department of Transportation must educate all personnel on the requirements in this Certification, pollution prevention measures, spill response, and Best Management Practices (BMP) implementation and maintenance.

D. The California Department of Transportation must, at all times, maintain appropriate types and sufficient quantities of materials on-site to contain any spill or inadvertent release of materials that may cause a condition of pollution or nuisance if the materials reach waters of the United States and/or State.

E. The treatment, storage, and disposal of wastewater during the life of the project must be done in accordance with waste discharge requirements established by the San Diego Water Board pursuant to CWC § 13260.

F. Discharges of concentrated flow during construction or after completion must not cause downstream erosion or damage to properties or stream habitat.

G. Water containing mud, silt, or other pollutants from equipment washing or other activities, must not be discharged to waters of the United States and/or the State or placed in locations that may be subjected to storm flows. Pollutants discharged to areas within a stream diversion area must be removed at the end of each work day or sooner if rain is predicted.

H. All surface waters, including ponded waters, must be diverted away from areas undergoing grading, construction, excavation, vegetation removal, and/or any other activity which may result in a discharge to the receiving water. Diversion activities must not result in the degradation of beneficial uses or exceedance of water quality objectives of the receiving waters. Any temporary dam or other artificial obstruction constructed must only be built from materials such as clean gravel which will cause little or no siltation. Normal flows must be restored to the affected stream immediately upon completion of work at that location.

I. All areas that will be left in a rough graded state must be stabilized no later than two weeks after completion of grading. The California Department of Transportation, land owners, and/or land managers are responsible for implementing and maintaining BMPs to prevent erosion of the rough graded areas. After completion of grading, all areas must be revegetated. The revegetation palette must not contain any plants listed on the California Invasive Plant Council Invasive Plant Inventory, which can be found online at http://www.cal-ipc.org/ip/inventory/weedlist.php.

J. Except as authorized by this Certification, substances hazardous to aquatic life including, but not limited to, petroleum products, raw cement/concrete, asphalt, and coating materials, must be prevented from contaminating the soil and/or entering waters of the United States and/or State. BMPs must be implemented to prevent such discharges during each project activity involving hazardous materials.

K. Removal of vegetation must occur by hand, mechanically, or using EPA approved herbicides deployed using applicable BMPs to prevent impacts to Beneficial Uses of waters of the State. Use of aquatic pesticides must be done in accordance with *State Water Resources Control Board Water Quality Order No. 2004-0009-DWQ*, and any subsequent reissuance as applicable. Removal of vegetation must occur outside of the avian nesting season (March 15 to August 31).

L. If groundwater dewatering with discharge to surface water is necessary for project construction, the California Department of Transportation must comply with *San Diego Water Board Order No. R9-2008-0002, General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters Within the San Diego Region*. These General Waste Discharge Requirements are accessible at:
http://www.swrcb.ca.gov/rwqcb9/board_decisions/adopted_orders/2008/2008_0002.pdf

M. During construction, the California Department of Transportation must maintain a copy of this Certification at the project site so as to be available at all times to site personnel and agencies.

IV. ADDITIONAL CONDITIONS: POST-CONSTRUCTION BEST MANAGEMENT PRACTICES

A. Post-construction BMPs must be implemented as described in the *California Department of Transportation Appendix E Long Form Storm Water Data Report*, dated May 9, 2012. Proposed structural, post-construction BMPs will include three bioswales that will treat at least 18.27-acres of (combined) existing and new impervious areas.

B. The project must not add more than 14.79-acres of new, impervious areas.

C. Structural Best Management Practices (BMPs) must be sized to comply with the following numeric sizing criteria:

a) Volume

Volume-based BMPs must be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.6 inch approximate average for the San Diego County area); or

ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or

iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event; or

b) Flow

Flow-based BMPs must be designed to mitigate (infiltrate, filter, or treat) either:

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or

ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or

iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

D. Pedestrian-accessible storm drain inlet structures within the project boundaries must be stamped and/or stenciled with appropriate language prohibiting non-storm water discharges.

E. Post-construction BMPs must be installed and functional prior to occupancy and/or planned use of development areas.

F. The California Department of Transportation must inspect and maintain post-construction structural BMPs per the manufacturers' specifications and/or engineering design specifications. An inspection and maintenance log must be maintained for review by the San Diego Water Board. Copies of the inspection and maintenance log must be provided to upon request.

G. Any extended detention basins must be designed and constructed in accordance with the most recent California Stormwater Quality Association guidance for extended detention basins. The basin outlets must be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet must be at least 1.5:1. The flowpath length is defined as the mean width of the basin.

V. ADDITIONAL CONDITIONS: IMPACTS AND COMPENSATORY MITIGATION

A. Impacts to waters of the U.S. and State are limited to 0.11-acre and 1,290-linear feet in the Miramar Reservoir hydrologic area (906.10).

B. Mitigation for permanent project impacts to non-wetland waters of the U. S. and/or State must be implemented as described in the *Final Compensatory Wetland/Upland Mitigation Plan for Deer Canyon*, prepared by the California Department of Transportation, and dated May 25, 2011. The Deer Canyon Mitigation site is proposed

to provide compensatory mitigation for the proposed impacts from the I-5/Genesee Avenue Interchange, the I-805 Managed Lanes, and Carroll Canyon Road Extension, and the Sorrento to Miramar Double Track Project – Phase I projects.

C. Compensatory mitigation must consist of the establishment of 3.36-acre of Southern willow scrub (1,290-linear feet) consisting of willows (4 species), Fremont's cottonwood, Coast live oak, and Western sycamore, Mulefat, and herbaceous understory at the Deer Canyon Mitigation site (Miramar Reservoir hydrologic area (906.10). This mitigation compensates only for unavoidable impacts from the I-5/Genesee project and no other projects.

D. Project impacts will require the mathematical subtraction of 3.36-acres and 1,290-linear feet of Southern willow scrub credits from the Deer Canyon Mitigation site mitigation credits ledger.

E. The construction of proposed mitigation must be concurrent with project grading and completed no later than 9 months following the initial discharge of dredge or fill material into on-site waters. Delays in implementing mitigation must be compensated for by an increased mitigation implementation of 10 percent of the cumulative compensatory mitigation for each month of delay.

F. The California Department of Transportation must restore all areas of temporary impacts and all other areas of temporary disturbance which could result in a discharge or a threatened discharge to waters of the U.S. and/or State. Restoration must include grading of disturbed areas to pre-project contours and revegetation with native species.

G. The Deer Canyon mitigation site must be designed, constructed, and maintained in perpetuity to meet the following conditions:

1. Most of the channel through the mitigation sites are characterized by equilibrium conditions, with no evidence of severe aggradation or degradation;

2. As viewed along cross-sections, the channel and buffer have a variety of slopes, or elevations, that are characterized by different moisture gradients. Each sub-slope contains physical patch types or features that contribute to irregularity in height, edges, or surface and to complex topography overall; and

3. The mitigation sites have a well-developed plant community characterized by a high degree of horizontal and vertical interspersion among plant zones and layers.

H. Throughout the mitigation monitoring program phase, mitigation areas must be maintained free of perennial exotic plant species including, but not limited to, pampas grass, giant reed, tamarisk, sweet fennel, tree tobacco, castor bean, and pepper tree. Annual exotic plant species must not occupy more than 5 percent of the mitigation areas.

I. San Diego Water Board acceptance of the final mitigation plan for each project site applies only to the site and plan that mitigates for each project and must not be construed as approval of the mitigation site or plan for use by other current or future projects that are planning to use additional acreage at the site for mitigation.

J. Any maintenance activities that do not contribute to the success of the mitigation sites and enhancement of beneficial uses and ecological functions and services are prohibited. Maintenance activities are limited to the removal of trash and debris, removal of exotic plant species, replacement of dead native plant species and remedial measures deemed necessary for the success of the restoration program.

K. If at any time during the implementation and establishment of the mitigation areas, and prior to verification of meeting success criteria, a catastrophic natural event (e.g., fire, flood) occurs and impacts the mitigation areas, the California Department of Transportation is responsible for repair and replanting of the damaged areas.

L. For the purpose of determining mitigation credit for the removal of exotic/invasive plant species, only the actual area occupied by exotic/invasive plant species must be quantified to comply with mitigation requirements.

M. For purposes of this Certification, establishment is defined as the creation of vegetated or unvegetated waters of the U.S. and/or State where the resource has never previously existed (e.g. conversion of nonnative grassland to a freshwater marsh). Restoration is divided into two activities, re-establishment and rehabilitation. Re-establishment is defined as the return of natural/historic functions to a site where vegetated or unvegetated waters of the U.S. and/or State previously existed (e.g., removal of fill material to restore a drainage). Rehabilitation is defined as the improvement of the general suite of functions of degraded vegetated or unvegetated waters of the U.S. and/or State (e.g., removal of a heavy infestation or monoculture of exotic plant species from jurisdictional areas and replacing with native species). Enhancement is defined as the improvement to one or two functions of existing vegetated or unvegetated waters of the U.S. and/or State (e.g., removal of small patches of exotic plant species from an area containing predominantly natural plant species). Preservation is defined as the acquisition and legal protection from future impacts in perpetuity of existing vegetated or unvegetated waters of the U.S. and/or State (e.g., conservation easement).

N. Mitigation site monitoring must continue until the mitigation site has met the success criteria stated in the mitigation plan(s). The mitigation site must be maintained free of non-native and invasive plant species and maintained in accordance with specified success criteria in perpetuity.

VI. MONITORING REQUIREMENTS

A. Bioassessment -

The California Department of Transportation must conduct bioassessment monitoring, as described in this section, to assess effects on the biological integrity of the Deer Canyon mitigation site. Bioassessment shall include: 1) the collection and reporting of specified instream biological data, and 2) the collection and reporting of specified instream physical and habitat data. The results of the Bioassessment must be submitted **each year with the Mitigation Monitoring Reports.**

Site Locations and Frequency
Macroinvertebrate samples shall be collected at Deer Canyon mitigation site. Annual sampling must occur for 5 years until established success criteria are met for the Deer Creek mitigation site.

Index Period
Macroinvertebrate sampling shall be conducted between April 1st and October 1st. Sampling should be conducted when water is present and preferably flowing.

Field Methods for Macroinvertebrate Collections
In collecting macroinvertebrate samples, the California Department of Transportation shall use the "Reachwide Benthos (Multihabitat) Procedure" specified in Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (Ode 2007, available at: http://www.swrcb.ca.gov/swamp/docs/phab_sopr6.pdf).

Habitat Assessment Methods
The California Department of Transportation shall conduct, concurrently with all required macroinvertebrate collections, the "Full" suite of physical/habitat characterization measurements as specified in Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (Ode 2007), and as summarized in the Surface Water Ambient Monitoring Program's Stream Habitat Characterization Form — Full Version.

Laboratory Methods
Macroinvertebrates shall be identified and classified according to the Standard Taxonomic Effort (STE) Level II of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT; requirements for Level I and Level II taxonomic effort, and are located at: http://www.safit.org/ste.html) and using a fixed-count of 600 organisms per sample.

Quality Assurance
The California Department of Transportation shall have and follow a quality assurance (QA) plan that covers the required bioassessment monitoring. The QA plan shall include, or be supplemented to include, a specific requirement for external QA checks (i.e., verification of taxonomic identifications and correction of data where errors are identified). External QA checks shall be performed on one of the discharger's macroinvertebrate samples collected per calendar year, or ten percent of the samples per year (whichever is greater). QA samples shall be randomly selected. The external QA checks shall be paid for by the discharger, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent or better expertise and performance may be used if approved in writing by the San Diego Water Board.

Sample Preservation and Archiving
The original sample material shall be stored in 70 percent ethanol and retained by the discharger until: 1) all QA analyses specified herein and in the relevant QA plan are completed; and 2) any data corrections and/or re-analyses recommended by the external QA laboratory have been implemented. The remaining subsampled material shall be stored in 70 percent ethanol and retained until completeness checks have been performed according to the relevant QA plan. The identified organisms shall be stored in 70 percent ethanol, in separate glass vials for each final ID taxon. (For example, a sample with 45 identified taxa would be archived in a minimum of 45 vials, each containing all individuals of the identified taxon.) Each of the vials containing identified organisms shall be labeled with taxonomic information (i.e., taxon name, organism count) and collection information (i.e., site name/site code, waterbody name, date collected, and method of collection). The identified organisms shall be archived (i.e., retained) by the discharger for a period of not less than three years from the date that all QA steps are completed, and shall be checked at least once per year and "topped off" with ethanol to prevent desiccation. The identified organisms shall be relinquished to the San Diego Water Board upon request.

Definitions: The "original sample material" is that material (i.e., macroinvertebrates, organic material, gravel, etc.) remaining after the subsample has been removed for identification. The "remaining subsampled material" is that material (e.g., organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but this needs to be verified via QA completeness checks.) The "identified organisms" are those organisms within the subsample that are specifically identified and counted.

Data Submittal
The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) shall be submitted to the San Diego Water Board in electronic format. The Water Board's Surface Water Ambient Monitoring Program (SWAMP) is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats

become available shall be submitted using the SWAMP formats. Until those formats are available, the biological data shall be submitted in MS-Excel (or equivalent) format. The physical/habitat data shall be reported using the standard format titled SWAMP Stream Habitat Characterization Form - Full Version.

B. **California Rapid Assessment Method**

The California Department of Transportation must conduct a quantitative, function-based assessment of the health of wetland and riparian habitats in the Deer Canyon mitigation site using the California Rapid Assessment Method (CRAM)[1] upstream, within, and downstream of Deer Canyon mitigation site. Monitoring must occur prior to impacts and for at least three consecutive years after impacts. The results of the CRAM assessment must be submitted **each year with the Mitigation Monitoring Reports.**

C. **Invasive Species Prevention**

In conducting the required monitoring, the discharger and its consultants shall take precautions to prevent the introduction or spread of aquatic invasive species. At minimum, the California Department of Transportation and its consultants shall follow the recommendations of the California Department of Fish and Game to minimize the introduction or spread of the New Zealand mudsnail.

VII. NOTIFICATION REQUIREMENTS

A. The California Department of Transportation must report to the San Diego Water Board any noncompliance that may endanger human health or the environment. Any information shall be provided orally within **24 hours** from the time the California Department of Transportation becomes aware of the circumstances. A written submission shall also be provided within **five (5) days** of the time the California Department of Transportation becomes aware of the circumstances. The written submission shall contain a written description of the incident and its cause, the period of the noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The San Diego Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours.

[1] Information on CRAM is available at the California Rapid Assessment Method homepage at http://www.cramwetlands.org/

B. The California Department of Transportation must notify the San Diego Water Board of any transfer in responsibility for implementation of the requirements of this Certification. Notification must include, but not be limited to, a statement that the California Department of Transportation has provided the transferee with a copy of the Certification and that the transferee understands and accepts the certification requirements and the obligation to implement them or be subject to liability for failure to do so. The California Department of Transportation and transferee must sign and date the notification and including a designated date of transfer. The California Department of Transportation must provide such notification to the Executive Officer of the San Diego Water Board **prior to the intended date of transfer**. Upon properly noticed transfers of responsibility, the transferee assumes responsibility for compliance with this Certification and references in this Certification to the California Department of Transportation will be interpreted to refer to the transferee as appropriate. Transfer of responsibility does not necessarily relieve the California Department of Transportation of this Certification in the event that a transferee fails to comply.

C. **Prior to the start of construction**, the California Department of Transportation must provide the San Diego Water Board a draft preservation mechanism (e.g. deed restriction, conservation easement, etc.) that will protect all mitigation areas and their buffers in perpetuity. **Within one year of the start of construction**, the California Department of Transportation must submit proof of a completed preservation mechanism that will protect all mitigation areas and their buffers in perpetuity. The conservation easement, deed restriction, or other legal limitation on the mitigation property must be adequate to demonstrate that the site will be maintained without future development or encroachment on the site which could otherwise reduce the functions and values of the site for the variety of beneficial uses of waters of the United States that it supports. The legal limitation must prohibit, without exception, all residential, commercial, industrial, institutional, and transportation development, and any other infrastructure development that would not maintain or enhance the wetland and streambed functions and values of the site. The preservation mechanism must clearly prohibit activities that would result in soil disturbance or vegetation removal, other than the removal of non-native vegetation. Other infrastructure development to be prohibited includes, but is not limited to, additional utility lines, maintenance roads, and areas of maintained landscaping for recreation.

VIII. REPORTING REQUIREMENTS

A. The California Department of Transportation must submit annual progress reports describing status of compliance with all requirements of this Certification to the San Diego Water Board prior to **August 1** of each year following the issuance of this Certification until the project has reached completion. The California Department of Transportation must submit a Final Project Annual Report to the San Diego Water

Board prior to **August 1** following completion of the project. The reports must include, but not be limited to, the following:

1. Date of construction initiation.

2. Projected date of construction completion.

3. Status of BMPs for the project.

4. Final Project Report: As-built drawings no larger than 11"X17", GPS readings of all post-construction BMPs, and photodocumentation of post-construction BMPs.

B. Mitigation monitoring reports must be submitted annually until mitigation has been deemed successful. Annual monitoring reports must be submitted prior to **December 1** of each year. Monitoring reports must include, but not be limited to, the following:

1. Names, qualifications, and affiliations of the persons contributing to the report;

2. Date of initiation of mitigation installation and date mitigation installation was completed.

3. Mitigation as-builts, including topography maps and planting locations.

4. Tables presenting the raw data collected in the field as well as analyses of the physical and biological data;

5. Topographic complexity characteristics at each mitigation site;

6. Upstream and downstream habitat and hydrologic connectivity;

7. Source of hydrology;

8. Width of native vegetation buffer around the entire mitigation site;

9. Qualitative and quantitative comparisons of current mitigation conditions with pre-construction conditions and previous mitigation monitoring results, including evaluation of Benthic Macroinvertebrate Community Analysis, California Rapid Assessment Method, and other success criteria.

10. Stream Photodocumentation, including all areas of permanent and temporary impact, prior to and after project construction, and mitigation areas, prior to and after implementation. Photo documentation must be conducted in accordance with guidelines posted at http://www.waterboards.ca.gov/sandiego/water_issues/programs/401_certification/docs/StreamPhotoDocSOP.pdf. In addition, photo documentation must include

Geographic Positioning System (GPS) coordinates for each of the photo points referenced.

11. A Survey report documenting boundaries of mitigation area(s), including Geographic Information System (GIS) shape files (polygons) of the impact and mitigation areas (Two GPS readings (points) must be taken on each line of the polygon and the polygon must have a minimum of 10 points). GIS metadata must also be submitted.

C. All information requested in this Certification is pursuant to California Water Code (CWC) section 13267. Civil liability may be administratively imposed by the San Diego Water Board for failure to furnish requested information pursuant to CWC section 13268.

D. All reports and information submitted to the San Diego Water Board must be submitted in both hardcopy and electronic format. The preferred electronic format for each report submission is one file in PDF format that is also Optical Character Recognition (OCR) capable.

E. All applications, reports, or information submitted to the San Diego Water Board must be signed and certified as follows:

1. For a corporation, by a responsible corporate officer of at least the level of vice president.

2. For a partnership or sole proprietorship, by a general partner or proprietor, respectively.

3. For a municipality, or a state, federal, or other public agency, by either a principal executive officer or ranking elected official.

4. A duly authorized representative may sign applications, reports, or information if:

   a. The authorization is made in writing by a person described above.

   b. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated activity.

   c. The written authorization is submitted to the San Diego Water Board Executive Officer.

F. All applications, reports, or information submitted to the San Diego Water Board must be signed and certified as follows:

> "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

G. The California Department of Transportation must submit reports required under this Certification, or other information required by the San Diego Water Board, to:

> Executive Officer
> California Regional Water Quality Control Board
> San Diego Region
> Attn: 401 Certification No. 12C-033
> 9174 Sky Park Court, Suite 100
> San Diego, California 92123

IX. CEQA FINDINGS

A. The California Department of Transportation is the lead agency under the California Environmental Quality Act (Public Resources Code section 21000, et seq., (CEQA)), and issued the Interstate 5/Genesee Avenue Interchange Reconstruction Project, Initial Study with Mitigated Negative Declaration/Environmental Assessment With Finding of No Significant Impact, State Clearinghouse No. 2010091064, June 2011.

B. The San Diego Water Board has reviewed the lead agency's Mitigated Negative Declaration and finds that the project as proposed will not have a significant effect on the environment if compensatory mitigation is accomplished as conditioned in this Certification.

X. PUBLIC NOTIFICATION OF PROJECT APPLICATION

On April 10, 2012, receipt of the project application was posted on the San Diego Water Board web site to serve as appropriate notification to the public. No public comments were received.

XI. SAN DIEGO WATER BOARD CONTACT PERSON

Mike Porter, Engineering Geologist
California Regional Water Quality Control Board San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123
Telephone: 858-467-2726
Email: mporter@waterboards.ca.gov

XII. WATER QUALITY CERTIFICATION

I hereby certify that the proposed discharge from the **I-5/Genesee Interchange Project** (Certification No. 12C-033) will comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Board Order No. 2003-0017-DWQ, "*Statewide General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification (General WDRs)*," which requires compliance with all conditions of this Water Quality Certification. Please note that enrollment under Order No. 2003-017-DWQ is conditional and, should new information come to our attention that indicates a water quality problem, the San Diego Water Board may issue individual waste discharge requirements at that time.

Except insofar as may be modified by any preceding conditions, all Certification actions are contingent on (a) the discharge being limited to, and all proposed mitigation being completed in strict compliance with, the applicants' project description and/or on the attached Project Information Sheet, and (b) on compliance with all applicable requirements of the Water Quality Control Plan for the San Diego Basin Region (9) (Basin Plan).

David W. Gibson

DAVID W. GIBSON
Executive Officer
Regional Water Quality Control Board

31 May 2012
Date

Attachments:
1. Project Information
2. Distribution List
3. Location Map(s)
4. Site and Mitigation Figures(s)

ATTACHMENT 1
PROJECT INFORMATION

Applicant:	Mr. Arturo Jacobo Project Manager California Department of Transportation 4050 Taylor Street San Diego, CA 92110 Telephone: 619-688-6866 Fax: 619-688-4258 Email: arturo_jacobo@dot.ca.gov
Applicant Representatives:	Ms. Kim Smith Chief Environmental Stewardship and Ecological Services Branch California Department of Transportation 4050 Taylor Street MS 331 San Diego, CA 92110 Telephone: 619-688-0220 Fax: 619-688-4258 Email: kim_t_smith@dot.ca.gov
Project Name:	I-5/Genesee Interchange Project
Project Location:	The proposed project is located at the intersection of Interstate-5 and Genesee Avenue. The project is located within the City of San Diego's communities of La Jolla and Torrey Pines, coastal-central San Diego County, California. The project is located approximately at latitude 32.886849° north and longitude -117.227747° east.
Type of Project:	Highway onramp and offramp improvements.

Project Description and Need:	The project consists of improvements to Interstate-5 (I-5) and Genesee Avenue to improve traffic flow and provide a connection for bicyclists between two, existing bicycle paths. The project will occur in two phases. The first phase of construction will include the reconstruction of I-5/Genesee interchange, the addition of auxiliary lanes north of Genesee Avenue, construction of a bicycle path, and improvement to Sorrento Valley on-ramps and off-ramps. The second phase of construction will include the addition of auxiliary lanes south of Genesee Avenue, replacement of the Voigt Drive overcrossing, and realignment of Gilman Drive.
Federal Agency/Permit:	U.S. Army Corps of Engineers §404, Nationwide Permits 14 and 42, Ms. Stephanie Hall, Los Angeles District.
Other Required Regulatory Approvals:	California Department of Fish and Game (CDFG) § 1602 Streambed Alteration Agreement, Mr. Tim Dillingham. California Coastal Commission, Coastal Development Permit, Mr. Gabe Buhr.
California Environmental Quality Act (CEQA) Compliance:	Interstate 5/Genesee Avenue Interchange Reconstruction Project, Initial Study with Mitigated Negative Declaration/Environmental Assessment With Finding of No Significant Impact, California Department of Transportation, State Clearinghouse No. 2010091064, June 2011.
Receiving Waters:	An unnamed tributary to Soledad Canyon Creek; Penasquitos hydrologic unit, Miramar Reservoir hydrologic area (906.10).
Impacted Wetlands and Waters of the United States and State:	Permanent – Unvegetated streambed 0.11-acre, 1,290-linear feet Temporary - none

Impacted Waters for CDFG jurisdiction only:	Permanent - Riparia as Southern willow scrub 1.01-acre, 1,290-linear feet Temporary - none
Dredge Volume:	None.
Related Projects Implemented/to be Implemented by the Applicant(s):	None disclosed.
Compensatory Mitigation:	Unavoidable impacts will be mitigated through the Establishment of 3.36-acres of Southern willow scrub (1,290-linear feet) consisting of willows (4 species), Fremont's cottonwood, Coast live oak, and Western sycamore, Mulefat, and herbaceous understory at the Deer Canyon Mitigation site (Miramar Reservoir hydrologic area, 906.10).
Best Management Practices (BMPs):	Proposed Construction BMPs will include: • Sediment Control • Erosion Control • Material Delivery ad Storage • Material Use • Stockpile Management • Spill Prevention and Control • Solid Waste Management • Hazardous Waste Management • Sanitary/Septic Waste Management • Water Conservation Practices • Dewatering Operations • Paving and Grinding Operations • Vehicle and Equipment Cleaning • Vehicle and Equipment Fueling • Vehicle and Equipment Maintenance • Concrete Curing • Concrete Finishing

Proposed post-construction BMPs (three bioswales) will treat 18.27-acres of project impervious areas. Proposed new impervious areas total 14.79-acres.

Public Notice: On April 10, 2012, receipt of the project application was posted on the San Diego Water Board web site to serve as appropriate notification to the public. No comments were received.

Fees: Total Due: $13,122.00
Total Paid: $13,122.00 (Check No. 082-989028)

CIWQS:

Regulatory Measure ID:	384327
Place ID:	779849
Party ID:	7222
Person ID:	526363
WDID	9 000002398

ATTACHMENT 2
DISTRIBUTION LIST

Ms. Stephanie Hall
Environmental Protection Specialist/Senior PM
USACOE-Los Angeles District
Regulatory Division
Stephanie.J.Hall@usace.army.mil

Mr. Tim Dillingham
California Department of Fish and Game
South Coast Region
Habitat Conservation Planning – North
tdillingham@dfg.ca.gov

Mr. Gabe Buhr
California Coastal Commission
San Diego Coast District Office
gbuhr@coastal.ca.gov

Mr. Eric Raffini
Wetlands Regulatory Office
U.S. Environmental Protection Agency, Region 9
R9-WTR8-Mailbox@epa.gov

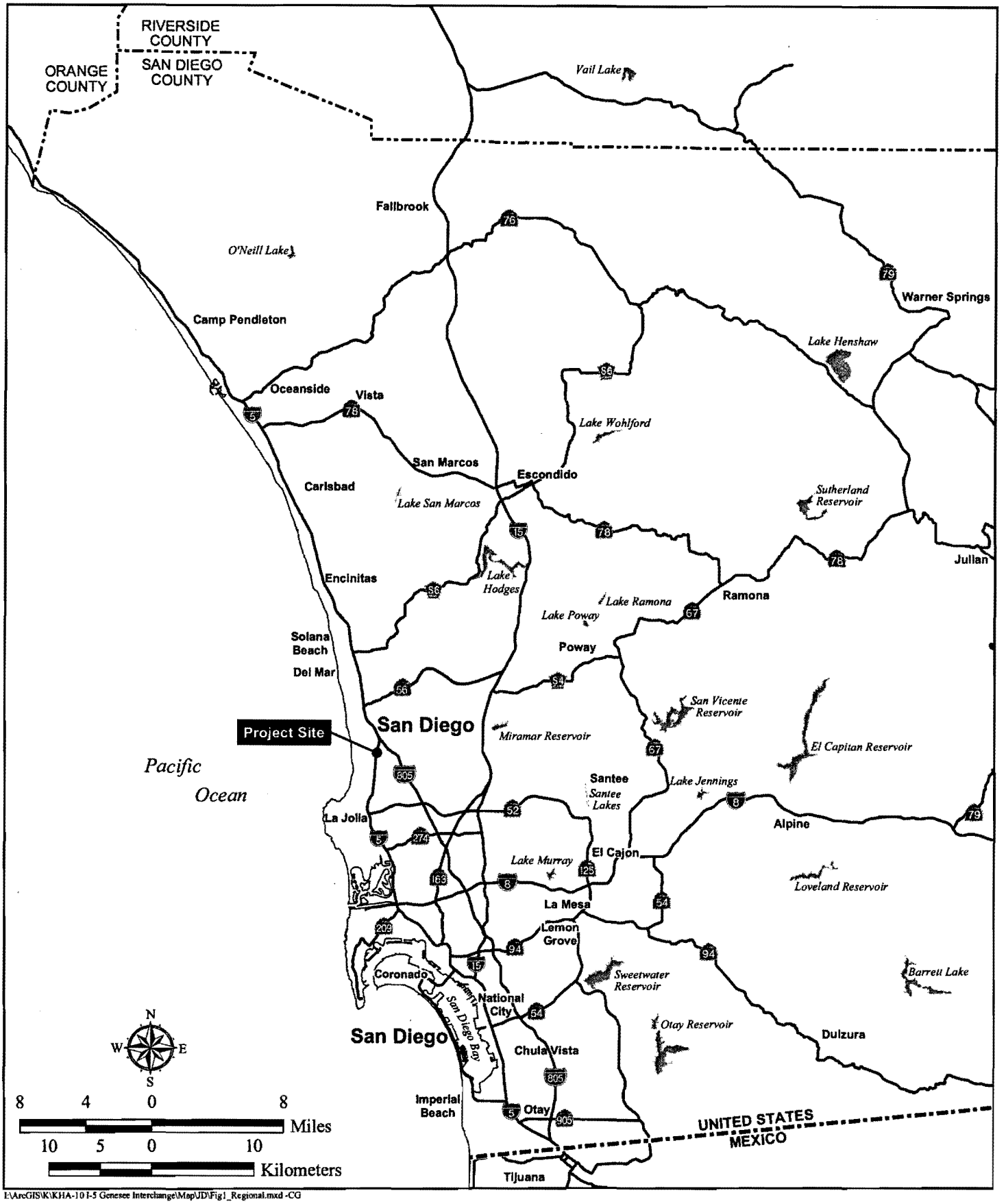
State Water Resources Control Board
Division of Water Quality
401 Water Quality Certification and Wetlands Unit
Stateboard401@waterboards.ca.gov

Ms. Kim Smith
Chief Environmental Stewardship and Ecological Services Branch
California Department of Transportation
kim_t_smith@dot.ca.gov

Ms. Michele Madigan
Associate Environmental Planner
Community Impacts and Permits
California Department of Transportation
michelle_madigan@dot.ca.gov

ATTACHMENT 3

LOCATION MAP(S)

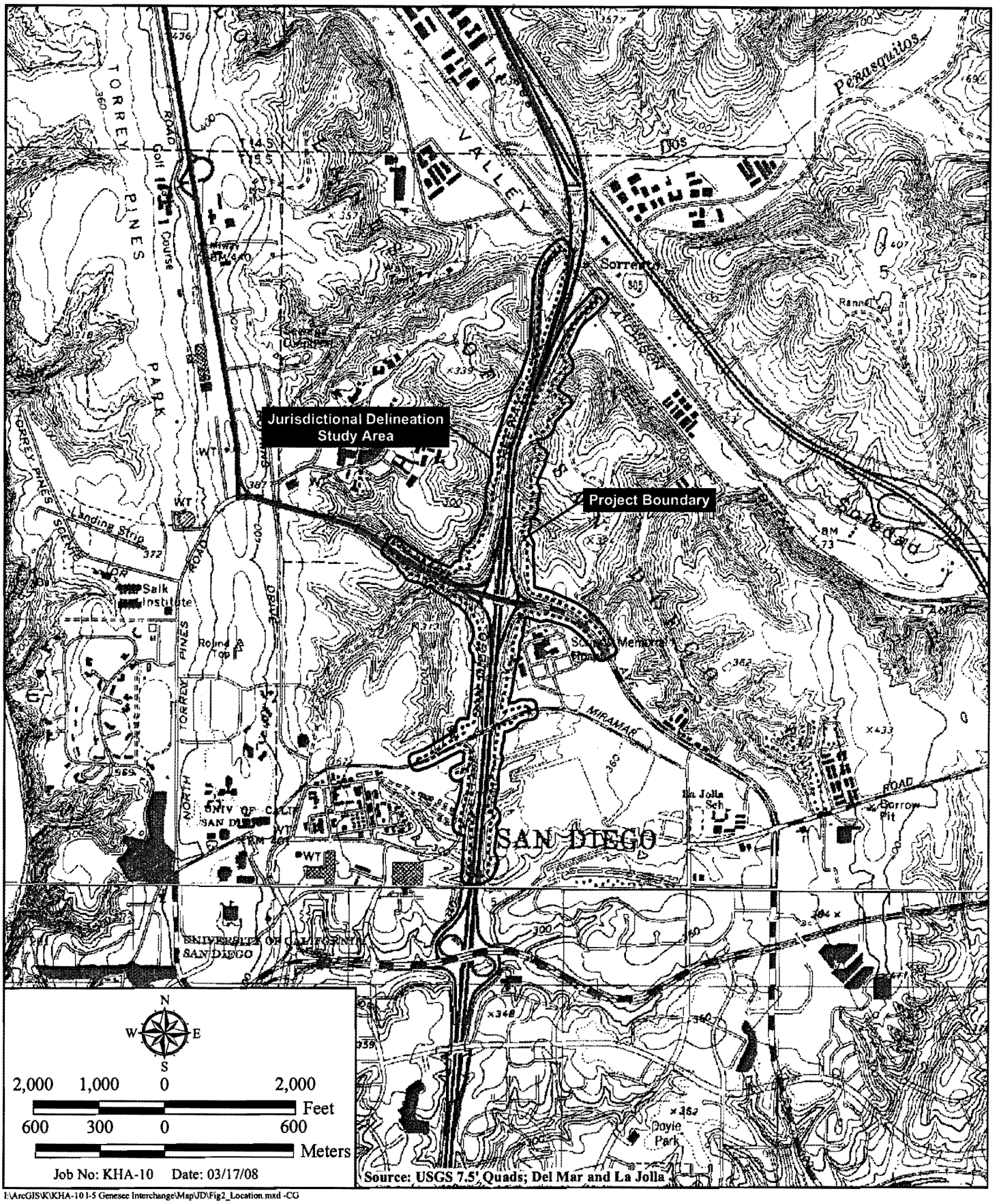


I:\ArcGIS\K\KHA-10 I-5 Genesee Interchange\Map\JD\Fig1_Regional.mxd -CG

Regional Location Map

INTERSTATE 5/GENESEE AVENUE INTERCHANGE RECONSTRUCTION

Figure 1



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Project Location

INTERSTATE 5/GENESEE AVENUE INTERCHANGE RECONSTRUCTION

Figure 2

DEPARTMENT OF THE ARMY
Los Angeles District, Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

REPLY TO
ATTENTION OF

June 21, 2012

Regulatory Division

Michelle Madigan
Caltrans - District 11
4050 Taylor Street, MS-242
San Diego, California 92110

DEPARTMENT OF THE ARMY NATIONWIDE PERMIT VERIFICATION

Dear Ms. Trudell:

This correspondence is in response to your request (SPL-2012-00416-SJH), dated March 26, 2012, for a Department of the Army permit.

Your proposed project, Caltrans Interstate (I) 5 at Genesee Interchange Project, would result in a discharge of fill material into waters of the United States (WOUS). Therefore, pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344; 33 C.F.R. parts 323 and 330), your proposed project requires a Department of the Army permit.

I have determined construction of Caltrans I-5/Genesee Interchange Project, in the city of San Diego, San Diego County, California complies with Nationwide Permit (NWP) No. 14, *Linear Transportation Projects*, if conducted as described in your application.

Specifically, you are authorized to conduct the following regulated activities:

1. Discharge permanent fill into 0.11 acre of non-wetland WOUS associated with the reconstruction of the Genesee Interchange at I-5.

For this NWP 14, *Linear Transportation Projects*, verification letter to be valid, you must comply with all of the terms and conditions in Enclosure 1. Furthermore, you must comply with the following non-discretionary Special Conditions listed below:

1. Prior to initiating construction in waters of the U.S., and to mitigate for impacts to 0.11 acres of non-wetland WOUS, the Permittee shall provide documentation verifying purchase of 3.36 acres of credits for the establishment of Southern Willow Scrub from the Corps-approved Deer Canyon Mitigation Bank. The Permittee shall not initiate work in waters of the U.S. prior to receiving written confirmation (by letter or e-mail) from the Corps Regulatory Division as to compliance with this special condition. The permittee retains responsibility for providing the

compensatory mitigation until the number and resource type of credits described above have been secured from a sponsor and the district engineer has received documentation that confirms that the sponsor has accepted the responsibility for providing the required compensatory mitigation. This documentation may consist of a letter or form signed by the sponsor, with the permit number and a statement indicating the number and resource type of credits that have been secured from the sponsor.

2. Prior to initiating construction in waters of the U.S., the Permittee shall submit to the Corps Regulatory Division a complete set of final detailed grading/construction plans showing all work and structures in waters of the U.S. All plans shall be in compliance with the Final Map and Drawing Standards for the Los Angeles District Regulatory Division dated September 21, 2009 (http://www.spl.usace.army.mil/regulatory/pn/SPL-RG_map-drawing-standard_final_w-fig.pdf). All plan sheets shall be signed, dated, and submitted on paper no larger than 11x 17 inches. No work in waters of the U.S. is authorized until the Permittee receives, in writing (by letter or e-mail), Corps Regulatory Division approval of the final detailed grading/construction plans. The Permittee shall ensure that the project is built in accordance with the Corps-approved plans.

3. The Permittee shall clearly mark the limits of the workspace with flagging or similar means to ensure mechanized equipment does not enter preserved waters of the U.S. and riparian wetland/habitat areas. Adverse impacts to waters of the U.S. beyond the Corps-approved construction footprint are not authorized. Such impacts could result in permit suspension and revocation, administrative, civil or criminal penalties, and/or substantial, additional, compensatory mitigation requirements.

Endangered Species Act:

1. This Corps permit does not authorize you to take any threatened or endangered species, in particular the Bell's vireo and coastal California gnatcatcher or adversely modify their designated critical habitat. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g. ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with "incidental take" provisions with which you must comply). The enclosed USFWS BO's (FWS-SDG-08B0205-11F0246; FWS-SDG-08B0205-12F0144) contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a "take" of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit.

Your verification is valid through June 21, 2014. All NWPs will expire on March 18, 2017. It is incumbent upon you to remain informed of changes to the NWPs. A public notice of the change(s) will be issued when any of the NWPs are modified, reissued, or revoked. Furthermore, if you commence or are under contract to commence this activity before the date on which the relevant NWP is reissued, modified, or revoked, you will have twelve (12) months

from the date of the reissuance, modification, or revocation of the NWP to complete the activity under the present terms and conditions of the relevant NWP.

An approved jurisdictional determination (JD) has been conducted to determine the extent of U.S. Army Corps of Engineers (Corps) geographic jurisdiction, upon which this NWP verification is based. An approved JD is an official Corps determination of the precisely identified limits of Corps geographic jurisdiction on a particular site, and is appealable. Should you wish to appeal an approved JD, you may request an administrative appeal under Corps regulations at 33 C.F.R. part 331. Please refer to the enclosed Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form for more information.

A NWP does not grant any property rights or exclusive privileges. Additionally, it does not authorize any injury to the property, rights of others, nor does it authorize interference with any existing or proposed Federal project. Furthermore, it does not obviate the need to obtain other Federal, state, or local authorizations required by law.

Thank you for participating in our regulatory program. If you have any questions, please contact Stephanie Hall at 213-452-3410 or via e-mail at Stephanie.J.Hall@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

"Building Strong and Taking Care of People!"

Sincerely,

Mark D. Cohen
Deputy Chief, Regulatory Division

Enclosure(s)

LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

CERTIFICATE OF COMPLIANCE WITH DEPARTMENT OF THE ARMY NATIONWIDE PERMIT

Permit Number: *SPL-2012-00416-SJH*

Name of Permittee: *Michelle Madigan, California Department of Transportation - District 11*

Date of Issuance: *June 21, 2012*

Upon completion of the activity authorized by this permit and the mitigation required by this permit, sign this certificate, and return it to the following address:

U.S. Army Corps of Engineers, Los Angeles District
Regulatory Division
ATTN: CESPL-RG-SPL-2012-00416-SJH
Los Angeles District, Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

Please note that your permitted activity is subject to a compliance inspection by an Army Corps of Engineers representative. If you fail to comply with this Nationwide Permit, you may be subject to permit suspension, modification, or revocation procedures as contained in 33 C.F.R. § 330.5 or enforcement procedures such as those contained in 33 C.F.R. §§ 326.4 and 326.5.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit condition(s).

_____ _____
Signature of Permittee Date

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Michelle Madigan, Caltrans D-11		File Number: 2012-00416-SJH	Date:20 June 2012
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
X	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/cecw/pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact: Thomas J. Cavanaugh Administrative Appeal Review Officer, U.S. Army Corps of Engineers South Pacific Division 1455 Market Street, 2052B San Francisco, California 94103-1399 Phone: (415) 503-6574 Fax: (415) 503-6646 Email: thomas.j.cavanaugh@usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

Enclosure 1: NATIONWIDE PERMIT NUMBER(S) NWP 14 Linear Transportation Projects. TERMS AND CONDITIONS

1. Nationwide Permit(s) NWP 14 Linear Transportation Projects, Terms:

Your activity is authorized under Nationwide Permit Number 14, Linear Transportation Projects, subject to the following terms:

14. Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project. This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars. Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404) Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

2. Nationwide Permit General Conditions: The following general conditions must be followed in order for any authorization by an NWP to be valid:

1. 1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.
   (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
   (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of

the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.
(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the

project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.
(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.
(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.
(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.
(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on,

determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.
(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.
(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:
(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).
(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.
(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.
(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.
(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.
(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.
(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

    "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

    _____
    (Transferee)

    _____
    (Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required

compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;
(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);
(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;
(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.
(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and
(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300

linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

3. Regional Conditions for the Los Angeles District:

In accordance with General Condition Number 27, "Regional and Case-by-Case Conditions," the following Regional Conditions, as added by the Division Engineer, must be met in order for an authorization by any Nationwide to be valid:

1. For all activities in waters of the U.S. that are suitable habitat for federally listed fish species, the permittee shall design all road crossings to ensure that the passage and/or spawning of fish is not hindered. In these areas, the permittee shall employ bridge designs that span the stream or river, including pier- or pile-supported spans, or designs that use a bottomless arch culvert with a natural stream bed, unless determined to be impracticable by the Corps.

2. Nationwide Permits (NWP) 3, 7, 12-15, 17-19, 21, 23, 25, 29, 35, 36, or 39-46, 48-52 cannot be used to authorize structures, work, and/or the discharge of dredged or fill material that would result in the "loss" of wetlands, mudflats, vegetated shallows or riffle and pool complexes as defined at 40 CFR Part 230.40-45. The definition of "loss" for this regional condition is the same as the definition of "loss of waters of the United States" used for the Nationwide Permit Program. Furthermore, this regional condition applies only within the State of Arizona and within the Mojave and Sonoran (Colorado) desert

regions of California. The desert regions in California are limited to four USGS Hydrologic Unit Code (HUC) accounting units (Lower Colorado -150301, Northern Mojave-180902, Southern Mojave-181001, and Salton Sea-181002).

3. When a pre-construction notification (PCN) is required, the appropriate U.S. Army Corps of Engineers (Corps) District shall be notified in accordance with General Condition 31 using either the South Pacific Division PCN Checklist or a signed application form (ENG Form 4345) with an attachment providing information on compliance with all of the General and Regional Conditions. The PCN Checklist and application form are available at: http://www.spl.usace.army.mil/regulatory. In addition, the PCN shall include:
   a. A written statement describing how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;
   b. Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity as well as the location of delineated waters of the U.S. on the site. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and area (in acres) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the mean high water mark and high tide line, should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation. All drawings for projects located within the boundaries of the Los Angeles District shall comply with the most current version of the *Map and Drawing Standards for the Los Angeles District Regulatory Division* (available on the Los Angeles District Regulatory Division website at: www.spl.usace.army.mil/regulatory/); and

   c. Numbered and dated pre-project color photographs showing a representative sample of waters proposed to be impacted on the project site, and all waters proposed to be avoided on and immediately adjacent to the project site. The compass angle and position of each photograph shall be documented on the plan-view drawing required in subpart b of this regional condition.

4. Submission of a PCN pursuant to General Condition 31 and Regional Condition 3 shall be required for all regulated activities in the following locations:
   a. All perennial waterbodies and special aquatic sites within the State of Arizona and within the Mojave and Sonoran (Colorado) desert regions of California, excluding the Colorado River in Arizona from Davis Dam to River Mile 261 (northern boundary of the Fort Mojave Indian Tribe Reservation). The desert region in California is limited to four USGS HUC accounting units (Lower Colorado -150301, Northern Mojave-180902, Southern Mojave-181001, and Salton Sea-181002).
   b. All areas designated as Essential Fish Habitat (EFH) by the Pacific Fishery Management Council (i.e., all tidally influenced areas - Federal Register dated March 12, 2007 (72 FR 11092)), in which case the PCN shall include an EFH assessment and extent of proposed impacts to EFH. Examples of EFH habitat assessments can be found at: http://www.swr.noaa.gov/efh.htm.
   c. All watersheds in the Santa Monica Mountains in Los Angeles and Ventura counties bounded by Calleguas Creek on the west, by Highway 101 on the north and east, and by Sunset Boulevard and Pacific Ocean on the south.
   d. The Santa Clara River watershed in Los Angeles and Ventura counties, including but not limited to Aliso Canyon, Agua Dulce Canyon, Sand Canyon, Bouquet Canyon, Mint Canyon, South Fork of the Santa Clara River, San Francisquito Canyon, Castaic Creek, Piru Creek, Sespe Creek and the main-stem of the Santa Clara River.

5. Individual Permits shall be required for all discharges of fill material in jurisdictional vernal pools, with the exception that discharges for the purpose of restoration, enhancement, management or scientific study of vernal pools may be authorized under NWPs 5, 6, and 27 with the submission of a PCN in accordance with General Condition 31 and Regional Condition 3.

6. Individual Permits shall be required in Murrieta Creek and Temecula Creek watersheds in Riverside County for new permanent fills in perennial and intermittent watercourses otherwise authorized under NWPs 29, 39, 42 and 43, and in ephemeral watercourses for these NWPs for projects that impact greater than 0.1 acre of waters of the United States. In addition, when NWP 14 is used in conjunction with residential, commercial, or industrial developments the 0.1 acre limit would also apply.

7. Individual Permits (Standard Individual Permit or 404 Letter of Permission) shall be required in San Luis Obispo Creek and Santa Rosa Creek in San Luis Obispo County for bank stabilization projects, and in Gaviota Creek, Mission Creek and Carpinteria Creek in Santa Barbara County for bank stabilization projects and grade control structures.

8. In conjunction with the Los Angeles District's Special Area Management Plans (SAMPs) for the San Diego Creek Watershed and San Juan Creek/Western San Mateo Creek Watersheds in Orange County, California, the Corps' Division Engineer, through his discretionary authority has revoked the use of the following 26 selected NWPs within these SAMP watersheds: 03, 07, 12, 13, 14, 16, 17, 18, 19, 21, 25, 27, 29, 31, 33, 39, 40, 41, 42, 43, 44, 46, 49, and 50. Consequently, these NWPs are no longer available in those watersheds to authorize impacts to waters of the United States from discharges of dredged or fill material under the Corps' Clean Water Act section 404 authority.

9. Any requests to waive the 300 linear foot limitation for intermittent and ephemeral streams for NWPs 29, 39, 40 and 42, 43, 44, 51 and 52 or to waive the 500 linear foot limitation along the bank for NWP 13, must include the following:
   a. A narrative description of the stream. This should include known information on: volume and duration of flow; the approximate length, width, and depth of the waterbody and characters observed associated with an Ordinary High Water Mark (e.g. bed and bank, wrack line, or scour marks); a description of the adjacent vegetation community and a statement regarding the wetland status of the associated vegetation community (i.e. wetland, non-wetland); surrounding land use; water quality; issues related to cumulative impacts in the watershed, and; any other relevant information.
   b. An analysis of the proposed impacts to the waterbody in accordance with General Condition 31 and Regional Condition 3;
   c. Measures taken to avoid and minimize losses, including other methods of constructing the proposed project; and
   d. A compensatory mitigation plan describing how the unavoidable losses are proposed to be compensated, in accordance with 33 CFR Part 332.

10. The permittee shall complete the construction of any compensatory mitigation required by special condition(s) of the NWP verification before or concurrent with commencement of construction of the authorized activity, except when specifically determined to be impracticable by the Corps. When mitigation involves use of a mitigation bank or in-lieu fee program, the permittee shall submit proof of payment to the Corps prior to commencement of construction of the authorized activity.

4. Further information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:
   ( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
   (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
   ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.
   (a) This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
   (b) This permit does not grant any property rights or exclusive privileges.
   (c) This permit does not authorize any injury to the property or rights of others.
   (d) This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
   (a) Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
   (b) Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
   (c) Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
   (d) Design or construction deficiencies associated with the permitted work.
   (e) Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:
   (a) You fail to comply with the terms and conditions of this permit.
   (b) The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
   (c) Significant new information surfaces which this office did not consider in reaching the original public interest decision.

   Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 330.5 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. This letter of verification is valid for a period not to exceed two years unless the nationwide permit is modified, reissued, revoked, or expires before that time.

7. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition H below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

8. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, U.S. ARMY CORPS OF ENGINEERS
915 WILSHIRE BOULEVARD, SUITE 930
LOS ANGELES, CALIFORNIA 90017-3401

June 5, 2014

Michelle Madigan, Associate Environmental Planner
Environmental Stewardship Branch
California Department of Transportation, District 11
4050 Taylor Street MS-242
San Diego, California 92110

DEPARTMENT OF THE ARMY NATIONWIDE PERMIT VERIFICATION

Dear Ms. Madigan:

This correspondence is in response to your request (SPL-2012-00416-SJH), dated Apil14, 2014, for re-verification that a proposed project of yours is authorized under a Department of the Army Nationwide Permit. The previous verification of Nationwide Permit authorization, dated June 21, 2012, is due to expire on June 21, 2014.

Your proposed project, Caltrans Interstate (I) 5 at Genesee Interchange Project, would result in a discharge of fill material into waters of the United States (WOUS). Therefore, pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344; 33 C.F.R. parts 323 and 330), your proposed project requires a Department of the Army permit.

I have determined discharges into WOUS associated with construction of the Caltrans I-5/Genesee Interchange Project, in the City of San Diego, San Diego County, California, would comply with Nationwide Permit (NWP) No. 14, *Linear Transportation Projects*, if conducted as described in your application.

Specifically, you are authorized to conduct the following regulated activities:

1. Discharge permanent fill into 0.11 acre of non-wetland WOUS associated with the reconstruction of the Genesee Interchange at I-5.

For this NWP 14 verification letter to be valid, you must comply with all of the terms and conditions in Enclosure 1. Furthermore, you must comply with the following non-discretionary Special Conditions listed below:

1. The Permittee has proposed to mitigate for impacts to waters of the U.S. through implementation of the Corps Regulatory Division-approved "Final Compensatory Wetland/Upland Mitigation Plan for Deer Canyon" (HMMP) dated May 2011, and prepared by Sue Scatolini, Caltrans D-11 Biologist. The permittee responsible Deer Canyon mitigation site includes mitigation for several Caltrans transportation projects, including the I-5/Genesee Interchange project. In accordance with the Final HMMP, the permittee shall mitigate for impacts to 0.11 acre of non-wetland WOUS through establishment of 3.51 acres of Riparian Habitat, specifically, Southern Willow Scrub. This 3.51-acre area shall be specifically mapped

and identified as compensatory mitigation for the I-5/Genesee Interchange project only. All supporting compensatory mitigation site maps and drawings shall be prepared in compliance with the Final Map and Drawing Standards for the Los Angeles District Regulatory Division dated September 21, 2009 (http://www.spl.usace.army.mil/regulatory/pn/SPL-RG_map-drawing-standard_final_w-fig.pdf). The Permittee shall complete site preparation and planting, and initiate monitoring as described in the final HMMP prior to or concurrently with discharging any fill material in waters of the U.S. Your responsibility to complete the required compensatory mitigation, as set forth in this Special Condition, will not be considered fulfilled until you have demonstrated compensatory mitigation success and have received written verification of that success from the Corps Regulatory Division.

GIS DATA: The Permittee shall provide the Corps Regulatory Division with GIS data, including polygon and latitude longitude coordinates, depicting the boundaries of the compensatory mitigation site associated with this project. Within 60 days following completion of compensatory mitigation construction activities, if any deviations have occurred, you shall submit as-built GIS data (polygons only) accompanied by a narrative description listing and explaining each deviation.

2. Prior to initiating construction in waters of the U.S., the Permittee shall submit to the Corps Regulatory Division a complete set of final detailed grading/construction plans showing all work and structures in waters of the U.S. All plans shall be in compliance with the Final Map and Drawing Standards for the Los Angeles District Regulatory Division dated September 21, 2009 (http://www.spl.usace.army.mil/regulatory/pn/SPL-RG_map-drawing-standard_final_w-fig.pdf). All plan sheets shall be signed, dated, and submitted on paper no larger than 11x 17 inches. No work in waters of the U.S. is authorized until the Permittee receives, in writing (by letter or e-mail), Corps Regulatory Division approval of the final detailed grading/construction plans. The Permittee shall ensure that the project is built in accordance with the Corps Regulatory Division-approved plans. Any deviations affecting waters of the U.S. shall be reported to the Corps Regulatory Division.

3. The Permittee shall clearly mark the limits of the workspace with flagging or similar means to ensure mechanized equipment does not enter preserved or avoided waters of the U.S. and riparian wetland/habitat areas. Adverse impacts to waters of the U.S. beyond the Corps Regulatory Division-approved construction footprint are not authorized. Such impacts could result in permit suspension and revocation, administrative, civil or criminal penalties, and/or substantial, additional, compensatory mitigation requirements.

Endangered Species Act:

4. This Corps permit does not authorize you to take any federally threatened or endangered species, in particular the Bell's vireo and coastal California gnatcatcher, or to adversely modify their designated critical habitat. In order to legally take a listed species, you must have separate

authorization under the Endangered Species Act (ESA) (e.g. ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with "incidental take" provisions with which you must comply). The enclosed USFWS BOs (FWS-SDG-08B0205-11F0246; FWS-SDG-08B0205-12F0144) contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BOs. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BOs, terms and conditions of which are incorporated by reference to this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a "take" of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit.

This verification is valid through **March 18, 2017**. If on March 18, 2017 you have commenced or are under contract to commence the permitted activity you will have an additional twelve (12) months to complete the activity under the present NWP terms and conditions. However, if I discover noncompliance or unauthorized activities associated with the permitted activity I may request the use of discretionary authority in accordance with procedures in 33 CFR § 330.4(e) and 33 CFR §§ 330.5(c) or (d) to modify, suspend, or revoke this specific verification at an earlier date. Additionally, at the national level the Chief of Engineers, any time prior to March 18, 2017, may chose to modify, suspend, or revoke the nationwide use of a NWP after following procedures set forth in 33 CFR § 330.5. It is incumbent upon you to comply with all of the terms and conditions of this NWP verification and to remain informed of any change to the NWPs.

A NWP does not grant any property rights or exclusive privileges. Additionally, it does not authorize any injury to the property, rights of others, nor does it authorize interference with any existing or proposed Federal project. Furthermore, it does not obviate the need to obtain other Federal, state, or local authorizations required by law.

Thank you for participating in the regulatory program. If you have any questions, contact Stephanie Hall at (213) 452-3410, or via e-mail at Stephanie.J.Hall@usace.army.mil. Please help me to evaluate and improve the regulatory experience for others by completing the customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,

Mark D. Cohen
Deputy Chief, Regulatory Division

Enclosures

LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

CERTIFICATE OF COMPLIANCE WITH DEPARTMENT OF THE ARMY NATIONWIDE PERMIT

Permit Number: *SPL-2012-00416-SJH*

Name of Permittee: *Michelle Madigan, California Department of Transportation - District 11*

Date of Issuance: *June 5, 2014*

Upon completion of the activity authorized by this permit and the mitigation required by this permit, sign this certificate, and return it by **ONE** of the following methods;

1) Email a digital scan of the signed certificate to Stephanie.J.Hall@usace.army.mil

OR

2) Mail the signed certificate to

U.S. Army Corps of Engineers
ATTN: Regulatory Division SPL-2012-00416-SJH
Los Angeles District, Corps of Engineers
915 Wilshire Boulevard, Suite 930
Los Angeles, California 90017-3401

I hereby certify that the authorized work and any required compensatory mitigation has been completed in accordance with the NWP authorization, including all general, regional, or activity-specific conditions. Furthermore, if credits from a mitigation bank or in-lieu fee program were used to satisfy compensatory mitigation requirements I have attached the documentation required by 33 CFR § 332.3(l)(3) to confirm that the appropriate number and resource type of credits have been secured.

_____ _____

Signature of Permittee Date

Enclosure 1: NATIONWIDE PERMIT NUMBER(S) NWP 14 Linear Transportation Projects. TERMS AND CONDITIONS

1. Nationwide Permit(s) NWP 14 Linear Transportation Projects. Terms:

Your activity is authorized under Nationwide Permit Number(s) NWP 14 Linear Transportation Projects, subject to the following terms:

14. Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project. This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars. Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404) Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

2. Nationwide Permit General Conditions: The following general conditions must be followed in order for any authorization by an NWP to be valid:

1. 1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.
   (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.
   (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of

the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.
(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the

project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.
(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.
(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.
(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.
(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.
(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on,

determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.
(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.
(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:
(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).
(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.
(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.
(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.
(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.
(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.
(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

    "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

    _____
    (Transferee)

    _____
    (Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required

compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;
(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);
(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;
(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.
(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and
(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300

linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

3. Regional Conditions for the Los Angeles District:

In accordance with General Condition Number 27, "Regional and Case-by-Case Conditions," the following Regional Conditions, as added by the Division Engineer, must be met in order for an authorization by any Nationwide to be valid:

1. For all activities in waters of the U.S. that are suitable habitat for federally listed fish species, the permittee shall design all road crossings to ensure that the passage and/or spawning of fish is not hindered. In these areas, the permittee shall employ bridge designs that span the stream or river, including pier- or pile-supported spans, or designs that use a bottomless arch culvert with a natural stream bed, unless determined to be impracticable by the Corps.

2. Nationwide Permits (NWP) 3, 7, 12-15, 17-19, 21, 23, 25, 29, 35, 36, or 39-46, 48-52 cannot be used to authorize structures, work, and/or the discharge of dredged or fill material that would result in the "loss" of wetlands, mudflats, vegetated shallows or riffle and pool complexes as defined at 40 CFR Part 230.40-45. The definition of "loss" for this regional condition is the same as the definition of "loss of waters of the United States" used for the Nationwide Permit Program. Furthermore, this regional condition applies only within the State of Arizona and within the Mojave and Sonoran (Colorado) desert

regions of California. The desert regions in California are limited to four USGS Hydrologic Unit Code (HUC) accounting units (Lower Colorado -150301, Northern Mojave-180902, Southern Mojave-181001, and Salton Sea-181002).

3. When a pre-construction notification (PCN) is required, the appropriate U.S. Army Corps of Engineers (Corps) District shall be notified in accordance with General Condition 31 using either the South Pacific Division PCN Checklist or a signed application form (ENG Form 4345) with an attachment providing information on compliance with all of the General and Regional Conditions. The PCN Checklist and application form are available at: http://www.spl.usace.army.mil/missions/regulatory. In addition, the PCN shall include:
   a. A written statement describing how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;
   b. Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity as well as the location of delineated waters of the U.S. on the site. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and area (in acres) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the mean high water mark and high tide line, should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation. All drawings for projects located within the boundaries of the Los Angeles District shall comply with the most current version of the *Map and Drawing Standards for the Los Angeles District Regulatory Division* (available on the Los Angeles District Regulatory Division website at: www.spl.usace.army.mil/missions/regulatory/); and

   c. Numbered and dated pre-project color photographs showing a representative sample of waters proposed to be impacted on the project site, and all waters proposed to be avoided on and immediately adjacent to the project site. The compass angle and position of each photograph shall be documented on the plan-view drawing required in subpart b of this regional condition.

4. Submission of a PCN pursuant to General Condition 31 and Regional Condition 3 shall be required for all regulated activities in the following locations:
   a. All perennial waterbodies and special aquatic sites within the State of Arizona and within the Mojave and Sonoran (Colorado) desert regions of California, excluding the Colorado River in Arizona from Davis Dam to River Mile 261 (northern boundary of the Fort Mojave Indian Tribe Reservation). The desert region in California is limited to four USGS HUC accounting units (Lower Colorado -150301, Northern Mojave-180902, Southern Mojave-181001, and Salton Sea-181002).
   b. All areas designated as Essential Fish Habitat (EFH) by the Pacific Fishery Management Council (i.e., all tidally influenced areas - Federal Register dated March 12, 2007 (72 FR 11092)), in which case the PCN shall include an EFH assessment and extent of proposed impacts to EFH. Examples of EFH habitat assessments can be found at: http://www.swr.noaa.gov/efh.htm.
   c. All watersheds in the Santa Monica Mountains in Los Angeles and Ventura counties bounded by Calleguas Creek on the west, by Highway 101 on the north and east, and by Sunset Boulevard and Pacific Ocean on the south.
   d. The Santa Clara River watershed in Los Angeles and Ventura counties, including but not limited to Aliso Canyon, Agua Dulce Canyon, Sand Canyon, Bouquet Canyon, Mint Canyon, South Fork of the Santa Clara River, San Francisquito Canyon, Castaic Creek, Piru Creek, Sespe Creek and the main-stem of the Santa Clara River.

5. Individual Permits shall be required for all discharges of fill material in jurisdictional vernal pools, with the exception that discharges for the purpose of restoration, enhancement, management or scientific study of vernal pools may be authorized under NWPs 5, 6, and 27 with the submission of a PCN in accordance with General Condition 31 and Regional Condition 3.

6. Individual Permits shall be required in Murrieta Creek and Temecula Creek watersheds in Riverside County for new permanent fills in perennial and intermittent watercourses otherwise authorized under NWPs 29, 39, 42 and 43, and in ephemeral watercourses for these NWPs for projects that impact greater than 0.1 acre of waters of the United States. In addition, when NWP 14 is used in conjunction with residential, commercial, or industrial developments the 0.1 acre limit would also apply.

7. Individual Permits (Standard Individual Permit or 404 Letter of Permission) shall be required in San Luis Obispo Creek and Santa Rosa Creek in San Luis Obispo County for bank stabilization projects, and in Gaviota Creek, Mission Creek and Carpinteria Creek in Santa Barbara County for bank stabilization projects and grade control structures.

8. In conjunction with the Los Angeles District's Special Area Management Plans (SAMPs) for the San Diego Creek Watershed and San Juan Creek/Western San Mateo Creek Watersheds in Orange County, California, the Corps' Division Engineer, through his discretionary authority has revoked the use of the following 26 selected NWPs within these SAMP watersheds: 03, 07, 12, 13, 14, 16, 17, 18, 19, 21, 25, 27, 29, 31, 33, 39, 40, 41, 42, 43, 44, 46, 49, and 50. Consequently, these NWPs are no longer available in those watersheds to authorize impacts to waters of the United States from discharges of dredged or fill material under the Corps' Clean Water Act section 404 authority.

9. Any requests to waive the 300 linear foot limitation for intermittent and ephemeral streams for NWPs 29, 39, 40 and 42, 43, 44, 51 and 52 or to waive the 500 linear foot limitation along the bank for NWP 13, must include the following:
   a. A narrative description of the stream. This should include known information on: volume and duration of flow; the approximate length, width, and depth of the waterbody and characters observed associated with an Ordinary High Water Mark (e.g. bed and bank, wrack line, or scour marks); a description of the adjacent vegetation community and a statement regarding the wetland status of the associated vegetation community (i.e. wetland, non-wetland); surrounding land use; water quality; issues related to cumulative impacts in the watershed, and; any other relevant information.
   b. An analysis of the proposed impacts to the waterbody in accordance with General Condition 31 and Regional Condition 3;
   c. Measures taken to avoid and minimize losses, including other methods of constructing the proposed project; and
   d. A compensatory mitigation plan describing how the unavoidable losses are proposed to be compensated, in accordance with 33 CFR Part 332.

10. The permittee shall complete the construction of any compensatory mitigation required by special condition(s) of the NWP verification before or concurrent with commencement of construction of the authorized activity, except when specifically determined to be impracticable by the Corps. When mitigation involves use of a mitigation bank or in-lieu fee program, the permittee shall submit proof of payment to the Corps prior to commencement of construction of the authorized activity.

4. Further information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:
   ( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
   (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
   ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.
   (a) This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
   (b) This permit does not grant any property rights or exclusive privileges.
   (c) This permit does not authorize any injury to the property or rights of others.
   (d) This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
   (a) Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
   (b) Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
   (c) Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
   (d) Design or construction deficiencies associated with the permitted work.
   (e) Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:
   (a) You fail to comply with the terms and conditions of this permit.
   (b) The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
   (c) Significant new information surfaces which this office did not consider in reaching the original public interest decision.

   Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 330.5 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. This letter of verification is valid for a period not to exceed two years unless the nationwide permit is modified, reissued, revoked, or expires before that time.

7. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition H below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

8. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
South Coast Region
Habitat Conservation Planning
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.dfg.ca.gov

EDMUND G. BROWN, Jr., Governor
CHARLTON H. BONHAM, Director

May 4, 2012

Arturo Jacobo
California Department of Transportation
4050 Taylor Street, MS-331

Subject: Final Lake or Streambed Alteration Agreement
Notification No. 1600-2012-0054-R5
Interstate 5/Genesee Avenue Interchange Reconstruction Project
Unnamed Tributary to Soledad Creek

Dear Jacobo:

Enclosed is the final Streambed Alteration Agreement (Agreement) for the I-5/ Genesee Avenue Interchange Reconstruction Project (Project). Before the Department of Fish and Game (Department) may issue an Agreement, it must comply with the California Environmental Quality Act (CEQA). In this case, the Department, acting as a responsible agency, filed a notice of determination (NOD) on the same date it signed the Agreement. The NOD was based on information contained in the Mitigated Negative Declaration the lead agency prepared for the Project.

Under CEQA, filing a NOD starts a 30-day period within which a party may challenge the filing agency's approval of the project. You may begin your project before the 30-day period expires if you have obtained all necessary local, state, and federal permits or other authorizations. However, if you elect to do so, it will be at your own risk.

If you have any questions regarding this matter, please contact Tim Dillingham at (858) 467-4250 or tdilling@dfg.ca.gov.

Sincerely,

Stephen M. Juarez
Environmental Program Manager

ec: Tim Dillingham
Kim T. Smith, Caltrans, kim.t.smith@dot.ca.gov
Michelle Madigan, Caltrans, michelle.madigan@dot.ca.gov

CALIFORNIA DEPARTMENT OF FISH AND GAME
SOUTH COAST REGION (REGION 5)
3883 RUFFIN ROAD
SAN DIEGO, CALIFORNIA 92123

STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2012-0054-R5
UNNAMED TRIBUTARY TO SOLEDAD CREEK

ARTURO JACOBO
I-5/ GENESEE AVENUE INTERCHANGE RECONSTRUCTION PROJECT

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Game (DFG) and California Department of Transportation, District 11 (Permittee) as represented by Arturo Jacobo, Project Manager.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified DFG on March 21, 2012 that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, DFG has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project is located at an unnamed tributary to Soledad Creek, in the County of San Diego, State of California; Latitude 323886849, Longitude -117.227747; Township 15S, Range 3W, U.S. Geological Survey (USGS) map La Jolla Quad, San Bernardino meridian.

PROJECT DESCRIPTION

The project is limited to reconstruction of the Interstate 5 (I-5)/ Genesee Interchange bridge over the I-5 freeway, from a four lane overcrossing to a longer, wider and higher six lane overcrossing, with bicycle and pedestrian access. The project will also widen

and lengthen the four ramps associated with the overcrossing, add auxiliary lanes in both directions between the ramps and adjoining interchanges, ramp meters, two additional lanes including a high occupancy vehicle (HOV) bypass. An additional lane will be added to the Sorrento Valley Road northbound offramp.

The additional lanes on I-5 will require the replacement of the Voigt Drive overcrossing and realignment of Gilman Drive to connect to the modified overcrossing. All overcrossing modifications will not preclude future planned projects, which include widening of the I-5 as part of the I-5 North Coast Corridor project, direct access ramps for HOV lanes, a Class 1 two way bike path along the shoulder of the southbound I-5 separated by a concrete barrier, and a Light Rail Transit (LRT) crossing of I-5 adjacent to Voigt Drive.

The project would be constructed in two phases, the first to include the reconstruction of the I-5/ Genesee interchange, auxiliary lanes to the north of Genesee, and improvements to the Sorrento Valley Road ramps. Phase 2 would add auxiliary lanes to the south of Genesee, replacement of the Voigt Drive overcrossing and realignment of Gilman Drive.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include:

Plants: chamise (*Adenostoma fasciculatum*), coyote brush (*Baccharis pilularis*), mulefat (*Baccharis salicifolia*), California sunflower (*Encelia californica*), California buckwheat (*Eriogonum fasciculatum ssp fasciculatum*), coast barrel cactus (*Ferocactus viridescens*), goldenbush (*Isocoma menziesii*), southwestern spiny rush (*Juncus acutus ssp. lepodii*), monkeyflower (*Mimulus aurantiacus*), sycamore (*Platanus racemosa*), black sage (*Salvia mellifera*), sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), poison oak (*Toxicodendron diversilobum*); **Invertebrates**: Behr's metalmark (*Apodemia mormo virgulti*), southern blue (*Glaucopsyche lygdamun australis*), anise swallowtail (*Papilio zelicaon*), common white (*Pontia protodice*); **Reptiles**: orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*), southern Pacific rattlesnake (*Crotalus oreganos helleri*), western fence lizard (*Sceloporus occidentalis*), common side-blotched lizard (*Uta stansburiana*); **Birds:** white-throated swift (*Aeronautes saxatilis*), Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), western scrub jay (*Aphelocoma californica*), red-tailed hawk (*Buteo jamaicensis*), Anna's hummingbird (*Calypte anna*), lesser goldfinch (*Carduelis psaltria*), common yellowthroat (*Ceothlypis trichas*), wrentit (*Chamaea fasciata*), northern harrier (*Circus cyaneus*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), yellow warbler (*Dendroica petechia brewsteri*), Pacific slope flycatcher (*Empidonax difficilis*), cliff swallow (*Hirundo pyrrhonota*), yellow breasted chat (*Icteria virens*), hooded oriole (*Icterus cucullatus*), song sparrow (*Melospiza melodia*), northern mockingbird (*Mimus polyglottus*), ash throated flycatcher (*Myiarchus cinerascens*), Nuttall's woodpecker (*Picoides nuttallii*), downy woodpecker (*Picoides pubescens*),

California towhee (*Pipilo crissalis*), spotted towhee (*Pipilo maculatus*), coastal California gnatcatcher (*Polioptila californica californica*), black phoebe (*Sayornis nigricans*), northern rough-winged swallow (*Stelgidopteryx serripennis*), California thrasher (*Toxostoma redivivum*), western kingbird (*Tyrannus verticalis*), Cassin's kingbird (*Tyrannus vociferans*), mourning dove (*Zenaida macroura*); **Mammals**: coyote (*Canis latrans*), Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), San Diego desert woodrat (*Neotoma lepida intermedia*), mule deer (*Odocoileus hemionus*), Raccoon (*Procyon lotor*), California ground squirrel (*Spermophilus beecheyi nudipes*), Audubon's cottontail (*Sylvilagus audubonii*), and all other aquatic and wildlife resources, including the riparian vegetation, such as mulefat, arroyo willow, etc. which provides habitat for those species.

The adverse effects the project could have on the fish or wildlife resources identified above include: permanent impacts to 1.01 acres of southern willow scrub and 0.11 acres of unvegetated channel of streambed under the jurisdiction of DFG.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to DFG personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify DFG if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, DFG shall contact Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that DFG personnel may enter the project site at any time to verify compliance with the Agreement.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

2.1 Conditions for Species of Special Concern. No direct or indirect impacts shall occur to any species listed as threatened or endangered under the California Endangered Species Act or federal Endangered Species Act, (e.g. least Bell's vireo or southwestern arroyo toad). If any threatened or endangered species could be impacted by the work proposed, the Permittee should consult with the appropriate agency to prevent unauthorized take of the species.

2.2 Work Period and Time Limits. The Permittee shall not remove vegetation within the stream from February 15 to August 31 to avoid impacts to nesting birds. However, the Permittee may remove vegetation during this time if a qualified biologist conducts a survey for nesting birds within three days prior to any vegetation removal, and ensures no nesting birds could be impacted by the project. If nesting birds are present, no work shall occur within a 250 foot buffer area around the nest until the young have fledged and will no longer be impacted by the project.

2.3 Habitat Protection. All native /sensitive habitat outside the permanent and temporary construction limits shall be designated as an Environmentally Sensitive Area (ESA) on project maps. ESA shall be temporarily fenced during construction with orange plastic snow fence. No personnel, equipment, or debris will be allowed within an ESA.

2.4 Habitat Protection. Project personnel will be prohibited from bringing domestic pets to construction sites to ensure that domestic pets do not disturb or depredate wildlife in adjacent native habitats during construction.

2.5 Habitat Protection. Permittee shall make use of erosion and sediment control measures such as fiber rolls and erosion control blankets that utilize biodegradable materials such as jute instead of plastic mesh, to avoid potential plastics pollution hazards to wildlife and aquatic life.

2.6 Construction Material Waste. Raw cement/ concrete or washings thereof, asphalt, paint, construction waste, or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from project-related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. Any of these materials, placed within or where they may enter a stream or lake, by the Permittee or any party working under contract, or with the permission of the Permittee, shall be removed immediately.

2.7 Equipment and Access. Staging/storage areas for equipment and materials shall be located outside of the stream/lake. (pollution)

2.8 Turbidity/Siltation. Precautions (e.g. Best Management Practices) to minimize turbidity/siltation shall be taken into account during project planning and implementation. This may require that the work site be isolated and /or the construction of silt catchment basins, so that silt, or other deleterious materials are not allowed to pass to downstream reaches. The placement of any structure or materials in the stream for this purpose, not included in the original project description, shall be coordinated with DFG. Coordination shall include the negotiation of additional Agreement provisions.

2.9 Vegetation, Revegetation and Restoration. DFG recommends the use of native plants to the greatest extent feasible in the landscape areas adjacent and/or near open space and wetland/riparian areas. The Permittee shall not plant, seed or otherwise introduce invasive exotic plant species to the landscaped areas adjacent and/or near the mitigation/open space and wetland/riparian areas. Exotic plant species not to be used include: those species listed on updated Lists A & B of the California Invasive Plant Council's (Cal-IPC) list of "Exotic Pest Plants of Greatest Ecological Concern in California" as of October 1999; species listed as invasive in the California Invasive Plant Inventory Database (Cal-IPC 2006); or species listed on United States Department of Agriculture – Natural Resource Conservation Service's 2009 California State-listed Noxious Weeds; This list includes such species as: pepper trees, pampas grass, fountain grass, ice plant, myoporum, tree of heaven, black locust, capeweed, periwinkle, sweet alyssum, English ivy, French broom, Scotch broom, and Spanish broom. A copy of the complete Cal-IPC lists can be obtained by contacting the California Invasive Plant Council at 1442-A Walnut Street, #462, Berkeley, CA 94709, or by accessing their web site at http://www.cal-ipc.org. For USDA-NRCS information, the website link is http://plants.usda.gov/java/noxComposite

3. Compensatory Measures

To compensate for adverse impacts to fish and wildlife resources identified above that cannot be avoided or minimized, Permittee shall implement each measure listed below.

3.1 Mitigation for Unauthorized Impacts. The Permittee shall mitigate at a minimum 5:1 ratio for impacts beyond those authorized in this Agreement. In the event that additional mitigation is required, the type of mitigation shall be determined by DFG, and may include creation, restoration, enhancement and/or preservation.

3.2 Habitat Restoration. Permanent impacts to 1.12 acres of streambed and riparian habitat will be mitigated at a ratio of 3:1 using creation (3.36 acres) at an offsite location (e.g. Caltrans mitigation site at Deer Canyon (Agreement # 1600-2011-

0099-R5)). Permittee will provide documentation of debiting of mitigation credits to DFG prior to initiating project impacts.

4. Reporting Measures

Permittee shall meet each reporting requirement described below.

4.1 Notification Prior to and Following Completion of Work. The Permittee shall notify DFG, in writing, at least five days prior to initiation of construction (project) activities and at least five days prior to completion of construction (project) activities, each time project activities occur. Notification shall be sent to DFG's South Coast Office at the address below, ATTN: Streambed Alteration Program – SAA # 1600-2012-0054-R5.

CONTACT INFORMATION

Any communication that Permittee or DFG submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or DFG specifies by written notice to the other.

To Permittee:

Arturo Jacobo
4050 Taylor Street, MS-336
San Diego, CA 92110
Fax (619) 688-6998
arturo.jacobo@dot.ca.gov

Cc: Kim Smith, kim.t.smith@dot.ca.gov

To DFG:

Department of Fish and Game
South Coast Region (R5)
3883 Ruffin Road
San Diego, CA 92123
Attn: Lake and Streambed Alteration Program – Tim Dillingham
Notification #1600-2012-0054-R5
Fax (858) 467-4239
tdilling@dfg.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute DFG's endorsement of, or require Permittee to proceed with the project. The decision to proceed with the project is Permittee's alone.

SUSPENSION AND REVOCATION

DFG may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before DFG suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before DFG suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused DFG to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes DFG from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects DFG's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 *et seq.* (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse

disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

DFG may amend the Agreement at any time during its term if DFG determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by DFG and Permittee. To request an amendment, Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter DFG approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to DFG a completed DFG "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). DFG shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code, § 1605, subd. (f)). .

EFFECTIVE DATE

The Agreement becomes effective on the date of DFG's signature, which shall be: 1) after Permittee's signature; 2) after DFG complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on December 31, 2017 unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify DFG in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

FOR CALIFORNIA DEPARTMENT OF TRANSPORTATION

Arturo Jacobo — 5-1-12

Arturo Jacobo
Project Manager

Date

FOR DEPARTMENT OF FISH AND GAME

Stephen M. Juarez
Environmental Program Manager

4 May 2012
Date

Prepared by: Tim Dillingham
Staff Environmental Scientist

STATE OF CALIFORNIA – THE NATURAL RESOURCES AGENCY

EDMUND G. BROWN, JR., *Governor*

CALIFORNIA COASTAL COMMISSION
San Diego Coast Area Office
7575 Metropolitan Drive, Suite 103
San Diego, CA 92108-4421
(619) 767-2370
www.coastal.ca.gov

Date: June 21, 2012
Permit Application No.: **6-11-093**

COASTAL DEVELOPMENT PERMIT

On **June 14, 2012**, the California Coastal Commission granted to:

California Department of Transportation (Caltrans)

this permit subject to the attached Standard and Special Conditions, for development consisting of

Replacement and reconstruction of the Interstate 5/Genesee Avenue overcrossing and associated freeway access ramps, and the widening of Genesee Avenue from four to six lanes as it approaches the interchange from both east and west directions. The proposed project also includes retaining walls, bioswales, and a new 8,000 foot-long pedestrian and bicycle path with overcrossing extending across Genesee Avenue. Habitat impacts from the project are proposed to be mitigated off-site at the Deer Canyon Mitigation Site

more specifically described in the application filed in the Commission offices.

The development is within the coastal zone at

Interstate 5 (I-5) and Genesee Avenue interchange, San Diego, San Diego County.

Issued on behalf of the California Coastal Commission by

CHARLES LESTER
Executive Director

By: **GABRIEL BUHR**
Coastal Program Analyst

ACKNOWLEDGMENT:

The undersigned permittee acknowledges receipt of this permit and agrees to abide by all terms and conditions thereof.

The undersigned permittee acknowledges that Government Code Section 818.4 which states in pertinent part that: "A Public entity is not liable for injury caused by the issuance . . . of any permit. . . " applies to the issuance of this permit.

IMPORTANT: THIS PERMIT IS NOT VALID UNLESS AND UNTIL A COPY OF THE PERMIT

WITH THE SIGNED ACKNOWLEDGMENT HAS BEEN RETURNED TO THE COMMISSION OFFICE. 14 Cal. Admin. Code Section 13158(a).

12/12/13
Date

Signature of Permittee

STANDARD CONDITIONS:

1. **Notice of Receipt and Acknowledgment.** The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration.** If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation.** Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment.** The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. **Terms and Conditions Run with the Land.** These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

SPECIAL CONDITIONS:

The permit is subject to the following conditions:

1. **Final Plans. PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the applicant shall submit to the Executive Director for review and written approval, full-size final plans for the permitted development that are in substantial conformance with the original plans submitted with the permit application dated March 2012 by Caltrans.

   The applicant shall undertake development in accordance with the final approved plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. Such reportable changes include any alteration that could potentially affect the kind, location, intensity or other substantive aspect of the approved development, or any avoidance, minimization or mitigation measure to be employed in conjunction with the approval.

In the event that the proposed change will require modification of the development approved by this permit, or modification of the mitigation measures required under the terms of this permit, permittee shall submit a timely request for Executive Director review of materiality, as provided by Commission Regulations (Section 13166(b)). If the change is determined to be material, then it shall be reviewed in accordance with the process prescribed for amendments of coastal development permits, as detailed in Commission Regulations, Sections 13164 & 13166.

2. **Mitigation Acreage Accounting. PRIOR TO COMMENCEMENT OF CONSTRUCTION**, in order to provide updated and accurate mitigation acreage amounts already used within the Deer Canyon Mitigation Site, the applicant shall provide an updated accounting of the restored acreage amounts for the mitigation site, specifically identifying available restoration acreage within the site, and acreage amounts totaling no less than 3.36 acres of riparian habitat and 13.84 acres of Coastal Sage Scrub habitat that the applicant will use as mitigation for the proposed Genesee Interchange project. The updated acreage accounting table shall also describe mitigation amounts that have already been deducted as mitigation for separate projects, within or outside of the Coastal Zone, and quantify any acreage amounts that are yet unaccounted for as mitigation for a specific project. This information shall be provided when final permits with required mitigation amounts are issued by the relevant state and federal agencies.

3. **Landscaping/Planting Plan. PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit a final landscaping plan for adjacent highway and interchange slopes for the review and written approval of the Executive Director. The plan shall include the following:

   a. Plans and specifications for the planted area that shall describe the herbicide, pesticide and fertilizer practices as well as list the chemical pesticides and fertilizers that will be used on site, including the expected frequency and volume of each application. Additional applications of herbicide to control weeds shall be determined by the contractor as required by the site conditions. The selected chemicals shall not be toxic to fish or wildlife or persistent in the environment. Herbicides and pesticides, if used at all, shall be applied by hand application or by other means that will prevent leakage, percolation, or aerial drift into adjacent lagoon, wetland and upland areas;

   b. A plan showing the type, size, extent and location of all plant materials used; and

   c. Specific ecological performance criteria that shall include standards for species diversity and vegetative cover. Success criteria shall insure that the major structure-producing species that characterize the habitat are present and that there is an appropriate diversity of species in both the shrub and herbaceous vegetation layers.

d. Only species native to southern California and typical of Coastal Sage Scrub habitats shall be used, such that the proposed planted slopes will be compatible with surrounding natural and manmade areas, except in areas completely surrounded by urban uses within the interchange. No plant species listed as problematic and/or invasive by the California Native Plant Society (http://www.CNPS.org/), the California Invasive Plant Council (http://www.cal-ipc.org/), or as may be identified from time to time by the State of California shall be employed or allowed to naturalize or persist on the site. No plant species listed as a 'noxious weed' by the State of California or the U.S. Federal Government shall be utilized within the property;

e. Seeds or cuttings used for planting materials shall come from within 20 miles of the coast from Los Angeles, Orange, or San Diego Counties;

f. A planting schedule that indicates that areas of native revegetation shall be planted concurrent with or immediately following completion of the construction project, and that areas completely surrounded by urban uses in the interchange shall be planted within 60 days of completion of the construction project;

g. All required plantings shall be maintained in good growing conditions, and whenever necessary, shall be replaced with new drought-tolerant native or non-invasive plant materials to ensure continued compliance with landscape requirements; and

h. Five years from the date of issuance of the coastal development permit, the applicant shall submit a landscape monitoring report for review and written approval of the Executive Director. The report shall be prepared by a licensed Landscape Architect or qualified Resource Specialist, and certify that the on-site landscaping is in conformance with the landscape/planting plan approved pursuant to this Special Condition. The monitoring report shall include photographic documentation of plant species and plant coverage.

If the landscape monitoring report indicates the landscaping is not in conformance with or has failed to meet the performance standards specified in the landscaping plan approved pursuant to this permit, the applicant, or successors in interest, shall submit a revised or supplemental landscape plan for the review and written approval of the Executive Director. The revised landscaping plan shall be prepared by a licensed Landscape Architect or Resource Specialist and shall specify measures to remediate those portions of the original plan that have failed or are not in conformance with the original approved plan.

The permittee shall undertake the development in accordance with the approved planting plans. Any proposed changes to the approved planting plans shall be reported to the Executive Director. No changes to the planting plans shall occur without a Coastal Commission approved amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

4. **Timing of Construction.** To avoid potential impacts to coastal California gnatcatcher, southwestern willow flycatcher, and least Bell's vireo, during their nesting season, removal of existing vegetation will not be permitted between the dates of February 15th and September 15th of any year; unless written permission from the California Department of Fish and Game and US Fish and Wildlife Service is provided to the Executive Director for review and approval.

5. **Water Quality Management Plan. PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit a final detailed water quality plan for review and written approval of the Executive Director. The applicant shall develop the plan to protect post construction water quality in consultation with the Regional Water Quality Control Board (RWQCB). The plan shall be in conformity with the Storm Water Data Report (PS&E Phase, dated May 2012 or later version) and consist of the following:

   a. The applicant shall submit final grading plans for the entire alignment of the proposed road work, clearly delineating existing and proposed contours throughout the project site. All excess graded material (cut) shall be disposed of at a legal disposal site. If the disposal site is located in the coastal zone, a coastal development permit or an amendment to this permit shall be required before disposal can take place unless the Executive Director determines that no amendment or new permit is legally required
   b. The applicant shall submit a Best Management Practices (BMP) Plan addressing post-construction BMPs to protect coastal water quality post construction. This Plan shall include, but is not limited to, final drainage plans delineating bioswales and outlet design, and calculations/evidence that the facilities are designed to treat, infiltrate or filter storm water from each runoff event, up to and including the 85th percentile, 24-hour runoff event for volume-based BMPs, and/or the 85th percentile, 1-hour runoff event, with a factor of safety of 2X, for flow-based BMPs.

   c. Additional pavement resulting from widening the Genesee overcrossing shall be included in the calculation of added impervious surface and the treatment of storm water runoff.

   d. All opportunities, including Total Maximum Daily Load (TMDL) reducing retrofit opportunities, shall be taken in order to maximize the treatment of runoff from all elements of the highway within the project study area in order to protect water quality. For example, all feasible extensions in the length of the treatment swales and/or increase in the area of pavement drainage that can be routed through the swales in addition to that documented in the May 2012 draft SWDR shall be pursued and reflected in the final SWDR.

   e. Plan for the management and/or disposal of non-hazardous Aerially Deposited Lead (ADL) contaminated soils at the project site identified by the applicant, that:

      1) requires that all ADL soils will either be transported off site with full disclosure to the receiving party, be disposed of at an appropriate landfill facility, or remain on site and shall be documented in the as-built plans and a record of ADL sample results and volume of contaminated soil be kept in the Caltrans project file for future reference;

      2) provides that ADL soils within ten (10) feet of any drainage features such as an unlined ditch or drain, or structural water quality BMPs such as a bioswale or sand filter, or is within 10 feet of ESHA, coastal waters or coastal wetlands, shall be removed and replaced with clean soil for the purpose of preventing movement of ADL to these features ;

3) provides that any ADL soils that are disturbed during construction shall be managed using construction Best Management Practices (BMPs), and that ADL soils remaining on site will use permanent BMPs such as placing the soils above the water table, capping the soils with clean material and/or situating the soil under pavement areas to isolate the soils from coastal waters;

4) ensures that undisturbed ADL soils that remain on site, disturbed ADL soils that have been incorporated into fills or embankments, and impermeable protective material covering these soils will not be subject to erosion.

The permittee shall undertake development in accordance with the approved final BMP program. Any proposed changes to the approved final program shall be reported to the Executive Director. No changes to the approved water quality plan shall occur without a Coastal Commission-approved amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

6. **Erosion Control and Construction Best Management Practices Plan. PRIOR TO COMMENCEMENT OF SITE CLEARING OR OTHER DEVELOPMENT**, a Storm Water Pollution Prevention Plan (SWPPP) that prevents contamination of wetlands and associated damage to sensitive species from storm water runoff during the proposed construction period. The applicant shall develop the SWPPP in consultation with the Regional Water Quality Control Board (RWQCB). The SWPPP shall be in conformity with the draft Storm Water Data Report (PS&E Phase, dated May 2012) and shall specify the following:

Erosion Control Plan

a. The plan shall delineate the areas to be disturbed by grading or construction activities and shall include any temporary access roads, staging areas and stockpile areas. The natural areas to be protected on the site (i.e., the ESAs) shall be clearly delineated on the plan and on-site with fencing or survey flags;

b. Include a narrative report describing all temporary run-off and erosion control measures to be used during construction;

c. The plan shall identify and delineate on a site or grading plan the locations of all temporary erosion control measures;

d. The plan shall specify that should grading take place during the rainy season (November 1 – March 31); the applicant shall install or construct temporary sediment basins (including debris basins, desilting basins or silt traps); temporary drains and swales; sand bag barriers; silt fencing; stabilize any stockpiled fill with geofabric covers or other appropriate cover; install geotextiles or mats on all cut or fill slopes; and close and stabilize open trenches as soon as possible; and

e. The erosion measures shall be required on the project site prior to or concurrent with the initial grading operations and maintained throughout the development process to minimize erosion and sediment from runoff waters during construction. All sediment should be retained on-site unless removed to an appropriate approved dumping location either outside the coastal zone or to a site within the coastal zone permitted to receive fill. If the disposal site is located in the coastal zone, a coastal development permit or an amendment to this permit shall be required before disposal can take place unless the Executive Director determines that no amendment or new permit is legally required.

Construction Best Management Practices

a. No demolition or construction materials, debris, or waste shall be placed or stored where it may enter sensitive habitat, receiving waters or a storm drain, or be subject to wave, wind, rain, or tidal erosion and dispersion;

b. No demolition or construction equipment, materials, or activity shall be placed in or occur in any location that would result in impacts to environmentally sensitive habitat areas, streams, wetlands or their buffers;

c. Any and all debris resulting from demolition or construction activities shall be removed from the project site within 24 hours of completion of the project;

d. Demolition or construction debris and sediment shall be removed from work areas each day that demolition or construction occurs to prevent the accumulation of sediment and other debris that may be discharged into coastal waters;

e. All trash and debris shall be disposed in the proper trash and recycling receptacles at the end of every construction day;

f. The applicant shall provide adequate disposal facilities for solid waste, including excess concrete, produced during demolition or construction;

g. Debris shall be disposed of at a legal disposal site or recycled at a recycling facility. If the disposal site is located in the coastal zone, a coastal development permit or an amendment to this permit shall be required before disposal can take place unless the Executive Director determines that no amendment or new permit is legally required;

h. All stock piles and construction materials shall be covered, enclosed on all sides, shall be located as far away as possible from drain inlets and any waterway, and shall not be stored in contact with the soil;

i. Machinery and equipment shall be maintained and washed in confined areas specifically designed to control runoff. Thinners or solvents shall not be discharged into sanitary or storm sewer systems;

j. The discharge of any hazardous materials into any receiving waters shall be prohibited;

k. Spill prevention and control measures shall be implemented to ensure the proper handling and storage of petroleum products and other construction materials. Measures shall include a designated fueling and vehicle maintenance area with appropriate berms and protection to prevent any spillage of gasoline or related petroleum products or contact with runoff. The area shall be located as far away from the receiving waters and storm drain inlets as possible;

l. Best Management Practices (BMPs) and Good Housekeeping Practices (GHPs) designed to prevent spillage and/or runoff of demolition or construction-related materials, and to contain sediment or contaminants associated with demolition or construction activity, shall be implemented prior to the on-set of such activity; and

m. All BMPs shall be maintained in a functional condition throughout the duration of construction activity.

The final SWPPP shall be in conformance with the site/development plans approved by the Coastal Commission. Any changes to the SWPPP shall be reported to the Executive Director and no changes shall occur without an amendment to the coastal development permit, unless the Executive Director determines that no amendment is required.

7. **Plans Conforming to Geotechnical Engineer's Recommendations.** By acceptance of this permit, the applicant agrees to comply with the recommendations contained in all of the geology, geotechnical, and/or soils reports referenced as Substantive File Documents. These recommendations, including recommendations concerning foundations, sewage disposal, and drainage, shall be incorporated into all final design and construction plans, which must be reviewed and approved by a Certified Engineering Geologist or licensed Geotechnical Engineer prior to commencement of development.

   The final plans approved by the consultant shall be in substantial conformance with the plans approved by the Commission relative to construction, grading, and drainage. Any substantial changes in the proposed development approved by the Commission that may be required by the consultant shall require amendment(s) to the permit(s) or new Coastal Development Permit(s).

8. **Structural Appearance. PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit for the review and approval of the Executive Director, a color palette, design, and material specifications for the outer surface of all structures authorized by the approval of this Coastal Development Permit (including but not limited to retaining walls, overcrossings, etc.) and shall be subject to the following requirements:

   a. Acceptable colors shall be limited to colors compatible with the surrounding environment (earth tones) such as deep shades of green, brown and gray with no white or light shades and no bright tones;

   b. Incorporation of drought tolerant and sustainable landscape palettes;

   c. Trees or other vegetated buffers planted between the highway traveler's viewpoint and retaining walls taller than 3 meters tall, where feasible, to soften views of walls;

   d. Architectural features, textures, and integral concrete color shall be used to mitigate the appearance of visible sections of retaining walls. Walls shall incorporate architectural features such as pilasters and caps to provide shadow lines, provide relief from monolithic appearance, and reduce their apparent scale;

   e. Retaining walls shall be designed to visibly blend with graded slopes using techniques such as slope rounding, slope sculpting and variable gradients to mimic the appearance of natural topography when feasible; and

   f. Where site conditions are favorable, retaining walls should be divided into separate structures sufficiently offset from one another to create a planting area.

   The approved structures shall be finished with only the colors and design features authorized pursuant to this special condition. Alternative colors or materials for future repainting or resurfacing may only be applied to the structures authorized by this Coastal Development

Permit if such changes are specifically authorized by the Executive Director as complying with this special condition.

9. **Other Permits. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION**, the permittee shall provide to the Executive Director copies of all other required state or federal discretionary permits for the development authorized by CDP #6-11-093. The applicant shall inform the Executive Director of any changes to the project required by other state or federal agencies. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this permit, unless the Executive Director determines that no amendment is legally required.

STATE OF CALIFORNIA - NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *GOVERNOR*

CALIFORNIA COASTAL COMMISSION
San Diego Coast District Office
7575 Metropolitan Drive, Suite 103
San Diego, California 92108-4402
PH (619) 767-2370 FAX (619) 767-2384

COASTAL DEVELOPMENT PERMIT EXTENSION

March 20, 2014

Coastal Development Permit Extension No. **6-11-093-E1**

Re: Extension Request for Permit No.: **6-11-093**
Original Permit Expiration Date: June 14, 2014
Extended Permit Expiration Date: June 14, 2015

Caltrans District 11 Arturo Jacobo, 4050 Taylor Street M.S. D1, San Diego, CA 92110

Dear Arturo Jacobo:

The Executive Director has determined that there are no changed circumstances affecting the conformity of the subject development with the California Coastal Act. No objections to this determination have been received at the Commission office. Therefore, the Executive Director grants an extension of the subject permit, subject to the same conditions approved by the Commission, to expire on the Extended Permit Expiration Date indicated above.

CHARLES LESTER,
Executive Director

Kanani Brown
Coastal Program Analyst

cc: File

STATE OF CALIFORNIA - NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *GOVERNOR*

CALIFORNIA COASTAL COMMISSION
San Diego Coast District Office
7575 Metropolitan Drive, Suite 103
San Diego, California 92108-4402
PH (619) 767-2370 FAX (619) 767-2384

NOTICE OF EXTENSION REQUEST FOR COASTAL DEVELOPMENT PERMIT

March 7, 2014

Notice is hereby given that California Department of Transportation (Caltrans) District 11 has applied for a one year extension of 6-11-093 granted by the California Coastal Commission on June 14, 2012

for: Replacement and reconstruction of the Interstate 5/Genesee Avenue overcrossing and associated freeway access ramps, and the widening of Genesee Avenue from four to six lanes as it approaches the interchange from both east and west directions. The proposed project also includes retaining walls, bioswales, and a new 8,000 foot-long pedestrian and bicycle path with overcrossing extending across Genesee Avenue. Habitat impacts from the project are proposed to be mitigated off-site at the Deer Canyon Mitigation Site.

at: Interstate 5 (I-5) and Genesee Avenue interchange , San Diego (San Diego County)

Pursuant to Section 13169 of the Commission Regulations, the Executive Director has determined that there are no changed circumstances affecting the proposed development's consistency with the Coastal Act. The Commission Regulations state that "if no objection is received at the Commission office within ten (10) working days of publishing notice, this determination of consistency shall be conclusive... and the Executive Director shall issue the extension." If an objection is received, the extension application shall be reported to the Commission for possible hearing.

Persons wishing to object or having questions concerning this extension application should contact the district office of the Commission at the above address or phone number.

Sincerely,
CHARLES LESTER
Executive Director

By: Kanani Brown
Coastal Program Analyst II

STATE OF CALIFORNIA -- THE NATURAL RESOURCES AGENCY

EDMUND G. BROWN, JR., *Governor*

CALIFORNIA COASTAL COMMISSION
SAN DIEGO AREA
7575 METROPOLITAN DRIVE, SUITE 103
SAN DIEGO, CA 92108-4421
(619) 767-2370

June 13, 2014

Kimberly T. Smith
4050 Taylor St, MS-242
San Diego, CA 92110

Re: Notice of Acceptance for Coastal Development Permit #6-11-093

Dear Ms. Smith:

Commission staff has reviewed the modified plans submitted on June 5, 2014 for Coastal Development Permit #6-11-093, the Interstate 5/Genesee Avenue Interchange Reconstruction Project , including the removal of retaining wall #2; modification of retaining wall #4 to 2,080 linear ft. and 60 ft. high; modification of retaining walls #13, #14, and #15 to Geosynthetically Reinforced Embankment (GRE) walls with changes to adjacent grading and footprint; reduced pavement and grading; reduced project limits; realignment of bicycle path to follow future edge of pavement for the I-5 NCC project; and replacement of retaining wall #17 with concrete barrier and graded slope.

Please accept this letter as notification that the modified plans submitted in compliance with Special Condition #1 (Final Plans) of your development permit have been reviewed and found to be in substantial conformance with the requirements of said condition. Your submitted plans and a copy of this letter have been made a part of the permanent file. Should you have any questions, please contact me at (619) 767-2370.

Sincerely,

Kanani Brown
Coastal Program Analyst II

(G:\San Diego\KANANI\Permits\2011\6-11-093 (Caltrans)\6.13.14 Notice of Acceptance Letter.doc)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-SDG-08B0205-11F0246

MAR 23 2011

Ms. Kim Smith, Chief
California Department of Transportation - District 11
Environmental Resource Studies
4050 Taylor Street
San Diego, California 92110

Attention: Susan Scatolini, Associate Environmental Planner

Subject: Formal Section 7 Consultation for the Interstate 5/Genesee Avenue Interchange Reconstruction Project, San Diego County, California

Dear Ms. Smith:

This document transmits our biological opinion based on our review of the proposed Interstate 5 (I-5)/Genesee Avenue Interchange Reconstruction Project and its potential effects on the federally threatened coastal California gnatcatcher (*Polioptila californica californica,* "gnatcatcher"), in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). The California Department of Transportation (Caltrans) has assumed the Federal Highway Administration's (FHWA) responsibilities under the Act for this consultation in accordance with Sections 6004 and 6005 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) 2005, as described in the National Environmental Policy Act (NEPA) Delegation Pilot Program Memorandum of Understanding between FHWA and Caltrans (effective July 1, 2007) and codified in Renewed 23 U.S.C. 326 and 23 U.S.C. 327. We initiated consultation to address the effects of the proposed project on the gnatcatcher on November 5, 2010, the date we received your request.

The federally endangered least Bell's vireo (*Vireo bellii pusillus*, "vireo") is known to occur in habitat adjacent to the Pardee (Deer Canyon) property, where restoration will occur to offset the impacts of the I-5/Genesee Avenue Interchange Project. Conservation measures (enclosed) have been incorporated into the Deer Canyon restoration project to avoid and minimize impacts to the vireo. Based on Caltrans' commitment to implement these measures, we concur with your determination that the proposed project is not likely to adversely affect the vireo. Therefore, the vireo is not addressed further in this formal consultation.

TAKE PRIDE® IN AMERICA

This biological opinion is based on information provided in 1) *Interstate 5/Genesee Avenue Interchange Reconstruction Biological Assessment* (Caltrans 2009); 2) *Interstate 5/Genesee Avenue Interchange Reconstruction Project Initial Study with Proposed Mitigated Negative Declaration / Environmental Assessment* (Caltrans 2010); and 3) other information available in our files. The complete project file addressing this consultation is maintained at the Carlsbad Fish and Wildlife Office (CFWO).

The project purpose is to accommodate increased traffic flows and meet vertical clearance requirements for the I-5/Genesee Avenue interchange overcrossing. For this, the project will replace the existing I-5/Genesee Avenue 4-lane overcrossing with a 6-lane overcrossing that is wider, longer, and higher than the existing structure and will include a sidewalk on the north side of the bridge. An earthen buttress will also be incorporated into the project grading limits north of Genesee Avenue and west of I-5 to stabilize an ancient landslide underneath the southbound Genesee Avenue off-ramp. The project includes auxiliary lanes in both directions on I-5 between the Genesee Avenue ramps and the adjacent ramps for La Jolla Village Drive and Sorrento Valley Road. One standard lane and high-occupancy vehicle (HOV) bypass lane with a ramp meter will be added at the Sorrento Valley Road southbound on-ramp. One additional lane will be added to the Sorrento Valley Road northbound off-ramp. The construction of the auxiliary lanes between Genesee Avenue and La Jolla Village Drive will require replacement of the Voigt Drive overcrossing. The Voigt Drive overcrossing will be lowered, lengthened, and widened and will include bike lanes and sidewalks. The changes to the overcrossing configuration at Voigt Drive will conflict with the existing alignment of Gilman Drive. Therefore, the project includes realignment of Gilman Drive and modifications to its intersection with Voigt Drive.

The Multiple Species Conservation Program (MSCP) establishes a comprehensive habitat conservation planning program that provides for a streamlined process to minimize and mitigate habitat loss and the incidental take of covered species in association with specific activities covered by the program. The MSCP encompasses a 900-square mile (mi) [2,331-square kilometer (km)] area in southwestern San Diego County and includes the City of San Diego (City), 10 additional city jurisdictions, and unincorporated portions of the County of San Diego. On July 18, 1997, our agency, the U.S. Fish and Wildlife Service (Service), issued a section 10(a)(1)(B) permit ("incidental take permit") to the City for their Subarea Plan under the broader MSCP. The proposed project is located within the City's Subarea Plan boundary.

The City's Subarea plan established a Multi-Habitat Planning Area (MHPA) to be conserved to provide the necessary habitat to support the future viability of San Diego's unique biodiversity. The City's Subarea Plan allows limited impacts to the MHPA for essential public projects, including circulation element roads such as Genesee Avenue. Consistent with the requirements of the City's Subarea Plan, the project has been designed to minimize impacts to the MHPA. The project will result in permanent impacts to 1.1 hectares (ha) [2.8 acres (ac)] of the MHPA and temporary impacts to 0.2 ha (0.6 ac) of the MHPA. To offset impacts to the MHPA, the project will restore, preserve and manage 9.07 ha (22.41 ac) of land within the City's MHPA on

the Deer Canyon property. This includes 5.4 ha (13.4 ac) of Diegan coastal sage scrub, 1.42 ha (3.51 ac) southern willow scrub, and 2.25 ha (5.5 ac) non-native grassland. The City has agreed to own and manage the Deer Canyon property with an endowment that will be paid by Caltrans in accordance with the requirements of the *TransNet Memorandum of Agreement among the San Diego Association of Governments ("SANDAG"), the California Department of Fish and Game ("CDFG"), the California Department of Transportation ("Caltrans"), and the United States Fish & Wildlife Service ("USFWS")* (collectively "the signatories") regarding the mitigation for transportation projects under the TransNet Extension Ordinance Environmental Mitigation Program (TransNet MOA). The TransNet MOA specifies that funds will be allocated for acquisition, restoration and enhancement, and monitoring and management of conservation lands.

There is suitable habitat for gnatcatchers within the project impact area. During protocol surveys in 2007, seven pairs, two of which had fledglings, and three individual gnatcatchers were observed within and adjacent to the Biological Study Area for the project. The project will impact habitat occupied by one pair of gnatcatchers and potentially used by a second pair of gnatcatchers. The project will result in permanent impacts to 1.5 ha (3.7 ac) Diegan Coastal Sage Scrub (DCSS), 0.4 ha (1.0 ac) Disturbed DCSS, and 0.3 ha (0.7 ac) Coyote Brush Scrub. The project will result in temporary impacts to 0.3 ha (0.8 ac) DCSS, 0.1 ha (0.3 ac) Disturbed DCSS 0.1 ha (0.3 ac), and 0.1 ha (0.2 ac) Coyote Brush Scrub.

The gnatcatcher is a covered species under the City's Subarea Plan, and the City's incidental take permit authorizes take of gnatcatcher for projects consistent with their Subarea Plan. The Service concurs with your agency's determination that the proposed project may affect gnatcatcher. We have also determined that the project, including the proposed conservation measures (enclosed), is consistent for impacts to gnatcatcher with the City's Subarea Plan and its associated implementation agreement and permit.

The status of the gnatcatcher and the effects of implementing the City's Subarea Plan under the MSCP were previously addressed in our biological opinion for the City's Subarea Plan dated June 6, 1997. In this biological opinion, we concluded that the level of anticipated take in the City's Subarea Plan area boundary was not likely to result in jeopardy to the gnatcatcher. Given that the proposed action is consistent with the City's Subarea Plan, we do not anticipate any adverse effects to the gnatcatcher that were not previously evaluated in the biological opinion for City's Subarea Plan will occur. No incidental take of gnatcatcher beyond that anticipated in the biological opinion for the HCP will occur. Therefore, it is our conclusion that implementation of the proposed project will not result in jeopardy to the gnatcatcher.

By this consultation, we are extending to Caltrans the take coverage for gnatcatcher (incorporated herein by reference) already provided to the City through their incidental take permit for their Subarea Plan. Extension of take coverage to Caltrans under the City's Subarea Plan is limited to the proposed project as described in this biological opinion and as provided in

the incidental take statement of our biological opinion for the City's Subarea Plan dated June 6, 1997. Thus, Caltrans' consultation obligations under the Act for gnatcatcher have been met.

This concludes formal consultation on the proposed action. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the proposed action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or 4) a new species is listed or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your coordination on this project. Should you have any questions regarding this biological opinion, please contact Sally Brown of my staff at (760) 431-9440, extension 278.

Sincerely,

Karen A. Goebel

For Jim A. Bartel
Field Supervisor

ENCLOSURE

Conservation measures to avoid and minimize potential adverse effects to the coastal California gnatcatcher (*Polioptila californica californica*) and least Bell's vireo (*Vireo bellii pusillus*, "vireo") from the I-5 Genesee Interchange Reconstruction Project and Deer CanyonRestoration/Enhancement Project

Caltrans has committed to implement the following conservation measures to avoid and minimize potential adverse effects to the gnatcatcher and vireo and to support a determination by the U.S. Fish and Wildlife Service (Service) that the project: 1) is consistent with the City of San Diego's Subarea Plan and its associated implementation agreement and Endangered Species Act (Act) section 10(a)(1)(B) permit for gnatcatcher and 2) is not likely to adversely affect the vireo.

1. Permanent and temporary impacts to gnatcatcher habitat totaling 2.7 ha (6.7 ac) will be offset through restoration and preservation of 5.4 ha (13.4 ac) of Diegan coastal sage scrub at the Pardee (Deer Canyon) property. Temporary impacts will be offset the same as permanent impacts because revegetation of these areas is anticipated to be temporary, as documented in Conservation Measure 3 below.

2. Caltrans will submit a final restoration/enhancement plan for the Deer Canyon property to the Service's Carlsbad Fish and Wildlife Office (CFWO) for approval prior to initiating project impacts. The final plan will be based on the *Compensatory Wetland/Upland Mitigation Plan for Deer Canyon* (Caltrans, January 18, 2011). In addition to the measures proposed in the draft plan, the final plan will include the following information and conditions:

    a. All final specifications and topographic-based grading, planting and irrigation plans (with 1-foot contours for wetlands and 10-foot contours for uplands). All wetland mitigation areas will be graded to the same elevation as adjacent existing U.S. Army Corps of Engineers jurisdictional areas, and will be left in a rough grade state with micro topographic relief (including channels for wetlands) that mimics natural topography. All upland habitat creation/restoration/enhancement sites will be prepared for planting by decompacting the top soil in a way that mimics natural upland habitat top soil to the maximum extent practicable while maintaining slope stability. Planting and irrigation will not be installed until the CFWO has approved of upland habitat restoration/creation site grading. All planting will be installed in a way that mimics natural plant distribution, and not in rows;

    b. Planting palettes (plant species, size and number/acre) and seed mix (plant species and pounds/acre). The plant palette proposed in the draft plans will include native species specifically associated with the habitat type(s). Unless otherwise approved by the CFWO, only locally native species (no cultivars) obtained from San Diego County will be used;

c. Container plant survival will be a minimum of 80 percent of the initial plantings for the first 5 years. If survival is less than 80 percent, the reason for poor plant survival will be evaluated in coordination with the CFWO. At the first and second anniversary of plant installation, all dead plants will be replaced unless their function has been replaced by natural recruitment;

d. A final implementation schedule that indicates when all habitat impacts, as well as creation/restoration/enhancement grading, planting and irrigation will begin and end. Habitat creation/restoration/enhancement grading, planting and irrigation will be completed during the concurrent or next planting season (i.e., late fall to early spring, or later in irrigated areas) after finishing grading within the creation/restoration/ enhancement area. Any temporal loss of habitat caused by delays in creation/ restoration/enhancement will be offset through habitat preservation/creation/restoration/ enhancement as determined in coordination with the CFWO, unless the delays were caused by unforeseeable circumstances or were beyond the reasonable control of the project proponent;

e. Five years of success criteria for wetland and upland restoration/enhancement areas including: separate percent cover criteria for herbaceous understory, shrub midstory, and tree overstory for wetland creation; a total of 75-100 percent absolute cover for wetland and 40-65 percent absolute cover for upland; evidence of natural recruitment of multiple species for all habitat types; 0 percent coverage for Cal-IPC List A and B species, and no more than 10 percent coverage for other exotic/weed species;

f. A minimum 5 years of maintenance and monitoring of restoration/enhancement areas, unless success criteria are met earlier and all artificial water has been off for at least two years. Monitoring will include protocol surveys for coastal gnatcatcher and vireo;

g. A qualitative and quantitative vegetation monitoring plan with a map of proposed sampling locations. Photo points will be used for qualitative monitoring and stratified-random sampling will be used for all quantitative;

h. Contingency measures in the event of restoration/enhancement failure;

i. Annual mitigation maintenance and monitoring reports will be submitted to the CFWO after the maintenance and monitoring period and no later than January 1 of each year;

j. If maintenance of a wetland restoration/enhancement area potentially occupied by vireos is necessary between March 15 and September 15, a biologist[1] will survey for vireos within the creation/restoration/enhancement area, access paths to it, and other areas susceptible to disturbances by creation/restoration/enhancement site maintenance. Surveys will consist of three visits separated by 2 weeks starting April 10 of each

[1] The biologist for this measure should be experienced in vireo biology and ecology.

maintenance/monitoring year. Restoration work will be allowed to continue on the site during the survey period. However, if vireos are found during any of the visits, the project proponent will notify and coordinate with the CFWO to identify measures to avoid and/or minimize effects to the vireo (e.g., nests and an appropriate buffer will be flagged by the biologist and avoided by the maintenance work);

k. If maintenance of a coastal sage scrub creation/restoration/enhancement area is necessary between February 15 and August 31, a biologist[2] will survey for gnatcatchers within the creation/restoration/enhancement area, access paths to it, and other areas susceptible to disturbances by site maintenance. Surveys will consist of three visits separated by 2 weeks starting March 1 of each maintenance/monitoring year. Work will be allowed to continue on the site during the survey period. However, if gnatcatchers are found during any of the visits, the project proponent will notify and coordinate with the CFWO to identify measures to avoid and/or minimize effects to the gnatcatcher (e.g., nests and an appropriate buffer will be flagged by the biologist and avoided by the maintenance work);

3. Both permanent impact areas that are not paved (i.e., cut and fill slopes) and temporary impact areas will be temporarily revegetated with native species after construction. Diegan Coastal Sage Scrub (DCSS) and coyote brush scrub areas will be restored by hydroseeding with a DCSS plant palette. Non-native grassland will be restored by hydroseeding with a native grassland and forb palette. This revegetation will be considered temporary for at least 10 years after project construction until future widening of I-5 is completed, at which time the final I-5 fill slopes and temporary impact areas will be permanently revegetated with native species. Revegetation with native species as described above will be completed by Caltrans with the understanding that no further off site measures will be required to offset impacts within these areas resulting from future I-5 widening. However, after each future construction project, the I-5 fill slope and temporary impact areas will be revegetated with native species.

4. Bioswales will be planted with appropriate species as determined by the storm water pollution prevention professional. Slopes adjacent to developed urban areas will be vegetated with native and drought tolerant non-invasive species selected by a biologist[2] and landscape architect. Interchanges located in urban areas will be landscaped with native or ornamental non-invasive species.

5. Caltrans will prepare a restoration plan for the temporary impact areas and cut and fill slopes northwest of the I-5 Genesee Interchange. The plan will be submitted to the CFWO for review and approval at least 60 days prior to initiating project impacts. This plan will include the following conditions and information:

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[2] The biologist for this measure should be experienced in gnatcatcher biology and ecology.

a. A detailed description of restoration methods, slope stabilization, and erosion control, criteria for restoration to be considered successful, and monitoring protocol(s). Following the completion of construction activities, the restoration plan will be implemented for a minimum of 5 years, unless success criteria are met earlier and all artificial water has been off for at least 2 years;

b. Revegetated areas will have temporary irrigation and will be planted with native container plants and seeds selected by a biologist[2]. The revegetated areas will also be maintained to control invasive weeds until success criteria have been met.

c. Special care will be taken during transport, use, and disposal of soils containing invasive weed seeds to ensure that invasive weeds are not spread into new areas by the project. All heavy equipment will be washed and cleaned of debris prior to entering a new area to minimize the spread of invasive weeds;

d. Duff from areas with coastal sage scrub and chaparral will be saved to aid in revegetating slopes with native species;

e. Rare plants will be salvaged where practicable for use in revegetation efforts;

f. Landscaping should not use plants that require intensive irrigation, fertilizers, or pesticides adjacent to preserve areas, and water runoff from landscaped areas should be directed away from adjacent native habitats and contained and/or treated within the development footprint;

g. A list of species to be included in the landscaping; and

h. Any planting stock to be brought onto the project site for landscape or habitat creation/ restoration/enhancement will be first inspected by a qualified pest inspector to ensure it is free of pest species that could invade natural areas, including but not limited to, Argentine ants (*Iridomyrmex humil*), fire ants (*Solenopsis invicta*) and other insect pests. Any planting stock found to be infested with such pests will not be allowed on the project site or within 91.4 meters (m) [300 feet (ft)] of natural habitats unless documentation is provided to the CFWO that these pests already occur in natural areas around the project site. The stock will be quarantined, treated, or disposed of according to best management principles in a manner that precludes invasions into natural habitats;

6. Existing vegetation on the Deer Canyon property will be cleared between September 16 and March 14 to avoid the vireo nesting season;

7. If grading of the Deer Canyon property cannot be completed prior to the breeding season of the vireo, monitoring for the vireo and noise levels within the habitat adjacent to the Pardee

site will be completed. If noise levels are above 60 dBA, a plywood wall will be constructed between the vireo habitat and grading activities to reduce the noise to below 60 dBA within the habitat;

8. A perpetual biological conservation easement or other conservation mechanism acceptable to the Service will be recorded over the areas preserved, restored, and/or enhanced by the project at the Deer Canyon Property. The conservation mechanism will specify that no easements or activities (e.g., fuel modification zones, public trails, drainage facilities, walls, maintenance access roads) that will result in soil disturbance and/or vegetation removal will be allowed within the biological conservation easement areas. Caltrans anticipates that they will not be able to place the conservation easement or other conservation mechanism for the Deer Canyon property prior to initiating project impacts; however, annual reports will be provided on its status until the conservation mechanism has been placed.

9. Caltrans will prepare a perpetual long-term management, maintenance and monitoring plan (e.g., HMP) for the Deer Canyon property. The HMP will include, but not be limited to, the following: method of protecting the resources in perpetuity (e.g., conservation easement), monitoring schedule, measures to prevent human and exotic species encroachment, funding mechanism, and contingency measures should problems occur. The City of San Diego has agreed to own and manage the Deer Canyon property with a management endowment that will be paid by Caltrans, in accordance with the requirements of the TransNet MOA. Caltrans will establish a non-wasting endowment in an amount approved by the Service based on a Property Analysis Record (PAR; Center for Natural Lands Management ©1998) or similar cost estimation method to secure the ongoing funding for the perpetual long-term management, maintenance and monitoring of the biological conservation easement area by an entity approved by the Service. Caltrans will submit a draft HMP including a description of perpetual management, maintenance and monitoring actions and the PAR or other cost estimation results for the non-wasting endowment to the Service for approval. Caltrans will submit the final HMP to the Service and transfer the funds for the non-wasting endowments to the appropriate management entities. Caltrans anticipates that they will not be able to prepare the HMP and transfer the funds for the non-wasting endowment prior to initiating project impacts; however, annual reports will be provided on their status until the final HMP has been provided and the endowment funds have been transferred.

10. The clearing and grubbing of native habitats for the I-5/Genesee Interchange Reconstruction Project will occur from September 1 to February 14 to avoid the gnatcatcher breeding season [or sooner than September 1 if a biologist[3] approved by the CFWO ("Project Biologist") demonstrates to the satisfaction of the CFWO that all nesting is complete]. Caltrans will submit the biologist's name, address, telephone number, and

[3] The designated project biologist for this measure should be experienced in gnatcatcher biology and ecology.

work schedule on the project to the CFWO at least 5 working days prior to initiating project impacts.

11. The Project Biologist will be on site during: a) initial clearing and grubbing; and b) weekly during project construction within 152.4 m (500 ft) of offsite gnatcatcher habitat to ensure compliance with all conservation measures. The Project Biologist will be familiar with the habitats, plants, and wildlife in the project area to ensure that issues relating to biological resources are appropriately and lawfully managed. The biologist will perform the following duties:

    a. Perform a minimum of three focused surveys, on separate days, to determine the presence of gnatcatchers in the project impact footprint. Surveys will begin a maximum of 30 days prior to performing vegetation clearing/grubbing and one survey will be conducted the day immediately prior to the initiation of remaining work. If any gnatcatchers are found within the project impact footprint, the Project Biologist will direct construction personnel to begin vegetation clearing/grubbing in an area away from the gnatcatchers. In addition, the Project Biologist will walk ahead of clearing/grubbing equipment to flush birds towards areas of coastal sage scrub to be avoided. It will be the responsibility of the Project Biologist to ensure that gnatcatchers will not be injured or killed by vegetation clearing/grubbing. The Project Biologist will also record the number and location of gnatcatchers disturbed by vegetation clearing/grubbing. Caltrans will notify the CFWO at least 7 days prior to vegetation clearing/grubbing to allow the CFWO to coordinate with the Project Biologist on bird flushing activities;

    b. Oversee installation of and inspect the construction fencing and erosion control measures within or up-slope of adjacent native habitat areas a minimum of once per week to ensure that any breaks in the fence or erosion control measures are repaired immediately;

    c. Periodically monitor the work area to ensure that work activities do not generate excessive amounts of dust;

    d. Train all contractors and construction personnel on the biological resources associated with the projects and ensure that training is implemented by construction personnel. At a minimum, training will include: 1) the purpose for resource protection; 2) a description of the sensitive resources and their habitats; 3) the conservation measures that should be implemented during project construction to conserve the sensitive resources, including strictly limiting activities, vehicles, equipment, and construction materials to the fenced project footprint to avoid sensitive resource areas in the field (i.e., avoided areas delineated on maps or on the project site by fencing); 4) environmentally responsible construction practices; 5) the protocol to resolve conflicts that may arise at any time during the construction process; and 6) the general provisions

of the Act, the need to adhere to the provisions of the Act, and the penalties associated with violating the Act;

e. Halt work, if necessary, and confer with the CFWO to ensure the proper implementation of species and habitat protection measures. The Project Biologist will report any violation to the CFWO within 24 hours of its occurrence;

f. Submit monthly email reports (including photographs of impact areas) to Caltrans and the CFWO during clearing of gnatcatcher habitat and project construction. The monthly reports will document that authorized impacts were not exceeded and general compliance with all conditions. The reports will also outline the location of construction activities, the type of construction that occurred, and equipment used. These reports will specify numbers, locations, and sex of gnatcatchers (if observed), observed gnatcatcher behavior (especially in relation to construction activities), and remedial measures employed to avoid and minimize impacts to gnatcatchers. Raw field notes should be available upon request by the CFWO; and

g. Submit a final report to the CFWO within 120 days of project completion that includes: photographs of habitat areas that were to be avoided, and other relevant summary information documenting that authorized impacts were not exceeded and that general compliance with all conservation measures was achieved. As-built construction drawings with an overlay of habitat that was impacted and avoided will be provided as well once they have been completed.

12. All lighting, including night lighting for project construction, installed in the vicinity of the Multiple Habitat Planning Area (MHPA), native vegetation communities, and other open space will be directed away or shielded to prevent light overspill. Streetlights will be low-intensity and shielded to minimize illumination of the adjacent MHPA. Night lighting of construction areas will be of the lowest illumination necessary for human safety, selectively placed, shielded and directed away from natural habitats;

13. Caltrans will temporarily fence (with orange plastic snow fence) the limits of project impacts (including construction staging areas and access routes) to prevent additional habitat impacts. Fencing will be installed in a manner that does not impact habitats to be avoided and such that it is clearly visible to personnel on foot and operating heavy equipment and will be maintained throughout the construction period to preclude human entry into the MHPA. Fencing will be installed in a manner that does not impact avoided habitats. No construction activities, materials, or equipment will be permitted outside the fenced project footprint. Caltrans will submit to the CFWO for approval, at least 5 days prior to initiating project impacts (except for impacts resulting from clearing to install temporary fencing), the final plans for initial clearing and grubbing of habitat and project construction. These final plans will include photographs that show the fenced limits of impact and all areas to be impacted or avoided. If work occurs beyond the fenced or

demarcated limits of impact, all work will cease until the problem has been remedied to the satisfaction of the CFWO. Any impacts that occur beyond the approved fenced area will be offset in consultation with the CFWO. Temporary construction fencing will be removed upon project completion.

14. Drainage from the construction area and new and proposed developed areas in and adjacent to the preserve will not drain directly into the MHPA. Topography of the site is such that MHPA lands directly adjacent to the project are at a higher elevation. The project will use vegetated bioswales to treat road runoff prior to discharge into receiving waterbodies. The use of structural and non-structural Best Management Practices and the restriction of grading and paving activity during significant rain events will reduce potential impacts associated with construction. The project design will comply with the Standard Urban Stormwater Management Plan and Municipal Stormwater Permit criteria of the State Water Resources Control Board and the Clean Water Act section 401 Water Quality Certification issued by the Regional Water Quality Control Board for the Project. Erosion and sediment control devices used for the proposed project, including fiber rolls and bonded fiber matrix, will be made from biodegradable materials such as jute, with no plastic mesh, to avoid creating a wildlife entanglement hazard.

15. Uses in or adjacent to the MHPA should be designed to minimize noise impacts. Gnatcatchers that occupy habitats adjacent to the existing I-5 freeway are subjected to existing noise and vibration and continue to occupy the habitat. Ambient noise levels range from 61.1 dB(A) L_{eq} and 66.4 dB(A) L_{eq}. Once construction is complete, project operations are anticipated to result in a minimal increase in existing noise levels of 2 dB(A) or less. To minimize construction noise impacts to nesting gnatcatchers, all pile driving for the project that will occur near habitats that support gnatcatchers will be conducted between September 1 and February 14 to avoid the gnatcatcher breeding season (or sooner than September 1 if the Project Biologist demonstrates to the satisfaction of the CFWO that all nesting is complete).

16. Caltrans will ensure that the following conditions will be implemented during project construction.

    a. Contractors and construction personnel will strictly limit their activities, vehicles, equipment, and construction materials to the fenced project footprint;

    b. The project site will be kept as clean of debris as possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site;

    c. Pets of project personnel will not be allowed on the project site;

    d. All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities will occur within the fenced project impacts limits. The changing of oil,

refueling, and other actions that could result in a release of a hazardous substance will be restricted to designated areas that are a minimum of 30.5 m (100 ft) from any drainages. Such designated areas will be surrounded with berms, sandbags, or other barriers to further prevent the accidental spill of fuel, oil, or chemicals. Any accidental spills will be immediately contained, cleaned up, and properly disposed;

e. Impacts from fugitive dust will be avoided and minimized through watering and other appropriate measures; and

f. Cut and fill will be balanced within the project or the construction contractor will identify the source or disposal location. All spoils and material disposal will be disposed of properly.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-SDG-08B0205-12F0144

FEB 06 2012

Kim T. Smith
Branch Chief, Environmental Resource Studies
California Department of Transportation
4050 Taylor Street
San Diego, California 92110

Attention: Sue Scatolini, District Biologist

Subject: Amendment to the Formal Section 7 Consultation for the Interstate 5/Genesee Avenue Interchange Reconstruction Project, San Diego County, California

Dear Ms. Smith:

This is in response to your correspondence dated December 16, 2011, requesting that our biological opinion (FWS-SDG-08B0205-11F0246) for the Interstate 5/Genesee Avenue Interchange Reconstruction Project be amended to address modifications to the project that will result in effects to the federally threatened coastal California gnatcatcher (*Polioptila californica californica,* "gnatcatcher") that were not addressed in the original biological opinion. The project is receiving Federal funding through the Federal Highway Administration (FHWA), and the California Department of Transportation (Caltrans) has assumed the Federal Highway Administration's (FHWA) responsibilities under the Act for this consultation in accordance with Sections 6004 and 6005 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) 2005, as described in the National Environmental Policy Act (NEPA) Delegation Pilot Program Memorandum of Understanding between FHWA and Caltrans (effective July 1, 2007) and codified in Renewed 23 U.S.C. 326 and 23 U.S.C. 327. We initiated consultation on December 21, 2011, the date we received your request.

The project is located at the Interstate 5 (I-5)/Genesee Avenue Interchange and will replace the existing I-5/Genesee Avenue 4-lane overcrossing with a 6-lane overcrossing that is wider, longer, and higher than the existing structure. The project also includes additional improvements to accommodate increased traffic flows, such as auxiliary lanes in both directions on I-5 between the Genesee Avenue ramps and the adjacent ramps for La Jolla Village Drive and Sorrento Valley Road. The proposed modifications to the project are a result of final design changes and the addition of a Class 1 bicycle facility west of the southbound lanes. Retaining walls will be used to minimize impacts to sensitive habitats.

The amended impacts due to the proposed changes are summarized in Table 1. While there will be a decrease of 0.14 acre (ac) in high quality coastal sage scrub impacts, overall impacts to vegetation suitable for gnatcatchers will increase by approximately 0.22 ac. Less nonnative grassland will be impacted primarily on the northbound side of the freeway north of Genesee. In addition, the changes to the project footprint resulted in a decrease in impacts to southern willow scrub of approximately 0.16 ac. Unvegetated drainage channel was not included in the original vegetation mapping but was identified in the wetland delineation.

Table 1. Revised Impacts to Vegetation Communities

Vegetation Community	Original BO Impacts (ac/ha)	Amended Impacts (ac/ha)
Coyote Brush Scrub	0.4 / 0.9	**0.48 / 1.18**
Coastal Sage Scrub	1.8 / 4.5	(1.77 / 4.36)
Disturbed Coastal Sage Scrub	0.5 / 1.3	**0.55 / 1.38**
Total CSS and Coyote brush scrub	2.7 / 6.7	**2.8 / 6.92**
Nonnative Grassland	4.41 / 10.9	(3.47 / 8.58)
Southern Willow Scrub	0.47 / 1.17	(0.41 / 1.01)
Unvegetated Drainage Channel	--	**0.04 / 0.11**

As stated in the biological opinion, all impacts to sensitive habitats are considered to be permanent and will be mitigated offsite as permanent impacts. The amended offsite conservation due to the proposed changes is summarized in Table 2.

Table 2. Revised Offsite Conservation at Deer Canyon

Vegetation Community	Original BO Conservation (ac/ha)	Amended Conservation (ac/ha)
Southern willow scrub/Unvegetated channel	1.41 / 3.51	(1.35 / 3.36)
Coastal Sage Scrub and Coyote Brush Scrub	5.4 / 13.4	**5.6 / 13.84**
Nonnative Grassland	2.2 / 5.5	(1.74 / 4.29)

Bold Text indicates an increase over the original BO impacts

Text in (parentheses) indicates a decrease from the original BO impacts

Temporary impact areas will be temporarily revegetated with native species after construction. This revegetation will be considered temporary for at least 10 years after project construction until future widening of I-5 is completed, at which time the final I-5 fill slopes and temporary impact areas will be permanently revegetated with native species. Revegetation with native species as described above will be completed by Caltrans with the understanding that no further off site measures will be required to offset impacts within these areas resulting from future I-5 widening. However, after each future construction project, the I-5 fill slope and temporary impact areas will be revegetated with native species.

The following amended conservation measure is proposed to avoid and minimize potential impacts to the gnatcatcher. Changes from the original biological opinion are indicated with the underlined text.

1. Permanent and temporary impacts to gnatcatcher habitat totaling 2.8 ha (6.92 ac) will be offset through restoration and preservation of 5.6 ha (13.84 ac) of Diegan coastal sage scrub at the Pardee (Deer Canyon) property. Temporary impacts will be offset the same as permanent impacts because revegetation of these areas is anticipated to be temporary, as documented in Conservation Measure 3 below.

We have determined that the above modifications will not change the conclusion or alter the incidental take statement of our March 23, 2011, biological opinion. Therefore, the interagency consultation requirements of section 7 of the Act have been satisfied. With the exception of the conservation measures amended above, all conservation measures will be implemented as written in the biological opinion (FWS-SDG-08B0205-11F0246) previously issued for the proposed action. By copy of this letter, we are formalizing these changes to the March 23, 2011, biological opinion. If you have any questions regarding this amendment, please contact Sally Brown of this office at 760-431-9440, extension 278.

Sincerely,

Karen A. Goebel

Karen A. Goebel
Assistant Field Supervisor

EXHIBIT "B"

CONSTRUCTION PRACTICES

TERMS AND CONDITIONS OF WORK TO BE PERFORMED

I. Any work for the Interstate 5 Genesee Interchange Project ("Project") to be performed on Property owned by THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, a California public corporation on behalf of the San Diego Campus ("UCSD") by CALTRANS ("CALTRANS") and its CONTRACTOR ("Contractor") is subject to the terms and conditions, as set forth below.

1. No construction shall be allowed on UCSD's campus without first contacting UCSD's representatives for the I-5 Genesee Interchange Project, Anka Fabian, Principal Civil Engineer, UCSD Facilities Design and Construction (FD&C) Department at 858-534-3813 or by email at anfabian@ucsd.edu, and Richard Cota, Assistant Director, UCSD's Building Operations Facilities Management (FM) Department at 858-822-1061 with at least four weeks advance notice.

2. A preliminary construction schedule must be presented to UCSD and reviewed at least thirty (30) days prior to the start of construction.

3. Weekly construction meetings shall begin at least one week prior to the start of construction on the UCSD campus and shall continue throughout the duration of construction activity on the UCSD campus.

4. Recognize that the UCSD campus is a year-round operation and that there are critical times during the year when University activities (e.g., finals week) must be coordinated with CALTRANS and its contractor to minimize negative impacts to the campus and CALTRANS' construction project. CALTRANS will include these restrictions in its construction contracts. Relief from any restriction affecting UCSD Property would require the written authorization of UCSD.

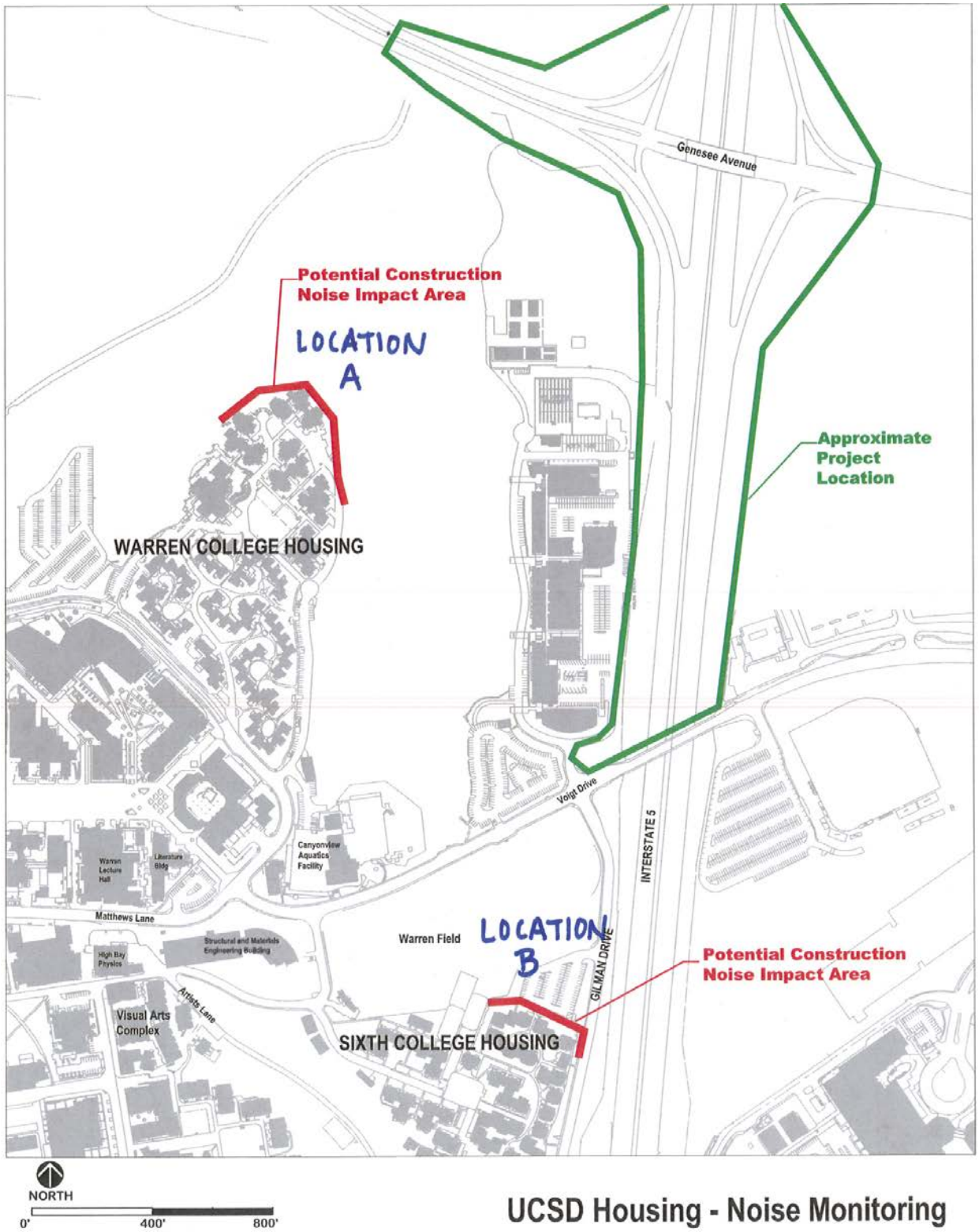
During the following periods, construction activities located on UCSD Property shall be during UCSD's standard construction hours of 7:00 am to 3:30 pm, Monday through Saturday.

Academic Quarter	Finals Week
Fall 2013	December 9 – December 14
Winter 2014	March 17 – March 22
Spring 2014	June 9 – June 13
Fall 2014	December 15 – December 20
Winter 2015	March 16 – March 21
Spring 2015	June 8 –June 12
Fall 2015	December 7 – December 12

5. All streets and intersections on the UCSD campus must remain open and passable at all times including for emergency vehicles.

6. Other than the above time periods, Construction on the UCSD campus shall be permitted as follows:

   CALTRANS and Contractor shall limit construction activities at locations "A" and "B" which are identified in the depiction below to an average exterior sound level of 75dBA or less over 12- hour periods: (i) between 7 am to 7 pm Monday through Sunday, (ii) 7 pm to 7 am Monday through Sunday, or the City of San Diego standard for construction activities in the vicinity of residential, whichever is more restrictive. If CALTRANS and Contractor are granted any permits for night construction work between 7 pm and 7 am for the Project by the Noise Abatement and Control Administrator of the City of San Diego, copies of such permits shall be provided to UCSD in advance of the work. Notwithstanding the foregoing, UCSD shall be permitted to coordinate with CALTRANS and Contractor regarding any reports of excessive noise to ensure that these standards are being followed including, if necessary, the placement of noise monitoring devices by CALTRANS or Contractor at the locations identified below. CALTRANS and Contractor shall contact UCSD Real Estate to obtain a license agreement to place such noise monitoring devices.



UCSD Housing - Noise Monitoring

7. CALTRANS and Contractor shall be sensitive to campus activities that may be adversely impacted by construction activities.

8. Limit temporary vibration, noise, dust, and visual impacts to a reasonable extent and within compliance with Federal, State and local rules and regulations including any Mitigation and Monitoring and Reporting Program required by the California Environmental Quality Act for this Project. CALTRANS and Contractor will include these requirements in its construction contracts and monitor and enforce these provisions.

9. Reasonably allow UCSD to inspect Project construction occurring on UCSD Property for compliance with this License Agreement, Easements, and the conformed plans and specifications prepared by Donaldo Martinez, dated _____ 2013 ("Final Project Plans") in coordination with CALTRANS' Construction Resident Engineer.

10. Coordinate with UCSD-approved utility mark out services, to be funded by the Project, in order to identify all known campus facilities and underground utilities that are within Temporary Construction Licensed Areas. In addition to the Underground Service Alert, to ensure proper coordination of utility and telecommunication identification, since Dig Alert does not mark out UCSD utilities and telecommunications lines, a locating company needs to be contracted to do a mark out. CALTRANS shall have its Contractor contract at their cost with any locating company independently to mark out utilities and telecommunications lines. Contact the appropriate representative at UCSD's Telecommunications Department (Buck Wilmerding at 858 534-5694) to coordinate telecommunication identification.

11. Caltrans shall select qualified and competent construction management teams.

12. Hold construction contractors responsible for work area and laydown area cleanliness, security and safety on UCSD Property in coordination with UCSD.

13. Notify UCSD a minimum of 72 hours in advance of pedestrian and vehicular way closures or restriction within 500 feet of Temporary Access Areas or Temporary Construction Licensed Areas or on roadways utilized by the Contractor to access the Temporary Construction Licensed Areas or areas of Easements.

14. Maintain effective communication and coordination during Project construction. In order to comply with this item, CALTRANS' David Pound (Phone: 858-720-2112, Email: dave.pound@dot.ca.gov), will:

    i. Be the point of contact for UCSD to interface with CALTRANS, its construction manager and Contractor.

    ii. Hold weekly meetings while construction is occurring on the UCSD campus.

    iii. Invite UCSD to the meetings.

    iv. Provide three-week "look ahead" schedules at the weekly meetings.

15. Provide traffic control and flagging for pedestrians and vehicles when construction equipment and personnel are required to cross UCSD pedestrian or vehicle ways.

16. Secure prior approval from UCSD a minimum of 7 days in advance regarding the movements of large construction equipment on or off UCSD Property or between access or construction areas within UCSD Property.

17. Limit temporary impacts to parking spaces on UCSD Property as a result of the Project.

18. Prepare Pre-Construction Surveys prepared by a licensed surveyor of the Temporary Construction Licensed Areas, and shall prepare a pre-construction photographic survey ("Pre-Construction Photographic Survey"), a post-construction survey prepared by a licensed surveyor ("Post Construction Survey"), and a post-construction photographic survey ("Post-Construction Photographic Survey") of the condition of Temporary Access Areas and roadways and general conditions (to include above ground structures, utilities, landscape and other facilities identified by CALTRANS, Contractor and UCSD as potentially vulnerable to accidental unavoidable damage ("General Conditions') on UCSD Property to be utilized during Project construction, outside of the Project work and laydown areas. It is assumed that:

    i. Prior to commencement of construction, CALTRANS and Contractor shall prepare a Pre-Construction Survey and Pre-Construction Photographic Survey of UCSD roadways and General Conditions, and

    ii. After completion of major construction activities, CALTRANS and Contractor shall prepare a Post-Construction Survey and a Post-Construction Photographic Survey of UCSD roadways and General Conditions, and UCSD will review both the Post-Construction Survey and the Post-Construction Photographic Survey results and agree on required repairs needed to return roadways and General Conditions to pre-construction condition.

19. Provide as-built plans of the Project to UCSD in an electronic CAD format within 12- months following completion of the Project.

20. Relocate or construct on UCSD Property in accordance with UCSD construction standards (http://www.fdc.ucsd.edu), and plans and specifications approved by UCSD. Caltrans shall construct, at its own expense, the Fire Rated Wall adjacent to the Gas Cylinder Storage Facility pursuant to plans and specifications approved by UCSD.

21. Provide, if desired by UCSD, security for the Temporary Construction Licensed Areas and easement areas at the Project's sole cost and expense. It is understood by CALTRANS and Contractor that UCSD assumes no responsibility for stolen and/or damaged property belonging to CALTRANS, Contractor or their employees.

22. Assume, at the Project's sole cost and expense, all responsibility for preparation and required clean-up of the Temporary Construction Access Area, the Temporary Construction Licensed Areas and easement areas prior to, during, and immediately following the term of this License Agreement.

23. Coordinate with UCSD regarding citations for violation of UCSD rules and regulations.

24. Notify UCSD Campus Police at 858-534-4357 of any unusual occurrence.

25. Contact UCSD emergency services at 858-534-2930 in case a utility line is broken or in the event of an emergency situation. Contact UCSD Telecommunications at 858-534-3187 in case any telecommunications line is damaged.

26. A. Caltrans shall reimburse UCSD in an amount not to exceed One Hundred and Fifty Thousand Dollars ($150,000) for technical support (including Fire and Life Safety and Environmental Affairs), construction inspection services and telecommunications support of Project components being constructed on the campus. Compensation will be based on monthly invoices listing actual technical staff hours spent in direct support of the Project, and hourly rates. Attachment 1, Compensation Schedule, lists current hourly rates that may be increased periodically based on salary adjustments and overhead increases.

    B. In the event that it appears reasonably foreseeable that the maximum amount set forth herein of $150,000 will be exceeded over the course of the Project, Caltrans shall consider in good faith and prior to expending or committing any funds higher than the maximum amount, an increase in such amount as may be reasonably justified.

    C. Caltrans shall promptly review UCSD invoices and promptly process approved invoices for payment. The process for submission and payment of invoices shall be mutually agreed upon by Caltrans and UCSD.

27. <u>Permits and Regulations</u>. CALTRANS and Contractor shall be responsible for securing any required approvals, permits and authorizations from any federal, state or local agencies, and shall comply with all applicable laws, ordinances, and regulations including, but not limited to, all applicable regulatory, environmental, and safety requirements including UC Regents' policies, specifications, design standards, seismic safety requirements and guidelines at CALTRANS's and Contractor's sole cost and expense.

    CALTRANS and Contractor shall be responsible for compliance with UC San Diego's Campus Services Complex Industrial Storm Water General Permit Order 97-03-DWQ and NPDES permit that regulates discharges associated with 10 broad categories of industrial activities. A site-specific Storm Water Pollution Prevention Plan (SWPPP) includes a monitoring plan to

manage sources and reduce storm water pollution. Results are posted electronically on a State website.

28. No Interference. CALTRANS and Contractor shall not unreasonably interfere with the use by and operation and activities of UCSD on its Property including the fueling facility, fuel tanks, fleet services operations and buses, Environmental Management Facility ("EMF"), compressed gas cylinder storage, hazardous and universal waste storage, and hazardous materials storage, Clark Martin (explosive bunker), and CALTRANS and Contractor shall use such routes and follow such procedures on the Temporary Construction Access Areas and the Temporary Construction Licensed Area that result in the least damage and inconvenience to UCSD, its agents, employees and invitees. UCSD shall not unreasonably interfere with the construction activities by CALTRANS and Contractor on the Temporary Construction Licensed Areas and easement areas as long as such activities are performed in accordance with this Agreement.

29. No Hazardous Material Release. CALTRANS and Contractor shall be permitted the use of hazardous materials for routine operation, maintenance and repair of facilities on the Temporary Construction Access Area, Temporary Construction Licensed Areas and easement areas, including but not limited to cleaning products, fuels, lubricants, or coatings. CALTRANS and Contractor shall not store, deposit, dispose, or allow the controlled or uncontrolled spill or release of any hazardous material or toxic waste or other harmful substances on the Temporary Construction Access Area and Temporary Construction Licensed Areas, easement areas, or on any other Property of UCSD.

    CALTRANS and Contractor shall be responsible for clean-up of unplanned releases or spills of hazardous materials or wastes ("Hazardous Materials Release") per the regulatory requirements of Resource, Conservation and Recovery Act ("RCRA"), the Clean Water Act, and Chapter 6.95 of the California Health and Safety Code embodied in the UC San Diego Storm Water Management Plan, and California Stormwater Quality Association ("CASQA") Best Management Practices (http://www.cabmphandbooks.com/); UC San Diego Sewer System Management Plan, Spill Prevention Control and Countermeasures ("SPCC") Plan, Hazardous Materials Team Field Operations Guide; Duty Responders Handbook; and accepted industry standards for California.

    In the event that CALTRANS and Contractor do not immediately clean up a Hazardous Materials Release, UCSD may clean up such Hazardous Materials Release, and CALTRANS and Contractor shall reimburse UCSD for the actual accrued cost of such Hazardous Materials Release for mitigating spill and clean-up including UCSD staff time, or their agents, and any costs associated with a temporary operation of temporary refueling location including UCSD staff time, or their agents, if needed.

CALTRANS and Contractor shall comply with UCSD's "only rain in the storm drain" requirement of the UC san Diego Phase II MS4 Storm Water Permit embodied in the UC San Diego Storm Water Management Plan (Draft December 2011), which means if it is not raining, there should not be any discharge to the storm drain, including cigarette butts or any other litter or any non-rain liquids such as coffee or juices, to the storm drain or to any adjacent area.

30. CALTRANS represents and warranties that it has not received any notice from any city, county, state or other governmental authority of any violation of any federal, state and local laws, ordinances and regulation applicable to the Temporary Construction Access Area, Temporary Construction Licensed Areas and easement areas with respect to hazardous or toxic substances or industrial hygiene (collectively, "Environmental Laws") which violation has not been corrected and CALTRANS has no actual knowledge of any such violation.

31. Repair and Restoration. CALTRANS and Contractor shall construct Project and repair and restore the Temporary Access Area, Temporary Construction Licensed Areas and easement areas in accordance with the Final Project Plans and site restoration plan ("Site Restoration Plan") submitted by CALTRANS to UCSD and approved by UCSD Physical Planning. If CALTRANS, its agents or contractors cause any damage including, but not limited to, soil erosion, subsidence or damage resulting therefrom to the Temporary Access Area or the Temporary Construction Licensed Areas, easement areas or to UCSD's roads, infrastructure, facilities, flatwork, structures, landscape or other property and improvements (collectively "Property") in connection with the exercise of this Agreement, CALTRANS and Contractor shall promptly repair and restore the Temporary Construction Licensed Areas and Property to their condition prior to CALTRANS's use of the Temporary Construction Licensed Areas, as documented by Pre-construction Surveys, and Pre-Construction Photographic Surveys and Post-construction Surveys and Post-Construction Photographic Surveys conducted on UCSD Property as required under Paragraph 18. In the event that repair and restoration is performed following the termination of this Agreement, the CALTRANS' and Contractor's Indemnity and Insurance obligations in Paragraphs 32 and 33 shall continue until repair and restoration is completed as provided herein. Prior to the expiration date of this Agreement, UCSD shall review site restoration work and either accept the site restoration, or CALTRANS shall be required to complete site restoration based upon an agreed upon acceptance. If UCSD and CALTRANS are unable to reach an agreed upon acceptance of the site restoration prior to the expiration date of this Agreement, then UCSD shall have the right to perform the site restoration and maintenance and CALTRANS shall be liable to UCSD for repayment of such actual and reasonable costs incurred by UCSD.

Damage to Telecommunications facilities, whether marked or not, including conduits and cables therein, shall be repaired by UCSD Telecommunications or their subcontractors. CALTRANS and Contractor shall reimburse UCSD or its designee for actual and reasonable

costs. Such costs shall not include betterments or replacement of 100% depreciated or obsolete facilities.

32. Indemnification.

32.1 CALTRANS' Obligation. CALTRANS shall indemnify, defend, and hold harmless The Regents of the University of California, its officers, agents, employees and invitees, from and against any claims, damages, costs, expenses, or liabilities (collectively "Claims") arising out of or in any way connected with this License Agreement including, without limitation, Claims for loss or damage to any property, or for death or injury to any person or persons but only in proportion to and to the extent that such Claims arise from the negligent or intentional acts or omissions of CALTRANS, its officers, agents, employees or invitees.

32.2 Contractor's Obligation. Contractor shall indemnify, defend, and hold harmless The Regents of the University of California, its officers, agents, employees and invitees, from and against any claims, damages, costs, expenses, or liabilities (collectively "Claims") arising out of or in any way connected with this License Agreement including, without limitation, Claims for loss or damage to any property, or for death or injury to any person or persons but only in proportion to and to the extent that such Claims arise from the negligent or intentional acts or omissions of Contractor, its officers, agents, employees or invitees.

.

33. Insurance.

33.1 CALTRANS, at its sole cost and expense, shall insure its activities in connection with this Agreement and obtain, keep in force, and maintain insurance, or a program of self-insurance, as follows:

A. Commercial Form General Liability Insurance (contractual liability included) with minimum limits as follows:

a. Each Occurrence	$2,000,000
b. Products/Completed Operations Aggregate	$2,000,000
c. Personal and Advertising Injury	$2,000,000
d. General Aggregate	$5,000,000

If the above insurance is written on a claims-made form, it shall continue for three (3) years following termination of this Agreement. The insurance shall have a retroactive date of placement prior to or coinciding with the commencement of the Term of this Agreement.

B. Business Automobile Liability Insurance for owned, scheduled, non-owned, or hired automobiles with a combined single of not less than Five Million dollars ($5,000,000) per occurrence.

C. Property, Fire and Extended Coverage Insurance in an amount sufficient to reimburse CALTRANS for all of its equipment, trade fixtures, inventory, fixtures and other personal property located on or in the Temporary Construction Licensed Areas.

D. Workers' Compensation as required by California law.

The coverages required herein shall not limit the liability of CALTRANS.

The coverages referred to under "A" and "B" of this Paragraph 33.1 shall include The Regents of the University of California as an additional insured. Such a provision shall apply only in proportion to and to the extent of the negligent acts or omissions of CALTRANS, its officers, agents, and employees. CALTRANS, upon the execution of this Agreement, shall furnish UCSD with certificates of insurance evidencing compliance with all requirements. Certificates shall provide for thirty (30) days (ten (10) days for non-payment of premium) advance written notice to UCSD of any material modification, change or cancellation of the above insurance coverages. Coverage shall be procured from an insurer licensed to do business in California with a Best's rating of "A-, VIII" or better.

33.2 Contractor's Insurance Requirements

A. Commercial Form General Liability Insurance (contractual liability included) with minimum limits as follows:

a. Each Occurrence	$2,000,000
b. Products/Completed Operations Aggregate	$2,000,000
c. Personal and Advertising Injury	$2,000,000
d. General Aggregate	$5,000,000

If the above insurance is written on a claims-made form, it shall continue for three (3) years following termination of this Agreement. The insurance shall have a retroactive date of placement prior to or coinciding with the commencement of the Term of this Agreement.

B. Business Automobile Liability Insurance for owned, scheduled, non-owned, or hired automobiles with a combined single of not less than Five Million dollars ($5,000,000) per occurrence.

C. Property, Fire and Extended Coverage Insurance in an amount sufficient to reimburse Contractor for all of its equipment, trade fixtures, inventory, fixtures and other personal property located on or in the Temporary Construction Licensed Areas.

D. Workers' Compensation as required by California law.

E. The coverages required herein shall not limit the liability of Contractor.

F. The coverages referred to under "A" and "B" of this Paragraph 33.2 shall include The Regents of the University of California as an additional insured. Such a provision shall apply only in proportion to and to the extent of the negligent acts or omissions of Contractor, its officers, agents, and employees. CALTRANS, upon the execution of construction contract with Contractor, shall furnish UCSD with Contractor certificates of insurance evidencing compliance with all requirements. Certificates shall provide for thirty (30) days (ten (10) days for non-payment of premium) advance written notice to UCSD of any material modification, change or cancellation of the above insurance coverages. Coverage shall be procured from an insurer licensed to do business in California with a Best's rating of "A-, VIII" or better.

34. CALTRANS and Contractor to Maintain Lien Free Title. UCSD may post such notices of non-responsibility as it reasonably deems appropriate on its Property during the construction of the Project provided for herein. If a mechanic's lien should be recorded against UCSD's Property, CALTRANS and Contractor must immediately either satisfy and discharge lien or obtain a legally adequate statutory release bond. If CALTRANS and Contractor refuse to satisfy and discharge such lien, or to obtain a statutory release bond sufficient to release such lien from title, after demand by UCSD, then UCSD shall have the unilateral right to satisfy and discharge lien without regard to its validity and recover the full cost of doing so from CALTRANS and Contractor. If UCSD is named in any lawsuit arising out of construction activities for the Project, CALTRANS and Contractor shall be required to indemnify and defend UCSD with regard to any such lawsuit, and UCSD shall have the right to settle any such lawsuit on behalf of CALTRANS and Contractor if CALTRANS and Contractor refuse to indemnify and/or defend. In the event that UCSD settles such lawsuit, UCSD shall be entitled to recover from CALTRANS and Contractor the full amount of such settlement and all costs of UCSD's defense, including without limitation UCSD's attorneys' fees.

35. Payment and Performance Bonds. CALTRANS shall require Contractor to obtain payment and performance bonds for all work undertaken upon the Temporary Access Area and Temporary Construction Licensed Areas, easement areas and UCSD's Property covering 100% of the contract amount, issued in a form and by an admitted surety(ies) with a Best's rating of "A-, VIII" or better. Such bonds shall be obtained prior to commencement of construction. Such bonds shall conform to the requirements of the Civil Code and be issued by sureties that are, on the date of issuance of such bonds, listed in the latest published State of California, Department

of Insurance, list of "Sureties Admitted to Transact Surety Insurance in this State." Bonds must be approved as to form by UCSD, which approval shall not be unreasonably withheld.

36. Any work performed by Caltrans or its Contractor on Caltrans property adjacent to the UCSD Campus Services Complex and fuel facility/fuel tanks shall be subject to the terms and conditions as set forth below:

    A. UCSD shall have a seven working day period following receipt of hard copies to review and comment on the proposed construction methods, bid set of plans and specifications, and during the course of construction, those submittals relating to the construction of the retaining walls adjacent to referenced UCSD Property.

    B. UCSD shall be provided access to Caltrans property periodically and in such a manner to effectively observe the referenced work. Specifically, UCSD IOR shall observe material from those cased soil nails as they are drilled below the fuel tanks and as the drilling spoils are removed from the casing.

    C. Caltrans and its Contractor shall halt construction if any conditions arise that could jeopardize the integrity of the fuel tanks. Caltrans is responsible for any issues related to integrity of the fuel tanks during construction and as a result of the Caltrans' work.

ATTACHMENT 1
To Exhibit "B"

UCSD COMPENSATION SCHEDULE (As of July 2012)*

Description	# Hours	Rate/Hour	Estimated Total
Associate Vice Chancellor	0	$230	$0
Senior Director/Director	55	$160	$8,800
Project Manager & Engineers	218	$105	$22,890
Project Inspector	608	$105	$63,840
Project Specialist/Project Specialist Assistant, Contract Personnel	55	$53	$2,915
Facilities Management	0	$100	$0
Environment, Health and Safety – Fire & Life Safety	181	$138	$24,978
Environment, Health and Safety – Environmental Affairs	242	$103	$24,926
Telecom Project Manager/Engineer	0	$85	$0
Telecom Installation and Repair Technician	0	$45	$0
			$148,349
Estimated Total (Rounded)			**$150,000**

Current Rates/Hour for UCSD Staff (as of July 2012)

Associate Vice Chancellor	$230
Senior Director/Director	$160
Project Manager & Engineers	$105
Project Inspector	$105
Project Specialist/Project Specialist Assistant/Contract Personnel	$53
Facilities Management	$100
Environment, Health and Safety – Fire & Life Safety	$138
Environment, Health and Safety – Environmental Affairs	$103
Telecom Project Manager/Engineer	$85
Telecom Installation and Repair Technician	$45

*The hourly rates in this Attachment 1, Compensation Schedule, may be increased periodically based on salary adjustments and overhead increases.

RONALD W. BEALS, Chief Counsel
JEFFREY R. BENOWITZ, Deputy Chief Counsel
GLENN B. MUELLER, Assistant Chief Counsel
JOHN FREDERICK SMITH, Assistant Chief Counsel
REBECCA A. LEVI, Deputy Attorney (CBN 249180)
State of California, Department of Transportation
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San Diego, California 92110
Tel: (619) 688-2531
Fax: (619) 688-6905

Attorneys for Plaintiff
STATE OF CALIFORNIA

(NO FEE PURSUANT TO GOV. CODE, § 6103)

FILED
Clerk of the Superior Court
MAR 13 2014
By L Urie, Deputy

COPY

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN DIEGO

THE PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the Department of Transportation, Plaintiff, v. ARE-9880 CAMPUS POINT, LLC, A Delaware Limited Liability Company; TREGA BIOSCIENCES, INC. dba LION BIOSCIENCE; CHICAGO TITLE COMPANY, as Trustee; AID ASSOCIATION FOR LUTHERANS, A Wisconsin Corporation; AMYLIN PHARMACEUTICALS, INC., A Delaware Corporation; and DOES ONE through FIFTY, inclusive, Defendants.	Case No. 37-2012-00104676-CU-EI-CTL Parcel 34866-1, -2 **STIPULATION FOR JUDGMENT IN CONDEMNATION** **"IMAGED FILE"** Dept.: C-66 Judge: Joel M. Pressman Trial Date: Not Set C. Filed: September 28, 2012

IT IS HEREBY STIPULATED by and among Plaintiff THE PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the Department of Transportation ("Plaintiff"), and defendant ARE-9880 CAMPUS POINT, LLC, a Delaware Limited Liability Company ("ARE-9880"), individually and/or through their respective counsel of record, that Judgment in Condemnation as to the real property or interests in real property described in Plaintiff's complaint filed in this action as Parcels 34866-1, -2 may be entered in the sums and containing the terms and conditions of the attached proposed judgment, marked Exhibit A, and by this

reference made a part of this stipulation, and that Statement of Decision is hereby waived. However, Plaintiff shall give ARE-9880 written notice at least seven (7) Court days before filing Notice of Entry of Judgment with the Court, before filing a proposed Final Order of Condemnation with the Court, and before submitting the Final Order of Condemnation for recordation. The parties further waive their respective litigation expenses, including attorney's fees and expert witness fees. By executing this stipulation, each party expressly agrees to, approves of, and accepts the terms of the Judgment marked Exhibit A.

The signatories in this Stipulation expressly warrant and represent that each is legally authorized to act on behalf of the respective parties herein and have full rights to obligate and bind the party to the terms and conditions of this Stipulation and further agree to indemnify and hold harmless each other Party from any loss incurred directly or indirectly by reason of the falsity or inaccuracy of such representation and from any and all claims that such authority did not exist.

This Stipulation may be executed in counterparts with facsimile signatures sufficient for presentation, filing and approval by the Court.

DATE: 3/12/2014

THE PEOPLE OF THE STATE OF CALIFORNIA,
acting by and through the Department of Transportation

By: _____
AMY LAMOTT VARGAS
Deputy District Director
Right of Way, District 11

DATE: 3/12/2014

ARE-9880 CAMPUS POINT, LLC,
A DELAWARE LIMITED LIABILITY COMPANY

By: _____
GARY DEAN
Vice President-Real Estate Legal Affairs

APPROVED AS TO FORM:

DATE: 4/12/14

RONALD W. BEALS, Chief Counsel

By: _____
REBECCA A. LEVI
Attorneys for Plaintiff
STATE OF CALIFORNIA

DATE: 3/12/14

HECHT, SOLBERG, ROBINSON, GOLDBERG & BAGLEY LLP

By: _____
RICHARD A. SCHULMAN
Attorneys for Defendant
ARE-9880 CAMPUS POINT, LLC

EXHIBIT A

RONALD W. BEALS, Chief Counsel
JEFFREY R. BENOWITZ, Deputy Chief Counsel
GLENN B. MUELLER, Assistant Chief Counsel
JOHN FREDERICK SMITH, Assistant Chief Counsel
REBECCA A. LEVI, Deputy Attorney (CBN 249180)
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Fax: (619) 688-6905

Attorneys for Plaintiff
STATE OF CALIFORNIA

(NO FEE PURSUANT TO GOV. CODE, § 6103)

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN DIEGO

THE PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the Department of Transportation, Plaintiff, v. ARE-9880 CAMPUS POINT, LLC, A Delaware Limited Liability Company; TREGA BIOSCIENCES, INC. dba LION BIOSCIENCE; CHICAGO TITLE COMPANY, as Trustee; AID ASSOCIATION FOR LUTHERANS, A Wisconsin Corporation; AMYLIN PHARMACEUTICALS, INC., A Delaware Corporation; and DOES ONE through FIFTY, inclusive, Defendants.	Case No. 37-2012-00104676-CU-EI-CTL Parcel 34866-1, -2 **JUDGMENT IN CONDEMNATION** **"IMAGED FILE"** Dept.: C-66 Judge: Joel M. Pressman Trial Date: Not Set C. Filed: September 28, 2012

Plaintiff, THE PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the Department of Transportation ("Plaintiff"), and defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, individually and/or through their respective counsel of record, have stipulated that Judgment in Condemnation as to the real property, or interests in real property, described in Plaintiff's complaint filed in this proceeding as Parcels 34866-1 and 34866-2 may be entered herein among these parties. The parties have waived Statement of

Decision. The parties have also waived and discharged their respective litigation expenses, attorney's fees, interest and expert witness fees.

GOOD CAUSE APPEARING, IT IS HEREBY ORDERED, ADJUDGED AND DECREED:

1. The total additional sum to be paid to defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, in this proceeding and for the acquisition of Parcels 34866-1 and 34866-2 as described in Plaintiff's complaint is $74,619 which is the amount of compensation assessed in this proceeding in the sum of $240,619, less the amount of $166,000 previously withdrawn on March 18, 2013, pursuant to order of this court. This sum shall be paid by check or warrant payable to defendant ARE-9880 Campus Point, LLC, and sent by messenger or recognized overnight delivery service attn: Jason Moorhead, 4660 La Jolla Village Drive, Suite 725, San Diego, CA 92122. Immediately upon receipt of the check or warrant and as a condition to negotiating the same, defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, itself or through its counsel of record, shall execute and deliver to Plaintiff's counsel an Acknowledgment of Satisfaction of Judgment.

2. The total sum of $74,619 shall be paid to defendant as follows:

a. To defendant ARE-9880 Campus Point, LLC, in the sum of $74,619.

3. The defendant, by counsel, has executed a State of California Payee Data Record and furnished the executed Payee Data Record to Plaintiff's counsel, Rebecca A. Levi, Esq., at 4050 Taylor Street, MS-130, San Diego, California 92110.

4. Defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, pursuant to Code of Civil Procedure section 1263.025, shall also receive reimbursement from Plaintiff for its reasonable costs incurred to obtain an independent appraisal in this proceeding as follows:

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a. To defendant ARE-9880 Campus Point, LLC, in the sum of $5,000. This sum shall be paid by check or warrant payable to ARE-9880 Campus Point, LLC, and delivered concurrently with the payment described by paragraph 1, above.

5. Plaintiff shall notify defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, within ten (10) days after construction of the Project on and use of the temporary construction easement on Parcel 34866-1 has been completed. Between sixty (60) and ninety (90) days thereafter, Plaintiff and defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, shall meet at the subject property located at 9880 Campus Point Drive, San Diego, California 92121, to conduct an inspection of irrigation and landscaping. Plaintiff or its contractor shall repair any irrigation belonging to defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, within Parcels 34866-1 and 34866-2 or on the subject property located at 9880 Campus Point Drive, San Diego, California 92121 identified during the inspection as having been damaged by the construction work. In addition, if defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, and Plaintiff's arborist/engineer conclude during the joint inspection that landscaping (other than the damaged trees identified in exhibit A already compensated for in the amount of $50,000) has been damaged, Plaintiff or its contractor shall replace the damaged landscaping.

6. Plaintiff shall notify defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, a minimum of forty-five (45) days prior to use of the temporary construction easement on Parcel 34866-1 for Plaintiff and defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, to meet at the subject property located at 9880 Campus Point Drive, San Diego, California 92121 to conduct a check and test of existing irrigation facilities to remain in place or to be relocated for missing parts, damaged components, and improper operation (all together, "Deficiencies"). Plaintiff shall provide a list of irrigation system Deficiencies to defendant within seven (7) working days after checking the existing facilities. Defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, shall repair any irrigation Deficiencies belonging to defendant ARE-9880 Campus Point, LLC, a

Delaware Limited Liability Company (within or outside the subject property located at 9880 Campus Point Drive, San Diego, California 92121), identified during the joint inspection prior to Plaintiff beginning work. If the defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, does not make the repairs by the time the forty-five (45) days have elapsed, Plaintiff will document the unrepaired Deficiencies and notify the defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, that these Deficiencies have not been repaired and Plaintiff will not be responsible for making the repairs as required under paragraph five of this Judgment.

7. The payment to defendant ARE-9880 Campus Point, LLC, in the amount specified above shall be in full payment for this defendant's interests in Parcels 34866-1 and 34866-2 and damages with respect to Parcels 34866-1 and 34866-2 caused by any or all of the following: (a) the acquisition of Parcels 34866-1 and 34866-2; (b) the severance of the remainder from Parcels 34866-1 and 34866-2, the part being acquired; and (c) the construction and use of the project for which Parcels 34866-1 and 34866-2 are being taken in the manner proposed by Plaintiff. This payment shall be in full payment for all of this defendant's claims of just compensation arising out of the condemnation of Parcels 34866-1 and 34866-2, including, without limitation, defendant's claims for the fair market value of the real and personal property taken, severance damages, loss of rents, loss of business goodwill, precondemnation damages, and all damages of every kind and nature suffered or to be suffered by reason of Plaintiff's acquisition of Parcels 34866-1 and 34866-2, and the construction and use of the project in the manner proposed.

8. Upon payment of the above-specified sum of money to, or for the benefit of, defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, Parcels 34866-1 and 34866-2 shall be condemned to Plaintiff and as against defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, for state highway purposes (Parcel 34866-1 as a temporary construction easement, and Parcel 34866-2 as an easement for public street purposes), and all interests of defendant ARE-9880 Campus Point, LLC, a Delaware Limited Liability Company, in and to these parcels as defined shall be terminated.

9. The purpose for which Parcels 34866-1 and 34866-2 are sought to be condemned is a public use authorized by law, and the taking of these parcels is necessary for this use.

10. Defendants LION BIOSCIENCE INC., AMYLIN PHARMACEUTICALS, INC., A Delaware Corporation, and AID ASSOCIATION FOR LUTHERANS, A Wisconsin Corporation, having disclaimed any and all right, title or interest in Parcels 34866-1 and 34866-2, these defendants are not entitled to any compensation in this proceeding.

11. Defendants CHICAGO TITLE COMPANY, as Trustee, and TREGA BIOSCIENCES, INC. dba LION BIOSCIENCE have been dismissed from this proceeding.

12. Plaintiff having taken possession of Parcels 34866-1 and 34866-2 on March 1, 2013, all taxes, assessments, penalties and costs which are a lien on these parcels and which are apportioned to that portion of the fiscal year after this date are hereby canceled pursuant to sections 5081 et seq. of the Revenue and Taxation Code.

Dated: _____

_____
THE HONORABLE JOEL M. PRESSMAN
JUDGE OF THE SUPERIOR COURT

EXHIBIT A

People v. ARE-9880
Appendix E
Campus Point, LLC
Appraisal Comparison

W & A Tree No.	Arbor West Tree No.	W & A Final Appraised Value	Arbor West Value of Tree	Keagy Appraiser's Valuation	W & A Appraisal Method	
33	33	$2,370.00	$8,283.52	$8,283.52	TFM	
35	35	$9,200.00	$26,908.00	$15,000.00	TFM	
39	39	$3,020.00	$10,108.00	$10,108.00	TFM	
52	52	$1,620.00	$4,032.00	$4,032.00	TFM	
54	54	$1,140.00	$3,087.00	$3,087.00	TFM	
55	55	$280.00	$1,183.00	$1,183.00	TFM	
59	59	$3,680.00	$6,561.00	$6,561.00	TFM	
60	61	$3,670.00	$13,799.52	$13,799.52	TFM	
61	62	$3,280.00	$7,257.88	$7,257.88	TFM	
62	63	$940.00	$7,168.00	$7,168.00	TFM	
64	59	$6,700.00	$14,175.00	$14,175.00	TFM	
		$35,900.00	$102,562.92	$90,654.92		Subtotal
53	53	$420.41	$567.00	$567.00	Replace	
65	N.A.	$1,901.52	$0.00	$100.00	Replace	
		$2,321.93	$567.00	$667.00		Subtotal
		$38,221.93	$103,129.92	$91,321.92		GRAND TOTAL
NOTE:						
1. W & A Tree No. refers to the trees as actually marked in the field.						
2. Arbor West Tree No. refers to the number listed in the Keagy Real Estate Report.						
3. Appraisal Method abbreviations are as follow:						
	Replace = Plant Replacement Cost					
	TFM = Trunk Formula Method					

PROOF OF SERVICE

RONALD W. BEALS, Chief Counsel
JEFFREY R. BENOWITZ, Deputy Chief Counsel
GLENN B. MUELLER, Assistant Chief Counsel
JOHN FREDERICK SMITH, Assistant Chief Counsel
REBECCA A. LEVI, Deputy Attorney (CBN 249180)
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SUPERIOR COURT OF CALIFORNIA
COUNTY OF SAN DIEGO

People v. ARE-9880 Campus Point, LLC, et al.
San Diego County Superior Court Case No. 37-2012-00104676-CU-EI-CTL

THE UNDERSIGNED STATES:

At the time of service I was over 18 years of age and not a party to this action. My business address is 4050 Taylor Street, MS 130, San Diego, California 92110. On March 13, 2014, I served the attached STIPULATION FOR JUDGMENT IN CONDEMNATION on the following parties of interest in this action:

Richard A. Schulman, Esq.
Neil S. Hyytinen, Esq.
HECHT SOLBERG ROBINSON GOLDBERG & BAGLEY LLP
600 West Broadway, Suite 800
San Diego, California 92101

Tel: (619) 239-3444
Fax: (619) 232-6828
Attorneys for Defendant ARE-9880 CAMPUS POINT, LLC

X **(BY UNITED STATES MAIL)** I enclosed the documents in a sealed envelope or package addressed to the parties listed above and placed the envelope or package for collection and mailing, following our ordinary business practices. I am readily familiar with this business's practice for collecting and processing correspondence for mailing. On the same day that correspondence is placed for collection and mailing, it is deposited in the ordinary course of business with the United States Postal Service, in a sealed envelope with postage fully prepaid. I am a resident or employed in the county where the mailing occurred. The envelope or package was placed in the mail at San Diego, California.

____ **(BY OVERNIGHT MAIL)** I enclosed the documents in an envelope or package provided by an overnight delivery carrier and addressed to the parties listed above. I placed the envelope or package for collection and overnight delivery at an office or a regularly utilized drop box of the overnight delivery carrier.

____ **(BY PERSONAL SERVICE)** I personally delivered the documents to the parties listed above.

____ **(BY FACSIMILE)** I faxed the documents to the parties listed above at the facsimile numbers listed. No error was reported by the facsimile machine that I used. A copy of the record of the facsimile transmission, which I printed out, is attached.

____ **(BY E-MAIL OR ELECTRONIC TRANSMISSION)** Based on an agreement of the parties to accept service by e-mail or electronic transmission, I caused the documents to be sent to the parties listed above at the e-mail addresses listed. I did not receive, within a reasonable time after the transmission, any electronic message or other indication that the transmission was unsuccessful.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Dated: March 13, 2014

LINDA SALERNO

CALIFORNIA DEPARTMENT OF TRANSPORTATION

REVISED
GEOTECHNICAL DESIGN REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

11-SD-5/PM R28.6/ R30.5

EA 11-022331
EFIS 1100000012

March 28, 2014

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2 BRANCH D
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California **Business, Transportation and Housing Agency**

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 28, 2014

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2 Branch D

Subject: Revised Geotechnical Design Report for the Interstate-5/Genesee Avenue Interchange Improvement Project

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Geotechnical Design Report (GDR) for the proposed Interstate-5/Genesee Avenue Interchange Improvement Project.

This GDR documents the prevailing site conditions and provides specific recommendations for the project features. The report defines the geotechnical conditions as evaluated from field investigation data and used in the geotechnical analyses and design. This report provides recommendations for project design and construction.

Please ensure that this GDR is included in the District Resident Engineer (RE) Pending File. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467- 4051.

Mike Fordham P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

REGISTERED PROFESSIONAL ENGINEER
MICHAEL M. FORDHAM
C61341
EXP. 06/2016
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
BRIAN K. HINMAN
No. 55654
Exp. 12/31/14
CIVIL
STATE OF CALIFORNIA

CARBON COPY (CC) LIST

Arturo Jacobo	District Project Manager
Yong Pak	Project Engineer
Art Padilla	District Materials Engineer
Abbas Abghari	Office Chief, OGDS2
Geotechnical Archive	
District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Mike Ross	Kimley Horn and Associates
Craig Shannon	Simon Wong Engineering

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1.0 INTRODUCTION

This Revised Geotechnical Design Report (GDR) has been prepared by the Office of Geotechnical Design South-2 (OGDS2) to address the geotechnical design considerations for the Interstate 5 (I-5)/Genesee Avenue Interchange Improvement Project, in the City of San Diego, San Diego County, California hereafter referred to as the project. Figure 1 depicts the project location and aerial photograph of the project site.

The project includes replacing the Genesee Avenue Overcrossing (OC) (Bridge No. 57-527), widening the portions of Genesee Avenue that adjoin the overcrossing, reconfiguring the adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5, and adding a twelve-foot (12ft) bi-directional bike lane from Voigt Drive to Roselle Street. Numerous retaining walls are necessary to accommodate the project.

The project is encompassed by the much larger I-5 North Coast Corridor Widening Project, (EA 11-235800/EFIS 1100000159), between PM R28.4 and R55.3. Hence, features constructed for the project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. Therefore, this GDR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The purpose of this GDR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and provide recommendations relevant to the design and construction of the project features. This report establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluation, recommendations, and advisories contained in this GDR supersede any information that may have been previously conveyed through correspondences or documents concerning the project features addressed herein, including but not limited to the *Geotechnical Design Report for the Interstate-5/Genesee Avenue Interchange Improvement Project, February 2012*.

This GDR is based on site reconnaissance, research of archived resources, subsurface exploration, and engineering analyses. This GDR was prepared in accordance with the guidelines set forth in the *Caltrans: Guidelines for Preparing Geotechnical Design Report (GDR), Version 1.3, December 2006.*

A District Preliminary Geotechnical Report (DPGR) was prepared in 2005 for this project by Ninyo and Moore. The scope and magnitude of the project has grown significantly since the development of the DPGR.

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENT

Interstate 5 through Northern San Diego County is one of the most significant transportation facilities in the region connecting San Diego County to Orange County and Los Angeles. I-5 is the western most interstate freeway, running from the United States-Mexico Border in the south to the United States-Canadian Border in the north. The I-5 Freeway within San Diego County is a vital link between the City of San Diego, north San Diego county beach communities, Camp Pendleton, and beyond. Construction of the I-5 freeway within the project area occurred in the 1960's.

Genesee Avenue is located within the University Community Plan area of the City of San Diego. The University Community Plan area is the second largest concentration of business and employment in the region. Genesee Avenue is identified as a six lane primary arterial for ingress and egress for the surrounding businesses. The Genesee Avenue OC is one of the last remaining four lane sections along this primary arterial. This project is anticipated to provide capacity improvements and eliminate the Genesee Avenue OC as a pinch point.

Project layout plans, profile plans, and cross sections were provided by Kimley Horn and Associate, and Caltrans District 11 Design. All units referenced in this document are United States (U.S) Customary

units, unless otherwise noted. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all Stations are referenced to the SD-5 Line.

2.1 Existing Facilities

Existing facilities along the project alignment include the Genesee Avenue OC and Voigt Drive OC (Bridge No. 57-526), retaining walls, fill embankments, graded slopes, underground utilities, highway drainage units, and a landslide stabilization buttress. The project is surrounded by facilities occupied by Qualcomm, Science Applications International Corporation (SAIC), the Scripps Memorial Hospital-La Jolla complex, and the University of California, San Diego (UCSD) campus. Figure 1 depicts existing facilities.

As-Built Log of Test Boring (LOTB) for the Genesee Avenue OC, Voigt Drive OC, Sorrento Valley Overhead (OH) (Bridge No. 57-513), the Route-5/805 Separation (Bridge No. 57-512), and the Los Penasquitos Channel (Bridge No. 57-511) are included in Appendix I. As-Built LOTB for RW-516, which is the existing retaining wall to the north of the Genesee Avenue OC and on the northbound side of I-5 are also included in Appendix I.

2.1.1 Existing Roadway

In the project area, I-5 consists of an eight-lane Portland Cement Concrete (PCC) freeway with asphalt concrete (AC) paved shoulders. The existing freeway lanes are twelve-feet (12ft) wide with eight-foot (8ft) wide inside shoulders and ten-foot (10ft) wide outside shoulders. The existing median is nineteen-feet (19ft) wide and consists of asphalt paved shoulders and an unpaved area between the concrete median barriers that divide the northbound and southbound lanes. The interchange is a Type L-1 four quadrant diamond interchange. The northbound and southbound ramps consist of twelve-feet (12ft) wide AC lanes with variable width AC shoulders and concrete curb and gutter or AC dike. All four ramps allow free right hand turns at the intersection with Genesee Avenue. All other traffic movement is controlled by signalized intersections adjoining each end of the Genesee Avenue OC.

Pavement distress has been observed along southbound I-5 between Genesee Avenue and Roselle Street. The distress is generally concentrated within the shoulder and the two outer most freeway lanes between Stations 1600+00 and 1609+00. An investigation conducted by Caltrans in the early 1980's concluded that the original distress and settlement had been the result of soft foundation soils and that additional ongoing pavement distress is likely being caused by the shrinking and swelling characteristics of the basement soil. This assessment is presented in *Caltrans: Settlement Analyses of Shale Embankments on I-5, March 1982, 11-022490*.

Pavement distress has also been observed on the northbound I-5 onramp from Genesee Avenue between Stations 1590+00 and 1600+00. Based on the pavement distress evaluated along the southbound I-5 between Genesee Avenue and Roselle Street, the pavement distress on the I-5 onramp from Genesee Avenue is likely attributed to the shrinking and swelling characteristics of the basement soils in the area.

2.1.2 Existing Cut, Fill and Natural Slopes

Numerous cut slopes along the project alignment have a typical slope inclination of one and one half horizontal to one vertical (1.5H:1V). Steep cut slopes along the south side of Genesee Avenue and west of the OC have slope benches spaced at vertical intervals of roughly thirty-feet (30ft). Other large cut slopes within the project limits up to one hundred and fifty-feet (150ft) in height have a ten to twenty-foot (10-20ft) wide mid slope bench. Such large, steep cut slopes exist on either side of I-5 between Genesee Avenue and Roselle Street. Steep cut slopes without benches exist on both sides of I-5 south of Genesee Avenue and adjacent to the Genesee Avenue north bound on ramp.

Cut slopes within the project limits expose sandstones and siltstone. Most cut slopes are well vegetated with a mixture of native and non-native species. No seeps or springs were identified within the project area cut slopes. The steep slopes show no outward signs of instability.

Existing fill slopes along the project alignment vary in height from approximately six-feet (6ft) to seventy five-feet (75ft). The tallest fill slopes exist to the northwest of the Genesee Avenue OC between Station 1600+00 and 1609+00. Fill slopes within the project alignment are inclined two horizontal to one vertical (2H:1V) or flatter.

Fill slopes appear to be composed of material derived from nearby cuts of native formations. Site reconnaissance and the subsurface data gathered indicate that the material is generally comprised of medium dense to dense silty sand and clayey sand. The majority of fill slopes are well vegetated with native and non native species.

There is an ancient landslide that is buried by fill embankment in the northwest quadrant of the Genesee Avenue interchange. The location of the landslide is depicted in Figure 1. An engineered embankment, which acts to provide a resisting mass to stabilize the landslide, was constructed along the base of the slide and freeway embankment slope.

Seepage was observed in the embankment slope along the southbound I-5 off-ramp to Genesee Avenue. The seepage appears in the face of the slope atop the landslide stabilization buttress. The approximate location of the seepage is depicted on Figure 1.

Natural slopes within the project alignment have a maximum height of roughly one hundred fifty-feet (150ft), with slope inclinations ranging from one and one half horizontal to one vertical (1.5H:1V) to two horizontal to one vertical (2H:1V). These slopes are typically vegetated by native scrub and intrusive, non native species. No seeps or springs where identified within natural slopes in the project area.

2.1.3 Existing Development

Land use adjacent to the project is densely developed and consists of technical, medical, and academic facilities. Existing development in the southeast quadrant of the Genesee Avenue Interchange includes the Scripps Memorial Hospital-La Jolla complex. Existing development in the northeast quadrant of the Genesee Avenue Interchange includes: the Qualcomm-San Diego BB facility, the SAIC facility, and the Scripps Health Corporate Offices. Existing development in the southwest quadrant of the Genesee Avenue Interchange includes the UCSD Campus Services Complex (CSC) and Biology Field Station (BSF). The slopes and mesas adjoining the project have been terraced by cut and fill grading operations for development purposes. This grading and development abuts the State right-of-way. The locations of the facilities in the area are depicted on Figure 1. UCSD provided the grading package for the UCSD CSC/BFS. The grading package provided by UCSD is included in Appendix I.

2.1.4 Existing Utilities

Utilities present within the limits of the project include underground water, sewer, gas, electrical, and telecommunication lines; and overhead electrical lines. Utilities that traverse the project alignment are concentrated within the Genesee Avenue OC and adjoining Genesee Avenue; Voigt Drive OC, and adjoining Voigt Drive; Gilman Avenue; and within a tunnel that traverses the freeway approximately two hundred-feet (200ft) south of the Voigt Drive OC. A temporary overhead power transmission line crosses I-5 near the Genesee Avenue OC.

2.2 Proposed Improvements

The proposed project will widen the Genesee Avenue OC, widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between PM R28.6 and R30.5. The construction of numerous retaining walls is necessary to accommodate the reconfigurations and widening. Figure 1

depicts the project location and aerial photograph of the project site. The project layouts and the proposed improvements are depicted on Figure 2A through Figure 2I.

2.2.1 Proposed Roadways

The reconstruction of the interchange will include the realignment of all four ramps. The northbound offramp will be widened from one (1) lane to two (2) lanes at the junction with I-5 and from three (3) lanes to four (4) lanes at the ramp terminus. The northbound onramp will be widened from one (1) lane to three (3) lanes at the ramp entrance and taper to two (2) lanes at the junction with I-5. The southbound offramp will be widened from one (1) lane to two (2) lanes at the junction with I-5 and from three (3) lanes to four (4) lanes at the ramp terminus. The southbound onramp will be widened from one lane to three (3) lanes at the ramp entrance and taper to one (1) lane at the junction with I-5.

One (1) dedicated right turn lane will be constructed from westbound Genesee Avenue to the northbound I-5 onramp. One (1) dedicated right turn lane will be constructed from eastbound Genesee Avenue to the southbound I-5 onramp. Two (2) left turn lanes will be constructed from the westbound Genesee Avenue OC to southbound I-5 onramp. Two (2) left turn lanes will be constructed from the eastbound Genesee Avenue OC to northbound I-5 onramp.

The project also incorporates an auxiliary lane along southbound I-5 between Roselle Street and Genesee Avenue and a twelve-foot (12ft) wide bi-directional bike lane between Voigt Drive and Roselle Street.

2.2.2 Proposed Slopes

The project will include the grading of cut and fill slopes to accommodate the widening and realignment of roadways. All proposed cut slopes that are independent of proposed retaining walls will be inclined one and one half horizontal to one vertical (1.5H:1V). Proposed cut slopes above or below planned retaining walls will be inclined at either one half horizontal to one vertical (1.5H:1V) or two horizontal to one vertical (2H:1V). All fill slopes within the project limits are proposed to be inclined two horizontal to one vertical (2H:1V). The locations of the cut and fill slopes are depicted on Figures 2A through Figure 2I.

2.2.3 Proposed Bridges

The Genesee Avenue Bridge over I-5 will be removed and replaced. The existing four (4) span five (5) lane overcrossing will be replaced with a two span structure. The new structure will host three (3) through lanes and two (2) left turn lanes in each direction.

A pedestrian bridge is also proposed to be constructed to cross over Genesee Avenue to the west of the Genesee Avenue OC. The pedestrian bridge will connect the bike lane in the southwest and northwest quadrant of the project.

2.2.4 Proposed Earth Retaining Systems

The use of both Caltrans standard retaining walls and special design retaining walls are proposed for the project. The retaining walls are necessary in areas where the proposed widening is constrained by limited right of way and severe topography. Special design retaining walls proposed for the project include Retaining walls RW-3, RW-4, RW-6, RW-7, RW-8, RW-9, RW-10, RW-11, RW-13, RW-14, and RW-15. Caltrans standard retaining walls proposed for the project include RW-5 and RW-12. Caltrans standard retaining walls are addressed in this GDR. The special design retaining walls are referred to in this GDR, however, the special design retaining walls are addressed in separate Foundation Reports.

The approximate locations of the standard retaining walls and special design retaining walls are depicted on Figure 1, Figure 2A through Figure 2I, and Figure 5. The standard retaining wall profiles are depicted on Figure 3A through Figure 3B. Illustrative cross sections perpendicular to the standard retaining wall

alignments are shown on Figure 4A through Figure 4B. Descriptions of the proposed retaining walls that include wall type, height and length are presented in Section 8.5.

2.2.5 Proposed Landslide Stabilization Buttress

A landslide stabilization buttress is proposed for the project. The buttress is necessary to stabilize the landslide under the new loading condition that will result from the placement of the additional embankment in the northwest quadrant of the Genesee Avenue interchange. The location of the landslide and the approximate limits of the landslide stabilization buttress are presented in Figure 1. A description of the landslide is presented in Section 4.3. A description of the proposed landslide stabilization buttress is presented in Section 8.4.

2.2.6 Proposed Culverts

The proposed project includes the construction of two (2) significant culverts. Both of the culverts will be located in the northwest quadrant of the project. One proposed culvert is a six-foot by six-foot (6ft X 6ft) concrete box culvert that will replace the concrete lined channel on the same alignment from Station 1595+70 to Station 1604+00 within the lowland area in the northwest quadrant of the project. The other culvert will be a seventy two inch (72in) diameter culvert that will collect storm runoff from multiple inlets and smaller culverts and convey that runoff from near freeway grade to the toe of the landslide stabilization buttress. This culvert will discharge into the lowland area and ultimately flow into the six-foot by six-foot (6ft X 6ft) concrete box culvert. The approximate locations of the seventy two inch (72in) diameter culvert and the six-foot by six-foot (6ft X 6ft) box culvert are depicted on Figure 1.

2.2.7 Proposed Soundwalls/Sound Berms

Soundwalls and sound berms are not proposed as part of this project.

2.2.8 Proposed Overhead Signs

Seven (7) overhead signs are proposed as part of this project. Five (5) overhead signs, of which three (3) are single-post and two (2) are two-post, will be located on I-5 near the off ramps. The other two (2) will be two-post signs and will be located on Genesee Avenue near the onramps. The approximate locations of the overhead signs are depicted on Figure 2A through 2I.

3.0 PERTINENT REPORTS AND INVESTIGATIONS

Pertinent reports and investigations utilized in the preparation of this GDR include:

- Caltrans (March 21, 2014) *Revised Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-3, 11-022331/EFIS 11000000012.*
- Caltrans (March 21, 2014) *Revised Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-4, 11-022331/EFIS 11000000012.*
- Caltrans (March 8, 2012) *Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-8, 11-022331/EFIS 11000000012.*
- Caltrans (December 14, 2012) *Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-11, 11-022331/EFIS 1100000001.*
- Caltrans (March 28, 2014) *Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-13, 11-022331/EFIS 11000000012.*
- Caltrans (March 28, 2014) *Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-14, 11-022331/EFIS 11000000012.*
- Caltrans (March 28, 2014) *Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-15, 11-022331/EFIS 11000000012.*

- Caltrans (December 2008), *GDR, Auxiliary lane Southbound Interstate 5 Offramp to Genesee Avenue and Landslide Buttress Construction,* 11-SD-5, PM R29.20 TO R30.60, 11-065001
- City of San Diego (May 2008), *Draft Project Report, I-5/Genesee Avenue Interchange Reconstruction Project,* 11-SD-5, KP R46.1/R49.1, City CIP No. 57-372-0/Caltrans Contract EA No. 022330
- Ninyo and Moore (April 2008), *Updated Geotechnical Evaluation Interstate 5/Genesee Avenue Interchange Reconstruction Project San Diego, CA,* Project No. 105256004. December 2007/Revised
- Ninyo and Moore (December 2007), *Updated Geotechnical Evaluation Interstate 5/Genesee Avenue Interchange Reconstruction Project San Diego, CA,* Project No. 105256004
- Ninyo and Moore (December 2005), *Preliminary Geotechnical Evaluation Proposed I-5 and Genesee Avenue Interchange Upgrade San Diego, CA,* Project No. 105256003
- Diaz-Yourman and Associates (October 2005), *Geotechnical Engineering Report Interstate 5/Interstate 805 Drilling Project,* Task Order No. 29, Caltrans Contract No. 11A0713, San Diego, CA, Project No. 2005-014
- Diaz-Yourman and Associates (October 2005), *Geotechnical Engineering Report Interstate 5/Interstate 805 Pavement Distress Study,* Task Order No. 5, Caltrans Contract No. 11A1124, San Diego, CA, Project No. 2005-26
- Caltrans (October 2005), *Preliminary Geotechnical Report," Construct State Route 5 Freeway in San Diego County from the 5.805 Interchange to North of State Route 76,* 11-SD-5, PM R28.428/R55.396, 11-235800
- Caltrans (October 1997), *PSR, Construct Auxiliary Lane on Southbound Interstate 5 In San Diego from 0.5 km South of the Sorrento Valley Overhead to 0.3 km North of Genesee Avenue Overcrossing,* 11-SD-5, KP R47.00/R49.24, 11-06500k

Additional references and memorandum utilized in the preparation of this report are described in Section 15.0 and included in Appendix V.

4.0 PHYSICAL SETTING

The following section describes the physical setting of the project including: the climate; topography and drainage; man-made and natural features of engineering and construction significance; regional geology and seismicity; and soil survey mapping.

4.1 Climate

San Diego has a Mediterranean to semi-arid climate that is characterized by warm, dry summers and mild winters with some rain. San Diego has mild, mostly dry weather with approximately two hundred (200) days above seventy degrees Fahrenheit (70°F). The extended summer and dry period lasts from May to October. Temperatures are mild to warm in the summer. High temperatures during the summer range between seventy and seventy-eight degrees Fahrenheit (70-78°F). Low temperatures during summer range between fifty-five and sixty-six degrees Fahrenheit (55–66°F). Temperatures exceed ninety degrees Fahrenheit (90°F) approximately four days a year. Winter is the rainy period and lasts from November to April. Temperatures are mild with periods of moderate to heavy precipitation. High temperatures during the winter range between sixty-six and seventy degrees Fahrenheit (66–70°F) Low temperatures during winter range between fifty and fifty-six degrees Fahrenheit (50–56°F). On average there are approximately ten-inches (10in) of rainfall in San Diego annually. However precipitation may range from three-inches (3.0in) to thirty-inches (30.0in) during any given year.

The project alignment is located in proximity to the Pacific Ocean. This proximity to the ocean will generally result in mild temperatures and wind. Thick marine fog is possible throughout the year. The marine fog is most prevalent in the early morning and late evening during the winter months, but can also appear during the summer months and can be thick enough to severely impact visibility.

4.2 Topography & Drainage

The project site topography may be described as a somewhat planar, coastal, terraced dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. In places, the freeway crosses, or runs within the incised canyons. The approximate elevation of I-5 at the project site is two hundred sixty-feet (260ft) above mean sea level (MSL).

On the surrounding mesas, urban runoff is gathered and conveyed by a system of gutters and storm drains. Runoff from the project area is directed to small canyons that trend toward the lowland northwest of the Genesee Avenue interchange. Runoff that drains from the lowland flows north along the freeway embankment to a concrete lined channel running along Carroll Canyon. Flows from the urban storm drain system, area slopes, and canyons ultimately discharge to Soledad Valley and the Pacific Ocean.

4.3 Man-made and Natural Features of Engineering and Construction Significance

A landslide exists within the project limits. As depicted on Figure 1, the landslide is located beneath the Genesee Avenue southbound off-ramp and a portion of the freeway lanes. This ancient landslide was mobilized following construction of I-5 in 1964 resulting in pavement distress of the ramp and freeway lanes. In 1986 a landslide stabilization buttress was constructed to halt the downward progression of the highway embankment. The stabilization buttress consists of a mass of compacted earth roughly twenty-feet (20ft) in height that is keyed into native ground at the base of the embankment fill. The buttress applies a resisting force against movement of the landslide under the current loading condition.

Archived documentation of geotechnically significant features, such as the landslide, is limited because documentation methods in the mid 1980s predated current formal investigation, design, documentation, and archiving requirements. Somewhat scattered documentation of the landslide was discovered in archived LOTB, memorandum, and site investigation photos and maps. Copies of the archived LOTB, memorandum, maps, and photos are included in Appendix I.

The proposed freeway widening and ramp reconfiguration will add significant embankment, and thus driving force, atop the tentatively stable landslide. Recommendations for a new landslide stabilization buttress to accommodate the widening of the Genesee Avenue off-ramp and the addition of an auxiliary lane were previously presented in the *Geotechnical Design Report Auxiliary Lane Southbound Interstate 5 Offramp to Genesee Avenue and Landslide Buttress Construction, January 2009, 11-065000.*

Since production of the 2009 GDR, the project has been revised to include the addition of a twelve-foot (12ft) bike lane. This increased embankment widening necessitates a renewed assessment of the proposed landslide stabilization buttress. Evaluation and design recommendations for the new buttress are presented later in this report.

Scripps Memorial Hospital-La Jolla is concurrently developing or have implemented plans to construct improvements including a Central Energy Plant (CEP) the Scripps XiMED II Medical Office Building (MOB), a retaining wall (Scripps-RW), perimeter access roads, and the Burtec parking lot. A map depicting the existing features and proposed improvements developed by Scripps Memorial Hospital-La Jolla and provided to OGDS2 is included in Appendix I.

The CEP and associated perimeter access roads are currently under construction and will be completed prior to the construction of the Genesee Avenue Interchange Improvement Project. The planned location of the Scripps XiMED II MOB is to the north of the Scripps Memorial Hospital-La Jolla parking structure. The Scripps-RW and an access road will be constructed between the Scripps Memorial

Hospital-La Jolla parking structure, the Scripps XiMED MOB, and Caltrans right-of-way. The Burtec parking lot will be constructed to the south of the Scripps Memorial Hospital-La Jolla parking structure. A right-of-way swap with Scripps Memorial Hospital-La Jolla was developed to accommodate the improvements proposed by all stakeholders and to simplify the properties lines in the area. A map depicting the right-of-way swap is included in Appendix I.

4.4 Regional Geology and Seismicity

The project site lies within the coastal plain of the Peninsular Range Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault System running on a north-northwest trend and located offshore approximately two and one half-mile (2.5mi) to the west. Data pertaining to the regional active faults are included in Table 1.

4.5 Soil Survey Mapping

The Soil Survey of San Diego Area, California prepared by U.S. Department of Agriculture, Soil Conservation Service and Forest Service (1973) was utilized to determine the surficial soils and their general properties. The results of the soil survey review are presented in Table 2.

5.0 EXPLORATION

A surface and subsurface investigation was conducted to help characterize the soil conditions present within the project alignment such as the presence of groundwater, depth and quality of artificial fills, and other conditions that could impact the design or construction of the proposed project features.

5.1 Drilling and Sampling

The subsurface investigation was conducted between December 2006 and June 2011. Twenty five (25) exploratory borings, ranging in depth from fifteen-feet (15ft) to over one hundred feet (100ft), were developed using hollow stem augering, punch coring, and mud rotary drilling methods within the project limits. Caltrans drilling equipment was used to develop the borings. The locations of the borings are depicted on Figure 2A through Figure 2I.

Boring records associated with specific project features, such as Caltrans Standard retaining walls, are included in Appendix II. Log of Test Borings (LOTB) are in the process of being prepared and will be submitted separately from this report. Logging of the borings was performed by either a consultant geologist or engineer or a Caltrans geologist or engineer.

The naming convention used for the majority of the borings includes the boring method initial, the two digit year, and the approximate center line Stations along the metric preliminary exploration plan, followed by the notation R or L indicating that the boring was right or left of the ascending Station line. For example, boring R-07-48560L is a rotary boring conducted in 2007 that was developed to the left of the approximate metric Station 485+60 along the 11-SD-5 line. The names of borings reflect metric Stationing because the vast majority of the subsurface investigation was performed prior to the Caltrans transition back to U.S. Customary Units. The metric plans referenced for the development of the boring records are not included in this report.

The five (5) borings performed along Genesee Avenue differ in the boring naming convention. Two (2) borings performed to the east of I-5 along Genesee Avenue follow the naming convention defined in the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2007*. Three (3) borings performed along Genesee Avenue west of the I-5 use a naming convention which includes the boring method initial, two digit year, and the approximate Genesee Avenue center line Station (GEN-line) along the metric preliminary exploration plan, followed by the notation R or L indicating the boring was right or left of the descending Station line.

Exploratory borings using a hand auger were conducted in January 2011. The hand auger borings were conducted to determine the type and density of the subsurface soils along the alignments of RW-11 and RW-12; and near the toe of the existing slope near the alignments of RW-13, RW-14, and RW-15. The hand auger boring records are included in Appendix II.

5.2 Geologic Mapping

The project site geologic overview map is presented in Figure 5. The geologic map is a modified version of the *California Divisions of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7½ Minute Quadrangles, Kennedy, 1975*. The map depicts an overview of the geologic formations present at the project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining walls, the extent of fill mapped by OGDS2, and the approximate area of the landslide.

5.3 Geophysical Studies

No geophysical studies were conducted for the preparation of this GDR.

5.4 Instrumentation

Seven (7) Slope Inclinometers (SI) are installed within the landslide within the northwest quadrant of the Genesee Avenue Interchange. Three (3) SI were installed during the subsurface investigation. These SI were installed along the top of the existing stabilization buttress and were intended to supplement information gathered from four (4) SI that were installed for a previous geotechnical investigation and are located in the AC shoulder of the southbound Genesee Avenue offramp. The SI's are used to monitor movement of the landslide. The locations of the existing SI are depicted on Figure 2B and Figure 2D.

5.5 Exploration Notes

All boring were backfilled with bentonite chips. When borings were performed along the shoulder or traveled way, bentonite chips were used to fill the drill hole below pavement elevation and then asphalt or cement was used to reestablish roadway grade.

Attempts at subsurface exploration of the lowland in the northwest quadrant were unsuccessful due to limited access, standing water, soft ground, and impenetrable vegetation.

No potentially hazardous waste was identified during this study.

The request to the district 11 Office of Land Surveys to stake the alignments of the RW-11 through RW-15 and the subsequent survey data provided are included in Appendix II. The request for the survey of the I-5/Genesee Avenue Interchange Improvement Project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are also included in Appendix II.

6.0 GEOTECHNICAL TESTING

The sections below describe the in-situ and laboratory testing program performed for the proposed project.

6.1 In Situ Testing

Standard Penetration Tests (SPT) and Modified California Samplers were utilized during the subsurface investigation to collect disturbed and undisturbed samples for use in laboratory analysis. SPT were performed using a Safety Hammer, Diedrich Auto Hammer, and CME Auto Hammer; the specific hammer used depended on the Caltrans drill rig performing the work. SPT were performed approximately every 5 feet during the development of each boring. SPT followed ASTM 1586 utilizing a 140 lbs hammer with a free fall drop of 30 inches.

Hand driven soil probe testing was conducted in January 2011. The soil probes were conducted to determine the density of subsurface materials along the alignments of RW-11 and RW-12; and along the original alignments for RW-13, RW-14, and RW-15. The original alignments for RW-13, RW-14, and RW-15 are presented in *Geotechnical Design Report for the Interstate-5/Genesee Avenue Interchange Improvement Project, February 2012*. The soil probe tests were performed adjacent to the hand auger borings. The soil probe boring records are included in Appendix II.

6.2 Laboratory Testing

Laboratory tests were performed on undisturbed and disturbed samples obtained during the subsurface investigation. Laboratory tests performed included:

- Mechanical Analyses (ASTM D422)
- Atterberg Limts (AASHTO T89, T90)
- Moisture Content (ASTM D2216, AASHTO T265)
- Unit Weight (ASTM D4767)
- Specific Gravity (AASHTO T100)
- Corrosion (CTM 643)
- Sulfates (CTM 417)
- Chlorides (CTM 422)
- PH (EPA 9081)

Mechanical Analysis, Atterberg Limits, Moisture Content, and Specific Gravity tests, aka. Soil index tests, were conduct on several samples from exploratory borings. Direct Shear and Unit Weight testing were also performed. Corrosion testing was performed on samples collected during the field review. A summary of the laboratory test results is presented in the Appendix III.

Diaz-Yourman, October 2005 conducted consolidation (ASTM 2435) tests on samples collected within the proposed project limits.

7.0 GEOTECHNICAL CONDITIONS

The following section describes geotechnical conditions that will affect the project.

7.1 Site Geology

The project site is underlain by a succession of relatively flat lying sedimentary strata comprised of the Scripps Formation conformably overlying the Ardath Shale. However, the site geology has been rendered somewhat more complex by the relative displacements of blocks of strata along ancient faults. This geologic structure is described further in Section 7.1.2. The site geology is additionally complicated by: alluvium and slope wash deposited in current and buried ravines and canyons; a landslide as described in Section 4.3; and engineered roadway embankment that underlies portions of I-5 and Genesee Avenue and that, depending on location, rest directly upon either the sedimentary strata, the alluvium/slope wash, or the landslide. A geologic overview map is depicted on Figure 5. Geologic profiles are depicted on Figure 6A through Figure 6B. Geologic cross sections are depicted on Figure 7A through Figure 7B.

7.1.1 Lithology

The following formations are found in the project area and are depicted on the geologic overview map presented on Figure 5.

Artificial Fill (Qf): Artificial fill in the project area appear to be derived from material excavated from nearby cuts in the sandstone and siltstone. Artificial fill encountered during the field investigation were determined to be engineered fill. The engineered fill is composed of medium dense to very dense sand, and silty sand/clayey sand.

Alluvium/Slope Wash (Qal/Qsw): The alluvium/slope wash is located in canyon bottoms and drainages and often underlies engineered fill. The alluvium/slope wash is comprised primarily of loose to very dense poorly graded sand, silty sand and clayey sand with the presence of little fat clay and sandy fat clay. Abundant alluvium/slope wash exists within the lowland areas west of the freeway.

Landslide Debris (Qls): Landslide debris derived from Scripps Formation and Ardath Shale is primarily composed of loose to very dense silt, silty sand, and clayey sand as well as stiff to hard lean clay, fat clay, and sandy fat clay. The landslide debris underlies the freeway embankment in the North West quadrant of the Genesee Interchange.

Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of near shore marine, beach, and non-marine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistance ledgy nature.

Scripps Formation (Tsc): The Scripps formation consists of yellowish light brown to gray silty to clayey sand, interbedded with clay and silt. It includes gravel lenses that can be several feet thick (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The sandstone encountered within the project limits is moderately to intensely weathered. CONFIRM The Scripps Formation conforms to the Ardath Shale.

Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

7.1.2 Structure

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and Genesee Avenue is complicated by deformations and offsets that have occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voigt Drive and Genesee Avenue. The limbs of the anticline dip five degrees (5°) to the southwest and twenty five-degrees (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the City of San Diego, Seismic Safety Study Geologic Hazards and Faults for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6 mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8± 0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.6 million to 12,000 years ago) Linda Vista Formations.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults.

There is also an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC. Additionally, one or more un-named short inactive faults will cross the RW-3, RW-4, RW-13, RW-14, and RW-15 alignments.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; *the Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC through the UCSD campus and into Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault in not depicted on Figure 5, Figure 8A, and Figure 8B.

7.1.3 Natural Slope Stability

The project alignment bisects a developed landscape. Natural or unaltered slopes do not appear to exist within Caltrans right-of-way but exist within adjoining properties. The natural slopes in the project area appear to be stable with the exception of the landslide described in Section 4.3. Landslides are commonly associated with areas of the Ardath Shale where expansive claystone locally comprises as much as twenty five-percent (25%) of the geologic unit. The project slopes appear to lack concentrated deposits of expansive claystone.

7.2 Subsurface Conditions

The following sections describe the relevant geotechnical conditions that impact project design and excavations.

7.2.1 Soil

Sedimentary strata underlie the entire project and are, or will be, exposed at existing and proposed cut locations. The sedimentary strata are comprised of inter layered sandstone and siltstone with occasional conglomerate beds and concretions occurring locally. The sandstone is soft to moderately soft. The siltstone is soft to moderately hard. Due to weak induration and ample weathering, both the sandstone and siltstone have the characteristics of very dense soil. These formational soils will provide suitable subgrade for roadways and retaining structures.

Alluvium and colluvium occupy the bottoms of drainages and lowlands areas and often underlie the existing embankments. The alluvium and colluvium are often poorly consolidated and will not make suitable subgrade for newly placed embankments and retaining structures.

Engineered fill of varying quality forms the roadway embankments. The engineered fill primarily consists of moist, medium dense to dense silty sand. The engineered fill will mostly provide suitable subgrade for embankments, roadways, and retaining structures. However, some sites of relatively weak and less compact fill were identified during the exploration program. These sites may require special treatment to provide adequate support of the proposed project features. Some project retaining walls may be designed to tolerate the anticipated settlement of less compact foundation soils.

The data obtained from the subsurface investigation and laboratory analysis were used to develop soil strength parameters. These strength parameters have been used in evaluations of the proposed project features. The pertinent geologic units and the geotechnical strength parameters used in the evaluations are presented in Table 3.

7.2.2 Groundwater

Perched Groundwater was encountered in one boring performed for the *"Geotechnical Engineering Report-Interstate 5/Interstate 805 Drilling Project" by Diaz-Yourman, October 2005*. Boring DY-B-11 encountered ground water at an elevation of 40.8 feet above Mean Sea Level (MSL). Groundwater was not encountered during the Caltrans subsurface investigation.

Seepage of perched groundwater was encountered at the landslide stabilization buttress. The seep is located at the toe of slope at approximate Station 1593+00. The approximate location of the seep is depicted on Figure 1. Multi-seasonal observations of the site revealed that the seepage is present throughout the year, with the greatest flow following precipitation events. No other occurrence of groundwater was discovered within the project limits during the field review and investigations.

Perched groundwater likely fluctuates seasonally in the alluvial bottom of the lowland to the west of I-5 between Genesee Avenue OC and Roselle Street. Additionally, perched groundwater is anticipated to occur at the base of the fill that lies in relic valleys beneath the freeway embankment.

7.3 Surface Water

No perennial streams or large bodies of water exist within the project limits. A concrete drainage channel and ephemeral stream are present within the lowland area to the west of I-5 between Genesee Avenue and Roselle Street. A shallow, perennial pond exists along the toe of the existing landslide stabilization buttress. The depth of the water likely fluctuates throughout the year. The standing water is anticipated to have a minimum depth of two-feet (2ft) and a maximum depth of five-feet (5ft).

Urban storm runoff and landscape irrigation runoff from nearby businesses is the primary source of water in this area.

7.3.1 Scour

Moderate to severe scour has occurred along the toe of the existing landslide stabilization buttress. There are no plans to alter the drainage pattern of the lowland in a manner that would preclude continued scour along the freeway embankment and buttress. Proposed scour remediation recommendations for this site are described in *Caltrans: Geotechnical Design Report (GDR), Auxiliary Lane Southbound Interstate 5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-065000)* and presented later in this report.

7.3.2 Erosion

The natural slopes and cut slopes with inclinations of one and one half horizontal to one vertical (1.5H:1V) or less and slope heights of fifty-feet (50ft) or less composed of sedimentary formation show little to no erosion and are generally well vegetated. Mild "badlands" type erosion exists above the Genesee Avenue northbound off ramp. Embankment fills of varying heights up to a maximum of seventy-feet (70ft) and inclined at two horizontal to one vertical (2H:1V) or less display no signs of erosion.

The face of the existing landslide stabilization buttress is inclined one and one half horizontal to one vertical (1.5H:1V). The slope face is moderately vegetated but severely eroded, and contains regularly spaced rills up to three-feet (3ft) in depth. One severe rill is located near Station 1593+00 at the south end of the existing landslide stabilization buttress. Erosion rill has undermined a concrete apron constructed along the hinge point of the slope. The rill is approximately four-feet (4ft) in depth and five to six-feet (5-6ft) in width. The erosion in this area is the result of steep slopes subject to concentrated runoff coalescing from the highway embankment slope and from the bench atop the stabilization buttress.

7.4 Site Seismicity

The project is located in proximity to the Newport Inglewood-Rose Canyon Fault Zone trending in a northwesterly direction and laying roughly two-miles (2.0mi) west of the project site. Numerous other fault zones including the Elsinore, San Jacinto, and San Andreas lay to the northeast. Ground motion caused by nearby and distant seismic events should be anticipated during the life of the facilities.

Several potentially active and inactive fault traces cross the project alignment and appear to cross the alignments of some of the proposed retaining walls. However, ground surface rupture caused by active faulting is considered unlikely within the project alignment because of the absence of any known active fault traces. The project does not lie within any Alquist-Priolo special study zone.

8.0 GEOTECHNICAL ANALYSIS AND DESIGN

The following section describes the geotechnical analyses, parameters, and design criteria that should be utilized by project designers in the continued developed of the project.

8.1 Dynamic Analysis

This section describes the seismic parameters selected and dynamic analysis developed for the project.

The proximity of the Newport Inglewood-Rose Canyon Fault Zone to the project could result in significant impact to the project features as the result of a seismic event. The Newport Inglewood-Rose Canyon Fault displaces Holocene sediments and is therefore considered active by current standards of practice. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set forth in the *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B.*

According to the *SDC Version 1.6, November 2010 Appendix B, Figure B.1 Soil Profile Types*, Soil Profile Type C has a Standard Penetration Test (SPT) value greater than fifty (N>50). Soil Profile Type D has SPT values greater than/or equal to fifteen and less than fifty ($15 \leq N < 50$).

The borings developed for the project had SPT results that ranged from as low as fourteen (14) to greater than fifty (>50). Based on the SPT results and as defined in Appendix B of the SDC, the engineered fill has a Soil Profile Type D and the sedimentary formation has a Soil Profile Type C.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and -117.22703, respectively. The Shear wave velocity used in the Caltrans ARS online tool was three hundred and sixty-meters per second (360m/s), which corresponds to a Soil Profile Type D. The shear wave velocity for soil profile Type D was used to obtain the most conservative results. The closest regional active fault as indicated by the Caltrans ARS Online Tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The attenuation period for the fault is estimated to be five-seconds (5sec) with a probability of exceedence of five-percent (5%) in fifty years (50yrs) or a reoccurrence interval of nine hundred and seventy five-years (975yrs). The results produced by the Caltrans ARS Online Tool and the Caltrans Online Tool QA/QC Checklist are include in Appendix IV.

The review of the seismic data provided an effective seismic horizontal coefficient, K_h, for use in pseudo-static (seismic) slope stability analyses. The K_h used is defined by the Caltrans Guidelines for Foundation Investigation and Reports (Version 1.2) as one third (1/3) the PGA of the project site. Therefore the

horizontal acceleration used for the pseudo-static evaluation of the proposed project features is fifteen one hundredths-gravity (0.15g).

8.2 Liquefaction Analysis

Liquefaction involves the sudden loss of shear strength of a saturated, cohesionless soil subjected to cyclic loading produced by an earthquake. The cyclic loading and loss of shear strength cause the soil to temporarily exhibit the strength characteristic of a fluid mass. Typically, liquefaction occurs in areas where groundwater is less than fifty-feet (50ft) from the surface and where the soils are predominantly comprised of poorly consolidated poorly graded fine sands, silty sands, and non plastic silts.

The project primarily resides on dense sedimentary formation with minor portions of embankment fill residing atop relatively thin deposits of alluvium/slope wash or landslide debris. There is little to no potential for soil liquefaction to adversely impact project features.

8.3 Cuts and Excavations

Existing and proposed slopes were described in Section 2.0. This section presents the analyses used to determine the stability, rippability, and grading factors of materials in proposed cuts or excavations.

8.3.1 Stability

Steep existing cut slopes, proposed cut slopes, and conceptual temporary cut slopes were evaluated for stability based on the observed performance of slopes in the project area and by using the computer program GSTABL7 with STEDwin v.2. The graphic results of computer based slope stability analyses for RW-5, RW-12 and RW-17 are provided in Appendix IV.

Steep existing cut slopes with a slope inclination of one and one half horizontal to one vertical (1.5H:1V) and a maximum height of fifty-feet (50ft) were found to satisfy Caltrans static and pseudo-static stability criteria. Steep existing slopes greater than fifty-feet (50ft) in height and configured with a substantial mid-slope bench were also found to satisfy stability criteria.

The various configurations of proposed cut slopes evaluated included: slopes inclined two horizontal to one vertical (2H:1V) of various height; slopes inclined one and one half horizontal to one vertical (1.5H:1V) to a maximum height of fifty-feet (50ft); and slopes inclined one half horizontal to one vertical (1.5H:1V) greater than fifty-feet (50ft) in height but with a modest mid-slope bench. These proposed cut slope configurations were found to satisfy Caltrans static and pseudo-static stability criteria.

Temporary cut slopes may be defined as slopes that exist for a limited duration to facilitate construction of project features. Conceptual temporary cut slopes were evaluated as part of this study to provide project development staff with useful criteria for the development of final design plans, construction staging plans, and final right-of-way requirements. For these design purposes, temporary cut slopes in fill and sedimentary formation should be inclined one and one half horizontal to one vertical (1.5H:1V) and one horizontal to one vertical (1H:1V), respectively.

The exact configurations of temporary excavations are proposed by the Contractor and subject to the approval of the Engineer. Conceptual temporary cut slopes were also evaluated to provide guidance and limitations on slope inclination to the Contractor and Engineer. Temporary cut slopes proposed by the Contractor should follow the guidelines set forth in the Caltrans Trenching and Shoring Manual and in Section 11.0.

Some temporary excavations are likely to require shoring in order to maintain stable slopes above or below the excavation. The temporary shoring proposed by the Contractor is anticipated to be a soldier pile, sheet pile, or soil nail walls.

8.3.2 Rippability

The sandstone and siltstone portion of the sedimentary units range from weak and poorly indurated, to hard and well indurated with a resistant nature. Generally the materials within the project area are considered rippable by conventional heavy duty grading equipment and are drillable by conventional drill equipment. Occasional cemented zones within the sedimentary units of the Scripps Formation may yield oversized blocks of rock like material (concretions). Concretions are anticipated to vary in size greatly and may be as small as a bowling ball and as large as a compact automobile. Concretions encountered during trenching or drilling operations may require the use of specialty excavation equipment.

Concretions were encountered in exploratory borings 11-R-48980R and 11-R-49040R. Concretions were observed within the base of the existing cut along the northbound offramp to Genesee Avenue and within the excavation performed for the Scripps CEP. Photographs of the concretions observed within the excavation performed for the Scripps CEP are included in Appendix II. Relatively abundant concretions are likely to be encountered along the alignment of RW-12.

8.3.3 Grading Factors

Earthwork factors relate the in place volume of material to be excavated to the in place volume of material after placement as fill. The factors are defined as in place volume of compacted fill divided by in place volume of material to be excavated.

$$G_f = V_{fill}/V_{exc}$$

An estimated grading factor of ninety eight one hundredths (0.98) may be used for material generated from cuts within existing fill slopes and one and two one hundredths (1.02) may be used for the material generated from cuts within the sedimentary formation.

8.4 Embankments

In order to provide the embankment width necessary to accommodate freeway and ramp widening, additional embankment fill will be placed atop existing fill slopes at some locations. Additional freeway embankment and a new slope stabilization buttress will encroach into the lowland to the northwest of the Genesee Avenue OC. Observations of the performance of existing embankments and the computer program GSTABL7 with STEDWIN v.2 were used to evaluate the stability of the proposed freeway embankments.

Fill slopes inclined two horizontal to one vertical (2H:1V) or flatter were found to satisfy Caltrans stability criteria. Steeper fill slopes, inclined one and one half horizontal to one vertical (1.5H:1V) and greater than ten-feet (10ft) in height, did not meet the Caltrans stability criteria.

A seep of perched groundwater was described in Section 7.2.2. The seep will be buried by the placement of additional embankment fill. Prior to the placement of embankment, a sub-drain should be constructed to provide effective, long-term groundwater management. A cross section of the proposed sub-drain is depicted on Figure 10. The components of the sub-drain parallel to I-5 should extend between Stations 1592+75 to 1593+25. The component of the sub-drain that is perpendicular to I-5 will be placed on top of the existing landslide stabilization buttress, extend through the proposed buttress, and then down the face of the proposed slope. The drain will discharge onto rock slope protection (RSP) at the toe of the slope.

8.4.1 Landslide Stabilization

Slope stability analyses that were conducted for existing and proposed embankment slope configurations atop the existing landslide are described in Section 8.4. The slope stability analyses revealed that without remedial measures the proposed widening would likely mobilize the landslide and threaten the integrity of I-5. Various landslide stabilization strategies were evaluated for possible implementation on the project

including: no mitigation, placing shear piles at the toe of the slope, removing the landslide, placing a new Geosynthetic Reinforced Embankment (GRE) buttress with a vertical Mechanically Stabilized Earth (MSE) type face or Caltrans Standard Type 1 wall face to minimize lowland encroachment, and placing a new landslide stabilization buttress. It was determined that placing a new landslide stabilization buttress is the appropriate landslide stabilization strategy.

The strategies were evaluated for effectiveness, impact to the lowland at the toe of the existing embankment, impact to freeway operations, and the cost relative to the cost of the placement of a new landslide stabilization buttress. A strategy was deemed effective if it satisfies Caltrans stability requirements. A strategy can generally be disregarded immediately if the stability analyses reveal that the strategy does not meet Caltrans stability requirements.

No Mitigation

The computer modeling revealed that a “No Mitigation” strategy would not provide the required stability for the additional embankment fill. The immediate impact to the lowland would be low as construction equipment would likely not enter into the area. However, when the landslide is mobilized, the impact to the lowland would likely be high. The immediate impact to the freeway would also be low as construction would occur without the need to close multiple lanes of I-5 for an extended period. However, when the landslide is mobilized, the impact to the freeway would likely be high. The cost of this strategy is low relative to the placement of a new landslide stabilization buttress.

Shear Pile Placement

The computer modeling revealed that placement of shear piles at the toe of the slope would not provide the required stability for the additional embankment fill. Shear piles will be required to extend past the depth of the buried landslide. The necessary lateral deflection of these deep shear piles to mobilize full passive resistance is five to ten-inches (5in-10in). A lateral deflection of five to ten-inches exceeds Caltrans allowable lateral deflection.

The immediate impact to the lowland would be low to moderate as construction equipment would likely not enter into the area. The immediate impact to the freeway would also be low as construction would occur without the need to close multiple lanes of I-5 for an extended period. However, when the lateral deflection of the shear piles is mobilized and there is five to ten-inches (5in-10in) of horizontal movement the impact to the freeway would likely be high. Cracking of pavement, settlement, and voids would likely develop in the area. The cost of this strategy is high relative to the placement of a new landslide stabilization buttress due to the additional time, materials, and complex techniques required to construct the shear piles.

Landslide Removal

The computer modeling revealed removal of the landslide would provide the required stability for the additional embankment fill. The impact to the lowland would be high as construction equipment would enter into the area. The impact to the freeway would be high as multiple lanes of I-5 and the Genesee Avenue offramp would need to be closed for an extended period due to the extensive excavation operations required to implement this strategy. The cost of this strategy is considerably higher relative to the placement of a new landslide stabilization buttress due to the extensive excavation.

Geosynthetic Reinforced Embankment with a Vertical Face

The computer modeling revealed that constructing a GRE with either a MSE Type vertical wall face or a Caltrans Standard Type-1 wall face at the toe of the existing embankment and outside the lowland would not provide the required stability for the additional embankment fill. Modeling revealed that, based on the geometry of the landslide and the new freeway embankment, the resisting force required to counteract the driving force applied to the landslide by the new embankment must be placed within the lowland.

The placement of a GRE embankment at the toe of the existing embankment and outside the lowland will not supply the resisting force required to stabilize the new embankment and landslide.

The immediate impact to the lowland would be low as construction equipment would likely not enter into the area. However, when the landslide is mobilized, the impact to the lowland would likely be high. The immediate impact to the freeway would also be low as construction would occur without the need to close multiple lanes of I-5 for an extended period. However, when the landslide is mobilized, the impact to the freeway would likely be high. The cost of this strategy is high relative to the placement of a new landslide stabilization buttress due to the need to import quality soil and the additional time and materials required to construct the GRE and vertical wall.

Landslide Stabilization Buttress

The computer modeling revealed the construction of a landslide stabilization buttress would provide the required stability for the additional embankment fill. The impact to the lowland would be high as construction equipment would enter into the area. The impact to the freeway would be low as construction would occur without the need to close multiple lanes of I-5 for an extended period.

The design of the new landslide stabilization buttress was initially developed in the *Geotechnical Design Report, Auxiliary Lane Southbound Interstate 5 Offramp to Genesee Avenue and Landslide Buttress Construction.* The new landslide stabilization buttress will be a minimum of thirty six-feet (36ft) in height and roughly seven hundred-feet (700ft) in length extending along the base of the fill slope between Station 1591+00 and Station 1598+00. The buttress will consist of either locally derived or imported engineered fill having a minimum unit weight of one hundred and ten-pounds per cubic foot (110pcf). The fill materials used to construct the landslide stabilization buttress should conform to Caltrans Standard Specifications for embankment construction. The inclination of the landslide stabilization buttress face will be two horizontal to one vertical (2H:1V). The landslide stabilization buttress will be keyed into the existing ground 10.0-feet (10.0ft). The approximate location of the landslide and the approximate limits of the landslide stabilization buttress are depicted on Figure 1.

RSP should be placed along the toe and face of the proposed landslide stabilization buttress to prevent scour. The RSP should be embedded three-feet (3ft) below the toe of the landslide stabilization buttress and extend approximately fifteen-feet (15ft) above the toe of the landslide stabilization buttress. The RSP should conform to Section 72-2 Method A of the 2010 Caltrans Standard Specifications or should be as recommended by District 11 Hydraulics.

A standing pond and thickly vegetated lowland currently occupy much of the proposed landslide stabilization buttress footprint. The pond basin and lowland are carpeted by a layer of soft, saturated, organic soil that is underlain by saturated alluvium. This material is considered unsuitable as embankment subgrade.

The freeway embankment and landslide stabilization buttress must be placed on competent ground. The footprint of any lowland to receive additional embankment must undergo remedial grading. The approximate area, configuration, and depth to undergo remedial grading are depicted on Figure 1 and Figure 10. Remedial grading will include drainage control, removal of unsuitable material, and replacement of excavated material with engineered fill.

Surface water flow and groundwater seepage into the area must be temporarily controlled. Such temporary control features will be selected by the Contractor and may include coffer dams, drainage sumps, drainage blankets, or shallow well points.

Roots and vegetation; and soft, loose, and saturated soils must be removed to an anticipated depth of ten-feet (10ft) below existing grade. This material is considered unsuitable for use as engineered fill.

The excavated material must be replaced with engineered fill that meets the Caltrans Standard Specifications for embankment construction. The total volume of lowland material to be removed and replaced by remedial grading, discounting vegetation, is roughly estimated to be thirty thousand-cubic yards (30,000cy). Details on the landslide stabilization buttress foundation treatment are provided in Table 4A.

Six (6) SI should be installed within the embankment and landslide stabilization buttress. Two (2) SI should be located along the top of the proposed landslide stabilization buttress as close to the toe of the highway embankment as possible. Two (2) SI should be placed next to the western edge of the proposed bike lane. Two (2) SI should be located along the inside shoulder of the southbound off ramp. The slope inclinometers located on the top of the landslide stabilization buttress should be completed prior to placement of the embankment fill above. The locations of the proposed SI are depicted on Figure 2B and Figure 2D. A non standard special provision for SI installation is provided in Appendix V.

8.5 Earth Retaining Systems

The project will incorporate retaining walls where the planned roadway widening and ramp reconfigurations are constrained by limited right-of-way and severe topography. The proposed retaining wall alignments, along with the position of borings conducted to characterize subsurface soil conditions, are depicted on Figure 2A through Figure 2I. Special design and standard plan retaining walls will be utilized on the project.

8.5.1 Retaining Wall-3

RW-3 will be a special design soil nail wall located below the UCSD facilities in the southwest quadrant of the project. RW-3 will include a segment of soldier pile wall. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to these three retaining walls are presented in the *Caltrans Revised Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-3, 11-022331/EFIS 11000000012,* dated March 21, 2014.

8.5.2 Retaining Wall-4 and Retaining Wall-5

RW-4 is located to the west of Scripps Memorial Hospital-La Jolla in the southeast quadrant of the project.RW-4 is proposed to extend from approximately seven hundred and fifty seven-feet (757) north of Voigt Drive OC to approximately one hundred fifty two-feet (152ft) south of Genesee Avenue. The approximate length of RW-4 is eight hundred eighty five-feet (885ft). RW-4 will be a combination special design retaining wall that will consist of a diaphragm ground anchor wall and a soil nail wall.

RW-5 will be located above RW-4 along the access road to the Scripps Hospital parking garage between Stations 1576+00 and 1577+10. RW-5 will be located outside Caltrans Right of Way on Scripps Memorial Hospital-La Jolla property. RW-5 is proposed to be a Caltrans Standard Type 1 Retaining Wall. The entire retaining wall will be approximately one hundred-feet (100ft) in length with a maximum height of the eight-feet (8ft). The wall height will taper to less than three-feet (3ft) at either end.

Preliminary planning, design, and coordination between Caltrans and Scripps Hospital are discussed in the RW-4 and RW-5 SPGR. It was previously believed that the construction of a retaining wall on the Scripps Campus (referred to as the Scripps RW in the SPGR) would precede the construction of RW-4. However, it is now apparent that the interchange project will precede improvements planned for the Scripps Memorial Hospital-La Jolla complex. Therefore, the construction of RW-5 is included in the project to provide continued access to the Scripps Memorial Hospital-La Jolla parking garage.

Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to RW-4 are presented in the *Caltrans Revised Foundation Report, Interstate-*

5/Genesee Avenue Interchange Improvement Project, Retaining Wall-4, 11-022331/EFIS 11000000012, dated March 21, 2014.

RW-5 will be founded on artificial fill. The bearing capacities of the artificial fill soil that will host RW-5 satisfy the soil strength criteria detailed in the Standard Plans. Due to the relatively low wall height and RW-5 will experience little settlement. Bearing capacity and settlement calculations are included in Appendix IV.

A two horizontal to one vertical (2H:1V) or flatter slope will exist below the toe of RW-5. A global stability evaluation was performed to assure the stability of the combined retaining wall and slope configuration. The proposed configuration was determined to meet Caltrans criteria for both static and pseudo static (seismic) stability. Results of the stability analyses for RW-5 are included in Appendix IV.

8.5.3 Retaining Wall-6 and Retaining Wall-7

RW-6 and RW-7 will be special design retaining walls located at the southern abutment of the pedestrian bridge proposed to cross over Genesee Avenue to the west of the Genesee Avenue OC. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant RW-6 and RW-7 will be presented in a foundation report(s) prepared by OGDS2 Branch B.

8.5.4 Retaining Wall-8

RW-8 will be a special design soil nail wall located on the slope below the SAIC building in the northeast quadrant of the project. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to this retaining wall will be presented in the *Caltrans Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-8, 11-022331/EFIS 11000000012,* dated March 8, 2012.

8.5.5 Retaining Wall-9 and Retaining Wall-10

RW-9 and RW-10 will be special design retaining walls located at the northern abutment of the pedestrian bridge proposed to cross over Genesee Avenue to the west of the Genesee Avenue OC. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to RW-9 and RW-10 will be presented in a foundation report(s) prepared by OGDS2 Branch B.

8.5.6 Retaining Wall-11

RW-11 will be a soil nail retaining wall located along the south side of Genesee Avenue east of the Genesee Avenue OC. The wall will parallel the south side of Genesee Avenue between "GEN" LINE Station 36+00 and Station 45+27. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to this retaining wall will be presented in the *Caltrans Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-11, 11-022331/EFIS 1100000001,* dated December 14, 2012

8.5.7 Retaining Wall-12

RW-12 will be a Caltrans Standard Type 1 retaining wall located along the north side of Genesee Avenue to the east of the Genesee Avenue OC. The wall will parallel the north side of Genesee Avenue between "GEN" LINE Station 38+72 and Station 41+27. The wall will be approximately two hundred fifty five-feet (255ft) in length with a maximum design height of approximately eight-feet (8ft). RW-12 will retain a relatively small wedge of embankment fill.

RW-12 will be founded on sedimentary formation comprised of layered siltstone and sandstone. The bearing capacities of these formational soils that will host RW-12 satisfy the soil strength criteria detailed in the Standard Plans. Due to the relatively low wall height and the dense nature of the host formation, RW-12 will experience little or no settlement. Bearing capacity and settlement calculations are included in Appendix IV.

A two horizontal to one vertical (2H:1V) or flatter slope will exist below the toe of RW-12. A global stability evaluation was performed to assure the stability of the combined retaining wall and slope configuration. The proposed configuration was determined to meet Caltrans criteria for both static and pseudo static (seismic) stability. Results of the stability analyses for RW-12 are included in Appendix IV.

8.5.8 Retaining Wall-13

RW-13 will be special design Geosynthetically Reinforced Earth wall placed parallel to Genesee Avenue west of I-5. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to these three retaining walls are presented in the *Caltrans Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-13, 11-022331/EFIS 11000000012,* dated March 28, 2014.

8.5.9 Retaining Wall-14

RW-14 will be special design Geosynthetically Reinforced Earth wall placed parallel to Genesee Avenue west of I-5. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to these three retaining walls are presented in the *Caltrans Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-14, 11-022331/EFIS 11000000012,* dated March 28, 2014.

8.5.10 Retaining Wall-15

RW-15 will be special design Geosynthetically Reinforced Earth wall placed parallel to I-5 north of Genesee Avenue. Wall descriptions and complete information on the site conditions, analyses, advisories, and recommendations relevant to these three retaining walls are presented in the *Caltrans Foundation Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-15, 11-022331/EFIS 11000000012,* dated March 28, 2014

8.6 Culvert Foundations

The proposed project includes the construction of two (2) significant culverts. Both of the culverts will be located in the northwest quadrant of the project.

The site of the existing concrete lined channel that drains the lowland portion of the northwest quadrant will be buried by the additional embankment placed to accommodate freeway widening and reconfiguration of the southbound off ramp to Genesee Avenue. A six-foot by six-foot (6ft X 6ft) concrete box culvert will replace the concrete lined channel on the same alignment from Station 1595+70 to Station 1604+00. The existing concrete channel is founded on a relatively weak layer of alluvium over more competent sedimentary formation. Special treatment of the foundation soil will be necessary to provide adequate culvert support and assure that culvert settlement is within tolerable limits. The treatment will consist of the additional structure excavation of material to a depth of three-feet (3ft) below the culvert bottom slab and two-feet (2.0ft) beyond the culvert walls, placing a drainage blanket comprised of gravel wrapped in filter fabric in the resulting trench, and placing structure backfill compacted to ninety five-percent (95%) relative compaction. The concept is depicted on Figure 11. Culvert foundation treatment data are provided in Table 4B.

The lowland area near and around the concrete lined channel is perpetually saturated and often inundated. It should be anticipated that the placement of a temporary sheet pile coffer dam, shallow well points, or other techniques that facilitate excavation and construction in saturated soil conditions will be necessary.

The other significant culvert is a seventy two-inch (72in) diameter culvert that will collect storm runoff from multiple inlets and smaller culverts and convey that concentrated flow from near freeway grade to the toe of the landslide stabilization buttress. This culvert will discharge into the lowland area that will flow to the six-foot by six-foot (6ft X 6ft) concrete box culvert. The culvert will reside within existing and newly placed engineered fill of the landslide stabilization buttress. The engineered fill will provide

suitable support. The joints of the seventy two-inch (72in) diameter culvert must be water tight to ensure water does not discharge from the joints into the existing and newly placed engineered fill of the landslide stabilization buttress.

8.7 Soundwall Foundations

No soundwalls are proposed for this project.

8.8 Overhead Sign Foundations

Seven (7) overhead signs are proposed for this project including four (4) double post and three (3) single post configurations. Descriptions of the overhead sign types, locations, and subsurface data are provided in Table 5. The design of appropriate CIDH pile foundations for each sign may be found in the Standard Plans.

In general, the subsurface conditions at the overhead sign locations are suitable for standard CIDH pile foundations. It is not anticipated that groundwater will be encountered during pile excavation for the overhead signs. Minor caving may occur during pile excavation within engineered fill. No caving is anticipated during pile excavation in sedimentary formation. Concretions are likely to be encountered during pile excavation right of I-5 Station 1581+00 and at “G2A” line Station 1580+30.

9.0 MATERIAL SOURCES

No off site material source has been identified for this project. Material generated from on site excavations will consist primarily of sand and silt derived from sedimentary formation and artificial fill. The material generated on site is anticipated to be suitable for use as roadway embankment. The material derived from sandstone is anticipated to be suitable for use as structure backfill. Concretions may be broken into one-quarter-ton (1/4ton) and buried within the landslide stabilization buttress or deep in engineered fill.

10.0 MATERIAL DISPOSAL

Examples of material unsuitable for embankment subgrade or fill include organic mud, highly expansive clay, stockpiled trash, and debris. The geotechnical site review suggests that unsuitable material is present in the lowland areas to the west of the freeway.

Material generated during construction that is found to be unsuitable for use as roadway subgrade, embankment fill, or topsoil should be placed in a suitable location within the projects limits or properly disposed. No locations were identified that would be adversely impacted by the placement of excess material within the project limits.

11.0 RECOMMENDATIONS

1. Permanent cut slopes should be inclined no steeper than one and one half horizontal to one vertical (1.5H:1V) up to a maximum height of fifty-feet (50ft). Similarly inclined cut slopes greater than fifty-feet (50ft) in height should incorporate a mid slope bench having a minimum width of ten-feet (10ft).
2. Under no circumstances should the inclination of temporary cut slopes between ten-feet (10ft) and thirty-feet (30ft) in height within engineered fill be allowed to exceed one and one quarter horizontal to one vertical (1.25H:1V) or be allowed to exceed one horizontal to one vertical (1H:1V) within sedimentary formation.
3. Under no circumstances should temporary cut slopes over thirty-feet (30ft) of height in fill and sedimentary formation be allowed to exceed one and one half horizontal to one vertical (1.5H:1V) and one and one quarter horizontal to one vertical (1.25H:1V), respectively.
4. Highway fill slopes should be inclined two horizontal to one vertical (2H:1V) or flatter.

5. A landslide stabilization buttress should be placed in the northwest quadrant of the Genesee Avenue interchange. The description and configuration of the buttress is provided in Section 8.4.1.
6. Material unsuited as embankment subgrade or embankment fill will be encountered in the lowland area of the northwest quadrant of the Genesee Avenue Interchange. This material should be removed and replaced prior to the placement of the landslide stabilization buttress. The description and extent of this remedial grading is discussed in Section 8.4. The limits of these zones are provided in Table 4A.
7. Rock Slope Protection (RSP) should be placed along the face of the proposed landslide stabilization buttress according to details provided in Section 8.4.
8. Expanded zones of structure excavation are necessary below portions of the (6-ft) by six-foot (6-ft) concrete box culvert. These zones are discussed in Section 8.6. The limits of these zones are provide in Table 4B and depicted on Figure 11.
9. A sub-drain should be constructed to manage the seepage of perched groundwater near Station 1593+00 in the northwest quadrant of the Genesee Avenue interchange. The sub-drain is discussed in Section 8.4.
10. The seventy two-inch (72in) diameter culvert that will be constructed within the landslide stabilization buttress must be constructed with water tight joints to ensure water does not discharge from the joints into the existing and newly placed engineered fill of the landslide stabilization buttress.
11. The installations of six (6) SI are proposed as part of the project to monitor freeway embankment performance at the landslide. A discussion of the SI is provided in Section 8.4.1.

12.0 DESIGN ADVISORIES

1. The material derived from excavations in the sandstone, siltstone, conglomerate, and engineered fills within the project will be suitable for use as embankment fill.
2. The subsurface conditions at each of the seven (7) proposed overhead sign locations are suitable for Caltrans Standard CIDH pile foundations.
3. For the purpose of developing staged construction plans, the temporary cut slopes in sedimentary formation should be inclined no steeper than one horizontal to one vertical (1H:1V). Temporary cut slopes in engineered fill should be inclined no steeper than one and one quarter horizontal to one vertical (1.25H:1V).
4. Areas of distressed pavement on south bound I-5 between Roselle Street and Genesee Avenue and at the northbound onramp to I-5 from Genesee Avenue were described in Section 2.1.1. While ongoing ground movement and continued pavement distress is not anticipated to be substantial, subgrade enhancement may be considered by project designers to mitigate future distress due to ground movement. Subgrade enhancement consists of excavation of the structural section and subgrade soil to a depth of two and three-tenths-feet (2.3ft) below the top of pavement followed by placement of two layers of biaxial geogrid. The geogrid should be placed at the bottom of the excavation and at one-half-feet (0.5ft) below the interface between the subgrade and bottom of the hot mix Asphalt (HMA). A diagram of the subgrade enhancement is depicted on Figure 12. The designers should include Standard Special Provision 88-1.02P Biaxial Geogrid in the project specifications.

13.0 CONSTRUCTION CONSIDERATIONS

1. The on-site soils may generally be excavated with conventional heavy grading equipment. It should be anticipated that the presence of cobble and concretions may create occasional difficulties during drilling and trenching operations. Trenching and boring methods should be capable of excavating through hard concretions.
2. The total volume of concretions excavated on the project is not anticipated to exceed five hundred-cubic yards (500cy). Excavated concretions may be broken into one-quarter-ton (1/4ton) and buried within the landslide stabilization buttress or deep in engineered fill.
3. Minor caving may occur within shafts drilled in fill. Caving conditions are not anticipated to be widespread. Drilled shafts that tend to cave may be cased or the placed volume of concrete may be increased.
4. Placement of a coffer dam and other temporary drainage control features will likely be necessary to control surface water and water seepage during the removal of unsuitable material located within the proposed footprint of the landslide stabilization buttress and additional freeway embankment.
5. The existing slope inclinometers will be monitored by OGDS2 during construction until such time that construction activities make the abandonment of the existing slope inclinometers necessary.
6. Temporary cut slopes proposed by the Contractor should follow the guidelines set forth in the Caltrans Trenching and Shoring Manual. Under no circumstances should the inclination of temporary cut slopes between ten-feet (10ft) and thirty-feet (30ft) in height within engineered fill be allowed to exceed one and one quarter horizontal to one vertical (1.25H:1V) or be allowed to exceed one horizontal to one vertical (1H:1V) within sedimentary formation.
7. Under no circumstances should temporary cut slopes over thirty-feet (30ft) of height in fill and sedimentary formation be allowed to exceed one and one half horizontal to one vertical (1.5H:1V) and one and one quarter horizontal to one vertical (1.25H:1V), respectively.
8. Temporary shoring will be necessary to facilitate the construction of several retaining walls.
9. Regular readings of the slope inclinometers will be performed by OGDS2 during and after project construction.

14.0 ACTUAL VS. REPORTED SITE CONDITIONS

The characterizations of geotechnical conditions along the project alignment and presented in this report are based on the review of the design information provided, proposed project features, as-built plans, geologic maps, geologic literature, archival reports, exploration by OGDS2, and laboratory testing. The evaluations and recommendations contained in this report are based on the information discovered and data gathered. If conditions are encountered during the project that appear to differ from the conditions conveyed in this report, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 Branch D should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Should project design features vary significantly from those described in this report an updated GDR should be prepared by OGDS2 Branch D to address the geotechnical considerations related to those features.

15.0 REFERENCES

USDA, Soil Conservation Service and Forest Service, (1973), *Soil Survey, San Diego Area, California.*

S.S Tan and M.P. Kennedy, (1996), Geologic *Map of Northwestern Part of San Diego County.*

S.S. Tan and M.P. Kennedy, (1996), *Geologic Map of Northwestern Part of San Diego County, Plate 2 Geologic Map of the Encinitas and Rancho Santa Fe 7.5' Quadrangles, San Diego County, California.*

S.S. Tan and M.P. Kennedy, (1996), *Geologic Map of Northwestern Part of San Diego County, Plate 1 Geologic Map of the Oceanside, San Luis Rey, and San Marcos 7.5' Quadrangles, San Diego County, California.*

GSTABLE7 with STEDwin v.2.

Caltrans, Division of Engineering Services, Geotechnical Services, (2009), *Geotechnical Services Design Manual v.1.0, Section 1: Seismic Design Recommendation.*

Caltrans, Division of Engineering Services, Geotechnical Services, (2009), *Geotechnical Services Design Manual v.1.0, Appendix B.*

FIGURES

Google earth

feet 5000

km 1

Note: The locations, alignments, and lengths of the retaining walls; the location of the seep; the location, length, and alignment of the landslide stabilization buttress, the location and area of the landslide are approximated.

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	15	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	△	T	L
4	3000.00'	03°11'44"	83.68'	167.32'
5	1900.00'	08°32'07"	141.78'	283.04'
7	2700.00'	03°02'46"	71.79'	143.54'

CURVE DATA ("P" LINE)

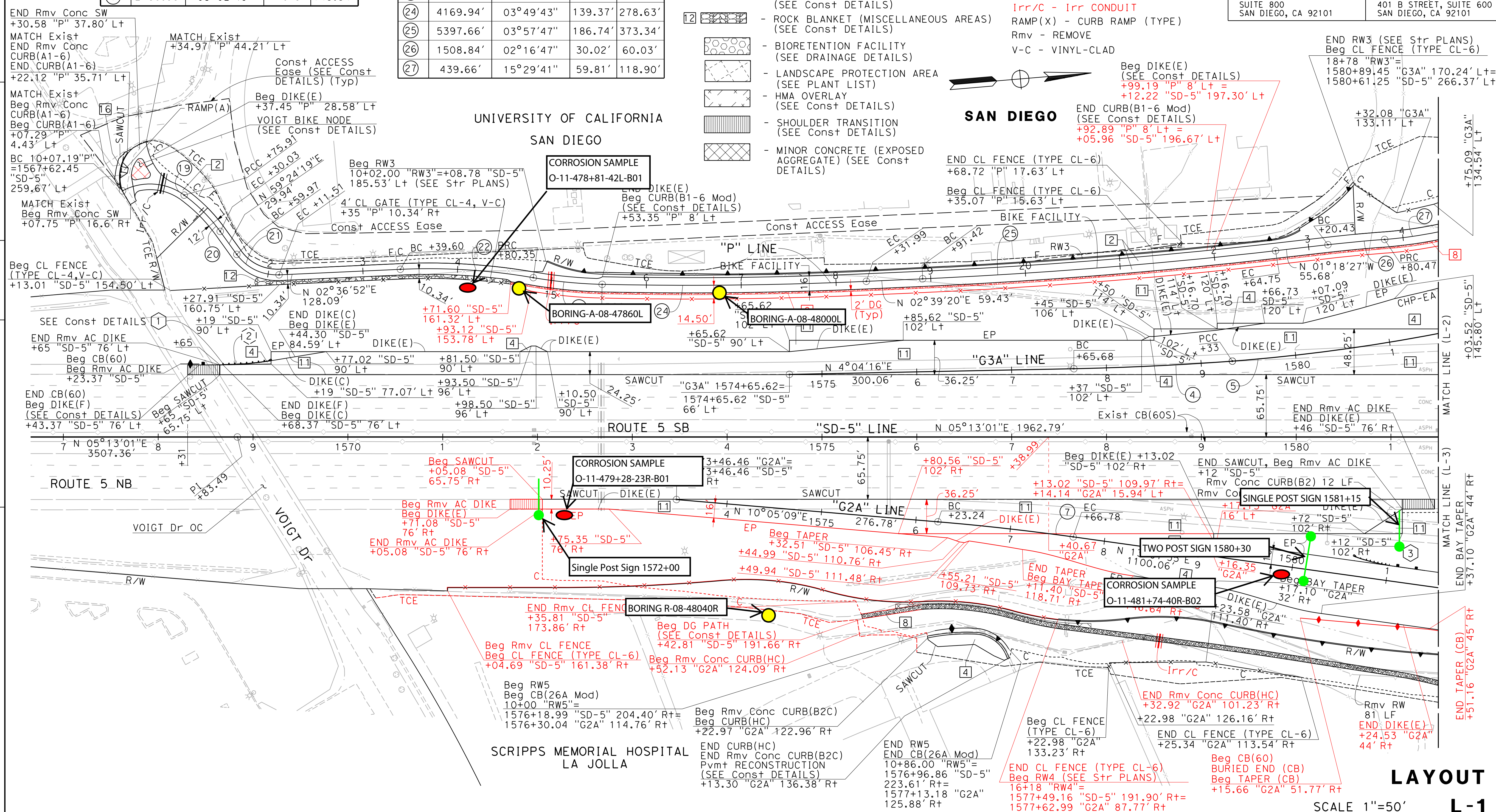
No.	R	△	T	L
19	61.00'	64°32'52"	38.52'	68.72'
20	173.00'	17°55'22"	27.28'	54.12'
21	52.00'	56°47'28"	28.11'	51.54'
22	650.00'	12°24'23"	70.65'	140.75'
23	490.00'	08°32'12"	36.57'	73.01'
24	4169.94'	03°49'43"	139.37'	278.63'
25	5397.66'	03°57'47"	186.74'	373.34'
26	1508.84'	02°16'47"	30.02'	60.03'
27	439.66'	15°29'41"	59.81'	118.90'

LEGEND:

- (X) - CURVE DATA NUMBER
- (#) - MIDWEST GUARDRAIL SYSTEM (MGS)
- (#) - REMOVE METAL BEAM GUARD RAILING
- [X] - STRUCTURAL SECTIONS (SEE TYPICAL CROSS SECTIONS FOR STRUCTURAL SECTIONS)
- [8] - DECOMPOSED GRANITE (MISCELLANEOUS AREAS) (SEE Const DETAILS)
- [12] - ROCK BLANKET (MISCELLANEOUS AREAS) (SEE Const DETAILS)
- BIORETENTION FACILITY (SEE DRAINAGE DETAILS)
- LANDSCAPE PROTECTION AREA (SEE PLANT LIST)
- HMA OVERLAY (SEE Const DETAILS)
- SHOULDER TRANSITION (SEE Const DETAILS)
- MINOR CONCRETE (EXPOSED AGGREGATE) (SEE Const DETAILS)

ABBREVIATIONS:

- CB(X) - Conc BARRIER (TYPE)
- CHP-EA - CALIFORNIA HIGHWAY PATROL ENFORCEMENT AREA
- CURB(X) - Conc CURB (TYPE)
- DG - DECOMPOSED GRANITE
- EJPCP - EDGE OF JPCP
- DIKE(X) - HMA DIKE (TYPE)
- HSSD - HIGH SIDE OF SUPERELEVATION DITCH
- Irr/C - Irr CONDUIT
- RAMP(X) - CURB RAMP (TYPE)
- Rmv - REMOVE
- V-C - VINYL-CLAD



LAYOUT

SCALE 1"=50'

L-1

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN | CHECKED BY: CASEY L. LEWIS | REVISED BY | DATE REVISED

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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BORDER LAST REVISED 07/02/10 | USERNAME => greg.zeitounian | DGN FILE => 1112000102ea001.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 2771 | PROJECT NUMBER & PHASE 11120001021

FIGURE 2A: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	16	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

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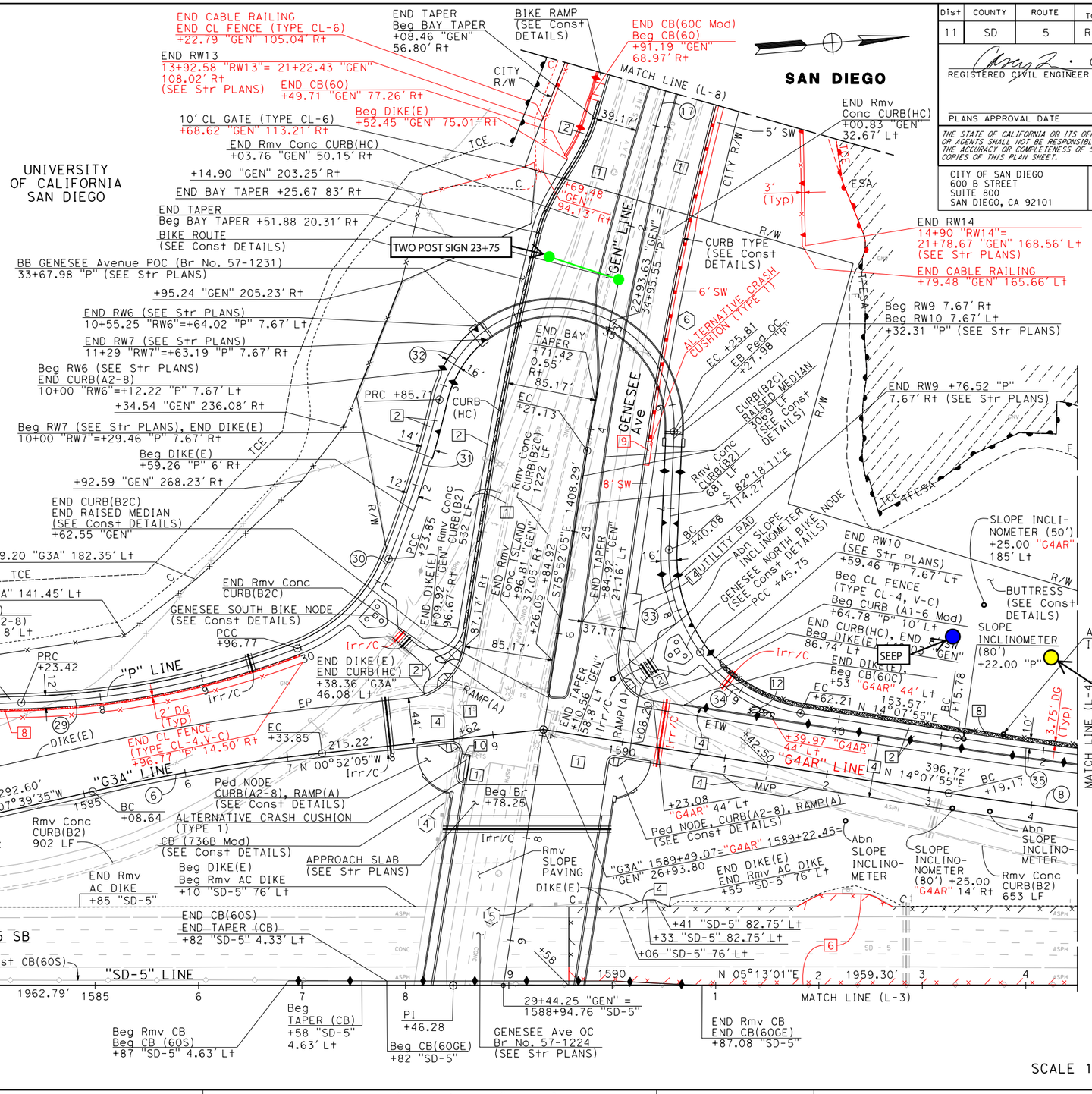
CURVE DATA

No.	R	Δ	T	L
5	1900.00′	08°32′06"	141.78′	283.04′
6	1900.00′	06°47′29"	112.74′	225.22′
8	3500.00′	03°28′22"	106.11′	212.15′
17	3000.00′	22°13′18"	589.17′	1163.53′

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
27	439.66′	15°29′41"	59.81′	118.90′
28	691.80′	18°33′24"	113.02′	224.06′
29	789.66′	19°50′02"	138.06′	273.35′
30	156.00′	46°40′27"	67.30′	127.08′
31	1000.00′	09°16′26"	81.11′	161.86′
32	115.00′	169°26′42"	1244.97′	340.10′
33	156.00′	38°48′43"	54.95′	105.67′
34	149.10′	44°45′12"	61.38′	116.46′
35	3446.00′	03°28′23"	104.47′	208.88′



LAYOUT L-2

SCALE 1"=50′

REVISED BY	DATE REVISED

GREGORY ZEITOUNIAN — CASEY L. LEWIS

CALCULATED-DESIGNED BY — CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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FIGURE 2B: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	17	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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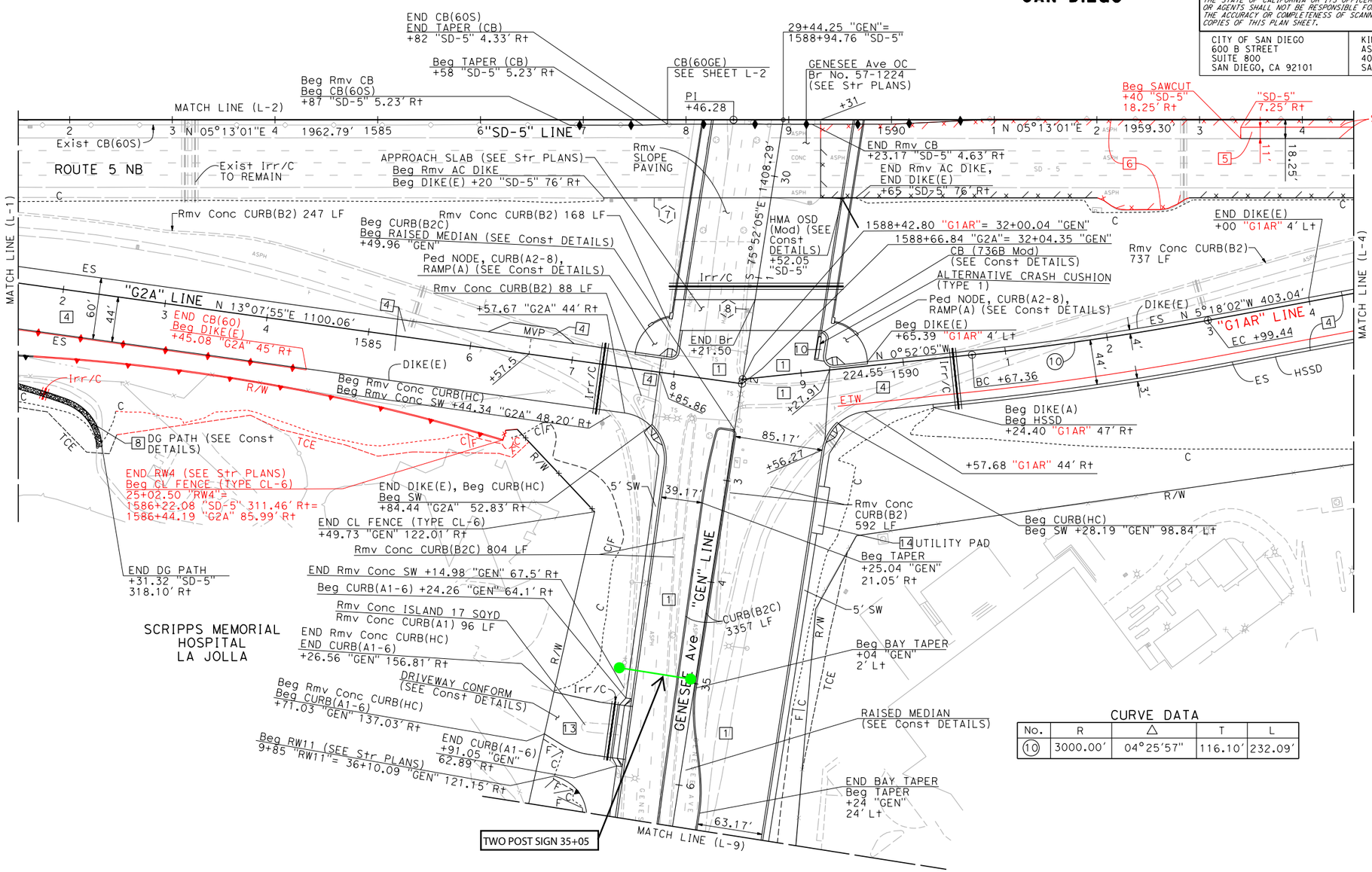
SAN DIEGO



CURVE DATA

No.	R	Δ	T	L
10	3000.00'	04°25'57"	116.10'	232.09'

LAYOUT

SCALE 1"=50' **L-3**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

CHECKED BY: CASEY L. LEWIS

REVISED BY / DATE REVISED

LAST REVISION 01-31-14

DATE PLOTTED => 2/20/2014
TIME PLOTTED => 7:35:17 PM

BORDER LAST REVISED 07/02/10

USERNAME => greg.zeitounian
DGN FILE => 1112000102ea003.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2771

PROJECT NUMBER & PHASE 11120001021

FIGURE 2C: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	18	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

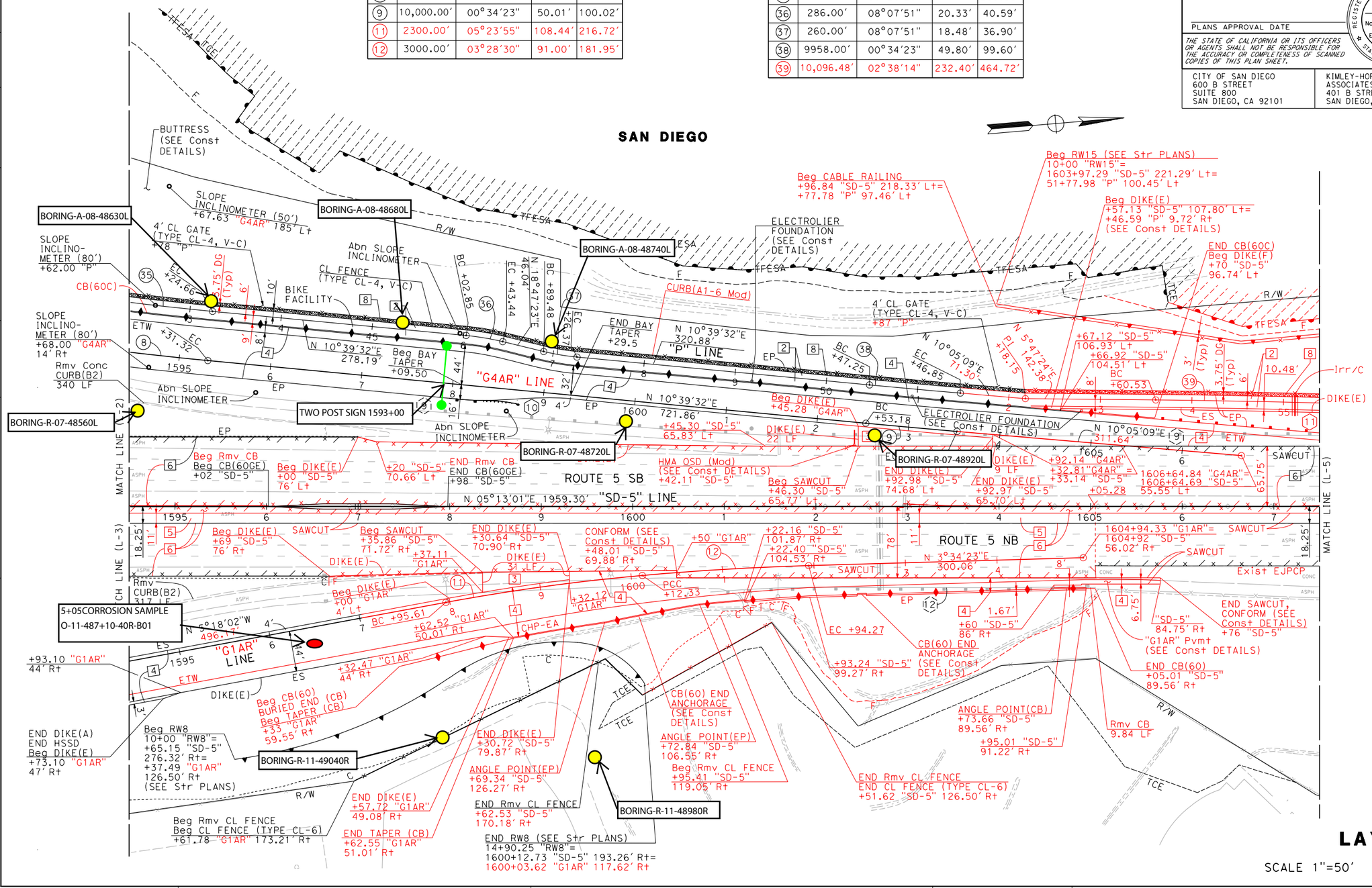
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
8	3500.00′	03°28′22"	106.11′	212.15′
9	10,000.00′	00°34′23"	50.01′	100.02′
11	2300.00′	05°23′55"	108.44′	216.72′
12	3000.00′	03°28′30"	91.00′	181.95′

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
35	3446.00′	03°28′23"	104.47′	208.88′
36	286.00′	08°07′51"	20.33′	40.59′
37	260.00′	08°07′51"	18.48′	36.90′
38	9958.00′	00°34′23"	49.80′	99.60′
39	10,096.48′	02°38′14"	232.40′	464.72′



LAYOUT L-4

SCALE 1"=50′

REVISED BY	DATE REVISED

GREGORY ZEITOUNIAN — CASEY L. LEWIS — CALCULATED-DESIGNED BY — CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR — MICHAEL S. ROSS

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

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FIGURE 2D: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	19	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

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NOTE:

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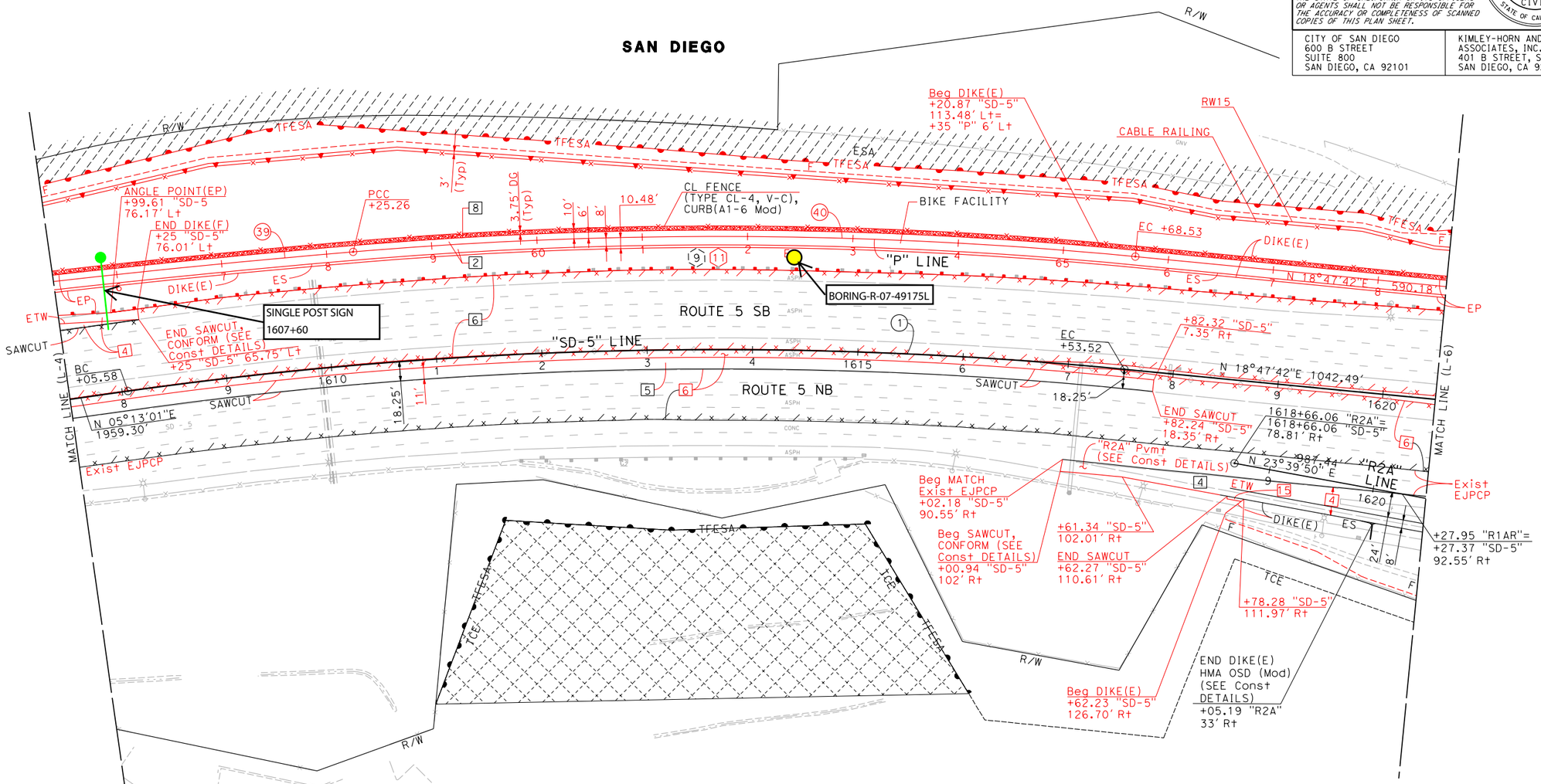

CURVE DATA

No.	R	Δ	T	L
1	4000.00'	13°34'41"	476.20'	947.94'

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
39	10,096.48'	02°38'14"	232.40'	464.72'
40	4107.48'	10°22'05"	372.65'	743.27'

LAYOUT

SCALE 1"=50' **L-5**

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CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

CHECKED BY: CASEY L. LEWIS

REVISED BY

DATE REVISED

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2771

PROJECT NUMBER & PHASE 11120001021

FIGURE 2E: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	20	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

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NOTE:

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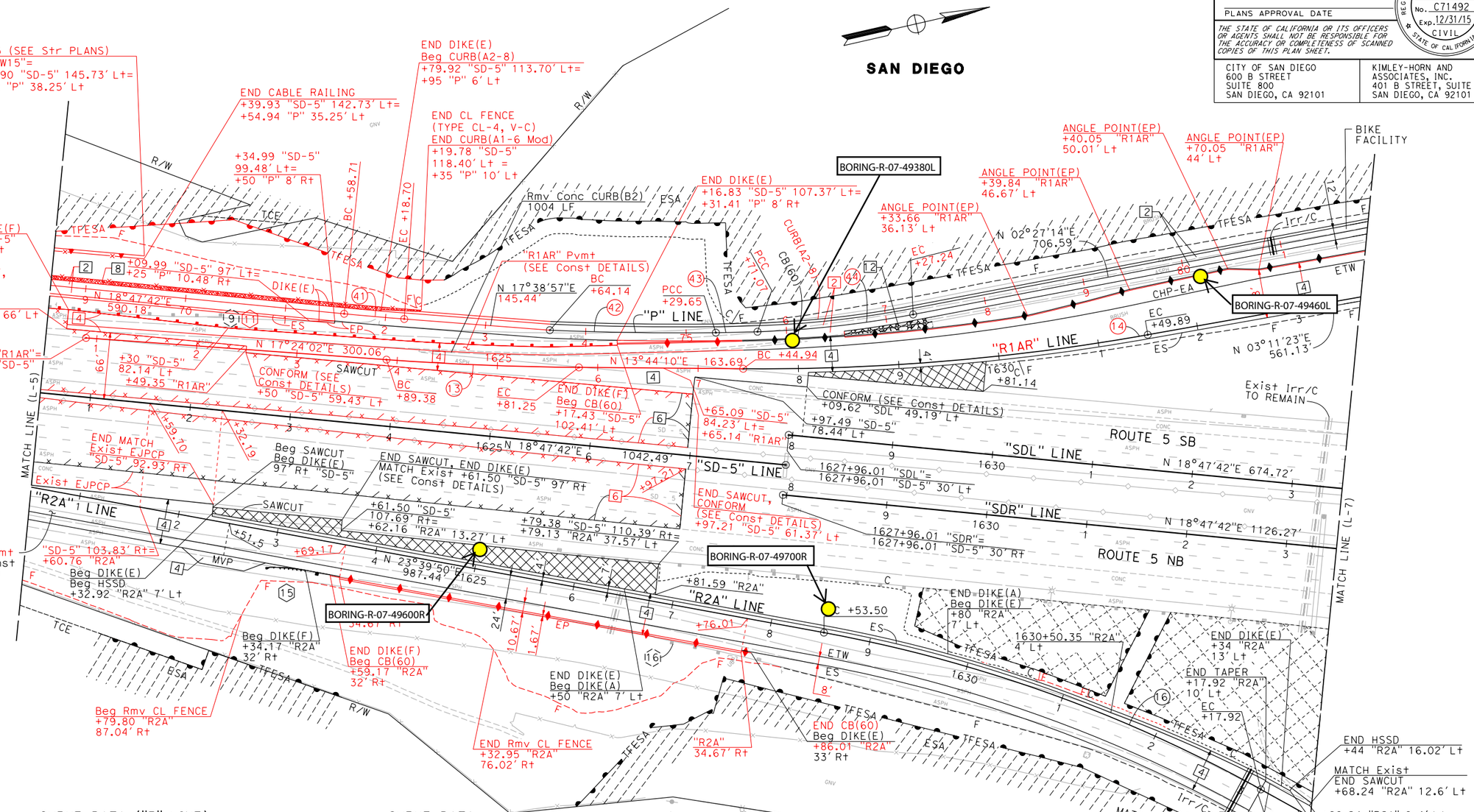

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
41	3000.00'	01°08'45"	30.00'	59.99'
42	2965.54'	03°11'52"	82.78'	165.51'
43	2155.98'	01°06'03"	20.71'	41.42'
44	997.00'	08°58'29"	78.25'	156.17'

CURVE DATA

No.	R	Δ	T	L
13	3000.00'	03°39'52"	95.97'	191.87'
14	2200.00'	10°32'47"	203.05'	404.95'
16	1425.59'	18°39'55"	234.28'	464.42'

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CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

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BORDER LAST REVISED 07/02/10

USERNAME => greg.zeitounian
DGN FILE => 1112000102ea006.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2771

PROJECT NUMBER & PHASE 11120001021

FIGURE 2F: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	21	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

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SAN DIEGO, CA 92101

NOTE:

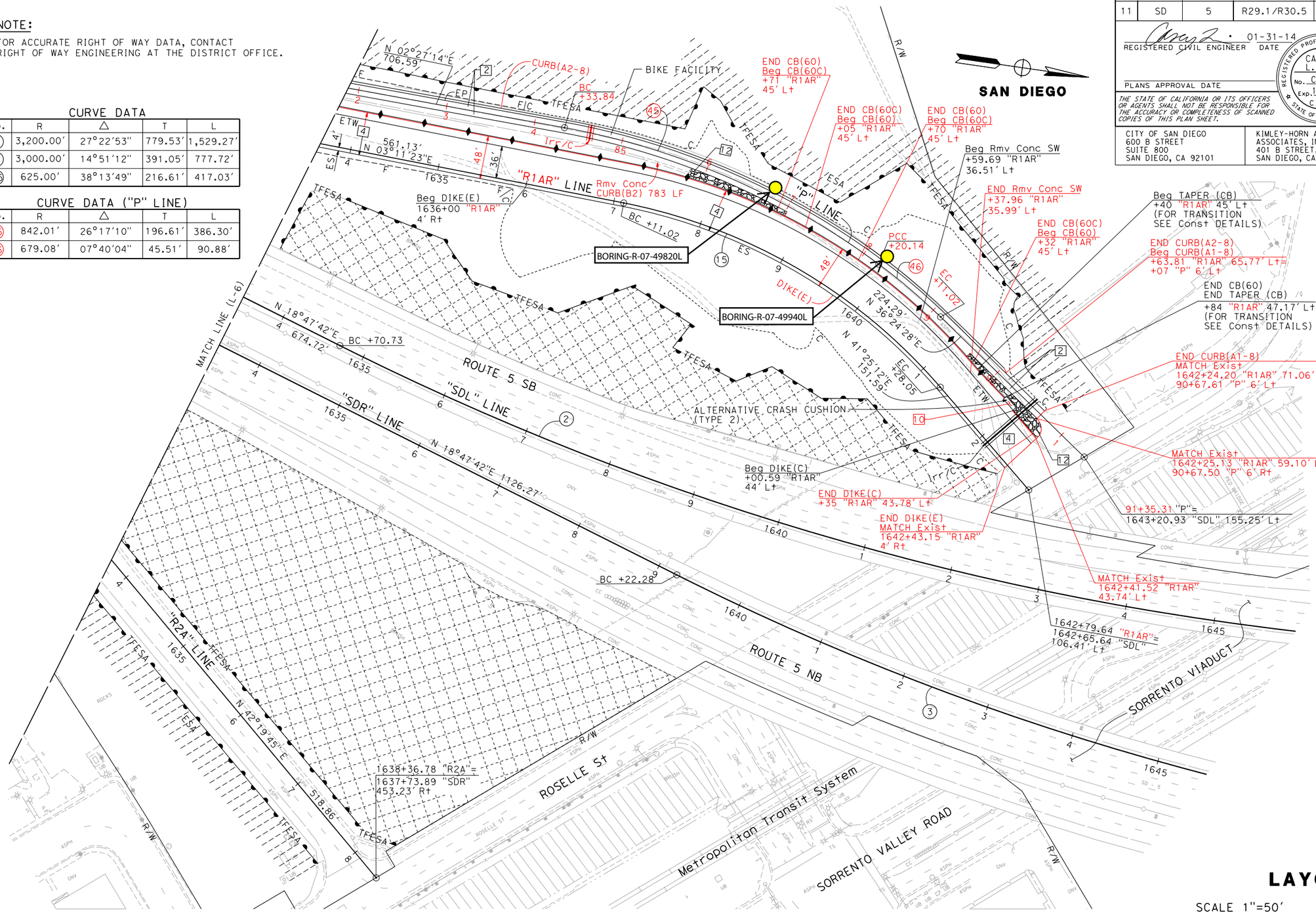
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
2	3,200.00′	27°22′53″	779.53′	1,529.27′
3	3,000.00′	14°51′12″	391.05′	777.72′
15	625.00′	38°13′49″	216.61′	417.03′

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
45	842.01′	26°17′10″	196.61′	386.30′
46	679.08′	07°40′04″	45.51′	90.88′



LAYOUT

SCALE 1"=50′ **L-7**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

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BORDER LAST REVISED 07/02/10

USERNAME => greg.zeitounian
DGN FILE => 1112000102ea007.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2771

PROJECT NUMBER & PHASE 11120001021

FIGURE 2G: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	22	964

REGISTERED CIVIL ENGINEER — DATE 01-31-14

PLANS APPROVAL DATE

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SAN DIEGO, CA 92101

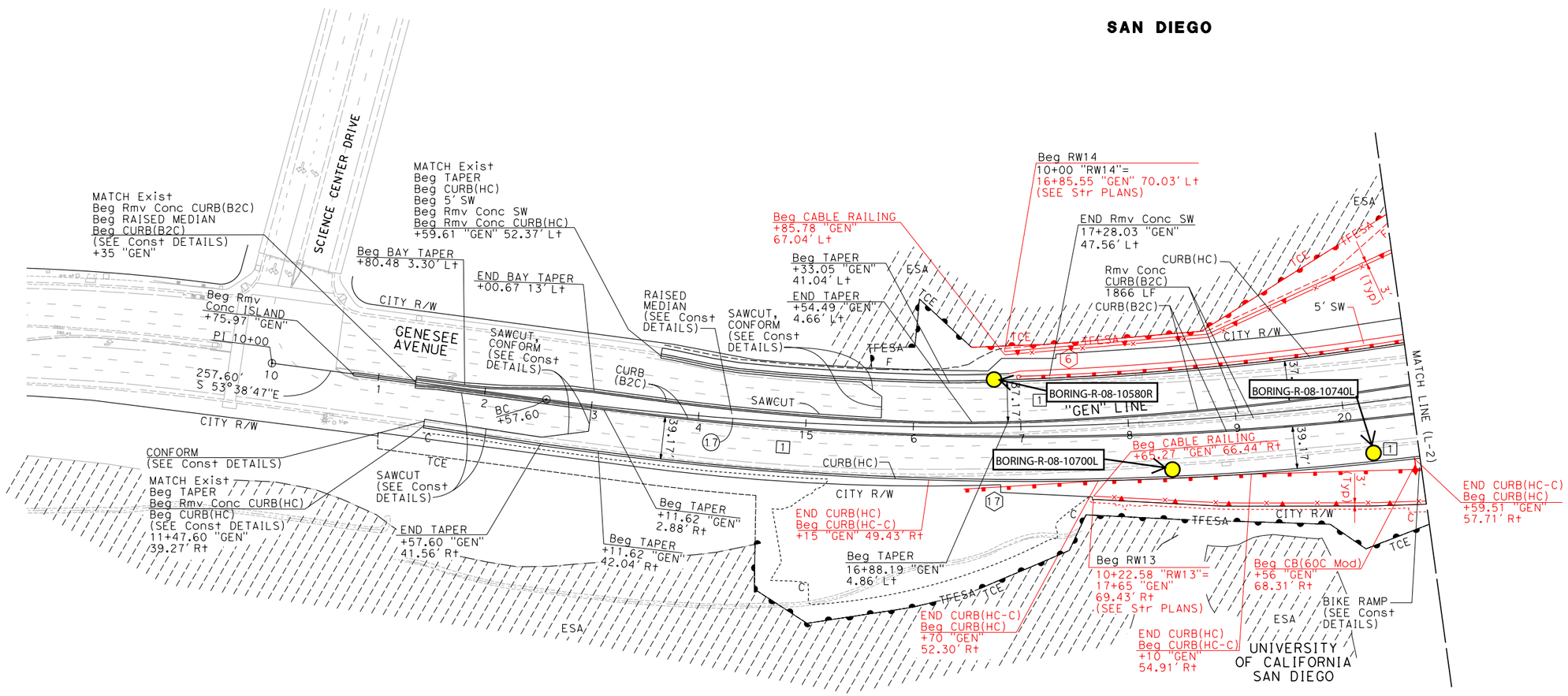
NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
17	3,000′	22°13′18"	589.17′	1,163.53′

SAN DIEGO



LAYOUT

SCALE 1"=50′ **L-8**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN — CHECKED BY: CASEY L. LEWIS — CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS — REVISED BY — DATE REVISED

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FIGURE 2H: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	23	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

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NOTE:

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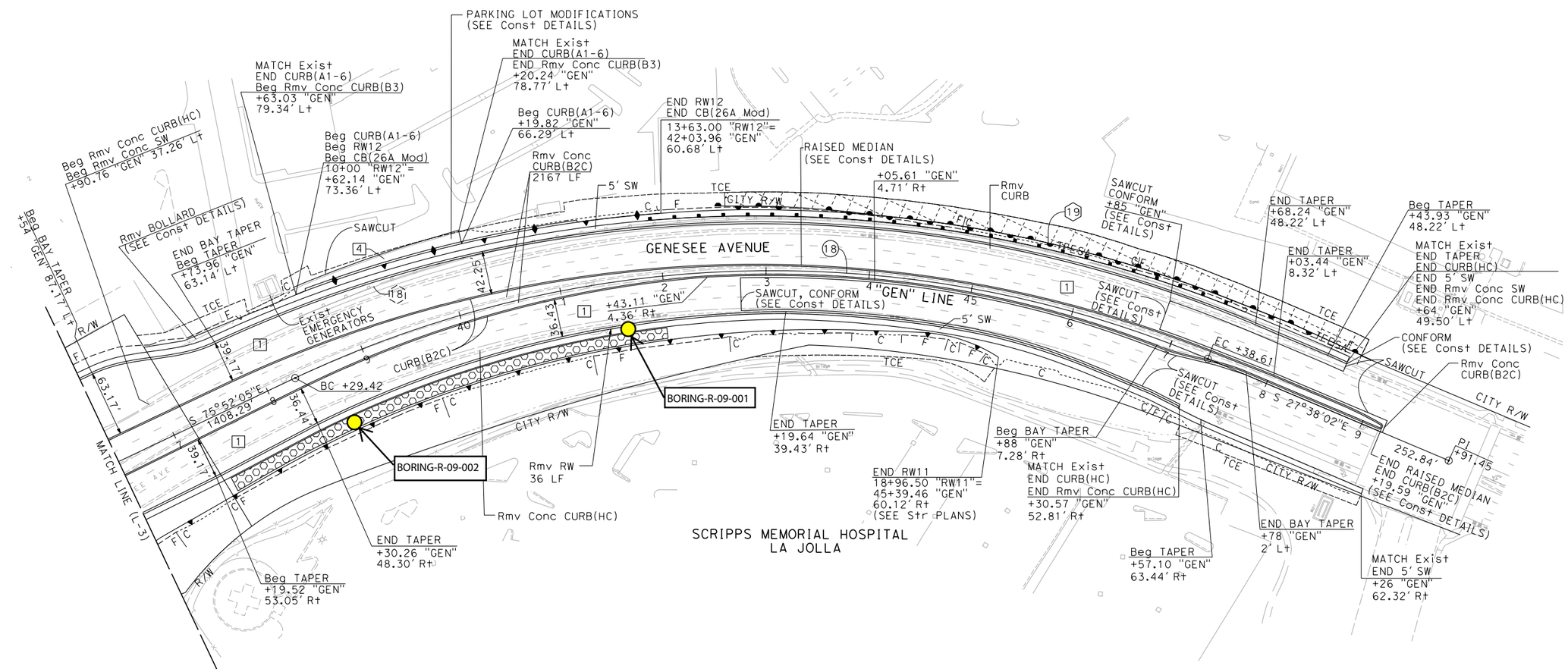
CURVE DATA

No.	R	Δ	T	L
18	1,080.00′	48°14′03″	483.49′	909.19′

SAN DIEGO



LAYOUT

SCALE 1"=50′ **L-9**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

CHECKED BY: CASEY L. LEWIS

REVISED BY

DATE REVISED

LAST REVISION 01-31-14

DATE PLOTTED => 2/20/2014

TIME PLOTTED => 7:35:32 PM

BORDER LAST REVISED 07/02/10

USERNAME => greg.zeitounian
DGN FILE => 1112000102ea009.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2771

PROJECT NUMBER & PHASE 11120001021

FIGURE 2I: PROJECT LAYOUT

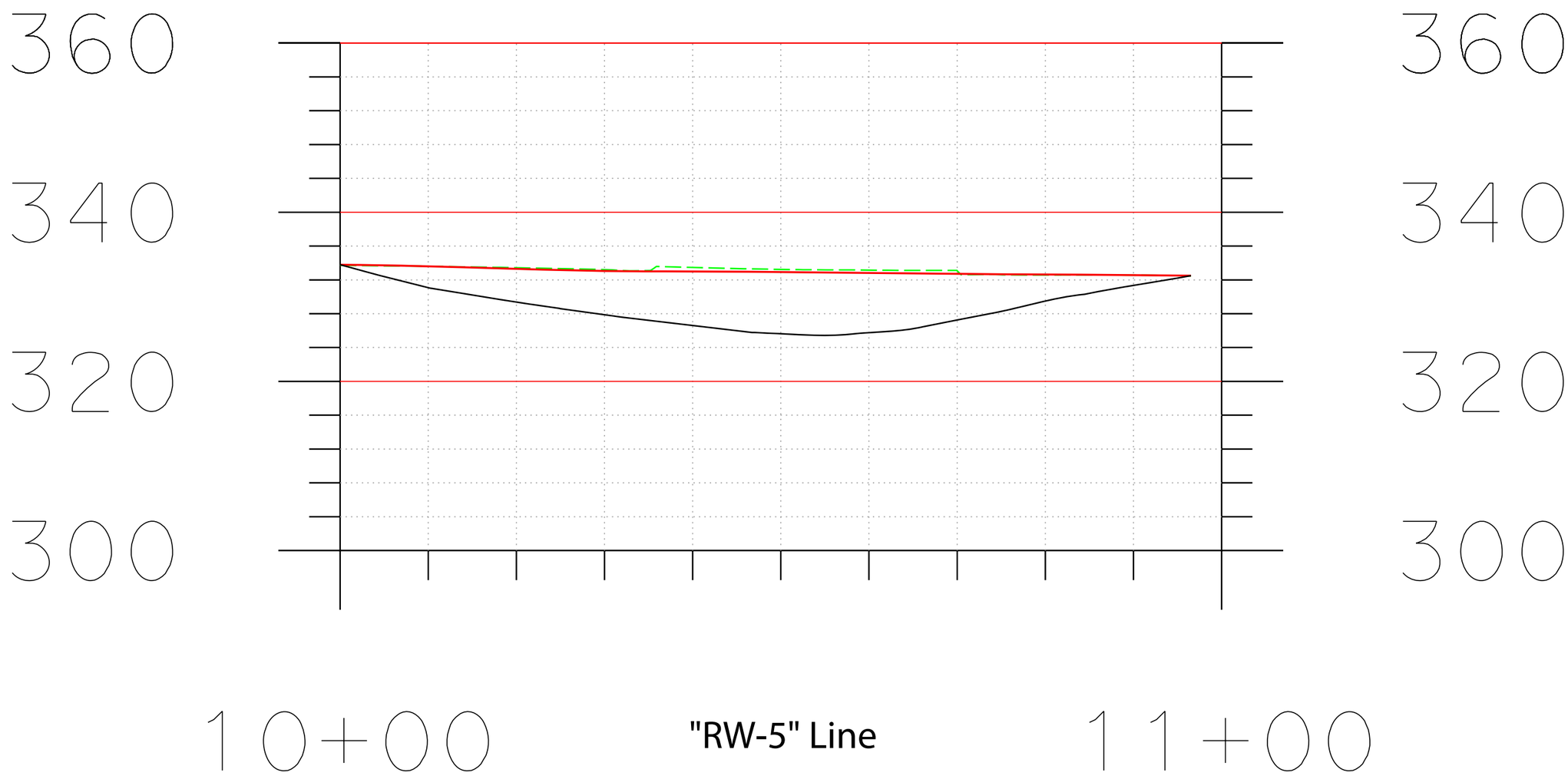
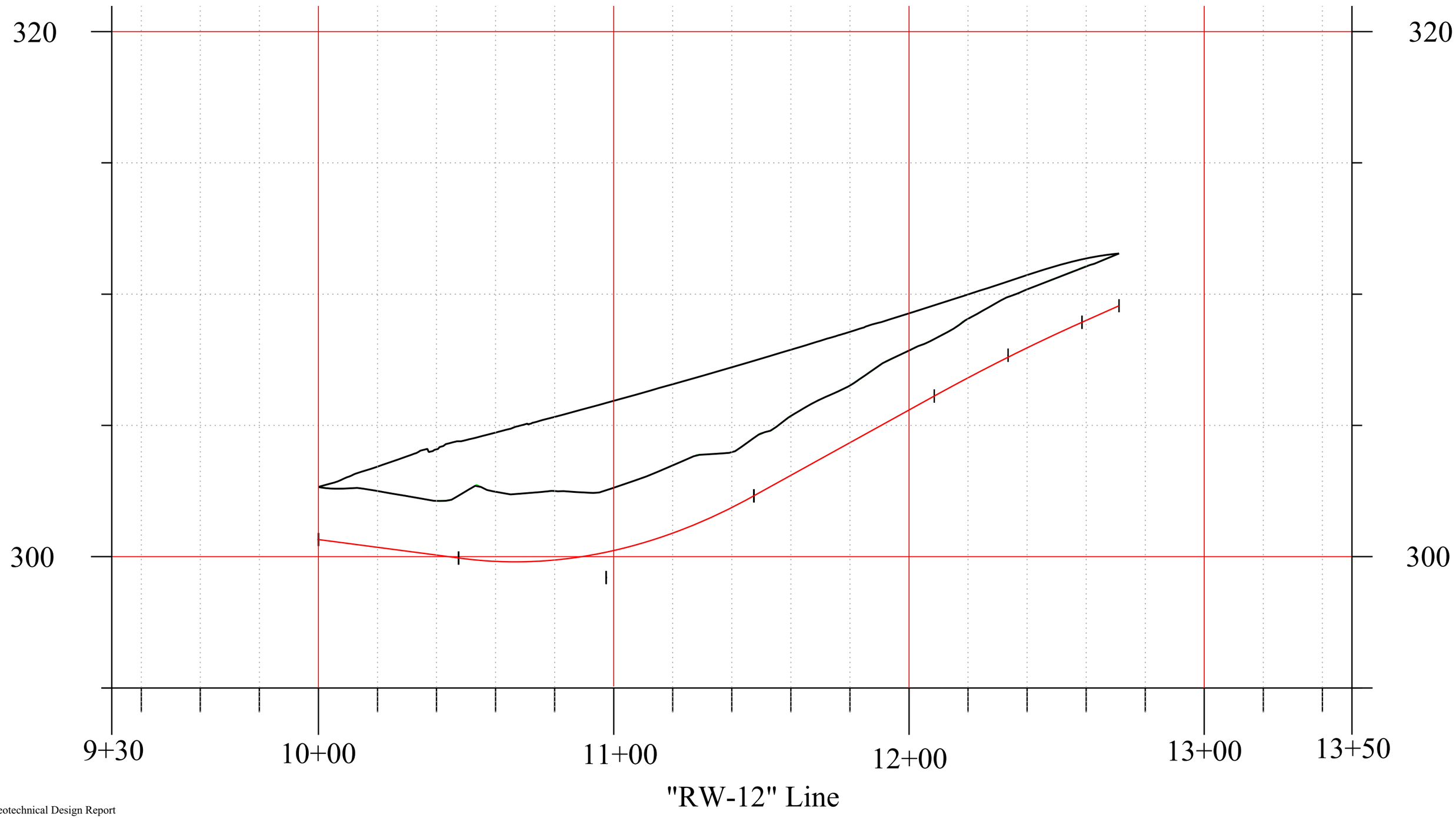
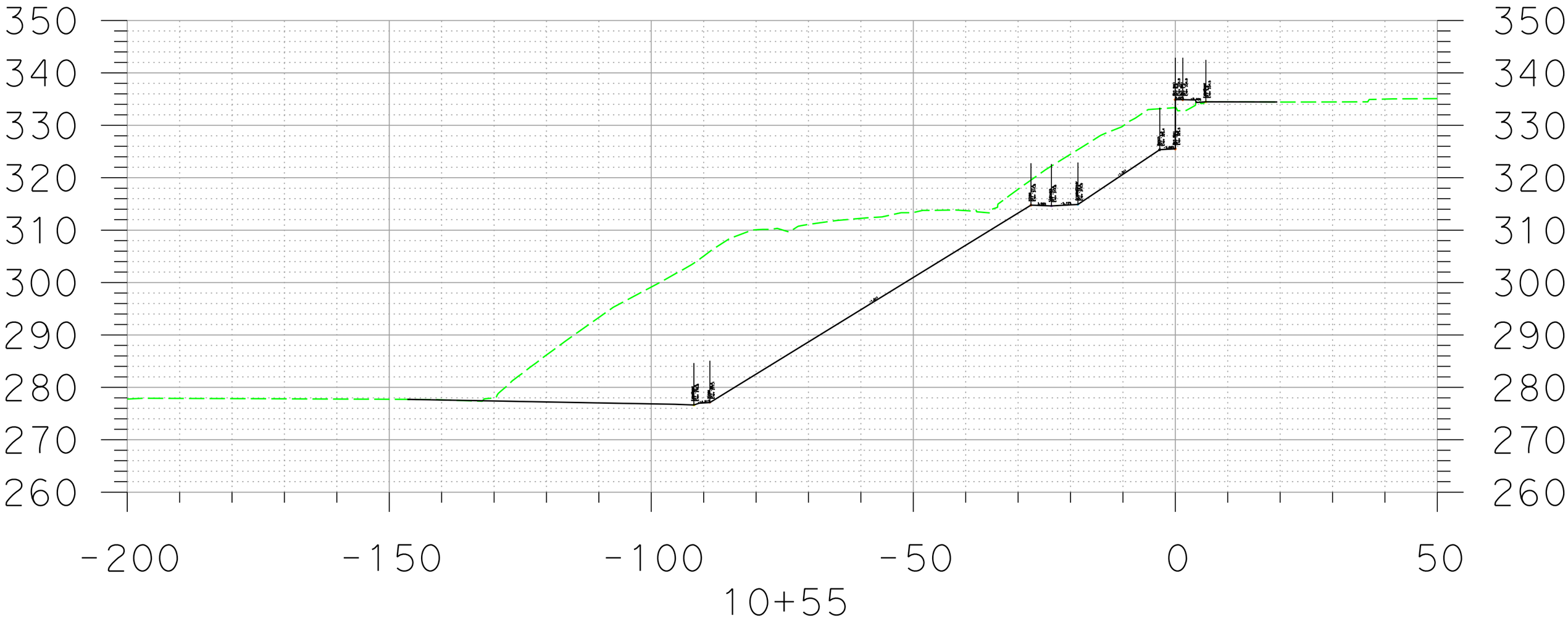


FIGURE 3A: PROJECT PROFILE



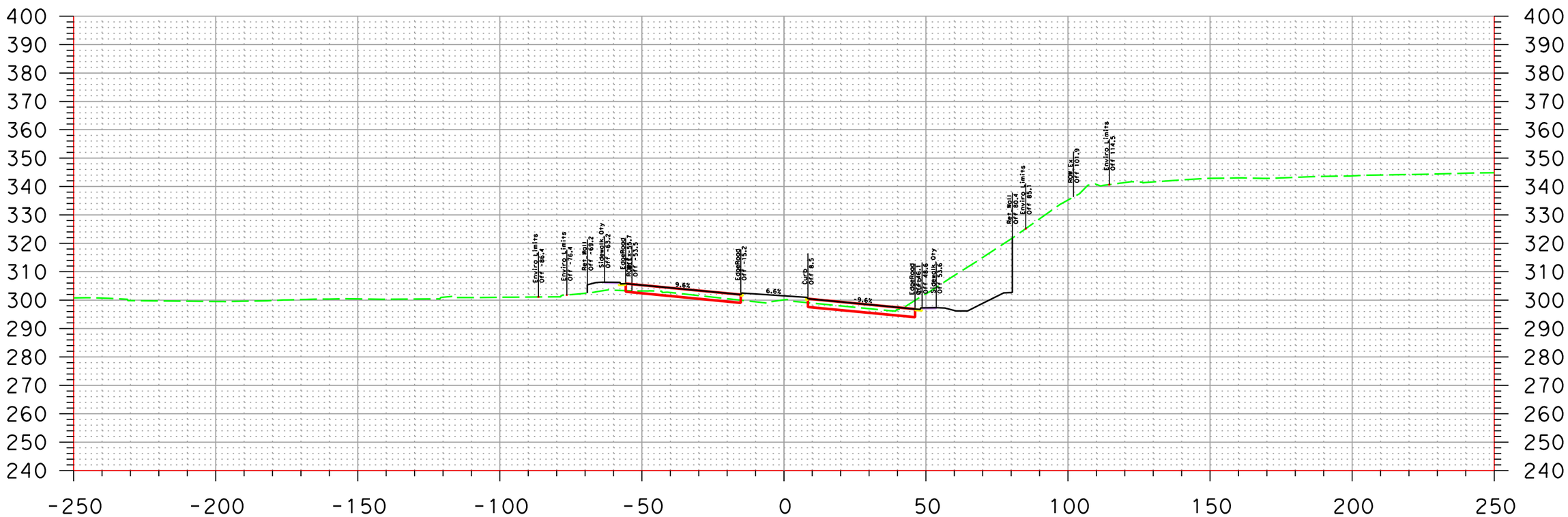
Geotechnical Design Report
Interstate-5/Genesee Avenue Interchange Improvement Project
EA 11-022331/EFIS 1100000012

FIGURE 3B: PROJECT PROFILE



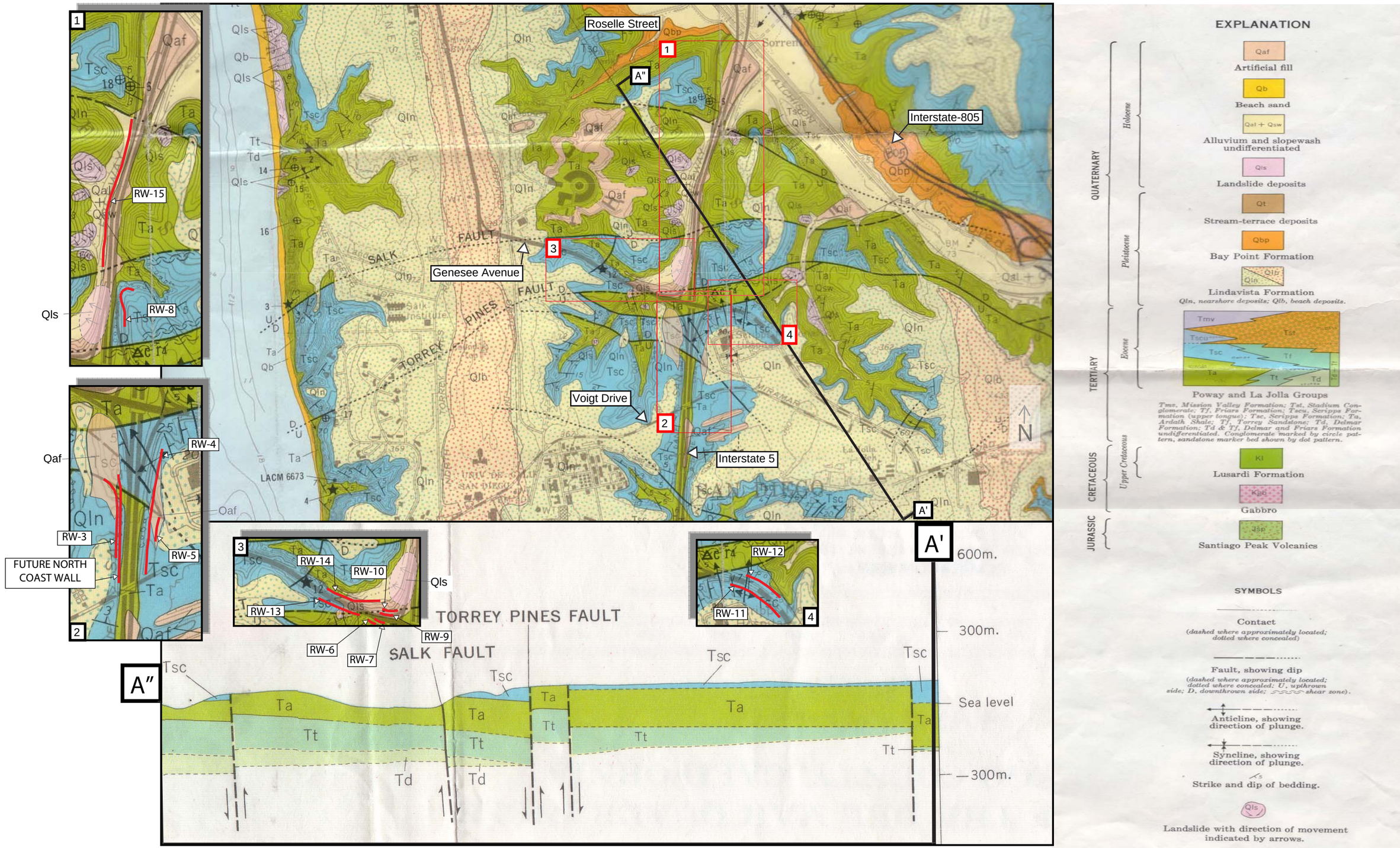
Wall 5 XSC.dgn 2/27/2014 1:09:19 PM

FIGURE 4A: PROJECT CROSS SECTION



39+50
"GEN" Line

FIGURE 4B: PROJECT CROSS SECTION



Geotechnical Design Report
Interstate-5/Genesee Avenue Interchange Improvement Project
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP

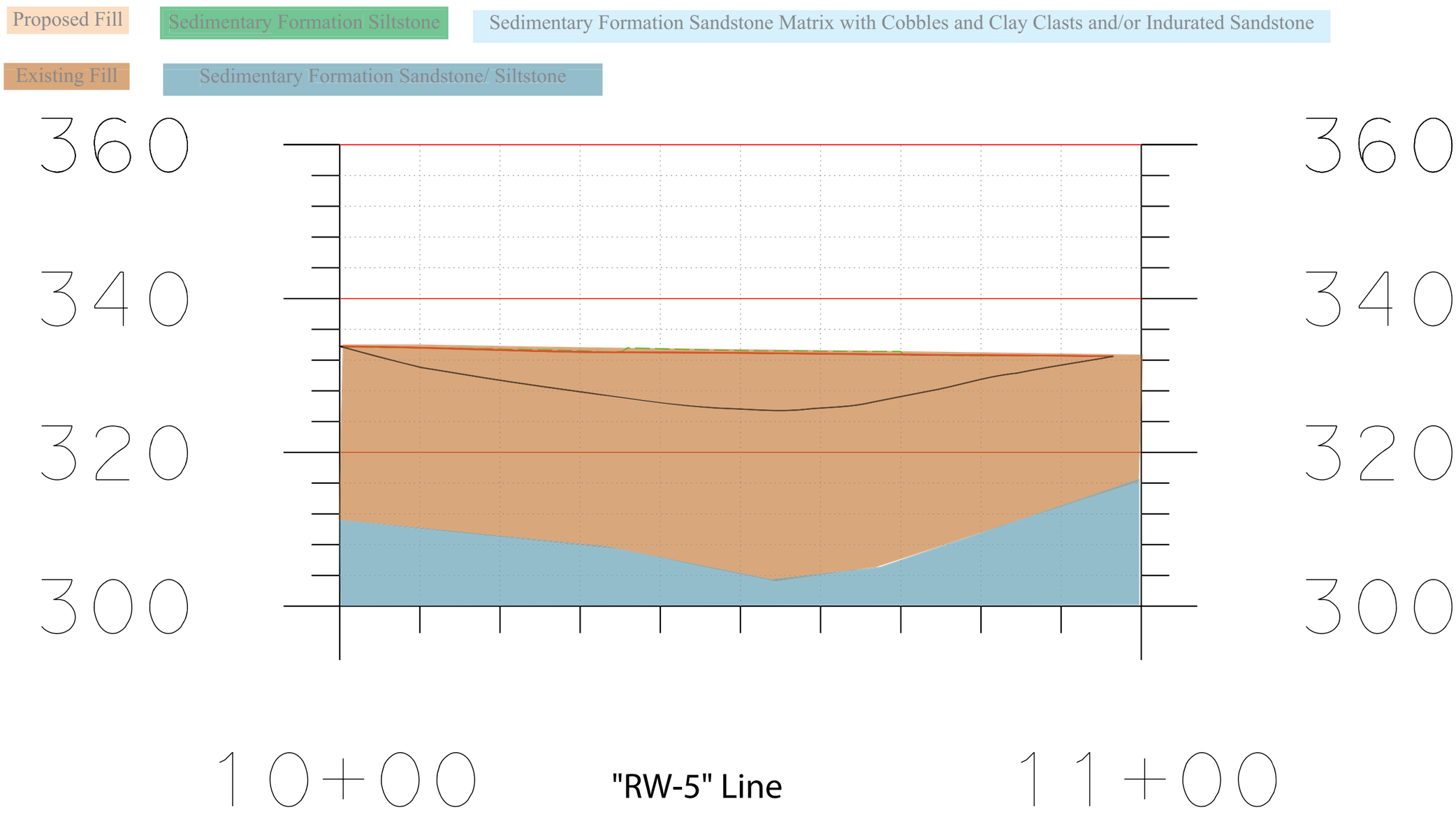


FIGURE 6A: GEOLOGIC PROFILE

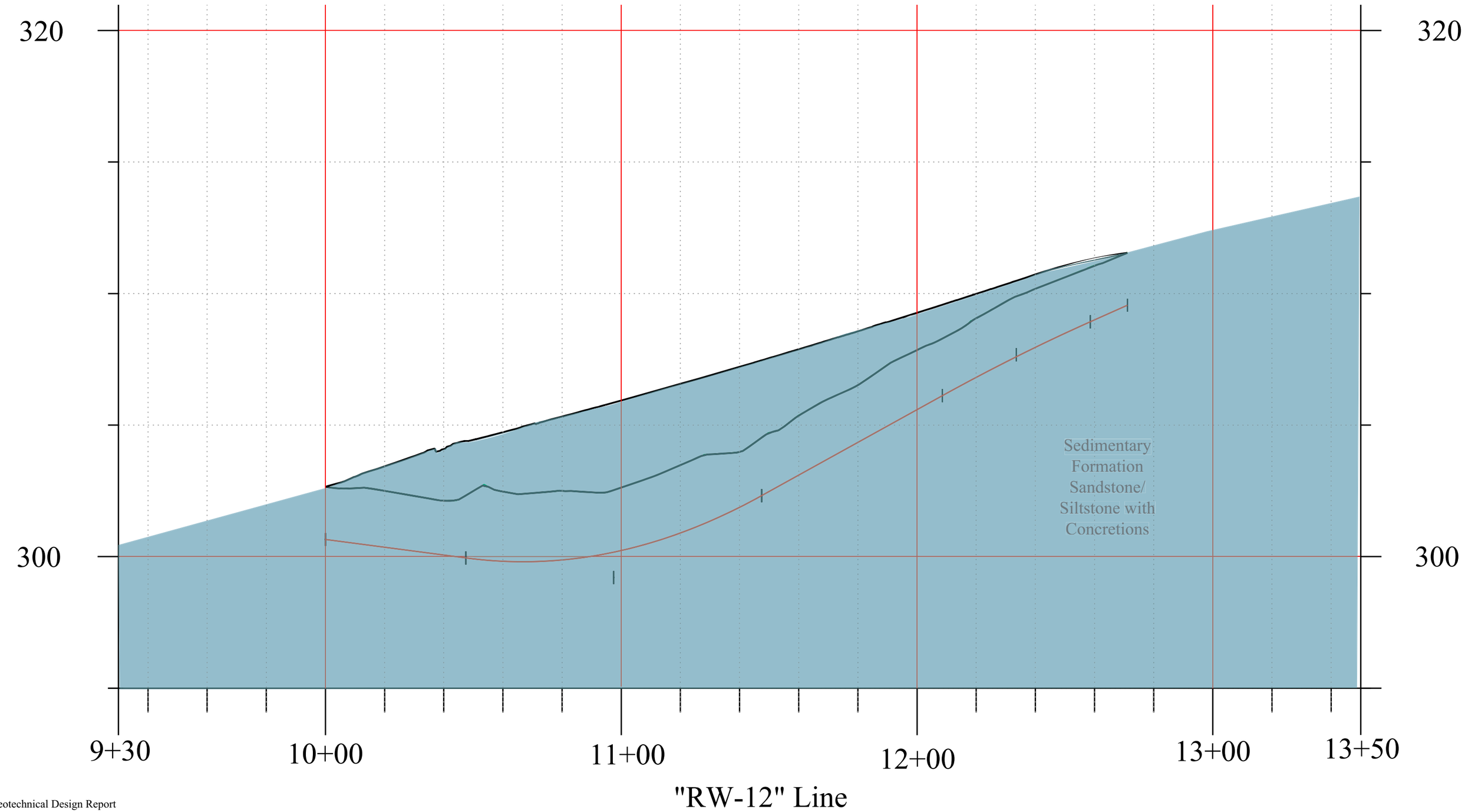
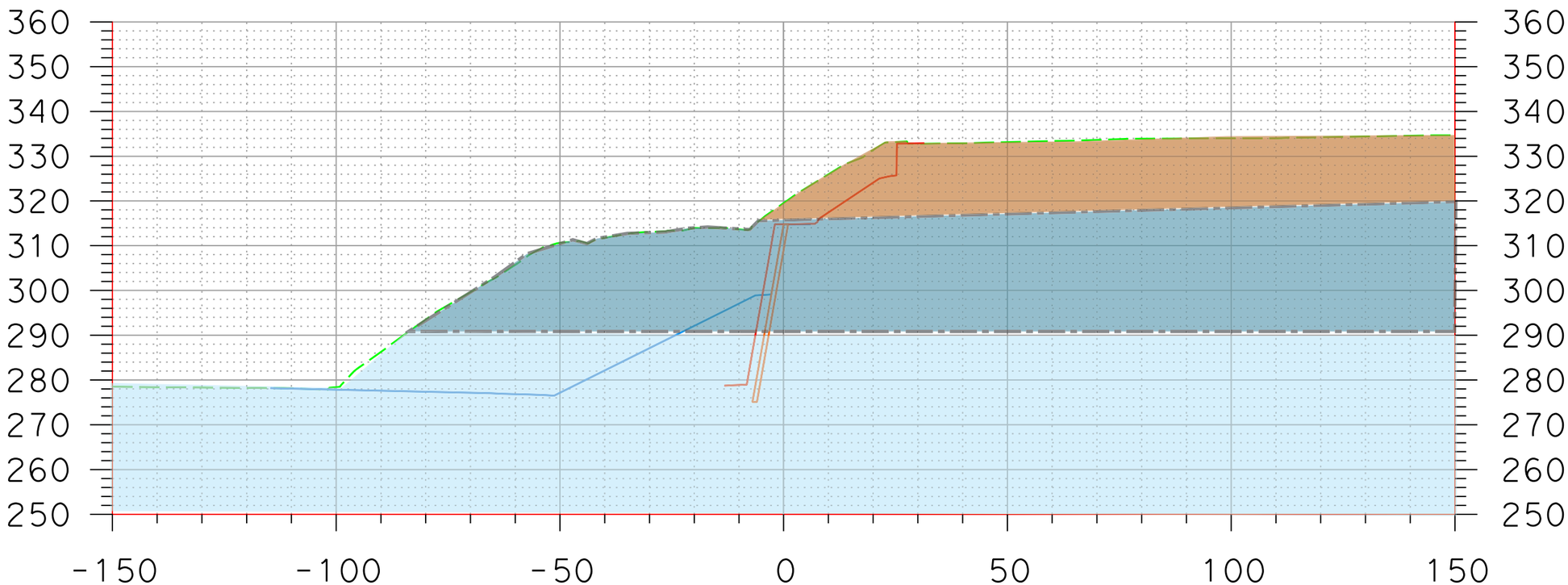


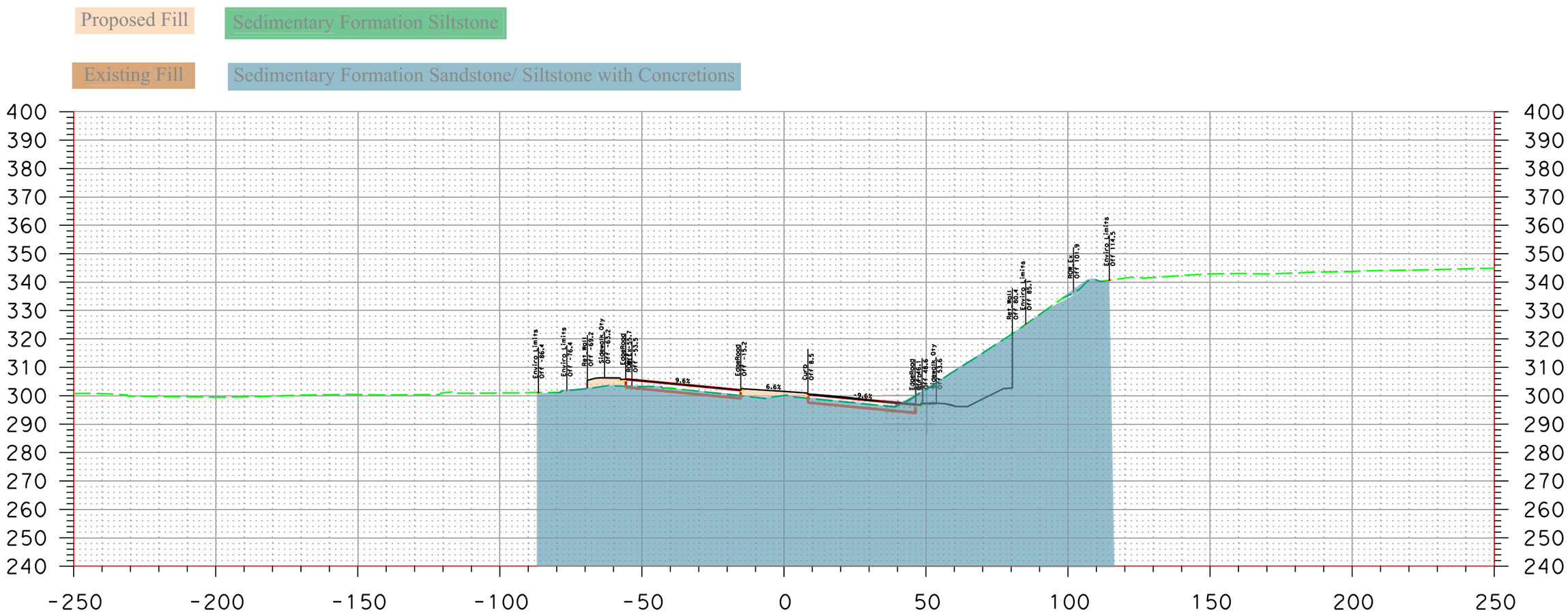
FIGURE 6B: GEOLOGIC PROFILE

Retaining Wall-4
Retaining Wall-5



15+10 RW-4 LINE
23+10 "GEN" LINE

FIGURE 7A: GEOLOGIC CROSS SECTION



39+50
"GEN" Line

FIGURE 7B: GEOLOGIC CROSS SECTION

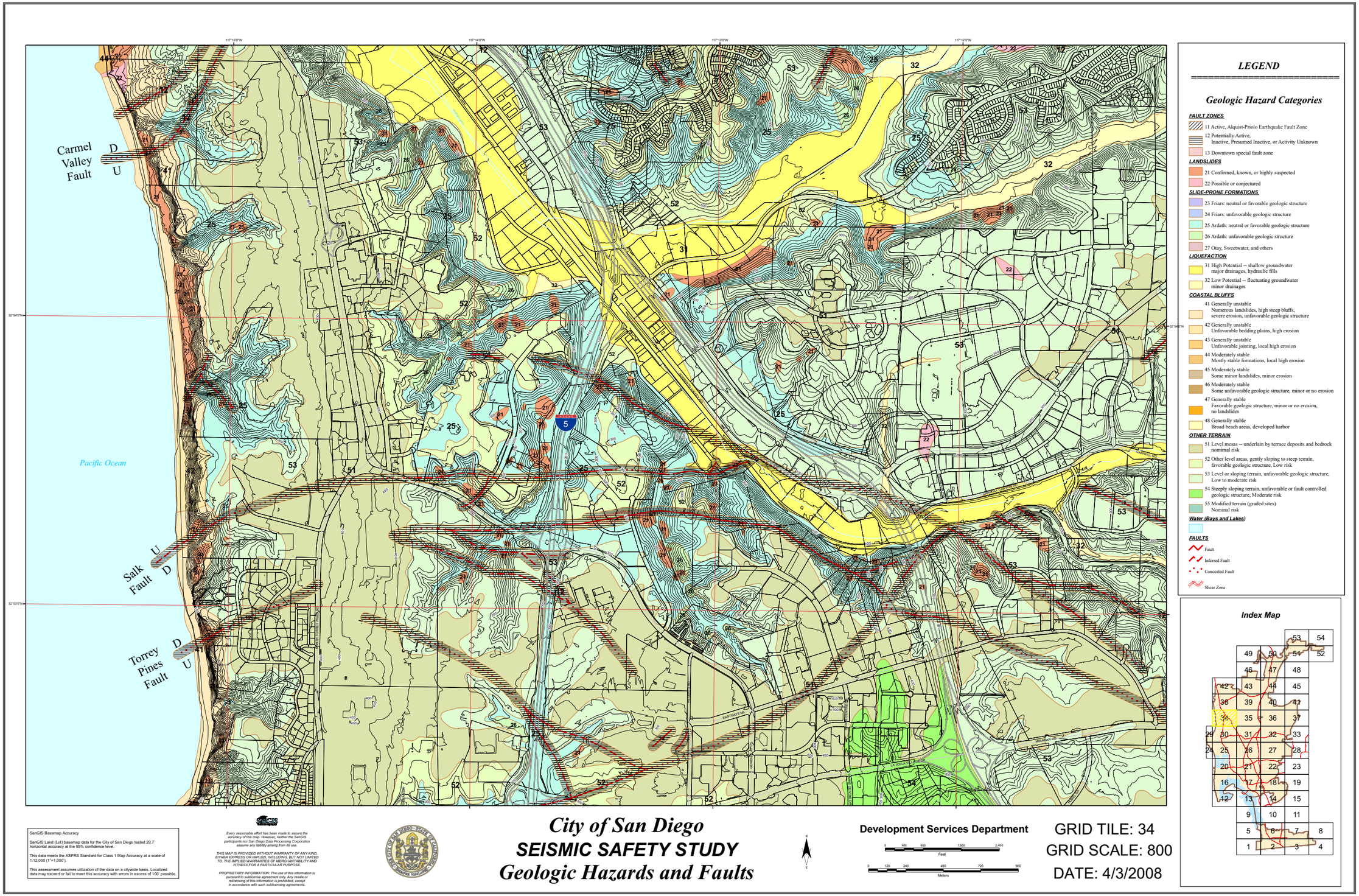
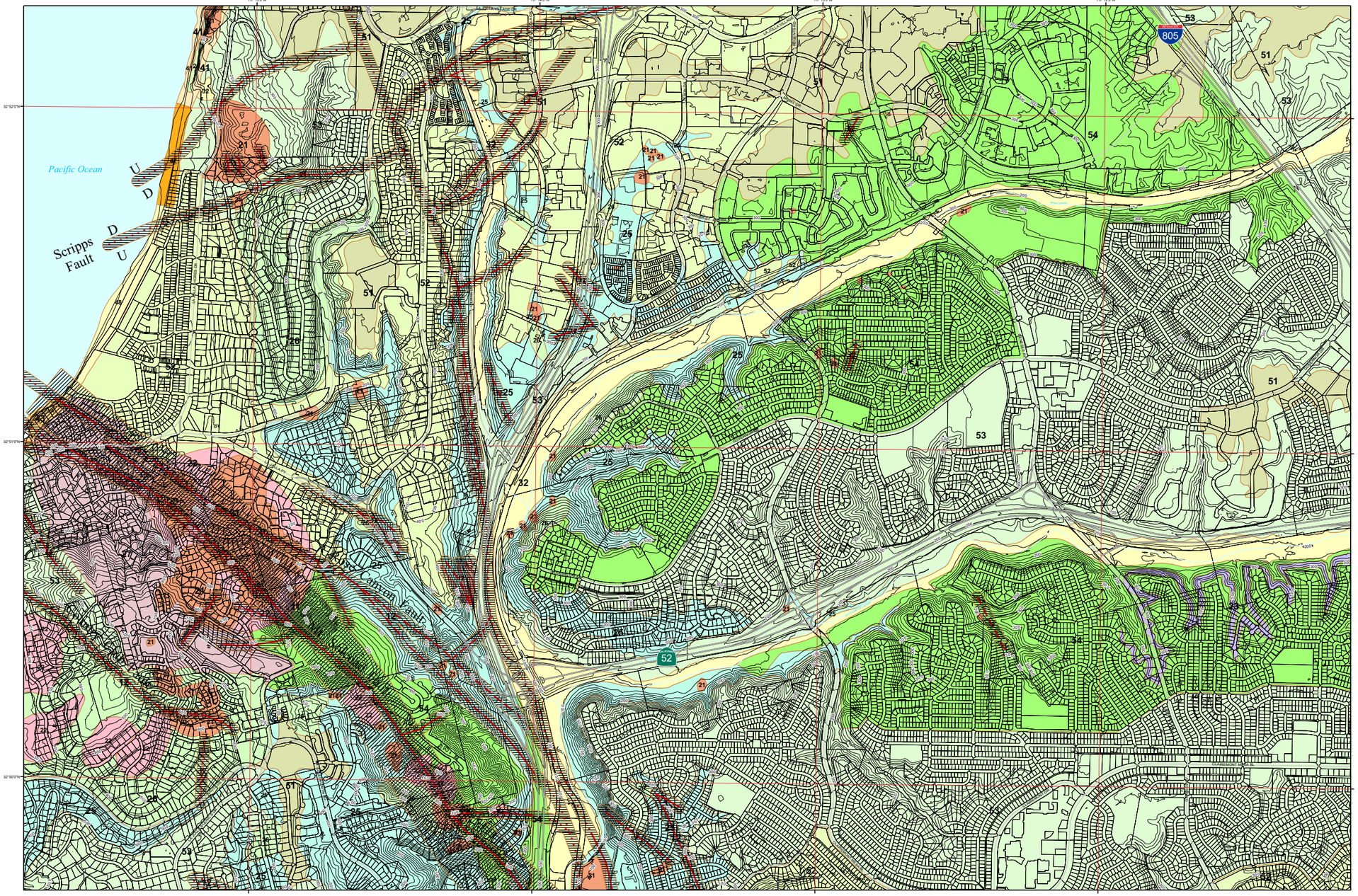


FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

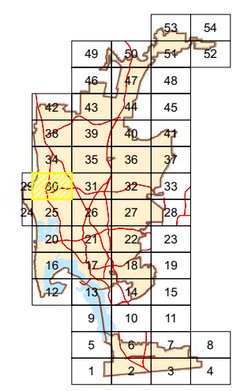
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

SANGIS

Every reasonable effort has been made to assure the accuracy of this map. However, neither the SanGIS participants nor San Diego Data Processing Corporation assume any liability arising from its use.

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

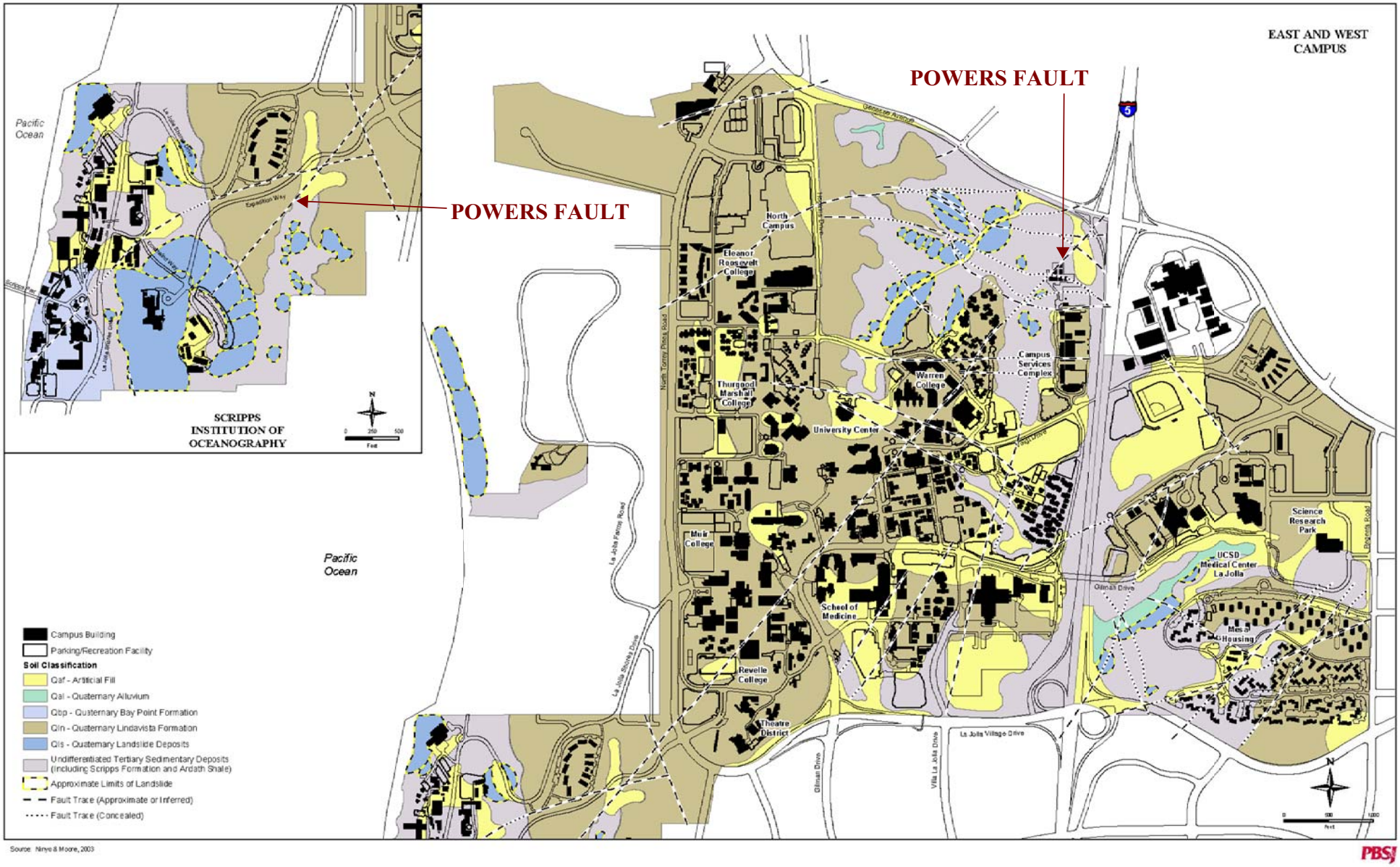
Development Services Department

0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



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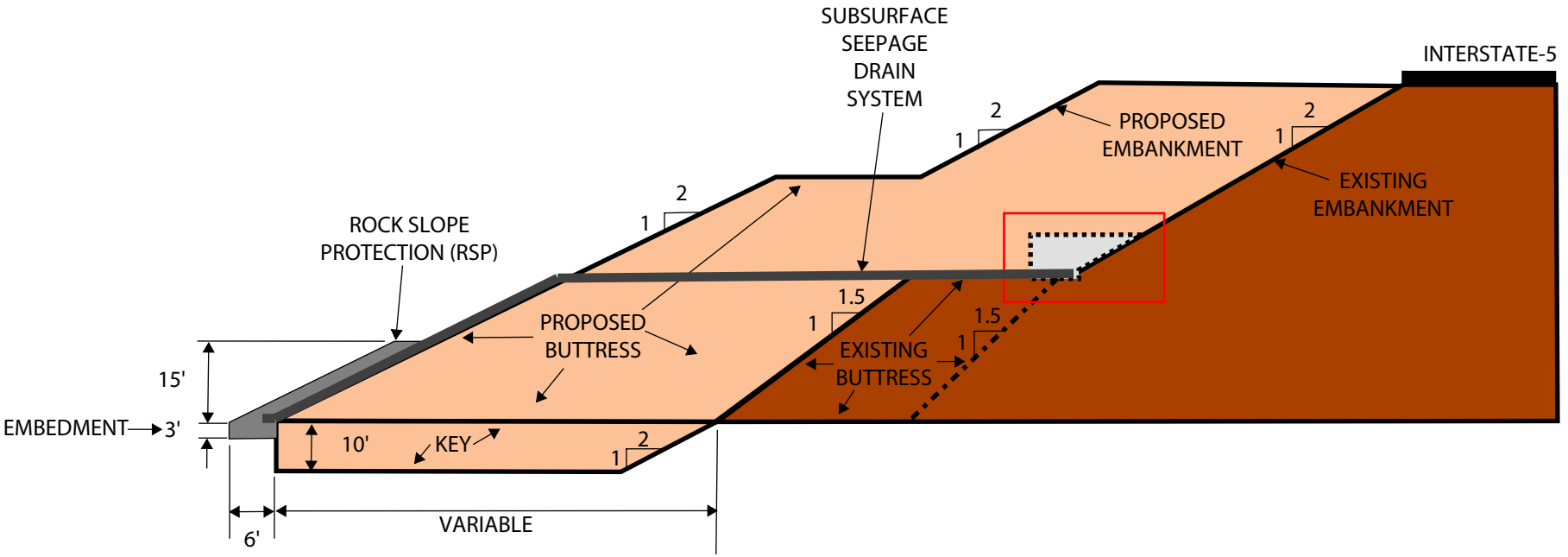
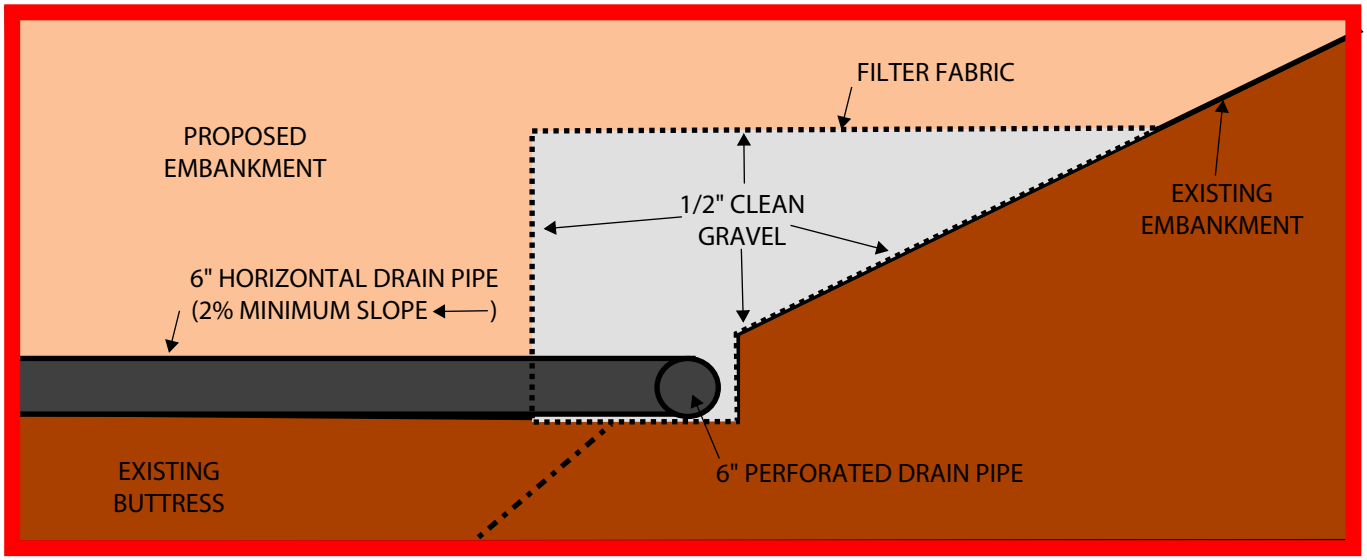
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP





NOTE: DRAWINGS NOT TO SCALE

FIGURE 10: SEEPAGE SUBDRAIN

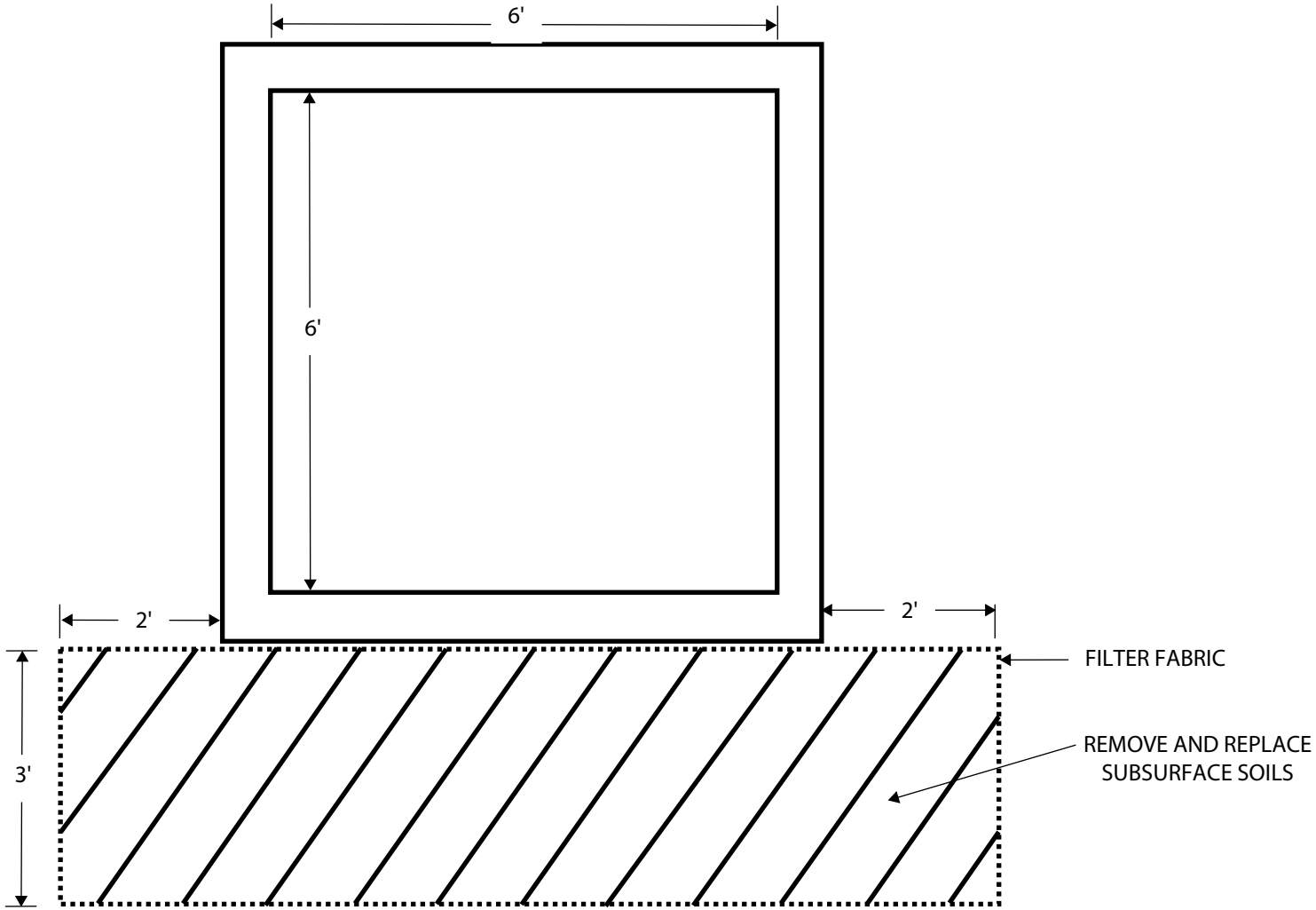


FIGURE 12: CULVERT FOUNDATION TREATMENT

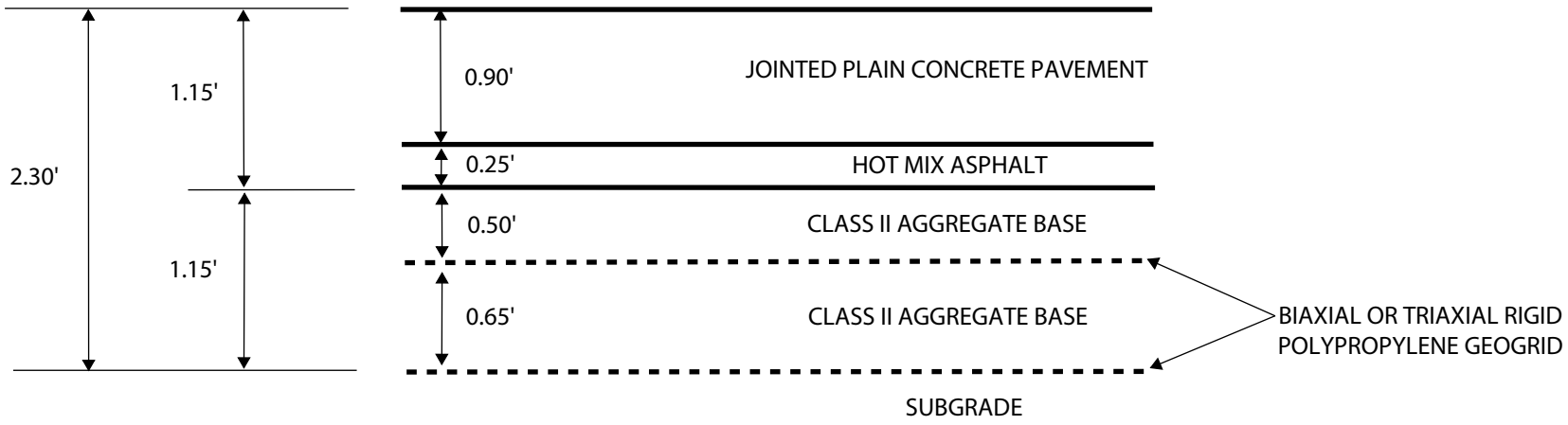


FIGURE 13: SUBGRADE REINFORCEMENT

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: SOIL SURVEY DATA

Soil Symbol	Soil Series	Soil Classification		Soil Depth (in)	Permeability (in/hr)	Erodibility by Water[a]	Hydraulic Group[b]
		Unified	AASHTO				
AtF	Alamont Clay 30%-50%	CH	A7	0 – 36	0.06 – 0.2	Severe (1)	D
CfB	Chesterson Fine Sandy Loam 2% - 5%	SM	A-4	0 – 19	2.0 – 6.3	Severe (9)	D
		CL	A-6	19 – 34	< 0.06		
		------	------	34	< 0.06		
CfC	Chesterson Fine Sandy Loam 2% - 9%	SM	A-4	0 – 36	2.0 – 6.3	Severe (9)	D
		CL	A-6	0 – 19	< 0.06		
		------	------	19 – 34	< 0.06		
CgC	Chesterson Urdan 2% - 9%	------	------	------	------	------	D
CsB	Corralitos Loamy Sand 0% - 5%	SM	A-2	0 – 43	6.3 – 20	Severe (2)	A
		SP or SP-SM	A-3	43 – 60	6.3 – 20		
HrC2	HuerhueroLoam 5% - 9%	ML, CL	A-4, A-6	0 – 68	0.63 – 2.0	Severe (1)	D
HrD2	HuerhueroLoam 9% - 15%	ML, CL	A-4, A-6	0 – 68	0.63 – 2.0	Severe (1)	D

Notes:

a: Numerals indicate soil properties of qualities that effect erodibility.

(1) sloped,
(2) surface layer texture
(9) depth to hard rock

b: Reference United States Department of Agriculture, Soil Survey (1973) and General Map (1971), San Diego Area, California

A = Soil with a very high infiltration rate.
C = Soil with a slow infiltration rate.
D = Soil with a very slow infiltration rate.

TABLE 3: SOIL STRENGTH PARAMETERS

Geologic Unit	Cohesion (psf)	Angle of Internal Friction (degrees)	In-Situ Dry Density (pcf)
Artificial Fill	120	33	115
Sandstone	350	33	121
Siltstone (Ardath Shale)	350	28	121

TABLE 4A: LANDSLIDE STABILIZATION BUTTRESS FOUNDATION TREATMENT, REMOVE AND REPLACE

"SD-5" Line Beginning Station	"SD-5" Line Ending Station	Cal OSHA Soil Type	Length (ft)	Width (ft)	Depth (ft)	Volume (ft)	Volume (cy)
1593+00	1593+65	D	65.00	61.00	10.00	39,650.00	1,468.52
1593+65	1594+30	D	65.00	104.00	10.00	67,600.00	2,503.70
1594+30	1594+95	D	65.00	127.00	10.00	82,550.00	3,057.41
1594+95	1595+60	D	65.00	141.00	10.00	91,650.00	3,394.44
1595+60	1596_25	D	65.00	138.30	10.00	89,895.00	3,329.44
1596_25	1596+90	D	65.00	128.50	10.00	83,525.00	3,093.52
1596+90	1597+55	D	65.00	112.60	10.00	73,190.00	2,710.74
1597+55	1598+20	D	65.00	106.30	10.00	69,095.00	2,559.07
1598+20	1598+85	D	65.00	103.90	10.00	67,535.00	2,501.30
1598+85	1599+50	D	65.00	81.20	10.00	52,780.00	1,954.81
1599+50	1600+15	D	65.00	54.59	10.00	35,483.50	1,314.20
1600+15	1600+85	D	65.00	38.19	10.00	24,823.50	919.39
1600+85	1601+45	D	65.00	27.50	10.00	17,875.00	662.04
1601+45	1620+10	D	65.00	12.35	10.00	8,027.50	297.31
		Total:	910.00			803,679.50	29,765.91

30,000 cy

TABLE 4B: CULVERT FOUNDATION TREATMENT, REMOVE AND REPLACE

"SD-5" Line Beginning Station	"SD-5" Line Ending Station	Cal OSHA Soil Type	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Volume (cy)
1597+00	1604+50	D	750	12	3	27,000	1,000

TABLE 5: OVERHEAD SIGN SUBSURFACE DATA

Overhead Sign Station	Number of Posts	Soil Description	Cal OSHA Soil Type
“SD-5” Line 1572+00	Single-Post	Sedimentary Formation, Sandstone	C
“SD-5” Line 1580+30	Two-Post	Sedimentary Formation, Siltstone	C
“SD-5” Line 1581+15	Single-Post	Sedimentary Formation, Siltstone	C
“GEN” Line 23+75	Two-Post	Sedimentary Formation, Siltstone	C
“GEN” Line 35+05	Two-Post	Sedimentary Formation, Siltstone	C
“SD-5” Line 1598+00	Two-Post	Engineered Fill	D
“SD-5” Line 1607+60	Single-Post	Engineered Fill	D

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA

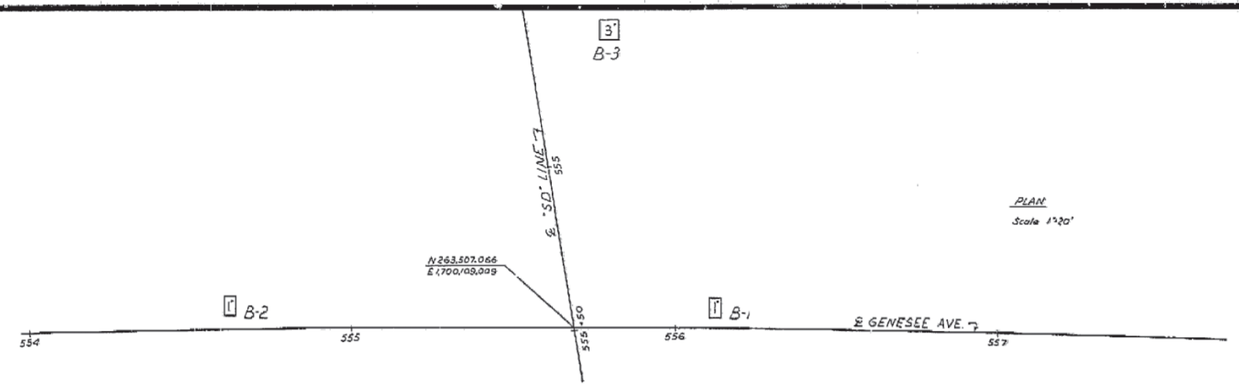
DIST.	COUNTY	ROUTE	PREFIX	BRIDGE NO.	TOTAL SHEETS
XI	SD	5	1R(4)(5)	118	197

DATE APPROVED July 20, 1964

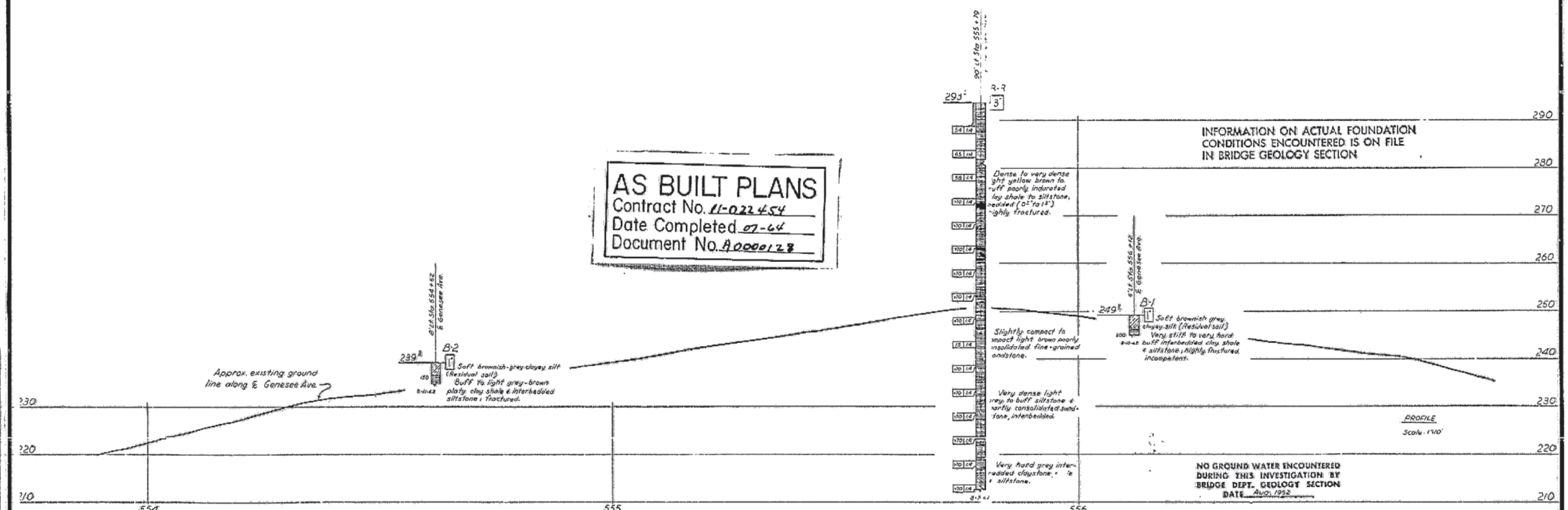
BENCH MARK

TBM #1 - ℄ Stake, sta. 554+86 "SD" top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV 278.66



PLAN
Scale 1"=20'



AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128

BRIDGE DEPARTMENT

Approved Recommended By: Bridge Geologist

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

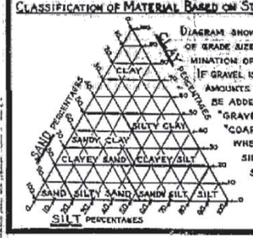


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

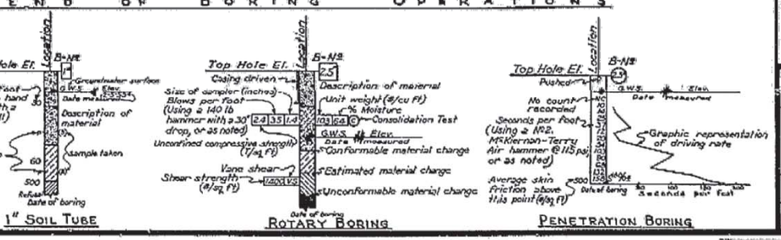
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2 1/4" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

GENESEE AVENUE OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-527	FILE	DRAWING 57527-9

PREL. DRAWING NO. P-

5-4

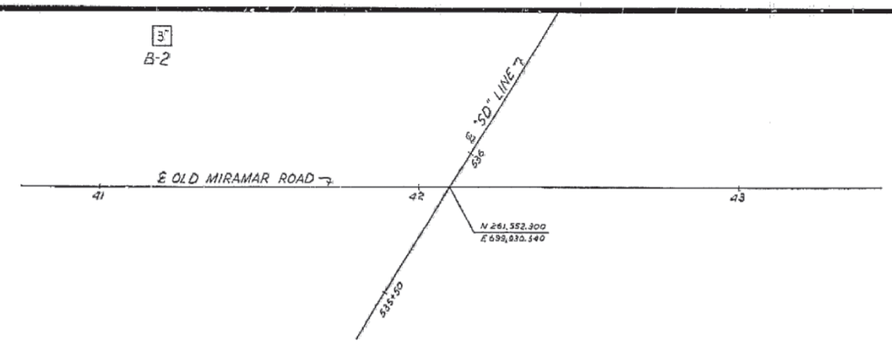
YEAR	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
11	SD	5	29/32	13	134

DATE APPROVED November 30, 1964

BENCH MARK #AS 506-I

RR spike in PMS Rd. 11' Lt.
Sta 535+09 "SD"

ELEV. 330.53



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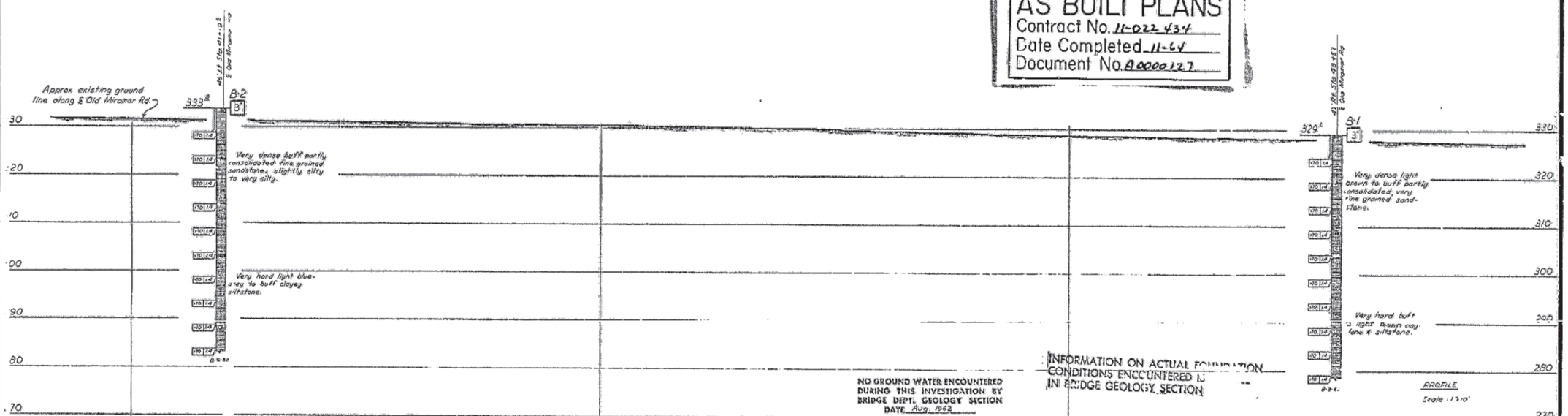
AS BUILT PLANS
Contract No. 11-022434
Date Completed 11-64
Document No. A0000127



NO GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION
DATE Aug. 1962

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS IN BRIDGE GEOLOGY SECTION

PROFILE
Scale 1"=10'

BRIDGE DEPARTMENT

CHECKED

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

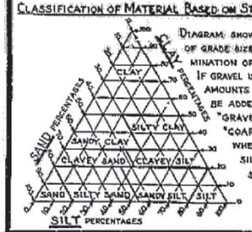


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

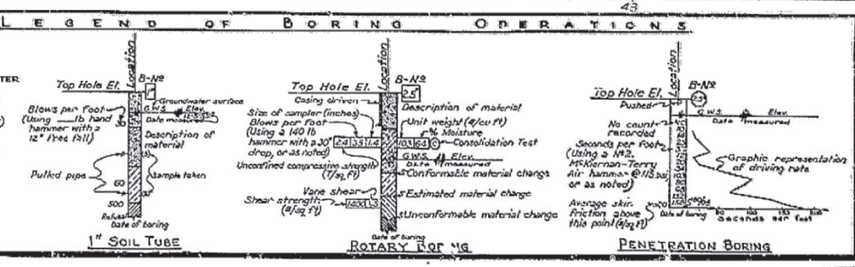
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND". THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2¼" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SHEET	OF
12	12

OLD MIRAMAR ROAD OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-526	FILE	DRAWING 57526-13

PH. L. DRAWING NO. P-

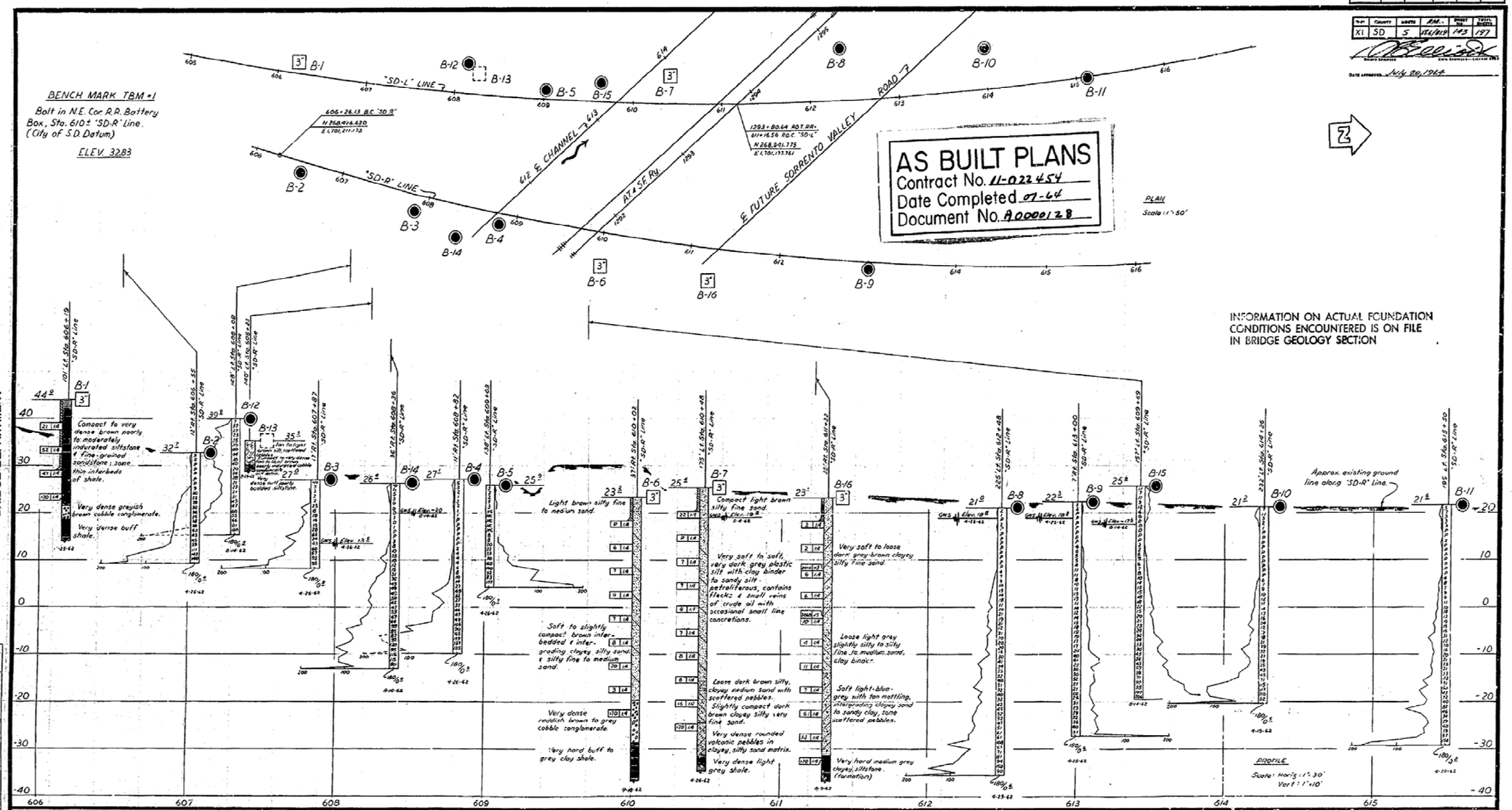
34

FED. ROAD DIV. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.				

DIST.	COUNTY	ROUTE	ALT.	SHEET NO.	TOTAL SHEETS
XI	SD	5	164/169	143	197

DATE APPROVED July 20, 1964

BENCH MARK TBM #1
Bolt in N.E. Cor R.R. Battery Box, Sta. 610± 'SD-R' Line. (City of S.D. Datum)
ELEV. 32.83



INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION

BRIDGE DEPARTMENT

FIELD STUDY	By: J. Bernardino	4-30-62
DRAWN	By: H. Tsukamoto	9-10-62
CHECKED	By: D. Ramos-Prof. E.	9-19-62

(Revised 9-10-62)

Approval Recommended by: E. C. Hirschfeld

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

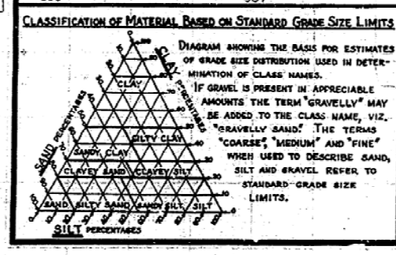


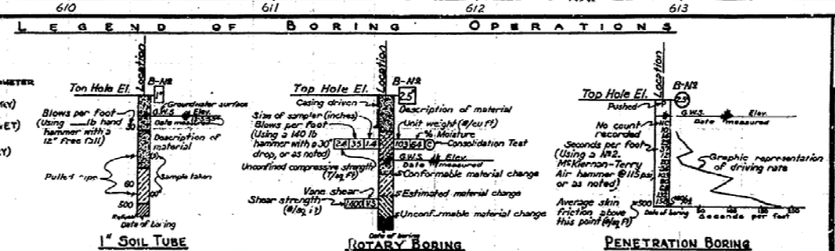
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES. IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE," "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2½" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET	OF
25	25

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKES
DIVISION OF HIGHWAYS

SORRENTO VALLEY OVERHEAD

LOG OF TEST BORINGS

SCALE As Noted | BRIDGE 57-513 L/R | FILE | DRAWING 57513-25

PREL. DRAWING NO. F-

143

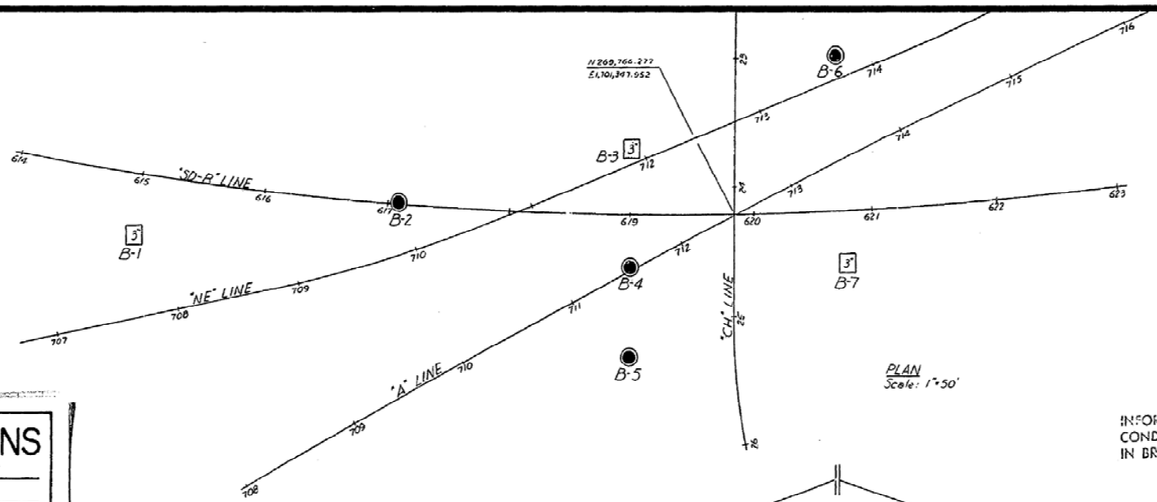
FED. ROAD DIV NO	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.				

PREF	PROJECT	ROUTE	PM	SHEET NO.	TOTAL SHEETS
XI	SD	5	26.6/31.9	165	197

BRIDGE ENGINEER — DATE APPROVED July 20, 1964

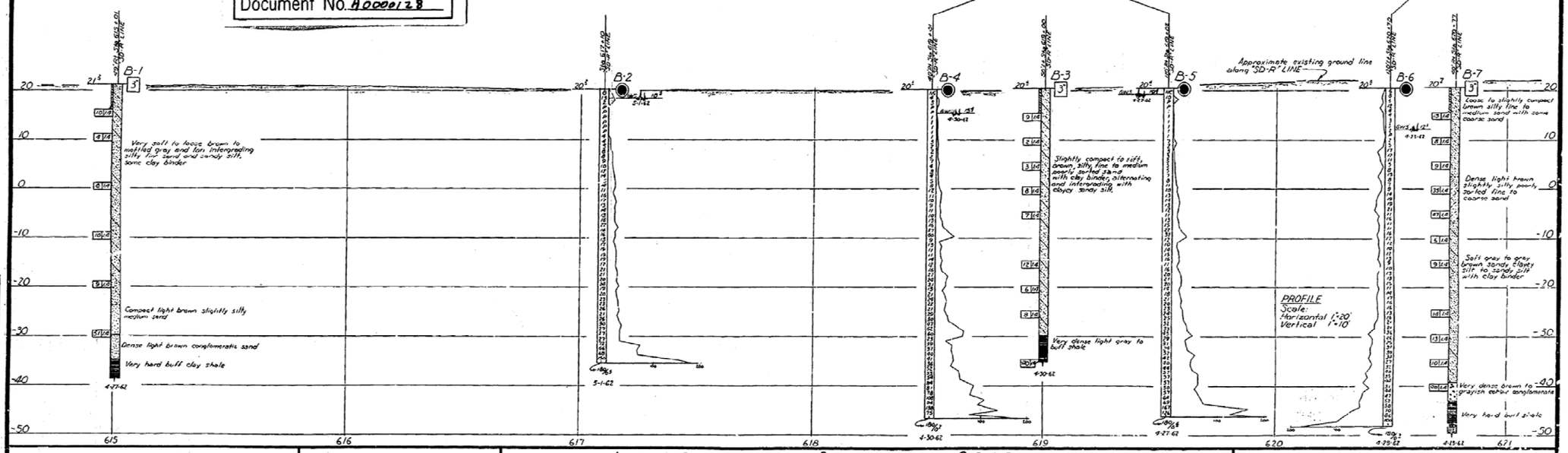
BRIDGE DEPARTMENT

Bench Mark - TBM #1
Bolt in NE cor., R.R. Battery Box, Sta 610± "SDR" Line
EL 32.83



AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION



FIELD INVEST. — DRAWN — CHECKED

Approved Recommended by: C. E. Weakley, Engineering Geologist

Classification of Material Based on Standard Grade Size Limits

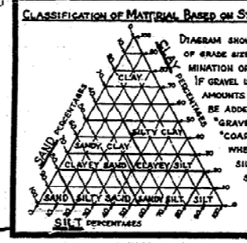


Diagram showing the basis for estimates of grade size distribution used in determination of class names.

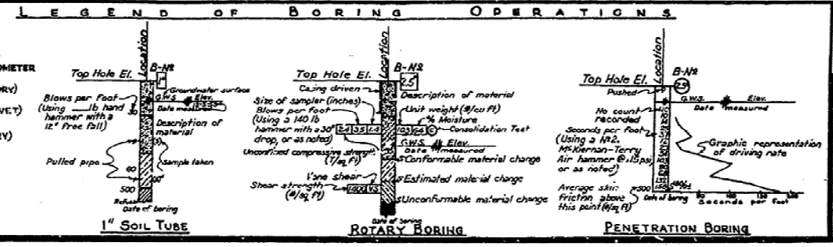
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand". The terms "coarse", "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

Legend of Earth Materials

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Penetrometer
- 2¼" Cone Penetrometer
- Sampler Boring (DRY)
- Rotary Boring (WET)
- Auger Boring (DRY)
- Jet Boring
- Core Boring
- Test Pit



NOTE

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

No. 17-5177

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

ROUTE 5/805 SEPARATION

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-512	FILE	DRAWING 57512-18

PREL. DRAWING NO. F. 165

165

FED. ROAD DIV. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.				

DIST.	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
XI	SD	5	28.5/31.4	172	197

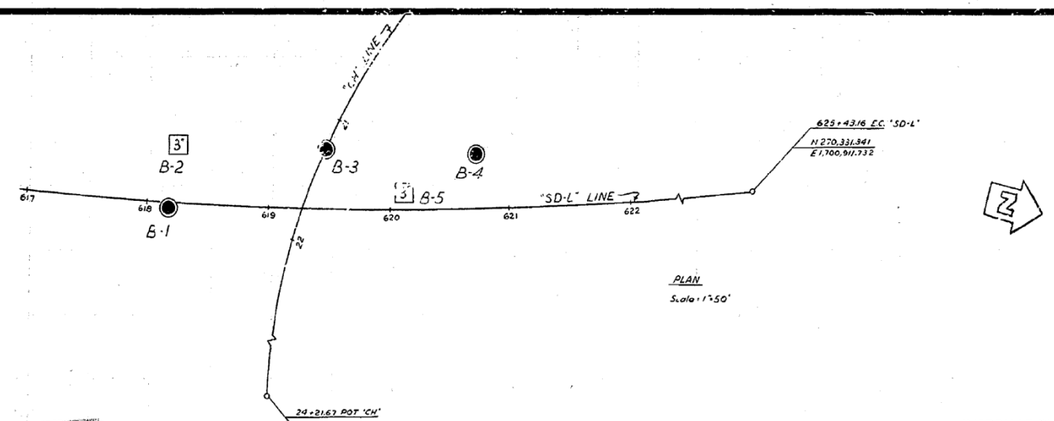
PRIME ENGINEER — LICENSED — REGISTERED ENGINEER

DATE APPROVED July 20, 1966

BENCH MARK - TBM #1

Bolt in N.E. Cor. R.R. Battery Box, Sta. 610± "SD-R", City of S.D. Datum.

ELEV. 32.83



PLAN

Scale: 1"=50'

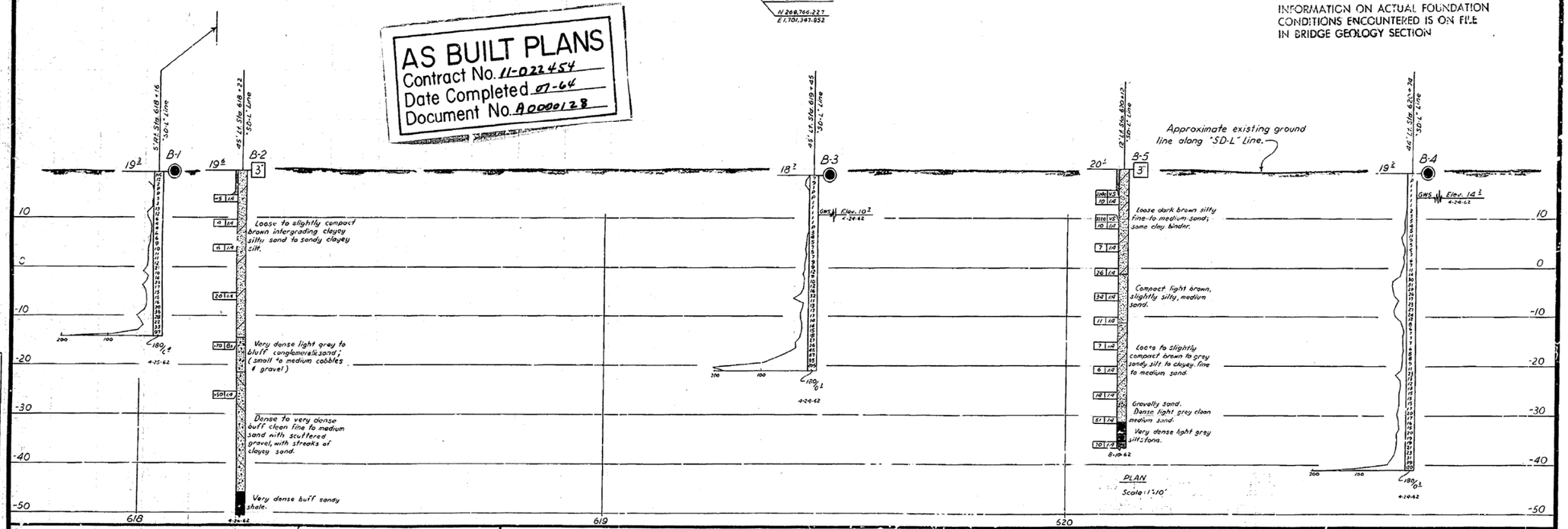
AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-66
Document No. A0000128

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION

BRIDGE DEPARTMENT

(Revised 8-10-66)

FIELD STUDY — H. Rosenblum 8-17-66
DRAWN — K. Bertino 8-26-66
CHECKED — W. Wheeler 8-26-66
Approval Recommended by — C. E. Nuckolls, Engineering Geologist



PLAN

Scale: 1"=10'

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

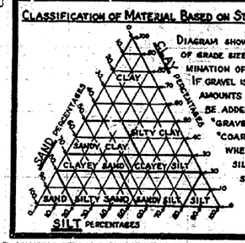


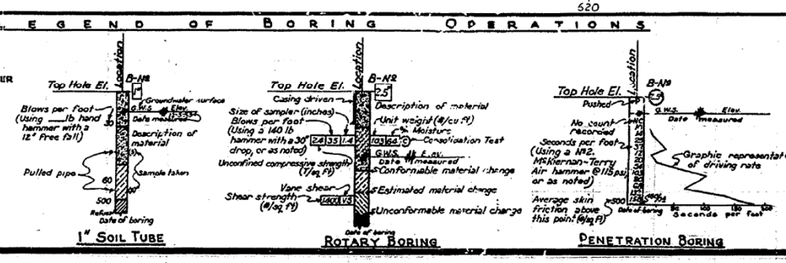
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES. IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2½" CORE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

SHEET	OF
7	7

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

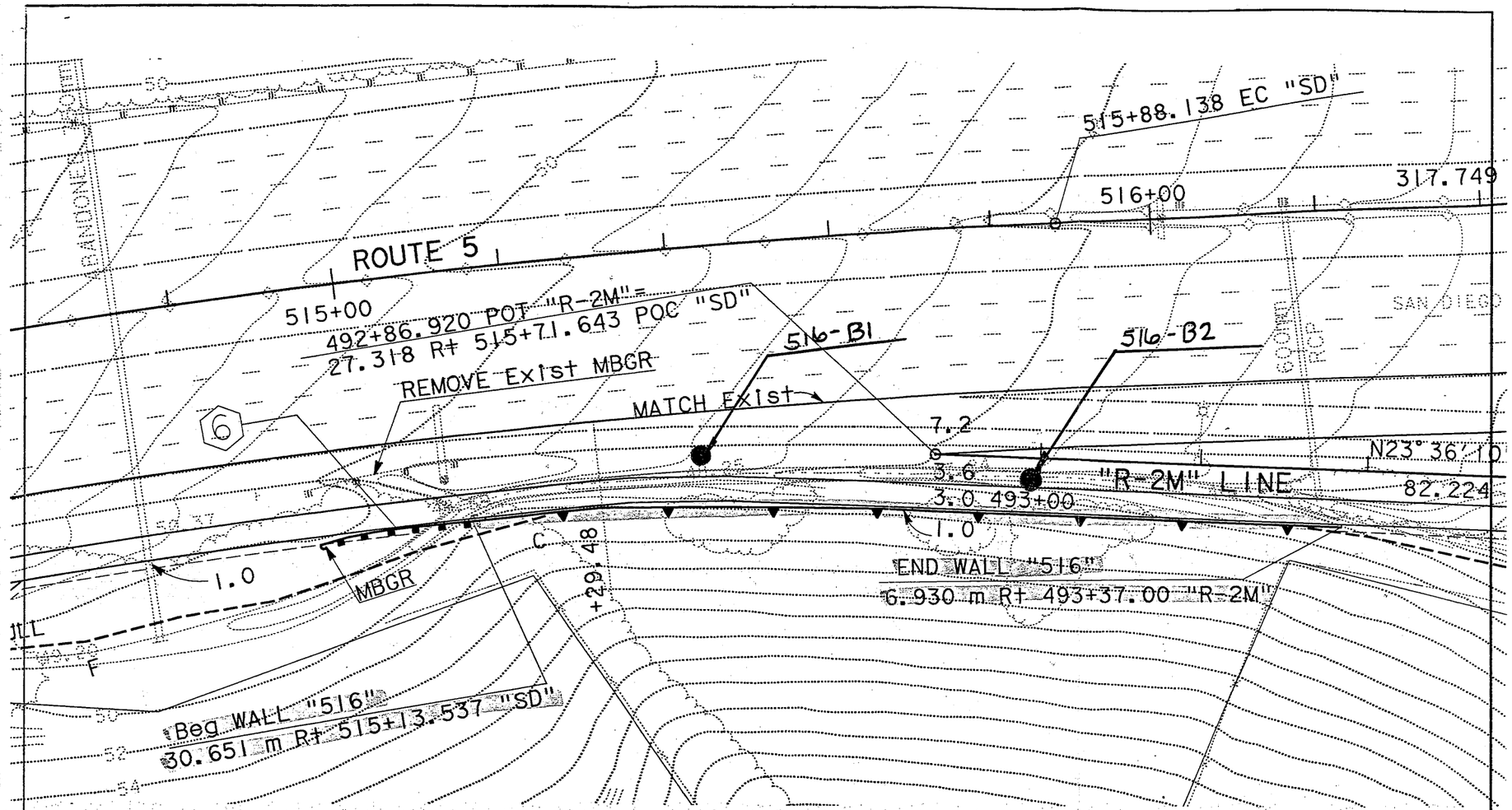
BRIDGE ACROSS
LOS PENASQUITOS CHANNEL

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-511	FILE	DRAWING 57511-7

PREL. DRAWING NO. P-

172



I-5/805 RETAINING WALLS	EA 11-0301U1	SCALE 1:500	PLAN VIEW	FIGURE 2-516
WALL- 516				

516-B1
● -- BORING LOCATIONS

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805, 56	R45.5/R59.5, 41.4/46.3, TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

PLANS APPROVAL DATE

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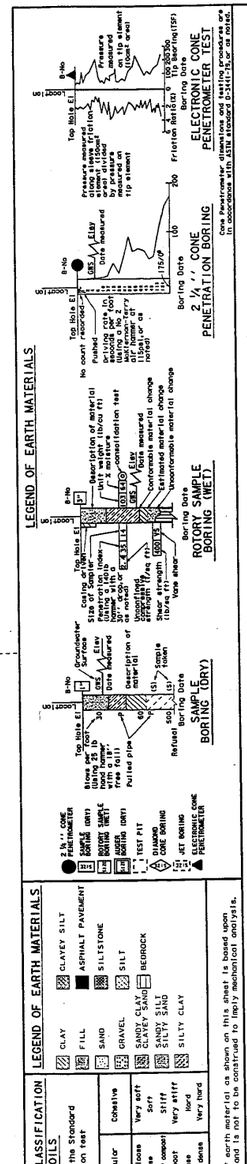
Cal-Trans now has a web site! To get to the web site, go to: http://tresc.dot.ca.gov

Caltrans Metric



BORING No. : 516-B1

Date Drilled: 08/4/99

Project Name : I-5/805 Retaining Walls

Location : 25R; 515+42 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 49.0 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Silty Sand (SM), brown, moist, traces of fine gravel.
-2.00	1	SPT	54		SILTSTONE: (Ardath Shale Formation): Graybrown, moist, laminated (laminas are 7 mm thick) at about 90 degrees to the boring axis, locally caliche stringers, locally slightly clayey, rusty laminas.
-3.00	2	SPT	59		
-4.00					- at 3.0 m: grades to dark gray and blue (layers).
	3	SPT	60		- at 4.6 m : becomes less laminated and massive.

DRAWN BY

CHECKED BY

CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.

POST MILE

BORING: 516-B1 **R-66**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

USERNAME => tbdjac
DGN FILE => b0301ua66.dgn

DATE PLOTTED => 06-APR-2001
TIME PLOTTED => 15:02

FORM DC-OE-92-PF (REV. 3/88)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	5, 805,56	R45.5/R59.5, 41.4/46.3,TO.7/2.0	XX	XXX

CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST JEFF J. TESAR No. 2137 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

PLANS APPROVAL DATE

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Caltrans Metric

BORING No. : 516-B2

Date Drilled: 08/4/99

Project Name : I-5/805 Retaining Walls

Location : 31R;515+84 "SD" Line

Drilling Method : Mud Rotary

Top of hole elevation : 47.5 m

SAMPLE				PROFILE	
DEPTH M	NUMBER	TYPE	BLOWS PER 0.30 METER (N)	SYMBOL	DESCRIPTION OF MATERIALS
0.0					Ground Surface
					ASPHALT PAVEMENT
					FILL (base and subbase)
-1.00					FILL : Silty Sand /Sandy Silt (SM/ML), brown, moist.
-2.00	1	SPT	20		SILTSTONE: (Ardath Shale Fm.): Graybrown, moist, locally laminated at about 90 degrees to the boring axis, locally caliche stringers, locally slightly clayey, rusty bands.
-3.00	2	SPT	33		
-4.00					at 3.0 m : grades to more massive and brittle, damp.
	3	SPT	39		

LEGEND OF EARTH MATERIALS

2 1/4" CONE PENETROMETER; SAMPLE BORING (DRY); ROTARY SAMPLE BORING (WET); WATER BORING (WET); TEST PIT; DIAMOND CORE BORING; JET BORING; ELECTRONIC CONE PENETROMETER

Top Hole El; Blows per foot (blows per 0.3 m) Hand hammer (free fall); Pushed pipe; Refusal; Soil Description; Sample Label; Elev Date Measured; Groundwater Surface; Description of material salt weight (lb/cu ft) & automatic/ation test; Pushed core in seconds per 2 cm (blows per 2 cm) salt/moisture/dry (difference in tilsa) or as noted; No count recorded; Coating or (wet density) (lb/cu ft); Penetration index blows/ft; Shear strength (lb/sq ft); Pressure measured at tip element (load cell); Pressure measured at tip element (load gauge); Pressure measured at tip element (hydraulic); Friction Ratio; Conformable material change; Unconformable material change; Boring Date

CONSISTENCY CLASSIFICATION FOR SOILS According to the Standard Penetration Test

Penetration Index Blows/ft	Granular	Cohesive
0-4	Very loose	Very soft
5-9	Loose	Soft
10-19	Slightly compact	Stiff
20-34	Compact	Very stiff
35-69	Dense	Hard
>70	Very dense	Very hard

LEGEND OF EARTH MATERIALS: CLAY; CLAYEY SILT; FILL; ASPHALT PAVEMENT; SAND; SILTSTONE; GRAVEL; SILT; BEDROCK; SANDY CLAY / CLAYEY SAND; SANDY SILT / SILTY SAND; SILTY CLAY

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

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DEPARTMENT OF TRANSPORTATION

ORIGINAL SCALE IS IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO

POST MILE

BORING: 516-B2 **R-67**

LOG OF TEST BORINGS (of)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

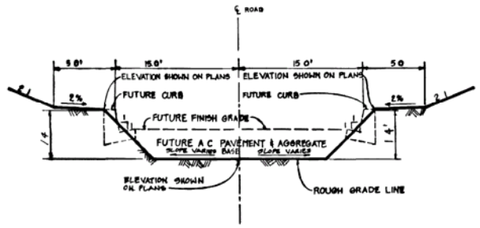
REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

CU 11275 EA 0301U1

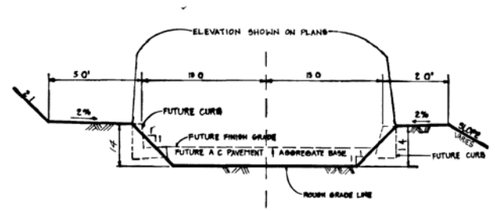
USERNAME => tbdjoc
DGN FILE => b0301ua67.dgn

PLOTTED => 06-APR-2001
PLOTTED => 15:03

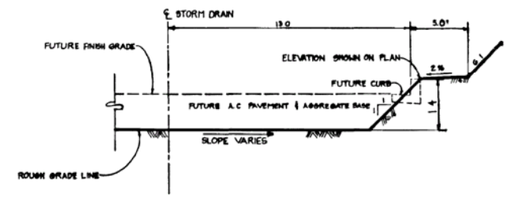
FORM DC-OE-92-PF (REV. 3/88)



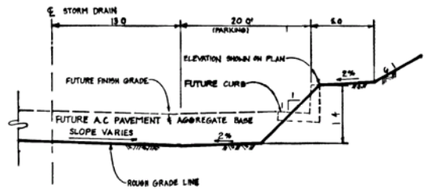
A C6 **SECTION @ ENTRANCE ROAD**
NO SCALE
SEE SHEET C 2



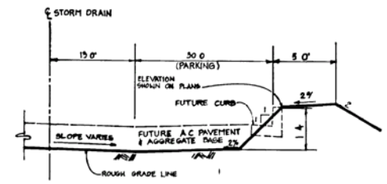
B C-6 **SECTION @ EASTERLY ENTRANCE ROAD**
NO SCALE
SEE SHEET C 2



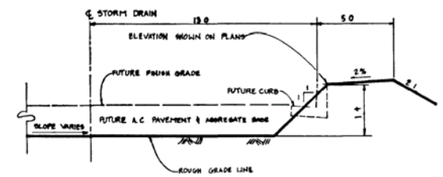
C C-6 **SECTION @ EASTERLY CURB (CUT)**
NO SCALE STA 0+00 THRU STA 5+08 87
STA 5+39 86 THRU STA 5+50 01
SEE SHEET C 2



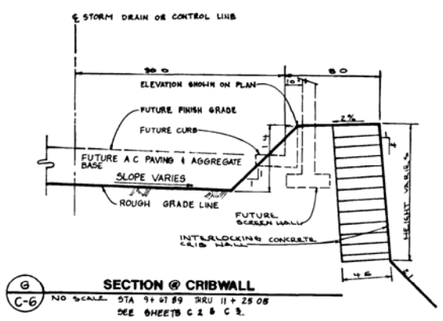
D C-6 **SECTION @ EASTERLY CURB (CUT)**
NO SCALE STA 3+08 87 THRU 5+33 86
SEE SHEET C 2



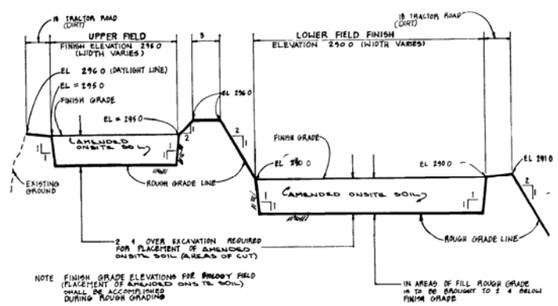
E C-6 **SECTION @ EASTERLY CURB (FILL)**
NO SCALE STA 5+50 01 THRU 8+14 27
SEE SHEET C 2



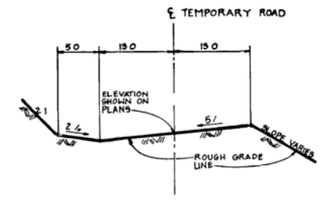
F C-6 **SECTION @ EASTERLY CURB (FILL)**
NO SCALE STA 8+14 27 THRU 8+25 89
SEE SHEETS C 2



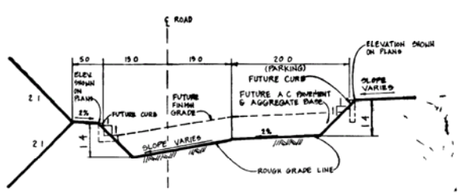
G C-6 **SECTION @ CRIBWALL**
NO SCALE STA 9+07 89 THRU 11+25 08
SEE SHEETS C 2 & C 3



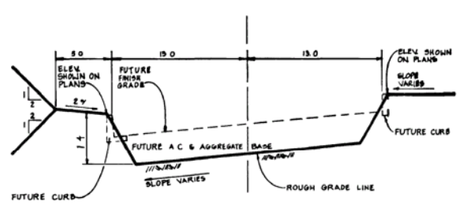
H C-6 **SECTION THROUGH BIOLOGY FIELDS**
NO SCALE
SEE SHEET C 3



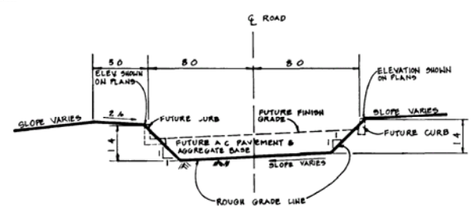
J C-6 **SECTION THROUGH TEMPORARY ROAD**
NO SCALE
SEE SHEET C 2



L C-6 **SECTION THROUGH WESTERLY SERVICE ROAD (W/PARKING)**
NO SCALE
SEE SHEETS C 2 & C 3



K C-6 **SECTION THROUGH WESTERLY SERVICE ROAD (W/NO PARKING)**
NO SCALE
SEE SHEETS C 2 & C 3



M C-6 **SECTION THROUGH BFS ROAD**
NO SCALE
SEE SHEET C 3

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Sorrento Mesa Design Center
9909 Huennekens Street
Suite 110
San Diego, California 92121 2928
(619) 455-5225

11/27/89

ANSHEN + ALLEN
ARCHITECTURE
PLANNING
INTERIOR DESIGN
324 N FOOTHILL ROAD
BEVERLY HILLS
CALIFORNIA 90210
213 276 0008

DRAWN BY
CHECKED
APPROVED
CONSULTANTS

KSA Klagge-Stevens & Associates, Inc. Sorrento Mesa Design Center 9909 Huennekens Street Suite 110 San Diego, California 92121-2928 (619) 455-5225

NO	DESCRIPTION	DATE

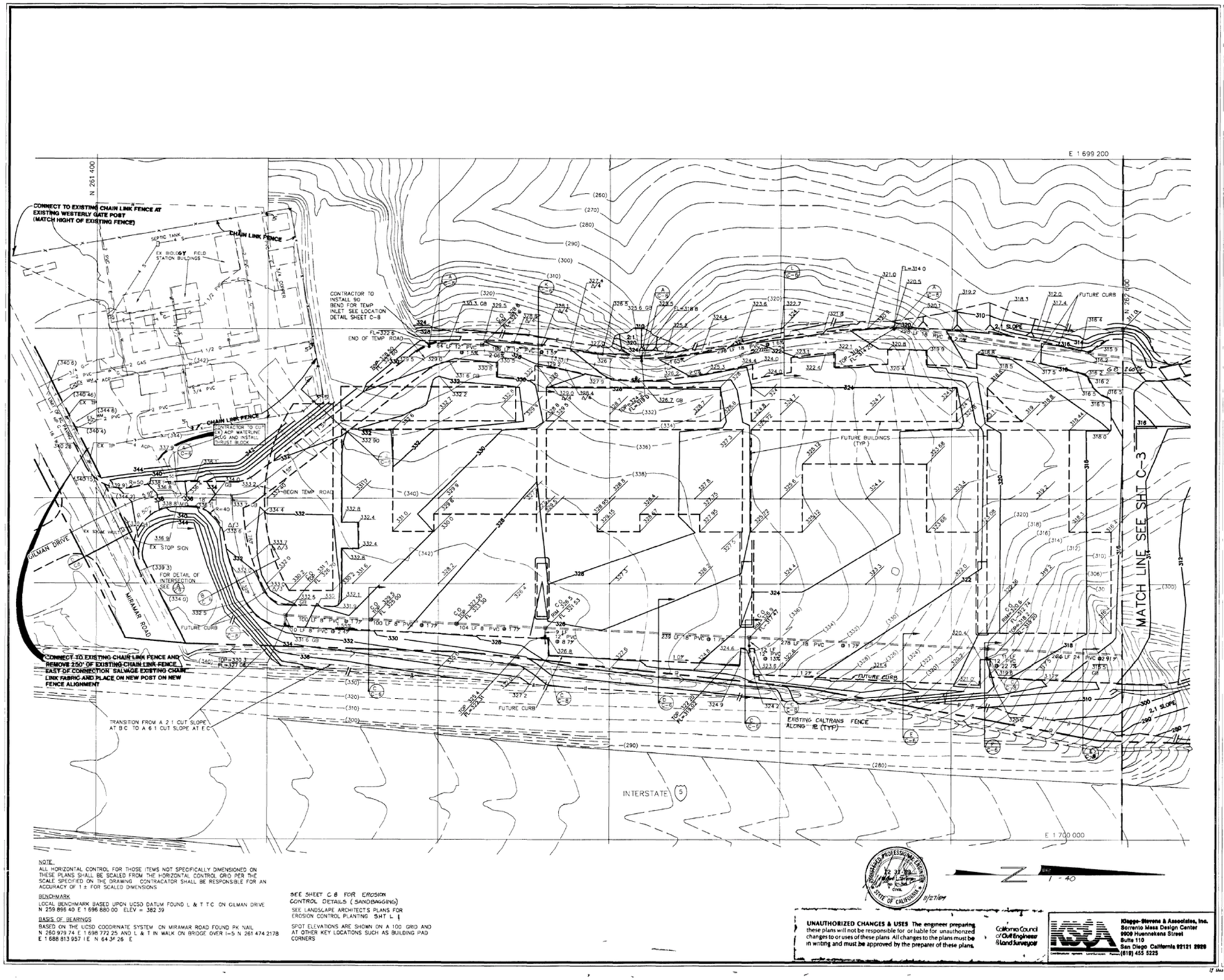
REVISIONS

CAMPUS SERVICES COMPLEX/ BIOLOGY FIELD STATION GRADING PACKAGE

UNIVERSITY OF CALIFORNIA SAN DIEGO

CIVIL DETAILS

SCALE NONE
PROJECT NO 1851 88109 37
DATE 11/27/89
DRAWING NO **C-6**



NOTE
ALL HORIZONTAL CONTROL FOR THOSE ITEMS NOT SPECIFICALLY DIMENSIONED ON THESE PLANS SHALL BE SCALED FROM THE HORIZONTAL CONTROL GRID PER THE SCALE SPECIFIED ON THE DRAWING CONTRACATOR SHALL BE RESPONSIBLE FOR AN ACCURACY OF 1 ± FOR SCALED DIMENSIONS

BENCHMARK
LOCAL BENCHMARK BASED UPON UCSD DATUM FOUND L & T T C ON GILMAN DRIVE
N 259 896 40 E 1 696 880 00 ELEV = 382 39

BASIS OF BEARINGS
BASED ON THE UCSD COORDINATE SYSTEM ON MIRAMAR ROAD FOUND PK NAIL
N 260 979 74 E 1 698 772 25 AND L & T IN WALK ON BRIDGE OVER I-5 N 261 474 2178 E 1 688 813 957 I E N 64 3' 26 E

SEE SHEET C 8 FOR EROSION CONTROL DETAILS (SANDBAGGING)
SEE LANDSCAPE ARCHITECTS PLANS FOR EROSION CONTROL PLANTING SHT L 1
SPOT ELEVATIONS ARE SHOWN ON A 100 GRID AND AT OTHER KEY LOCATIONS SUCH AS BUILDING PAD CORNERS

REGISTERED PROFESSIONAL ENGINEER 12 31 89 CIVIL STATE OF CALIFORNIA 11/27/89

1 - 40

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BEVERLY HILLS
CALIFORNIA 90210
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DRAWN BY
CHECKED
APPROVED

CONSULTANTS

NO	DESCRIPTION	DATE

REVISIONS

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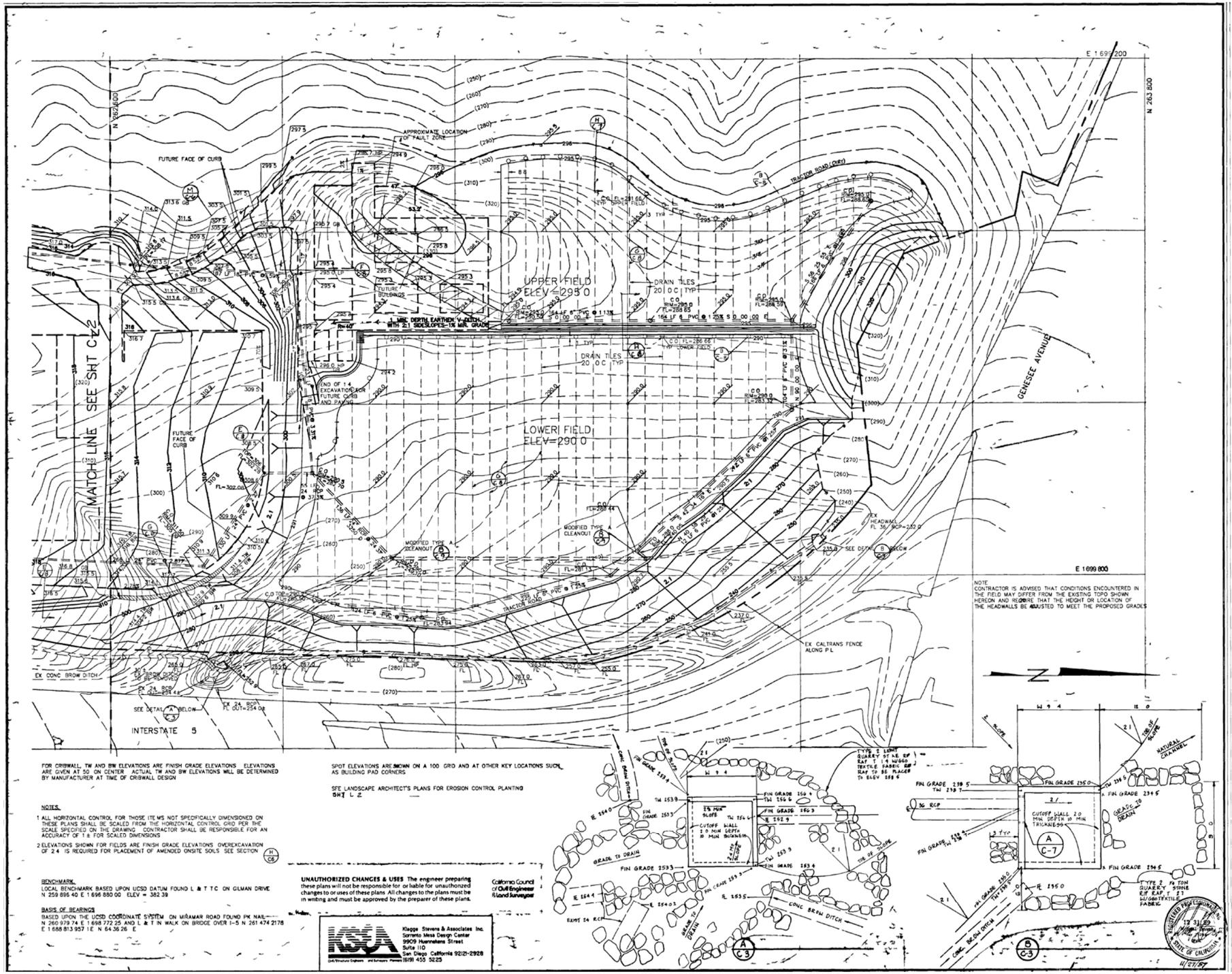
GRADING PACKAGE

UNIVERSITY OF CALIFORNIA
SAN DIEGO

ROUGH GRADING (CAMPUS SERVICE COMPLEX)

SCALE 1 = 40
PROJECT NO 1881 88109 37
DRAWING NO C-2
DATE 11/27/89

If this bar is not 3/4" then it is not full size and drawing is not to scale



ANSHEN + ALLEN

ARCHITECTURE
PLANNING
INTERIOR DESIGN
324 N FOOTHILL ROAD
BEVERLY HILLS
CALIFORNIA 90210
213 276 0008

DRAWN BY:

CHECKED:

APPROVED:

CONSULTANTS:

KSLA Klagge Stevens & Associates, Inc. Sorrento Mesa Design Center 9909 Huennekens Street Suite 110 San Diego, California 92121-2928 (619) 455 5225

NO	DESCRIPTION	DATE
	REVISIONS	

CAMPUS SERVICES COMPLEX/ BIOLOGY FIELD STATION

GRADING PACKAGE

UNIVERSITY OF CALIFORNIA SAN DIEGO

ROUGH GRADING (BIOLOGY FIELD STATION)

SCALE 1 = 40'

PROJECT NO 1861 88109 37

DRAWING NO C-3

DATE 11/27/89

RECORD OF MEETING OR CONVERSATION

TO: Files	DATE: 6-27-86
FROM: LLoyd Hughes	FILE NO: 11206-022491

WHERE HELD: ☐ BY TELEPHONE ☒ DISTRICT OFFICE ☐ AT OTHER PARTY'S OFC ☐ OTHER — TIME

INITIATED BY: ☒ DISTRICT ☐ OTHER PARTY ☐ OTHER — DATE OF CONVERSATION: 6-26, 6-27-86

PARTICIPANTS

NAMES	TITLES & AFFILIATIONS
Joe Eagan	Dist 11 Lab
AL Boost	✓ ✓ ✓
LLoyd Hughes	Project Engr
Dale Schmoldt	Design Engr.

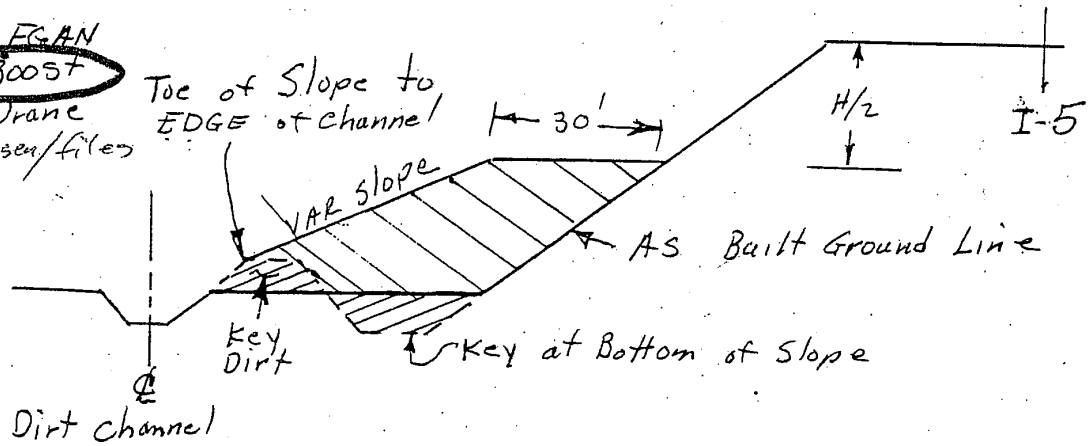
SUBJECT STRUT Embankment

Joe Egan and AL Boost pointed out the location of the SLIDE (560+50 to 565+00 "G-3").

There is a dirt drainage channel in the bottom of Canyon. To cross this channel would result in constructing a drainage facility at least as large as the one down-stream, 90" SSPP.

It was Agreed to shorten the strut embankment to 550' Long, to steepen the strut slope enough to miss the dirt channel, and to build a key at the bottom of existing slope.

CC, Joe EGAN
AL Boost
Tom Drane
N Larsen/files



State of California

Business and Transportation Agency

MEMORANDUM

To: Lloyd Hughes
Design B

Date: August 25, 1986

File: 11-SD-5, PM R29.5/R32.9, 022491

From: W.R. Gibson
District 11 Materials Engineer
Department of Transportation

Subject: Embankment Stabilization

Introduction:

The embankment for the southbound Rte 5/Genesee offramp area was constructed in the early 1960's on an older landslide in the natural terrain. Subsequent movement of the slide has required considerable effort and expense to maintain the roadway. Slide stabilization has been studied for this area through the Value Engineering process, to be accomplished in the rehabilitation of Rte 5 through the area.

This report presents the investigation and analysis for a proposed stablization strut in the landslide area.

Investigation:

Exploration in the spring and summer of 1983, consisted of mapping surface crack patterns and placing subsurface test borings and instrumentation to define and monitor any future slide movement.

Subsurface displacement detected with a slope indicator in boring S-14 has shown that constant creep is occuring. Three additional slope indicators were installed in December 1985 to supplement and extend monitoring after the proposed slide stabilization measures are installed.

Analysis:

Plans and cross sections showing the proposed strut embankment that has been drawn by design based on our conversation of June 26, 1986 have been analysed for slope stability. The attached geologic cross section and Table of Slope Stablility presents safety factors for various embankment stabilization configurations.

Conclusions:

The strut embankment is a remedial measure that will improve the condition of embankment stability.

Slope stability calculations across three pertinent geologic sections show that the strut embankment will increase the factor of safety from a critical condition near 1 to a range of 1.2 to 1.6 depending on strut geometry.

The factor of safety can be increased to a higher value if the proposed strut is lowered 10 to 20 feet. The factor of safety could be further increasd if the material eliminated from the brow is placed at the toe.

To accommodate the toe addition the toe load could be constructed to rise at a slope of 1-1/2:1 from the concrete lined channel up to a bench about 15 feet above the toe level. This configuration is shown on the attached geologic section.

Recomendations:

1. Either embankment geometry (3) or (5) presented in the Slope Stability Table is the recommended configuration.

2. Embankment should be constructed to the edge of the existing channel for the length of the strut.

3. Surface cracks along the head-scarp of the slide should be excavated to a minimum depth of 4 feet and replaced with compacted embankment material. The cracks to be treated are approximately located between stations "G-3" 559+50 to 562+00, as shown on the attached plan.

4. Landscape irrigation should not be permitted in the gore area north of Station "G-3" 559+00.

5. Embankment material to be used in the strut should have a sand equivalent of not less than 25 nor greater than 40. This specification can be adjusted if other materials are found to be more economically available.

WR Gibson

W.R. GIBSON
District 11 Materials Engineer
Department of Transportation

JPE:RO/EH

Attachments

CC: J. Egan

R. Oquita

Table of Slope Stability
Interstate 5 Southbound at the Genesee Offramp
Limit Equilibrium Static Slope Stability Analysis

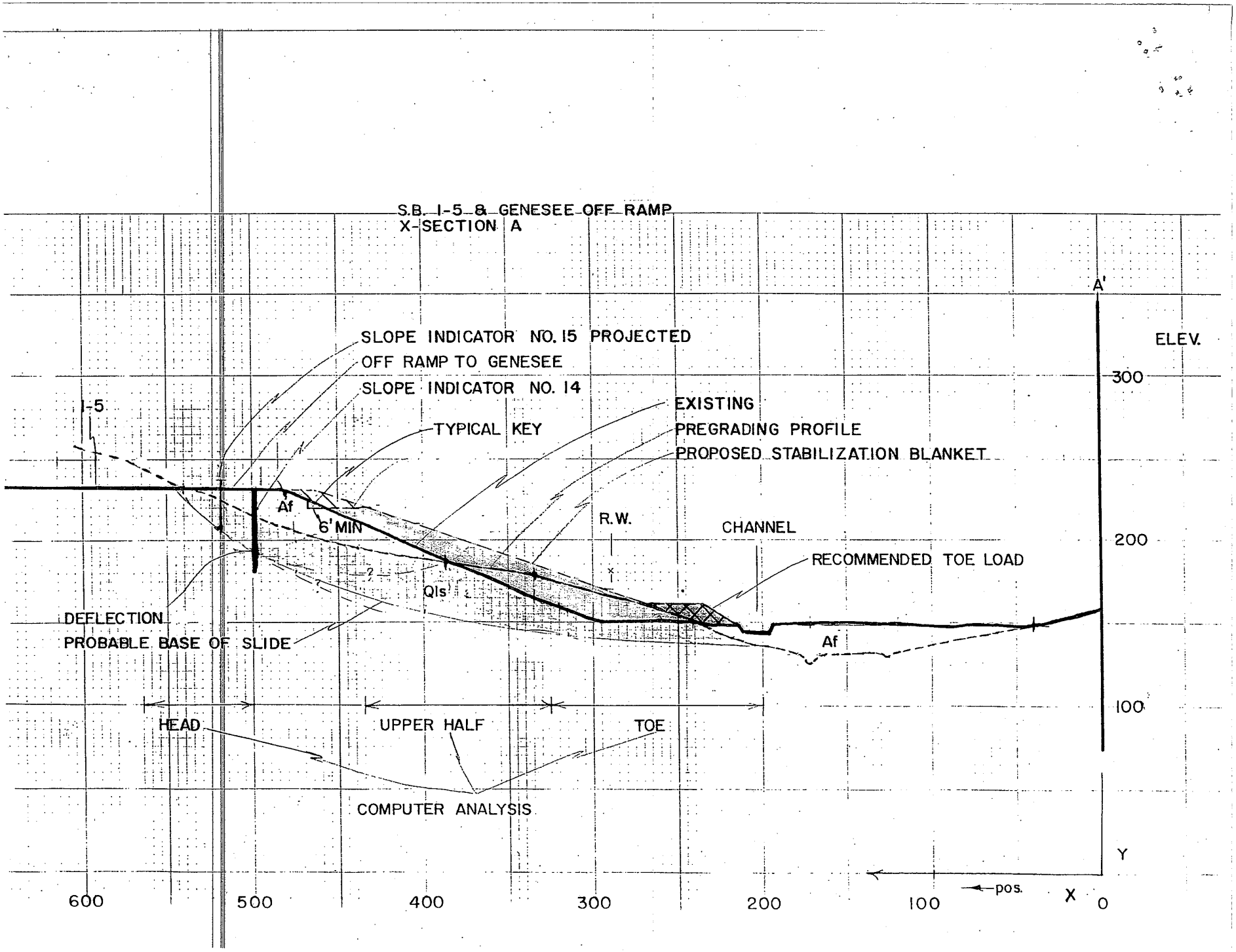
Joe Egan, Engineering Geologist
Ramiro Oquita, Env. Geologist
Caltrans District 11

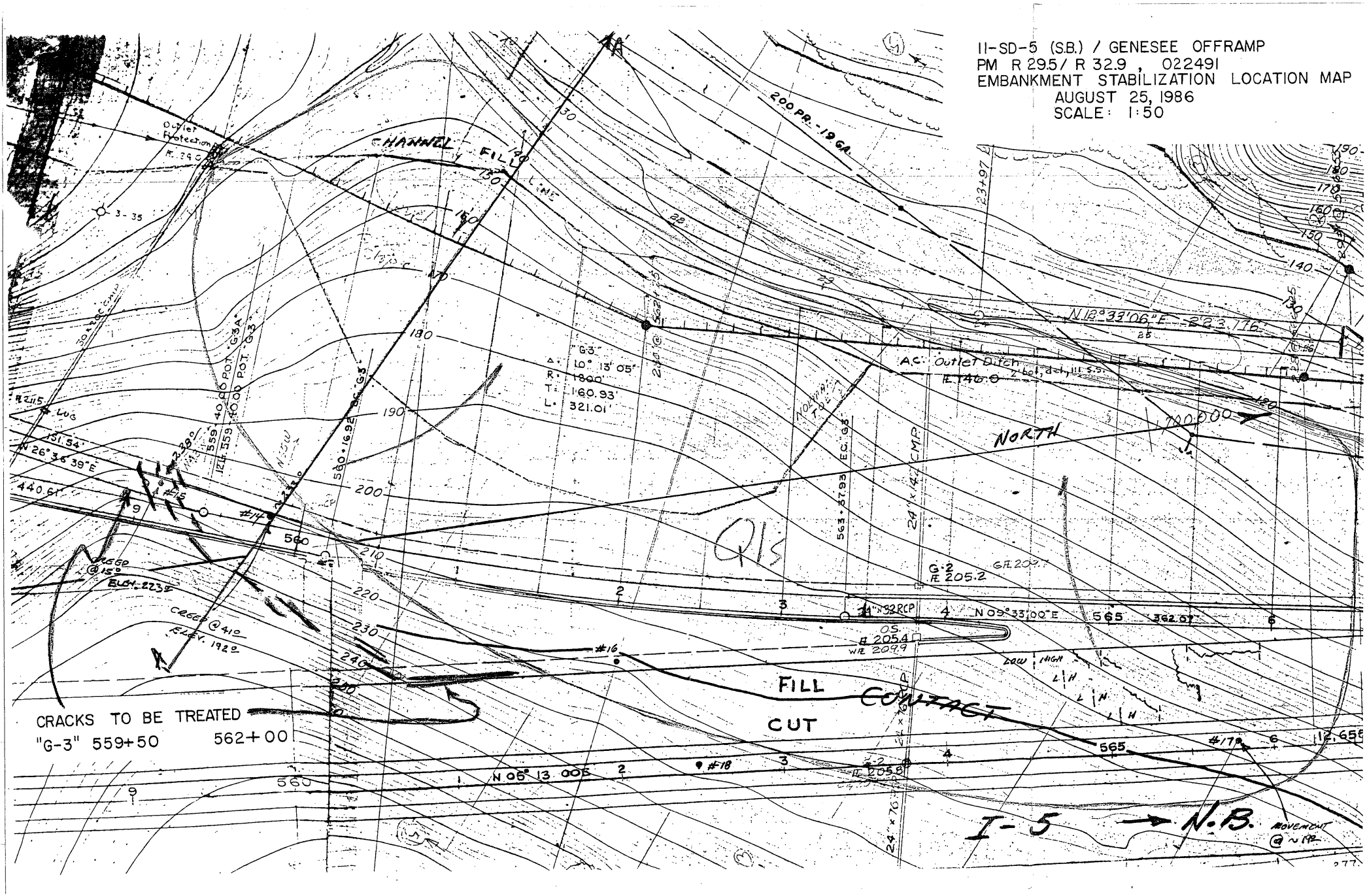
August 25, 1986

The following analysis is based on
x-section A-A'. See attached plan.

Embankment Geometry	Safety Factor
Existing cut/fill slope	
-face	.99-1.0
-toe	.99-1.0
Existing cut/fill slope with stability blanket added	
(1) -full slope coverage	
-face	1.4-1.6
-toe	1.2-1.4
(2) -10 ft. below grade to the toe	
-face	1.4-1.6
-toe	1.3
(3) -10 ft. below grade to the toe (with toe load)	
-face	1.4-1.6
-toe	1.3-1.4
(4) -20 ft. below grade to the toe	
-face	1.2-1.5
-toe	1.3-1.4
(5) -20 ft. below grade to the toe (with toe load)	
-face	1.3-1.5
-toe	1.4-1.5

11-SD-5(SB)/GENESEE


S.B. I-5 & GENESEE OFF RAMP
X-SECTION A
A'
ELEV.
300
200
100
SLOPE INDICATOR NO. 15 PROJECTED
OFF RAMP TO GENESEE
SLOPE INDICATOR NO. 14
I-5
TYPICAL KEY
EXISTING
PREGRADING PROFILE
PROPOSED STABILIZATION BLANKET
Af
6' MIN
R.W.
CHANNEL
RECOMMENDED TOE LOAD
Qls
DEFLECTION
PROBABLE BASE OF SLIDE
Af
HEAD
UPPER HALF
TOE
COMPUTER ANALYSIS
Y
pos.
X
600
500
400
300
200
100
0


11-SD-5 (S.B.) / GENESEE OFFRAMP
PM R 29.5/ R 32.9 , 022491
EMBANKMENT STABILIZATION LOCATION MAP
AUGUST 25, 1986
SCALE: 1:50
CHANNEL FILL LINE
200 PR. - 19 GA.
N 18° 33' 06" E 223.16'
A.C. Outlet Ditch
NORTH
FILL
CUT
CONTACT
CRACKS TO BE TREATED
"G-3" 559+50 562+00
N 09° 13' 00" E
N 09° 33' 00" E
I-5 → N.B.

State of California

Business, Transportation and Housing Agency

MEMORANDUM

To: Andrew Sanford
Project Engineer
Advanced Planning

Date: June 5, 1997

File: 11 SD 5
KP R47.00 to R49.24
11 - 910230

From: **DEPARTMENT OF TRANSPORTATION**
Office of Structural Foundations
Roadway Geotechnical Engineering - South

Subject: Geologic Hazards Review for Proposed Road Widening

Introduction:
In accordance with your instructions, we have examined your plans to add an auxiliary lane in the southbound direction between Sorrento Valley entrance ramp and the Genesee Ave. exit ramp. We inspected the location and reviewed related records in our files such as "As-Built " plans plus other maps and reports on slope failures that have occurred in that area.

Site Description and Condition:
This section of Interstate 5 was constructed in 1964. Here a small, steep-wall canyon which empties northward was graded to accommodate the highway part way up the eastern flank of the canyon. Construction required both cut and fill grading to equalize several minor ridges that projected westward into the highway and the intervening canyons. Hence, the boundary line between cut and fill meanders across the highway and produced several, small, sliver fills on relatively steep natural slopes that are now buried beneath the fill. In fact, one of the sliver fills was inadvertently placed over a shallow landslide causing it to creep downslope for many years. Creep on the main part of the slide mass was stopped about ten years ago by placing a strut fill along a part of the toe. However, the strut location and size were compromised to reduce cost and to avert construction of a concrete drainage channel beneath or below the strut. The remedial measures stopped movement on most of the slide. However, the northern end of the slide may still be creeping for stress cracks can be traced across concrete gore terminus on the South Bound Genesee Avenue offramp. These creep cracks may, however, also be related to settlement of a sliver fill placed near the road edge. The cut-fill boundary line lies near the cracks.

Another inherent problem is that most of the site is underlain by the Ardath Shale which is notorious for its instability. Studies by Caltrans conducted over ten years ago found that fill material produced from the Ardath Shale was prone to serious settlement because clumps of clayey shale fragments disintegrate or decompose slowly into smaller grains after they become wet. The smaller grains fill in voids between clumps causing the volume to shrink which in turn induces settlement. Settlement of over half meter was recorded along most of the western edge of the subject embankment

during their study. Settlement has improved slowly over the years and is believed to be near-minimal now.

Proposed Improvements:
Proposed improvements call for constructing an auxiliary lane in the southbound direction by placing a wedge of fill 1.5 to 3.6 m wide over the face of the existing fill. Your exhibit 1 and 2 show that the proposed slope ranges from 1:1.5 (vertical to horizontal ratio) at the south end of the project to 1:2 at the north end. Although most of the proposed slope would incline at 1:2, the most precarious section of existing embankment is the south half where the your proposed fill slope would be the steepest.

Conclusions and Recommendations:
Analysis of the site including your plans and maps of past instabilities clearly show that the site has been and is capable of being unstable particularly along the outer edge of the slope. Stress cracks are evident near the brow of the fill slope on recently laid asphalt pavement west of station 565+00. (Station numbers are English as noted on exhibit 1 and 2.) Immediately north of and up to station 573, the former stream channel meandered beneath the massive fill embankment; the asphalt pavement there was recently laid and is too fresh to show cracks, but stress cracks were common place in the recent past. Between stations 573 and stations 577, we know that a sliver fill underlies the pavement and that it could be destabilized. Further the toe of this fill is buried in a pond of water. (Water softens the soil and reduces the bearing capacity of the fill). Water ponds in this stream channel from this area to the north end of the project. On the south end of the project, the slope west of and between stations 560 and 566+50 is comprised of landslide debris that is partially buttressed.

We believe that placing a fill wedge on the outer edge of the embankment could be either detrimental or beneficial to the slope condition depending on the slope design and mostly on the slope face inclination. If the slope is designed as flat as possible with a wide section at the toe, the new slope fill would serve to buttress the existing slope. If the toe width is narrow it may add a critical disadvantage to the topside. We therefore recommend that the new slopes incline no steeper than 1:2 and gentler wherever possible. We would also like to encourage you to extend the landslide buttress northward to at least station 566+50. We also recommend that you contact the hydraulics department to see if they can design a deeper channel that will drain the ponded water in the stream north of station 573.

Placing fill in the ponded area is very difficult, we encourage you to use filter fabric or geogrid to strengthen the soil parameters.

If you have any questions or comments regarding this memo please feel free to call me at 467 4062.

REGISTERED GEOLOGIST
RAMIRO M. OQUITA
429
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

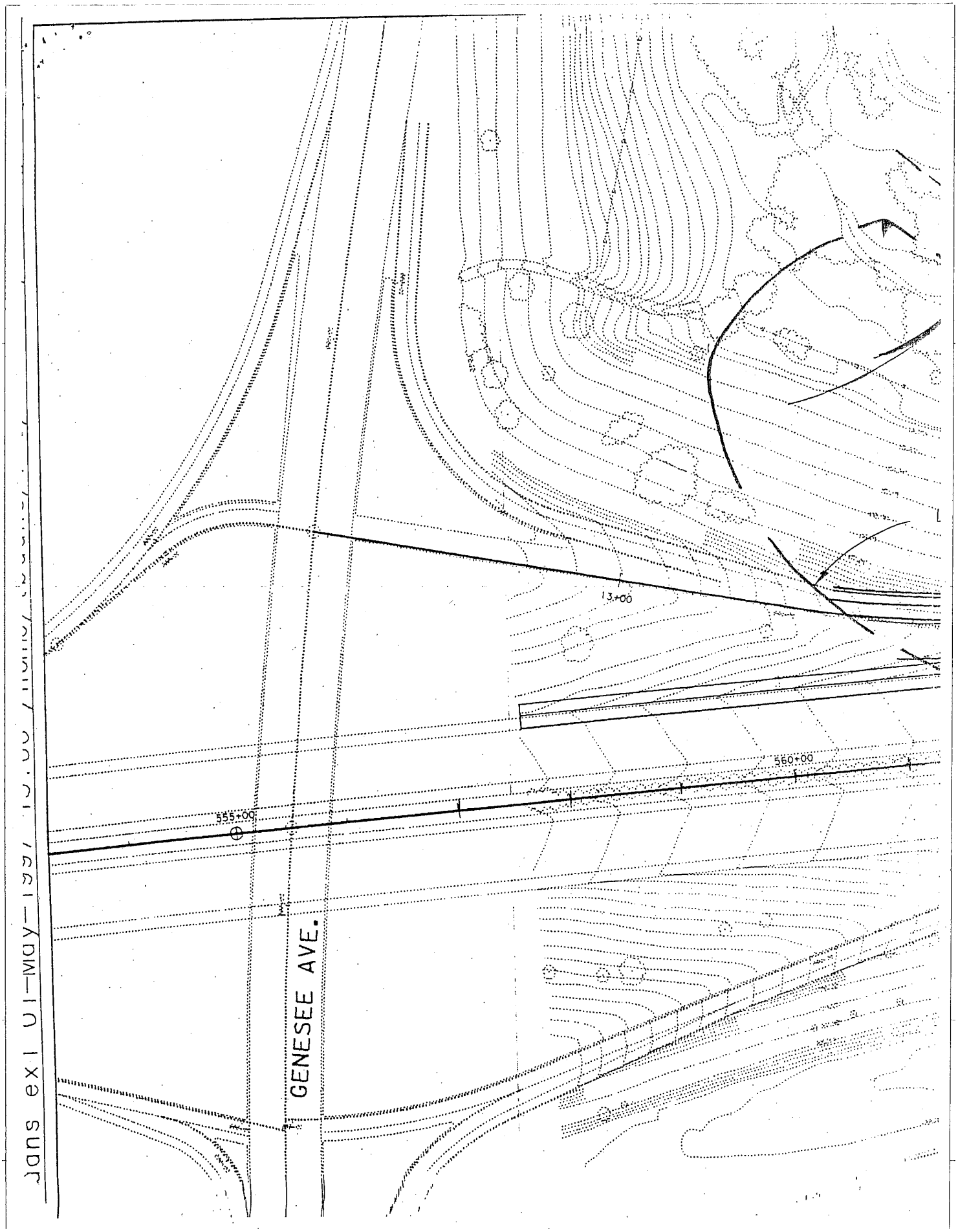
Prepared By:

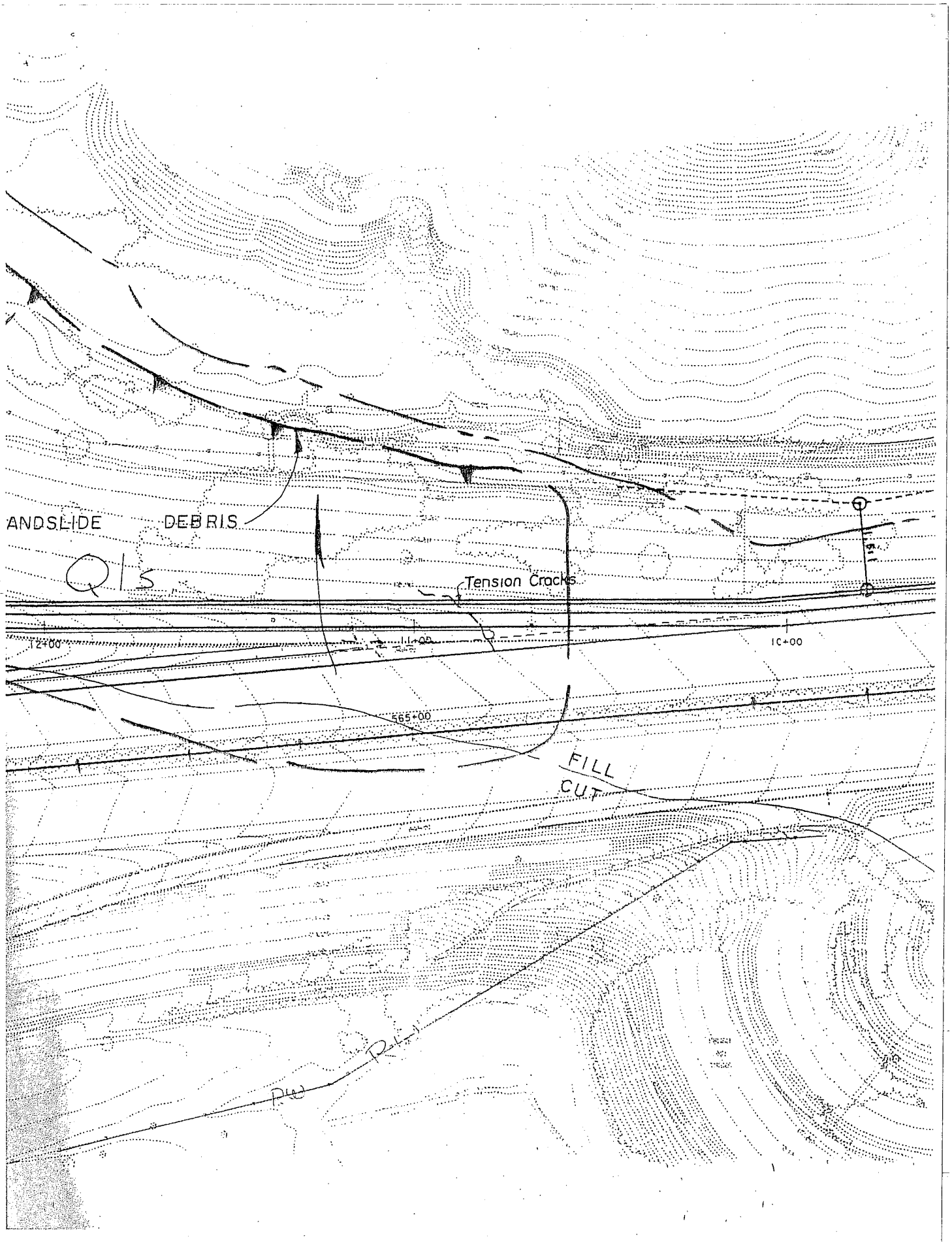
Ramiro Oquita

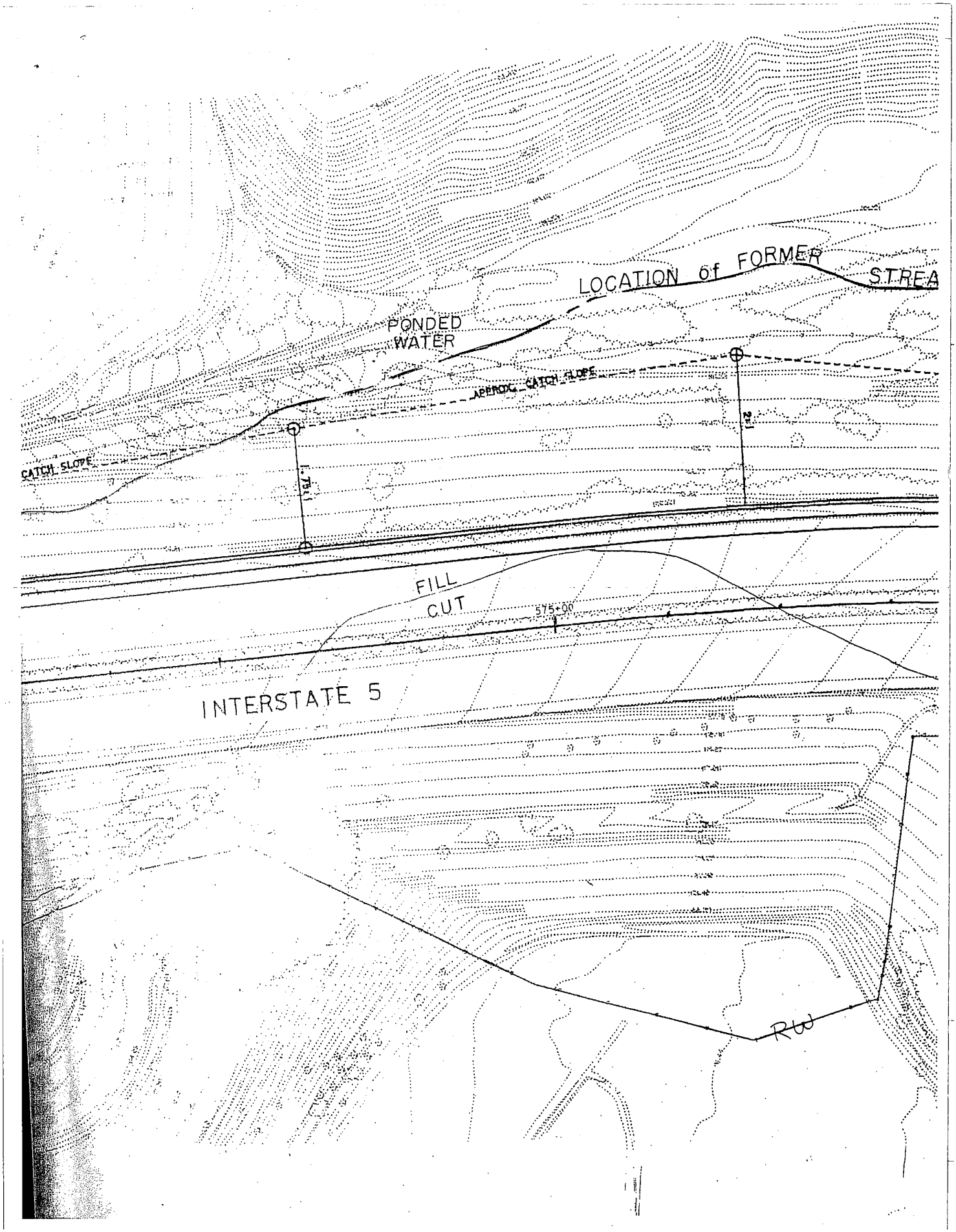
Ramiro Oquita
Assoc Engineering Geologist

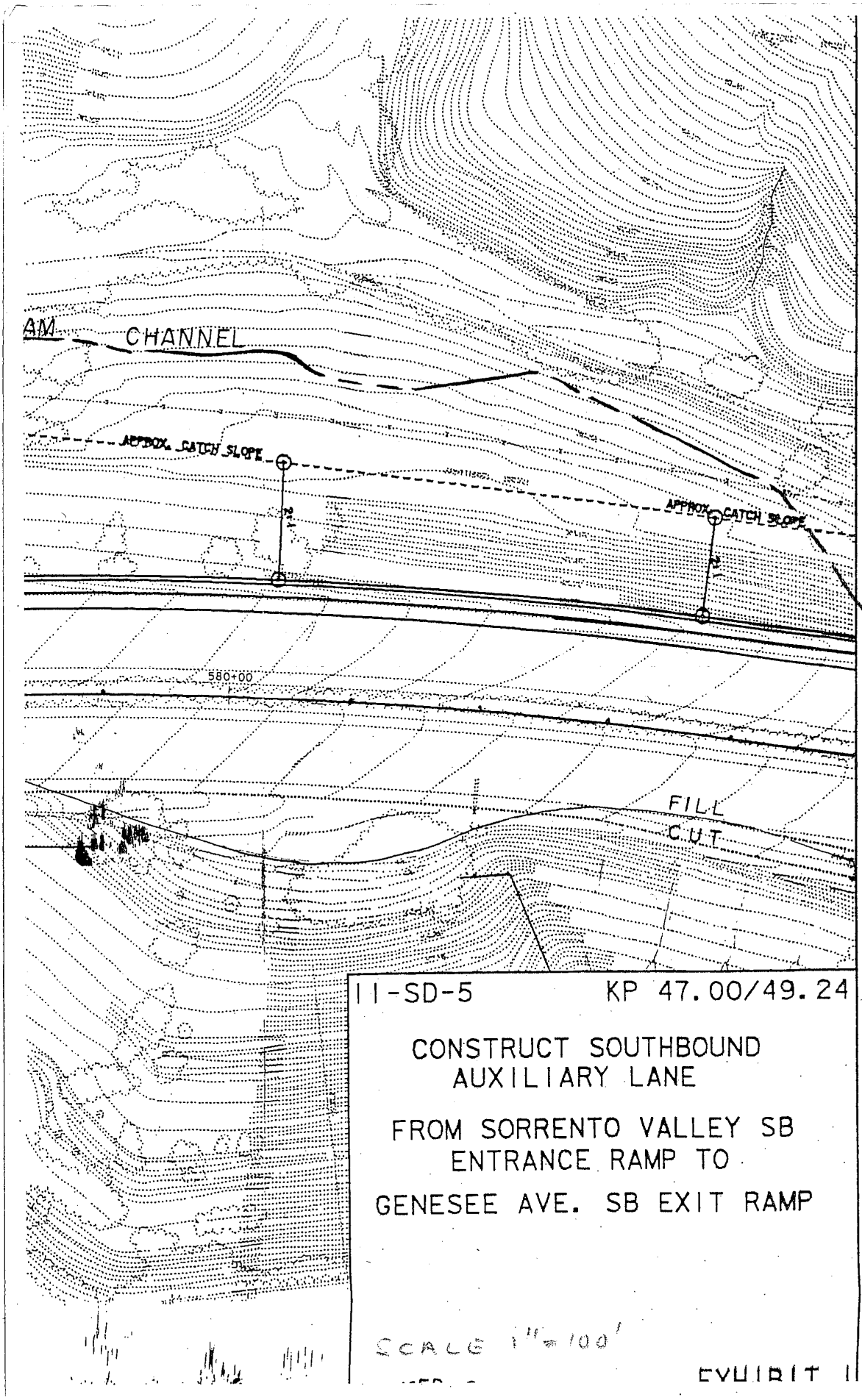
2 Attachments

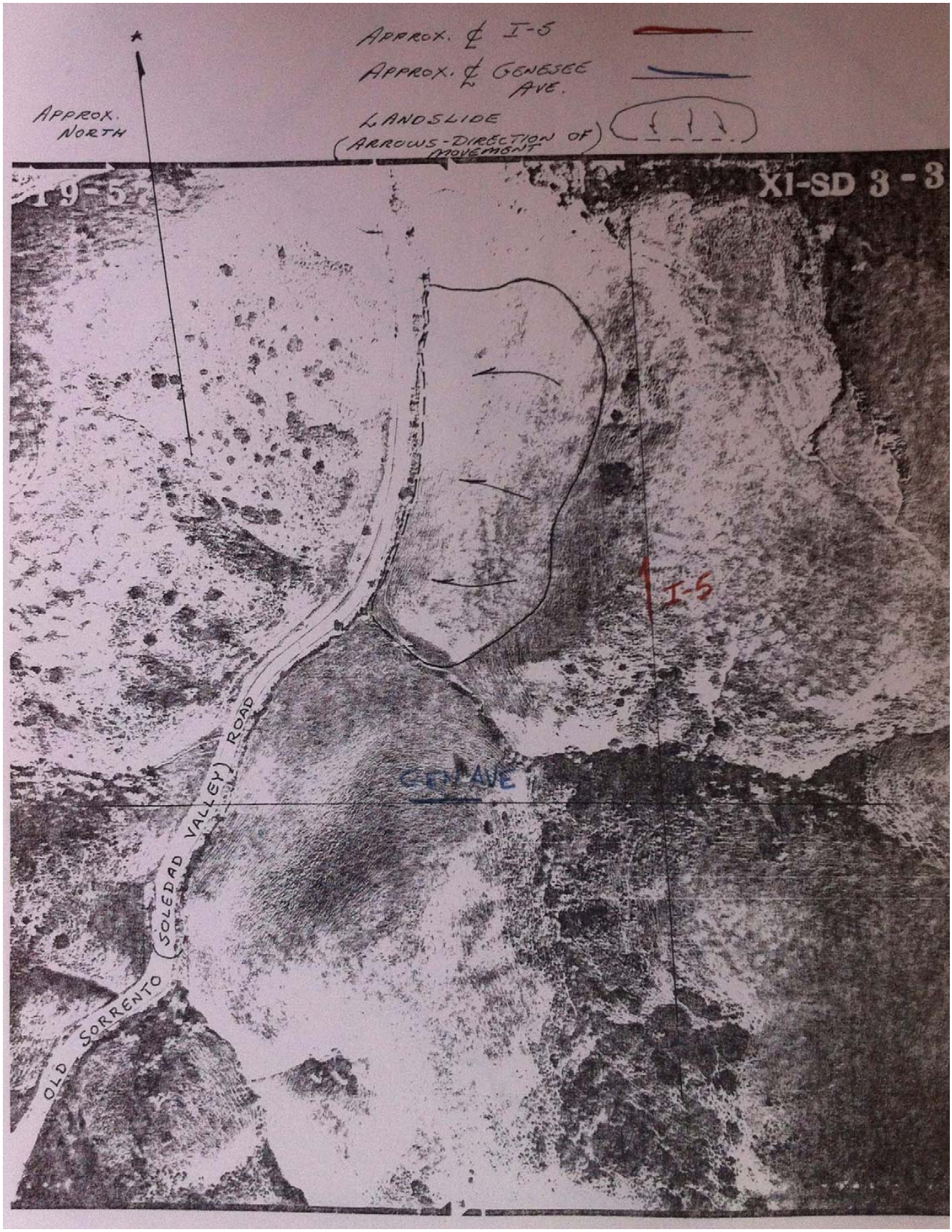
cc: KJackura
JMcKaughan

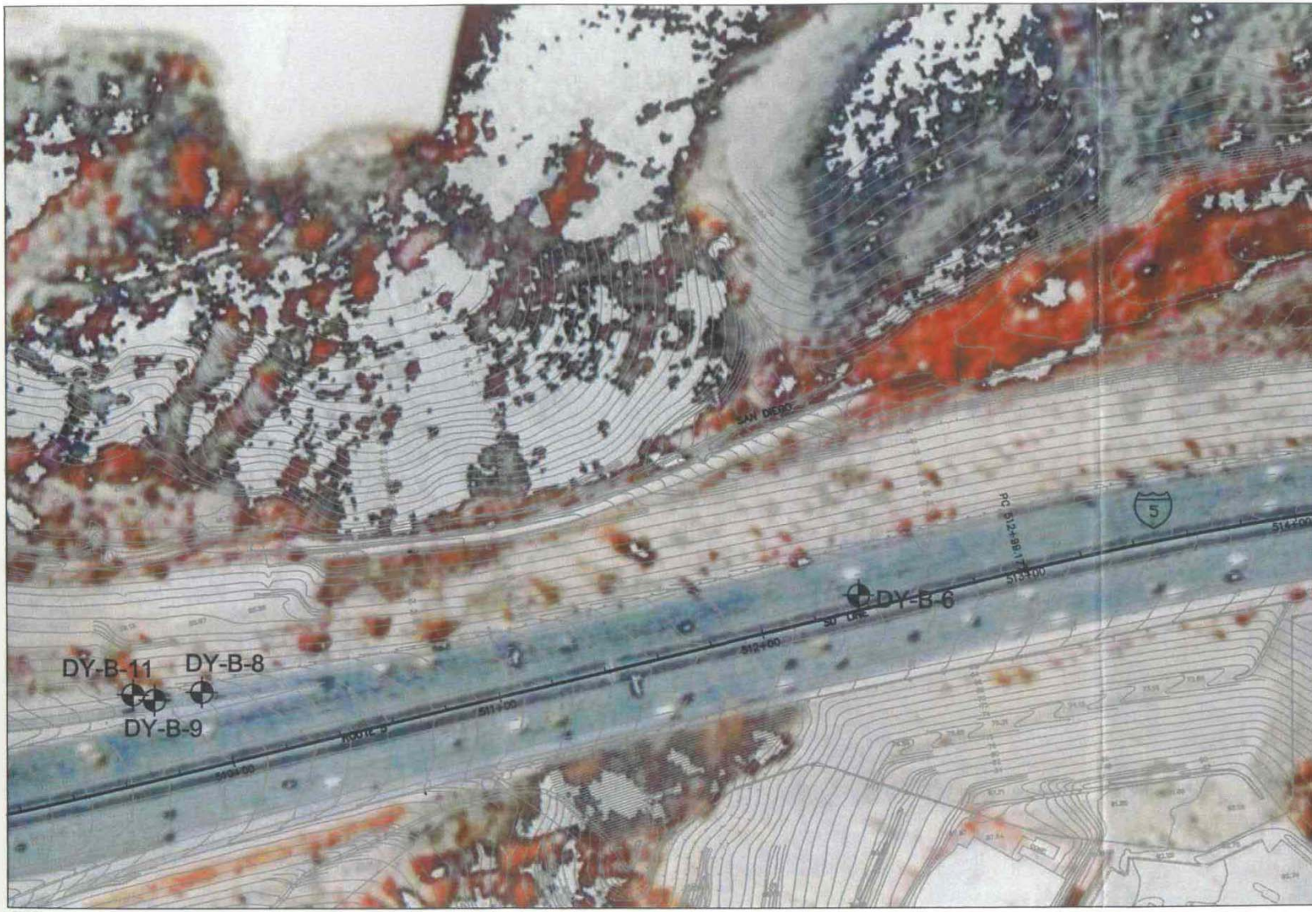

GENESEE AVE.
555+00
560+00
13+00


ANDSLIDE
DEBRIS
Q15
Tension Cracks
12+00
11+00
10+00
565+00
FILL
CUT
Rw
Rw


LOCATION of FORMER STREA
PONDED WATER
APPROX. CATCH SLOPE
CATCH SLOPE
1.75:1
2:1
FILL
CUT
575+00
INTERSTATE 5
RW


AM
CHANNEL
APPROX. CATCH SLOPE
APPROX. CATCH SLOPE
580+00
FILL
CUT
11-SD-5
KP 47.00/49.24
CONSTRUCT SOUTHBOUND
AUXILIARY LANE
FROM SORRENTO VALLEY SB
ENTRANCE RAMP TO
GENESEE AVE. SB EXIT RAMP
SCALE 1" = 100'
EXHIBIT 11

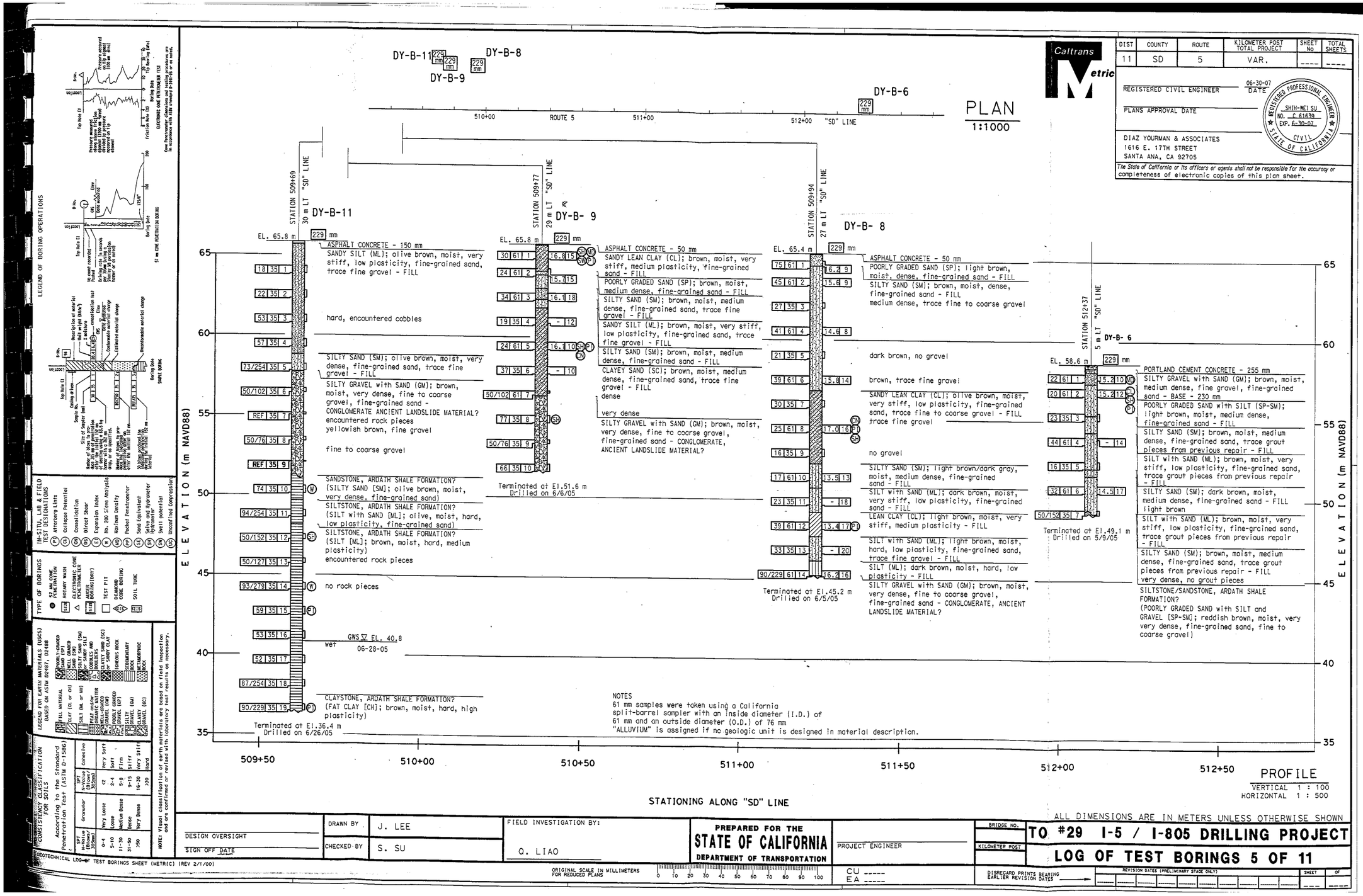

APPROX. ℄ I-5
APPROX. ℄ GENESEE AVE.
LANDSLIDE
(ARROWS - DIRECTION OF MOVEMENT)
APPROX. NORTH
X1-SD 3 - 3
I-5
GEN AVE
OLD SORRENTO (SOLEDAD VALLEY) ROAD



Reference : Electronic Base Map Provided by Dokken Engineering, Inc., 2005

EXPLANATION

DY-B-9 DYA BORING LOCATIONS


DY-B-11
DY-B-9
DY-B-8
DY-B-6
PLAN
1:1000
510+00
ROUTE 5
511+00
512+00
"SD" LINE
STATION 509+69
30 m LT "SD" LINE
DY-B-11
EL. 65.8 m
229 mm
ASPHALT CONCRETE - 150 mm
SANDY SILT (ML); olive brown, moist, very stiff, low plasticity, fine-grained sand, trace fine gravel - FILL
hard, encountered cobbles
SILTY SAND (SM); olive brown, moist, very dense, fine-grained sand, trace fine gravel - FILL
SILTY GRAVEL with SAND (GM); brown, moist, very dense, fine to coarse gravel, fine-grained sand - CONGLOMERATE ANCIENT LANDSLIDE MATERIAL? encountered rock pieces
yellowish brown, fine gravel
fine to coarse gravel
SANDSTONE, ARDATH SHALE FORMATION? (SILTY SAND [SM]; olive brown, moist, very dense, fine-grained sand)
SILTSTONE, ARDATH SHALE FORMATION? (SILT with SAND [ML]; olive, moist, hard, low plasticity, fine-grained sand)
SILTSTONE, ARDATH SHALE FORMATION? (SILT [ML]; brown, moist, hard, medium plasticity) encountered rock pieces
no rock pieces
GWS EL. 40.8
wet
06-28-05
CLAYSTONE, ARDATH SHALE FORMATION? (FAT CLAY [CH]; brown, moist, hard, high plasticity)
Terminated at El.36.4 m
Drilled on 6/26/05
STATION 509+77
29 m LT "SD" LINE
DY-B- 9
EL. 65.8 m
229 mm
ASPHALT CONCRETE - 50 mm
SANDY LEAN CLAY (CL); brown, moist, very stiff, medium plasticity, fine-grained sand - FILL
POORLY GRADED SAND (SP); brown, moist, medium dense, fine-grained sand - FILL
SILTY SAND (SM); brown, moist, medium dense, fine-grained sand, trace fine gravel - FILL
SANDY SILT (ML); brown, moist, very stiff, low plasticity, fine-grained sand, trace fine gravel - FILL
SILTY SAND (SM); brown, moist, medium dense, fine-grained sand - FILL
CLAYEY SAND (SC); brown, moist, medium dense, fine-grained sand, trace fine gravel - FILL
dense
very dense
SILTY GRAVEL with SAND (GM); brown, moist, very dense, fine to coarse gravel, fine-grained sand - CONGLOMERATE, ANCIENT LANDSLIDE MATERIAL?
Terminated at El.51.6 m
Drilled on 6/6/05
STATION 509+94
27 m LT "SD" LINE
DY-B- 8
EL. 65.4 m
229 mm
ASPHALT CONCRETE - 50 mm
POORLY GRADED SAND (SP); light brown, moist, dense, fine-grained sand - FILL
SILTY SAND (SM); brown, moist, dense, fine-grained sand - FILL
medium dense, trace fine to coarse gravel
dark brown, no gravel
brown, trace fine gravel
SANDY LEAN CLAY (CL); olive brown, moist, very stiff, low plasticity, fine-grained sand, trace fine to coarse gravel - FILL
trace fine gravel
no gravel
SILTY SAND (SM); light brown/dark gray, moist, medium dense, fine-grained sand - FILL
SILT with SAND (ML); dark brown, moist, very stiff, low plasticity, fine-grained sand - FILL
LEAN CLAY (CL); light brown, moist, very stiff, medium plasticity - FILL
SILT with SAND (ML); light brown, moist, hard, low plasticity, fine-grained sand, trace fine gravel - FILL
SILT (ML); dark brown, moist, hard, low plasticity - FILL
SILTY GRAVEL with SAND (GM); brown, moist, very dense, fine to coarse gravel, fine-grained sand - CONGLOMERATE, ANCIENT LANDSLIDE MATERIAL?
Terminated at El.45.2 m
Drilled on 6/5/05
STATION 512+37
5 m LT "SD" LINE
DY-B- 6
EL. 58.6 m
229 mm
PORTLAND CEMENT CONCRETE - 255 mm
SILTY GRAVEL with SAND (GM); brown, moist, medium dense, fine gravel, fine-grained sand - BASE - 230 mm
POORLY GRADED SAND with SILT (SP-SM); light brown, moist, medium dense, fine-grained sand - FILL
SILTY SAND (SM); brown, moist, medium dense, fine-grained sand, trace grout pieces from previous repair - FILL
SILT with SAND (ML); brown, moist, very stiff, low plasticity, fine-grained sand, trace grout pieces from previous repair - FILL
SILTY SAND (SM); dark brown, moist, medium dense, fine-grained sand - FILL light brown
SILT with SAND (ML); brown, moist, very stiff, low plasticity, fine-grained sand, trace grout pieces from previous repair - FILL
SILTY SAND (SM); brown, moist, medium dense, fine-grained sand, trace grout pieces from previous repair - FILL very dense, no grout pieces
SILTSTONE/SANDSTONE, ARDATH SHALE FORMATION? (POORLY GRADED SAND with SILT and GRAVEL [SP-SM]; reddish brown, moist, very very dense, fine-grained sand, fine to coarse gravel)
Terminated at El.49.1 m
Drilled on 5/9/05
ELEVATION (m NAVD88)
65
60
55
50
45
40
35
509+50
510+00
510+50
511+00
511+50
512+00
512+50
PROFILE
VERTICAL 1 : 100
HORIZONTAL 1 : 500
STATIONING ALONG "SD" LINE
NOTES
61 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 61 mm and an outside diameter (O.D.) of 76 mm
"ALLUVIUM" is assigned if no geologic unit is designed in material description.
LEGEND OF BORING OPERATIONS
LEGEND FOR EARTH MATERIALS (USCS) BASED ON ASTM D2487 & D2488
TYPE OF BORINGS
IN-SITU, LAB & FIELD TEST DESIGNATIONS
CONSISTENCY OF COHESIVE SOILS According to the Standard Penetration Test (ASTM D-1586)
NOTE: Visual classification of earth materials are based on field inspection and are confirmed or revised with laboratory test results as necessary.
GEOTECHNICAL LOG OF TEST BORINGS SHEET (METRIC) (REV 2/1/00)
Caltrans Metric
DIST 11
COUNTY SD
ROUTE 5
KILOMETER POST TOTAL PROJECT VAR.
SHEET No
TOTAL SHEETS
REGISTERED CIVIL ENGINEER
06-30-07 DATE
PLANS APPROVAL DATE
REGISTERED PROFESSIONAL ENGINEER SHIH-WEI SU No. C 61639 EXP. 6-30-07 CIVIL STATE OF CALIFORNIA
DIAZ YOURMAN & ASSOCIATES
1616 E. 17TH STREET
SANTA ANA, CA 92705
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.
DESIGN OVERSIGHT
SIGN OFF DATE
DRAWN BY J. LEE
CHECKED BY S. SU
FIELD INVESTIGATION BY: Q. LIAO
PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
PROJECT ENGINEER
ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN
BRIDGE NO. TO #29 I-5 / I-805 DRILLING PROJECT
KILOMETER POST LOG OF TEST BORINGS 5 OF 11
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS
CU -----
EA -----
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET OF

State of California | Business, Transportation and Housing Agency

Memorandum

Flex Your Power!
Be energy efficient!

To: Mr. Mohammed Khan
District 11
Office of Construction, MS# 35

Date: November 18, 2005

File: 11-SD-5
KP R47.00/R49.24

EA: 11 – 0301U3

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Southbound Interstate 5 to Genesee Avenue ~~Onramp~~ OFF RAMP: Geologic Hazard Evaluation.

GENERAL

In order to determine the cause of the pavement distress at the subject location, an exploratory drilling program that included the installation of about 30 m deep slope inclinometer (SI-1) was conducted by the Diaz Yourman & Associates Consultant (in June 2005). Starting on July 7, 2005, the SI-1 has been surveyed by our office on the monthly basis. The collected data indicates that over a period of four months a cumulative displacement of about 13 mm occurred at about the depth of 2.3 m, and in the direction to the south. That was the only deflection recorded so far (see attached Slope Inclinometer Results). Following the last SI-1 reading performed on November 15, 2005, the geologic site evaluation was conducted in order to determine the cause of the recorded displacement. This evaluation consisted of a site reconnaissance, a review of the existing reports and geologic maps, and the writing of this memorandum.

SITE HISTORY

The SB I-5 to Genesee Avenue Onramp was constructed in 1964. Along this section, of the freeway a west-facing slope of the steep canyon that empties (drains) to the north was graded to accommodate the ramp. Therefore, the construction of I-5 in this area involved both cut and fill grading methods to bring to the grade several minor ridges and

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intervening arroyos that trended westward, across the highway alignment. As a result, the daylight line (the contact between fill and cut) meanders across the freeway. In addition, small silver fills were often placed on the faces of relatively steep natural slopes. At the subject location, based on the archived documents, a sliver fill was placed over a shallow landslide causing it to creep down slope for many years (Oquita, 1997). In 1987 this creep on the main section of the slide mass was arrested by placing a strut fill (buttress) along the section of its toe (see attached archived Cross-section C-C'). However, the strut location and its size were compromised to reduce costs and to avert the construction of a concrete drainage channel beneath or below the strut. This remedial measure stopped the movement of the slide. However, at the northern end of the slide location stress-related cracks can be observed in the area of the gore terminus on the SB I-5 to Genesee Avenue Onramp.

Anther important geologic factor is that the subject section of I-5 is predominately underlain by the Ardath Shale Formation that is notorious for its instability. Most landslides in the vicinity of the SB I-5 to Genesee Avenue Onramp occurred at the locations that were underlain by this formation. In addition, studies by Caltrans found that the fill material that originated from the Ardath Shale Formation was susceptible to significant settlement. This was due to the fact that upon wetting clumps of clayey Ardath Shales decomposed or disintegrated slowly into smaller grains filling voids existing between the clumps, thus inducing settlement.

SITE OBSERVATIONS

The distress cracks located in the area of the gore terminus on the SB I-5 to Genesee Avenue Onramp were studied during the drilling program of June 2005 and after five months on November 17, 2005, and -- in general -- no change in their appearance, density, thickness, and depths was observed (see attached Photo: SB I5 to Genesee Offramp). In addition, no evidence of slope instability was found on the west-facing face of the embankment fill slope that is inclined at 1:2 (V:H) and descends from the curb of this ramp to the west. However, the about 1.0 m thick top layer on the face of this slope, when probed, was found to be loose, with frequent animal burrows. This slope was constructed using Ardath Shale Formation materials.

At about one half of the height of the original embankment slope built in 1964, a horizontal about 9.0 m wide bench of the buttress constructed in 1987 was found to exist (see attached Photo: SB I-5 to Genesee Onramp: Buttress) (Hughes, 1986). A small creek was found to flow north at the toe of this buttress. The about 1.0 m thick top layer of the buttress bench built of granular materials, when probed, was found to be dense.

However, the face of this buttress/strut was found to be sparsely vegetated and heavily eroded, with frequent erosional rills up to 1.0 m deep (see attached Photo: SB I-5 to Genesee: Erosion of the Buttress Face). In addition, the face of the buttress' slope, when probe, was found to be loose.

CONCLUSIONS AND RECOMMENDATIONS

Based on field reconnaissance, no evidence of the slope instability was found at the location of the gore terminus on the SB I-5 to Genesee Avenue Onramp. The distress cracks could be related to the differential settlement of a sliver fill built of the Ardath Shale Formation materials. However, at this time the possibility that the creeping movement of northern section of the slide that underlies the site of concern is causing the pavement to crack cannot be excluded. In addition, the deflection recorded by the SI-1 needs to be explained. Therefore, it is recommended that in addition to SI-1 at least two more slope inclinometers be installed at the subject site. They will be frequently monitored by our office. Data collected from all instruments should help in explaining the cause of the aforementioned distress cracks and detecting a potential reactivation of the landslide.

According to archived documentation, the proposed size (volume) of the stabilization strut/buttress was reduced during the construction phase of the project. Consequently, the final slope stability safety factor of the built buttress, while still acceptable, was lower than recommended. The performance of the stabilization strut depends of its dead weight. Therefore, the more of its material is washed away/eroded the lesser weight remains to retain the toe of the slide. This ongoing process steadily diminishes the slope stability safety factor of the slope. If the erosion process is not stopped this could lead to the reactivation of the slide movement, and – consequently – a potentially catastrophic landslide along the subject section of the offramp. Therefore, the face of the buttress should to be restored by filling the erosional rills with compacted materials and providing a permanent erosion protection.
For the erosion protection, recommendations from the Caltrans Office of Landscape Architect should be utilized.

If you have any question regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716) or cell (858) 945-0458.

J. Tesar

Jeff Tesar, C.E.G.
Associate Engineering Geologist,
Office of Geotechnical Design-South 2
Branch D

REGISTERED GEOLOGIST
JEFF J. TESAR
No. 2137
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Attachments

1. Inclinometer Results (Graphs)
2. Cross-section C-C'
3. Photos

References:

1. R. Oquita, Geologic Hazard Review for Proposed Road Widening, June 5, 1997
2. L. Hughes, Strut Embankment.

JT

Cc:

Abbas Abghari
Brian Hinman

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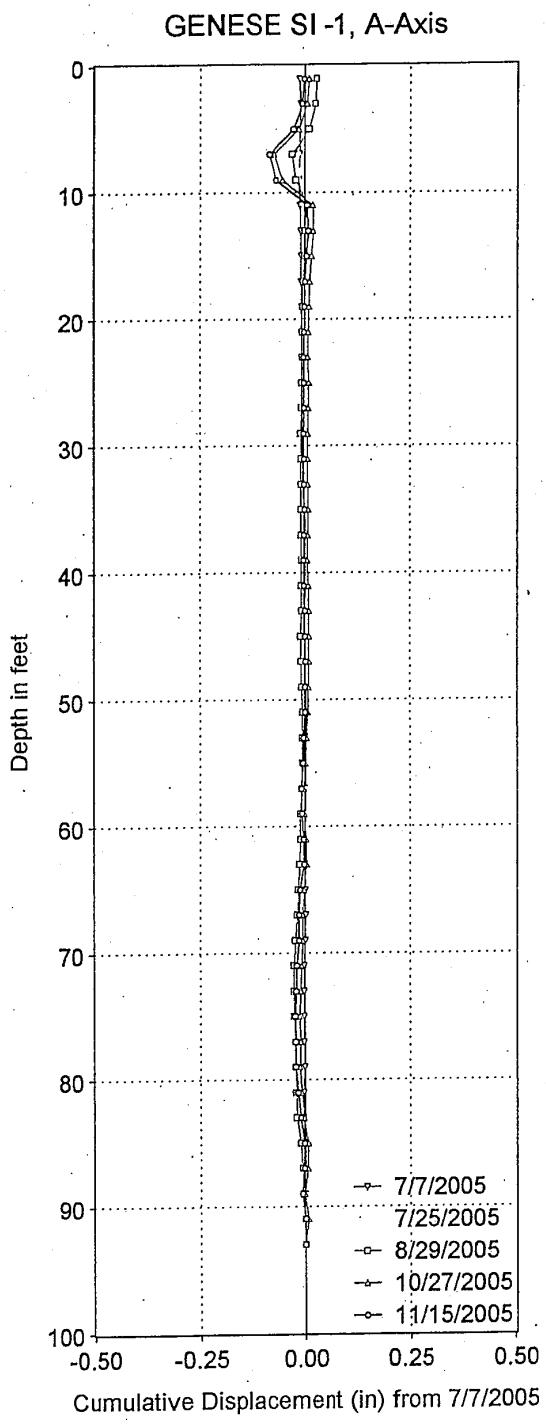
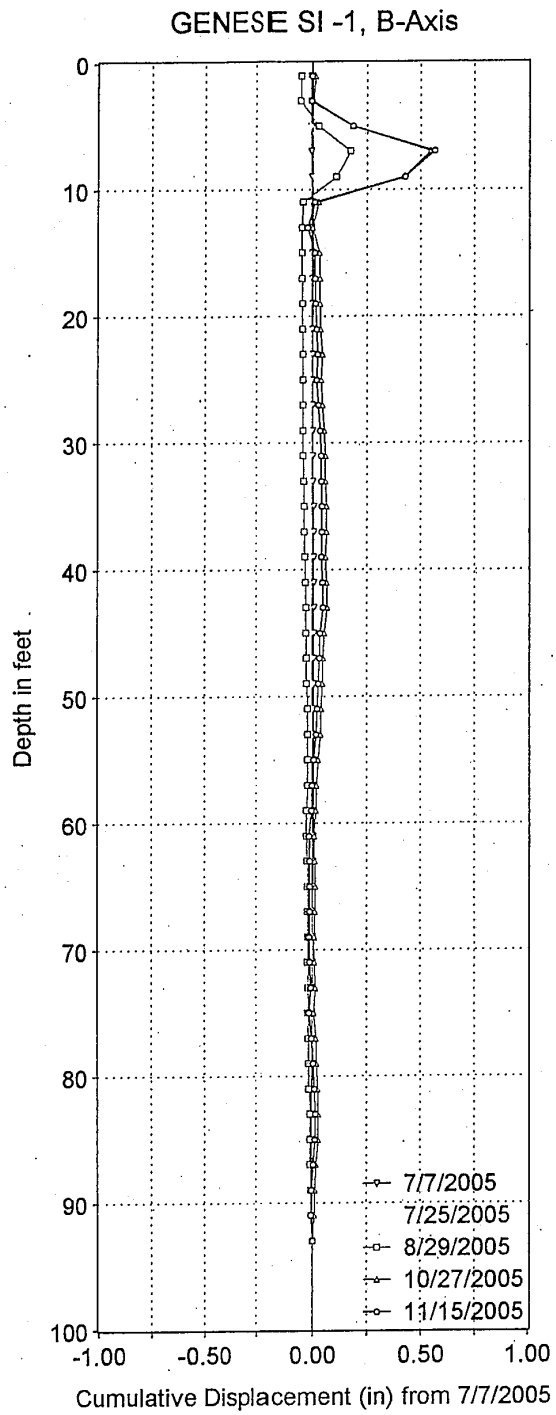
ATTACHMENTS

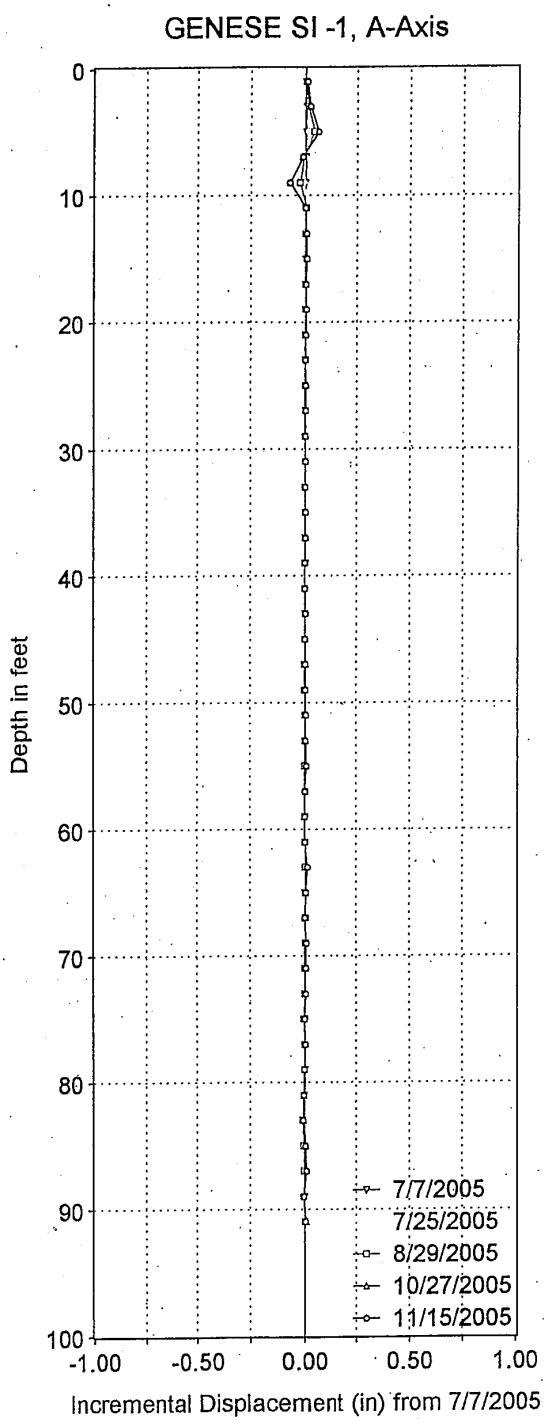


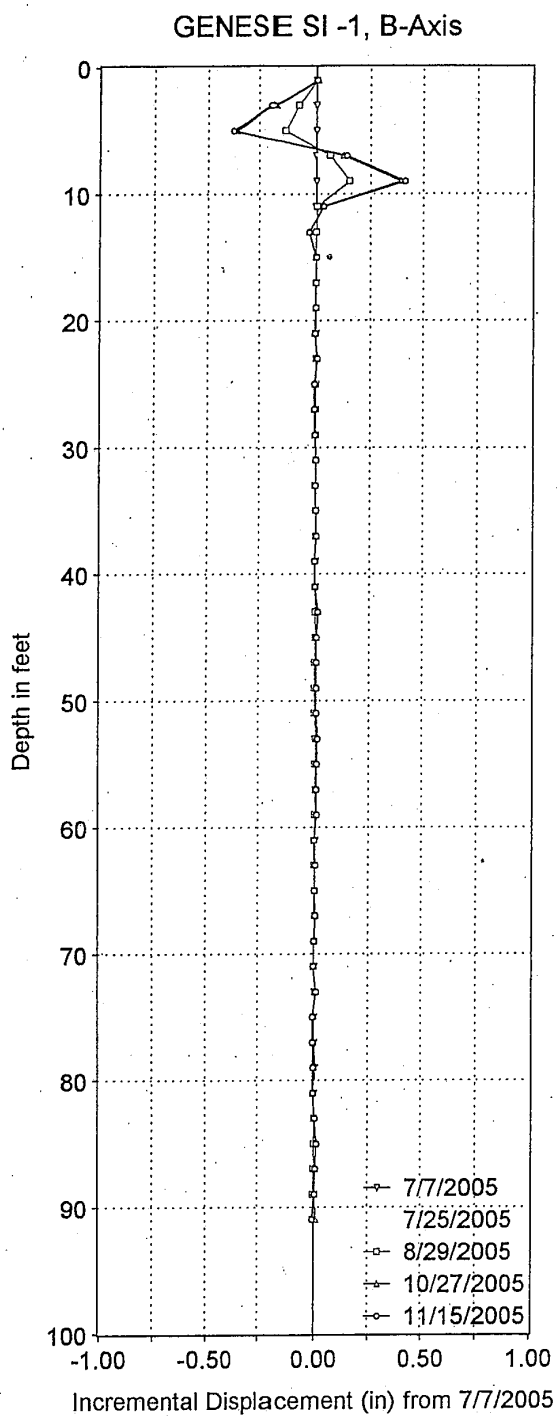


INCLINOMETER RESULTS

11-SD-5-PM 000
I-5/GENESEE AVE OFF RAMP
E. A.#

DEPTH OF INCLINOMETERCASING: 92 FT
Ao DIRECTION: DW
LOCATION: I-5 SB/GENESEE OFF RAMP SHOULDER

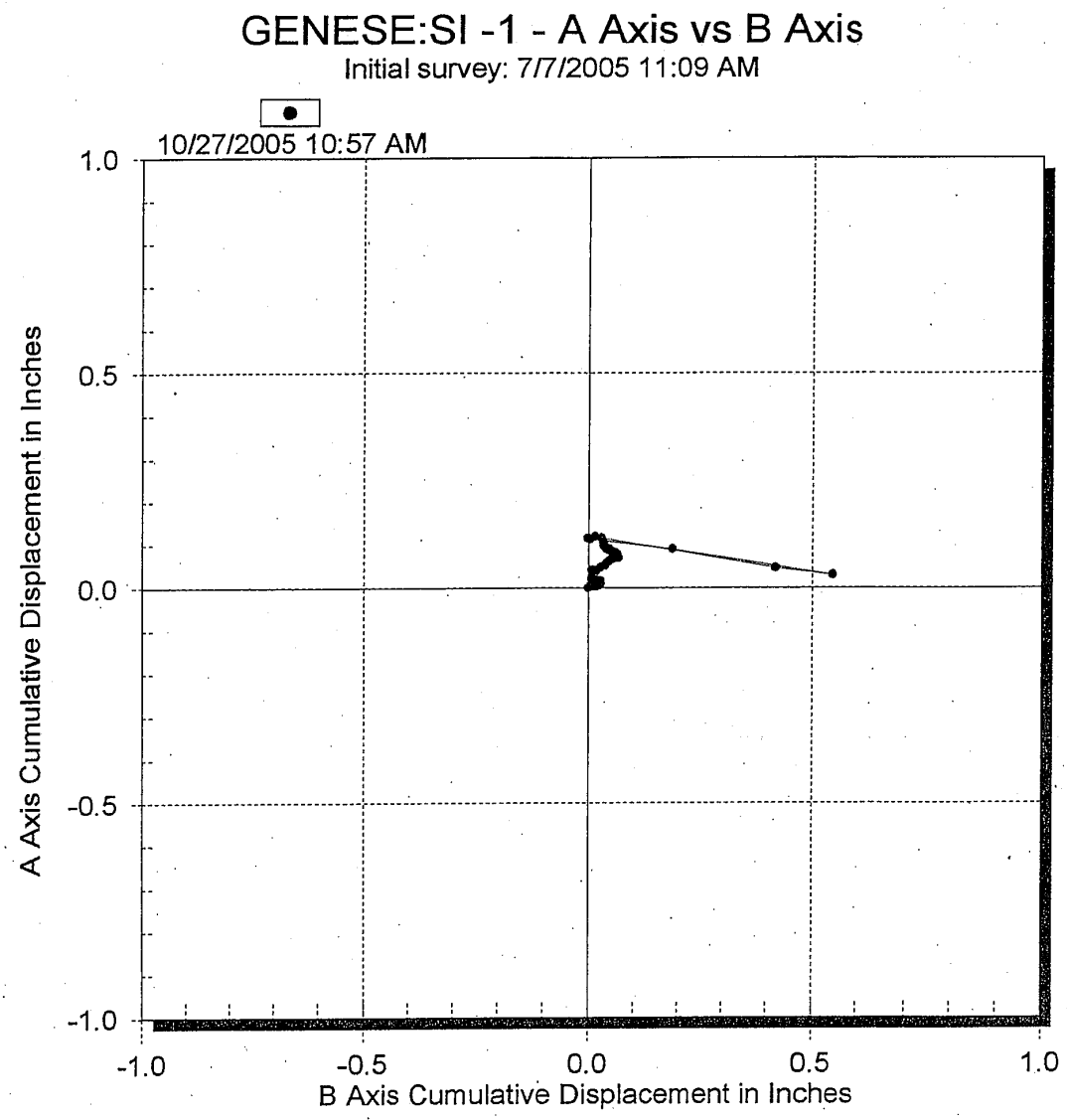




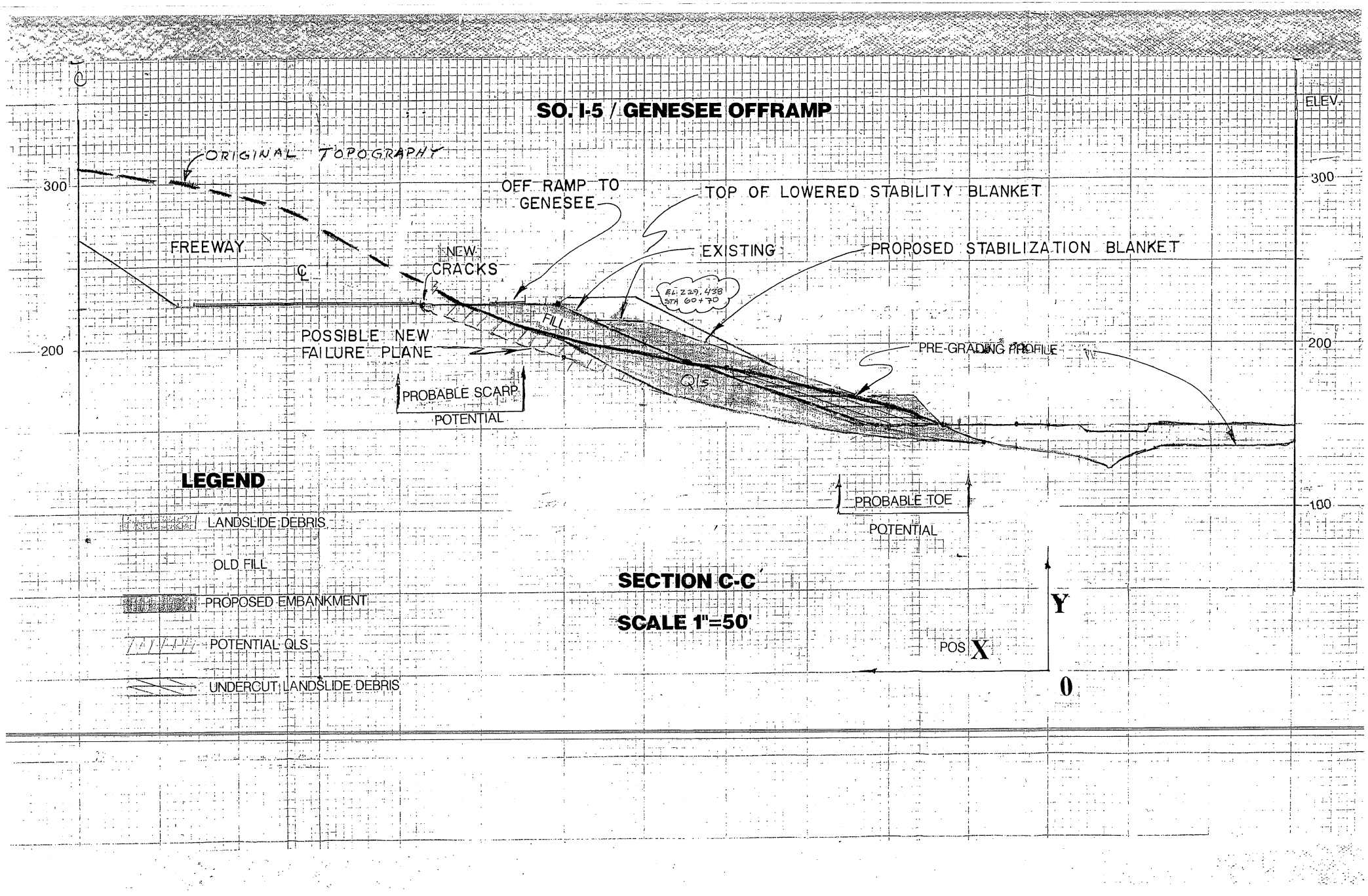
INCLINOMETER RESULTS

11-SD-5-PM 000
I-5SB/GENESEE AVE OFF RAMP
E.A.# 11-0301U3

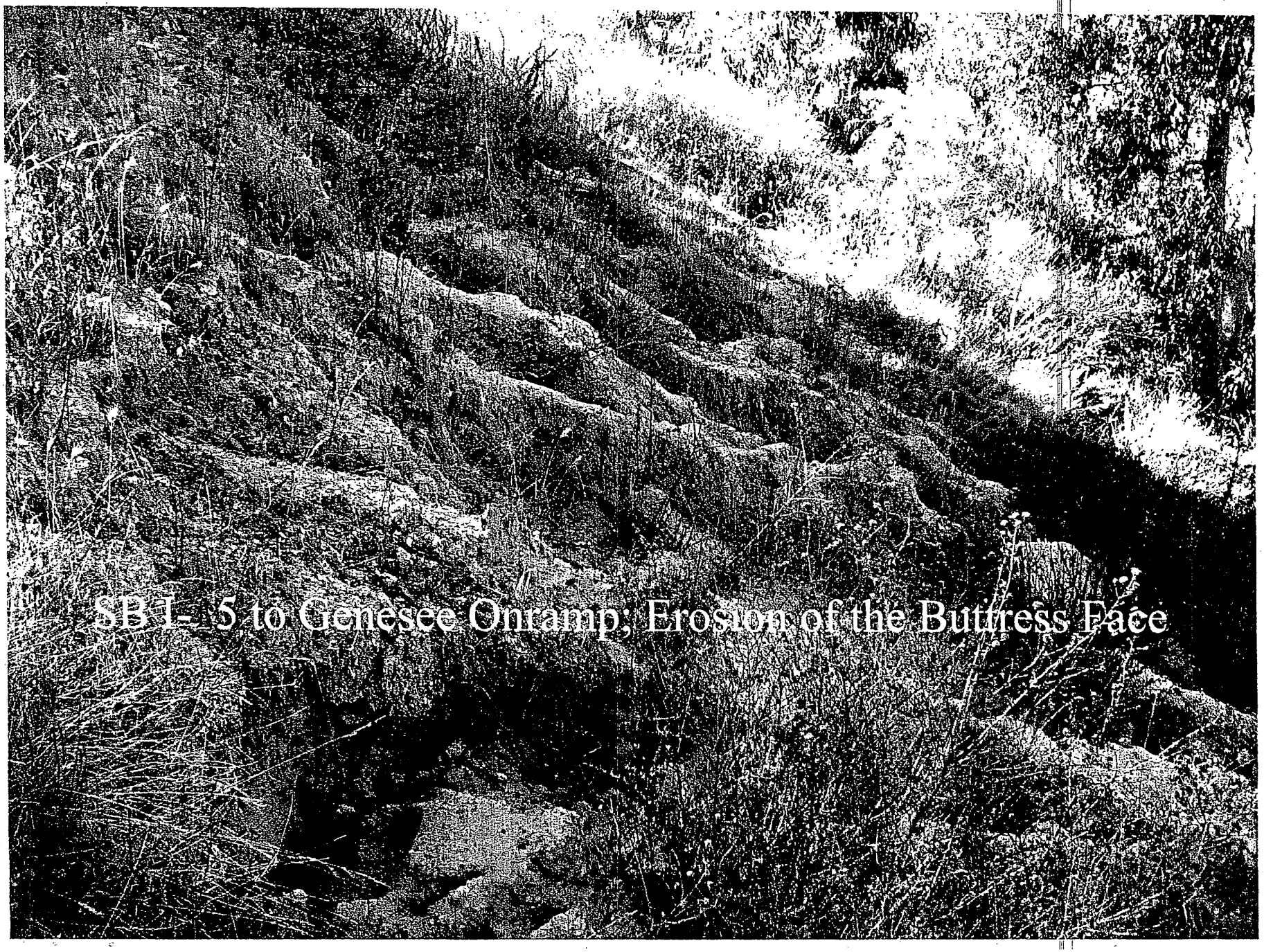
DEPTH : 92 ft
Ao DIRECTION: DW
LOCATION: I-5SB/GENESEE AVE OFF RAMP SHOULDE



GENESE:SI -1 Page 6 10/27/2005 10:57:09 AM


SO. I-5 / GENESEE OFFRAMP
ORIGINAL TOPOGRAPHY
OFF RAMP TO GENESEE
TOP OF LOWERED STABILITY BLANKET
FREEWAY
NEW CRACKS
EXISTING
PROPOSED STABILIZATION BLANKET
EL. 229.438 STA 60+70
FILL
POSSIBLE NEW FAILURE PLANE
PRE-GRADING PROFILE
QLS
PROBABLE SCARP POTENTIAL
PROBABLE TOE POTENTIAL
ELEV.
300
200
100
LEGEND
LANDSLIDE DEBRIS
OLD FILL
PROPOSED EMBANKMENT
POTENTIAL QLS
UNDERCUT LANDSLIDE DEBRIS
SECTION C-C
SCALE 1"=50'
Y
POS X
0

SB I-5
Genesee Onramp, S.I. #1


SB I-5 to Genesee Onramp; Erosion of the Buttress Face

SB I-5 to Genesee Offramp; Buttress

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER

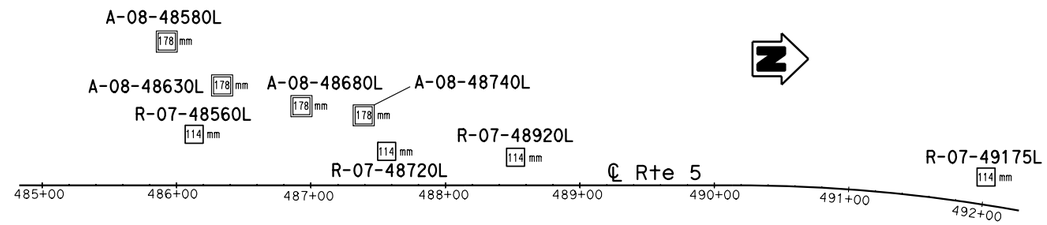
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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.

BENCH MARK

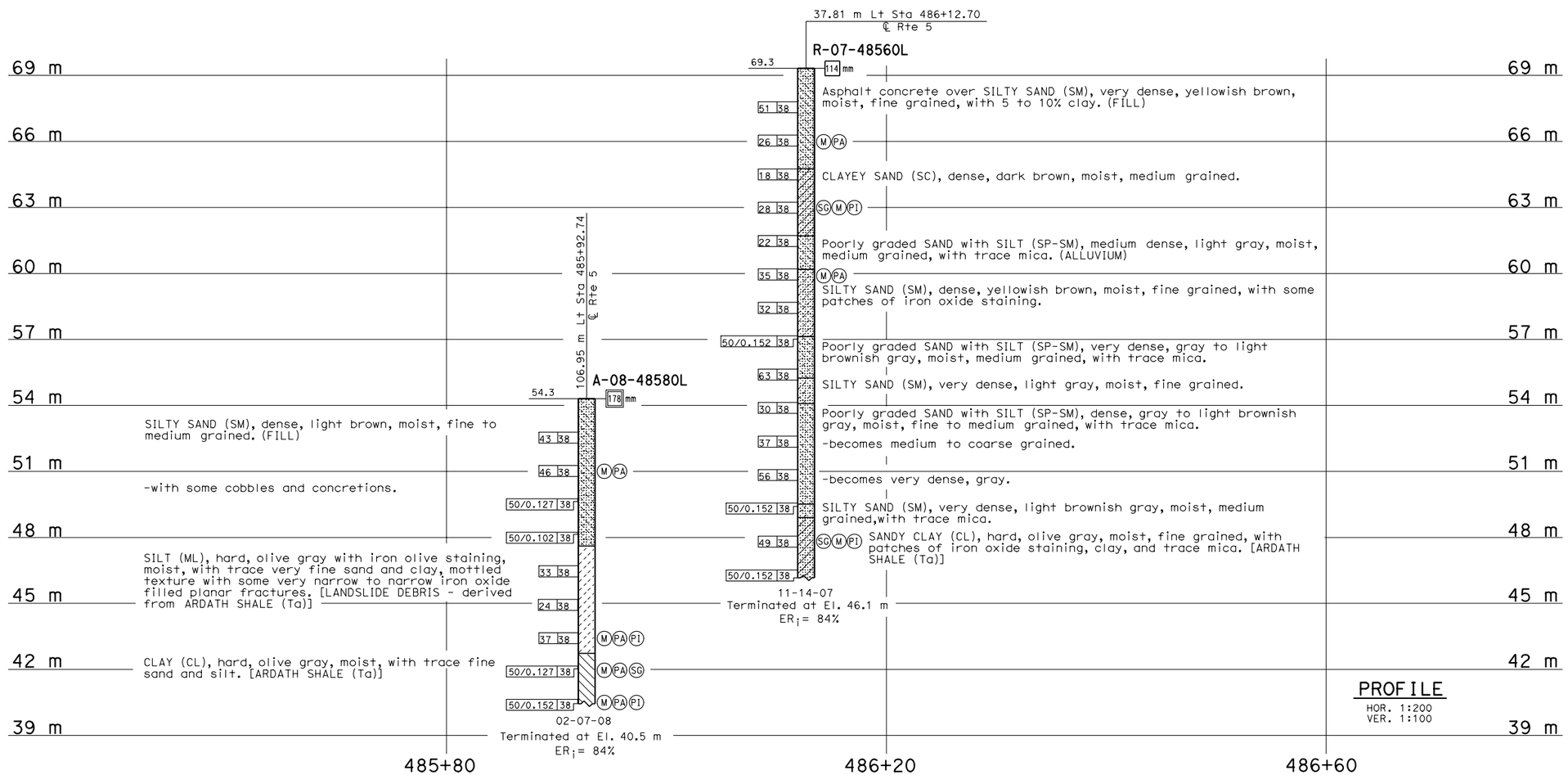
Monument 5-29.6 SD-5-PM 29.57
CHD Std Br Disk in concrete
801.9' Lt Sta 561+01.31 P.O.T "SD".
Monument is located 3.4' West of shoulder dike. Accessible from main lanes.
N 264063.10
E 1700079.16
Elev. 225.19'



PLAN

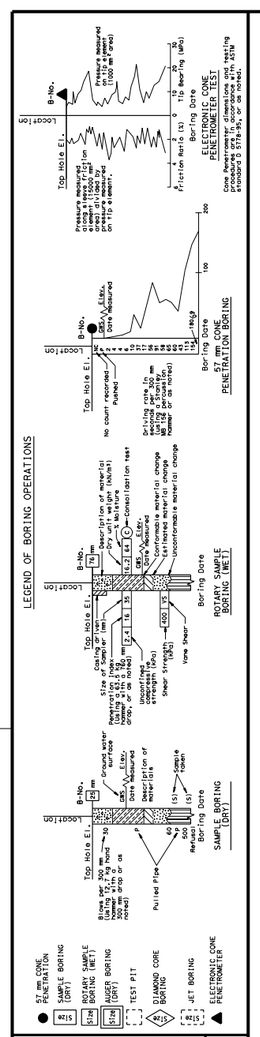
1:2000

NOTE: Ground water not encountered during field investigation.



PROFILE

HOR. 1:200
VER. 1:100



OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

Caltrans Metric

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08
CHECKED BY	M. Fordham

FIELD INVESTIGATION BY: M. Fordham

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

BRIDGE NO.

KILOMETER POST R29.20/R30.06

INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE

LOG OF TEST BORINGS 1 OF 4

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

FILE => genesee1of4.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES 12-03-08 12-04-08

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

USERNAME => s116982 DATE PLOTTED => 04-DEC-2008 TIME PLOTTED => 15:39

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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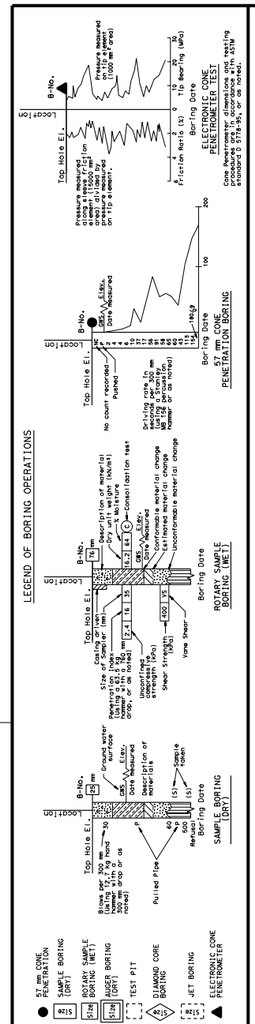
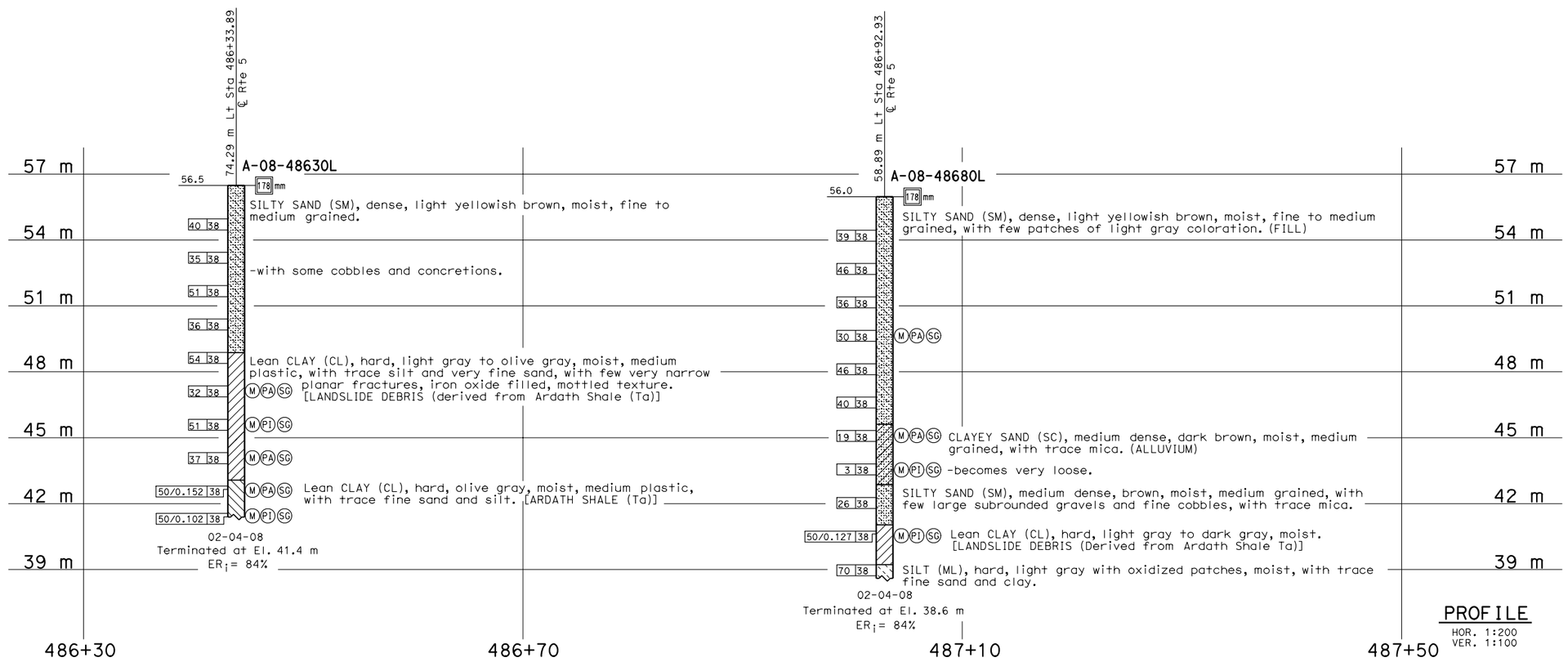


FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4



Caltrans Metric	ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE
	DRAWN BY F. Nguyen 11/08, I.G-Remmen 12/08		M. Fordham		DESIGN BRANCH	KILOMETER POST R29.20/R30.06	LOG OF TEST BORINGS 2 OF 4
	CHECKED BY M. Fordham						

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

FILE => genesee2of4.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 12-03-08 12-04-08 SHEET OF

USERNAME => s116982 DATE PLOTTED => 04-DEC-2008 TIME PLOTTED => 15:39

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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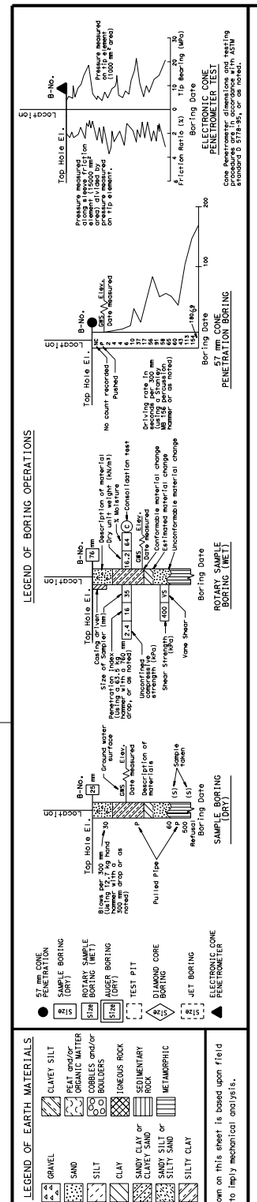
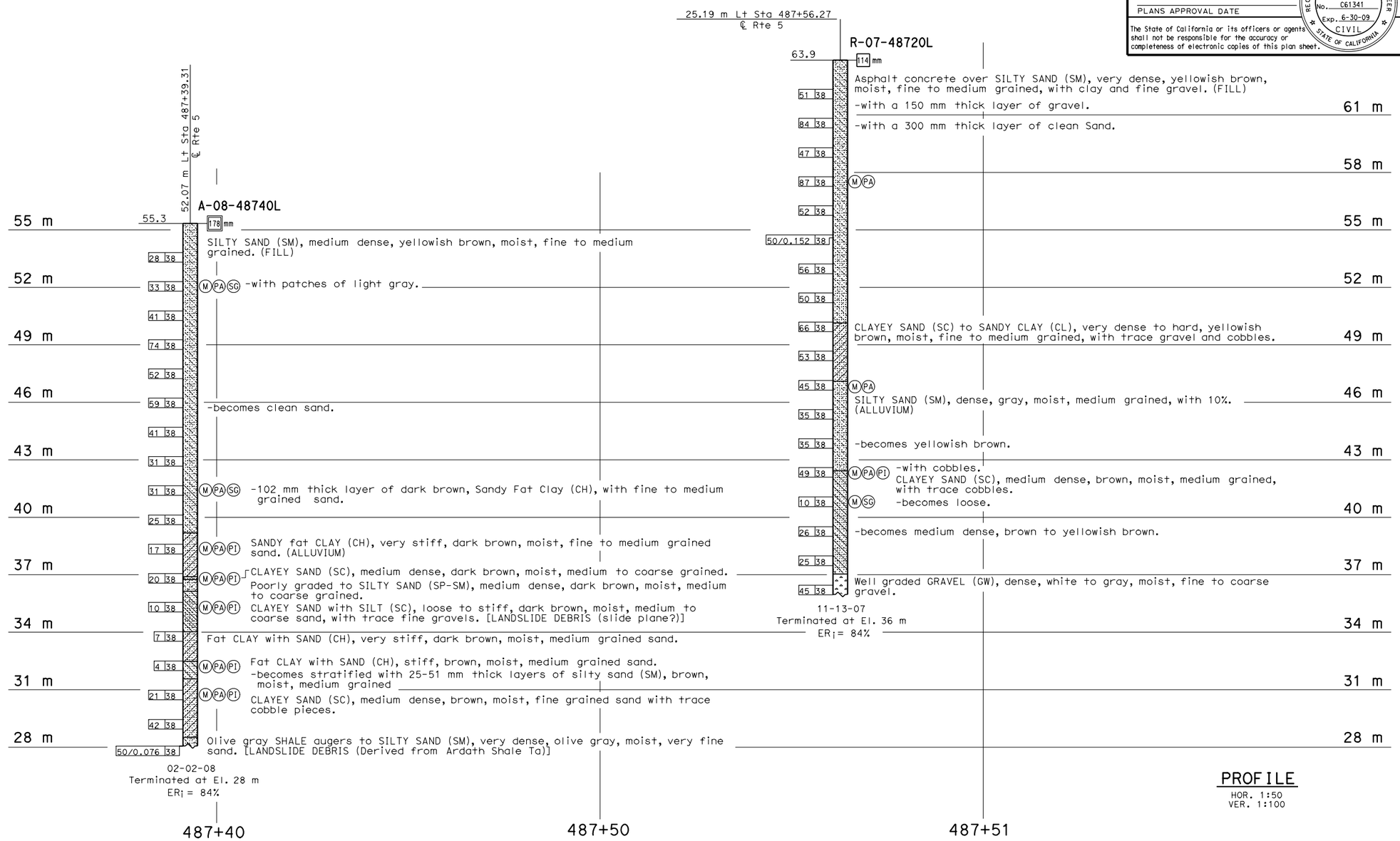


OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4



PROFILE
HOR. 1:50
VER. 1:100

Caltrans Metric

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08
CHECKED BY	M. Fordham

FIELD INVESTIGATION BY: M. Fordham

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

BRIDGE NO.

KILOMETER POST R29.20/R30.06

INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE

LOG OF TEST BORINGS 3 OF 4

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

FILE => genesee3of4.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES 12-03-08 12-04-08

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

USERNAME => s116982 DATE PLOTTED => 04-DEC-2008 TIME PLOTTED => 15:40

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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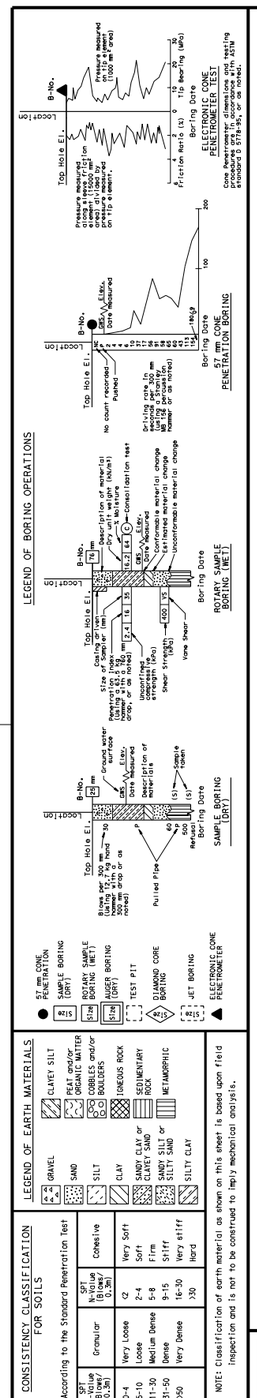
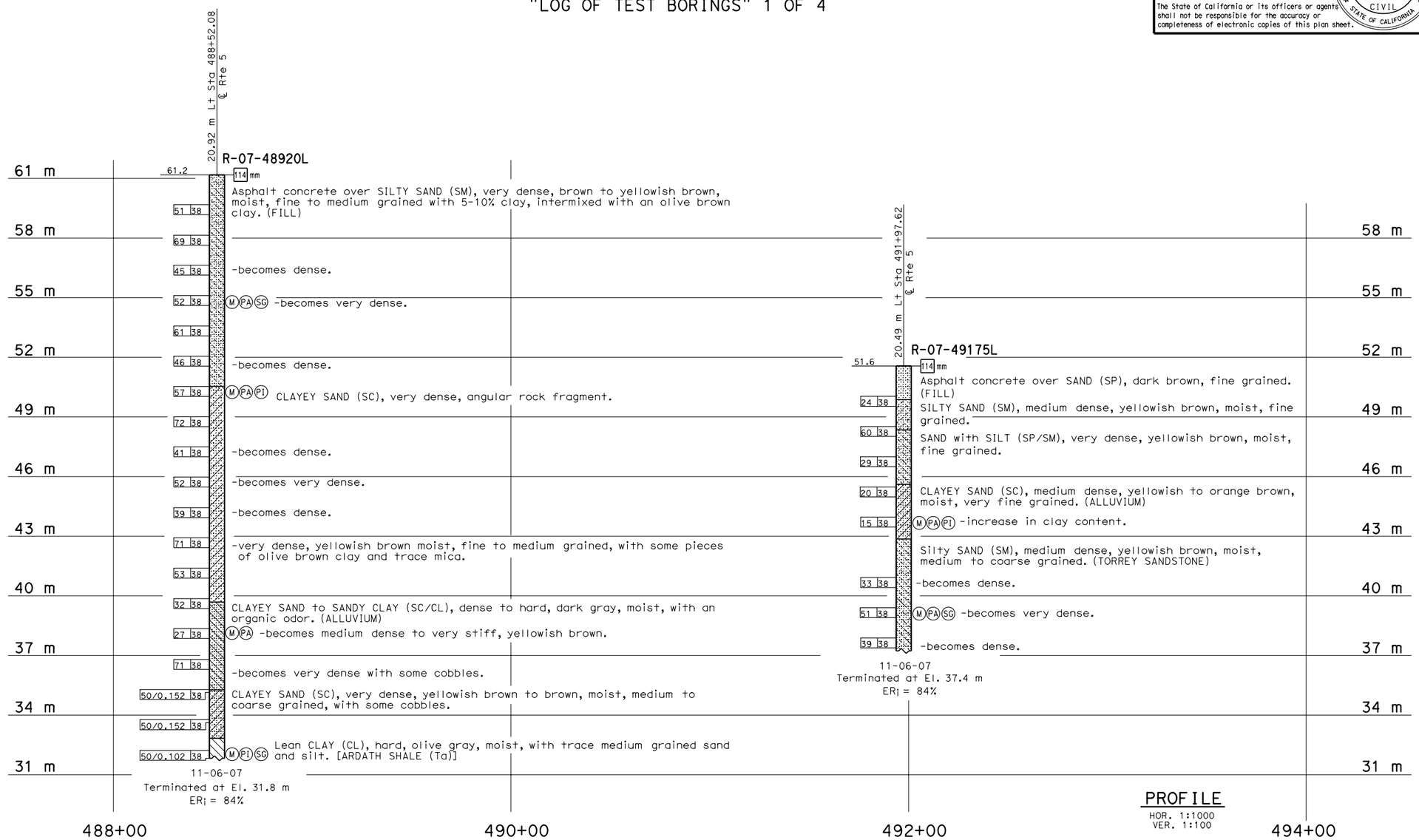


FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4



Caltrans Metric

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08
CHECKED BY	M. Fordham

FIELD INVESTIGATION BY: M. Fordham

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

BRIDGE NO. KILOMETER POST R29.20/R30.06

INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE

LOG OF TEST BORINGS 4 OF 4

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

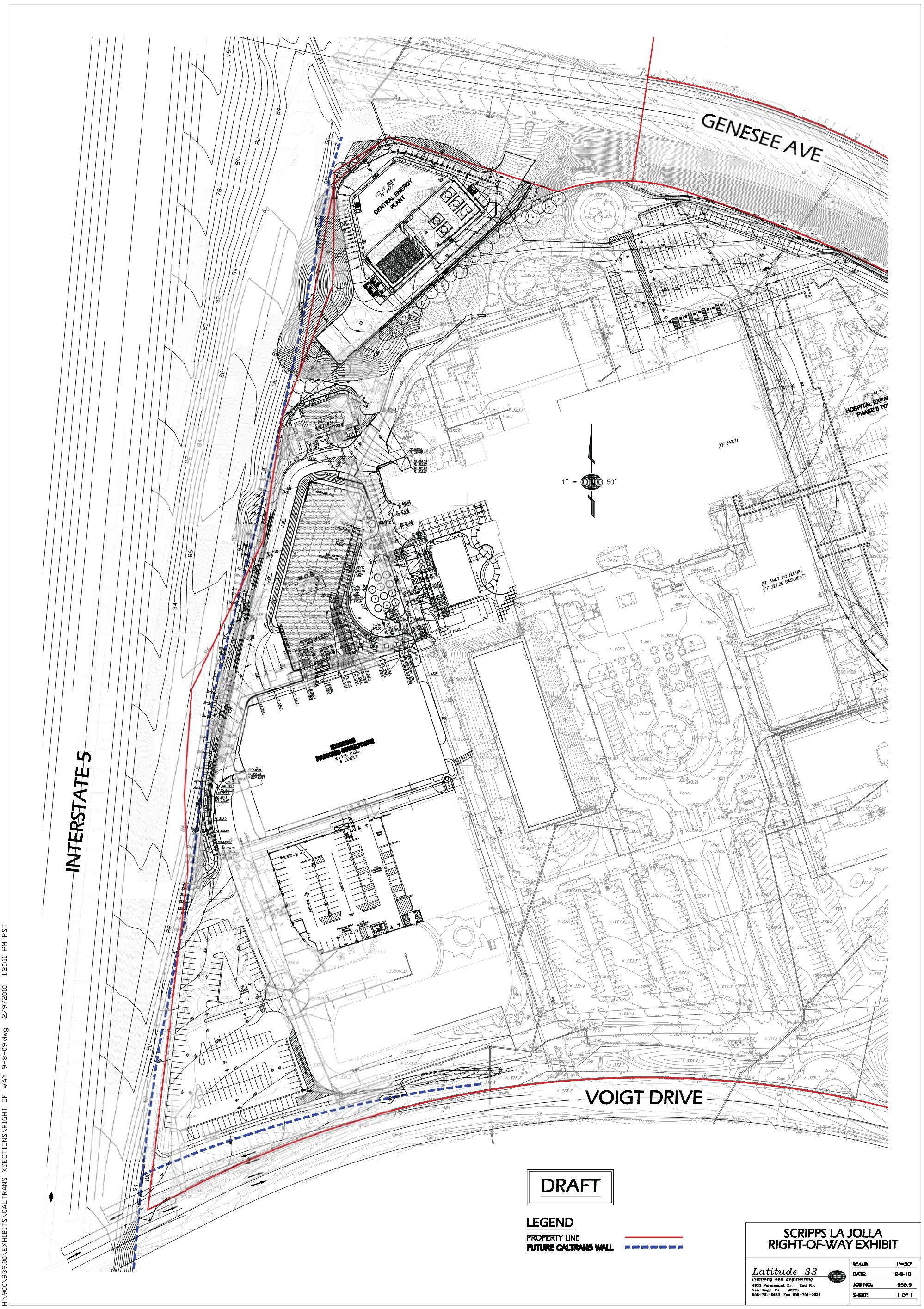
CU 11
EA 065000

DISREGARD PRINTS BEARING EARLIER REVISION DATES 12-03-08 12-04-08

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FILE => genesee4of4.dgn

USERNAME => s116982 DATE PLOTTED => 04-DEC-2008 TIME PLOTTED => 15:40


GENESEE AVE
INTERSTATE 5
VOIGT DRIVE
CENTRAL ENERGY PLANT
1" = 50'
DRAFT
LEGEND
PROPERTY LINE
FUTURE CALTRANS WALL
SCRIPPS LA JOLLA
RIGHT-OF-WAY EXHIBIT
Latitude 33
Planning and Engineering
4933 Paramount Dr. 2nd Flr.
San Diego, Ca. 92123
858-751-0633 Fax 858-751-0634
SCALE: 1"=50'
DATE: 2-9-10
JOB NO.: 939.9
SHEET: 1 OF 1
H:\900\939.00\EXHIBITS\CALTRANS XSECTIONS\RIGHT OF WAY 9-8-09.dwg 2/9/2010 1:20:11 PM PST

GENESEE AVE
VOIGT DRIVE
INTERSTATE 5
A5
AREA=600sf±
A4
AREA=3,800sf±
A3
AREA=2,000sf±
A2
AREA=9,900sf±
A1
AREA=4,700sf±
CENTRAL ENERGY PLANT
EXISTING PARKING STRUCTURE
±356 CARS
8 LEVELS
HOSPITAL EXPAN
PHASE II TO
(FF 343.7)
(FF 344.7 1st FLOOR)
(FF 327.25 BASEMENT)
1" = 50'
LEGEND
PROPERTY LINE
FUTURE CALTRANS WALL
CALTRAN'S LAND ACQUISITION
AREA RELINQUISHED TO SCRIPPS
NOTE: FUTURE WORK WITHIN CALTRAN'S RIGHT-OF-WAY IS APPROXIMATE IN NATURE AND SHOWN FOR REFERENCE ONLY. ELEVATIONS ARE IN METRIC AND ON DIFFERENT DATUM THAN AERIAL TOPOGRAPHY. CONVERSION FACTOR = -2.13'
LAND "SWAP" SUMMARY
CALTRAN'S LAND ACQUISITION
NO. | AREA(sf) | TOTAL AREA(sf)
A2 | 9,900 | 10,500±
A5 | 660
SCRIPP'S LAND ACQUISITION
A1 | 4,700 | 10,500±
A3 | 2,000
A4 | 3,800
DRAFT
SCRIPPS LA JOLLA
RIGHT-OF-WAY EXHIBIT
Latitude 33
Planning and Engineering
4933 Paramount Dr. 2nd Flr.
San Diego, Ca. 92123
858-751-0633 Fax 858-751-0634
SCALE: 1"=50'
DATE: 9-08-09
JOB NO.: 939.9
SHEET: 1 OF 1
H:\900\939.00\EXHIBITS\CALTRANS XSECTIONS\RIGHT OF WAY 8-10-09.dwg 9/8/2009 5:37:34 PM PDT

APPENDIX II

FIELD EXPLORATION DATA

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-47860L
M. Fordham	12/30/08	12/30/08	N579825.785E1908420.610	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1571+85.37, 154.65, SD5	335.8 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Auger			CME 75	6 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			CME Auto Hammer, 140 lbs, 30-inch drop	82 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				56.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
335.8		0.0	SEDIMENTARY ROCK (Sandstone); medium to fine grained; massive; yellowish brown; intensely weathered; soft; unfractured; poorly indurated.												
	1														
	2														
	3														
	4														
330.8	5	5.0				47									Samples collected for USCD. UCSD requested subsurface samples be collected to at 5, 10 and 15 feet for use in determining natural background levels of arsnic.
	6				1	22	58								
						36									
	7														
	8														
	9														
325.8	10	10.0				16									Samples collected for USCD
	11				2	28	66								
						38									
	12														
	13														
	14														
320.8	15	15.0				15									Samples collected for USCD
	16				3	27	63								
						36									
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: A-08-47860L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09	SHEET: 1 of 3	

47860L-54170R BORING RECORD english template.xls - 47860L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
315.8		20.0				15									
					4	33	70								
	21					37									
	22														
	23														
	24														
310.8	25	25.0	SEDIMENTARY ROCK (Siltstone); fine grained; very thinly bedded; light gray; moderately weathered; moderately soft to soft.			NR									
					5	32	85								
	26					53									
	27														
	28														
	29														
305.8	30	30.0				10									
					6	19	61								
	31					42									
	32														
	33														
	34														
300.8	35	35.0	hard			10									
					7	50/5.5"	50/5.5"								
299.8	36	36.0	moderately soft to soft												
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-47860L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 2 of 3

47860L-54170R BORING RECORD english template.xls - 47860L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
295.8		40.0	hard			9									
295.2		40.6	moderately soft to soft		8	24	60								
	41					36									
	42														
	43														
	44														
	45					9									
	46				9	19	51								
						32									
	47														
	48														
	49														
	50					17									
	51				10	28	65								
						37									
	52														
	53														
	54														
	55					18									
	56				11	49	99/9"								
279.3		56.5				50/3"									
	57		Bottom of Borehole at 56.5 ft. Boring terminated at planned depth. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: A-08-47860L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	3 of 3

47860L-54170R BORING RECORD english template.xls - 47860L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-48000L
M. Fordham	12/30/08	12/30/08	N579893.831E1908425.534	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1574+09.16, 158.86, SD5	331.6 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Auger			CME 75	6 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			CME Auto Hammer, 140 lbs, 30-inch drop	82 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				56.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
331.6		0.0	SEDIMENTARY ROCK (Sandstone); medium to fine grained; massive; yellowish brown; moderately weathered; soft; unfractured; poorly indurated.												
	1														
	2														
	3														
	4														
326.6	5	5.0		X		16									Samples collected for USCD. UCSD requested subsurface samples be collected to at 5, 10 and 15 feet for use in determining natural background levels of arsnic.
	6			X		37	93								
				X		56									
	7														
	8														
	9														
321.6	10	10.0		X		14									Samples collected for USCD
	11			X		34	83								
				X		49									
	12														
	13														
	14														
316.6	15	15.0		X		13									Samples collected for USCD
	16			X		30	77								
				X		47									
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: A-08-48000L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09	SHEET: 1 of 3

47860L-54170R BORING RECORD english template.xls - 48000L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
311.6		20.0				NR									Samples collected for USCD, NR: Not Recorded.
						39	87								
	21					48									
	22														
	23														
	24														
306.6	25	25.0				27									
						52/5.5"	52/5.5"								
	26														
	27														
	28														
	29														
301.6	30	30.0	SEDIMENTARY ROCK (Siltstone); fine grained; very thinly bedded; light gray; moderately weathered; moderately soft to soft.			15									
						30	80/10"								
	31					50/4"									
	32														
	33														
	34														
296.6	35	35.0	hard: Yellowish brown			28									
						30	80/11"								
	36					50/5"									
295.0		36.6	moderately soft to soft												
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48000L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 2 of 3

47860L-54170R BORING RECORD english template.xls - 48000L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
291.6		40.0				28									
						53/5.5"	53/5.5"								
	41														
	42														
	43														
	44														
286.6	45	45.0				10									
						24	74/10"								
	46					50/4"									
	47														
	48														
	49														
281.6	50	50.0	light gray			30									
						50/5"	50/5"								
	51														
	52														
	53														
	54														
276.6	55	55.0				19									
						50/5"	50/5"								
	56														Hole remained open after removal of augers.
275.1		56.5	Bottom of Borehole at 56.5 ft. Boring terminated 10 ft above planned depth because of consistency of material.												
	57		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: A-08-48000L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	3 of 3

47860L-54170R BORING RECORD english template.xls - 48000L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-48040R
M. Fordham	07/20/08	07/30/08	N579889.662E1908521.689	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1574+24.22, 156.5, SD5	338.6 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			CS 2000	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip				55.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
338.6		0.0	Silty SAND (SM); dark brown; moist; medium to fine SAND; some fines.												
337.6	1	1.0	SEDIMENTARY ROCK (Sandstone); fine grained; massive; yellowish brown; moderately weathered; soft to very soft; slightly fractured.												
	2														
	3														
	4														
333.6	5	5.0				4									
					1	15	41								
	6					26									
	7														
	8														
	9														
328.6	10	10.0				11									
					2	17	41								
	11					24									
	12														
	13														
	14														
323.6	15	15.0				19									
					3	30	73								
	16					43									
	17														
	18														
	19														
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-08-48040R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09	SHEET: 1 of 3	

47860L-54170R BORING RECORD english template.xls - 48040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	21														
	22														
	23														
	24														
	25														
	26														
311.6	27	27.0	SEDIMENTARY ROCK (Siltstone); silt; laminated; light gray; moderately weathered; soft; unfractured,												
	28														
	29														
308.6	30	30.0				12									
	31				4	19	53			16%	107				
						34									
	32														
	33														
	34														
	35														
	36														Lost Water Circulation
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-48040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 2 of 3

47860L-54170R BORING RECORD english template.xls - 48040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	41														
	42														Water circulation returned
	43														
	44														
293.6	45	45.0	slightly fractured			5									
	46				5	15	43								
						28									
	47														
	48														
	49														
	50														
	51														
	52														
	53														
	54														
283.6	55	55.0	Bottom of Borehole at 55.0 ft. Boring terminated at planned depth.												
	56		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-08-48040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	3 of 3

47860L-54170R BORING RECORD english template.xls - 48040R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-48260L
M. Fordham	07/29/08	07/29/08	N580162.050E1908430.085	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1582+86.86, 224.01, SD5	297.5 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CS 2000	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				77.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
297.5		0.0	Clayey SAND (SC); yellowish brown; moist; medium to fine SAND; little fines; trace Shale fragements; [FILL].												
	1														
	2														
	3														
	4														
292.5	5	5.0	very dense	X		16									
				X		27	45								
	6			X		18									
	7														
	8														
	9														
287.5	10	10.0	dense; w/ fragments of Sandstone.	X		7									
				X		9	22								
	11			X		13									
	12														
	13														
	14														
282.5	15	15.0		X		5									
				X		6	14								
	16			X		8									
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-08-48260L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09	SHEET: 1 of 4	

47860L-54170R BORING RECORD english template.xls - 48260L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
277.5		20.0				3									
						4	12								
	21					8									
275.5	22	22.0	Silty SAND (SM); yellowish brown; moist; medium to fine SAND; some fines; trace Shale fragments.												
	23														
	24														
272.5	25	25.0	medium dense			7									
						11	23								
	26					12									
	27														
	28														
	29														
	30														
	31														
	32														
	33														
	34														
262.5	35	35.0	dense; w/ trace subrounded fine GRAVEL.			16									
						18	28								
	36					10									
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-48260L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	2 of 4

47860L-54170R BORING RECORD english template.xls - 48260L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
257.5		40.0				10									
						12	28								
	41					16									
	42														
	43														
	44														
252.5	45	45.0	dark brown			12									
						14	33								
	46					19									
	47														
	48														
	49														
247.5	50	50.0	medium Dense; yellowish brown.			10									
						9	17								
	51					8									
	52														
	53														
	54														
242.5	55	55.0	with coarse subrounded GRAVEL.			16									
						9	19								
	56					10									
	57														
	58														
	59														
	60		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-48260L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 3 of 4

47860L-54170R BORING RECORD english template.xls - 48260L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
237.5		60.0	dense.			60									
						18	27								
	61					9									
	62														
	63														
	64														
232.5	65	65.0	SEDIMENTARY ROCK (Sandstone); medium to fine grained; massive; yellowish brown; mocerately weathered; soft to very soft; unfractured; poorly indurated.			31									
						41	91/7"								
	66					50/1"									
	67														
	68														
	69														
227.5	70	70.0				20									
						32	72								
	71					40									
	72														
	73														
	74														
222.5	75	75.0				7									
						23	65								
	76					42									
220.5	77	77.0	Bottom of Borehole at 77.0 ft. Boring terminated 3ft above target depth of 80 ft. because of site time constraints. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	78														
	79														
	80														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-08-48260L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	4 of 4

47860L-54170R BORING RECORD english template.xls - 48260L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-48560L
D. Rector	11/14/07	11/14/07	N 580524.8920 E 1908493.8140	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1594+91.05 -124.04 "SD5"	227.4 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
soil cuttings, bentonite chips				76.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
227.4		0.0	Asphalt Concrete (AC)												
			SILTY SAND (SM); yellowish brown; moist; fine SAND; little fines; [FILL].												
	1														
	2														
	3														
	4														
222.4	5	5.0	dense												
					1		51								
	6														
	7														
	8														
	9														
217.4	10	10.0	medium dense												
					2		26								
	11														
	12														
	13														
	14														
212.4	15	15.0	CLAYEY SAND (SC); medium dense; dark brown; moist; medium SAND; little fines.												
					3		18								
	16														
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: R-07-48560L	
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/10/09	SHEET: 1 of 4	

46920R - 49940L BORING RECORD english template.xls - R-07-48560L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
207.4		20.0													
	21				4		28								
	22														
	23														
	24														
202.4	25	25.0	Poorly-graded SAND w SILT (SP-SM); medium dense; light gray; moist; medium SAND; few fines, [ALLUVIUM].												
	26				5		22								
	27														
	28														
	29														
197.4	30	30.0	SILTY SAND (SM); dense; yellowish brown; moist; fine SAND; little fines.												Patches of iron oxide staining
	31				6		35								
	32														
	33														
	34														
192.4	35	35.0													
	36				7		32								
	37														
	38														
	39														
	40		(continued)												

50

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-07-48560L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/10/09	2 of 4

46920R - 49940L BORING RECORD english template.xls - R-07-48560L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
187.4		40.0	Poorly-graded SAND w SILT (SP-SM); very dense; gray to light brownish gray; moist; medium SAND; few fines.												Trace mica
					8		50/6"								
	41														
	42														
	43														
	44														
182.4	45	45.0													
182.0		45.4	SILTY SAND (SM); very dense; light gray; moist; medium SAND; little fines.		9		63								
	46														
	47														
	48														
	49														
177.4	50	50.0	Poorly-graded SAND w SILT (SP-SM); dense; gray to light brownish gray; moist; fine to medium SAND; few fines; trace mica.		10		30								
	51														
	52														
	53														
	54														
172.4	55	55.0	medium to coarse SAND.		11		37								
	56														
	57														
	58														
	59														
	60														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48560L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/10/09	3 of 4

46920R - 49940L BORING RECORD english template.xls - R-07-48560L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
167.4		60.0	very dense; gray.												
					12		56								
	61														
	62														
	63														
	64														
162.4	65	65.0	SILTY SAND (SM); very dense; light brownish gray; moist; fine SAND; little fines; trace mica.												
					13		50/6"								
	66														
160.4	67	67.0	SEDIMENTARY ROCK (Shale); silt; laminated; olive gray; moderately to intensely weathered; moderately hard; unfractured.												
	68														
	69														
157.4	70	70.0													
					14		49								
	71														
	72														
	73														
	74														
152.4	75	75.0													
					15		50/6"								
	76														
150.9		76.5	Bottom of Borehole at 76.5 ft. Boring terminated at planned depth.												
	77														
	78		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	79														
	80														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-07-48560L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/10/09	4 of 4

46920R - 49940L BORING RECORD english template.xls - R-07-48560L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-07-48580L
D. Rector	02/07/08	02/07/08	N 580511.0340 E 1908423.1140	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Tri County Drilling			1594+24.68 -350.90 "SD5"	178.2 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Auger			Limited Access	7 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
SI installed (2")				46.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
178.2		0.0	SILTY SAND (SM); light brown; moist; fine to medium SAND; little fines, [FILL].												
	1														
	2														
	3														
	4														
173.2	5	5.0	very dense												
					1		43								
	6														
	7														
	8														
	9														
168.2	10	10.0													
					2		46								
	11														
	12														
	13														
164.8		13.4	with few subrounded COBBLES												
	14														
163.2	15	15.0													
					3		50/5"								
	16														
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: A-07-48580L	
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/10/09	SHEET: 1 of 3	

46920R - 49940L BORING RECORD english template.xls - A-08-48580L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
158.2		20.0													
	21				4		50/4"								
156.2	22	22.0	SILT (ML); olive gray; moist; trace fine SAND; [LANDSLIDE DEBRIS, trace of CLAY, mottled w narrow iron oxide filled planar fractures]												
	23														
	24														
153.2	25	25.0	dense												
	26				5		33								
	27														
	28														
	29														
148.2	30	30.0													
	31				6		24								
	32														
	33														
	34														
143.2	35	35.0	very dense												
	36				7		37								
	37														
140.2	38	38.0	SEDIMENTARY ROCK (Shale); sitl; laminated; olive gray; moderately to intensely weathered; moderately hard; unfractured.												
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: A-07-48580L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/10/09	2 of 3

46920R - 49940L BORING RECORD english template.xls - A-08-48580L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
138.2		40.0													
					8		50/5"								
	41														
	42														
	43														
	44														
	45														
133.2		45.0													
					9		50/6"								
132.2	46	46.0	Bottom of Borehole at 46.0ft. Boring terminated at planned depth.												
	47		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	48														
	49														
	50														
	51														
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-07-48580L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/10/09	3 of 3

46920R - 49940L BORING RECORD english template.xls - A-08-48580L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-48630L
D. Rector	2/5/008	02/05/08	N 580549.0380 E 1908459.3880	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Tri County Drilling			1595+59.67 -243.72 "SD5"	185.3 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Auger			Limited Access	7 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, soil cuttings				51.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
185.3		0.0	SILTY SAND (SM); light brown; moist; fine to medium SAND; little fines, [FILL].												
	1														
	2														
	3														
	4														
180.3	5	5.0	very dense												
					1		40								
	6														
	7														
	8														
	9														
175.3	10	10.0	dense												
					2		35								
	11														
	12														
172.8		12.5	few subrounded COBBLES												
	13														
	14														
170.3	15	15.0	very dense												
					3		51								
	16														
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID:	A-08-48630L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 3	

46920R - 49940L BORING RECORD english template.xls - A-08-48630L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
165.3		20.0													
					4		36								
	21														
	22														
	23														
	24														
160.3	25	25.0	SILT (ML); very dense; olive gray; moist; trace fine SAND; [LANDSLIDE DEBRIS, trace of CLAY, mottled w narrow iron oxide filled planar fractures]		5		54								
	26														
	27														
	28														
	29														
155.3	30	30.0	dense		6		32								
	31														
	32														
	33														
	34														
150.3	35	35.0	very dense		7		51								
	36														
	37														
	38														
	39														
	40														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48630L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 3

46920R - 49940L BORING RECORD english template.xls - A-08-48630L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
145.3		40.0													
					8		37								
	41														
	42														
	43														
141.3	44	44.0	SEDIMENTARY ROCK (Shale); silt; laminated; olive gray; moderately to intensely weathered; moderately hard; unfractured.												
140.3	45	45.0													
					9		50/6"								
	46														
	47														
	48														
	49														
135.3	50	50.0													
					10		50/4"								
134.3	51	51.0	Bottom of Borehole at 51.0ft. Boring terminated at planned depth.												
	52		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48630L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 3

46920R - 49940L BORING RECORD english template.xls - A-08-48630L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-48680L
D. Rector	2/5/008	02/05/08	N 580606.4420 E 1908480.0870	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Tri County Drilling			1597+53.40 -193.21 "SD5"	183.6 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Auger			Limited Access	7 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
SI installed (2")				57.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
183.6		0.0	SILTY SAND (SM); light brown; moist; fine to medium SAND; little fines; locally light gray, [FILL].												
	1														
	2														
	3														
	4														
178.6	5	5.0	very dense												
					1		39								
	6														
	7														
	8														
	9														
173.6	10	10.0													
					2		46								
	11														
	12														
	13														
	14														
168.6	15	15.0													
					3		36								
	16														
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID:	A-08-48680L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 3	

46920R - 49940L BORING RECORD english template.xls - A-08-48680L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
163.6		20.0	dense												
					4		30								
	21														
	22														
	23														
	24														
158.6	25	25.0	very dense												
					5		46								
	26														
	27														
	28														
	29														
153.6	30	30.0													
					6		40								
	31														
	32														
	33														
149.6	34	34.0	CLAYEY SAND (SC); dark brown; moist; medium SAND; little fines; trace mica; [ALLUVIUM].												
148.6	35	35.0	medium dense												
					7		19								
	36														
	37														
	38														
	39														
	40														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48680L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 3

46920R - 49940L BORING RECORD english template.xls - A-08-48680L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
143.6		40.0	very loose												
					8		3								
	41														
	42														
140.6	43	43.0	SILTY SAND (SM); brown; moist; few subrounded coarse GRAVEL and COBBLES; medium SAND; little fines; few patches of light gray CLAY; trace mica.												
	44														
138.6	45	45.0	dense												
					9		26								
	46														
	47														
	48														
134.6	49	49.0	Lean CLAY (CL); medium stiff; light gray; moist; trace fine SAND; [LANDSLIDE DEBRIS (derived from Ardath Shale), Lean CLAY, mottled w narrow iron oxide filled planar fractures].												
133.6	50	50.0													
					10		50/5"								
	51														
	52														
	53														
	54														
128.6	55	55.0	SILT (ML); very dense; light gray; moist; trace SAND.												
					11		70								
	56														
126.6	57	57.0	Bottom of Borehole at 57.0ft. Boring terminated at planned depth.												
	58		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: A-08-48680L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 3

46920R - 49940L BORING RECORD english template.xls - A-08-48680L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-48720L
D.Rector	11/13/07	11/13/07	N 580666.4500 E 1908519.4080	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1599+61.19 -82.64 "SD5"	209.5 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, soil cuttings				91.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
209.5		0.0	Asphalt Concrete												
209.3		0.2	SILTY SAND (SM); yellowish brown; moist; trace fine subrounded gravel; fine to medium SAND; little fines.												
	1														
	2														
	3														
	4														
204.5	5	5.0	very dense												
					1		50/6"								
	6														
	7														
202.3		7.2	with 6 inch layer fine subrounded GRAVEL												
	8														
	9														
199.5	10	10.0													
					2		84								
198.7	11	10.8	with 1 foot layer of Poorly-graded SAND (SP)												
	12														
	13														
	14														
194.5	15	15.0	dense												
					3		47								
	16														
	17														
	18														
	19														
	20														

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DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: R-07-48720L	
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 5	

46920R - 49940L BORING RECORD english template.xls - R-07-48720L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
189.5		20.0	very dense												
					4		87								
	21														
	22														
	23														
	24														
184.5	25	25.0	dense												
					5		52								
	26														
	27														
	28														
	29														
179.5	30	30.0	very dense												
					6		50/6"								
	31														
	32														
	33														
	34														
174.5	35	35.0													
					7		56								
	36														
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48720L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48720L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
169.5		40.0	Dense												
					8		50								
	41														
	42														
	43														
	44														
164.5	45	45.0	very dense												
					9		66								
	46														
	47														
	48														
161.3		48.2	CLAYEY SAND (SC); yellowish brown; moist; trace rounded COBBLES; trace subrounded coarse GRAVEL; medium to fine SAND; some fines.												
	49														
159.5	50	50.0	very dense												
					10		53								
	51														
	52														
	53														
	54														
154.5	55	55.0	SILTY SAND (SM); dense; gray; moist; medium SAND; little fines; [ALLUVIUM].												
					11		45								
	56														
	57														
	58														
	59														
	60														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48720L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48720L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
149.5		60.0													
					12		35								
	61														
	62														
	63														
	64														
144.5	65	65.0	yellowish brown												
					13		35								
	66														
	67														
	68														
	69														
139.5	70	70.0	with rounded COBBLES												
139.3		70.2	CLAYEY SAND (SC); medium dense; brown; moist; trace COBBLES; medium SAND; little fines.		14		22								
	71														
	72														
	73														
	74														
134.5	75	75.0	loose												
					15		10								
	76														
	77														
	78														
	79														
	80														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48720L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 11/12/09
SHEET: 4 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48720L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
129.5		80.0	medium dense; yellowish brown to brown.												
					16		26								
	81														
	82														
	83														
	84														
124.5	85	85.0													
					17		25								
	86														
	87														
121.6	88	87.9	Well-graded GRAVEL (GW); white to gray; moist; coarse to fine GRAVEL.												
	89														
119.5	90	90.0	dense												
					18		45								
	91														
118.0		91.5	Bottom of Borehole at 91.5ft. Boring terminated at planned depth.												
	92														
			This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48720L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	5 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48720L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-48740L
R. Rector	01/31/08	02/01/08	N 580652.0090 E 1908491.1010	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Tri County Drilling			1599+05.56 -170.82 "SD5"	182.2 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Auger			Limited Access	7 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip				90.8 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
182.2		0.0	SILTY SAND (SM); yellowish brown; fine to medium SAND; some fines [FILL].												
	1														
	2														
	3														
	4														
177.2	5	5.0	dense												
					1		28								
	6														
	7														
	8														
	9														
172.2	10	10.0	locally light gray												
					2		33								
	11														
	12														
	13														
	14														
167.2	15	15.0	very dense												
					3		41								
	16														
	17														
	18														
	19														
	20														

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DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: A-08-48740L	
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 5	

46920R - 49940L BORING RECORD english template.xls - A-08-48740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
162.2		20.0													
	21				4		74								
	22														
	23														
	24														
157.2	25	25.0													
	26				5		52								
	27														
	28														
	29														
152.2	30	30.0	Poorly-graded SAND (SP); very dense; yellowish brown; fine SAND; trace fines.												
	31				6		59								
	32														
	33														
	34														
147.2	35	35.0													
	36				7		41								
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 5

46920R - 49940L BORING RECORD english template.xls - A-08-48740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
142.2		40.0	dense												
					8		31								
	41														
	42														
	43														
	44														
137.2	45	45.0													
					9		31								
	46														
	47														
	48														
	49														
132.2	50	50.0	SANDY fat CLAY (CH); very stiff; brown; some fine to medium SAND; mostly fines; [4 inch thick layer]												
					10		25								
	51														
	52														
129.7		52.5	SANDY fat CLAY (CH); very stiff; dark brown; miost; some fine to medium SAND; [ALLUVIUM].												
	53														
	54														
127.2	55	55.0													
					11		17								
	56														
	57														
	58														
	59														
	60														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 5

46920R - 49940L BORING RECORD english template.xls - A-08-48740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
122.2		60.0													
121.8		60.4	CLAYEY SAND (SC); medium dense; dark brown; moist; medium to coarse SAND; some fines.		12		20								
121.2	61	61.0	Poorly-graded SAND w/ SILT(SP); medium dense; dark brown; moist; medium to coarse SAND; little fines.												
	62														
119.2	63	63.0	CLAYEY SAND (SC); dark brown; moist; trace fine subrounded GRAVEL; medium to coarse SAND; some fines [LANDSLIDE DEBRIS].												
	64														
117.2	65	65.0	medium dense		13		10								
	66														
	67														
	68														
	69														
112.2	70	70.0	Fat CLAY w SAND (CH); very stiff; dark brown; moist; little medium SAND.		14		7								
	71														
	72														
	73														
	74														
167.2	75	15.0	stiff		15		4								
	76														
	77														
104.8		77.4	stratified w/ 1- 2 inch thick layers of SILTY SAND (SM); brown; moist; mostly medium SAND; some fines.												
104.2	78	78.0	SILTY SAND (SM); brown; moist; trace subrounded COBBLE pieces; fine SAND; little fines.												
	79														
	80														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	4 of 5

46920R - 49940L BORING RECORD english template.xls - A-08-48740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
102.2		80.0	medium dense.												
					16		21								
	81														
	82														
	83														
	84														
97.2	85	85.0	very dense.												
					17		42								
	86														
	87														
94.2	88	88.0	Silty SAND (SM); very dense; olive gray; moist; few subanguar GRAVEL (derived from shale, modrately to intensly weathered, hard); fine SAND; little fines.												
	89														
92.2	90	90.0	very dense												
91.4		90.8			18		50/3"								
	91		Bottom of Borehole at 90.8ft. Boring terminated at planned depth.												
	92		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	5 of 5

46920R - 49940L BORING RECORD english template.xls - A-08-48740L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-48920L
D. Rector	11/06/07	11/06/07	N 580761.4740 E 1908532.3680	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1602+75.52 -68.65 "SD5"	200.7 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, asphalt patch				96.4 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
200.7		0.0	ASPHALT CONCRETE												
200.5		0.2	SILTY SAND (SM); brown; moist; medium to fine SAND; little fines; intermixed with trace of olive brown clay [FILL].												
	1														
	2														
	3														
	4														
195.7	5	5.0	dense												
					1		51								
	6														
	7														
	8														
	9														
190.7	10	10.0	very dense												
					2		69								
	11														
	12														
	13														
	14														
185.7	15	15.0	dense												
					3		45								
	16														
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-07-48920L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 5	

46920R - 49940L BORING RECORD english template.xls - R-07-48920L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
180.7		20.0													
					4		52								
	21														
	22														
	23														
	24														
175.7	25	25.0	very dense												
					5		61								
	26														
	27														
	28														
	29														
170.7	30	30.0	dense												
					6		46								
	31														
	32														
	33														
	34														
165.7	35	35.0	very dense												
					7		57								
	36														
163.9	37	36.8	trace angular coarse GRAVEL												
	38														
	39														
	40														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48920L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48920L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
160.7		40.0													
	41				8		72								
	42														
	43														
	44														
155.7	45	45.0	dense												
	46				9		41								
	47														
	48														
	49														
150.7	50	50.0													
	51				10		52								
	52														
	53														
	54														
145.7	55	55.0													
	56				11		39								
	57														
	58														
	59														
	60														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48920L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 11/12/09
SHEET: 3 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48920L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
140.7		60.0	CLAYEY SAND (SC); very dense; yellowish brown; moist; medium to fine SAND; little fines												pieces of olive brown clay and trace mica.
					12		71								
	61														
	62														
	63														
	64														
135.7	65	65.0													
					13		53								
	66														
	67														
	68														
	69														
130.7	70	70.0	dense, dark gray,												organic odor
					14		32								
	71														
	72														
	73														
	74														
125.7	75	75.0	medium dense												
					15		27								
	76														
	77														
	78														
	79														
	80														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-48920L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 11/12/09
SHEET: 4 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48920L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
120.7		80.0	very dense; trace subrounded COBBLES												
					16		71								
	81														
	82														
	83														
	84														
115.7	85	85.0	yellowish brown to brown; trace subrounded COBBLES; medium to coarse SAND												
					17		50/6"								
	86														
	87														
	88														
	89														
110.7	90	90.0													
					18		50/6"								
	91														
	92														
	93														
	94														
105.7	95	95.0	SEDIMENTARY ROCK (shale); fine grained to SILT; olive gray; moderately to intensly weathered; hard; unfractured.												
					19		50/4"								
	96														
104.3		96.4	Bottom of Borehole at 96.4ft. Boring terminated at planned depth.												
	97														
			This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-07-48920L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	5 of 5

46920R - 49940L BORING RECORD english template.xls - R-07-48920L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-11-48980R
M. Fordham	06/08/11	06/08/11	Lat 32.88920957 Long -117.22670674	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1595+98, 340 ft, SD5	322.0 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CME 75 (5677)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Automatic Hammer	79 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				85.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
322.0		0.0	SEDIMENTARY ROCK (SANDSTONE); fine to meduim grained; thickly bedded; light brown; moderately weathered; soft; unfractured; poorly indurated.												
	1														
	2														
	3														
	4														
317.0	5	5.0		X		29									
					SPT1	64	\								
	6					50/4"									
	7														
	8														
	9														
312.0	10	10.0		X		18									
					SPT2	24	43								
	11					19									
	12														
	13														
	14														
307.0	15	15.0		X		16									
					SPT3	28	65								
	16					37									
	17														
	18														
	19														
	20														

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DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-11-48980R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 065000
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 06/08/11	SHEET: 1 of 5	

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
302.0		20.0	SEDIMENTARY ROCK (SANDSTONE); moderately bedded with thin interbeds of SILTSTONE. SANDSTONE; fine to meduim grained; light brown; moderately weathered; soft; unfractured. SILTSTONE; light gray; moderately weathered; moderately hard.			23									
	21				SPT4	29	54								
						25									
	22														
	23														
	24														
	25														
	26														
	27														
	28														
	29														
292.0	30	30.0				22									
	31				SPT5	21	58								
						37									
	32														
	33														
	34														
	35														
286.0	36	36.0	6" Concretion fragments present.												
	37														
	38														
	39														
	40														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/08/11
SHEET: 2 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
282.0		40.0	SEDIMENTARY ROCK (SANDSTONE); meduim grained; moderately bedded; yellowish orange and light brown; moderately weathered; soft; unfractured.			11									
					SPT6	20	85								
	41					65									
	42														
	43														
	44														
	45														
	46														
	47														
	48														
	49														
272.0	50	50.0				34									
					SPT7	50\5"	\								
	51					\									
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/08/11
SHEET: 3 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
262.0		60.0	SEDIMENTARY ROCK (SILTSTONE); moderately bedded; light brown; moderately weathered; moderately hard; slighty fractured; 8" concretion fragement.			21									
	61				SPT8	36	82								
						46									
	62														
	63														
	64														
257.0	65	65.0	SEDIMENTARY ROCK (SANDSTONE); medium grained; moderately bedded; light brown and yellowish orange; moderately weathered; soft; unfractured.												
	66														
	67														
	68														
	69														
252.0	70	70.0				37									
	71				SPT9	50/3"	\								
						\									
	72														
	73														
	74														
	75														
	76														
	77														
	78														
	79														
	80														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/08/11
SHEET: 4 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	81														
	82														
	83														
	84														
237.0	85	85.0	Bottom of Borehole at 85ft. Boring terminated 5ft below planned depth. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	86														
	87														
	88														
	89														
	90														
	91														
	92														
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/08/11	5 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-11-49040R
M. Fordham	06/07/11	06/07/11	Lat 32.88948885 Long -117.22670674	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1597+96, 253 feet, SD5	291.0 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CME 75 (5677)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Automatic Hammer	79 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				80.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
291.0		0.0	SEDIMENTARY ROCK (SANDSTONE); fine grained; thickly bedded; yellowish brown; moderately weathered; very soft; unfractured; poorly indurated.												
	1														
	2														
	3														
	4														
	5														
285.0	6	6.0	Concretion fragment (8 inches thick)		SPT1	13 22 22	44								
	7														
	8														
	9														
	10														
280.0	11	11.0	SEDIMENTARY ROCK (SANDSTONE); fine grained; thickly bedded; light gray; moderately weathered; soft; moderately fractured.		SPT2	8 8 17	25								
	12														
	13														
	14														
	15														
275.0	16	16.0			SPT3	11 12 15	27								
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-11-49040R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 065000
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 06/07/11	SHEET: 1 of 5	

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
270.0	21	21.0	Concretion fragments		SPT4	4 5 6	11								
	22														
	23														
	24														
	25														
265.0	26	26.0	SEDIMENTARY ROCK (SANDSTONE); moderately bedded with thin interbeds of SILTSTONE. SANDSTONE; meduim grained; light brown; moderately weathered; soft; unfractured. SILTSTONE; light gray; moderately weathered; moderately hard.		SPT5	4 6 13	19								
	27														
	28														
	29														
	30														
260.0	31	31.0			SPT6	24 36 53	89								
	32														
	33														
	34														
256.0	35	35.0			SPT7	40 30 51	81								Change drill pit from punch core to diamond core
	36														
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/07/11
SHEET: 2 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
251.0		40.0				31									
	41				SPT6	51	\								
						50/4"									
	42														
	43														
	44														
246.0	45	45.0				26									
	46				SPT9	61	\								
						50/2"									
	47														
	48														
	49														
241.0	50	50.0				38									
	51				SPT10	73/6"	\								
						\									
	52														
	53														
	54														
236.0	55	55.0				20									
	56				SPT11	39	84								
						45									
	57														
	58														
	59														
	60		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/07/11
SHEET: 3 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
231.0		60.0				28									
					SPT8	57/4"	\								
	61					\									
	62														
	63														
	64														
226.0	65	65.0	Concretion Fragments (1 to 4 inches thick)												
	66														
	67														
	68														
	69														
221.0	70	70.0	Concretion Fragments (1' thick)												
	71														
	72														
	73														
	74														
	75														
	76														
	77														
	78														
	79														
	80														

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DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/07/11	4 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
211.0		80.0	Bottom of Borehole at 80 ft. Boring terminated at planned depth.												
			This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	81														
	82														
	83														
	84														
	85														
	86														
	87														
	88														
	89														
	90														
	91														
	92														
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/07/11	5 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49175L
D. Wader	11/06/07	11/06/07	N 581106.6400 E 1908578.4690	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1614+09.20 -67.21 "SD5"	169.2 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				46.6 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
169.2		0.0	ASPHALT CONCRETE												
169.0		0.2	Poorly -Graded SAND (SP); dark brown; moist; fine SAND; few fines [FILL].												
	1														
	2														
	3														
	4														
164.2	5	5.0	SILTY SAND (SM); medium dense; yellowish brown; moist; fine SAND; trace fines.		1		24								
	6														
	7														
	8														
	9														
159.2	10	10.0	Poorly-graded SAND w SILT (SP-SM); very dense; yellowish brown; moist; fine SAND; few fines.		2		60								
	11														
	12														
	13														
	14														
154.2	15	15.0	medium dense		3		29								
	16														
	17														
152.0		17.2	CLAYEY SAND (SC); yellowish brown; moist; fine SAND; little fines.												
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: R-07-49175L	
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 3	

46920R - 49940L BORING RECORD english template.xls - R-07-49175L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
149.2		20.0	medium dense; some fines.												
					4		20								
	21														
	22														
	23														
	24														
144.2	25	25.0													
					5		15								
	26														
	27														
141.4	28	27.8	SEDIMENTARY ROCK (sandstone); fine SAND; yellowish brown; massive; instensely weathered; moderately hard.												
	29														
139.2	30	30.0													
	31														
	32														
	33														
	34														
134.2	35	35.0													
					6		33								
	36														
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-49175L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 3

46920R - 49940L BORING RECORD english template.xls - R-07-49175L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
129.2		40.0													
					7		51								
	41														
	42														
	43														
	44														
124.2	45	45.0													
					8		39								
	46														
122.6		46.6	Bottom of Borehole at 46.6ft. Boring terminated at planned depth.												
	47														
			This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	48														
	49														
	50														
	51														
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-49175L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 3

46920R - 49940L BORING RECORD english template.xls - R-07-49175L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49380L
D. Rector	11/05/07	11/05/07	N 581505.7620 E 1908688.9810	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1627+60.29 -130.80 "SD5"	123.0 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Safety Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip, Asphalt Patch				15.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
123.0		0.0	ASPHALT CONCRETE SEDIMENTARY ROCK (SHALE); fine grained; olive brown to brown; intensely weathered; moderately soft; unfractured.												
	1														
	2														
	3														
	4														
118.0	5	5.0		X	1		50/6"								
	6														
	7														
	8														
	9														
113.0	10	10.0		X	2		50/4"								
	11														
	12														
	13														
	14														
107.8	15	15.2		X	3		50/4"								
107.5	16	15.5	Bottom of Borehole at 15.5ft. Boring terminated at planned depth. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE Boring Record			HOLE ID:	R-07-49380L
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POSTMILE(KP) R28.8/R55.3	EA 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER na	PREPARED BY M. Fordham	DATE 11/12/09	SHEET 1 of 1	

46920R - 49940L BORING RECORD english template.xls - R-07-49380L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49460L
D. Rector	11/05/07	11/05/07	N 581627.4580 E 1908696.4570	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1631+46.17 -206.22 "SD5"	101.4 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Safety Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, Asphalt Patch				7.2 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
101.4		0.0	ASPHALT CONCRETE SEDIMENTARY ROCK (SHALE); fine grained; olive brown to brown; intensely weathered; moderately soft; unfractured.												
	1														
	2														
	3														
	4														
96.4	5	5.0													
	6				1		50/5"								
94.4	7	7.0			2		50/3"								
94.2		7.2	Bottom of Borehole at 7.2ft. Boring terminated at planned depth.												
	8		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	9														
	10														
	11														
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE Boring Record			HOLE ID:	R-07-49460L
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POSTMILE(KP) R28.8/R55.3	EA 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER na	PREPARED BY M. Fordham	DATE 11/12/09	SHEET 1 of 1	

46920R - 49940L BORING RECORD english template.xls - R-07-49460L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49600R
D. Rector	11/08/07	11/08/07	N 581403.1610 E 1908727.9830	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1624+82.85 98.79 "SD5"	133.3 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786).	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Safety Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, Asphalt Patch				56.4 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
133.3		0.0	ASPHALT CONCRETE												
132.9		0.4	CLAYEY SAND (SC); yellowish brown; moist; few fine to coarse GRAVEL; medium to fine SAND; little fines.												
	1														
	2														
	3														
	4														
128.3	5	5.0	dense												
					1		36								
	6														
	7														
	8														
	9														
123.3	10	10.0	medium dense												
					2		21								
	11														
	12														
	13														
	14														
118.3	15	15.0	dense												
					3		42								
	16														
	17														
	18														
	19														
	20														

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DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-07-49600R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 3	

46920R - 49940L BORING RECORD english template.xls - R-07-49600R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
113.3		20.0	SILTY SAND (SM); medium dense; yellowish brown; moist; few fine GRAVEL; fine to medium SAND; little fines; .												
					4		44								
	21														
	22														
	23														
	24														
108.3	25	25.0													
					5		45								
	26														
	27														
	28														
	29														
103.3	30	30.0													
					6		48								
	31														
	32														
	33														
	34														
98.3	35	35.0													
					7		43								
	36														
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-49600R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 11/12/09
SHEET: 2 of 3

46920R - 49940L BORING RECORD english template.xls - R-07-49600R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
93.3		40.0	SILTY SAND (SM); medium dense; yellowish brown; moist; medium SAND; little fines.												
					8		31								
	41														
	42														
	43														
	44														
88.3	45	45.0	dense												
					9		47								
	46														
	47														
	48														
	49														
83.3	50	50.0	very dense												
					10		74								
	51														
	52														
	53														
	54														
	55														
	56														
76.9		56.4	Bottom of Borehole at 56.4ft. Boring terminated at planned depth.												
	57		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-07-49600R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 3

46920R - 49940L BORING RECORD english template.xls - R-07-49600R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49700R
D. Wader	11/05/07	11/05/07	N 581515.9780 E 1908766.5710	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1628+74.04 129.38 "SD5"	123.6 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Safety Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, Asphalt Patch				46.6 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
123.6		0.0	ASPHALT CONCRETE												
123.2		0.4	SILTY SAND (SM); brown to dark brown; moist; few fine GRAVEL; medium to fine SAND; little fines .												
	1														
	2														
	3														
	4														
118.6	5	5.0	SANDY LEAN CLAY (CL); soft; yellowish brown; moist; some fine SAND; trace asphalt fragments.		1		22								
	6														
	7														
	8														
	9														
113.6	10	10.0	SANDY SILT (ML); dense; olive brown to yellowish brown; moist; some fine SAND.		2		42								1 inch fragment of asphalt in SPT, rootlets in sample
	11														
	12														
	13														
	14														
108.6	15	15.0	very dense		3		58								
	16														
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-07-49700R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 3	

46920R - 49940L BORING RECORD english template.xls - R-07-49700R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
103.6		20.0	dense; yellowish brown to gray												
					4		47								
	21														
	22														
	23														
	24														
98.6	25	25.0	SEDIMENTARY ROCK (Sandstone); fine grained; massive; yellowish brown with orange; intensley weathered; soft, unfractured.												Some iron oxide staining and manganese
					5		68								
	26														
	27														
	28														
	29														
93.6	30	30.0													
					6		44								
	31														
	32														
	33														
	34														
88.6	35	35.0													
					7		53								
	36														
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-49700R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	2 of 3

46920R - 49940L BORING RECORD english template.xls - R-07-49700R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
83.6		40.0													
					8		40								
	41														
	42														
	43														
	44														
	45														
78.6		45.0													
					9		62								
	46														
77.0		46.6	Bottom of Borehole at 46.6ft. Boring terminated at planned depth.												
	47		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	48														
	49														
	50														
	51														
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-07-49700R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	11/12/09	3 of 3

46920R - 49940L BORING RECORD english template.xls - R-07-49700R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49820L
D. Wader	11/05/07	11/05/07	N 581823.3950 E 1908711.3670	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1638+08.07 -351.21 "SD5"	64.9 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Safety Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** — **DURING DRILLING** Not Encountered — **AFTER DRILLING (DATE)** Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, Asphalt Patch				14.1 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
64.9		0.0	ASPHALT CONCRETE												
64.5		0.4	SILTY SAND (SM); brown to dark brown; moist; medium to fine SAND; few fine GRAVEL.												
	1														
	2														
	3														
61.7		3.2	SEDIMENTARY ROCK; fine grained; yellowish brown with orange; intensley weathered; soft; unfractured.												
	4				1		50/5"								
	5														
	6														
	7														
57.1	8	7.8													Calcium Carbonte present in sample
					2		50/4"								
	9														
	10														
	11														
	12														
	13														
51.3		13.6													
50.8	14	14.1	Bottom of Borehole at 14.1ft. Boring terminated at planned depth.		3		50/6"								
			This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	15														
	16														
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION	**REPORT TITLE** Boring Record				**HOLE ID:** R-07-49820L
DIVISION OF ENGINEERING SERVICES	**DISTRICT** 11	**COUNTY** San Diego	**ROUTE** 5	**POSTMILE(KP)** R28.8/R55.3	**EA** 235800
GEOTECHNICAL SERVICES	**PROJECT OR BRIDGE NAME** I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	**BRIDGE NUMBER** na	**PREPARED BY** M. Fordham	**DATE** 11/12/09		**SHEET** 1 of 1

46920R - 49940L BORING RECORD english template.xls - R-07-49820L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-07-49940L
D. Wader	11/05/07	11/05/07	N 581874.0310 E 1908731.5090	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1640+04.30 -318.02 "SD5"	54.4 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			Mobile B-47 (4786)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Safety Auto Hammer, 140 lbs, 30-inch drop	57 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip, Asphalt Patch				10.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
54.4		0.0	ASPHALT CONCRETE												
54.0		0.4	SILTY SAND (SM); brown to dark brown; moist; medium to fine SAND; few fine GRAVEL.												
	1														
	2														
	3														
	4														
50.4		4.0	SEDIMENTARY ROCK (Sandstone); fine grained; yellowish brown with orange; intensley weathered; soft; unfractured.		1		46								
	5														
	6														
	7														
	8														
	9														
44.6	10	9.8													
43.9		10.5	Bottom of Borehole at 14.1ft. Boring terminated at planned depth.		2		50/6"								
	11		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-07-49940L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 11/12/09	SHEET: 1 of 1	

46920R - 49940L BORING RECORD english template.xls - R-07-49940L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-10580R
M. Fordham	07/22/08	07/22/08	N5800470.8550 E1908154.8960 (NAD 27, NAVD88)	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1592+13.40 -1215.244228 "SD"	226.7 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CS 2000	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				44.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
226.7			Silty SAND/Clayey SAND (SM/SC); Stiff, Dense; light brown; moist; trace fine GRAVEL; fine to meduim SAND; some fines [FILL].												
	1														
	2														
223.7	3	3.0				9									
						14	37								
	4					23									
	5														
	6														
	7														
	8														
218.2		8.5				12									GRAVEL present, appears to consist of shale fragements
	9					11	26								
						15									
	10														
	11														
	12														
213.7	13	13.0	Silty SAND (SM); dense; light brown; moist; trace GRAVEL; medium to fine SAND; some fines.			5									GRAVEL present, appears to consist of shale fragements
						13	29								
	14					16									
	15														
	16														
	17														
208.7	18	18.0	very dense			11									
						16	36								
	19					20									
	20														

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DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-08-10580R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/14/09	SHEET: 1 of 3	

10580R-47700R BORING RECORD english template.xls - 10580R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	21														
	22														
203.7	23	23.0	dense			10 15 15	30								
	24														
	25														
	26														
	27														
198.7	28	28.0	Silty SAND with COBBLES (SM); medium dense; light brown; moist; trace subrounded COBBLES; medium to fine SAND; some fines.			10 9 12	21								Presence of COBBLES may be a result of slope wash from side of canyon prior to roadway fill being constructed.
	29														
	30														
	31														
	32														
193.7	33	33.0	Clayey SAND (SC); medium dense; light brown; moist; medium to fine SAND [ALLUVIUM].			13 10 6	16								based on the estimated depth of roadway fill throughout the area this material may be slope wash and/or alluvium which was in the canyon bottom prior to placing the roadway fill.
	34														
	35														
	36														
	37														
188.7	38	38.0	SEDIMENTARY ROCK (Shale); fine-grained; laminated; light to meduim gray; slightly weathered; moderately soft; unfractured.			8 11 16	27								
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-10580R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/14/09
SHEET: 2 of 3

10580R-47700R BORING RECORD english template.xls - 10580R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	41														
	42														
183.7	43	43.0				17									
					1	20	48								
	44					28									
182.2		44.5	Bottom of Borehole at 44.5 ft. Boring terminated at planned depth.												
	45														
	46		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	47														
	48														
	49														
	50														
	51														
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE Boring Record			HOLE ID:	R-08-10580R
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POSTMILE(KP) R28.8/R55.3	EA 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER na	PREPARED BY M. Fordham	DATE 10/14/09	SHEET 3 of 3	

10580R-47700R BORING RECORD english template.xls - 10580R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-10700L
M. Fordham	07/23/09	07/23/09	N580429.464E1908189.115 (NAD 27, NAVD88)	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			1590+88.37 -1091.094883 "SD5"	227.3 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DAIMETER**
Mud Rotary			CS 2000	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	**TOTAL DEPTH OF BORING**
Bentonite Chip				51.2 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
227.3			Silty SAND/Clayey SAND (SM/SC); medium dense; light brown; moist; fine to meduim SAND [FILL].												
	1														
	2														
224.3	3	3.0				5									
	4					3	8								
						5									
	5														
	6														
	7														
219.3	8	8.0				5									
	9					4	14								
						10									
	10														
	11														
	12														
214.3	13	13.0	Silty SAND (SM); dense; light brown; moist; fine SAND.			9									
	14					11	22								
						11									
	15														
	16														
	17														
209.3	18	18.0	trace fine subangular GRAVEL [shale fragements].			8									
	19					11	27								
						16									
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: R-08-10700L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening			EA: 235800
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/14/09	SHEET: 1 of 3

10580R-47700R BORING RECORD english template.xls - 10700L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	21														
	22														
204.3	23	23.0	medium dense			8									
	24					9 11	20								
	25														
	26														
	27														
199.3	28	28.0	Silty SAND with COBBLES (SM); dense; light brown; moist; few subrounded COBBLES; medium to fine SAND; some fines.			15									
	29					15 12	27								
	30														
	31														
195.3	32	32.0	Silty SAND with COBBLES (SM); medium dense; light brown; moist; trace subrounded COBBLES; trace coarse GRAVEL; fine to medium SAND; some fines.			4									
	33					5 7	12								
	34														
	35														
	36														
	37														
189.3	38	38.0	SEDIMENTARY ROCK (shale); fine-grained; laminated; light to meduim gray; slightly weathered; hard; unfractured.			9									
	39					14 19	33								
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-08-10700L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/14/09	2 of 3

10580R-47700R BORING RECORD english template.xls - 10700L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	41														
	42														
184.3	43	43.0				9									
						13	34								
	44					21									
	45														
	46														
	47														
179.3	48	48.0				11									
						24	60								
	49					36									
177.3	50	50.0				19									
					1	48				18%	113				DS
	51					71									
176.1		51.2	Bottom of Borehole at 51.2 ft. Boring terminated at planned depth.												
	52														
	53		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	54														
	55														
	56														
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-08-10700L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/14/09	3 of 3

10580R-47700R BORING RECORD english template.xls - 10700L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-10740L
M. Fordham	07/22/08	07/22/08	N580425.556E1908249.181 (NAD 27, NAVD88)	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1590+93.52 -893.678862 "SD5"	229.3 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CS 2000	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				69.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
229.3			Silty SAND (SM); light brown; moist; medium to fine SAND; some fines [FILL].												
	1														
	2														
226.3	3	3.0	dense			9									
	4					12	26								
						14									
	5														
223.3	6	6.0	trace fine GRAVEL												
	7														
221.3	8	8.0				4									
	9					13	25								
						12									
	10														
	11														
	12														
216.3	13	13.0				11									
	14					15	31								
						16									
	15														
	16														
	17														
211.3	18	18.0	medium dense			37									
	19					8	17								
						9									
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record			HOLE ID: R-08-10740L	
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/15/09	SHEET: 1 of 4	

10580R-47700R BORING RECORD english template.xls - 10740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	21														
	22														
206.3	23	23.0	very dense			13									
						18	41								
	24					23									
	25														
	26														
	27														
201.3	28	28.0	dense			10									
						18	28								
	29					20									
	30														
	31														
	32														
196.3	33	33.0				9									
						15	33								
	34					18									
	35														
	36														
	37														
191.3	38	38.0				8									
						12	24								
	39					12									
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-10740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/15/09
SHEET: 2 of 4

10580R-47700R BORING RECORD english template.xls - 10740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	41														
	42														
186.3	43	43.0	very dense			12 19 20	39								
	44														
	45														
	46														
	47														
181.1	48	48.2	ClayeySAND (SC); very dense; light brown to light gray; moist; meduim to fine SAND; little fines.			9 17 20	37								
	49														
	50														
	51														
	52														
176.3	53	53.0	Silty SAND (SM); very dense; dark brown; moist; trace fine GRAVEL; medium to fine SAND; some fines.			11 20 33	53								
	54														
	55														
	56														
	57														
171.3	58	58.0				10 18 21	39								
	59														
	60														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-10740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/15/09	3 of 4

10580R-47700R BORING RECORD english template.xls - 10740L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	61														
	62														
166.3	63	63.0		X		9									
						13	36								
	64					23									
	65														
	66														
	67														
161.3	68	68.0		X		9									
						13	42								
	69					29									
159.8		69.5	Bottom of Borehole at 69.5 ft. Boring terminated at planned depth. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	70														
	71														
	72														
	73														
	74														
	75														
	76														
	77														
	78														
	79														
	80														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-10740L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/15/09	4 of 4

10580R-47700R BORING RECORD english template.xls - 10740L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-09-001
J. KERMODE / E. GALLETA	02/11/09	02/11/09	N: 580276.1483363 E: 1908736.1788164	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
CALTRANS			226.2 m Rt. Station 483+87 "11SD5A2" LINE	88.0 m
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
94 mm Punch Core			Mobile B-47 c#3174785	108 mm
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
35.6 mm I.D. Split Spoon; 94 mm Continuous double wall Punch Core barrel			Wire Line Safety hammer	94 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: N/A; AFTER DRILLING (DATE): N/A	**TOTAL DEPTH OF BORING**
Enviroplug and AC cold patch				6.5 m

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth (meters)	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m³)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
88.0				Asphalt Concrete (AC).												Diamond Single walled core barrel.
87.9			0.15	At 0.15: Silt with Sand (ML), estimated medium dense, pale yellow, dry, mostly silt with little fine sand, trace fine to coarse gravels. FILL												0.15 to 1.83 m hand auger; 100 mm diameter bucket auger.
		1														
87.4		2	0.61	At 0.61 m Sedimentary Rock (Siltstone), thinly bedded, yellow, olive gray, and reddish yellow, mottled, intensely to moderately weathered, soft to moderately soft, intensely to moderately fractured on bedding plane breaks. (Silt with Sand [ML], estimated very dense, dry, mostly silt, little fine sand).												
		3														
	1					1										
		4														
		5														
86.2		6	1.83		1.83		35									
				change to 94 mm punch core.				>50								1.83 m to 8.01 m 108 mm CRIS Bit; 94 mm Punch Core.
	2						22*									
		7														*22 Blows for 75 mm advance; Refusal.
85.6			2.41													
		8		At 2.41 m Sedimentary Rock (Claystone), thickly bedded, light olive brown, mottled, intensely to moderately weathered, soft. (Lean Clay [CL], hard, dry, mostly clay, little fine sand, medium plasticity).												PP ≥ 4.4 kg/cm
						2			100%	*1						*1 Does not meet RQD soundness criterion.
		9														
	3															
		10														
84.7		11	3.35		3.35		30*									
								>50								*30 Blows for 100 mm advance; Refusal.
		12														
	4	13														
83.9			4.10	At 4.10 m Sedimentary Rock (Siltstone), Moderately bedded to laminated, dark gray, light gray, and light yellowish brown, intensely to moderately weathered, soft to moderately hard. (Silt with Sand [ML], very dense, dry, mostly silt some fine sand trace cobble, medium plasticity).		3			78%	*1						*1 Does not meet RQD soundness criterion.
		14														
		15														
83.2		16	4.88		4.88		50*									
	5							>50								*50 Blows for 25 mm advance; Refusal.
82.9		17	5.12													at 4.88 m 254 mm length of well cemented, indurated siltstone. True rock. Remainder of sample does not meet RQD soundness criterion.
82.7			5.38	At 5.38 m: Sedimentary Rock (Sandstone and Siltstone) moderately and thinly bedded, pale yellow, intensely to moderately weathered, soft to very soft, intensely to moderately fractured on bedding plane breaks. (Silty Sand [SM], and Silt with Sand [ML], estimated very dense, dry, mostly fine sand with some silt and mostly silt with some fine sand).												Subhorizontal dips to ~ 3 degrees
		18				4			78%	17%						
		19														
	6	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Reconstruction Interchange, Signal Intersection, Add Aux Lanes & Bra			HOLE ID: R-09-001
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: SD	ROUTE: 5	POSTMILE(KP): PM @9.4 / EA: 11-022330
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Genesee Retaining Wall			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: Retaining Wall Genesee E	PREPARED BY: J. Kermode	DATE: 06/22/09	SHEET: 1 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-001

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth (meters)	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m3)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
81.9			6.17	See Previous page.		4										
81.6		21	6.40	At: 6.17 m: Sedimentary Rock (Claystone), moderately bedded, light olive brown, moderately to intensely weathered, soft to moderately soft, moderately fractured on bedding plane breaks, (Lean Clay [CL]), hard, dry mostly clay, little fine sand, high plasticity).	6.4		50*	>50								* 50 Blows for 100 mm advance; refusal.
81.3		22	6.77	At 6.77 m Sedimentary Rock (Sandstone), moderately bedded, pale yellow, intensely weathered, soft. (Silty Sand [SM], estimated very dense, mostly sand, some silt, weak ferrous cementation).												
81.0	7	23	7.09	At 7.09 m: Sedimentary Rock (Siltstone and Claystone), very thinly to thinly bedded, olive, very pale brown and reddish yellow, intensely to moderately weathered, soft. (Silt with Sand [ML] and Clay with sand [CL], estimated very dense, dry, mostly silt with some fine sand and mostly clay with some fine sand).		5			92%	*1						*1 Does not meet RQD soundness criterion.
		24														
		25														
80.1	8	26	7.93		7.93		50*	>50								* 50 blows for 100 mm advance.
80.0			8.01	Total Depth Drilled 8.01 m Hole terminated in formational soft rock. No groundwater observed 02/11/2009 Back filled with bentonite chip Enviroplug and AC cold patch.	8.01											Lane Closure, night work under artificial lighting.
		27														
		28														
		29														
	9															
		30														
		31														
		32														
	10															
		33														
		34														
		35														
	11	36														
		37														
		38														
	12	39														
		40														

DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

GEOTECHNICAL SERVICES

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Reconstruction Interchange, Signal Intersection, Add Aux Lanes & Bra

HOLE ID: R-09-001

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	SD	5	PM @9.4	11-022330

PROJECT OR BRIDGE NAME
Genesee Retaining Wall

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
Retaining Wall Genesee Ea	J. Kermode	06/22/09	2 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-001

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-09-002
J. KERMODE / E. GALLETA	02/11/09	02/11/09	N: 580241.0840742 E: 1908844.4958090	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
CALTRANS			337.2 m Rt. Station 483+62 "11SD5A2" LINE	92.6 m
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
94 mm Punch Core			Mobile B-47 c#3174785	108 mm
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
35.6 mm I.D. Split Spoon; 94 mm Continuous double wall Punch Core barrel			Wire Line Safety hammer	94 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING N/A	AFTER DRILLING (DATE) N/A	**TOTAL DEPTH OF BORING**
Enviroplug and AC cold patch					7.7 m

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth Meters	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m³)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
92.6			0.00	Asphalt Concrete: (AC)												Diamond Single Wall Core barrel
92.5			0.15													
92.3		1	0.30	Silt with Sand (ML): estimated medium dense, pale yellow, variegated, dry, silt with trace fine to medium angular gravels. Sub-base												0.15 to 1.60 m Hand Auger, Bucket Auger;100 mm Diameter
				Silt with Sand (ML): estimated medium dense, pale yellow, dry, mostly silt with little fine sand. Fill.		1										
92.0		2	0.61	At 0.61 m: Sedimentary Rock (Sandstone and Siltstone), laminated to very thinly bedded, light yellowish brown , olive gray, and reddish yellow, mottled, moderately weathered, very soft to soft, slightly fractured on bedding breaks. (Silty Sand [SM] and Silt with Sand [ML], very dense, dry, Mostly fine Sand with some silt, trace clay, and mostly silt with some fine sand; medium plasticity).												Subhorizontal dips to ~ 3 degrees
	1	3														
		4														
91.0		5	1.60		1.6 m		26	>50								1.6 to 7.7 m Change to 108 mm CRIS Bit; 94 mm punch core
		6				2	30*		80	*1						STP 30 blows 51 mm advance; refusal.
	2															
		7														*1: Does not meet RQD soundness criterion.
90.2		8	2.41													
		9														
	3															
89.5		10	3.12	At 3.12 m Sedimentary Rock (Claystone) thickly bedded, dark gray to olive gray, intensely to moderately weathered, soft, very slightly fractured on bedding breaks. (Lean Clay [CL] hard, dry, high plasticity).	3.12		25*	>50								* 25 Blows 25 mm advance. Refusal
		11														Gradationally coarsens with depth.
																Discontinuities dip ~ 3 degrees.
89.0			3.57	At 3.57 m Sedimentary Rock (Sandstone and Siltstone) laminated and thinly bedded, light gray and yellow, mottled, intensely to moderately weathered, soft to very soft, slightly fractured on bedding breaks. (Silt with Sand [ML], and Silty Sand [SM], estimated very dense, dry, mostly silt and fine sand , little medium to coarse trace gravel, weak ferrous cementation).												
		12														Discontinuities dip ~ 3 degrees.
						3			83	*1						*1 Does not meet RQD soundness criterion.
	4	13														
		14														
		15														Shear zone at 4.57 m. Dips 55 degrees.
88.0			4.65	At 4.65 m Sedimentary Rock (Siltstone), moderately bedded, olive gray, moderately weathered, moderately hard, unfractured).	4.65		25*	>50	100	100%						* 25 blows no advance - refusal.
87.7		16	4.89												4.89	Block off at 4.89 m.
	5			At 4.89 m Sedimentary rock (Sandstone), moderately to thinly bedded, light gray, live gray, and reddish yellow, intensely to moderately weathered, moderately soft to very soft, intensely to moderately fractured on bedding breaks. (Silty Sand [SM], estimated very dense, dry, mostly sand, some silt, little coarse, trace clay, weakly cemented).												Discontinuities dip ~ 3 degrees.
		17														
						4										
		18							94	*1						*1 Does not meet RQD soundness criterion.
87.0			5.64	At 5.64 m Sedimentary Rock (Sandstone and Claystone) very thinly bedded, reddish yellow and olive gray, intensely to moderately weathered, very soft to soft. (Sand with Clay [SC] and Lean Clay with Sand [CL], estimated very dense, dry, mostly fine sand and clay with some fine sand, trace medium sand).												
		19														
	6															
86.4		20	6.17		6.17											

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Reconstruct Interchange, Signal Intersection, Add Aux Lanes & Bradec			HOLE ID: R-09-002
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: SD	ROUTE: 5	POSTMILE (KP): PM @9.4	EA: 11-022330
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Genesee Retaining Wall			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: Retaining Wall Genesee E	PREPARED BY: J. Kermode	DATE: 06/22/09	SHEET: 1 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-002

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth Meters	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m3)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
86.4			6.17	At 6.17 m Sedimentary Rock (Siltstone and Sandstone), moderately to very thinly bedded, olive gray, light gray and pale yellow, intensely to moderately weathered, very soft to moderately hard, intensely to moderately fractured on bedding plane breaks. (Silt with Sand [ML] and Silty Sand [SM], very dense, dry, mostly silt and fine sand with some silt, low plasticity, weakly cemented).	6.17		50*	>50								50 blows 127 mm advance.
86.3		21	6.32		6.32					20%						304 mm long core segment of well cemented, indurated sandstone at 6.32 m.
		22														
	7	23				5			83%							
		24														
84.9		25	7.70													
	8	26		Total Depth Drilled 7.7 m. Hole terminated at design depth. No Groundwater observed; Hole backfilled with Enviroplug and AC cold patch.												ane Closure, night work under artificial lighting.
		27														
		28														
	9	29														
		30														
		31														
	10	32														
		33														
		34														
		35														
	11	36														
		37														
		38														
	12	39														
		40														

Caltrans

DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

GEOTECHNICAL SERVICES

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Reconstruct Interchange, Signal Intersection, Add Aux Lanes & Bradec

HOLE ID: R-09-002

DISTRICT	COUNTY	ROUTE	POSTMILE (KP)	EA
11	SD	5	PM @9.4	11-022330

PROJECT OR BRIDGE NAME
Genesee Retaining Wall

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
Retaining Wall Genesee Ea	J. Kermode	06/22/09	2 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-002

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-10553R
M. Fordham	01/10/12	01/10/12	N 1904274.860/E 6260413.250	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			10+50, 0.0ftL, RW-13 Line	213.6 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				3.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
213.6															FILL Silty Sand (SM): light brown, moist, fine grained, poorly graded, sandstone fragments
		1					20								
		2					49								
210.6		3	3.0				81								Terminate hand auger at 3.0 ft
		4					75								
		5					88								
		6					150								
		7					76								
		8					42								
		9					108								
		10					193								
202.6		11	11.0				225								Terminate soil probe at 11.0 ft
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-10553R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-13.xlsx - HA-12-10553R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-10601L
M. Fordham	01/09/12	01/09/12	N 1904332.100/E 6260610.220	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			12+30, 0.0ftL, RW-14 Line	212.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				4.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
212.8															FILL Silty Sand (SM): light brown, moist, fine grained, sandstone/siltstone fragments
		1					4								
		2					35								
		3					51								
208.8		4	4.0				73								Terminate hand auger at 4.0 ft
		5					127								
		6					190								
		7					200								
		8					145								
203.8		9	9.0				205								Terminate Soil Probe 9.0ft
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-10601L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-14.xls - HA-12-10601L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-10626R
M. Fordham	01/10/12	01/10/12	N 1904152.120/E 6260630.870	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			13+00, 0.0ftL, RW-13 Line	200.9 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				1.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
200.9															FILL Silty Sand (SM): light brown, moist, fine grained, poorly graded, sandstone fragments
199.9		1.0					12								Terminate hand auger at 1.0 ft
		1													
		2					18								
		3					28								
		4					85								
		5					110								
		6					107								
		7					71								
		8					73								
		9					95								
		10					55								
		11					94								
		12					121								
		13					130								
		14					142								
		15					130								
		16					163								
183.9		17	17.0				226								Terminate soil probe at 17.0 ft
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-10626R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-13.xlsx - HA-12-10626R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-10647L
M. Fordham	01/09/12	01/09/12	N 1904280.310/E 6260750.980	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			13+80, 0.0ftL, RW-14 Line	216.2 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				3.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
216.2															FILL Silty Sand (SM): light brown, moist, fine grained, sandstone/siltstone fragments
		1					10								
		2					28								
		3					44								
212.2		4	4.0				93								Terminate hand auger at 4.0 ft
		5					115								
		6					100								
		7					60								
		8					168								
207.2		9	9.0				228								Terminate Soil Probe 9.0ft
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-10647L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-14.xls - HA-12-10647L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-10656R
M. Fordham	01/10/12	01/10/12	N 1904108.010/E 6260720.620	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			14+00, 0.0ftL, RW-13 Line	229.9 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				5.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
229.9															FILL Clayey Sand (SC): medium to dark brown, moist, semi-plastic, fine grained
		1					15								
		2					14								
		3					30								
		4					30								
224.9		5	5.0				27								Terminate hand auger at 5.0 ft
		6					27								
		7					42								
		8					49								
		9					65								
		10					60								
218.9		11	11.0				67								
		12					65								
		13					72								
		14					75								
		15					71								
		16					122								
		17					141								
		18					136								
210.9		19	19.0				324								Terminate soil probe at 19.0 ft
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report				HOLE ID: HA-12-10656R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5	EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12		SHEET: 1 of 1

RW-13.xlsx - HA-12-10656R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-10663L
M. Fordham	01/09/12	01/09/12	N 1904264.690/E 6260798.520	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			14+30, 0.0ftL, RW-14 Line	217.7 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				3.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
217.7															FILL Silty Sand (SM): light brown, moist, fine grained, sandstone/siltstone fragments
		1					8								
		2					20								
214.7		3	3.0				33								Terminate hand auger ansd soil probe at 3.0 Concretion
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-10663L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-14.xls - HA-12-10663L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11114R
M. Fordham	01/03/12	01/03/12	N 1903748.920/E 6262170.730	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			10+50.88, 0.0ftL, RW-11 Line	308.5 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				1.5 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
308.5															Silty Sand (SM): tan to light brown, moist, medium and fine grained, roots
308.0		0.5													SEDIMENTARY FORMATION: Siltstone/ Sandstone, light brown to light gray, fine grained, soft, moderatly weathered
307.0		1.5													Terminate hand auger at 1.5 ft

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID:	HA-12-11114R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5	EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1	

RW-11.xlsx - HA-12-11114R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11136R
M. Fordham	01/03/12	01/03/12	N 1903733.170/E 6262238.030	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			11+20, 0.0ftL, RW-11 Line	313.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
313.8															Silty Sand (SM): tan to light brown, moist, medium and fine grained, roots
313.3		0.5													SEDIMENTARY FORMATION: Siltstone/ Sandstone, light brown to light gray, fine grained, soft, moderatly weathered
		1													
		2													
311.8		2.0													Terminate hand auger at 2.0 ft
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11136R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-11.xlsx - HA-12-11136R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11197L
M. Fordham	01/03/12	01/03/12	N 1903821.920/E 6262495.510	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			10+60, 0.0ftL, RW-12 Line	302.5 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				4.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
302.5															Silty Sand (SM): medium brown to reddish brown, moist, fine grained, 0.25 inch to 1.0 inch sandstone and siltstone fragments, roots
		1													
		2													
		3													
		4													
298.5		4.0													Terminate hand auger at 4.0ft
298.0		4.5				400									Soil Probe driven 6 inches into bottom of Retrieved sample from the bottom of the boring Sedimentary Formation (sandstone/siltstone), gray, fine grained,
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11197L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-12.xlsx - HA-12-11197L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11212R
M. Fordham	01/03/12	01/03/12	N 1903733.170/E 6262238.030	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			11+20, 0.0ftL, RW-11 Line	313.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
313.8															Silty Sand (SM): light and medium brown, moist, medium and fine grained, sedimentary formation fragments
313.3		0.5													SEDIMENTARY FORMATION: Sandstone, light and medium brown, fine grained, soft, intensely weathered
		1													
		2													
311.8		2.0													Terminate hand auger at 2.0 ft
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11212R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-11.xlsx - HA-12-11212R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11233L
M. Fordham	01/03/12	01/03/12	N 1903769.550/E 6262609.110	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			11+85, 0.0ftL, RW-12 Line	307.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				0.8 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
307.8															Silty Sand (SM): medium brown to reddish brown, moist, fine grained, 0.25 inch to 1.0 inch sandstone and siltstone fragments,
307.1		1	0.8				37								Terminate hand auger at 0.75 ft Sedimentary Formation (sandstone/siltstone), gray, fine grained, concretion
306.3		2	1.5			400									Soil Probe driven 6 inches into bottom of
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11233L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-12.xlsx - HA-12-11233L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11258L
M. Fordham	01/03/12	01/03/12	N 1903727.250/E 6262683.940	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			12+71.1, 0.0ftL, RW-12 Line	311.7 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				1.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
311.7															Silty Sand (SM): light brown, moist, fine grained, sandstone and siltstone fragments, roots
310.7		1.0													Terminate hand auger at 1.0 ft

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report				HOLE ID: HA-12-11258L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5	EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1	

RW-12.xlsx - HA-12-11258L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11313R
M. Fordham	01/03/12	01/03/12	N 1903515.680/E 6262747.800	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			16+80, 0.0ftL, RW-11 Line	340.9 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
340.9															Silty Sand (SM): tan to light brown, moist, medium and fine grained, roots
339.9		1.0													SEDIMENTARY FORMATION: Sandstone, light and medium brown, fine grained, soft, intensely weathered
338.9		2.0													Terminate hand auger at 2.0 ft

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11313R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-11.xlsx - HA-12-11313R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-48910L
M. Fordham	01/03/12	01/03/12	N 1905580.860/E 6261535.320	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			10+03, 3.0ftL, RW15Line	168.7 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0ft ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
168.7															FILL, Silty Sand (SM): light brown, moist, fine grained, siltstone fragments
		1					17								
166.7		2 2.0					30								Terminate hand auger at 2.0ft
		3					64								
		4					90								
		5					194								
162.7		6 6.0					430								Possible Concretion Terminate Soil Probe 6.0ft
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE Geotechnical Design Report			HOLE ID: HA-12-48910L
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POST MILE R28.6 - R30.5 / EA_EFIS 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER NA	PREPARED BY M. Fordham	DATE 02/01/12	SHEET 1 of 1

RW-15.xlsx - HA-12-48910L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-49000L
M. Fordham	01/06/12	01/06/12	N 1905879.230/E 6261565.250	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			13+05, 5.0ftL, RW15Line	165.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.5 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
165.8															FILL, Silty Sand (SM): light brown, moist, fine grained, siltstone fragments
		1					22								
		2					74								
163.3		2.5													Terminate hand auger at 2.5ft
		3					110								
		4					176								
		5					210								
		6					150								
158.8		7	7.0				168								Terminate Soil Probe 7.0ft
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-49000L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-15.xlsx - HA-12-49000L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-49213L
M. Fordham	01/06/12	01/06/12	N 1906580.920/E 6261665.980	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			20+10, 0.0ftL, RW15Line	134.6 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				5.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
134.6															FILL, Silty Sand (SM): light brown, moist, fine grained, siltstone fragments
		1					22								
		2					12								
		3					33								
		4					62								
129.6		5	5.0				167								Terminate hand auger at 5.0ft
		6					109								
		7					127								
126.6		8	8.0				178								Terminate Soil Probe 8.0ft
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-49213L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-15.xlsx - HA-12-49213L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-49283L
M. Fordham	01/06/12	01/06/12	N 1906801.510/E 6261746.500	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			22+45, 0.0ftL, RW15Line	135.7 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.5 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
135.7															FILL, Silty Sand (SM): light brown, moist, fine grained, 0.25 inch to 1.0 inch siltstone fragments
		1					26								
		2					92								
133.2		2.5													Terminate hand auger at 2.5ft
		3					113								
		4					172								
		5					218								
129.7		6	6.0				278								Terminate Soil Probe 6.0ft
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-49283L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-15.xlsx - HA-12-49283L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-49408L
M. Fordham	01/06/12	01/06/12	N 1907195.770/E 6261874.510	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			26+60.38, 0.0ftL, RW15Line	123.9 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				3.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
123.9															FILL, Silty Sand (SM): light brown, moist, fine grained, 0.25 inch to 1.0 inch siltstone fragments
		1					18								
		2					50								
121.4		2.5													
		3					106								Terminate hand auger at 3.0ft
		4					115								
		5					97								
117.9		6	6.0				145								
		7					112								
		8					182								
114.9		9	9.0				300								Terminate Soil Probe 9.0ft
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-49408L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-15.xlsx - HA-12-49408L

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number: 12-135

Date:

Co. SD Rte. 005 PM 28.6 to 30.5

Pr. ID#: 1100000012 Phase: 1

EA: 022331 Reporting Code:

Request by: Mike Fordham Division: OGDS2 Ph: 858-467-3290

Project Desc: I-5/Genesee Avenue Interchange Improvement Project

Job Location: I-5 at Genesee Avenue, City of San Diego

Project. Mgr: Arturo Jacodo Ph: 6886816 Units: Feet ☒ Meters ☐

Descriptions and Limits of Work:

Stake retaining wall alignments Retaining Wall 11, 12, 13, 14, and 15

Attachments and/or References:

Caice chains for all wall and DGN of project with alignments

Desired Completion Date: 1/6/2011

Approved by (Project Engineer or above)

FOR SURVEYS USE ONLY

Date Received: Sub-Object: 185 Activity 1060

Horiz.Datum: Spec. NAD83 (HPGN) ☒ NAD83 (2007) ☐

Vert.Datum: Spec. NAVD88 +328.08' ☐ NAVD88 ☒ NAVD88 (CGPS) ☐

Rev.12/2010

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-11

10+01.13 -849.31' EL 337.580 CHAIN RWE11 N 1903369.360 E 6262898.810
FEATURE:OG PD: OG1022
CM:2012-135 dea
10+19.94 0.00' EL 304.500 CHAIN RWE11 N 1903743.110 E 6262141.230
FEATURE:OG PD: OG1008
CM:2012-135 dea
10+50.93 -0.02' EL 308.500 CHAIN RWE11 N 1903748.920 E 6262170.730
FEATURE:OG PD: OG1009
CM:2012-135 dea
11+20.04 0.03' EL 313.830 CHAIN RWE11 N 1903733.170 E 6262238.030
FEATURE:OG PD: OG1010
CM:2012-135 dea
11+74.93 -0.03' EL 317.890 CHAIN RWE11 N 1903720.760 E 6262291.490
FEATURE:OG PD: OG1011
CM:2012-135 dea
12+33.44 -0.05' EL 319.780 CHAIN RWE11 N 1903707.490 E 6262348.480
FEATURE:OG PD: OG1012
CM:2012-135 dea
13+00.02 -0.10' EL 321.120 CHAIN RWE11 N 1903690.340 E 6262412.810
FEATURE:OG PD: OG1013
CM:2012-135 dea
13+60.03 -0.02' EL 323.050 CHAIN RWE11 N 1903671.200 E 6262469.680
FEATURE:OG PD: OG1014
CM:2012-135 dea
14+20.00 0.01' EL 326.470 CHAIN RWE11 N 1903648.810 E 6262525.300
FEATURE:OG PD: OG1015
CM:2012-135 dea
14+79.99 0.00' EL 328.140 CHAIN RWE11 N 1903623.210 E 6262579.550
FEATURE:OG PD: OG1016
CM:2012-135 dea
16+20.09 -0.06' EL 334.110 CHAIN RWE11 N 1903551.400 E 6262699.720
FEATURE:OG PD: OG1017
CM:2012-135 dea
16+80.00 0.05' EL 340.870 CHAIN RWE11 N 1903515.680 E 6262747.800
FEATURE:OG PD: OG1018
CM:2012-135 dea
17+39.99 -0.05' EL 342.160 CHAIN RWE11 N 1903477.300 E 6262793.900
FEATURE:OG PD: OG1019
CM:2012-135 dea
18+00.04 -0.01' EL 344.480 CHAIN RWE11 N 1903436.130 E 6262837.610
FEATURE:OG PD: OG1020
CM:2012-135 dea
18+60.01 0.02' EL 343.030 CHAIN RWE11 N 1903392.530 E 6262878.770
FEATURE:OG PD: OG1021
CM:2012-135 dea

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-12

10+00.12 -0.09' EL 302.990 CHAIN RWW12 N 1903842.970 E 6262439.490
FEATURE:OG PD: OG1001
CM:2012-135 dea
10+59.96 0.04' EL 302.500 CHAIN RWW12 N 1903821.920 E 6262495.510
FEATURE:OG PD: OG1002
CM:2012-135 dea
11+04.93 0.16' EL 303.070 CHAIN RWW12 N 1903804.340 E 6262536.890
FEATURE:OG PD: OG1003
CM:2012-135 dea
11+85.12 0.15' EL 307.830 CHAIN RWW12 N 1903769.550 E 6262609.110
FEATURE:OG PD: OG1004
CM:2012-135 dea
12+34.99 0.12' EL 310.160 CHAIN RWW12 N 1903745.630 E 6262652.860
FEATURE:OG PD: OG1005
CM:2012-135 dea
12+71.10 0.08' EL 311.700 CHAIN RWW12 N 1903727.250 E 6262683.940
FEATURE:OG PD: OG1006
CM:2012-135 dea

file:///X|/_Survey%20Requests/02233%20sd5%2011%200000%200012/2012-135%20lnt%20walls/RWW10.rep.txt[1/3/2012 8:47:17 AM]

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-13

10+50.08 -0.00' EL 213.580 CHAIN RWE 13 N 1904274.860 E 6260413.250
FEATURE:OG PD: OG1063
CM:2012-135 dea
10+99.96 0.01' EL 208.950 CHAIN RWE 13 N 1904248.940 E 6260455.870
FEATURE:OG PD: OG1064
CM:2012-135 dea
11+50.03 -0.02' EL 205.060 CHAIN RWE 13 N 1904223.660 E 6260499.090
FEATURE:OG PD: OG1065
CM:2012-135 dea
11+99.94 0.02' EL 203.200 CHAIN RWE 13 N 1904199.110 E 6260542.540
FEATURE:OG PD: OG1066
CM:2012-135 dea
12+50.04 0.05' EL 201.600 CHAIN RWE 13 N 1904175.180 E 6260586.560
FEATURE:OG PD: OG1067
CM:2012-135 dea
12+99.99 -0.01' EL 200.940 CHAIN RWE 13 N 1904152.120 E 6260630.870
FEATURE:OG PD: OG1068
CM:2012-135 dea
13+49.94 -0.03' EL 211.620 CHAIN RWE 13 N 1904129.750 E 6260675.520
FEATURE:OG PD: OG1069
CM:2012-135 dea
14+00.00 0.00' EL 229.890 CHAIN RWE 13 N 1904108.010 E 6260720.620
FEATURE:OG PD: OG1070
CM:2012-135 dea

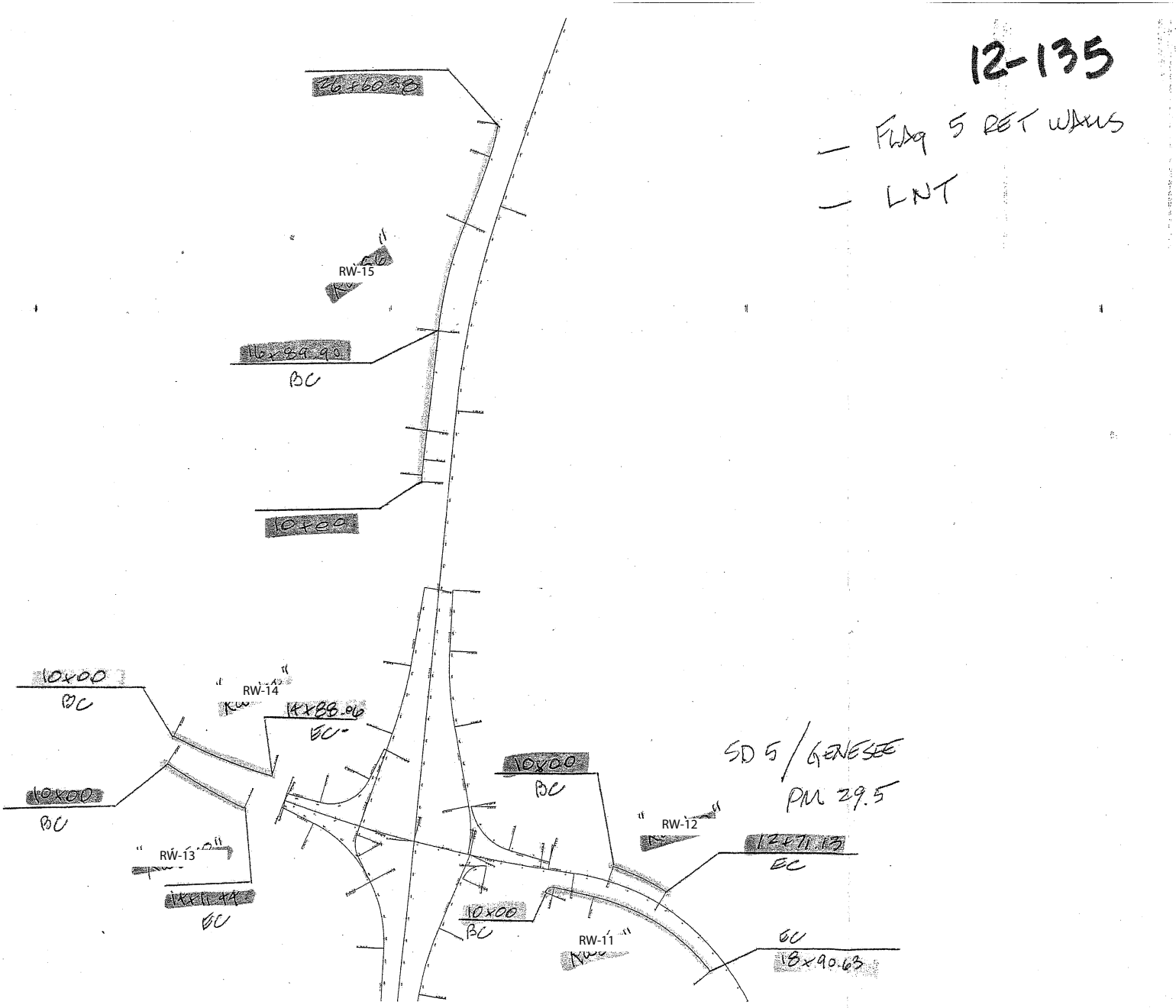
CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-14

10+00.01 -0.02' EL 222.280 CHAIN RWW14 N 1904425.370 E 6260400.130
FEATURE:OG PD: OG1061
CM:2012-135 dea
10+34.90 -0.03' EL 221.420 CHAIN RWW14 N 1904410.180 E 6260431.540
FEATURE:OG PD: OG1060
CM:2012-135 dea
10+90.03 0.03' EL 219.330 CHAIN RWW14 N 1904386.860 E 6260481.490
FEATURE:OG PD: OG1059
CM:2012-135 dea
11+35.03 0.05' EL 212.680 CHAIN RWW14 N 1904368.560 E 6260522.600
FEATURE:OG PD: OG1058
CM:2012-135 dea
11+80.02 0.01' EL 212.950 CHAIN RWW14 N 1904350.940 E 6260564.000
FEATURE:OG PD: OG1057
CM:2012-135 dea
12+29.94 0.02' EL 212.840 CHAIN RWW14 N 1904332.100 E 6260610.220
FEATURE:OG PD: OG1056
CM:2012-135 dea
12+80.00 -0.03' EL 213.500 CHAIN RWW14 N 1904314.050 E 6260656.920
FEATURE:OG PD: OG1055
CM:2012-135 dea
13+30.05 0.05' EL 215.010 CHAIN RWW14 N 1904296.680 E 6260703.860
FEATURE:OG PD: OG1054
CM:2012-135 dea
13+79.94 -0.03' EL 216.200 CHAIN RWW14 N 1904280.310 E 6260750.980
FEATURE:OG PD: OG1053
CM:2012-135 dea
14+29.98 -0.09' EL 217.690 CHAIN RWW14 N 1904264.690 E 6260798.520
FEATURE:OG PD: OG1052
CM:2012-135 dea

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-15

10+00.05 -0.03' EL 168.660 CHAIN RWS15 N 1905580.860 E 6261535.320
FEATURE:OG PD: OG1023
CM:2012-135 dea
11+01.00 16.92' EL 174.530 CHAIN RWS15 N 1905679.720 E 6261560.320
FEATURE:OG PD:Offset to LOL OG1025
CM:2012-135 dea
11+60.03 0.04' EL 166.060 CHAIN RWS15 N 1905740.130 E 6261549.650
FEATURE:OG PD: OG1026
CM:2012-135 dea
12+33.14 -0.01' EL 165.840 CHAIN RWS15 N 1905812.800 E 6261557.670
FEATURE:OG PD: OG1027
CM:2012-135 dea
13+00.00 0.08' EL 165.840 CHAIN RWS15 N 1905879.230 E 6261565.250
FEATURE:OG PD: OG1028
CM:2012-135 dea
13+60.03 -0.08' EL 165.200 CHAIN RWS15 N 1905938.920 E 6261571.680
FEATURE:OG PD: OG1029
CM:2012-135 dea
14+49.98 -0.02' EL 161.500 CHAIN RWS15 N 1906028.350 E 6261581.340
FEATURE:OG PD: OG1030
CM:2012-135 dea
14+50.02 0.01' EL 161.390 CHAIN RWS15 N 1906028.380 E 6261581.370
FEATURE:OG PD: OG1031
CM:2012-135 dea
15+00.00 -0.08' EL 159.120 CHAIN RWS15 N 1906078.100 E 6261586.480
FEATURE:OG PD: OG1032
CM:2012-135 dea
15+70.04 0.04' EL 156.070 CHAIN RWS15 N 1906147.770 E 6261593.720
FEATURE:OG PD: OG1033
CM:2012-135 dea
16+29.99 0.04' EL 153.130 CHAIN RWS15 N 1906207.420 E 6261599.660
FEATURE:OG PD: OG1034
CM:2012-135 dea
16+89.90 0.04' EL 149.740 CHAIN RWS15 N 1906267.050 E 6261605.450
FEATURE:OG PD: OG1035
CM:2012-135 dea
17+85.02 -0.02' EL 143.730 CHAIN RWS15 N 1906361.440 E 6261617.140
FEATURE:OG PD: OG1036
CM:2012-135 dea
18+50.04 -0.02' EL 140.220 CHAIN RWS15 N 1906425.500 E 6261628.230
FEATURE:OG PD: OG1037
CM:2012-135 dea
19+30.04 -0.01' EL 136.120 CHAIN RWS15 N 1906503.660 E 6261645.250
FEATURE:OG PD: OG1038
CM:2012-135 dea
20+10.04 0.03' EL 134.600 CHAIN RWS15 N 1906580.920 E 6261665.980
FEATURE:OG PD: OG1039
CM:2012-135 dea

20+70.05 -0.06' EL 134.000 CHAIN RWS15 N 1906638.220 E 6261683.810
FEATURE:OG PD: OG1040
CM:2012-135 dea
21+55.02 -0.02' EL 133.210 CHAIN RWS15 N 1906718.130 E 6261712.680
FEATURE:OG PD: OG1041
CM:2012-135 dea
21+91.45 0.04' EL 134.170 CHAIN RWS15 N 1906751.910 E 6261726.320
FEATURE:OG PD: OG1042
CM:2012-135 dea
22+45.00 -0.02' EL 135.670 CHAIN RWS15 N 1906801.510 E 6261746.500
FEATURE:OG PD: OG1043
CM:2012-135 dea
23+25.00 -0.03' EL 135.900 CHAIN RWS15 N 1906875.980 E 6261775.710
FEATURE:OG PD: OG1044
CM:2012-135 dea
24+00.07 -0.00' EL 134.180 CHAIN RWS15 N 1906946.280 E 6261802.040
FEATURE:OG PD: OG1045
CM:2012-135 dea
24+49.99 -0.04' EL 132.500 CHAIN RWS15 N 1906993.270 E 6261818.900
FEATURE:OG PD: OG1046
CM:2012-135 dea
25+09.35 -0.03' EL 130.040 CHAIN RWS15 N 1907049.350 E 6261838.370
FEATURE:OG PD: OG1047
CM:2012-135 dea
25+70.03 -0.02' EL 127.760 CHAIN RWS15 N 1907107.420 E 6261855.910
FEATURE:OG PD: OG1048
CM:2012-135 dea
26+09.98 0.03' EL 126.480 CHAIN RWS15 N 1907146.250 E 6261865.300
FEATURE:OG PD: OG1049
CM:2012-135 dea
26+60.36 -0.03' EL 123.850 CHAIN RWS15 N 1907195.770 E 6261874.510
FEATURE:OG PD: OG1050
CM:2012-135 dea


12-135
FLAG 5 RET WALLS
LNT
RW-15
16x89.90
BC
10+00
10x00
BC
RW-14
14x88.06
EC
10x00
BC
RW-13
14x11.44
EC
10x00
BC
RW-12
12+71.13
EC
10x00
BC
RW-11
EC
18x90.63
SD 5 / GENESEE
PM 29.5

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

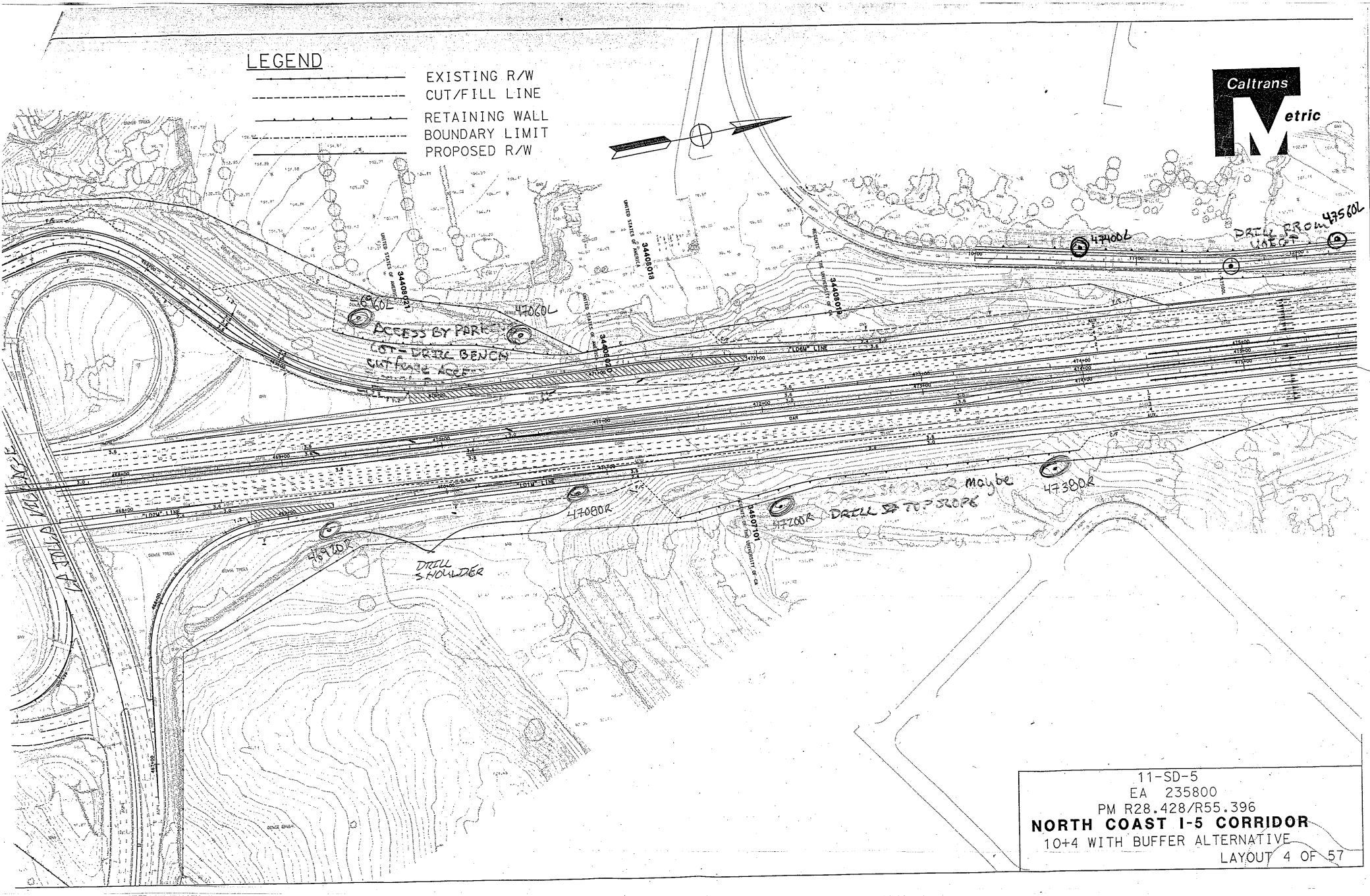
Approved by (Project Engineer or above)

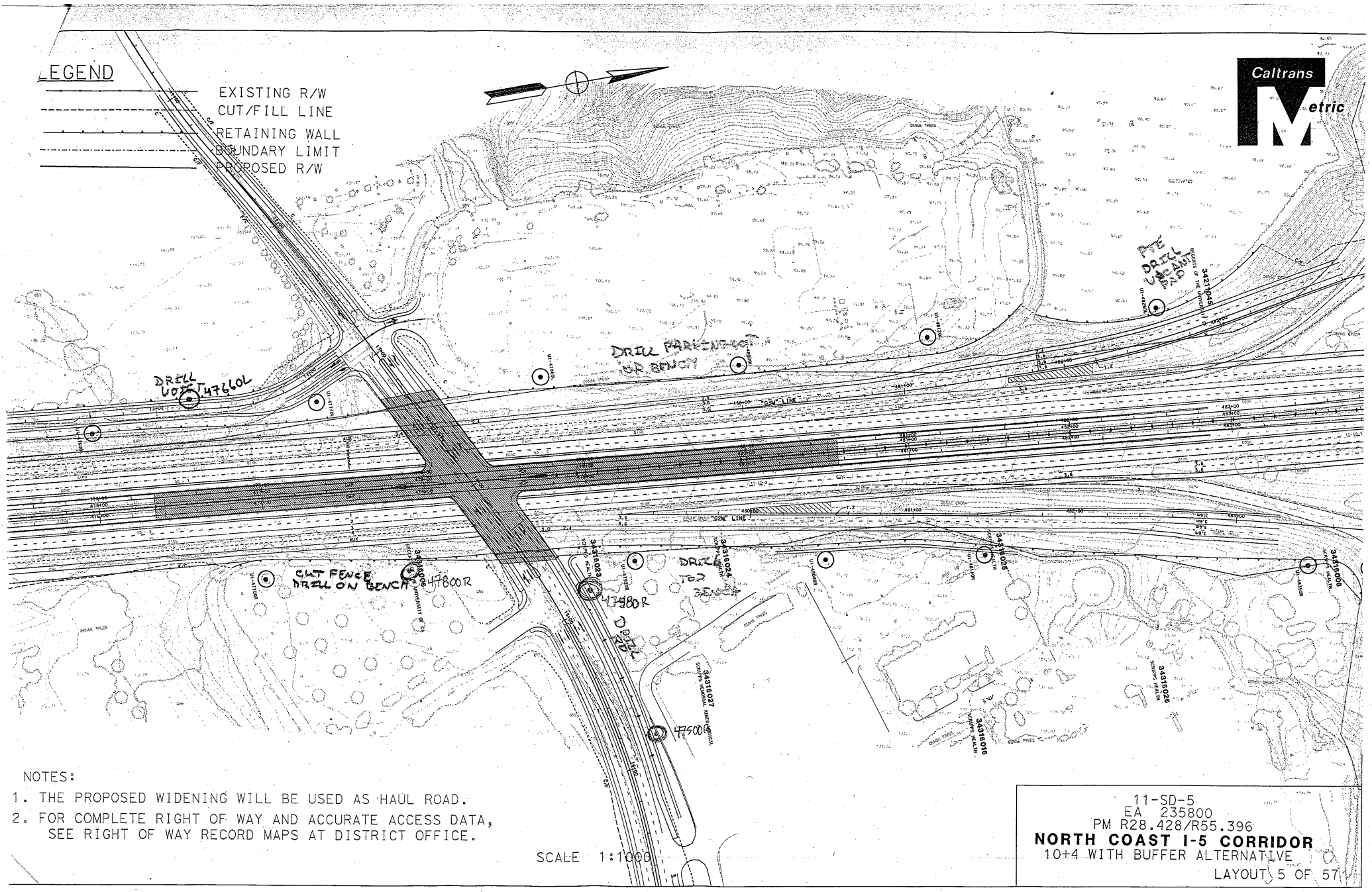
FOR SURVEYS USE ONLY

Date Received: WBS Codes:

Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

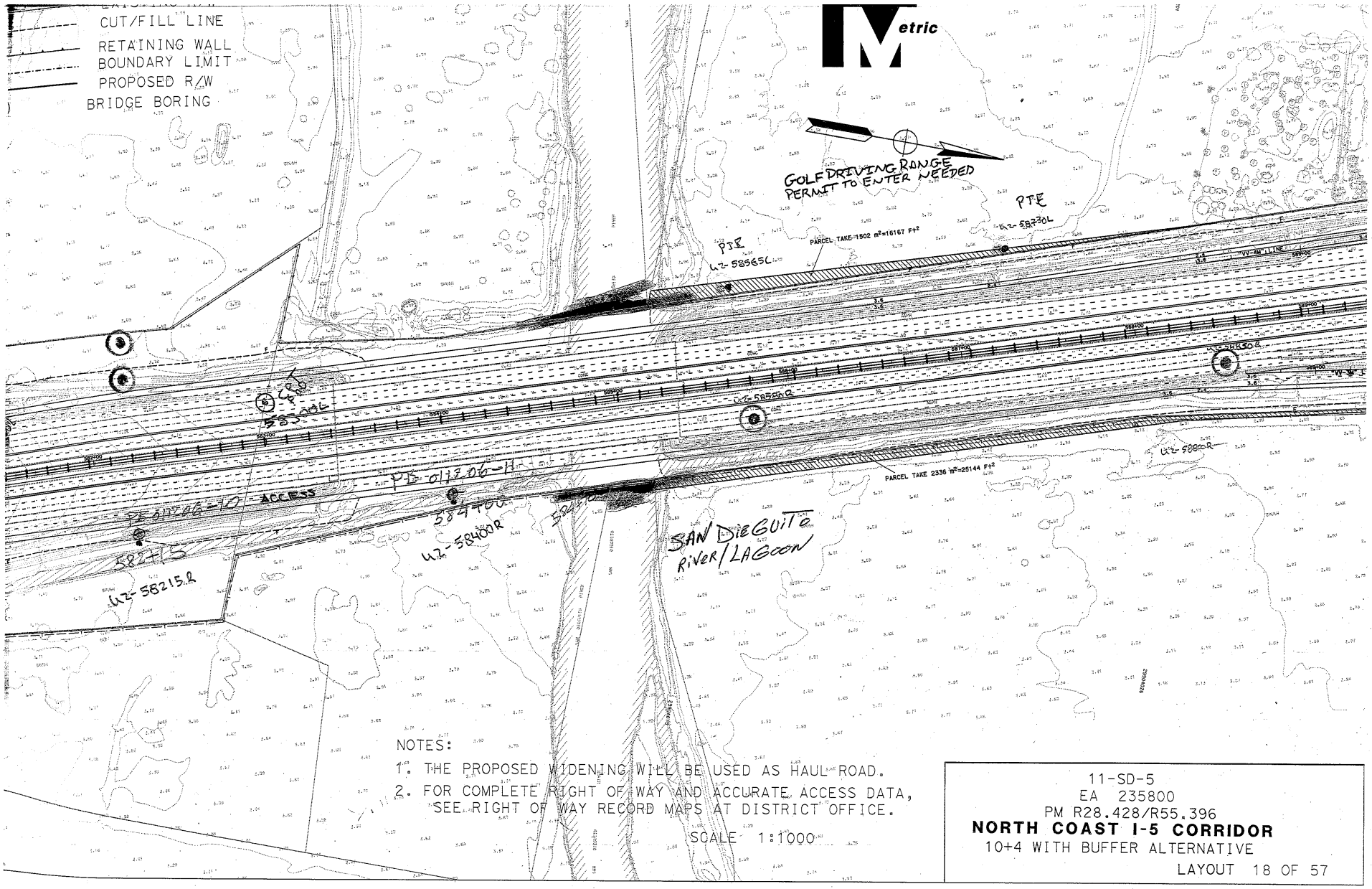
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE

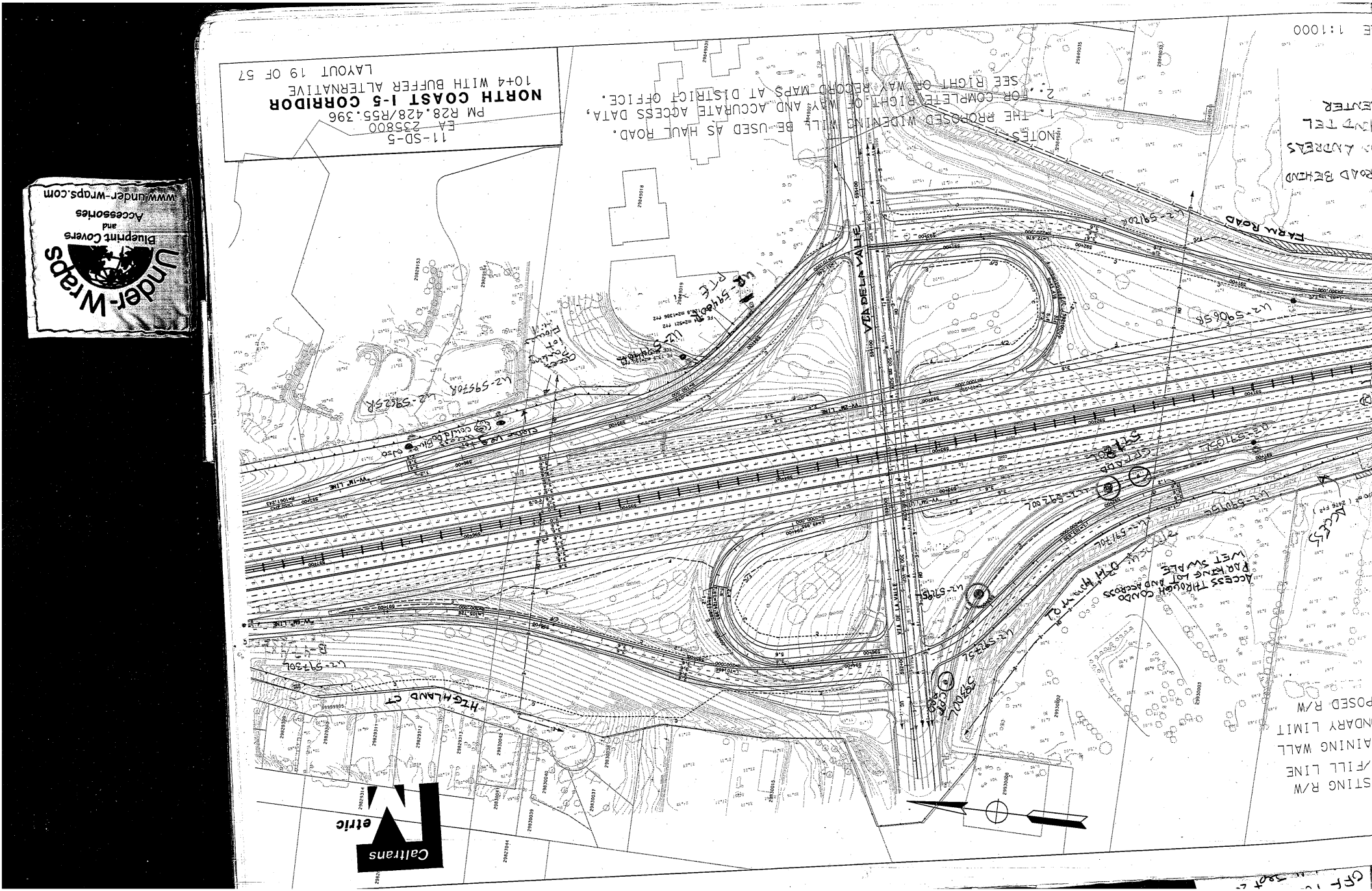

LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47080R
47200R
DRILL SHOULDER
DRILL SHOULDER maybe
DRILL TOP SLOPE
47380R
47080R
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57

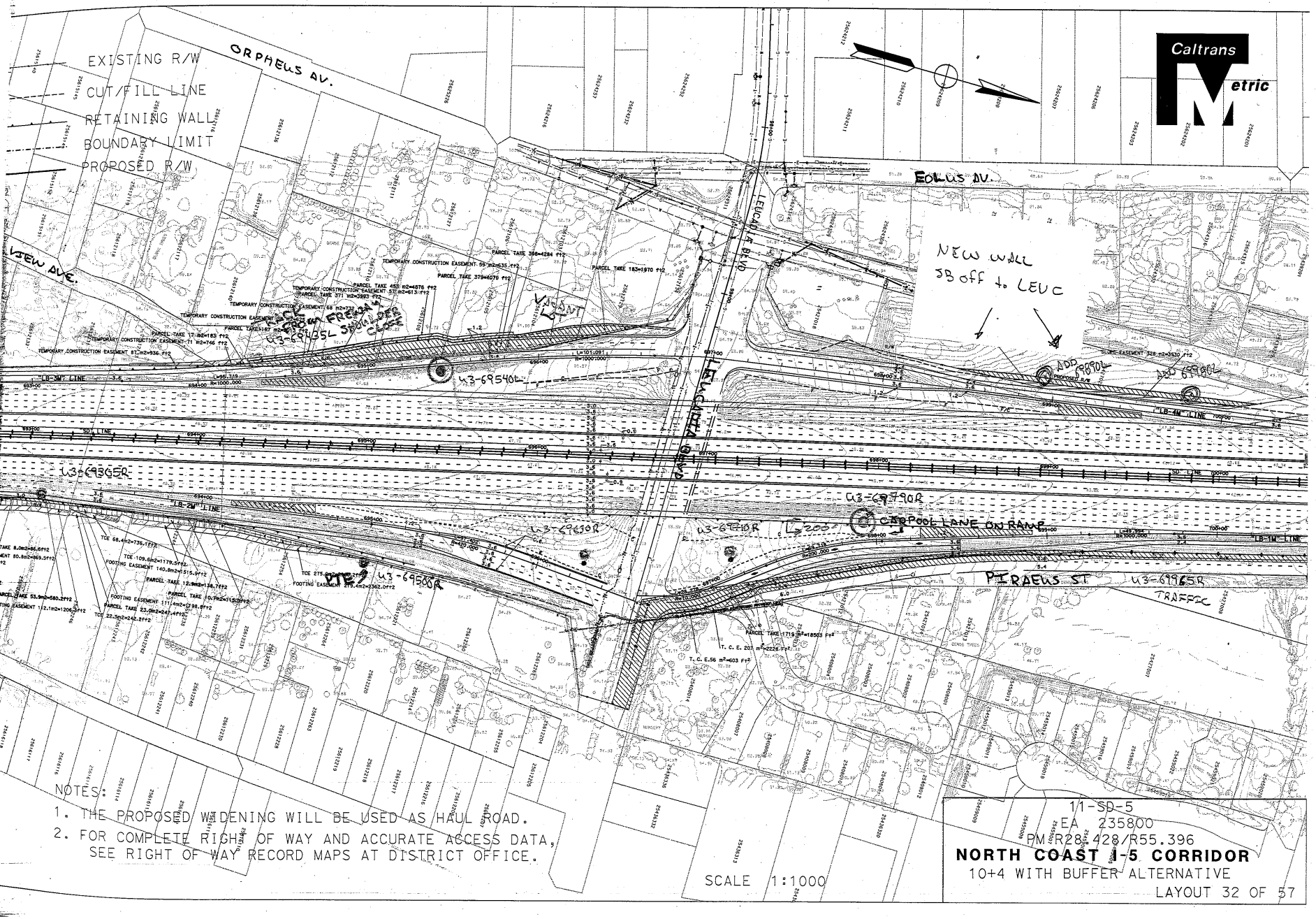


NOTES:

1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57


11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 19 OF 57
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
VIA DE LA VALLE
FARM ROAD
HIGHLAND CT
Caltrans
Metric
Under-Wraps
Blueprint Covers
and
Accessories
www.under-wraps.com


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEGACY BLVD.
NEW WALL SB off to LEVC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69780R
U3-69965R
ADD 69890L
ADD 69980L
"LB-2W" LINE
"LB-4W" LINE
"LB-1W" LINE
SD LINE
Caltrans
Metric
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

WERNER

ANDERSON

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS BUCKETS, ____ PLASTIC BAGS, ____ SHELBY TUBES, ____ BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	DO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11 479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+00 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER 0.11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	5.3	5300
20	1k	2.1	2100
20	1k	1.6	1600
20	1k	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	**6.6**	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		**0.006**

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	**3.1**	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		**0.021**

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	**3.4**	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		**0.030**

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	**1.8**	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		**0.019**

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	**2.1**	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		**0.004**

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		**#DIV/0!**	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		**#DIV/0!**

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 7/18/2008

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-022330
GL 08-070

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 1/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 2/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 12/19/2008

To: Mike Fordham / GDS-2

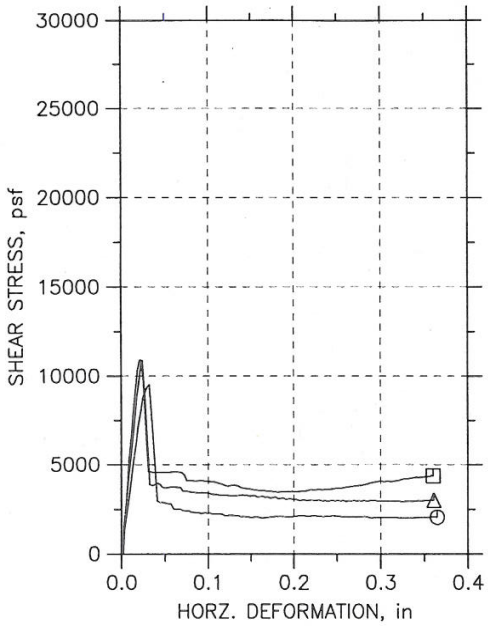
From: Lilibeth C. Purta / (916) 227-5434

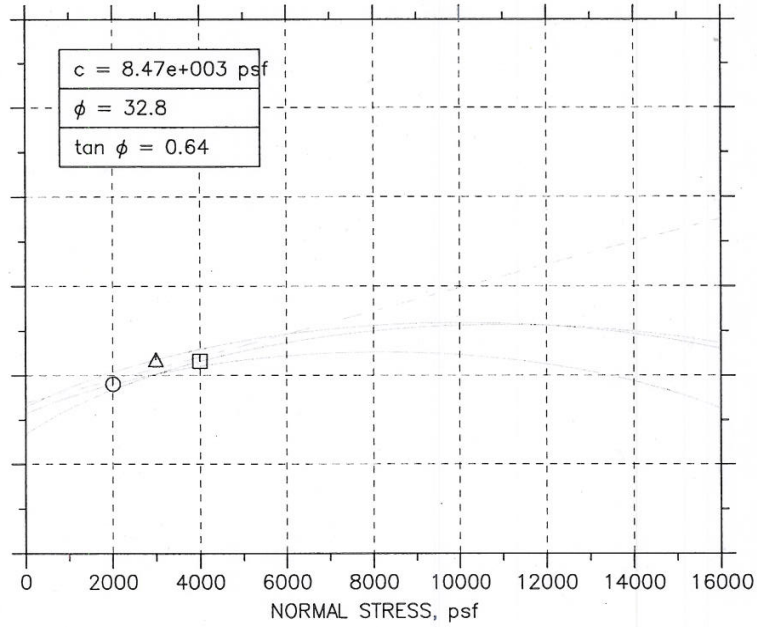
RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

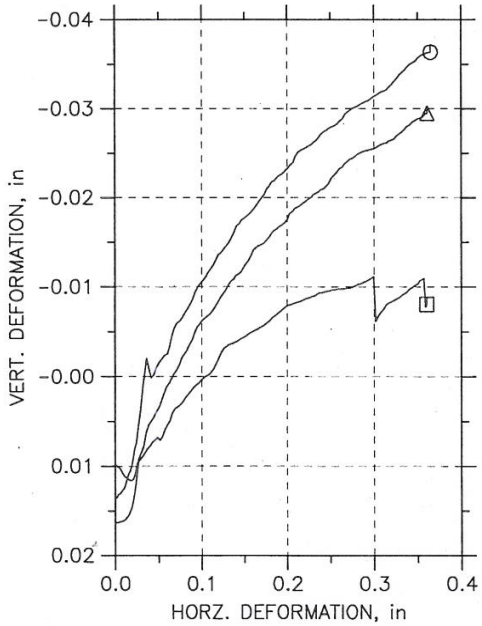
Partial test results.

AASHTO R18

DIRECT SHEAR TEST REPORT





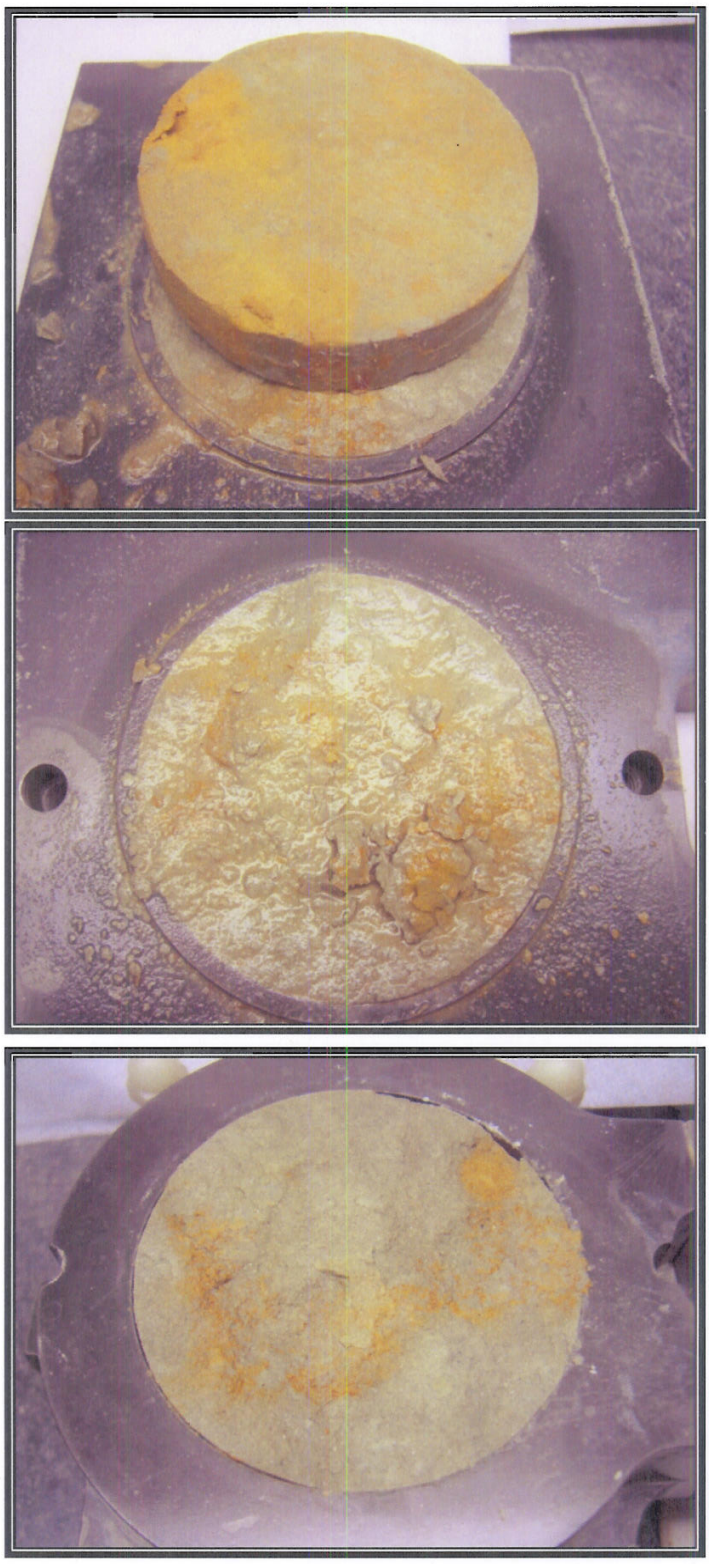


Symbol		⦶	△	⊡	
Test No.		DS08082A	DS08082B	DS08082C	
Sample No.		4	4	4	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.37	2.37	2.37	
	Area, in^2	4.4115	4.4115	4.4115	
	Height, in	1	1	1	
	Water Content, %	16.05	17.70	20.80	
	Dry Density, pcf	107.08	109.76	105.44	
	Saturation, %	73.16	86.29	91.07	
	Void Ratio	0.60324	0.56414	0.62819	
Consol. Height, in		0.98676	0.9837	0.99073	
Consol. Void Ratio		0.58201	0.53863	0.6131	
Final	Water Content, %	21.61	20.14	22.11	
	Dry Density, pcf	103.33	106.62	104.6	
	Saturation, %	89.85	90.77	94.83	
	Void Ratio	0.66149	0.61022	0.64126	
Normal Stress, psf		2016.4	3000.8	4003.7	
Max. Shear Stress, psf		9518.7	10902	10804	
Ult. Shear Stress, psf		2036.2	2996.2	4359.8	
Time to Failure, min		14.001	11.002	11.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

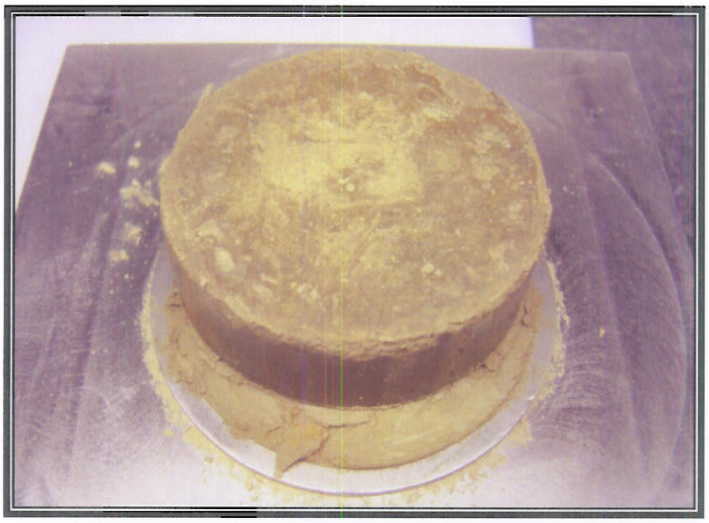
Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.	
Remarks: ASTM D3080	WP 12/12

Thu, 04-DEC-2008 16:56:12

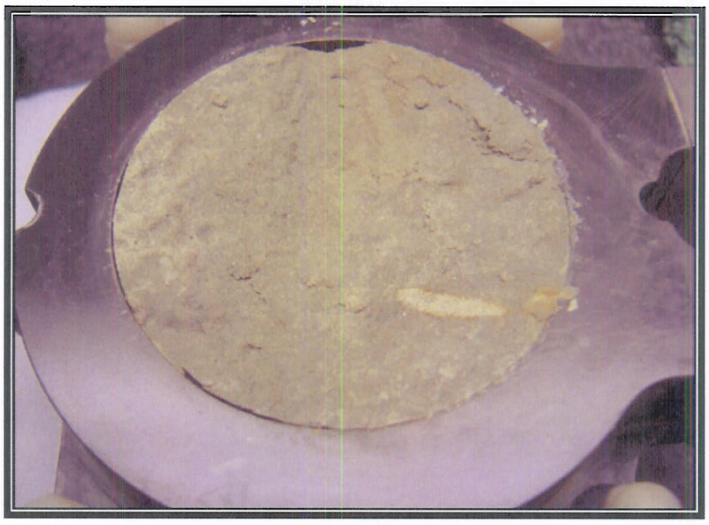
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B

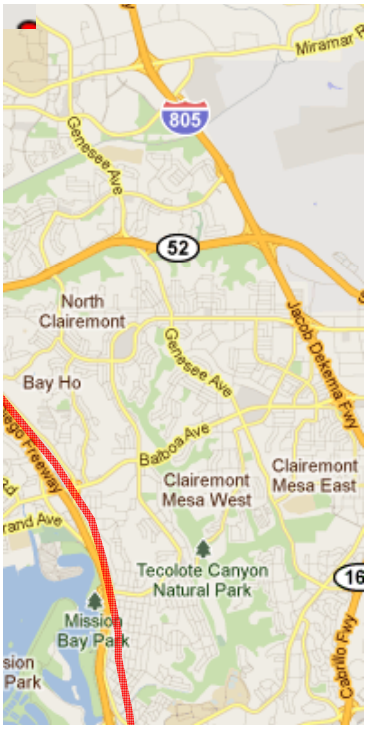


DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C

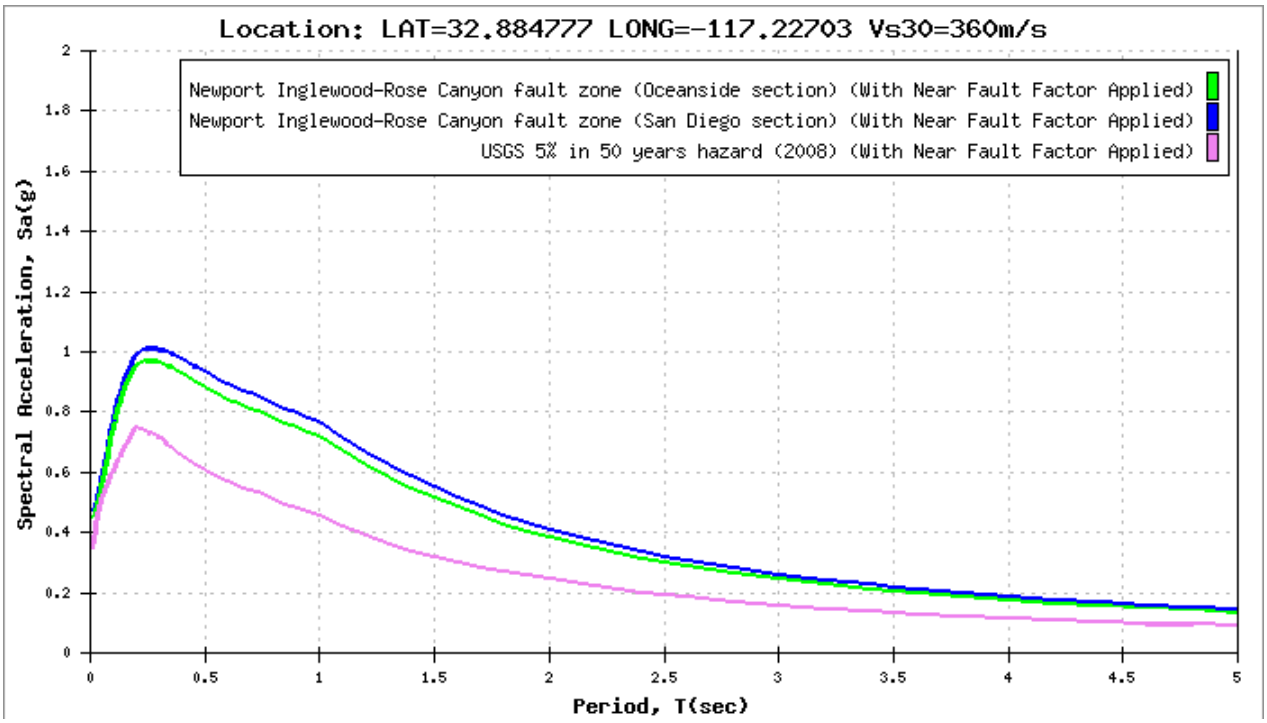


APPENDIX IV
ANALYSES AND CALCULATION

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	360 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	264 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.460	1.000	1.000	0.460
0.022	0.465	1.000	1.000	0.465
0.025	0.473	1.000	1.000	0.473
0.029	0.483	1.000	1.000	0.483
0.03	0.486	1.000	1.000	0.486
0.032	0.493	1.000	1.000	0.493
0.035	0.503	1.000	1.000	0.503
0.036	0.507	1.000	1.000	0.507
0.04	0.521	1.000	1.000	0.521
0.042	0.528	1.000	1.000	0.528
0.044	0.535	1.000	1.000	0.535
0.045	0.539	1.000	1.000	0.539
0.046	0.543	1.000	1.000	0.543
0.048	0.550	1.000	1.000	0.550
0.05	0.557	1.000	1.000	0.557
0.055	0.577	1.000	1.000	0.577
0.06	0.596	1.000	1.000	0.596

0.065	0.615	1.000	1.000	0.615
0.067	0.623	1.000	1.000	0.623
0.07	0.634	1.000	1.000	0.634
0.075	0.653	1.000	1.000	0.653
0.08	0.672	1.000	1.000	0.672
0.085	0.692	1.000	1.000	0.692
0.09	0.711	1.000	1.000	0.711
0.095	0.730	1.000	1.000	0.730
0.1	0.748	1.000	1.000	0.748
0.11	0.780	1.000	1.000	0.780
0.12	0.810	1.000	1.000	0.810
0.13	0.837	1.000	1.000	0.837
0.133	0.844	1.000	1.000	0.844
0.14	0.859	1.000	1.000	0.859
0.15	0.879	1.000	1.000	0.879
0.16	0.898	1.000	1.000	0.898
0.17	0.915	1.000	1.000	0.915
0.18	0.930	1.000	1.000	0.930
0.19	0.943	1.000	1.000	0.943
0.2	0.955	1.000	1.000	0.955
0.22	0.964	1.000	1.000	0.964
0.24	0.971	1.000	1.000	0.971
0.25	0.973	1.000	1.000	0.973
0.26	0.972	1.000	1.000	0.972
0.28	0.971	1.000	1.000	0.971
0.29	0.968	1.000	1.000	0.968
0.3	0.966	1.000	1.000	0.966
0.32	0.960	1.000	1.000	0.960
0.34	0.953	1.000	1.000	0.953
0.35	0.949	1.000	1.000	0.949
0.36	0.945	1.000	1.000	0.945
0.38	0.936	1.000	1.000	0.936
0.4	0.926	1.000	1.000	0.926
0.42	0.918	1.000	1.000	0.918
0.44	0.909	1.000	1.000	0.909
0.45	0.904	1.000	1.000	0.904
0.46	0.900	1.000	1.000	0.900
0.48	0.891	1.000	1.000	0.891
0.5	0.882	1.000	1.000	0.882
0.55	0.843	1.000	1.020	0.860
0.6	0.808	1.000	1.040	0.841
0.65	0.777	1.000	1.060	0.823
0.667	0.767	1.000	1.067	0.818
0.7	0.748	1.000	1.080	0.808
0.75	0.722	1.000	1.100	0.794
0.8	0.693	1.000	1.120	0.777

0.85	0.667	1.000	1.140	0.761
0.9	0.643	1.000	1.160	0.746
0.95	0.620	1.000	1.180	0.732
1	0.599	1.000	1.200	0.719
1.1	0.557	1.000	1.200	0.668
1.2	0.520	1.000	1.200	0.624
1.3	0.486	1.000	1.200	0.583
1.4	0.456	1.000	1.200	0.547
1.5	0.429	1.000	1.200	0.514
1.6	0.402	1.000	1.200	0.482
1.7	0.378	1.000	1.200	0.453
1.8	0.356	1.000	1.200	0.427
1.9	0.337	1.000	1.200	0.404
2	0.319	1.000	1.200	0.383
2.2	0.287	1.000	1.200	0.344
2.4	0.260	1.000	1.200	0.312
2.5	0.249	1.000	1.200	0.298
2.6	0.238	1.000	1.200	0.286
2.8	0.219	1.000	1.200	0.263
3	0.202	1.000	1.200	0.243
3.2	0.188	1.000	1.200	0.225
3.4	0.175	1.000	1.200	0.210
3.5	0.169	1.000	1.200	0.203
3.6	0.164	1.000	1.200	0.197
3.8	0.154	1.000	1.200	0.184
4	0.145	1.000	1.200	0.174
4.2	0.137	1.000	1.200	0.164
4.4	0.130	1.000	1.200	0.156
4.6	0.123	1.000	1.200	0.148
4.8	0.118	1.000	1.200	0.141
5	0.112	1.000	1.200	0.135

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.473	1.000	1.000	0.473
0.02	0.481	1.000	1.000	0.481
0.022	0.487	1.000	1.000	0.487
0.025	0.495	1.000	1.000	0.495
0.029	0.506	1.000	1.000	0.506
0.03	0.508	1.000	1.000	0.508
0.032	0.516	1.000	1.000	0.516
0.035	0.527	1.000	1.000	0.527
0.036	0.530	1.000	1.000	0.530
0.04	0.545	1.000	1.000	0.545
0.042	0.552	1.000	1.000	0.552
0.044	0.560	1.000	1.000	0.560
0.045	0.563	1.000	1.000	0.563
0.046	0.567	1.000	1.000	0.567
0.048	0.575	1.000	1.000	0.575
0.05	0.582	1.000	1.000	0.582
0.055	0.601	1.000	1.000	0.601
0.06	0.621	1.000	1.000	0.621
0.065	0.640	1.000	1.000	0.640
0.067	0.648	1.000	1.000	0.648
0.07	0.659	1.000	1.000	0.659
0.075	0.678	1.000	1.000	0.678
0.08	0.697	1.000	1.000	0.697
0.085	0.717	1.000	1.000	0.717
0.09	0.736	1.000	1.000	0.736
0.095	0.755	1.000	1.000	0.755
0.1	0.773	1.000	1.000	0.773
0.11	0.806	1.000	1.000	0.806
0.12	0.837	1.000	1.000	0.837
0.13	0.864	1.000	1.000	0.864
0.133	0.871	1.000	1.000	0.871
0.14	0.887	1.000	1.000	0.887
0.15	0.907	1.000	1.000	0.907
0.16	0.928	1.000	1.000	0.928
0.17	0.945	1.000	1.000	0.945
0.18	0.962	1.000	1.000	0.962
0.19	0.976	1.000	1.000	0.976
0.2	0.989	1.000	1.000	0.989
0.22	1.001	1.000	1.000	1.001
0.24	1.010	1.000	1.000	1.010
0.25	1.013	1.000	1.000	1.013
0.26	1.012	1.000	1.000	1.012
0.28	1.012	1.000	1.000	1.012

0.29	1.011	1.000	1.000	1.011
0.3	1.009	1.000	1.000	1.009
0.32	1.005	1.000	1.000	1.005
0.34	0.999	1.000	1.000	0.999
0.35	0.995	1.000	1.000	0.995
0.36	0.991	1.000	1.000	0.991
0.38	0.983	1.000	1.000	0.983
0.4	0.974	1.000	1.000	0.974
0.42	0.966	1.000	1.000	0.966
0.44	0.957	1.000	1.000	0.957
0.45	0.953	1.000	1.000	0.953
0.46	0.949	1.000	1.000	0.949
0.48	0.940	1.000	1.000	0.940
0.5	0.932	1.000	1.000	0.932
0.55	0.893	1.000	1.020	0.911
0.6	0.857	1.000	1.040	0.892
0.65	0.825	1.000	1.060	0.875
0.667	0.815	1.000	1.067	0.870
0.7	0.796	1.000	1.080	0.860
0.75	0.769	1.000	1.100	0.846
0.8	0.739	1.000	1.120	0.828
0.85	0.712	1.000	1.140	0.811
0.9	0.686	1.000	1.160	0.795
0.95	0.662	1.000	1.180	0.781
1	0.639	1.000	1.200	0.767
1.1	0.594	1.000	1.200	0.713
1.2	0.555	1.000	1.200	0.666
1.3	0.519	1.000	1.200	0.623
1.4	0.487	1.000	1.200	0.585
1.5	0.458	1.000	1.200	0.550
1.6	0.430	1.000	1.200	0.516
1.7	0.404	1.000	1.200	0.485
1.8	0.381	1.000	1.200	0.457
1.9	0.360	1.000	1.200	0.432
2	0.341	1.000	1.200	0.410
2.2	0.307	1.000	1.200	0.368
2.4	0.279	1.000	1.200	0.334
2.5	0.266	1.000	1.200	0.319
2.6	0.255	1.000	1.200	0.306
2.8	0.234	1.000	1.200	0.281
3	0.216	1.000	1.200	0.260
3.2	0.201	1.000	1.200	0.241
3.4	0.187	1.000	1.200	0.225
3.5	0.181	1.000	1.200	0.217
3.6	0.175	1.000	1.200	0.210
3.8	0.164	1.000	1.200	0.197

4	0.155	1.000	1.200	0.186
4.2	0.147	1.000	1.200	0.176
4.4	0.139	1.000	1.200	0.167
4.6	0.132	1.000	1.200	0.159
4.8	0.126	1.000	1.200	0.151
5	0.120	1.000	1.200	0.144

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.347	1.000	1.000	0.347
0.02	0.410	1.000	1.000	0.410
0.022	0.419	1.000	1.000	0.419
0.025	0.433	1.000	1.000	0.433
0.029	0.448	1.000	1.000	0.448
0.03	0.452	1.000	1.000	0.452
0.032	0.459	1.000	1.000	0.459
0.035	0.469	1.000	1.000	0.469
0.036	0.472	1.000	1.000	0.472
0.04	0.485	1.000	1.000	0.485
0.042	0.490	1.000	1.000	0.490
0.044	0.496	1.000	1.000	0.496
0.045	0.499	1.000	1.000	0.499
0.046	0.501	1.000	1.000	0.501
0.048	0.507	1.000	1.000	0.507
0.05	0.512	1.000	1.000	0.512
0.055	0.524	1.000	1.000	0.524
0.06	0.535	1.000	1.000	0.535
0.065	0.545	1.000	1.000	0.545
0.067	0.549	1.000	1.000	0.549
0.07	0.555	1.000	1.000	0.555
0.075	0.564	1.000	1.000	0.564
0.08	0.573	1.000	1.000	0.573
0.085	0.582	1.000	1.000	0.582
0.09	0.590	1.000	1.000	0.590
0.095	0.598	1.000	1.000	0.598
0.1	0.605	1.000	1.000	0.605
0.11	0.623	1.000	1.000	0.623
0.12	0.639	1.000	1.000	0.639
0.13	0.655	1.000	1.000	0.655
0.133	0.659	1.000	1.000	0.659

0.14	0.670	1.000	1.000	0.670
0.15	0.684	1.000	1.000	0.684
0.16	0.697	1.000	1.000	0.697
0.17	0.710	1.000	1.000	0.710
0.18	0.723	1.000	1.000	0.723
0.19	0.735	1.000	1.000	0.735
0.2	0.746	1.000	1.000	0.746
0.22	0.740	1.000	1.000	0.740
0.24	0.734	1.000	1.000	0.734
0.25	0.731	1.000	1.000	0.731
0.26	0.728	1.000	1.000	0.728
0.28	0.724	1.000	1.000	0.724
0.29	0.721	1.000	1.000	0.721
0.3	0.719	1.000	1.000	0.719
0.32	0.704	1.000	1.000	0.704
0.34	0.690	1.000	1.000	0.690
0.35	0.683	1.000	1.000	0.683
0.36	0.677	1.000	1.000	0.677
0.38	0.664	1.000	1.000	0.664
0.4	0.653	1.000	1.000	0.653
0.42	0.643	1.000	1.000	0.643
0.44	0.633	1.000	1.000	0.633
0.45	0.628	1.000	1.000	0.628
0.46	0.623	1.000	1.000	0.623
0.48	0.615	1.000	1.000	0.615
0.5	0.606	1.000	1.000	0.606
0.55	0.573	1.000	1.020	0.584
0.6	0.544	1.000	1.040	0.566
0.65	0.519	1.000	1.060	0.550
0.667	0.511	1.000	1.067	0.545
0.7	0.497	1.000	1.080	0.536
0.75	0.477	1.000	1.100	0.524
0.8	0.454	1.000	1.120	0.508
0.85	0.433	1.000	1.140	0.493
0.9	0.414	1.000	1.160	0.480
0.95	0.397	1.000	1.180	0.469
1	0.382	1.000	1.200	0.458
1.1	0.350	1.000	1.200	0.420
1.2	0.323	1.000	1.200	0.388
1.3	0.301	1.000	1.200	0.361
1.4	0.281	1.000	1.200	0.337
1.5	0.264	1.000	1.200	0.317
1.6	0.249	1.000	1.200	0.299
1.7	0.236	1.000	1.200	0.283
1.8	0.224	1.000	1.200	0.268
1.9	0.213	1.000	1.200	0.255

2	0.203	1.000	1.200	0.244
2.2	0.183	1.000	1.200	0.220
2.4	0.167	1.000	1.200	0.200
2.5	0.159	1.000	1.200	0.191
2.6	0.153	1.000	1.200	0.183
2.8	0.141	1.000	1.200	0.169
3	0.130	1.000	1.200	0.157
3.2	0.121	1.000	1.200	0.145
3.4	0.113	1.000	1.200	0.135
3.5	0.109	1.000	1.200	0.131
3.6	0.105	1.000	1.200	0.126
3.8	0.099	1.000	1.200	0.119
4	0.093	1.000	1.200	0.112
4.2	0.089	1.000	1.200	0.107
4.4	0.085	1.000	1.200	0.102
4.6	0.082	1.000	1.200	0.098
4.8	0.079	1.000	1.200	0.094
5	0.076	1.000	1.200	0.091

Envelope Data

Period	SA
0.01	0.451
0.02	0.460
0.022	0.465
0.025	0.473
0.029	0.483
0.03	0.486
0.032	0.493
0.035	0.503
0.036	0.507
0.04	0.521
0.042	0.528
0.044	0.535
0.045	0.539
0.046	0.543
0.048	0.550
0.05	0.557
0.055	0.577
0.06	0.596
0.065	0.615
0.067	0.623
0.07	0.634
0.075	0.653

0.08	0.672
0.085	0.692
0.09	0.711
0.095	0.730
0.1	0.748
0.11	0.780
0.12	0.810
0.13	0.837
0.133	0.844
0.14	0.859
0.15	0.879
0.16	0.898
0.17	0.915
0.18	0.930
0.19	0.943
0.2	0.955
0.22	0.964
0.24	0.971
0.25	0.973
0.26	0.972
0.28	0.971
0.29	0.968
0.3	0.966
0.32	0.960
0.34	0.953
0.35	0.949
0.36	0.945
0.38	0.936
0.4	0.926
0.42	0.918
0.44	0.909
0.45	0.904
0.46	0.900
0.48	0.891
0.5	0.882
0.55	0.860
0.6	0.841
0.65	0.823
0.667	0.818
0.7	0.808
0.75	0.794
0.8	0.777
0.85	0.761
0.9	0.746
0.95	0.732
1	0.719

1.1	0.668
1.2	0.624
1.3	0.583
1.4	0.547
1.5	0.514
1.6	0.482
1.7	0.453
1.8	0.427
1.9	0.404
2	0.383
2.2	0.344
2.4	0.312
2.5	0.298
2.6	0.286
2.8	0.263
3	0.243
3.2	0.225
3.4	0.210
3.5	0.203
3.6	0.197
3.8	0.184
4	0.174
4.2	0.164
4.4	0.156
4.6	0.148
4.8	0.141
5	0.135

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} *(km)*	0	

Distance

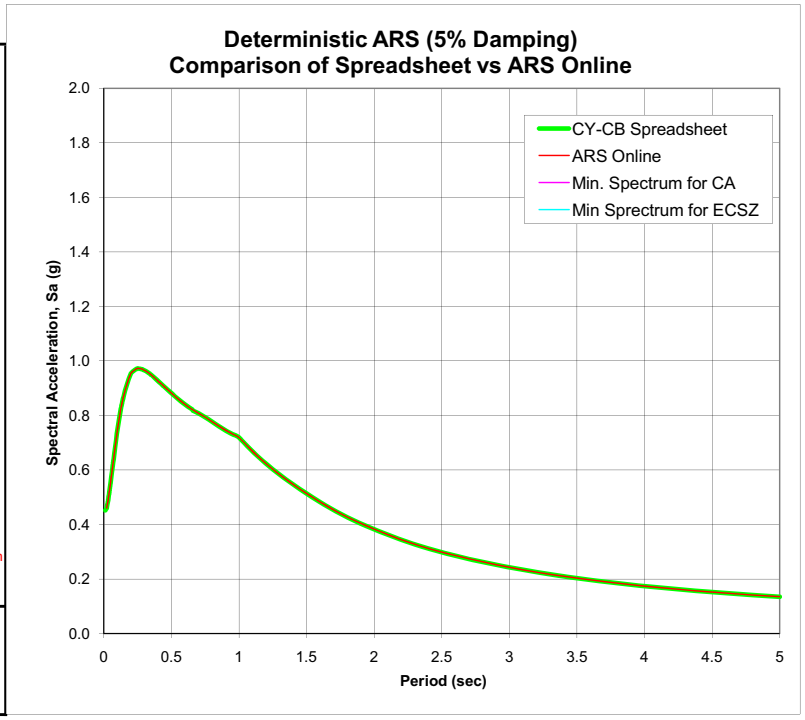
R_{RUP} *(km)*	4.2	
R_{JB} *(km)*	4.2	
R_x *(km)*	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} *(m/sec)*	360	(270 to 1500 m/s)
$Z_{1.0}$ *(m)*	264	(0 - No Basin)
$Z_{2.5}$ *(km)*	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45139
0.020	0.45947
0.022	0.46490
0.025	0.47294
0.029	0.48278
0.030	0.48562
0.032	0.49264
0.035	0.50314
0.036	0.50673
0.040	0.52058
0.042	0.52790
0.044	0.53500
0.045	0.53880
0.046	0.54250
0.048	0.54974
0.050	0.55711
0.055	0.57641
0.060	0.59603
0.065	0.61508
0.067	0.62288
0.070	0.63405
0.075	0.65285
0.080	0.67234
0.085	0.69186
0.090	0.71071
0.095	0.72940
0.100	0.74759
0.110	0.78037
0.120	0.81031
0.130	0.83671
0.133	0.84361
0.140	0.85907
0.150	0.87910
0.160	0.89809
0.170	0.91439

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.46	1	1	0.46	0%
0.022	0.465	1	1	0.465	0%
0.025	0.473	1	1	0.473	0%
0.029	0.483	1	1	0.483	0%
0.03	0.486	1	1	0.486	0%
0.032	0.493	1	1	0.493	0%
0.035	0.503	1	1	0.503	0%
0.036	0.507	1	1	0.507	0%
0.04	0.521	1	1	0.521	0%
0.042	0.528	1	1	0.528	0%
0.044	0.535	1	1	0.535	0%
0.045	0.539	1	1	0.539	0%
0.046	0.543	1	1	0.543	0%
0.048	0.55	1	1	0.55	0%
0.05	0.557	1	1	0.557	0%
0.055	0.577	1	1	0.577	0%
0.06	0.596	1	1	0.596	0%
0.065	0.615	1	1	0.615	0%
0.067	0.623	1	1	0.623	0%
0.07	0.634	1	1	0.634	0%
0.075	0.653	1	1	0.653	0%
0.08	0.672	1	1	0.672	0%
0.085	0.692	1	1	0.692	0%
0.09	0.711	1	1	0.711	0%
0.095	0.73	1	1	0.73	0%
0.1	0.748	1	1	0.748	0%
0.11	0.78	1	1	0.78	0%
0.12	0.81	1	1	0.81	0%
0.13	0.837	1	1	0.837	0%
0.133	0.844	1	1	0.844	0%
0.14	0.859	1	1	0.859	0%
0.15	0.879	1	1	0.879	0%
0.16	0.898	1	1	0.898	0%
0.17	0.915	1	1	0.915	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

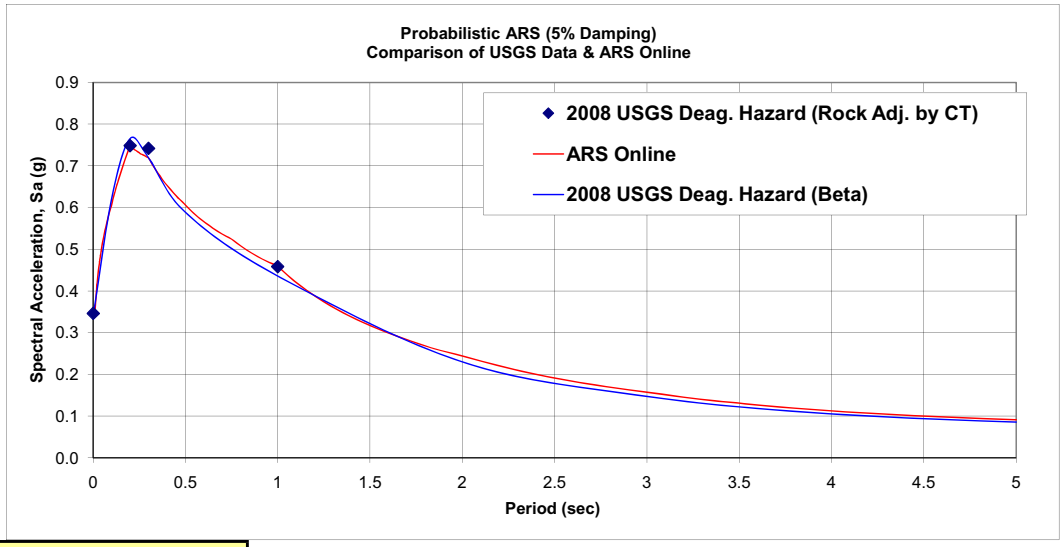
Deterministic_Response_Spectrum_072809.xls 9/19/2011 10:51 AM

0.180	0.92942	0.18	0.93	1	1	0.93	0%				
0.190	0.94265	0.19	0.943	1	1	0.943	0%				
0.200	0.95443	0.2	0.955	1	1	0.955	0%				
0.220	0.96409	0.22	0.964	1	1	0.964	0%				
0.240	0.97074	0.24	0.971	1	1	0.971	0%				
0.250	0.97261	0.25	0.973	1	1	0.973	0%				
0.260	0.97171	0.26	0.972	1	1	0.972	0%				
0.280	0.97033	0.28	0.971	1	1	0.971	0%				
0.290	0.96791	0.29	0.968	1	1	0.968	0%				
0.300	0.96562	0.3	0.966	1	1	0.966	0%				
0.320	0.96013	0.32	0.96	1	1	0.96	0%				
0.340	0.95309	0.34	0.953	1	1	0.953	0%				
0.350	0.94896	0.35	0.949	1	1	0.949	0%				
0.360	0.94494	0.36	0.945	1	1	0.945	0%				
0.380	0.93573	0.38	0.936	1	1	0.936	0%				
0.400	0.92617	0.4	0.926	1	1	0.926	0%				
0.420	0.91759	0.42	0.918	1	1	0.918	0%				
0.440	0.90828	0.44	0.909	1	1	0.909	0%				
0.450	0.90398	0.45	0.904	1	1	0.904	0%				
0.460	0.89951	0.46	0.9	1	1	0.9	0%				
0.480	0.89025	0.48	0.891	1	1	0.891	0%				
0.500	0.88172	0.5	0.882	1	1	0.882	0%				
0.550	0.85945	0.55	0.843	1	1.02	0.86	0%				
0.600	0.84028	0.6	0.808	1	1.04	0.841	0%				
0.650	0.82311	0.65	0.777	1	1.06	0.823	0%				
0.660	0.81721	0.667	0.767	1	1.067	0.818	0%				
0.700	0.80777	0.7	0.748	1	1.08	0.808	0%				
0.750	0.79391	0.75	0.722	1	1.1	0.794	0%				
0.800	0.77635	0.8	0.693	1	1.12	0.777	0%				
0.850	0.76043	0.85	0.667	1	1.14	0.761	0%				
0.900	0.74535	0.9	0.643	1	1.16	0.746	0%				
0.950	0.73161	0.95	0.62	1	1.18	0.732	0%				
1.000	0.71844	1	0.599	1	1.2	0.719	0%				
1.100	0.66744	1.1	0.557	1	1.2	0.668	0%				
1.200	0.62274	1.2	0.52	1	1.2	0.624	0%				
1.300	0.58253	1.3	0.486	1	1.2	0.583	0%				
1.400	0.54648	1.4	0.456	1	1.2	0.547	0%				
1.500	0.51357	1.5	0.429	1	1.2	0.514	0%				
1.600	0.48149	1.6	0.402	1	1.2	0.482	0%				
1.700	0.45257	1.7	0.378	1	1.2	0.453	0%				
1.800	0.42652	1.8	0.356	1	1.2	0.427	0%				
1.900	0.40307	1.9	0.337	1	1.2	0.404	0%				
2.000	0.38213	2	0.319	1	1.2	0.383	0%				
2.200	0.34354	2.2	0.287	1	1.2	0.344	0%				
2.400	0.31177	2.4	0.26	1	1.2	0.312	0%				
2.500	0.29779	2.5	0.249	1	1.2	0.298	0%				
2.600	0.28492	2.6	0.238	1	1.2	0.286	0%				
2.800	0.26192	2.8	0.219	1	1.2	0.263	0%				
3.000	0.24206	3	0.202	1	1.2	0.243	0%				
3.200	0.22481	3.2	0.188	1	1.2	0.225	0%				
3.400	0.20959	3.4	0.175	1	1.2	0.21	0%				
3.500	0.20264	3.5	0.169	1	1.2	0.203	0%				
3.600	0.19608	3.6	0.164	1	1.2	0.197	0%				
3.800	0.18399	3.8	0.154	1	1.2	0.184	0%				
4.000	0.17319	4	0.145	1	1.2	0.174	0%				
4.200	0.16400	4.2	0.137	1	1.2	0.164	0%				
4.400	0.15555	4.4	0.13	1	1.2	0.156	0%				
4.600	0.14783	4.6	0.123	1	1.2	0.148	0%				
4.800	0.14078	4.8	0.118	1	1.2	0.141	0%				
5.000	0.13425	5	0.112	1	1.2	0.135	1%				

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	360
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.1
$Z_{1.0}$ (m) =	264
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.347	1	1	0.347
0.02	0.41	1	1	0.41
0.022	0.419	1	1	0.419
0.025	0.433	1	1	0.433
0.029	0.448	1	1	0.448
0.03	0.452	1	1	0.452
0.032	0.459	1	1	0.459
0.035	0.469	1	1	0.469
0.036	0.472	1	1	0.472
0.04	0.485	1	1	0.485
0.042	0.49	1	1	0.49
0.044	0.496	1	1	0.496
0.045	0.499	1	1	0.499
0.046	0.501	1	1	0.501
0.048	0.507	1	1	0.507
0.05	0.512	1	1	0.512
0.055	0.524	1	1	0.524
0.06	0.535	1	1	0.535
0.065	0.545	1	1	0.545
0.067	0.549	1	1	0.549
0.07	0.555	1	1	0.555
0.075	0.564	1	1	0.564
0.08	0.573	1	1	0.573
0.085	0.582	1	1	0.582
0.09	0.59	1	1	0.59
0.095	0.598	1	1	0.598
0.1	0.605	1	1	0.605
0.11	0.623	1	1	0.623
0.12	0.639	1	1	0.639
0.13	0.655	1	1	0.655
0.133	0.659	1	1	0.659
0.14	0.67	1	1	0.67
0.15	0.684	1	1	0.684
0.16	0.697	1	1	0.697
0.17	0.71	1	1	0.71
0.18	0.723	1	1	0.723
0.19	0.735	1	1	0.735
0.2	0.746	1	1	0.746
0.22	0.74	1	1	0.74
0.24	0.734	1	1	0.734
0.25	0.731	1	1	0.731
0.26	0.728	1	1	0.728
0.28	0.724	1	1	0.724

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.128	1.000	0.346	0.347	-0.3%
0.2	0.722	1.000	1.037	1.000	0.748	0.746	0.3%
0.3	0.597	1.000	1.242	1.000	0.742	0.719	3.1%
1	0.228	1.200	1.673	1.000	0.458	0.458	0.1%

Max % Difference = 3.1%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.3398	1.000	1.000	0.340	0.347	2.1%
0.1	0.6208	1.000	1.000	0.621	0.605	2.5%
0.2	0.7651	1.000	1.000	0.765	0.746	2.5%
0.3	0.7188	1.000	1.000	0.719	0.719	0.0%
0.5	0.5881	1.000	1.000	0.588	0.606	3.0%
1	0.3631	1.200	1.000	0.436	0.458	5.1%
2	0.1914	1.200	1.000	0.230	0.244	6.2%
3	0.12256	1.200	1.000	0.147	0.157	6.8%
4	0.08762	1.200	1.000	0.105	0.112	6.5%
5	0.07141	1.200	1.000	0.086	0.091	6.2%

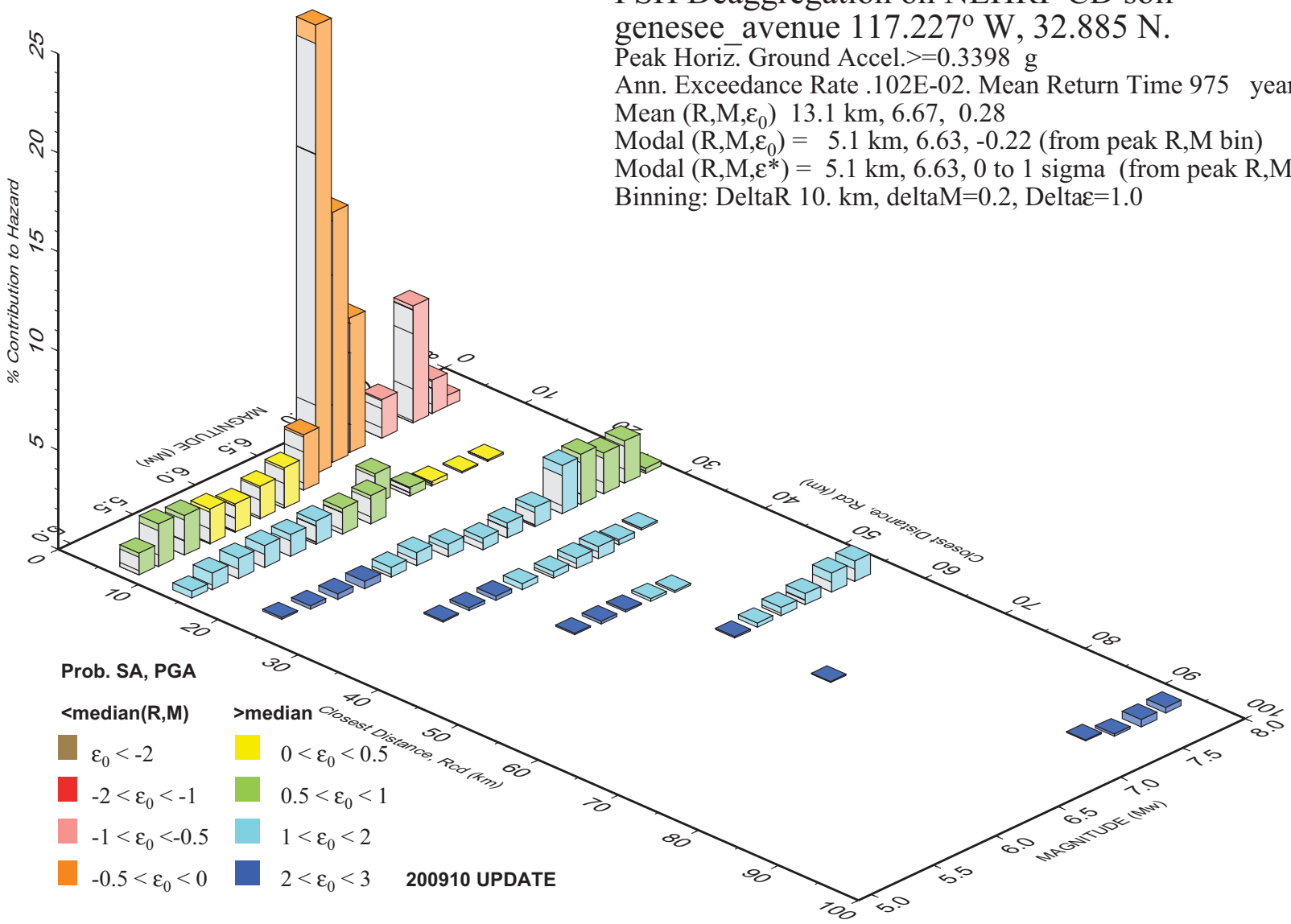
Max % Difference = 6.8%

Probabilistic_Response_Spectrum_080409.xls 9/19/2011 10:55 AM

0.29	0.721	1	1	0.721
0.3	0.719	1	1	0.719
0.32	0.704	1	1	0.704
0.34	0.69	1	1	0.69
0.35	0.683	1	1	0.683
0.36	0.677	1	1	0.677
0.38	0.664	1	1	0.664
0.4	0.653	1	1	0.653
0.42	0.643	1	1	0.643
0.44	0.633	1	1	0.633
0.45	0.628	1	1	0.628
0.46	0.623	1	1	0.623
0.48	0.615	1	1	0.615
0.5	0.606	1	1	0.606
0.55	0.573	1	1.02	0.584
0.6	0.544	1	1.04	0.566
0.65	0.519	1	1.06	0.55
0.667	0.511	1	1.067	0.545
0.7	0.497	1	1.08	0.536
0.75	0.477	1	1.1	0.524
0.8	0.454	1	1.12	0.508
0.85	0.433	1	1.14	0.493
0.9	0.414	1	1.16	0.48
0.95	0.397	1	1.18	0.469
1	0.382	1	1.2	0.458
1.1	0.35	1	1.2	0.42
1.2	0.323	1	1.2	0.388
1.3	0.301	1	1.2	0.361
1.4	0.281	1	1.2	0.337
1.5	0.264	1	1.2	0.317
1.6	0.249	1	1.2	0.299
1.7	0.236	1	1.2	0.283
1.8	0.224	1	1.2	0.268
1.9	0.213	1	1.2	0.255
2	0.203	1	1.2	0.244
2.2	0.183	1	1.2	0.22
2.4	0.167	1	1.2	0.2
2.5	0.159	1	1.2	0.191
2.6	0.153	1	1.2	0.183
2.8	0.141	1	1.2	0.169
3	0.13	1	1.2	0.157
3.2	0.121	1	1.2	0.145
3.4	0.113	1	1.2	0.135
3.5	0.109	1	1.2	0.131
3.6	0.105	1	1.2	0.126
3.8	0.099	1	1.2	0.119
4	0.093	1	1.2	0.112
4.2	0.089	1	1.2	0.107
4.4	0.085	1	1.2	0.102
4.6	0.082	1	1.2	0.098
4.8	0.079	1	1.2	0.094
5	0.076	1	1.2	0.091

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

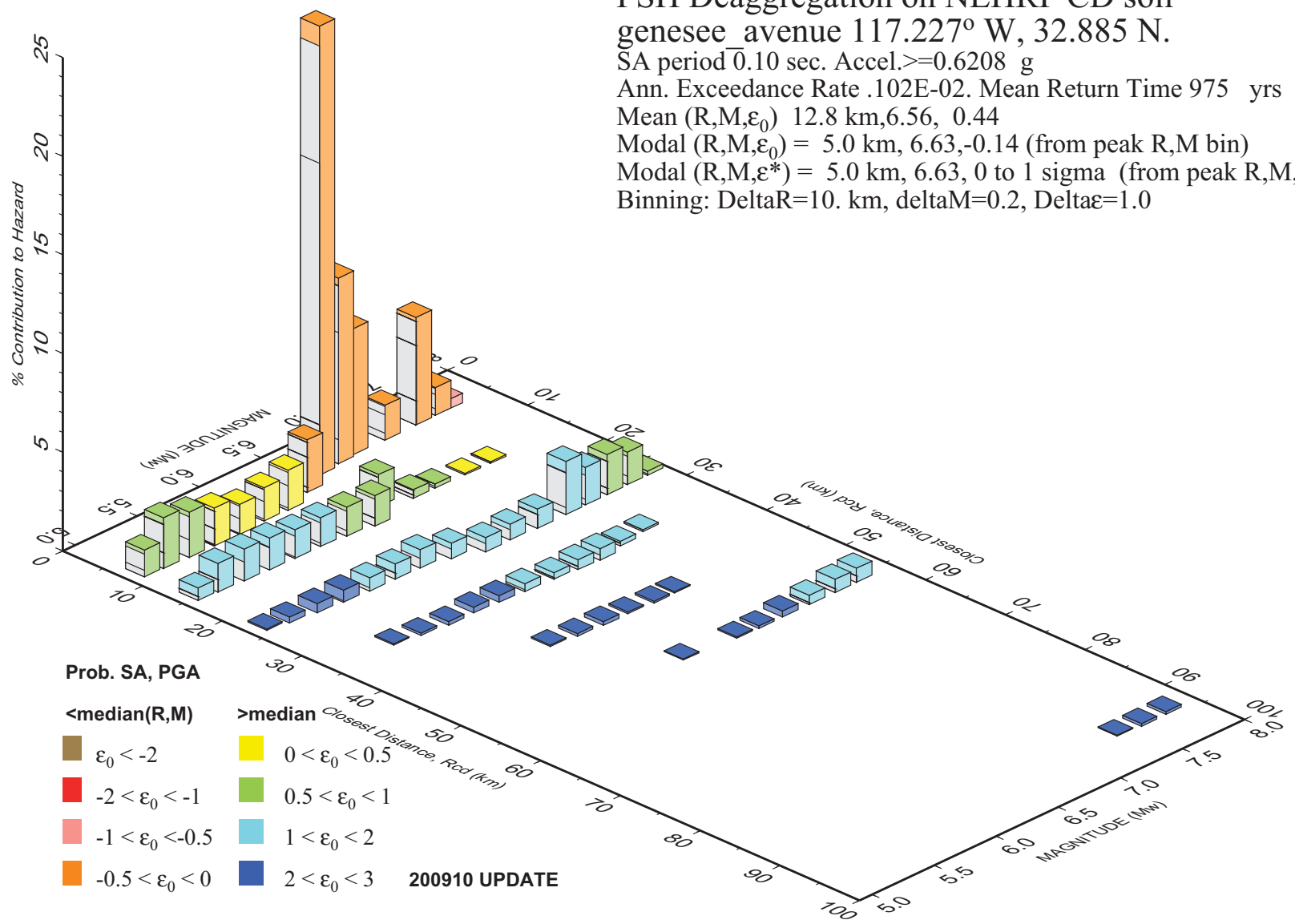
Peak Horiz. Ground Accel.>=0.3398 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 years
Mean (R,M,ε_0) 13.1 km, 6.67, 0.28
Modal (R,M,ε_0) = 5.1 km, 6.63, -0.22 (from peak R,M bin)
Modal (R,M,ε*) = 5.1 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:39:21 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

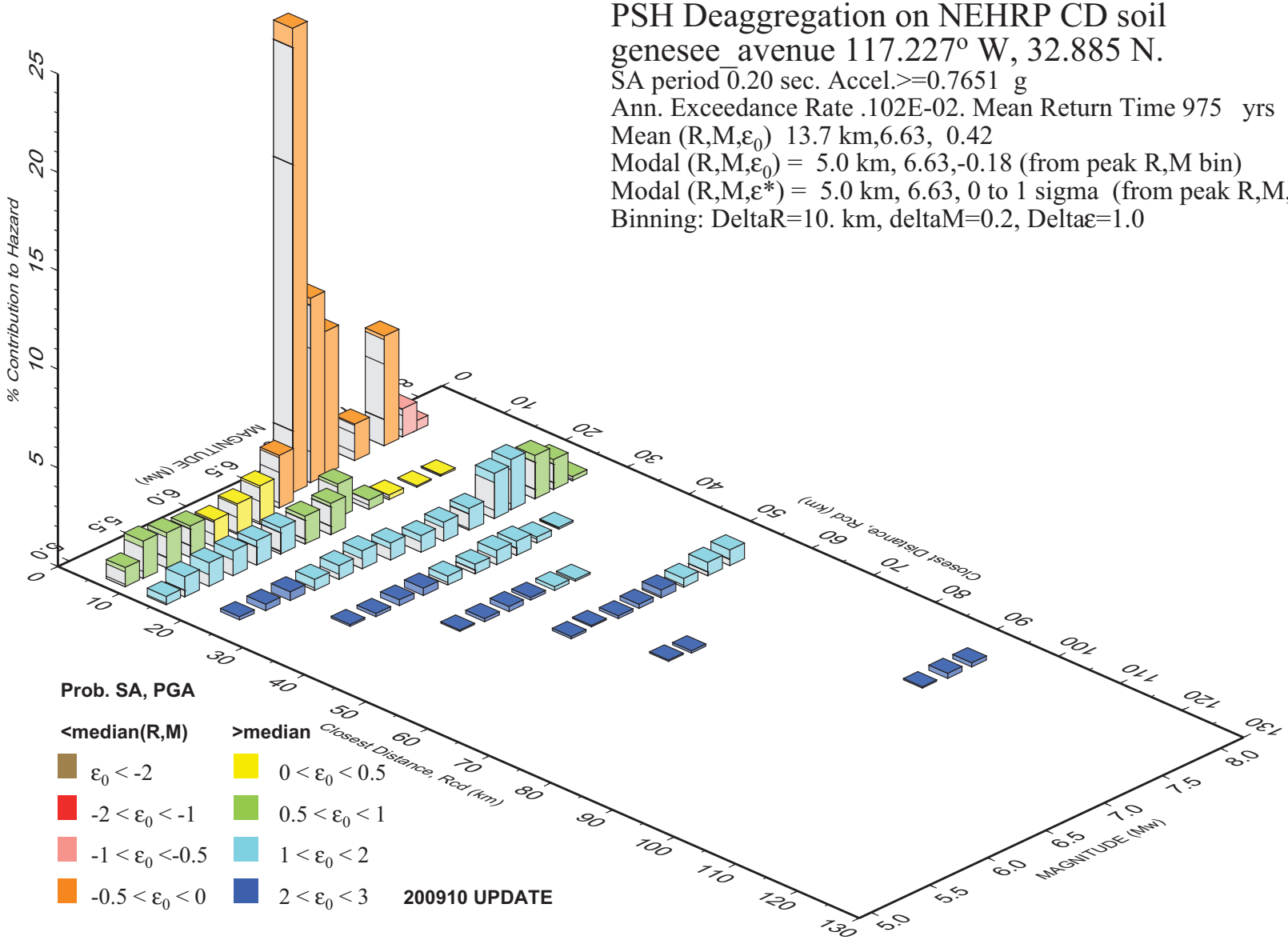
SA period 0.10 sec. Accel.>=0.6208 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 12.8 km,6.56, 0.44
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.14 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:47:02 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

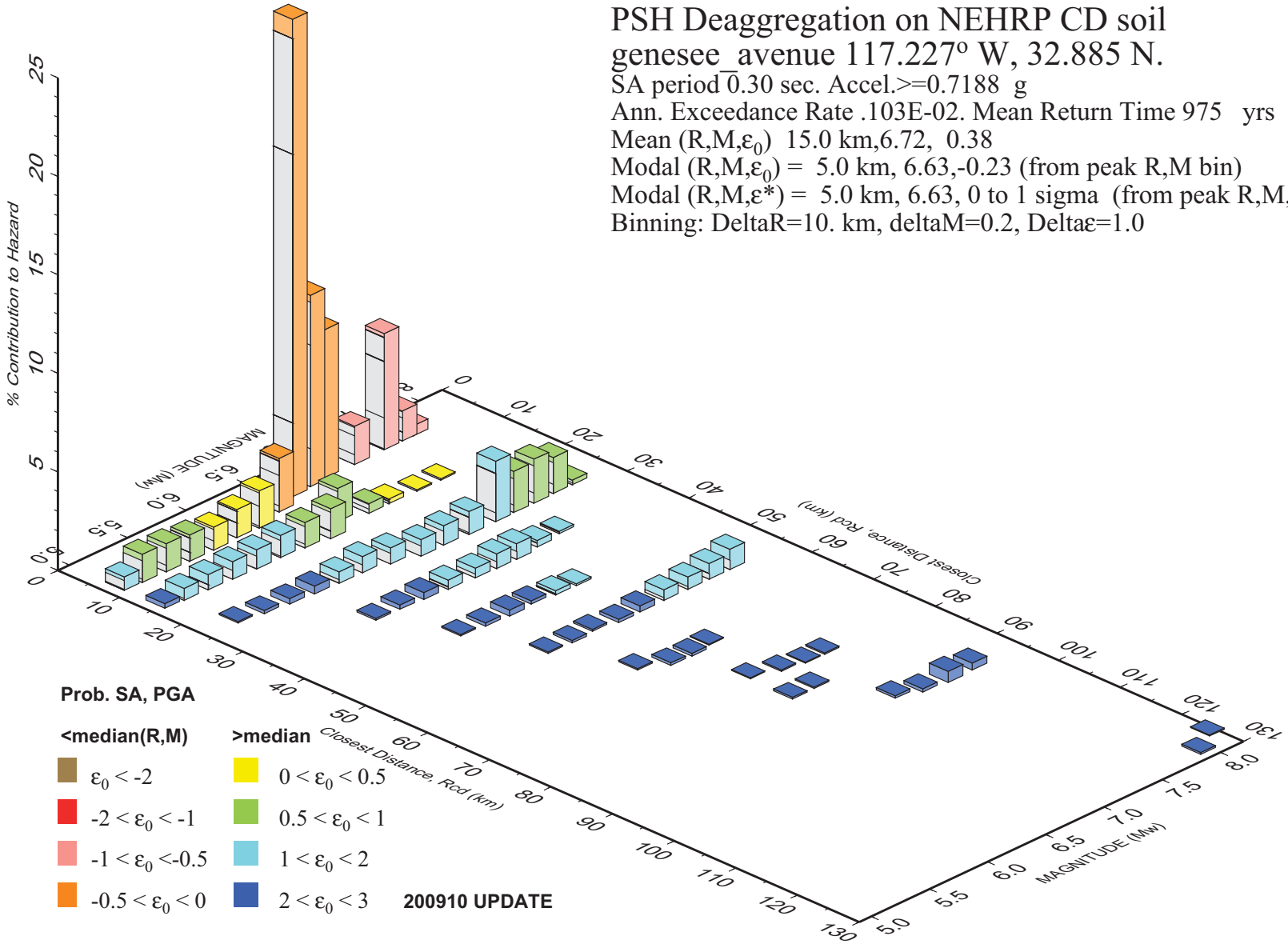
SA period 0.20 sec. Accel.>=0.7651 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 13.7 km,6.63, 0.42
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.18 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:48:40 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

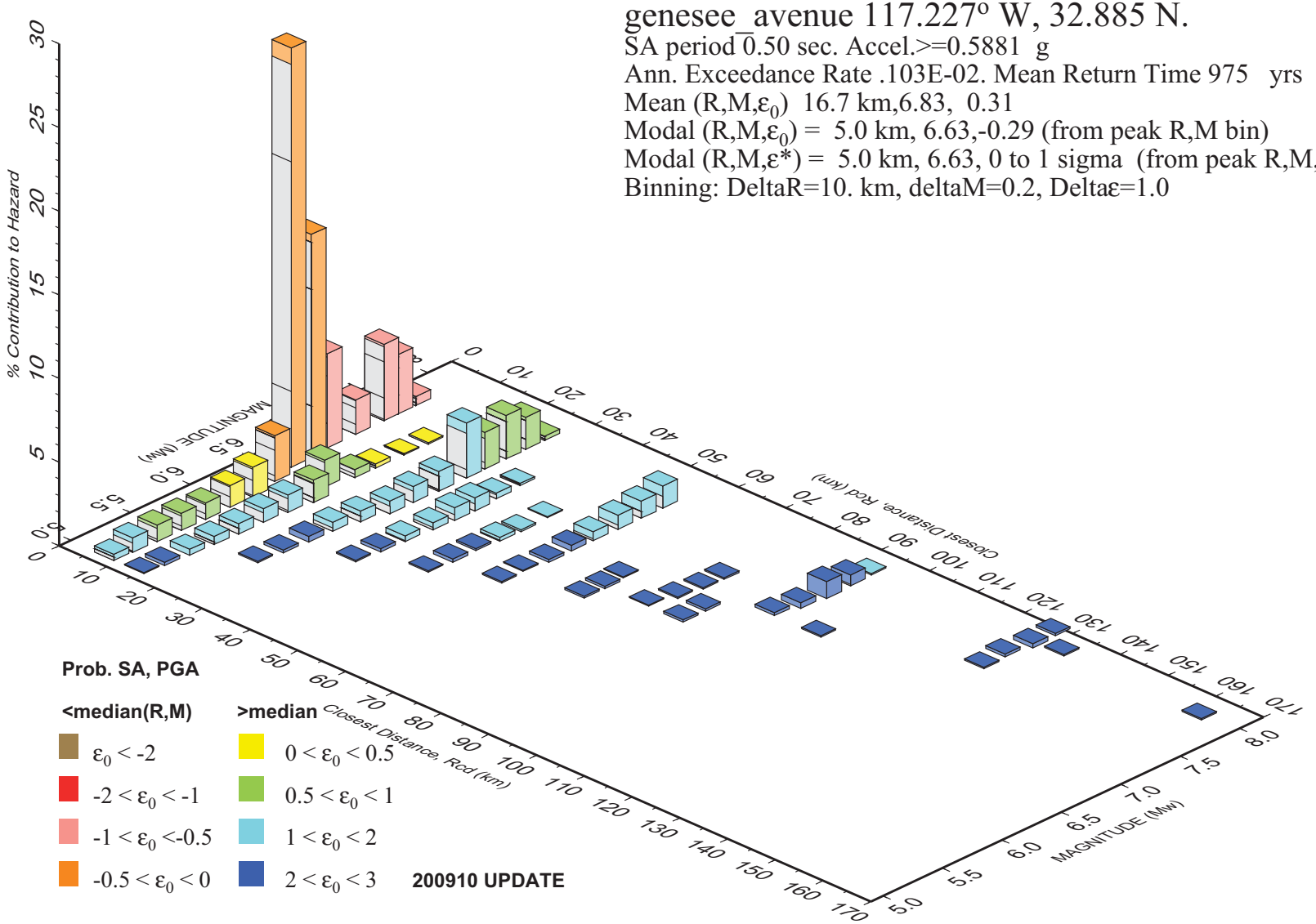
SA period 0.30 sec. Accel.>=0.7188 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 15.0 km,6.72, 0.38
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.23 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:49:49 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

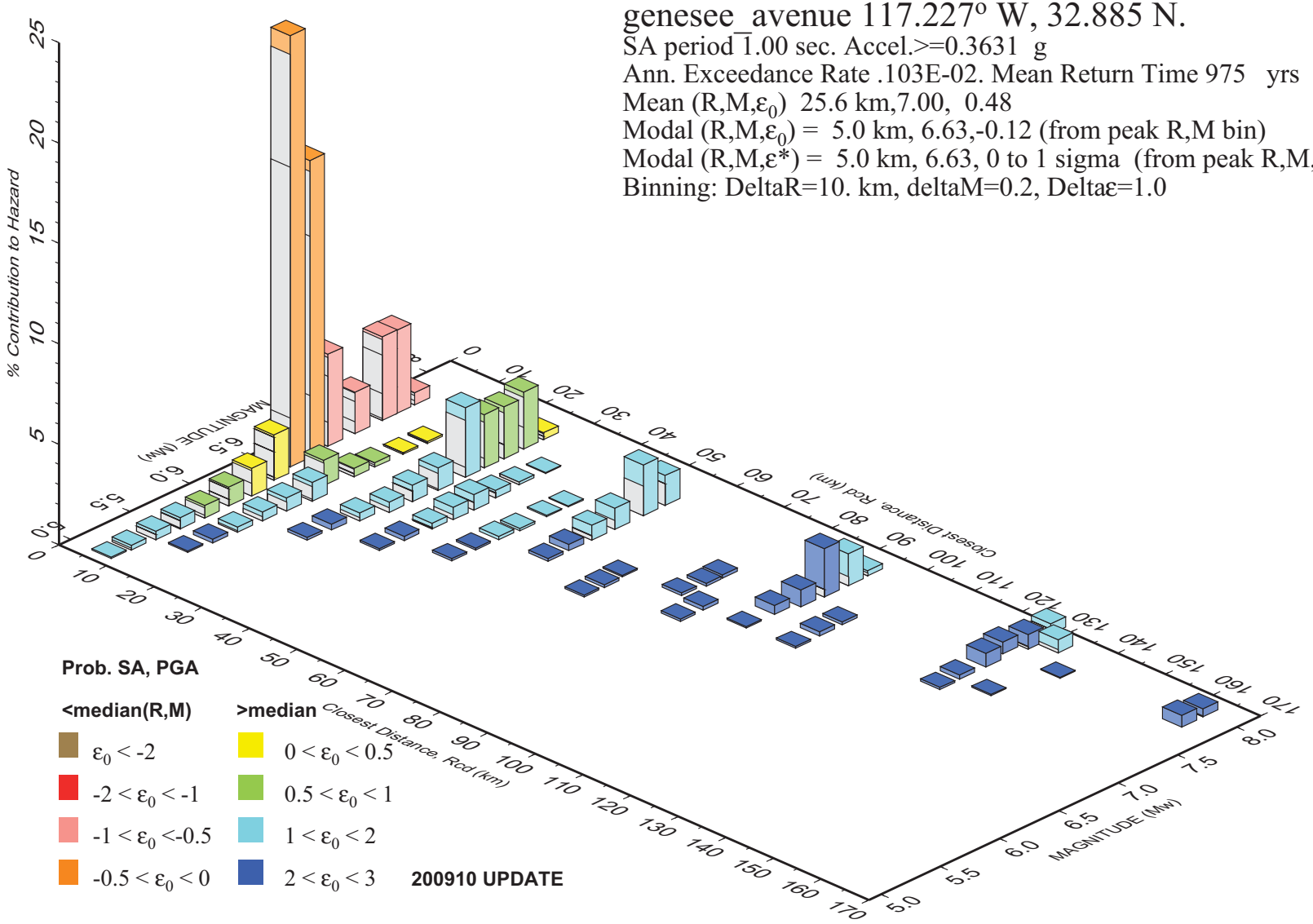
SA period 0.50 sec. Accel.>=0.5881 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 16.7 km,6.83, 0.31
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:50:55 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

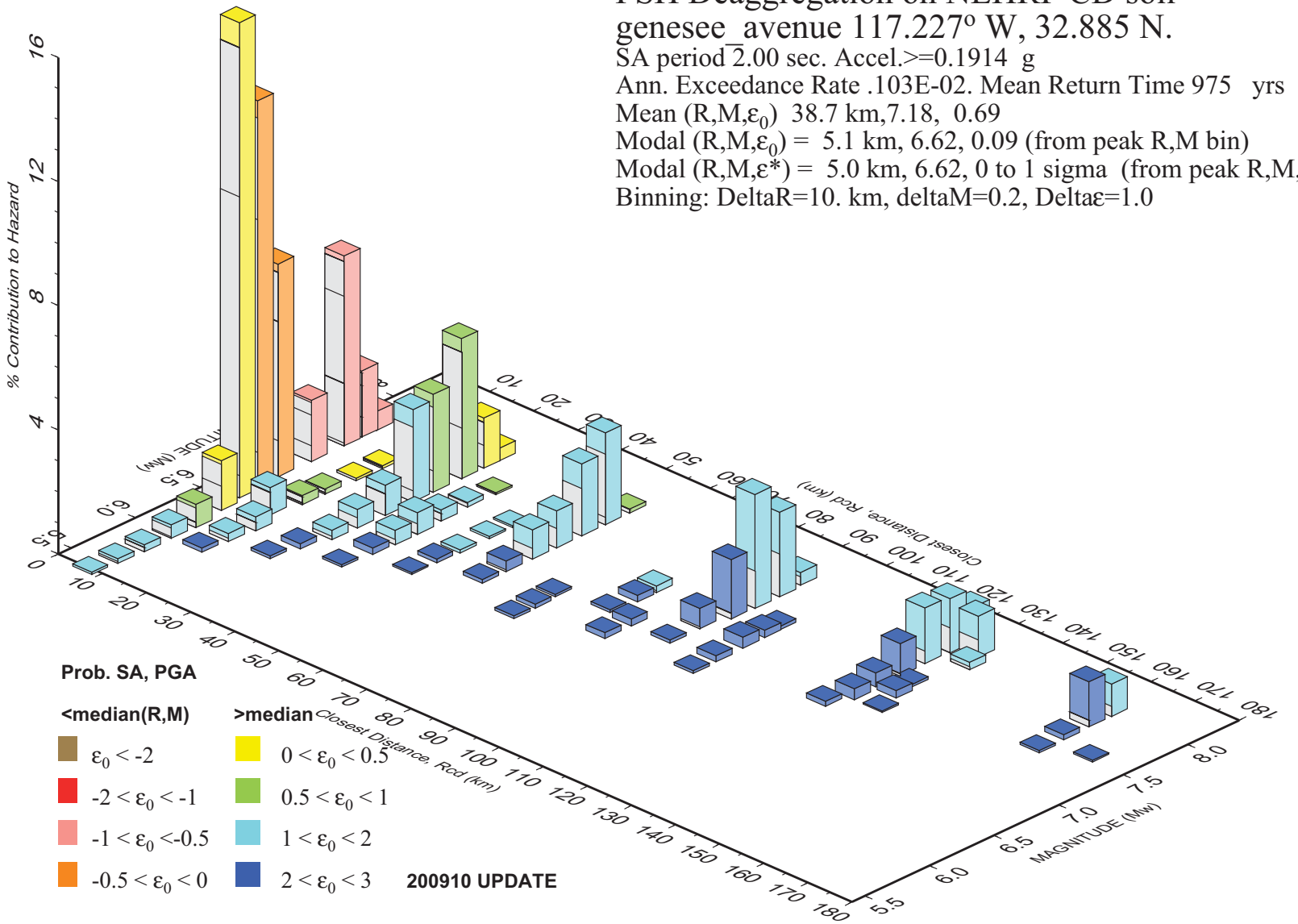
SA period 1.00 sec. Accel.>=0.3631 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 25.6 km,7.00, 0.48
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.12 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:52:12 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

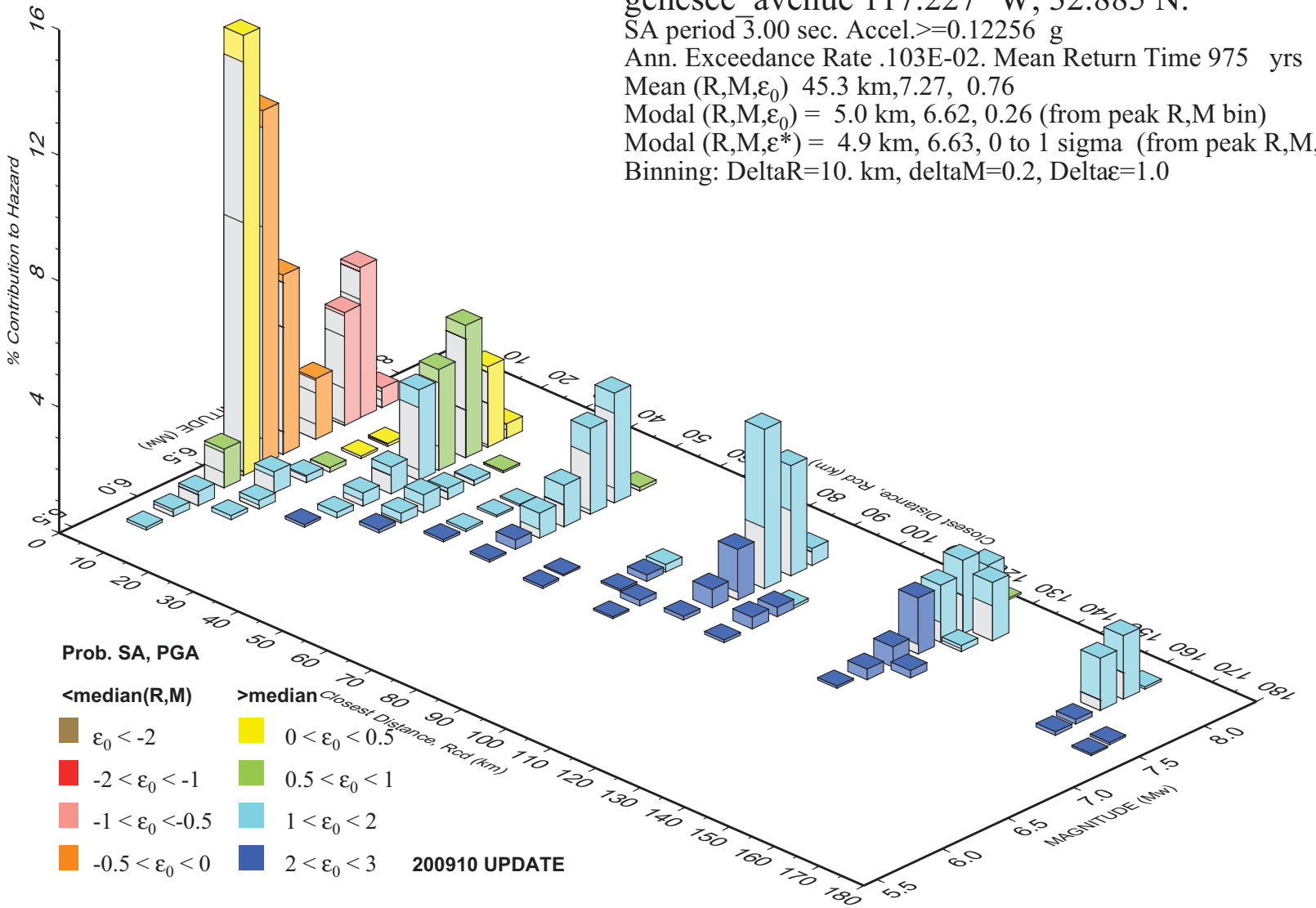
SA period 2.00 sec. Accel.>=0.1914 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 38.7 km,7.18, 0.69
Modal (R,M,ε_0) = 5.1 km, 6.62, 0.09 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.62, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:53:10 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

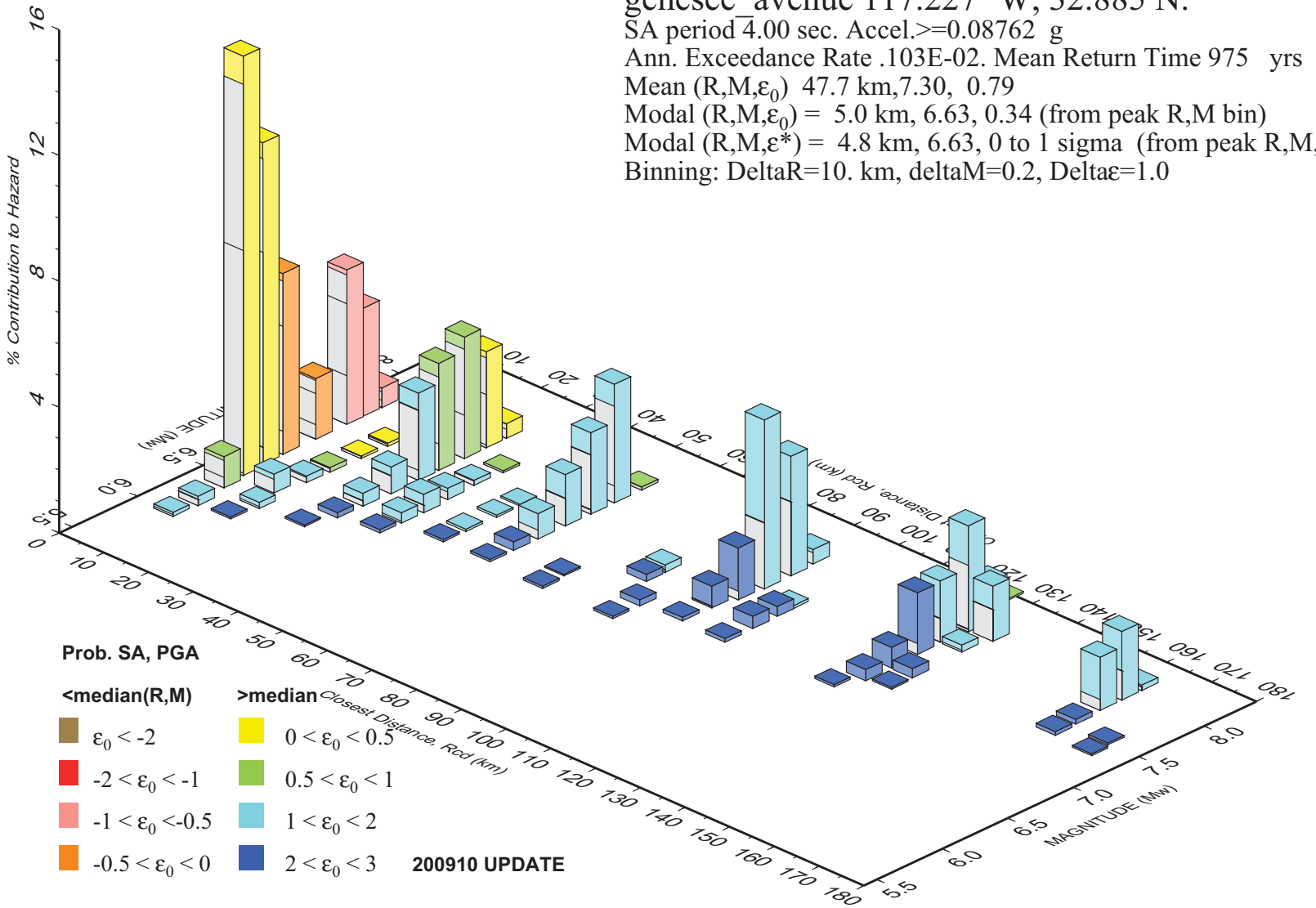
SA period 3.00 sec. Accel.>=0.12256 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 45.3 km,7.27, 0.76
Modal (R,M,ε_0) = 5.0 km, 6.62, 0.26 (from peak R,M bin)
Modal (R,M,ε*) = 4.9 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



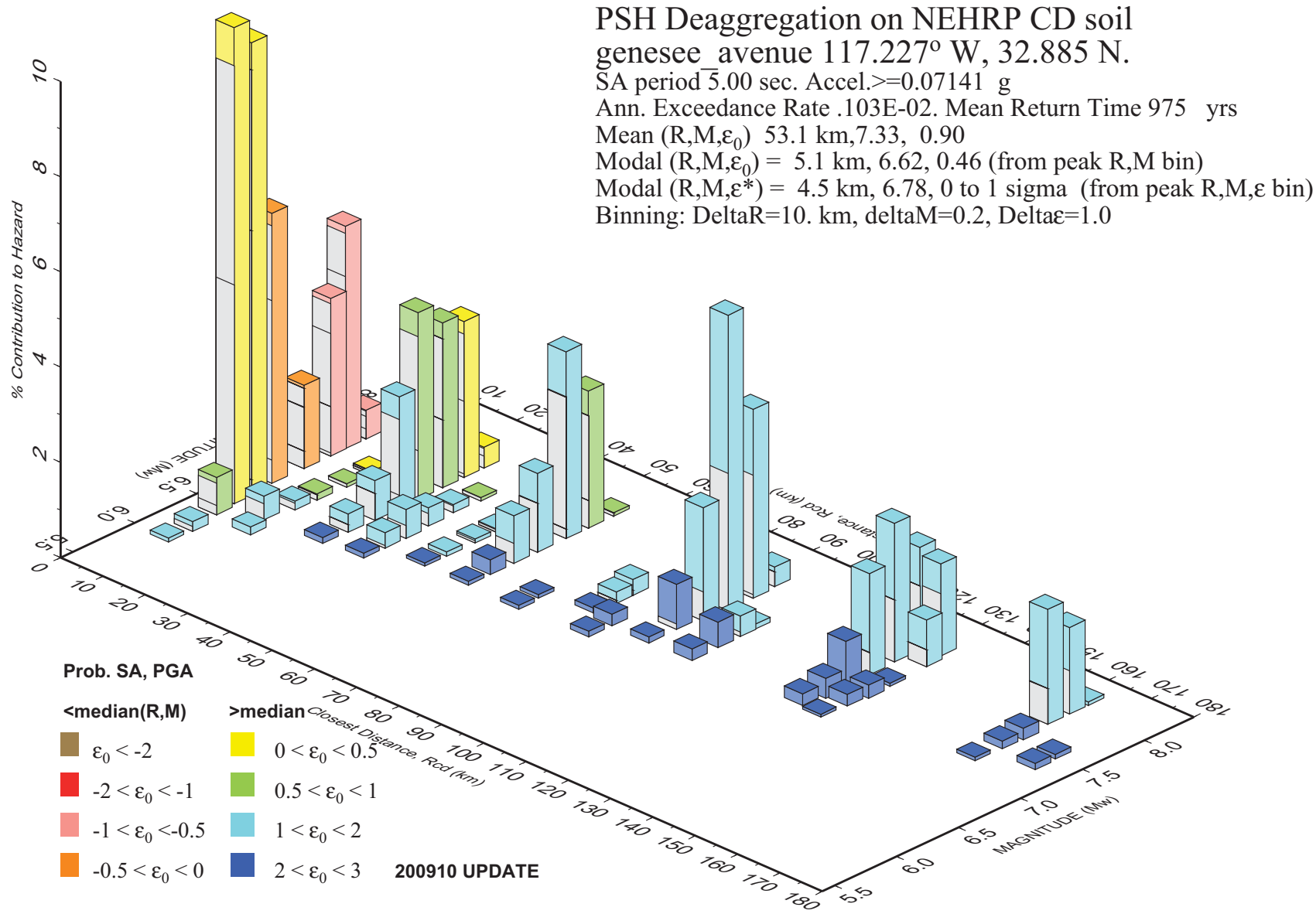
GMT 2011 Jul 20 16:54:05 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

SA period 4.00 sec. Accel.>=0.08762 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 47.7 km,7.30, 0.79
Modal (R,M,ε_0) = 5.0 km, 6.63, 0.34 (from peak R,M bin)
Modal (R,M,ε*) = 4.8 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:54:57 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:55:47 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: R-1,2,and3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

Fault Information (#1)

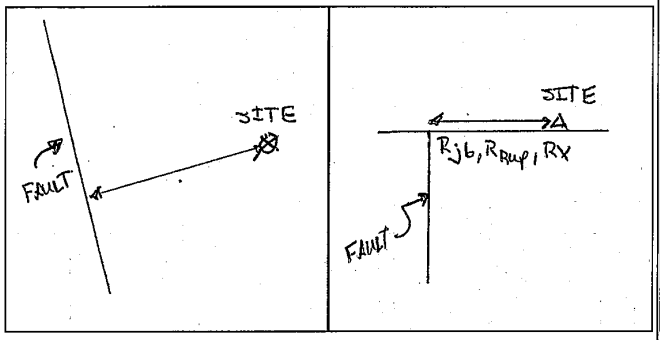
Fault Name: Newport Inglewood (Oceanside) Fault ID#: 223

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.00

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 4.21

R_{JB}: 4.21

R_X: 4.21

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

Fault Information (#2)

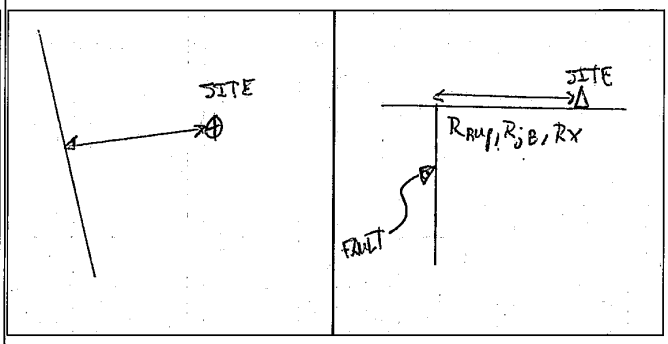
Fault Name: Newport Inglewood (San Diego) Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.0

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: RW-1, 2 and 3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

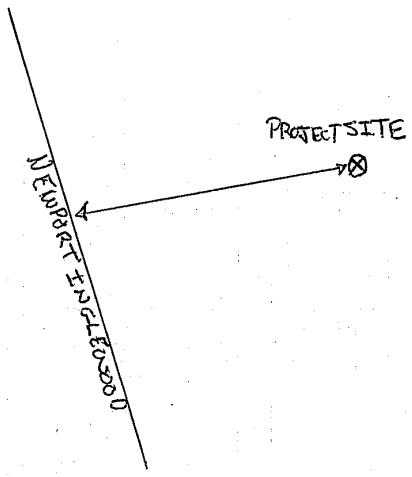
Deterministic Fault Information

Fault Name: ~~New Port Inglewood~~ Rose Canyon Fault ID#: 223 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13.00 km

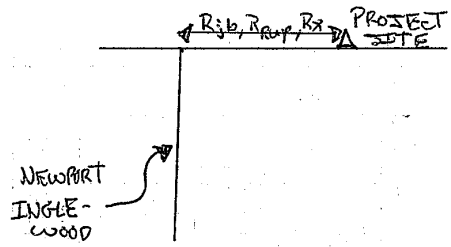
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	4.21 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT Correlation (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 20km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☒	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

ZIA YAZDANI — 11-7-11
Checker (Print) — Title

Checker (Signature) — 11-7-11
Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

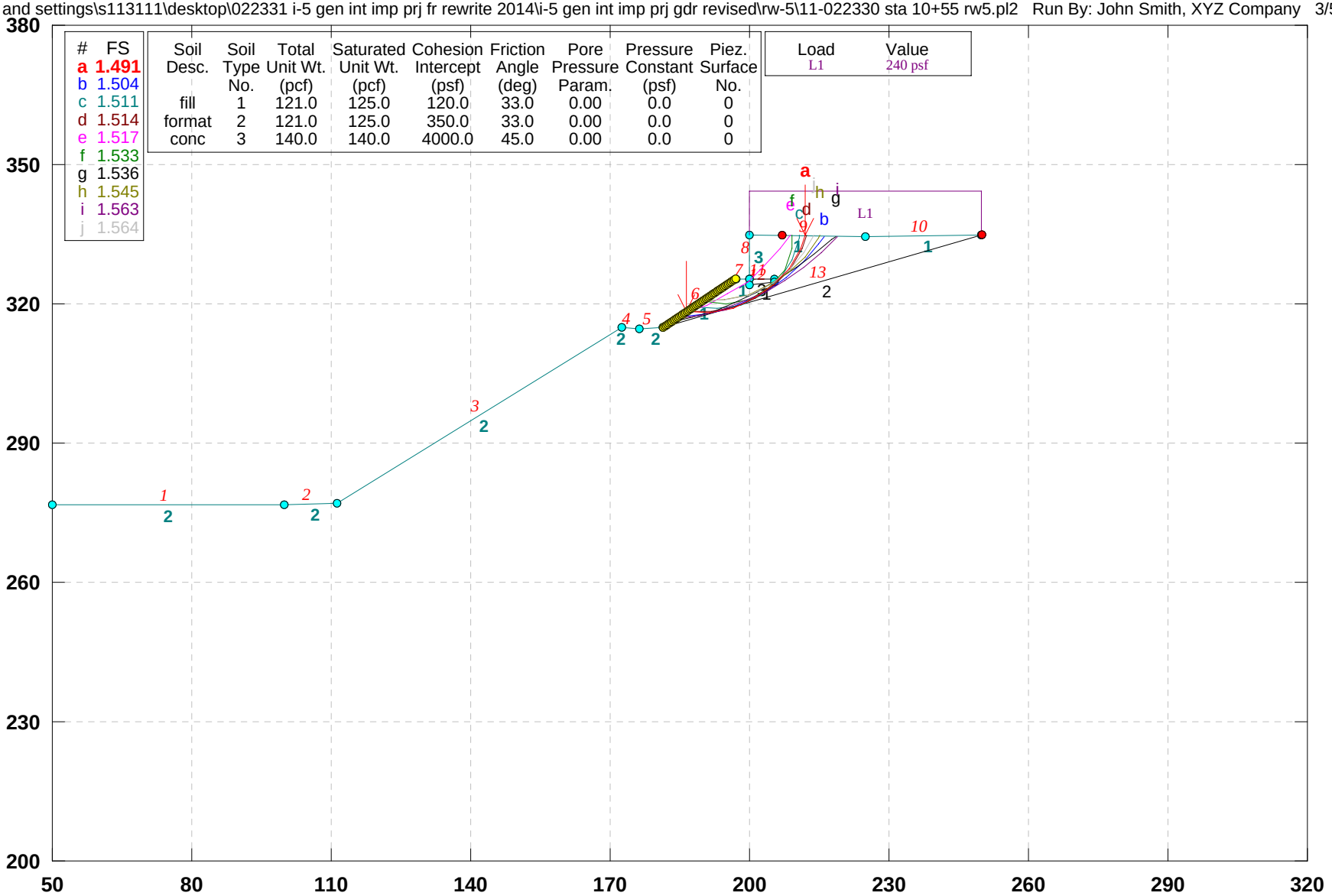
BRIAN HINMAN — SENIOR TE
Functional Supervisor (Print) — Title

Functional Supervisor (Signature) — 11/8/11
Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Genesee Int Imp Proj 11-022331 RW-5 10+55.00 H=9 global

c:\documents and settings\s113111\desktop\022331 i-5 gen int imp prj fr rewrite 2014\i-5 gen int imp prj gdr revised\rw-5\11-022330 sta 10+55 rw5.pl2 Run By: John Smith, XYZ Company 3/5/2014 10:05

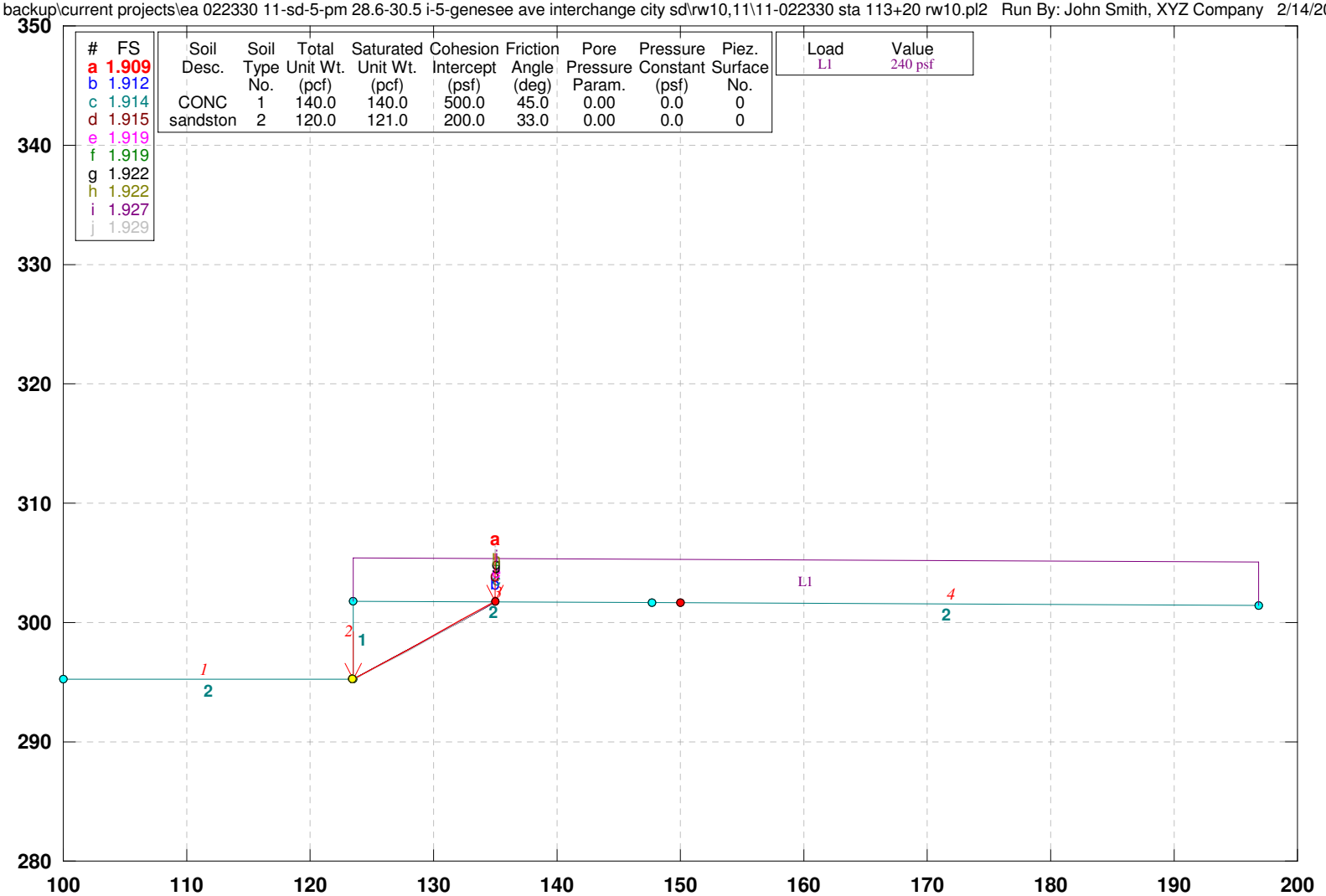


GSTABL7 v.2 FSmin=1.491

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 39+75 RW 12 global

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\11-022330 sta 113+20 rw10.pl2 Run By: John Smith, XYZ Company 2/14/2012 10:45AM



#	FS
a	1.909
b	1.912
c	1.914
d	1.915
e	1.919
f	1.919
g	1.922
h	1.922
i	1.927
j	1.929

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
CONC	1	140.0	140.0	500.0	45.0	0.00	0.0	0
sandston	2	120.0	121.0	200.0	33.0	0.00	0.0	0

Load	Value
L1	240 psf

GSTABL7 v.2 FSmin=1.909

Safety Factors Are Calculated By The Modified Bishop Method

RW-12

Bearing Capacity

$q_{ult} = CN_c + 0.5\gamma B_f N_\gamma + \gamma D_f N_q$

$q_{all} = q_{ult}/FS$

C	=	200.0	lb/ft^2
γ	=	120.0	lb/ft^3
ϕ	=	28.0	°
FS	=	3.0	
N_c	=	25.80	
N_γ	=	16.72	
N_q	=	14.72	
L_f	=	255.00	ft
B_f'	=	11.50	ft
D_f	=	2.00	ft
Design Height	=	14.00	ft
Load Case	=	I	

$L_f \neq B_f'$
if $L_f < 5(B_f)$ the "Apply Shape Factors"
if $L_f > 5(B_f)$ then "No Shape Factors Apply"

"No Shape Factors Apply"

q_{ult} = 20,229.60 lb/ft^2

q_{all} = 6,743.20 lb/ft^2

q_{all} = 6.74 $kilo\_lb/ft^2$

Bearing OK

Settlement

Settlement for competent, sedimentary rock without fractures is considered negligible.

APPENDIX V

PROJECT MEMORANDUM

Memorandum

To: Majid Kharrati
District 11 Design

Date: November 7, 2007
File: 11-SD-5-R28.6/R30.5
EA 11-022331

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design - South

Subject: Preliminary evaluation of proposed 1.5:1 cut slopes South side of Genesee and West of Interstate 5 (Retaining Wall 6 and 19) and adjacent to northbound Interstate 5 between Genesee Ave and Sorrento Valley Rd. (Retaining wall 5 and 12).

INTRODUCTION

District 11 design staff on October 16, 2007 requested The Office of Geotechnical Design South (OGDS) II perform a preliminary evaluation of four slopes within the proposed project area along Interstate 5 (I-5) and Genesee Ave. The purpose of the evaluation was to determine the feasibility of constructing 1.5:1 (H:V) cut slopes in four areas within the proposed project limits. The 1.5:1 (H:V) cut slopes have been proposed in order to eliminate the need for retaining walls or to reduce the size of proposed retaining walls. The retaining walls reviewed during this preliminary evaluation were walls 5, 6, 12, and 19 (see attached plan sheets for wall locations). This preliminary evaluation is based on information obtained during a field site review as well as a review of archival data and geologic maps.

Four retaining wall locations were reviewed during this preliminary evaluation. Two of the proposed retaining walls (19 and 6) are located along the south side of Genesee Ave and West of the I-5. The other two proposed retaining walls (12 and 5) are located adjacent to northbound I-5 south of the 5/805 merge and are positioned near the top of slope.

BACKGROUND

District 11 design staff provided OGDS II with cross sections of the existing ground surface as well as the limits of the proposed widening. The cross sections of the proposed retaining wall locations show the existing slopes to be steeper than 2:1 (H:V). The field review of the four locations verified that the existing slopes are greater than 2:1(H:V).

- Wall 6 - The existing cut slope located along Genesee Ave. (Station 105+20 to 106+20) ranges in height from 0 to approximately 90 feet. The slope consists of three 30-foot sections separated by two 10-foot wide benches. The existing cut slope is well vegetated

and based on field measurements has a slope angle of 40 to 50 degrees. Minor surficial erosion has taken place. The slope is composed of horizontally or near horizontally bedded shale and well-cemented Sandstone. Concretions are present within the sandstone matrix.

- Wall 19 – The existing cut slope located along Genesee Ave. (Station 107+80 to 108+40) and adjacent to the I-5 southbound on ramp from Genesee ranges in height from 0 to 80 feet. The existing cut slope is well vegetated and based on field measurements has a slope angle of 40 to 42 degrees. The slope is composed of horizontally bedded shale.

- Wall 5 and 12 – The existing slopes located adjacent to northbound I-5 between Genesee northbound onramp and Sorrento Valley northbound offramp. (Wall 12 Station 489+40 to 491+00 and Wall 5 Station 492+20 to 516+20 "R2M1"). The existing slope heights range from approximately 80 to 150 feet. The top of the slope is lined with business parks. Based on the cross section provided and verified during the field review the existing slopes consist of varying slope geometry along the length of the proposed walls. Along Wall 12 the slope is approximately 1.5:1 (H:V) with a 10-foot wide bench near mid slope between station 489+60 and 490+80. The remainder of the slope along Wall 12 and the slope along the length of Wall 5consists of a convex slope that varies from 1.5:1 (H:V) near the toe to 4:1 (H:V) near the top. Slopes with such geometry are often the result of side slope construction fills. The slopes are likely composed of a combination of Ardath Shale, Sandstone and Artificial Fill.

SITE GEOLOGY

The geology of the proposed locations of the 4 walls consists of Ardath Shale, Scripps Formation, and Artificial Fill. Ardath Shale is often adversely bedded and prone to sliding along its bedding planes.

CONCLUSIONS

The following conclusions are based on a visual field review and archival research of the four proposed retaining wall locations. These are preliminary recommendations that may change following a thorough subsurface geotechnical investigation. OGDS II reserves the right to make changes to these conclusions as additional information becomes available. Based on information gathered to date, the construction of a 1.5:1 slope in place of retaining wall 6 and 19 appears to be feasible. The remaining two wall locations will need to be studied further. At this time not enough data is available to make the determination if a 1.5:1 slope is feasible in these locations. This is due to the uncertain composition of the slope, and concern for its global stability because of adverse bedding planes. At this time the OGDS II recommends that District 11 design proceed with the design that includes 2:1 slopes and retaining walls for the proposed locations of Wall 5 and Wall 12. OGDS II is currently pursuing permits (entry/environmental) to access the proposed location for wall 5 and 12. Once the permits are obtained we will be able to perform a subsurface investigation at the wall locations and provide recommendations to District 11 design staff.

If you have additional questions or require clarification please contact Mike Fordham at (office) 858 467-3290 or (mobile) 858 869-5967.

Mike Fordham
1 Transportation Engineer
Office of Geotechnical Design - South

cc: Abbas Abghari
Brian Hinman
OGDS2 Files

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: THANG LE
Deputy Division Chief
Office Engineer
Division of Engineering Services

Date: February 10, 2012

File: 11-SD-5
PM R28.6/R30.5
EA11–022331/EFIS 11000000012
Interstate-5/Genesee Avenue
Interchange Improvement Project

Attn: REBECCA HARNAGEL, Chief
Office of Plans, Specifications, & Estimates

From: ABBAS ABGHARI, Chief
Office of Geotechnical Design – South
Materials Engineering and Testing Services & Geotechnical Services
Division of Engineering Services

Subject: Non-Standard Contract Special Provision (NSSP) Concurrence, Slope Inclinometer Installation

The following item has been recommended by my staff for use as a contract special provision for this project in San Diego County.

Office

Office of Geotechnical Design – South
Brian Hinman – Senior (858) 467-4051
Mike Fordham – Engineer (858) 467-3290

Proposed Contract Special Provision

Slope Inclinometer Installation

This NSSP provides detailed construction specifications for the slope inclinometer installation within the embankment and landslide stabilization buttress proposed for an existing landslide within the Interstate-5/Genesee Avenue Interchange Improvement Project limits. This method ensures that proposed slope inclinometers are properly installed during construction.

I concur with the recommendation for use of this NSSP on this project. A copy of this specification is attached, although it may undergo further editing in the district prior to District PS&E transmittal to Headquarters OE.

If you have any questions or comments, please call the Project Engineers listed above.

Attachment: DRAFT NSSP, SLOPE INCLINOMETER INSTALLATION
cc: AAbghari, MKharrati (SD-Design), OGDS2 File Room

SLOPE INCLINOMETER INSTALLATION

General

Slope inclinometers shall be installed in accordance with the project plans, these special provisions, and as directed by the Engineer. The slope inclinometers are intended to provide a means of monitoring the long term performance of the freeway embankment and stabilization buttress placed at the site of an existing landslide. The work shall be performed by a Contractor specializing in exploratory drilling and the installation of bore hole monitoring instruments. The Contractor and the field supervisor that performs the slope inclinometer installation shall have been regularly engaged in the installation of bore hole monitoring instruments and shall have a minimum of 5-years experience installing slope inclinometers. The Contractor shall be able to demonstrate these qualifications as described in the Submittals section of these Special Provisions.

Description

Slope inclinometers shall be installed at the locations and to the elevations shown on the project plans or as directed by the Engineer. The slope inclinometers shall consist of grooved inclinometer casings grouted into vertically drilled holes and finished with appropriate locking caps at the ground surface. The work shall be performed under direct observation of a Certified Engineering Geologist. The soil borings drilled for the installation of slope inclinometers shall be logged in accordance with the Caltrans Soil and Rock Logging Classification Manual, 2010. A boring record for each boring shall be submitted to the Engineer within 48-hours of completion of each boring.

The borehole must be clean and free of obstructions that interfere with insertion of the casing, compromise the casing integrity, or cause deflection in the alignment of the casing. Prior to the insertion of casing, the Engineer must confirm that the hole has been developed to the specified depth. Centralizers shall be used to maintain the casing in the center of the drilled shaft. The casing shall be installed to within 3-degrees of vertical. The orientation of casing grooves shall be as directed by the Engineer.

The annular space between the outer-casing wall and the drilled borehole wall shall be filled by a weak, pumped grout mixture. The grout shall be placed by upward displacement. Depending upon drill-hole diameter, grout may be placed either by tremie within the annulus between the bore-hole wall and the outside casing wall or by use of a grout valve fitted to the bottom of the casing.

Groundwater may be encountered during drilling of the borings and may remain in the bore holes during casing installation. The existence of groundwater in the bore hole, and the placement of grout in the annulus, will cause a buoyant force to act on the casing during installation. Under no circumstance shall the buoyant force acting on the casing be counteracted by a downward force applied at the top of the casing during placement of the annular grout column. Grout shall be pumped to the bottom of the hole until all of the water is displaced and clean grout returns from the annular space at the top of the boring. Slope inclinometer installations lost due to grout intrusion will be replaced at no expense to the State.

Slope inclinometers shall be completed in a manner that protects the installation from damage from vehicles, equipment, debris, and intentional acts of vandalism. The installations shall also be protected from becoming filled by sedimentation. Protection shall include locking end caps. At locations where vehicular traffic is unlikely, the casing and locking end cap shall extend 18-inches above final grade. At locations where vehicular traffic is likely, such as gores, shoulders, and landscaped areas, the top of casing and end cap shall be positioned 2-inches below final grade and fitted with a protective cover mounted flush with final grade. A minimum of 2-inches of clearance shall be provided between the end cap and the wall of flush mounted protective covers. The protective covers shall be installed around the slope inclinometer casing in a manner that does not inhibit access to the casing or the use of the measurement instrument. The protective covers shall be cemented in place with a minimum of 18-inches of embedment below grade.

All slope inclinometers shall be marked by metal paddles (similar to standard post mile markers) that uniquely identify the installation according to the naming convention identified on the project plans, in these special provisions, or as provided by the Engineer. Paddles shall be installed in a manner to make the inclinometer location visible from a distance. At locations where vehicular traffic is likely, the paddles shall be placed adjacent to the inclinometer at the nearest protected location, such as behind guardrail.

The Contractor shall protect the slope inclinometers from damage for the duration of project construction. Damaged inclinometers will be replaced by the Contractor at no expense to the State.

Drilling Equipment and Methods

The drilling equipment shall be capable of accessing the inclinometer sites and drilling to the bottom elevation shown on the project plans. The equipment should be capable of drilling the diameter borehole necessary to successfully install inclinometer casing in soils that may be wet, caving, or contain occasional rock like material. Either wet or dry methods of drilling may be utilized.

Materials

The slope inclinometer casing shall be compatible with the Digitilt Inclinometer Probe manufactured by Slope Indicator Company. The casing must be ABS plastic or equivalent. The outside diameter of the casing shall be 2.75-inches (inside diameter 2-5/16-inches). The casing grooves shall be orthogonal and shall have a spiral error of less than or equal to 0.33-degrees or less per 10-foot section of casing. The casing couplings shall be sealable and shall preclude grout or other fluids from

the entering the casing at all joints. The casing terminations shall preclude intrusion of grout or other debris at the down-hole end.

The grout shall be weak with a 28-day compressive strength of roughly 100-pounds per square inch. The grout shall be comprised of a mixture of cement, water, and Bentonite mixed at a weight ratio of 1.0-Cement/2.5-Water/0.25-Bentonite.

Locking end caps and protective covers shall conform to the casing and provide a secure fit.

Verification

Upon initial reading of the slope inclinometer the Engineer will confirm a successful installation. A successful installation will have the following characteristics:

A. Bore hole and casing meet or exceed the specified depth.
B. The casing integrity is in-tact to the specified depth and the casing spiral is within the specified tolerance.
C. The inside of the casing is free of obstructions that cause the probe to jam or cause the guiding wheels to diverge from the grooves.
D. The top of the slope inclinometer is appropriately finished. Appropriate finishing will include visible marker paddles and locking caps that will prevent unintended intrusion into the casing. At locations where vehicle travel is likely, the installations shall be completed with a flush mounted covers.
E. The initial readings shall be conducted by the Caltrans Office of Geotechnical Design South 2 Branch D (OGDS2). The Contractor shall allow OGDS2 access to the slope inclinometers at all times.

Submittals

Prior to drilling or the purchase and installation of any material for the construction of slope inclinometers, the Contractor shall provide submittals subject to review and approval by the Engineer. The submittals shall include:

A. Resumes verifying the experience of the proposed Contractor, Field Supervisor, and Certified Engineering Geologist.
B. A description of materials that will be used to construct the slope inclinometers including the grooved casing, casing caps, and protective covers. The manufacturer's product specifications shall be included in the submittal.
C. A description of the equipment that will be used and the space requirements for the equipment that will be used to develop the bore hole, place the inclinometer casings, and mix and place the grout.
D. A description of the method of slope inclinometer installation including: the bore hole drilling method and the method that will be utilized to counteract buoyant forces acting on the casing.
E. An example of the boring record format that will be utilized for records submitted to the Engineer.
F. Completed boring records for each boring shall be submitted within 48-hours of the completion of each boring.
G. The submittals shall be stamped by a Certified Engineering Geologist or a Civil Engineer Registered in the State of California

Measurement and Payment

Measurement and payment for complete installation of slope inclinometers shall be by linear foot of acceptably drilled and installed inclinometer casing. No payment shall be made prior to verification by the Engineer.

Thang Le/HQ/Caltrans/CAGov
02/14/2012 10:00 AM

To Richard Rusnak/D11/Caltrans/CAGov@DOT
cc Abbas Abghari/HQ/Caltrans/CAGov@DOT, Brian Hinman/HQ/Caltrans/CAGov@DOT, Majid Kharrati/D11/Caltrans/CAGov@DOT, Mike
bcc
Subject Re: NSSP Sponsor Letter, Slope Inclinometer Installation

The technical contents of the NSSP look fine. Check with District OE to see if the NSSP needs to conform to the Specification Style Guide in the link below. Please see Section 2 ORGANIZATION on page 2 for SSP Organization and Section 3.9 PAYMENT CLAUSES on page 13 for Contract Item Pay Clause. Also, address the memo to JOHN C. MCMILLAN.

http://www.dot.ca.gov/hq/esc/oe/specifications/Style_Guide_1999-2006.pdf

Thang Le
DES-GS-OGS
(916) 227-7179

Richard Rusnak/D11/Caltrans/CAGov

Richard Rusnak/D11/Caltrans/CAGov
02/10/2012 12:58 PM

To Thang Le/HQ/Caltrans/CAGov@DOT
cc Abbas Abghari/HQ/Caltrans/CAGov@DOT, Majid Kharrati/D11/Caltrans/CAGov@DOT, Brian Hinman/HQ/Caltrans/CAGov@DOT, Mike Fordham/D11/Caltrans/CAGov@DOT
Subject NSSP Sponsor Letter, Slope Inclinometer Installation

Thang Le,

Please review attached NSSP for Slope Inclinometer Installation in an embankment and Landslide Stabilization Buttress within the Interstate-5/Genesee Avenue Interchange Improvement Project limits in San Diego County.

2012-02-10 NSSP sponsor letter_Slope Inclinometer Installation.pdf

Richard Rusnak P.E.
California Department of Transportation
Office of Geotechnical Design - South 2
7177 Opportunity Road
San Diego, CA 92111
Mail Station: 63
(858) 467-4065

****

"For individuals with sensory disabilities, this document will be made available, upon request, in Braille, large print, audiocassette, or computer disk. To obtain a copy of one of these alternate formats, please call Della Moore at (916) 227-8185 or TTY (916) 227-8454 or write to Della Moore, Division of Engineering Services, P.O. Box 168041 Sacramento, CA 95816-8041."

****

http://www.dot.ca.gov/hq/esc/geotech/specification/specis.html

Specifications

The Non-Standard Special Provisions are provided by Geotechnical Services as templates for the preparation of project special provisions. Users of these templates must be licensed professionals acting in their area of expertise and must make any necessary changes before use and verify that the provisions reflect the current state of the practice. Non-Standard Special Provisions require approval by Geotechnical Services Deputy Division Chief for each project.

10-1.__ SUBGRADE ENHANCEMENT FABRIC

Subgrade enhancement fabric shall be placed where shown on the plans and locations designated by the Engineer in accordance with the special provisions.

Subgrade enhancement fabric shall be manufactured from one or more of the following materials: polyester, nylon, or polypropylene.

Subgrade enhancement fabric shall conform to the following:

Specification	Requirement	
	Woven	Non-Woven
Weight, grams per square meter, min. ASTM Designation: D 3776	200	200
Grab tensile strength (25-mm grip), kilonewtons, min. in each direction ASTM Designation: D 4632	0.90	0.81
Modulus (Tensile strength at 10% Elongation) kilonewtons, min.	1,200	NA
Elongation at break, percent min. ASTM Designation: D 4632	35 max.	50 min.

Subgrade enhancement fabric shall be furnished in an appropriate protective cover that shall protect it from ultraviolet radiation and from abrasion due to shipping and handling, and shall remain in said cover until installation.

Subgrade enhancement fabric shall be accompanied by a Certificate of Compliance conforming to the provisions in Section 6-1.07, “Certificate of Compliance,” of the Standard Specifications. The subgrade to receive the fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified in Section 25-1.03, “Subgrade,” of the Standard Specifications and these special provisions and shall be free or loose or extraneous material and sharp objects that may be damage the fabric during installation.

Subgrade enhancement fabric shall be handled and placed in accordance with the manufacturer’s recommendations and shall be positioned longitudinally along the alignment, and pulled taut to form a wrinkle-free mat.

Adjacent borders of the fabric shall be overlapped a minimum of 450 mm.

The amount of subgrade enhancement fabric placed shall be limited to that which can be covered with aggregate base or other material, as shown on the plans, within 72 hours.

Should the fabric be damaged during placing, the damaged section shall be repaired by placing a new piece of fabric over the damaged area. Said piece of fabric shall be large enough to cover the damaged area and to provide a minimum 1-m overlap on all edges. Damage to the fabric resulting from the Contractor’s vehicles, equipment, or operations shall be repaired at the Contractor’s expense.

During spreading and compaction of the aggregate base material, of other material placed immediately above the fabric, vehicles and equipment shall not be driven directly on the fabric. A sufficient thickness of material shall be maintained between the fabric and the equipment to prevent damage to the fabric.

The quantity of subgrade enhancement fabric to be paid for will be measured by the square meter of area covered, not including additional fabric for overlap.The contract price paid per cubic meter for subgrade enhancement fabric shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing the fabric, complete in place as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

State of California **Business, Transportation and Housing Agency**

M e m o r a n d u m

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To: MR. CRAIG SHANNON
Simon Wong Engineering
9968 Hibert St., Suite 202
San Diego, CA 92131

Date: April 10, 2012

File: 11-SD-5-PM 29.46
11-022331
Project No. 1100000012
Genesee Avenue OC (Replace)
Br. #57-1224

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH 2
DESIGN BRANCH B, MS #5

Subject: Foundation Report

This report is in response to a request from Simon Wong Engineering requesting final foundation recommendations for the proposed replacement of Genesee Avenue Overcrossing (OC), Br. No. 57-1224, which will replace the existing Genesee Road Overcrossing, Br. No. 57-0527. The foundation recommendations provided in this report are based on a review of the "As-Built" General Plan, "As-Built" Foundation Plan, 1962 Foundation Report, 1963 Foundation Review, "As-Built" Log of Test Borings (LOTB) sheets, along with the new General Plan (dated 4-10-12) and Foundation Plan (dated 4-10-12) from Simon Wong Engineering, local geological maps, historic aerial photos of the site, and subsurface investigations conducted in 1962 and June of 2011. As-Built information containing elevation data was updated to the NAVD88 vertical datum by adding 1.84 ft to the NGVD29 vertical datum (per District 11 Surveys), unless noted otherwise. This Foundation Report supercedes all previous foundation reports developed for this project.

Project Description

Genesee Avenue OC crosses Interstate-5 (I-5) at post mile 29.5 in southwestern San Diego County, approximately 1.4 miles south of the I-805 / I-5 interchange. The proposed replacement of Genesee Avenue OC is a result of the planned widening of Genesee Avenue and I-5 as a part of the improvements related to the broader I-5 North Coast Corridor Project.

The replacement of Genesee Avenue OC will consist of two stage construction procedures in order to maintain flow of traffic to and from the Scripps Hospital to the east, University of California San Diego, and the Torrey Pines community to the west. The first stage of construction will consist of building a 2-span bridge, approximately 78 ft wide and 343 ft long, adjacent to and north of the existing structure. The second stage of construction will begin once traffic on Genesee Avenue is transferred from the existing bridge to the stage 1 (north) replacement bridge. The original Genesee Avenue OC will then be demolished, and the stage 2 (south) replacement bridge will be constructed. Near the completion of the second phase of construction a closure pour will

join the two structures. Once completed the final structure will be approximately 343 feet long and approximately 156 feet wide.

Site Geology

The bridge site is located in southwestern San Diego County within the Peninsular Range Geomorphic Province of California. Based on the Geologic Map of the San Diego 30' x 60' Quadrangle (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by fill, the Scripps Formation (middle Eocene), and the Ardath Shale (middle Eocene). The fill material predominantly consists of the Scripps Formation excavated from the pre-existing hillsides during the construction of I-5 and Genesee Ave. OC. The Scripps Formation is generally described as a yellowish brown, fine and medium grained silty sandstone with occasional conglomerate interbeds. The Ardath Shale lies conformably underneath the Scripps Formation and is generally described as olive gray, shale.

The subsurface investigation performed in June of 2011 consisted of four 4-inch diameter mud-rotary borings (RC-11-001 through RC-11-004) utilizing wire-line coring methods. A Christensen CS 2000 drill rig was used to drill borings RC-11-001 and RC-11-003, and a Mobile B-47 was used to drill borings RC-11-002 and RC-11-004. Standard Penetration Test (SPT) testing was performed at regular intervals in the soil and upper portions of the rock during the field investigation. Some soil and rock samples were collected for corrosion and unconfined compression testing.

Boring RC-11-001 was located approximately 110 ft west of the proposed Abutment 1. At this boring location, the subsurface conditions consisted of 101.8 feet of fill (mostly derived from road cuts of local earth material interpreted as Scripps Formation) overlying sedimentary rock. The fill consisted of medium dense and dense silty sand and poorly graded sand with gravel, trace small cobbles, from the ground surface down to a depth of 65.0 ft (elev. 190.8 ft). From the elev. 190.8 ft to 168.5 ft, the fill consisted of dense and medium dense poorly graded sand with silt. From elev. 168.5 ft to 154.0 ft, the fill consisted of medium dense and dense clayey sand with gravel. The base of the fill/top of rock contact was encountered at a depth of 101.8 ft (elev. 154.0 ft). From elev. 154.0 ft to 146.1 ft, sedimentary rock formation was encountered and consisted of moderately soft, greenish-gray claystone, interbedded with yellowish brown siltstone. From elev. 146.1 ft to 139.8 ft, the sedimentary rock consisted of moderately soft and moderately hard, brown claystone. Below elev. 139.8 ft, the sedimentary rock consisted of moderately hard, gray siltstone and extended down to the maximum explored depth of 131.1 ft (elev. 124.5 ft).

Boring RC-11-002 was located approximately 120 ft east of the proposed Abutment 3 location. At this boring location, a 6 ft thick layer of fill consisting of very dense, silty sand overlying sedimentary rock was encountered. The base of the fill/top of rock contact was encountered at a depth of 6 ft (elev. 270.8 ft). From elev. 270.8 ft to 240.8 ft, the sedimentary rock consisted of decomposed, very soft, silty sandstone with isolated zones of cobbles. Below elev. 240.8 ft, the sedimentary rock consisted of light gray siltstone, ranging from intensely weathered to fresh, and moderately soft to hard which extended down to the maximum explored depth of 120.9 ft (elev. 155.9 ft).

Boring RC-11-003 was drilled within the southbound I-5 median approximately 30 ft south of the proposed Bent 2 (pile 6 location). At this boring location, the sedimentary rock was encountered at elev. 245.6 ft, just below the 6-inch thick pavement section. From elev. 245.6 ft to 218.1 ft, the sedimentary rock consisted of decomposed to intensely weathered, very soft sandstone. Below elev. 218.1 ft, the sedimentary rock consisted of siltstone which ranged from intensely to moderately weathered, unfractured to intensely fractured, moderately soft to hard with local very hard zones (up to 1.1 ft thick) and extended down to the maximum explored depth of 170 ft (elev. 76.1 ft).

Boring RC-11-004 was drilled within the southbound I-5 median within 10 ft of the proposed Bent 2 (pile 1 location). At this boring location, the subsurface conditions consisted of 59 ft of fill overlying sedimentary rock composed of siltstone. From elev. 241.9 ft to elev. 219.9 ft, the fill consisted of 8 inches of pavement section over dense and medium dense silt with sand and cobbles. From elev. 219.9 ft to elev. 211.9 ft, the fill consisted of dense silty sand. From elev. 211.9 ft to 182.9 ft, the fill consisted of dense and medium dense, silt with fine sand and sandy silt. The base of the fill/top of rock contact was encountered at a depth of 59 ft (Elev. 182.9). From Elev. 182.9 ft to elev. 174.9 ft, the sedimentary rock consisted of siltstone ranging from decomposed to intensely weathered, and very soft to soft. Below elev. 174.9 ft to elev. 111.1ft, the siltstone becomes moderately weathered, moderately hard, unfractured to moderately fractured with scattered hard, sandstone interbeds and extended down to the maximum explored depth of 130.8 ft (elev. 111.1 ft).

The 1962 field investigation for the existing bridge consisted of two 1-inch diameter soil tube borings and one 3-inch diameter mud rotary boring. The two 1-inch diameter soil tube borings were located near the existing Bent 2 and existing Bent 4 locations and were advanced to a maximum depth of 5ft. The borings revealed a few feet of clayey silt (interpreted as residual soil) overlying siltstone/shale sedimentary rock. The mud rotary boring was located along the Bent 3 support line approximately 60ft south of the bridge. The boring was advanced to a depth of 80 ft and revealed the sedimentary rock consisted of shale, siltstone, sandstone and claystone.

- Landforms and Historical Features

The "As-Built" foundation plan topographic contour lines show a natural drainage feature that trends primarily northwest along the northern edge of existing bridge. Based on the boring from the 1962 foundation investigation and the "As-Built" foundation plan, the topographic contours shown on the "As-Built" foundation plan can be used to help approximate the top of the sedimentary rock. The topographic contours on the "As-Built" foundation plan also show a large drainage feature that trends from southeast (near the proposed Abutment 3) to the northwest (near the proposed Abutment 1), which has the ability to transmit large amounts of perched groundwater.

During the construction of I-5 just north of the Genesee Ave. OC, the natural drainage was filled with material cut from the pre-existing hillsides composed primarily of the Scripps Formation. The composition of the fill material was identified in the recently drilled borings associated with

the 2011 foundation investigation. The proposed Bent 2 Piles on the northern stage construction are situated within the historic drainage feature which can transmit perched groundwater from the east hillside (near Abutment 3) down to the west (near Abutment 1).

By superimposing the proposed foundation supports on the "As-Built" foundation plan, steeply sloping top of rock surface was identified across all structure supports. Using the subsurface information from the recent field investigation, current foundation plan and the "As-Built" foundation plan, rough estimates of fill thickness overlying rock can be estimated. For specific details regarding the earth materials described above and boring locations, refer to the "As-Built" plans and LOTB sheets.

Groundwater

During the 1962 and 2011 subsurface investigations, groundwater was not encountered. As discussed in the geology section above, a natural drainage feature (see As-Built Foundation Plan) was buried with fill material during the construction of the I-5 highway in the 1960's. This fill material was encountered in the 2011 subsurface investigation and consists of permeable, granular soil that will allow groundwater to easily permeate through the fill and flow along the top of the sedimentary rock. Because the underlying rock is much less permeable than the overlying fill, this will create a perched groundwater condition which has the potential of transmitting large volumes of perched water from east to west along the historic drainage feature discussed above.

It is anticipated that perched groundwater will flow at the base of the fill/top of sedimentary rock interface within the buried historic drainage feature and the amount of groundwater that permeates and flows on top of the rock will vary considerably depending on the amount of precipitation during the season and/or intensity of storm events.

Scour Potential

The bridges do not span a waterway; therefore, scour is not considered an issue at this site.

Laboratory Testing - Corrosion

Corrosion test result for soil sample collected from boring RC-11-002 is shown below in Table 1. The soil sample tested is considered non-corrosive by current Caltrans standards.

Table 1 – Corrosion Test Summary

Sample Location	SIC number	pH	Minimum Resistivity (ohm-Cm)	Chloride Content (ppm)	Sulfate Content (ppm)
Boring RC-11-002 (El. 276.8-246.8 ft)	C701579	7.96	942	108	455

Note: Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 2000 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE walls, soil and water are not tested for chlorides and sulfates if the minimum resistivity is greater than 1,000 ohm-cm.

Laboratory Testing – Unconfined Compression Strength Testing

During the 2011 foundation investigation, rock samples were collected from three borings at five-foot intervals, when possible, and samples were submitted to the geotechnical laboratory for unconfined compression strength testing. Some of the recovered rock core samples were so weak or so fractured that they could not be tested, whereas other rock samples were strong and large enough to be tested. Some of the samples that were large enough to be tested may have broken into smaller pieces during transport, which resulted in the samples not being tested or not meeting the proper length to diameter ratio required for unconfined compression strength testing (per ASTM D2166 & ASTM D7012). A total of thirty-two unconfined compression strength tests were done for this structure and are listed on the Log of Test Borings (LOTB). Refer to the LOTB sheets for the site-specific rock and soil data.

Fault, Seismic and Liquefaction Data

Based on the 2007 Caltrans Fault Database, the site is located approximately 2.6 miles (4.2 km) east of the Newport Inglewood – Rose Canyon Fault "Oceanside Section" (Fault ID 223, Mmax = 7.5, strike slip type, dip = 90 deg) which is the controlling fault for the deterministic seismic procedure and the design response spectrum. The corresponding peak ground acceleration (PGA) is estimated as 0.45g.

Liquefaction potential due to strong ground shaking at this site is low due to the fact that no groundwater was encountered during the 1962 and 2011 foundation investigations. However, there is a potential for seismic settlement to occur near Abutment 1 due to strong ground motion which is estimated to be about 3-4 inches at locations where medium dense granular soil exists in the upper 60 ft.

For site specific seismic data and design recommendations, refer to the memorandum concerning seismic design recommendations (dated December 5, 2011), by AnhDan Le (916-227-7211) of the Office of Geotechnical Design South 2 (OGDS2).

"As-Built" Information

Built in 1966, the existing Genesee Avenue OC is approximately 240 feet long and about 76 feet wide. The structure consists of a four-span, continuous Reinforced Concrete (RC) box girder on open ended diaphragm abutments and 3 column bents. The structure is supported on 16-inch diameter Cast-In-Drilled-Hole (CIDH) pile foundations at all support locations. At structure supports Abutment 1 and Abutment 5, the foundations consist of single row of 9 CIDH piles with each having a design load of 45 tons. At the Bent support locations, the foundations consist of CIDH pile groups (9 piles per column) with each having a design load of 45 tons. The existing bent pile caps are 9ft by 9ft (length / width) and approximately 3 ft thick. For a summary of the "As-Built" information, refer to the following Table 2.

Table 2 - "As-Built" CIDH Pile Data - 1966

Support Location	Foundation Type	Bottom of Pile Cap / Footing Elev. (ft)*	Minimum "As-Built" Tip Elev.(ft)*	Average CIDH Pile Tip Elev. (ft)*	Maximum "As-Built" Tip Elev. (ft)*
Abut 1	16in CIDH	Not Available	193.0	216.0	237.0
Bent 2 (Left – Center)	16in CIDH	228.0	Unknown	212.0	Unknown
Bent 2 (Right)	16in CIDH	228.0	Unknown	204.0	Unknown
Bent 3 (Left – Center)	16in CIDH	228.5	213.0	219.0	221.0
Bent 3 (Right)	16in CIDH	228.5	207.0	212.0	218.0
Bent 4 (Left – Center)	16in CIDH	227.5	Unknown	211.0	Unknown
Bent 4 (Right)	16in CIDH	227.5	Unknown	204.0	Unknown
Abut 5	16in CIDH	Not Available	194.0	211.0	228.0

* Elevations are based on the NGVD 29 datum

Foundation Recommendations

The following foundation recommendations are for the proposed replacement of the Genesee Avenue OC (Br. No. 57-1224) as shown on the General Plan sheet developed by Simon Wong Engineering (dated 4-10-12). The following foundation recommendations provided are based upon a review of the 1962 and 2011 subsurface investigations, "As-Built" information, the General Plan (dated 4-10-12), the Foundation Plan (dated 4-10-12), and communications between Simon Wong Engineering and our office.

At the abutment support locations, driven H-piles (Class 140) with lugs are recommended for support of the proposed replacement structure. At the abutment locations, spread footings are not feasible due to the presence of weak soil at Abutment 1 and steeply sloping top of bedrock surface at Abutment 3. CIDH piles are also not recommended at the abutments due to the need for battered piles.

At the Bent 2 support locations, large diameter Type-II CIDH piles are recommended for structure support. At the Bent 2 support locations, spread footings and small diameter piles are not feasible due to the anticipated large structural loads and the soil strength available to support the structure combined with the limited work area anticipated during construction.

The foundation design at the abutment locations was based on working stress design (WSD) and Load Resistance Factored Design (LRFD) was used at the Bent location. The information shown in Table 3 & 4 is based on specific foundation design information provided to our office by Simon Wong Engineering on March 7, 2012.

Using the information provided in Table 3 & 4, the Office of Geotechnical Design South 2 developed the foundation design information for the abutments and the bent locations, which is shown in Tables 5 & 6, respectively.

As mentioned in the project description of this report, the bridge will be constructed in two stages with Stage 1 consisting of a north bridge and Stage 2 consisting of a south bridge. Bent 2, Columns 1-3 are to be constructed during Stage 1, and Bent 2, Columns 4-6 are to be constructed during Stage 2. The structure and foundation information for the abutments and bent supports have been provided in manner to clearly differentiate the stage construction (Tables 3-7).

Table 3: General Foundation Information Provided by Structure Designer

Support Location	Design Method	Pile Type	Finished Grade Elevation* (ft)	Pile Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles per Support
					B	L		
Abutment 1 (North Stage 1)	WSD	HP 10 x 57	254.0	241.92	12	79	1	45
Abutment 1 (South Stage 2)	WSD	HP 10 x 57	254.0	241.92	12	79	1	45
Bent 2, Col. 1 (North Stage 1)	LRFD	96-in CIDH	241.8	238.80	N/A	N/A	1	1
Bent 2, Col. 2 (North Stage 1)	LRFD	96-in CIDH	242.5	238.80	N/A	N/A	1	1
Bent 2, Col. 3 (North Stage 1)	LRFD	96-in CIDH	243.1	238.80	N/A	N/A	1	1
Bent 2, Col. 4 (South Stage 2)	LRFD	96-in CIDH	243.9	238.80	N/A	N/A	1	1
Bent 2, Col. 5 (South Stage 2)	LRFD	96-in CIDH	244.6	238.80	N/A	N/A	1	1
Bent 2, Col. 6 (South Stage 2)	LRFD	96-in CIDH	245.4	238.80	N/A	N/A	1	1
Abutment3 (North Stage 1)	WSD	HP 10 x 57	264.0	250.42	12	79	1	49
Abutment 3 (South Stage 2)	WSD	HP 10 x 57	264.0	250.42	12	79	1	49

* At the Abutments, “finished grade elevation” is measured at the front face of the abutment stem.

Table 4: Foundation Design Loads Provided by Structure Designer

Support Location	Service-I Limit State (kips)			Strength Limit State, kips (Controlling Group)				Extreme Event State, kips (Controlling Group)			
	Total Loads		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abutment 1 (North Stage 1)	4798	119	4357	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 1 (South Stage 2)	4622	114	4181	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2, Col. 1 (North Stage 1)	2327	2327	1820	3452	3452	0	0	2669	2669	0	0
Bent 2, Col. 2 (North Stage 1)	2461	2461	1988	3464	3464	0	0	2104	2104	0	0
Bent 2, Col. 3 (North Stage 1)	3182	3182	2606	4633	4633	0	0	3498	3498	0	0
Bent 2, Col. 4 (South Stage 2)	2248	2248	1823	3265	3265	0	0	2617	2617	0	0
Bent 2, Col. 5 (South Stage 2)	2928	2928	2453	4042	4042	0	0	2557	2557	0	0
Bent 2, Col. 6 (South Stage 2)	2420	2420	1916	3550	3550	0	0	2715	2715	0	0
Abutment3 (North Stage 1)	5178	117	4726	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 3 (South Stage 2)	4989	112	4537	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

At the Bent 2 pile locations, skin friction was considered from one diameter below the pile cut-off elevation to a level one-half (½) diameter above the specified pile tip elevation with no end bearing considered. These skin friction zones used to develop the required nominal resistance are specified in the construction considerations of this report. All foundation design loads and corresponding limit states (listed in Table 4) were considered in developing the foundation design recommendations developed in Tables 5 & 6.

Geotechnical design at the abutment 1 location considered seismic settlement of the soil as reported in the seismic design recommendations by AnhDan Le of OGDS2. At Abutment 1 (South - Stage 2) and Abutment 3 (Stage 1 & 3), "drilling" to assist driving was specified to ensure the pile tips would be situated into rock, to ensure the piles would penetrate below the lateral pile tip elevations, and to facilitate the installation of the piles.

Due to the sloping rock conditions at the site, each abutment and stage was separated into several zones in order to develop more predicable specified pile tip elevations and potentially yield cost savings by avoiding excessive pile cut-offs of the steel "H" piles. These zones are numbered from 1-6 (left to right) looking up-station. For details refer to Table 5.

Table 5: Foundation Design Recommendations for Abutments 1 and Abutment 3

Support Location	Zone Designation[2]	Pile Type	Cut-Off Elevation (feet)	LRFD Service-I Limit State Load per Support (kips)		LRFD Service-I Limit State Total Load per Pile – kips (Compression)	Required Nominal Resistance (kips)	Design Tip Elevation (feet)	Specified Tip Elevation (feet)
				Total	Permanent				
Abutment 1 (North Stage 1)	Zone 1	HP 10 x 57	241.92	4798	4357	119	240	167.0 (a)	167.0
	Zone 2	HP 10 x 57	241.92	4798	4357	119	240	167.0 (a)	167.0
	Zone 3	HP 10 x 57	241.92	4798	4357	119	240	175.0 (a)	175.0
Abutment 1 (South Stage 2)	Zone 4	HP 10 x 57	241.92	4622	4181	114	230	186.0 (a)	186.0
	Zone 5	HP 10 x 57	241.92	4622	4181	114	230	199.0 (a)	199.0
	Zone 6	HP 10 x 57	241.92	4622	4181	114	230	209.0 (a)	209.0
Abutment 3 (North Stage 1)	Zone 1	HP 10 x 57	250.42	5178	4726	117	240	215.0 (a)	215.0
	Zone 2	HP 10 x 57	250.42	5178	4726	117	240	212.0 (a)	212.0
	Zone 3	HP 10 x 57	250.42	5178	4726	117	240	203.0 (a)	203.0
Abutment 3 (South Stage 2)	Zone 4	HP 10 x 57	250.42	4989	4537	112	230	194.0 (a)	194.0
	Zone 5	HP 10 x 57	250.42	4989	4537	112	230	205.0 (a)	205.0
	Zone 6	HP 10 x 57	250.42	4989	4537	112	230	215.0 (a)	215.0

Note: 1) Design tip elevation is controlled by: (a) Compression
2) Zones are numbered from 1 to 6 (from left to right) looking up-station.

Table 6: Foundation Design Recommendations for Bent 2

Support Location	Pile Type	Cut-Off Elevation (ft)	Service-I Limit State Load per Support (kips)	Total Permissible Support Settlement (in)	Required Nominal Resistance (kips)				Design Tip Elevation (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)		
Bent 2, Col. 1 (North Stage 1)	96-in CIDH	238.8	2327	1	4940	0	2670	0	155.0 (a-I)	155.0
Bent 2, Col. 2 (North Stage 1)	96-in CIDH	238.8	2461	1	4950	0	2110	0	156.0 (a-I)	156.0
Bent 2, Col. 3 (North Stage 1)	96-in CIDH	238.8	3182	1	6620	0	3500	0	152.0 (a-I)	152.0
Bent 2, Col. 4 (South Stage 2)	96-in CIDH	238.8	2248	1	4670	0	2620	0	175.0 (a-I)	175.0
Bent 2, Col. 5 (South Stage 2)	96-in CIDH	238.8	2928	1	5780	0	2560	0	170.0 (a-I)	170.0
Bent 2, Col. 6 (South Stage 2)	96-in CIDH	238.8	2420	1	5080	0	2720	0	176.0 (a-I)	176.0

Note: Design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event)

The Pile Data Table for the proposed bridge is presented in Table 7, below. The ultimate geotechnical pile capacity of the "H" piles and CIDH piles will meet or exceed the required nominal resistance in compression.

Table 7: Pile Data Table for Genesee Ave OC

Location	Zone Designation[2]	Pile Type	Required Nominal Resistance (kips)		Design Tip Elevation (feet)	Specified Tip Elevation (feet)
			Compression	Tension		
Abutment 1 (North Stage 1)	Zone 1	HP 10 x 57	240	0	167.0 (a)	167.0
	Zone 2	HP 10 x 57	240	0	167.0 (a)	167.0
	Zone 3	HP 10 x 57	240	0	175.0 (a)	175.0
Abutment 1 (South Stage 2)	Zone 4	HP 10 x 57	230	0	186.0 (a)	186.0
	Zone 5	HP 10 x 57	230	0	199.0 (a)	199.0
	Zone 6	HP 10 x 57	230	0	209.0 (a)	209.0
Bent 2, Column 1 (North Stage 1)	N/A	96" CIDH	4940	0	155.0 (a)	155.0
Bent 2, Column 2 (North Stage 1)	N/A	96" CIDH	4950	0	156.0 (a)	156.0
Bent 2, Column 3 (North Stage 1)	N/A	96" CIDH	6620	0	152.0 (a)	152.0
Bent 2, Column 4 (South Stage 2)	N/A	96" CIDH	4670	0	175.0 (a)	175.0
Bent 2, Column 5 (South Stage 2)	N/A	96" CIDH	5780	0	170.0 (a)	170.0
Bent 2, Column 6 (South Stage 2)	N/A	96" CIDH	5080	0	176.0 (a)	176.0
Abutment 3 (North Stage 1)	Zone 1	HP 10 x 57	240	0	215.0 (a)	215.0
	Zone 2	HP 10 x 57	240	0	212.0 (a)	212.0
	Zone 3	HP 10 x 57	240	0	203.0 (a)	203.0
Abutment 3 (South Stage 2)	Zone 4	HP 10 x 57	230	0	194.0 (a)	194.0
	Zone 5	HP 10 x 57	230	0	205.0 (a)	205.0
	Zone 6	HP 10 x 57	230	0	215.0 (a)	215.0

Notes: 1) Design tip elevation is controlled by: (a) Compression
2) Zones are numbered from 1 to 6 (from left to right) looking up-station.

General Notes:

1) The structure engineer shall show on the plans, in the pile data table, the minimum pile design tip elevation required to meet the lateral load demands. If the specified pile tip elevation required to meet lateral load demands exceed the specified pile tip elevation given within this report, the Office of Geotechnical Design South 2, Branch B should be contacted for further recommendations.

2) All steel "H" piles are to have lugs installed prior to driving. It is recommended that the pile detail sheets or abutment detail sheets show the lugs as specified in the Bridge Construction Records and Procedures Manual, Bridge Construction Memo 130-5.0.

3) Due to the possibility of slurry displacement methods being used at Bent 2 pile locations, it is recommended that adequate spacing in the CIDH reinforcement cage be provided for possible placement of PVC inspection tubes.

4) The special provisions shall specify the requirements of Tunnel Safety Orders, for the CIDH shaft work that meets the definition of a tunnel or shaft as described in the Highway Design Manual, Section 110.12 "Tunnel Safety Orders."

Construction Considerations:

- **Rock Core Samples and Laboratory Testing**

1) Rock core samples from the 2011 Caltrans foundation investigation are available for viewing by bidders at the Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Blvd., Sacramento, CA. Potential bidders are to allow the State seven (7) days to prepare and display the rock cores.

2) During the 2011 field investigation, rock core samples were collected from several borings at (5 ft) intervals, when possible, and were submitted to the laboratory for strength testing. A total of 32 samples were tested. Laboratory strength test results are shown on the Log of Test Borings. Laboratory strength test data are available for viewing (per Standard Specifications 2-1.06B) at Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Blvd., Sacramento, CA.

- **Driven Piles**

1) The calculated geotechnical capacity of the "H" piles is based on both skin friction and end-bearing at the Abutment 1 (Stage 1 – North). At the Abutment 1 (Stage 2 –South) and Abutment 3 locations, the calculated geotechnical capacity of the "H" piles is based predominantly on end-bearing.

2) At Abutments 1 and 3 support locations, all "H" piles are to be driven with lugs installed to aid in achieving the required nominal resistance in compression when the pile is driven to the

specified pile tip elevation. Lugs shall be installed as specified in the Bridge Construction Records and Procedures Manual, Bridge Construction Memo 130-5.0.

3) At Abutments 1 and 3 locations, "drilling" to assist driving through the existing fill material down to the elevation listed in Table 8 is required prior to driving each "H" pile. All "drilling" to assist driving through the existing fill shall be done in accordance with Standard Specification Section 49-2.01C(3). For details regarding the soils that will need to be excavated to reach the bottom of the drilled hole elevations shown in Table 8, please refer to the geology section of the report and the Log of Test Boring Sheets.

Table 8: "Drilling" to Assist Driving for Abutment 1 & 3

Location	Zone Designation*	Bottom of Drilled Hole Elevation (ft)
Abutment 1 (North Stage 1)	Zone 1	198
Abutment 1 (North Stage 1)	Zone 2	198
Abutment 1 (North Stage 1)	Zone 3	184
Abutment 1 (South Stage 2)	Zone 4	195
Abutment 1 (South Stage 2)	Zone 5	208
Abutment 1 (South Stage 2)	Zone 6	218
Abutment 3 (North Stage 1)	Zone 1	225
Abutment 3 (North Stage 1)	Zone 2	221
Abutment 3 (North Stage 1)	Zone 3	212
Abutment 3 (South Stage 2)	Zone 4	203
Abutment 3 (South Stage 2)	Zone 5	214
Abutment 3 (South Stage 2)	Zone 6	225

* Zone designations are numbered from 1 to 6 (from left to right) looking up-station.

4) The 2011 subsurface investigation identified medium dense to dense fill material, which consisted of silt and sand with local cobbles overlying the sedimentary rock at this site. The specified "drilling" to assist driving elevations are at a level where drilling through sedimentary rock will be necessary, refer to Table 9 for details regarding estimated top of rock elevations and the Log of Test Boring sheets for site specific soil and rock information.

5) Top of rock elevations will vary from one pile location to the next pile location. For design purposes, the top of rock elevations were estimated using the 1964 foundation plan, 1962 foundation investigation, and the 2011 foundation investigation. The estimated top of rock elevations are listed below in Table 9.

Table 9: Estimated Top of Rock at Abutment 1 & 3

Location *	Estimated Top of Rock Elevation (ft)
Abutment 1 (North Stage 1)	varies 155 - 195
Abutment 1 (South Stage 2)	varies 195 - 225
Abutment 3 (North Stage 1)	varies 212 - 250
Abutment 3 (South Stage 2)	varies 203 - 240

6) At the abutment locations, the contractor should anticipate hard and erratic driving due to the variable physical characteristics of the sedimentary rock and the variable top of rock elevations described in the geology section of the this report and shown in the Log of Test Boring sheets. Field splicing and cutting off of steel piling should be anticipated due to these variations in the subsurface conditions.

7) Pile acceptance is to be based on Standard Specifications 49-2.01A(4)(b) "Pile Driving Acceptance Criteria". At Abutments 1 and 3 support locations, any pile that achieves 1½ times the required nominal resistance in compression, as shown on the contract plans, within 5 feet of the specified pile tip elevation, may be considered satisfactory and cut off with written approval from the engineer. (e.g. 1½ times the required nominal resistance in compression will be 360 kips at Abutment 1 – Stage 1).

- **CIDH Piles**

1) Static groundwater was not encountered during the 2011 and 1964 foundation investigation for this site. However, a historic drainage feature exists that will transmit perched groundwater across the base of the fill/top of sedimentary rock interface from southeast to northwest (as discussed in the geology and groundwater section in this report). The amount of groundwater that permeates through the fill across the base of the fill/top of rock interface will vary considerably depending on the amount of precipitation during the season and/or intensity of storm events. For details refer to the site geology and groundwater section of this report.

2) At the Bent 2 pile locations (Stage 1 – Piles 1, 2 & 3), perched groundwater (transmitted along the historic drainage feature) may be encountered during wet seasons and may require concrete placement of CIDH piles using slurry displacement methods. At Bent 2 pile locations (Stage 2 – Pile 4, 5 & 6), it is anticipated that perched groundwater will not be an issue and can be addressed with pumping methods.

3) The calculated geotechnical capacity of all CIDH piles is based on skin friction only and no end-bearing was considered. For the CIDH piles, the skin friction zones used to calculate geotechnical capacity are from approximately one diameter below the pile cut-off elevation down to within one-half (½) pile diameter from the specified pile tip elevation for compression. The skin friction zones of the CIDH piles are summarized below in Table 10.

Table 10: CIDH Pile Skin Friction Zone Elevations

Location *	Skin Friction Zone Start Elevation (ft)	Skin Friction Zone End Elevation (ft)
Bent 2, Column 1 (North Stage 1)	230.8	159.0
Bent 2, Column 2 (North Stage 1)	230.8	160.0
Bent 2, Column 3 (North Stage 1)	230.8	156.0
Bent 2, Column 4 (South Stage 2)	230.8	179.0
Bent 2, Column 5 (South Stage 2)	230.8	174.0
Bent 2, Column 6 (South Stage 2)	230.8	180.0

* Bent columns are numbered from 1 to 6 (from left to right) looking up-station.

4) If the CIDH piles are to be constructed using slurry displacement method, the slurry shall consist of mineral or synthetic slurry only. Use of water shall not be allowed as slurry.

5) The 2011 subsurface investigation identified medium dense to dense fill material, which consisted of silt and sand with local cobbles overlying the sedimentary rock at this site. Caving conditions are anticipated in the fill overlying the bedrock at the bent pile locations. The amount of caving the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles. Temporary casing may be necessary to control caving during construction. All temporary casing is to be removed during concrete placement.

6) At the proposed Bent 2 pile locations, the contractor will need to excavate sedimentary formational material which consists of siltstone, sandstone and claystone in order to construct the CIDH piles. The contractor should anticipate the need for using varying drilling techniques (alternating soft and hard drilling) across all the Bent 2 pile locations. The variations in conditions (described above) will occur from one pile location to the next pile location, please refer to the Log of Test Boring sheets for details. Some isolated hard rock zones identified in the Log of Test Borings may require hard rock excavation techniques (i.e. rock coring, etc). The amount of difficulty the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles.

7) Top of rock elevations will vary from one pile location to the next pile location. For design purposes, the top of rock elevations were estimated using the "As-Built" foundation plan, "As-Built" LOTB, and the 2011 foundation investigation. The estimate top of rock elevations are listed below in Table 10.

Table 10: Estimated Top of Rock At Bent 2

Location *	Estimated Top of Rock Elevation (ft)
Bent 2, Column 1 (North Stage 1)	182
Bent 2, Column 2 (North Stage 1)	184
Bent 2, Column 3 (North Stage 1)	204
Bent 2, Column 4 (South Stage 2)	221
Bent 2, Column 5 (South Stage 2)	244
Bent 2, Column 6 (South Stage 2)	245

* Bent columns are numbered from 1 to 6 (from left to right) looking up-station.

8) At the Bent 2, Type II CIDH piles are specified. At these locations, an optional construction joint is shown on the contract plans. If the contractor chooses to construct the optional construction joint, then it shall be in conformance to Standard Specifications 49-3.02C(6) and possibly 49-3.02C(5). If the contractor chooses to construct the optional construction joint, the contractor may reference Table 10 to determine how far to extend the permanent steel casing below the construction joint elevation when situated in rock or soil. Due to the fact that the elevation of the optional construction joint is within the skin friction zone of all CIDH piles, then all permanent steel casing must consist of a corrugated metal pipe (CMP).

The recommendations contained in this report are based on specific project information regarding structure type, support locations, and design loads that have been provided by Simon Wong Engineering. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South 2, Design Branch B, should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hector Valencia, (916) 227-4555, or Mark DeSalvatore, (916) 227-5391, at the Office of Geotechnical Design-South 2, Branch B.

Prepared by: Date: 4-10-12

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State of California **Business, Transportation and Housing Agency**

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To: MR. CRAIG SHANNON
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Date: May 2, 2012

File: 11-SD-5-PM 29.46
11-022331
Project No. 1100000012
Genesee Avenue OC (Replace)
Br. #57-1224

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH 2
DESIGN BRANCH B, MS #5

Subject: Revised Foundation Report for Genesee Ave Overcrossing (Replace)

This report is in response to a request from Simon Wong Engineering requesting final foundation recommendations for the proposed replacement of Genesee Avenue Overcrossing (OC), Br. No. 57-1224, which will replace the existing Genesee Avenue Overcrossing, Br. No. 57-0527. The sole purpose of this Revised Foundation Report is to correct the vertical datum adjustment cited in the "original" foundation report (dated 4-10-12) and to correct all foundation data affected by the corrected vertical datum.

During the PS&E Review, it was discovered that the original Genesee Ave OC (Br. No. 57-0527) was constructed using the "City of San Diego" vertical datum and not the NGVD29 vertical datum. According to District 11 Office of Land Surveys, elevation data from the 1964 As-Built plans can be updated to the NAVD88 vertical datum by adding 8.1 ft to the As-Built elevations which are based on the "City of San Diego" vertical datum.

As discussed in the geology section of the "original" foundation report, the foundation recommendations relied heavily on the As-Built information to estimate the top of rock at the site. Rather that correct a handful of tables and sections, it was decided by our office to re-issue the entire Foundation Report, which supercedes the "original" foundation report (dated 4-10-12) for this project.

The foundation recommendations provided in this report are based on a review of the "As-Built" General Plan, "As-Built" Foundation Plan, 1962 Foundation Report, 1963 Foundation Review, "As-Built" Log of Test Borings (LOTB) sheets, along with the new General Plan (dated 4-10-12) and Foundation Plan (dated 4-10-12) from Simon Wong Engineering, local geological maps, historic aerial photos of the site, and subsurface investigations conducted in 1962 and June of 2011.

Project Description

Genesee Avenue OC crosses Interstate-5 (I-5) at post mile 29.5 in southwestern San Diego County, approximately 1.4 miles south of the I-805 / I-5 interchange. The proposed replacement of Genesee Avenue OC is a result of the planned widening of Genesee Avenue and I-5 as a part of the improvements related to the broader I-5 North Coast Corridor Project.

The replacement of Genesee Avenue OC will consist of two stage construction procedures in order to maintain flow of traffic to and from the Scripps Hospital to the east, University of California San Diego, and the Torrey Pines community to the west. The first stage of construction will consist of building a 2-span bridge, approximately 78 ft wide and 343 ft long, adjacent to and north of the existing structure. The second stage of construction will begin once traffic on Genesee Avenue is transferred from the existing bridge to the stage 1 (north) replacement bridge. The original Genesee Avenue OC will then be demolished, and the stage 2 (south) replacement bridge will be constructed. Near the completion of the second phase of construction a closure pour will join the two structures. Once completed the final structure will be approximately 343 feet long and approximately 156 feet wide.

Site Geology

The bridge site is located in southwestern San Diego County within the Peninsular Range Geomorphic Province of California. Based on the Geologic Map of the San Diego 30' x 60' Quadrangle (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by fill, the Scripps Formation (middle Eocene), and the Ardath Shale (middle Eocene). The fill material predominantly consists of the Scripps Formation excavated from the pre-existing hillsides during the construction of I-5 and Genesee Ave. OC. The Scripps Formation is generally described as a yellowish brown, fine and medium grained silty sandstone with occasional conglomerate interbeds. The Ardath Shale lies conformably underneath the Scripps Formation and is generally described as olive gray, shale.

The subsurface investigation performed in June of 2011 consisted of four 4-inch diameter mud-rotary borings (RC-11-001 through RC-11-004) utilizing wire-line coring methods. A Christensen CS 2000 drill rig was used to drill borings RC-11-001 and RC-11-003, and a Mobile B-47 was used to drill borings RC-11-002 and RC-11-004. Standard Penetration Test (SPT) testing was performed at regular intervals in the soil and upper portions of the rock during the field investigation. Some soil and rock samples were collected for corrosion and unconfined compression testing.

Boring RC-11-001 was located approximately 110 ft west of the proposed Abutment 1. At this boring location, the subsurface conditions consisted of 101.8 feet of fill (mostly derived from road cuts of local earth material interpreted as Scripps Formation) overlying sedimentary rock. The fill consisted of medium dense and dense silty sand and poorly graded sand with gravel, trace small cobbles, from the ground surface down to a depth of 65.0 ft (elev. 190.8 ft). From the elev. 190.8 ft to 168.5 ft, the fill consisted of dense and medium dense poorly graded sand with silt. From elev. 168.5 ft to 154.0 ft, the fill consisted of medium dense and dense clayey sand with

gravel. The base of the fill/top of rock contact was encountered at a depth of 101.8 ft (elev. 154.0 ft). From elev. 154.0 ft to 146.1 ft, sedimentary rock formation was encountered and consisted of moderately soft, greenish-gray claystone, interbedded with yellowish brown siltstone. From elev. 146.1 ft to 139.8 ft, the sedimentary rock consisted of moderately soft and moderately hard, brown claystone. Below elev. 139.8 ft, the sedimentary rock consisted of moderately hard, gray siltstone and extended down to the maximum explored depth of 131.1 ft (elev. 124.5 ft).

Boring RC-11-002 was located approximately 120 ft east of the proposed Abutment 3 location. At this boring location, a 6 ft thick layer of fill consisting of very dense, silty sand overlying sedimentary rock was encountered. The base of the fill/top of rock contact was encountered at a depth of 6 ft (elev. 270.8 ft). From elev. 270.8 ft to 240.8 ft, the sedimentary rock consisted of decomposed, very soft, silty sandstone with isolated zones of cobbles. Below elev. 240.8 ft, the sedimentary rock consisted of light gray siltstone, ranging from intensely weathered to fresh, and moderately soft to hard which extended down to the maximum explored depth of 120.9 ft (elev. 155.9 ft).

Boring RC-11-003 was drilled within the southbound I-5 median approximately 30 ft south of the proposed Bent 2 (pile 6 location). At this boring location, the sedimentary rock was encountered at elev. 245.6 ft, just below the 6-inch thick pavement section. From elev. 245.6 ft to 218.1 ft, the sedimentary rock consisted of decomposed to intensely weathered, very soft sandstone. Below elev. 218.1 ft, the sedimentary rock consisted of siltstone which ranged from intensely to moderately weathered, unfractured to intensely fractured, moderately soft to hard with local very hard zones (up to 1.1 ft thick) and extended down to the maximum explored depth of 170 ft (elev. 76.1 ft).

Boring RC-11-004 was drilled within the southbound I-5 median within 10 ft of the proposed Bent 2 (pile 1 location). At this boring location, the subsurface conditions consisted of 59 ft of fill overlying sedimentary rock composed of siltstone. From elev. 241.9 ft to elev. 219.9 ft, the fill consisted of 8 inches of pavement section over dense and medium dense silt with sand and cobbles. From elev. 219.9 ft to elev. 211.9 ft, the fill consisted of dense silty sand. From elev. 211.9 ft to 182.9 ft, the fill consisted of dense and medium dense, silt with fine sand and sandy silt. The base of the fill/top of rock contact was encountered at a depth of 59 ft (Elev. 182.9). From Elev. 182.9 ft to elev. 174.9 ft, the sedimentary rock consisted of siltstone ranging from decomposed to intensely weathered, and very soft to soft. Below elev. 174.9 ft to elev. 111.1ft, the siltstone becomes moderately weathered, moderately hard, unfractured to moderately fractured with scattered hard, sandstone interbeds and extended down to the maximum explored depth of 130.8 ft (elev. 111.1 ft).

The 1962 field investigation for the existing bridge consisted of two 1-inch diameter soil tube borings and one 3-inch diameter mud rotary boring. The two 1-inch diameter soil tube borings were located near the existing Bent 2 and existing Bent 4 locations and were advanced to a maximum depth of 5ft. The borings revealed a few feet of clayey silt (interpreted as residual soil) overlying siltstone/shale sedimentary rock. The mud rotary boring was located along the Bent 3 support line approximately 60ft south of the bridge. The boring was advanced to a depth of 80 ft and revealed the sedimentary rock consisted of shale, siltstone, sandstone and claystone.

- Landforms and Historical Features

The "As-Built" foundation plan topographic contour lines show a natural drainage feature that trends primarily northwest along the northern edge of existing bridge. Based on the boring from the 1962 foundation investigation and the "As-Built" foundation plan, the topographic contours shown on the "As-Built" foundation plan can be used to help approximate the top of the sedimentary rock. The topographic contours on the "As-Built" foundation plan also show a large drainage feature that trends from southeast (near the proposed Abutment 3) to the northwest (near the proposed Abutment 1), which has the ability to transmit large amounts of perched groundwater.

During the construction of I-5 just north of the Genesee Ave. OC, the natural drainage was filled with material cut from the pre-existing hillsides composed primarily of the Scripps Formation. The composition of the fill material was identified in the recently drilled borings associated with the 2011 foundation investigation. The proposed Bent 2 Piles on the northern stage construction are situated within the historic drainage feature which can transmit perched groundwater from the east hillside (near Abutment 3) down to the west (near Abutment 1).

By superimposing the proposed foundation supports on the "As-Built" foundation plan, steeply sloping top of rock surface was identified across all structure supports. Using the subsurface information from the recent field investigation, current foundation plan and the "As-Built" foundation plan, rough estimates of fill thickness overlying rock can be estimated. For specific details regarding the earth materials described above and boring locations, refer to the "As-Built" plans and LOTB sheets.

Groundwater

During the 1962 and 2011 subsurface investigations, groundwater was not encountered. As discussed in the geology section above, a natural drainage feature (see As-Built Foundation Plan) was buried with fill material during the construction of the I-5 highway in the 1960's. This fill material was encountered in the 2011 subsurface investigation and consists of permeable, granular soil that will allow groundwater to easily permeate through the fill and flow along the top of the sedimentary rock. Because the underlying rock is much less permeable than the overlying fill, this will create a perched groundwater condition which has the potential of transmitting large volumes of perched water from east to west along the historic drainage feature discussed above.

It is anticipated that perched groundwater will flow at the base of the fill/top of sedimentary rock interface within the buried historic drainage feature and the amount of groundwater that permeates and flows on top of the rock will vary considerably depending on the amount of precipitation during the season and/or intensity of storm events.

Scour Potential

The bridges do not span a waterway; therefore, scour is not considered an issue at this site.

Laboratory Testing - Corrosion

Corrosion test result for soil sample collected from boring RC-11-002 is shown below in Table 1. The soil sample tested is considered non-corrosive by current Caltrans standards.

Table 1 – Corrosion Test Summary

Sample Location	SIC number	pH	Minimum Resistivity (ohm-Cm)	Chloride Content (ppm)	Sulfate Content (ppm)
Boring RC-11-002 (El. 276.8-246.8 ft)	C701579	7.96	942	108	455

Note: Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 2000 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE walls, soil and water are not tested for chlorides and sulfates if the minimum resistivity is greater than 1,000 ohm-cm.

Laboratory Testing – Unconfined Compression Strength Testing

During the 2011 foundation investigation, rock samples were collected from three borings at five-foot intervals, when possible, and samples were submitted to the geotechnical laboratory for unconfined compression strength testing. Some of the recovered rock core samples were so weak or so fractured that they could not be tested, whereas other rock samples were strong and large enough to be tested. Some of the samples that were large enough to be tested may have broken into smaller pieces during transport, which resulted in the samples not being tested or not meeting the proper length to diameter ratio required for unconfined compression strength testing (per ASTM D2166 & ASTM D7012). A total of thirty-two unconfined compression strength tests were done for this structure and are listed on the Log of Test Borings (LOTB). Refer to the LOTB sheets for the site-specific rock and soil data.

Fault, Seismic and Liquefaction Data

Based on the 2007 Caltrans Fault Database, the site is located approximately 2.6 miles (4.2 km) east of the Newport Inglewood – Rose Canyon Fault "Oceanside Section" (Fault ID 223, Mmax = 7.5, strike slip type, dip = 90 deg) which is the controlling fault for the deterministic seismic procedure and the design response spectrum. The corresponding peak ground acceleration (PGA) is estimated as 0.45g.

Liquefaction potential due to strong ground shaking at this site is low due to the fact that no groundwater was encountered during the 1962 and 2011 foundation investigations. However, there is a potential for seismic settlement to occur near Abutment 1 due to strong ground motion which is estimated to be about 3-4 inches at locations where medium dense granular soil exists in the upper 60 ft.

For site specific seismic data and design recommendations, refer to the memorandum concerning seismic design recommendations (dated December 5, 2011), by AnhDan Le (916-227-7211) of the Office of Geotechnical Design South 2 (OGDS2).

"As-Built" Information

Built in 1966, the existing Genesee Avenue OC is approximately 240 feet long and about 76 feet wide. The structure consists of a four-span, continuous Reinforced Concrete (RC) box girder on open ended diaphragm abutments and 3 column bents. The structure is supported on 16-inch diameter Cast-In-Drilled-Hole (CIDH) pile foundations at all support locations. At structure supports Abutment 1 and Abutment 5, the foundations consist of single row of 9 CIDH piles with each having a design load of 45 tons. At the Bent support locations, the foundations consist of CIDH pile groups (9 piles per column) with each having a design load of 45 tons. The existing bent pile caps are 9ft by 9ft (length / width) and approximately 3 ft thick. For a summary of the "As-Built" information, refer to the following Table 2.

Table 2 - "As-Built" CIDH Pile Data - 1966

Support Location	Foundation Type	Bottom of Pile Cap / Footing Elev. (ft)*	Minimum "As-Built" Tip Elev.(ft)*	Average CIDH Pile Tip Elev. (ft)*	Maximum "As-Built" Tip Elev. (ft)*
Abut 1	16in CIDH	Not Available	193.0	216.0	237.0
Bent 2 (Left – Center)	16in CIDH	228.0	Unknown	212.0	Unknown
Bent 2 (Right)	16in CIDH	228.0	Unknown	204.0	Unknown
Bent 3 (Left – Center)	16in CIDH	228.5	213.0	219.0	221.0
Bent 3 (Right)	16in CIDH	228.5	207.0	212.0	218.0
Bent 4 (Left – Center)	16in CIDH	227.5	Unknown	211.0	Unknown
Bent 4 (Right)	16in CIDH	227.5	Unknown	204.0	Unknown
Abut 5	16in CIDH	Not Available	194.0	211.0	228.0

* Elevations are based on the "City of San Diego" vertical datum (refer to As-Built Foundation plan for details)

Foundation Recommendations

The following foundation recommendations are for the proposed replacement of the Genesee Avenue OC (Br. No. 57-1224) as shown on the General Plan sheet developed by Simon Wong Engineering (dated 4-10-12). The following foundation recommendations provided are based upon a review of the 1962 and 2011 subsurface investigations, "As-Built" information, the General Plan (dated 4-10-12), the Foundation Plan (dated 4-10-12), and communications between Simon Wong Engineering and our office.

At the abutment support locations, driven H-piles (Class 140) with lugs are recommended for support of the proposed replacement structure. At the abutment locations, spread footings are not feasible due to the presence of weak soil at Abutment 1 and steeply sloping top of bedrock surface at Abutment 3. CIDH piles are also not recommended at the abutments due to the need for battered piles.

At the Bent 2 support locations, large diameter Type-II CIDH piles are recommended for structure support. At the Bent 2 support locations, spread footings and small diameter piles are not feasible due to the anticipated large structural loads and the soil strength available to support the structure combined with the limited work area anticipated during construction.

The foundation design at the abutment locations was based on working stress design (WSD) and Load Resistance Factored Design (LRFD) was used at the Bent location. The information shown in Table 3 & 4 is based on specific foundation design information provided to our office by Simon Wong Engineering on March 7, 2012.

Using the information provided in Table 3 & 4, the Office of Geotechnical Design South 2 developed the foundation design information for the abutments and the bent locations, which is shown in Tables 5 & 6, respectively.

As mentioned in the project description of this report, the bridge will be constructed in two stages with Stage 1 consisting of a north bridge and Stage 2 consisting of a south bridge. Bent 2, Columns 1-3 are to be constructed during Stage 1, and Bent 2, Columns 4-6 are to be constructed during Stage 2. The structure and foundation information for the abutments and bent supports have been provided in manner to clearly differentiate the stage construction (Tables 3-7).

Table 3: General Foundation Information Provided by Structure Designer

Support Location	Design Method	Pile Type	Finished Grade Elevation* (ft)	Pile Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles per Support
					B	L		
Abutment 1 (North Stage 1)	WSD	HP 10 x 57	254.0	241.92	12	79	1	45
Abutment 1 (South Stage 2)	WSD	HP 10 x 57	254.0	241.92	12	79	1	45
Bent 2, Col. 1 (North Stage 1)	LRFD	96-in CIDH	241.8	238.80	N/A	N/A	1	1
Bent 2, Col. 2 (North Stage 1)	LRFD	96-in CIDH	242.5	238.80	N/A	N/A	1	1
Bent 2, Col. 3 (North Stage 1)	LRFD	96-in CIDH	243.1	238.80	N/A	N/A	1	1
Bent 2, Col. 4 (South Stage 2)	LRFD	96-in CIDH	243.9	238.80	N/A	N/A	1	1
Bent 2, Col. 5 (South Stage 2)	LRFD	96-in CIDH	244.6	238.80	N/A	N/A	1	1
Bent 2, Col. 6 (South Stage 2)	LRFD	96-in CIDH	245.4	238.80	N/A	N/A	1	1
Abutment 3 (North Stage 1)	WSD	HP 10 x 57	264.0	250.42	12	79	1	49
Abutment 3 (South Stage 2)	WSD	HP 10 x 57	264.0	250.42	12	79	1	49

* At the Abutments, “finished grade elevation” is measured at the front face of the abutment stem.

Table 4: Foundation Design Loads Provided by Structure Designer

Support Location	Service-I Limit State (kips)			Strength Limit State, kips (Controlling Group)				Extreme Event State, kips (Controlling Group)			
	Total Loads		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abutment 1 (North Stage 1)	4798	119	4357	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 1 (South Stage 2)	4622	114	4181	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2, Col. 1 (North Stage 1)	2327	2327	1820	3452	3452	0	0	2669	2669	0	0
Bent 2, Col. 2 (North Stage 1)	2461	2461	1988	3464	3464	0	0	2104	2104	0	0
Bent 2, Col. 3 (North Stage 1)	3182	3182	2606	4633	4633	0	0	3498	3498	0	0
Bent 2, Col. 4 (South Stage 2)	2248	2248	1823	3265	3265	0	0	2617	2617	0	0
Bent 2, Col. 5 (South Stage 2)	2928	2928	2453	4042	4042	0	0	2557	2557	0	0
Bent 2, Col. 6 (South Stage 2)	2420	2420	1916	3550	3550	0	0	2715	2715	0	0
Abutment 3 (North Stage 1)	5178	117	4726	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 3 (South Stage 2)	4989	112	4537	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

At the Bent 2 pile locations, skin friction was considered from one diameter below the pile cut-off elevation to a level one-half (½) diameter above the specified pile tip elevation with no end bearing considered. These skin friction zones used to develop the required nominal resistance are specified in the construction considerations of this report. All foundation design loads and corresponding limit states (listed in Table 4) were considered in developing the foundation design recommendations developed in Tables 5 & 6.

Geotechnical design at the abutment 1 location considered seismic settlement of the soil as reported in the seismic design recommendations by AnhDan Le of OGDS2. At Abutment 1 (South - Stage 2) and Abutment 3 (Stage 1 & 2), "drilling" to assist driving was specified to ensure the pile tips would be situated into rock, to ensure the piles would penetrate below the lateral pile tip elevations, and to facilitate the installation of the piles.

Due to the sloping rock conditions at the site, each abutment and stage was separated into several zones in order to develop more predicable specified pile tip elevations and potentially yield cost savings by avoiding excessive pile cut-offs of the steel "H" piles. These zones are numbered from 1-6 (left to right) looking up-station. For details refer to Table 5.

Table 5: Foundation Design Recommendations for Abutments 1 and Abutment 3

Support Location	Zone Designation[2]	Pile Type	Cut-Off Elevation (feet)	LRFD Service-I Limit State Load per Support (kips)		LRFD Service-I Limit State Total Load per Pile – kips (Compression)	Required Nominal Resistance (kips)	Design Tip Elevation (feet)	Specified Tip Elevation (feet)
				Total	Permanent				
Abutment 1 (North Stage 1)	Zone 1	HP 10 x 57	241.92	4798	4357	119	240	167.0 (a)	167.0
	Zone 2	HP 10 x 57	241.92	4798	4357	119	240	167.0 (a)	167.0
	Zone 3	HP 10 x 57	241.92	4798	4357	119	240	181.0 (a)	181.0
Abutment 1 (South Stage 2)	Zone 4	HP 10 x 57	241.92	4622	4181	114	230	192.0 (a)	192.0
	Zone 5	HP 10 x 57	241.92	4622	4181	114	230	205.0 (a)	205.0
	Zone 6	HP 10 x 57	241.92	4622	4181	114	230	210.0 (a)	210.0
Abutment 3 (North Stage 1)	Zone 1	HP 10 x 57	250.42	5178	4726	117	240	215.0 (a)	215.0
	Zone 2	HP 10 x 57	250.42	5178	4726	117	240	216.0 (a)	216.0
	Zone 3	HP 10 x 57	250.42	5178	4726	117	240	209.0 (a)	209.0
Abutment 3 (South Stage 2)	Zone 4	HP 10 x 57	250.42	4989	4537	112	230	200.0 (a)	200.0
	Zone 5	HP 10 x 57	250.42	4989	4537	112	230	211.0 (a)	211.0
	Zone 6	HP 10 x 57	250.42	4989	4537	112	230	215.0 (a)	215.0

Note: 1) Design tip elevation is controlled by: (a) Compression
2) Zones are numbered from 1 to 6 (from left to right) looking up-station.

Table 6: Foundation Design Recommendations for Bent 2

Support Location	Pile Type	Cut-Off Elevation (ft)	Service-I Limit State Load per Support (kips)	Total Permissible Support Settlement (in)	Required Nominal Resistance (kips)				Design Tip Elevation (ft)	Specified Tip Elevation (ft)
					Strength Limit		Extreme Event			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)		
Bent 2, Col. 1 (North Stage 1)	96-in CIDH	238.8	2327	1	4940	0	2670	0	155.0 (a-I)	155.0
Bent 2, Col. 2 (North Stage 1)	96-in CIDH	238.8	2461	1	4950	0	2110	0	156.0 (a-I)	156.0
Bent 2, Col. 3 (North Stage 1)	96-in CIDH	238.8	3182	1	6620	0	3500	0	152.0 (a-I)	152.0
Bent 2, Col. 4 (South Stage 2)	96-in CIDH	238.8	2248	1	4670	0	2620	0	175.0 (a-I)	175.0
Bent 2, Col. 5 (South Stage 2)	96-in CIDH	238.8	2928	1	5780	0	2560	0	170.0 (a-I)	170.0
Bent 2, Col. 6 (South Stage 2)	96-in CIDH	238.8	2420	1	5080	0	2720	0	176.0 (a-I)	176.0

Note: Design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event)

The Pile Data Table for the proposed bridge is presented in Table 7, below. The ultimate geotechnical pile capacity of the "H" piles and CIDH piles will meet or exceed the required nominal resistance in compression.

Table 7: Pile Data Table for Genesee Ave OC

Location	Zone Designation[2]	Pile Type	Required Nominal Resistance (kips)		Design Tip Elevation (feet)	Specified Tip Elevation (feet)
			Compression	Tension		
Abutment 1 (North Stage 1)	Zone 1	HP 10 x 57	240	0	167.0 (a)	167.0
	Zone 2	HP 10 x 57	240	0	167.0 (a)	167.0
	Zone 3	HP 10 x 57	240	0	181.0 (a)	181.0
Abutment 1 (South Stage 2)	Zone 4	HP 10 x 57	230	0	192.0 (a)	192.0
	Zone 5	HP 10 x 57	230	0	205.0 (a)	205.0
	Zone 6	HP 10 x 57	230	0	210.0 (a)	210.0
Bent 2, Column 1 (North Stage 1)	N/A	96" CIDH	4940	0	155.0 (a)	155.0
Bent 2, Column 2 (North Stage 1)	N/A	96" CIDH	4950	0	156.0 (a)	156.0
Bent 2, Column 3 (North Stage 1)	N/A	96" CIDH	6620	0	152.0 (a)	152.0
Bent 2, Column 4 (South Stage 2)	N/A	96" CIDH	4670	0	175.0 (a)	175.0
Bent 2, Column 5 (South Stage 2)	N/A	96" CIDH	5780	0	170.0 (a)	170.0
Bent 2, Column 6 (South Stage 2)	N/A	96" CIDH	5080	0	176.0 (a)	176.0
Abutment 3 (North Stage 1)	Zone 1	HP 10 x 57	240	0	215.0 (a)	215.0
	Zone 2	HP 10 x 57	240	0	216.0 (a)	216.0
	Zone 3	HP 10 x 57	240	0	209.0 (a)	209.0
Abutment 3 (South Stage 2)	Zone 4	HP 10 x 57	230	0	200.0 (a)	200.0
	Zone 5	HP 10 x 57	230	0	211.0 (a)	211.0
	Zone 6	HP 10 x 57	230	0	215.0 (a)	215.0

Notes: 1) Design tip elevation is controlled by: (a) Compression
2) Zones are numbered from 1 to 6 (from left to right) looking up-station.

General Notes:

1) The structure engineer shall show on the plans, in the pile data table, the minimum pile design tip elevation required to meet the lateral load demands. If the specified pile tip elevation required to meet lateral load demands exceed the specified pile tip elevation given within this report, the Office of Geotechnical Design South 2, Branch B should be contacted for further recommendations.

2) All steel "H" piles are to have lugs installed prior to driving. It is recommended that the pile detail sheets or abutment detail sheets show the lugs as specified in the Bridge Construction Records and Procedures Manual, Bridge Construction Memo 130-5.0.

3) Due to the possibility of slurry displacement methods being used at Bent 2 pile locations, it is recommended that adequate spacing in the CIDH reinforcement cage be provided for possible placement of PVC inspection tubes.

4) The special provisions shall specify the requirements of Tunnel Safety Orders, for the CIDH shaft work that meets the definition of a tunnel or shaft as described in the Highway Design Manual, Section 110.12 "Tunnel Safety Orders."

Construction Considerations:

- **Rock Core Samples and Laboratory Testing**

1) Rock core samples from the 2011 Caltrans foundation investigation are available for viewing by bidders at the Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Blvd., Sacramento, CA. Potential bidders are to allow the State seven (7) days to prepare and display the rock cores.

2) During the 2011 field investigation, rock core samples were collected from several borings at (5 ft) intervals, when possible, and were submitted to the laboratory for strength testing. A total of 32 samples were tested. Laboratory strength test results are shown on the Log of Test Borings. Laboratory strength test data are available for viewing (per Standard Specifications 2-1.06B) at Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Blvd., Sacramento, CA.

- **Driven Piles**

1) The calculated geotechnical capacity of the "H" piles is based on both skin friction and end-bearing at the Abutment 1 (Stage 1 – North). At the Abutment 1 (Stage 2 –South) and Abutment 3 locations, the calculated geotechnical capacity of the "H" piles is based predominantly on end-bearing.

2) At Abutments 1 and 3 support locations, all "H" piles are to be driven with lugs installed to aid in achieving the required nominal resistance in compression when the pile is driven to the

specified pile tip elevation. Lugs shall be installed as specified in the Bridge Construction Records and Procedures Manual, Bridge Construction Memo 130-5.0.

3) At Abutments 1 and 3 locations, "drilling" to assist driving through the existing fill material down to the elevation listed in Table 8 is required prior to driving each "H" pile. All "drilling" to assist driving through the existing fill shall be done in accordance with Standard Specification Section 49-2.01C(3). For details regarding the soils that will need to be excavated to reach the bottom of the drilled hole elevations shown in Table 8, please refer to the geology section of the report and the Log of Test Boring Sheets.

Table 8: "Drilling" to Assist Driving for Abutment 1 & 3

Location	Zone Designation*	Bottom of Drilled Hole Elevation (ft)
Abutment 1 (North Stage 1)	Zone 1	198
Abutment 1 (North Stage 1)	Zone 2	198
Abutment 1 (North Stage 1)	Zone 3	190
Abutment 1 (South Stage 2)	Zone 4	201
Abutment 1 (South Stage 2)	Zone 5	214
Abutment 1 (South Stage 2)	Zone 6	219
Abutment 3 (North Stage 1)	Zone 1	225
Abutment 3 (North Stage 1)	Zone 2	225
Abutment 3 (North Stage 1)	Zone 3	218
Abutment 3 (South Stage 2)	Zone 4	209
Abutment 3 (South Stage 2)	Zone 5	220
Abutment 3 (South Stage 2)	Zone 6	225

* Zone designations are numbered from 1 to 6 (from left to right) looking up-station.

4) The 2011 subsurface investigation identified medium dense to dense fill material, which consisted of silt and sand with local cobbles overlying the sedimentary rock at this site. The specified "drilling" to assist driving elevations are at a level where drilling through sedimentary rock will be necessary, refer to Table 9 for details regarding estimated top of rock elevations and the Log of Test Boring sheets for site specific soil and rock information.

5) Top of rock elevations will vary from one pile location to the next pile location. For design purposes, the top of rock elevations were estimated using the 1964 foundation plan, 1962 foundation investigation, and the 2011 foundation investigation. The estimated top of rock elevations are listed below in Table 9.

Table 9: Estimated Top of Rock at Abutment 1 & 3

Location *	Estimated Top of Rock Elevation (ft)
Abutment 1 (North Stage 1)	varies 161 – 201
Abutment 1 (South Stage 2)	varies 201– 231
Abutment 3 (North Stage 1)	varies 218– 256
Abutment 3 (South Stage 2)	varies 209 – 246

6) At the abutment locations, the contractor should anticipate hard and erratic driving due to the variable physical characteristics of the sedimentary rock and the variable top of rock elevations described in the geology section of the this report and shown in the Log of Test Boring sheets. Field splicing and cutting off of steel piling should be anticipated due to these variations in the subsurface conditions.

7) Pile acceptance is to be based on Standard Specifications 49-2.01A(4)(b) "Pile Driving Acceptance Criteria". At Abutments 1 and 3 support locations, any pile that achieves 1½ times the required nominal resistance in compression, as shown on the contract plans, within 5 feet of the specified pile tip elevation, may be considered satisfactory and cut off with written approval from the engineer. (e.g. 1½ times the required nominal resistance in compression will be 360 kips at Abutment 1 – Stage 1).

- **CIDH Piles**

1) Static groundwater was not encountered during the 2011 and 1964 foundation investigation for this site. However, a historic drainage feature exists that will transmit perched groundwater across the base of the fill/top of sedimentary rock interface from southeast to northwest (as discussed in the geology and groundwater section in this report). The amount of groundwater that permeates through the fill across the base of the fill/top of rock interface will vary considerably depending on the amount of precipitation during the season and/or intensity of storm events. For details refer to the site geology and groundwater section of this report.

2) At the Bent 2 pile locations (Stage 1 – Piles 1, 2 & 3), perched groundwater (transmitted along the historic drainage feature) may be encountered during wet seasons and may require concrete placement of CIDH piles using slurry displacement methods. At Bent 2 pile locations (Stage 2 – Pile 4, 5 & 6), it is anticipated that perched groundwater will not be an issue and can be addressed with pumping methods.

3) The calculated geotechnical capacity of all CIDH piles is based on skin friction only and no end-bearing was considered. For the CIDH piles, the skin friction zones used to calculate geotechnical capacity are from approximately one diameter below the pile cut-off elevation down to within one-half (½) pile diameter from the specified pile tip elevation for compression. The skin friction zones of the CIDH piles are summarized below in Table 10.

Table 10: CIDH Pile Skin Friction Zone Elevations

Location *	Skin Friction Zone Start Elevation (ft)	Skin Friction Zone End Elevation (ft)
Bent 2, Column 1 (North Stage 1)	230.8	159.0
Bent 2, Column 2 (North Stage 1)	230.8	160.0
Bent 2, Column 3 (North Stage 1)	230.8	156.0
Bent 2, Column 4 (South Stage 2)	230.8	179.0
Bent 2, Column 5 (South Stage 2)	230.8	174.0
Bent 2, Column 6 (South Stage 2)	230.8	180.0

* Bent columns are numbered from 1 to 6 (from left to right) looking up-station.

4) If the CIDH piles are to be constructed using slurry displacement method, the slurry shall consist of mineral or synthetic slurry only. Use of water shall not be allowed as slurry.

5) The 2011 subsurface investigation identified medium dense to dense fill material, which consisted of silt and sand with local cobbles overlying the sedimentary rock at this site. Caving conditions are anticipated in the fill overlying the bedrock at the bent pile locations. The amount of caving the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles. Temporary casing may be necessary to control caving during construction. All temporary casing is to be removed during concrete placement.

6) At the proposed Bent 2 pile locations, the contractor will need to excavate sedimentary formational material which consists of siltstone, sandstone and claystone in order to construct the CIDH piles. The contractor should anticipate the need for using varying drilling techniques (alternating soft and hard drilling) across all the Bent 2 pile locations. The variations in conditions (described above) will occur from one pile location to the next pile location, please refer to the Log of Test Boring sheets for details. Some isolated hard rock zones identified in the Log of Test Borings may require hard rock excavation techniques (i.e. rock coring, etc). The amount of difficulty the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles.

7) Top of rock elevations will vary from one pile location to the next pile location. For design purposes, the top of rock elevations were estimated using the “As-Built” foundation plan, “As-Built” LOTB, and the 2011 foundation investigation. The estimate top of rock elevations are listed below in Table 10.

Table 10: Estimated Top of Rock At Bent 2

Location *	Estimated Top of Rock Elevation (ft)
Bent 2, Column 1 (North Stage 1)	182
Bent 2, Column 2 (North Stage 1)	184
Bent 2, Column 3 (North Stage 1)	204
Bent 2, Column 4 (South Stage 2)	221
Bent 2, Column 5 (South Stage 2)	244
Bent 2, Column 6 (South Stage 2)	245

* Bent columns are numbered from 1 to 6 (from left to right) looking up-station.

8) At the Bent 2, Type II CIDH piles are specified. At these locations, an optional construction joint is shown on the contract plans. If the contractor chooses to construct the optional construction joint, then it shall be in conformance to Standard Specifications 49-3.02C(6) and possibly 49-3.02C(5). If the contractor chooses to construct the optional construction joint, the contractor may reference Table 10 to determine how far to extend the permanent steel casing below the construction joint elevation when situated in rock or soil. Due to the fact that the elevation of the optional construction joint is within the skin friction zone of all CIDH piles, then all permanent steel casing must consist of a corrugated metal pipe (CMP).

The recommendations contained in this report are based on specific project information regarding structure type, support locations, and design loads that have been provided by Simon Wong Engineering. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South 2, Design Branch B, should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hector Valencia, (916) 227-4555, or Mark DeSalvatore, (916) 227-5391, at the Office of Geotechnical Design-South 2, Branch B.

Prepared by: Date: 5-2-12

Engineering Geologist
Office of Geotechnical Design-South 2
Design Branch B

cc: Arturo Jacobo – District 11 Project Manager
Majid Kharrati – District 11 Design Manager
Art Padilla– District 11 Materials Engineer
RE Pending File – HQ, Structures Construction
Norbert Gee – HQ, Office of Special Funded Projects
Shira Rajendra – GS Corporate
Abbas Abghari – OGDS2
Mark DeSalvatore – OGDS2

Memorandum

Flex your power!
Be energy efficient!

To: MR. ANDREW SANFORD
Simon Wong Engineering
9968 Hibert St., Suite 202
San Diego, CA 92131

Date: December 5, 2011

File: 11-SD-5-PM 29.46
11-22331
Project # 1100000012
Genesee Avenue OC (Replace)
Bridge No. 57-0527

From: Office of Geotechnical Design South 2
Geotechnical Services – MS 5
Division of Engineering Services

Subject: **Seismic Design Recommendations**

Introduction

This memorandum presents the seismic design recommendations for the above structure. Ground motion recommendation is based on the Caltrans 2009 Seismic Design Procedure (SDP) as described in the Seismic Design Criteria (SDC) version 1.6 Appendix B.

Seismicity

Based on the 2007 Caltrans fault database, the site is located approximately 2.6 miles (4.2 km) east of the Newport Inglewood – Rose Canyon Fault "Oceanside Section" (Fault ID 223, M_{max} = 7.5, strike slip type, dip = 90 deg) which is the controlling fault for the deterministic seismic procedure. The peak horizontal bedrock acceleration (PBA) at the site is estimated around 0.45g. A copy of a map showing the location of the bridge and the controlling fault is attached.

Soil Profile

The bridge site is located within the Peninsular Range Geomorphic Province of California located in southwestern San Diego County. Based on the Geologic Map of the San Diego 30' x 60' Quadrangle (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by the Scripps Formation (middle Eocene), Ardath Shale (middle Eocene), and artificial fill.

Based on the 1962 As-Built and 2011 logs of test borings, it can be seen that weak to very weak sedimentary rock are present near the ground surface in the east, south and southeast of the site. On the other hand, fill materials are encountered in the upper layers in the west, north and northwest of the site before reaching to the sedimentary rock layer. The soil profiles vary from loose to dense sand, silty sand with coble or gravel and sedimentary rock underlie the site.

No groundwater was encountered during the 1962 and 2011 subsurface explorations.

Design Response Spectrum

Based on the 2009 SDP, the design response spectrum is the upper envelope of deterministic and probabilistic response spectra, but not to be less than a deterministic response spectrum for a vertical strike-slip fault of M_{max}=6.5 at a distance of 12 km. The deterministic response spectrum is obtained by taking average of the median response spectra calculated using the 2008 Campbell-Bozorgnia and 2008 Chiou-Youngs ground motion prediction equations. Probabilistic response spectrum is obtained for 5% probability of exceedance in 50 years (about 1000 year return period) from the 2008 USGS Seismic Hazard Map (http://earthquake.usgs.gov/hazards/products/conterminous/2008/). Adjustment to account for site condition and near fault effects shall be implemented.

For this site the deterministic procedure controls. However, since the geologic conditions change significantly within the site, the acceleration response spectrum (ARS) recommended for design is the boundary envelope of ARS curves with different values of V_{s30}. The design ARS is the upper envelope of two soil profiles with V_{S30} values ranging from 270 m/s to 560 m/s. A copy of the acceleration response spectrum recommended for design is attached for your reference.

Soil Parameters Used for LPile program

As requested by Colby Cushing, P.E. with Simon Wong Engineering, the following soil parameters are provided to use in LPile program:

At Abutment 1: The boring drilled near this abutment shows the following soil properties:

Soil Properties for LPile

Location/Zone	Soil Type	Unit Weight (pcf)	Friction Angle (degree)	Modulus (pci)
From Ele. 256' to 215'	Silty Sand (SM)	120	34	90
From Ele. 215' to 200'	Silty Sand (SM)	115	30	30
Below 200'	Silty Sand (SM)	120	34	90

At Abutment 3: The boring drilled near this abutment shows the following soil properties:

Location/Zone	Soil Type	Unit Weight (pcf)	Friction Angle (degree)	Modulus (pci)
Below 275'	Silty Sand (SM)	130	38	225

At Bent 2: We drilled 2 borings, one in the north of Bent 2 and another in the south of Bent 2. It shows different soil profiles:

At North Bent 2:

Soil Properties for LPile

Location/Zone	Soil Type	Unit Weight (pcf)	Friction Angle (degree)	Modulus (pci)
From Ele. 242' to 215'	Silty Sand (SM)	125	36	150
From Ele. 215' to 185'	Silty Sand (SM)	120	34	90
Below 185'	Silty Sand (SM)	130	38	225

At South Bent 2:

Location/Zone	Soil Type	Unit Weight (pcf)	Friction Angle (degree)	Modulus (pci)
Below 245'	Silty Sand (SM)	130	38	225

Liquefaction

From the 1962 As-Built and 2011 logs of test borings, ground water surface was not encountered during these subsurface explorations, which were drilled to depths up to 130 feet below the existing ground surface. The potential for soil liquefaction due to strong ground shaking is considered low. However, due to the potential of settlement of the loose to medium dense dry sandy soils in the upper layers (above 60 feet below existing surface), we recommend considering the effect of this settlement on reducing friction resistance of piles in these layers during design.

Seismic Settlement

Seismic settlement due to strong ground motion is estimated about three to four inches.

Subsurface Fault Rupture Hazard

The site is not located within the Earthquake Fault Hazard Zone (EFHZ) in California. The potential for surface fault rupture hazard is considered negligible

If you have any question, please contact AnhDan Le (916) 227-7211 or Angel Perez-Cobo (916) 227-7167, Office of Geotechnical Design South-2.

Prepared by: Date: 12/5/2011

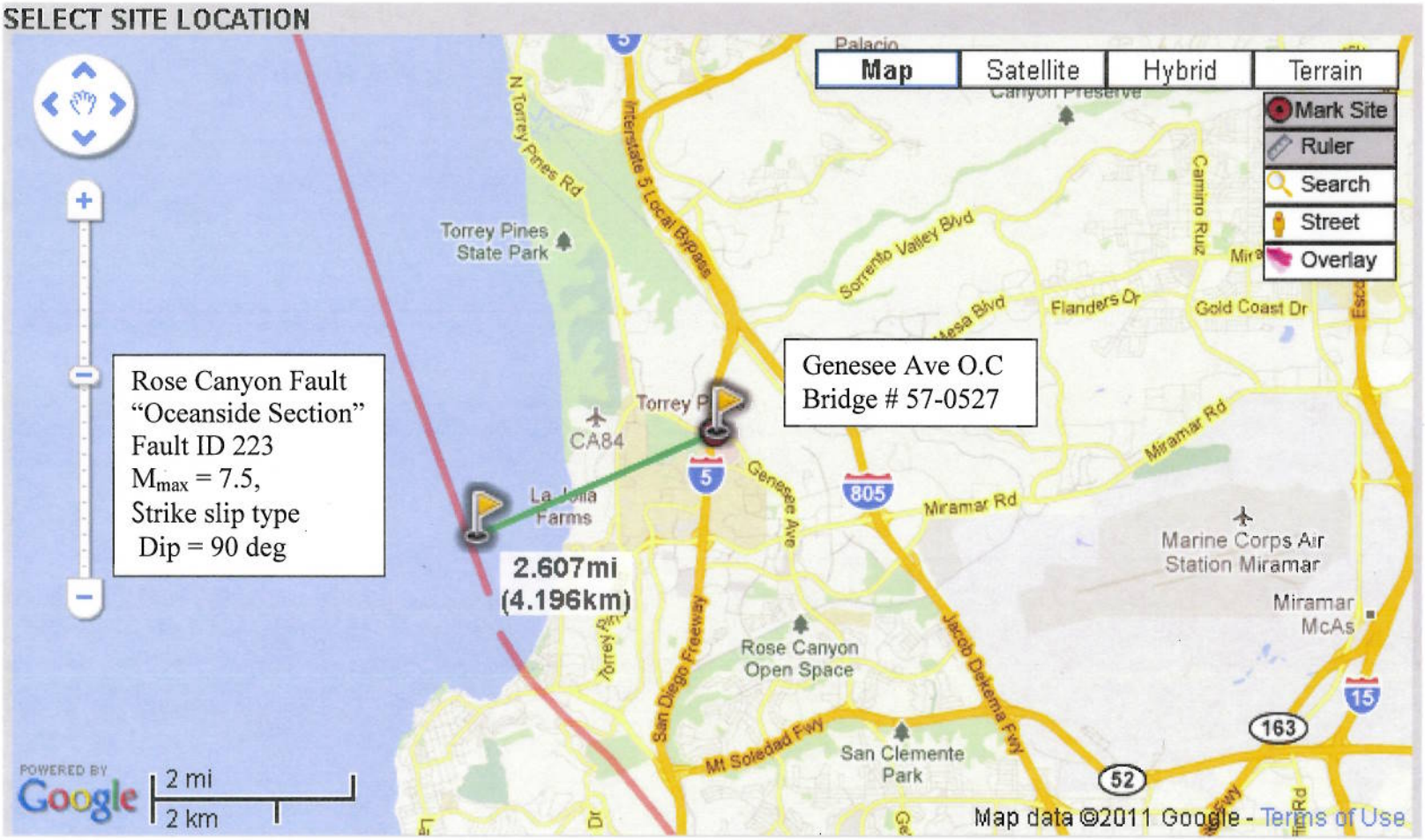
Supervised by: Date: 12/5/11

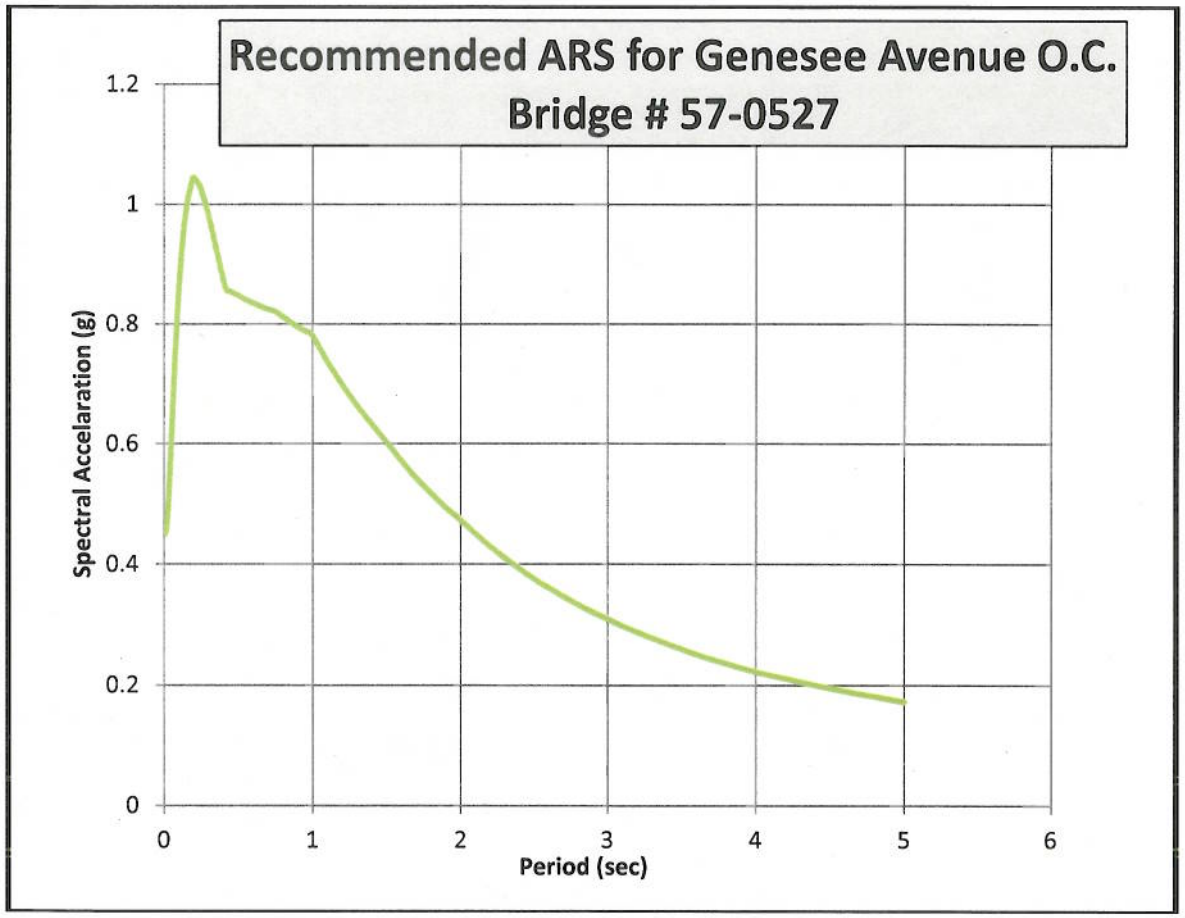
AnhDan Q Le, Ph.D, G.E.
Transportation Engineer
Geotechnical Design South-2

Angel Perez-Cobo, P.E.
Senior Transportation Engineer
Geotechnical Design South-2

cc: H. Valencia - GDS2
M. DeSalvatore - GDS2
File

Fault map
Genesee Avenue Overcrossing
Bridge # 57-0527





Period (s)	Sa(g)
0.01	0.451
0.02	0.459
0.03	0.493
0.05	0.594
0.08	0.754
0.10	0.846
0.12	0.916
0.15	0.986
0.20	1.043
0.25	1.024
0.30	0.982
0.40	0.875
0.50	0.847
0.75	0.820
1.00	0.781
1.50	0.604
2.00	0.474
3.00	0.310
4.00	0.222
5.00	0.172

State of California **Business, Transportation and Housing Agency**

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To: CRAIG SHANNON
Senior Bridge Engineer
Simon Wong Engineering
9968 Hibert St., Suite 202
San Diego, CA 92131

Date: May 24, 2012

File: 11-SD -5- PM 29.4
EA 11-022331
Proj. ID: 1100000012
Genesee Ave Pedestrian
Overcrossing (New)
Br. #57-1231

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH 2
DESIGN BRANCH B, MS #5

Subject: Foundation Report for Genesee Avenue Pedestrian Overcrossing

In a memorandum dated April 17, 2012, the District 11 Design Manager for the I-5 North Coast Corridor requested a Foundation Report (FR) for the proposed Genesee Avenue Pedestrian Overcrossing (POC) (Br. #57-1231), as well as the retaining walls RW6, RW7, RW9 and RW10 adjacent to Abutments 1 and 3 locations. This FR supersedes all previously generated Preliminary Foundation Reports for this structure. The following recommendations are based on information gathered from a subsurface investigation conducted during 2011 for the proposed new Genesee Ave POC and design information from Simon Wong Engineering (SWE). Additional subsurface information was also reviewed from the nearby structure, located approximately 400 feet to the east, which consisted of the 1962 "As-Built" LOTBs for the existing Genesee Ave OC (Br. #57-0527) and the LOTBs from the 2011 subsurface investigation for the proposed replacement of Genesee Ave OC (Br. #57-1224). The elevations referenced within this report are based on the NAVD 88 vertical datum.

Project Description

The proposed POC structure will be located west of Genesee Avenue OC at Interstate 5 (I-5), in the city of San Diego, in San Diego County. The POC will accommodate bicyclists and pedestrians traveling over Genesee Avenue. The Genesee Ave. POC (Br. #57-1231) is one of various proposed bridges along I-5 in the San Diego area that are part of the Cash Management Improvement Act (CMIA) program. The proposed structure will consist of two-span, cast-in-place, reinforced concrete box girders with monolithic closed-end diaphragm abutments and single column bent, all supported on pile foundations.

Geology

The POC site is located within the Peninsular Range Geomorphic Province of California located in southwestern San Diego County. Based on the "Geologic Map of the San Diego 30' x 60' Quadrangle" (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by the Scripps Formation (middle Eocene), Ardath Shale (middle Eocene), and fill.

In 2011, three mud rotary borings were drilled for the proposed Genesee Ave POC. Soil Borings RC-11-0001 and RC-11-003 were not drilled at the support locations due to drill rig access limitations. Abutment 1 will be located on a cut on existing hillside and Abutment 3 will be located on the existing fill slope. Boring RC-11-001 was drilled about 100 ft southeast of Abutment 3 location, Boring RC-11-002 was drilled near the Bent 2 location and Boring RC-11-003 was drilled about 50 ft north of Abutment 1 location. Boring RC-11-003 revealed siltstone below the pavement section at elev. 244.3 ft and extended to the maximum depth explored of 78.1 ft (elev. 166.6 ft). Boring RC-11-002 revealed fill material consisting of lean clay, loose silty sand and silt from elev. 242.2 to 223.9 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 71.5 ft (elev. 171.7 ft). Boring RC-11-001 revealed medium dense sandy silt and silty sand fill material from elev. 250.4 ft to 232.7 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 100.8 ft (elev. 149.9 ft). Based on the 2011 subsurface investigation and general plan information, it is estimated at the Abutment 3 location that engineered fill will be encountered from the proposed finished grade elev. of 243 to elev. 210. Siltstone will be encountered below the engineered fill. For more detail, please refer to the LOTBs.

Additional subsurface information reviewed consisted of the 1962 "As-Built" Log of Test Borings for the existing Genesee Ave OC (Br. #57-0527) and the recent 2011 borings drilled for proposed replacement of the Genesee Ave OC (Br. #57-1224). The "As-Built" borings consisted of two drive holes advanced to a maximum depth of 5 ft, and one mud-rotary boring advanced to a maximum depth of 80 ft. The 2011 subsurface investigation consisted of four mud rotary borings drilled to a maximum depth of 170.0 ft. All boring information described above was reviewed and considered when developing the geology section of this report.

Ground Water

During the 2011 subsurface exploration, no ground water was encountered in soil borings RC-11-002 and RC-11-003. However, perched ground water was encountered in soil boring RC-11-001 and was measured at elev. 192.7 ft. Perched ground water elevations are subject to seasonal fluctuations and may be encountered at higher or lower elevations depending on current conditions.

Scour Potential

Scour is not considered to be an issue at this bridge site.

Corrosion

Corrosion testing was conducted on composite soil samples during the 2011 subsurface investigation. The laboratory test results indicated that the site is not corrosive to foundation elements. For specific test results, please refer to Table 1.

Table 1 – Corrosion Test Summary

Location	pH	Minimum Resistivity (Ohm-Cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Boring RC-11-001 (Depth 0-30 ft)	8.20	1053	N/A	N/A
Boring RC-11-002 (Depth 5-60 ft)	7.96	805.8	54	201

Note: Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 2000 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE walls, soil and water are not tested for chlorides and sulfates if the minimum resistivity is greater than 1,000 ohm-cm.

Fault and Seismic Data

The structure site is potentially subject to ground motions from nearby earthquake sources during the design life of the new structure. The nearest fault to the site is the Newport-Inglewood-Rose Canyon fault zone (Oceanside section) strike-slip fault with a maximum credible earthquake M_w=7.5, located approximately 2.6 miles southwest of the bridge site. The corresponding peak ground acceleration (PGA) is estimated to be 0.45g.

Seismic design recommendations were provided in a separate memorandum for the proposed pedestrian overcrossing. For more information, please refer to the memorandum concerning Seismic Design Recommendations (dated March 27, 2012), by Anhdan Le (916-227-7211) of the Office of Geotechnical Design South 2.

Liquefaction

The Seismic Design Recommendations memorandum, dated March 27, 2012, states that the potential for soil liquefaction due to strong ground shaking is considered low at the proposed bridge site.

Surface Rupture Potential

The site does not fall within Fault Rupture Hazard Zones in California (Alquist-Priolo Earthquake Fault Maps). Therefore, the surface rupture potential at the bridge site is considered low.

Foundation Recommendations

The following recommendations are for the proposed Genesee Avenue POC (Br. #57-1231), as shown on the General Plan, dated April 10, 2012 and foundation design information provided by SWE.

At Abutments 1 and 3 locations, 48-inch diameter CIDH piles may be used for support. At Bent 2 location, 36-inch diameter CIDH piles may be used for support. The ultimate geotechnical pile capacity for the CIDH pile will meet or exceed the required nominal resistance in compression and tension. Tables 2 and 3, below, show the foundation design information provided by SWE.

Table 2 - Foundation Design Information Provided by SWE

Support Location	Design Method	Pile Type	Finished Grade Elev. (ft)	Pile Cutoff Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles
					B	L		
Abutment 1 West Pile	LRFD	48” CIDH Pile	259.00	251.50	N/A	N/A	1	1
Abutment 1 East Pile	LRFD	48” CIDH Pile	255.00	251.50	N/A	N/A	1	1
Bent 2	LRFD	36” CIDH Pile	243.00	236.25	14	14	1	4
Abutment 3 North Pile	LRFD	48” CIDH Pile	245.00	242.50	N/A	N/A	1	1
Abutment 3 South Pile	LFRD	48” CIDH Pile	246.00	242.50	N/A	N/A	1	1

Table 3 - Foundation Design Loads Provided by SWE

Support Location	Service-I Limit State (Kips)			Strength Limit State (Controlling Group, Kips)				Extreme Event Limit State (Controlling Group, Kips)			
	Total Loads		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut. 1 West Pile	760	760	570	980	980	0	0	930	930	0	0
Abut. 1 East Pile	-100*	-100*	35	150	150	230	230	500	500	450	450
Bent 2	1430	490	1170	1910	670	0	0	1380	680	0	0
Abut. 3 North Pile	840	840	640	1080	1080	0	0	1100	1100	0	0
Abut. 3 South Pile	-130*	-130*	25	160	160	290	290	580	580	540	540

*These piles have a tension load under Service Limit State.

The specified pile tip elevations for Abutments 1 and 3 and Bent 2 supports are listed in Table 4, below.

Table 4 - Foundation Design Recommendations (Br. #57-1231)

Support Location	Pile Type	Pile Cutoff Elev. (ft)	Service-I Limit State Per Support (kips)	Total Permissible Support Settlement (in)	Required Nominal Resistance (kips)				Design Tip Elev. (ft)	Specified Tip Elev. (ft)
					Strength Limit		Extreme Limit			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Abutment 1 West Pile	48" CIDH	251.50	570	1	1400	0	930	0	203.0 (a-I) 214.0 (a-II)	203.0
Abutment 1 East Pile	48" CIDH	251.50	40	1	220	330	500	450	236.0 (a-I) 226.0 (b-I) 225.0 (a-II) 218.0 (b-II)	218.0
Bent 2	36" CIDH	236.25	1170	1	960	0	680	0	191.0 (a-I) 201.0 (b-I)	191.0
Abutment 3 North Pile	48" CIDH	242.50	640	1	1550	0	1100	0	188.0 (a-I) 197.0 (a-II)	188.0
Abutment 3 South Pile	48" CIDH	242.50	30	1	230	420	580	540	220.0 (a-I) 206.0 (b-I) 206.0 (a-II) 202.0 (b-II)	202.0

Notes: *Design tip elevations are controlled by* (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Limit), (b-II) Tension (Extreme Limit).

The Pile Data Table for Abutments 1 and 3, and Bent 2, is presented below in Table 5. The ultimate geotechnical pile capacity of the CIDH piles will meet or exceed the required nominal resistance in compression and tension.

Table 5 – Pile Data Table

Support Location	Pile Type	Required Nominal Resistance		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abutment 1 West Pile	48" CIDH Pile	1400	0	203.0 (a)	203.0
Abutment 1 East Pile	48" CIDH Pile	500	450	225.0 (a) 218.0 (b)	218.0
Bent 2	36" CIDH Pile	960	0	191.0 (a)	191.0
Abutment 3 North Pile	48" CIDH Pile	1550	0	188.0 (a)	188.0
Abutment 3 South Pile	48" CIDH Pile	580	540	206.0 (a) 202.0 (b)	202.0

Notes: Design tip elevation is controlled by (a) Compression, (b) Tension

Retaining Wall RW6, RW7, RW9 and RW10

Retaining Walls RW6, RW7, RW9 and RW10 may be supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site. The Retaining Wall Layout Sheets 8, 9, 10, 11 and 12 dated April 10, 2012, show two retaining walls (RW 6 and RW 7) at Abutment 1 and two retaining walls (RW 9 and RW 10) at Abutment 3. Retaining Walls RW 6 and RW 7 are Type I Modified and Retaining Walls RW 9 and RW 10 are a combination of Type U and Type I Modified retaining walls. Tables 6, 7 and 8 below, show the design height of the walls, effective footing width, loading type and bottom of footing elevations.

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW6 & RW7

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 6 Abutment 1	Sta. 10+00.00 to Sta. 10+11.25 "RW6" LOL	4	269.00	Service	$q'_o = 0.9$	6.3
				Strength	$q_o = 1.3$	6.3
				Extreme I	$q_o = 0.9$	5.2
				Extreme II	$q_o = 2.2$	2.4
	Sta. 10+11.25 to Sta. 10+23.25 "RW6" LOL	6	267.00	Service	$q'_o = 1.2$	5.8
				Strength	$q_o = 1.7$	5.8
				Extreme I	$q_o = 1.4$	4.3
				Extreme II	$q_o = 2.4$	2.8
	Sta. 10+23.25 to Sta. 10+35.25 "RW6" LOL	8	265.00	Service	$q'_o = 1.7$	5.2
				Strength	$q_o = 2.3$	5.0
				Extreme I	$q_o = 2.6$	3.0
				Extreme II	$q_o = 3.0$	2.7
	Sta. 10+35.25 to Sta. 10+47.25 "RW6" LOL	12	261.50	Service	$q'_o = 2.2$	7.1
				Strength	$q_o = 3.1$	6.8
				Extreme I	$q_o = 3.7$	3.8
				Extreme II	$q_o = 2.6$	5.8
	Pilaster Sta. 10+47.25 to Sta. 10+55.25 "RW6" LOL	15	258.00	Service	$q'_o = 3.2$	9.1
				Strength	$q_o = 4.3$	8.9
				Extreme I	$q_o = 6.4$	4.2
				Extreme II	$q_o = 3.3$	8.4
RW 7 Abutment 1	Sta. 10+00.00 to Sta. 10+37.00 "RW7" LOL	6	264.00	Service	$q'_o = 1.2$	5.8
				Strength	$q_o = 1.7$	5.8
				Extreme I	$q_o = 1.4$	4.3
				Extreme II	$q_o = 2.4$	2.8
	Sta. 10+37.00 to Sta. 10+61.00 "RW7" LOL	8	263.00	Service	$q'_o = 1.7$	5.2
				Strength	$q_o = 2.3$	5.0
				Extreme I	$q_o = 2.6$	3.0
				Extreme II	$q_o = 3.0$	2.7
	Sta. 10+61.00 to Sta. 10+85.00 "RW7" LOL	12	261.00	Service	$q'_o = 2.2$	7.1
				Strength	$q_o = 3.1$	6.8
				Extreme I	$q_o = 3.7$	3.8
				Extreme II	$q_o = 2.6$	5.8
	Sta. 10+85.00 to Sta. 10+97.00 "RW7" LOL	14	258.75	Service	$q'_o = 2.6$	8.0
				Strength	$q_o = 3.6$	7.7
				Extreme I	$q_o = 4.7$	4.0
				Extreme II	$q_o = 2.8$	7.1

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW6 & RW7 (Continued)

RW 7 Abutment 1	Sta. 10+97.00 to Sta. 11+09.00 "RW7" LOL	16	256.50	Service	$q'_o = 2.8$	9.0
				Strength	$q_o = 3.9$	8.7
				Extreme I	$q_o = 5.2$	4.5
				Extreme II	$q_o = 2.9$	8.3
	Sta. 11+09.00 to Sta. 11+21.00 "RW7" LOL	18	254.00	Service	$q'_o = 3.1$	10.1
				Strength	$q_o = 4.3$	9.6
				Extreme I	$q_o = 5.7$	5.0
				Extreme II	$q_o = 3.1$	9.6
	Pilaster Sta. 11+21.00 to Sta. 11+29.00 "RW7" LOL	21	250.50	Service	$q'_o = 4.2$	12.1
				Strength	$q_o = 5.7$	11.8
				Extreme I	$q_o = 8.8$	5.5
				Extreme II	$q_o = 4.2$	11.8

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 8, 9, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 7 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Gross Uniform Bearing Stress (Ksf)	[2] Effective Footing Width (ft)
RW 9 Abutment 3	Sta. 11+04.00 to Sta. 11+16.00 "RW9" LOL	10	252.00	Service	$q'_o = 1.9$	5.9
				Strength	$q_o = 2.7$	5.7
				Extreme I	$q_o = 3.3$	3.1
				Extreme II	$q_o = 2.7$	4.1
	Sta. 11+16.00 to Sta. 11+42.00 "RW9" LOL	6	255.50	Service	$q'_o = 1.2$	5.8
				Strength	$q_o = 1.7$	5.8
				Extreme I	$q_o = 1.4$	4.3
				Extreme II	$q_o = 2.4$	2.8
RW 10 Abutment 3	Sta. 11+04.00 to Sta. 11+40.00 "RW10" LOL	12	250.00	Service	$q'_o = 2.2$	7.1
				Strength	$q_o = 3.1$	6.8
				Extreme I	$q_o = 3.7$	3.8
				Extreme II	$q_o = 2.6$	5.8
	Sta. 11+40.00 to Sta. 11+76.00 "RW10" LOL	8	252.00	Service	$q'_o = 1.7$	5.2
				Strength	$q_o = 2.3$	5.0
				Extreme I	$q_o = 2.6$	3.0
				Extreme II	$q_o = 3.0$	2.7
	Sta. 11+76.00 to Sta. 12+08.25 "RW10" LOL	4	254.00	Service	$q'_o = 0.9$	6.3
				Strength	$q_o = 1.3$	6.3
				Extreme I	$q_o = 0.9$	5.2
				Extreme II	$q_o = 2.2$	2.4

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 8 – Type U Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 9 / RW 10 Abutment 3	Pilaster Sta. 10+00.00 to Sta. 10+08.00 "Bike Path" LOL	25	241.00	Service	$q'_o = 3.7$	28.0
				Strength	$q_o = 4.9$	28.0
				Extreme I	$q_o = 4.3$	23.0
				Extreme II	$q_o = 3.6$	27.8
	Sta. 10+08.00 to Sta. 10+32.00 "Bike Path" LOL	24	242.00	Service	$q'_o = 3.3$	22.3
				Strength	$q_o = 4.4$	22.3
				Extreme I	$q_o = 4.0$	18.0
				Extreme II	$q_o = 3.5$	22.0
	Sta. 10+32.00 to Sta. 10+56.00 "Bike Path" LOL	21	244.00	Service	$q'_o = 2.9$	21.8
				Strength	$q_o = 3.9$	21.8
				Extreme I	$q_o = 3.4$	18.5
				Extreme II	$q_o = 3.1$	21.5
	Sta. 10+56.00 to Sta. 10+80.00 "Bike Path" LOL	18	246.00	Service	$q'_o = 2.6$	21.3
				Strength	$q_o = 3.5$	21.3
				Extreme I	$q_o = 2.8$	18.8
				Extreme II	$q_o = 2.7$	21.1
	Sta. 10+80.00 to Sta. 11+04.00 "Bike Path" LOL	15	248.00	Service	$q'_o = 2.3$	20.8
				Strength	$q_o = 3.0$	20.8
				Extreme I	$q_o = 2.3$	19.0
				Extreme II	$q_o = 2.3$	20.6

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Retaining wall design shall be in accordance with Section 11 of the LRFD Bridge Design Specifications. Seismic design shall abide with the Mononobe-Okabe method as presented in Appendix A11 which recommends a horizontal acceleration coefficient (k_h) equal to ½A, where A is the peak ground acceleration (PGA = 0.45g).

The gross uniform bearing stresses presented in Tables 6 thru 8, for retaining walls RW 6, RW 7, RW 9 and RW 10, do not exceed the calculated permissible net contact stress (q_{pn}) and factored gross nominal bearing resistances ($q_R = \varphi_b \times q_n$) where $\varphi_b = 0.45$ for strength limit state and φ_b=1.0 for extreme limit state. Retaining walls maybe supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site.

If any of the above wall heights are increased, or bottom of footing elevations raised, or loading parameters changed, the Office of Geotechnical Design South 2, Branch B, is to be contacted for reevaluation.

General Notes:

1) All support locations are to be plotted in plan view on the Log of Test Borings as stated in "Memo to Designers" 4-2. The plotting of support locations should be made prior to requesting a final foundation review.

2) The structure engineer shall show on the plans, in the pile data table, the minimum pile design tip elevation required to meet the lateral load demands. If the specified pile tip elevation required to meet the lateral load demands exceeds the specified pile tip elevation given within this report, the Office of Geotechnical Design South 2, Branch B should be contacted for further recommendations.

3) The specifications engineer shall specify the requirements of Tunnel Safety Orders, for the CIDH shaft work that meets the definition of a tunnel or shaft as described in the Standards Specifications, Section 7-1.02k(6)(c) "Tunnel Safety Orders."

Construction Considerations:

1) Rock core samples from the 2011 Caltrans foundation investigation are available for viewing by bidders at the Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Boulevard, Sacramento, CA. Potential bidders are to allow the State seven (7) days to prepare and display the rock cores.

CIDH Piles

2) The calculated geotechnical capacity of all CIDH piles is based on skin friction only and no end-bearing was considered. The skin friction zones used to calculate geotechnical capacity of the CIDH piles are summarized below in Table 9.

Table 9 - CIDH Pile Skin Friction Zone Elevations

Location	Skin Friction Zone Start Elevation	Skin Friction Zone End Elevation
Abutment 1 West Pile	247.5 ft	205.0 ft
Abutment 1 East Pile	247.5 ft	220.0 ft
Bent 2	231.3 ft	193.0 ft
Abutment 3 North Pile	238.5 ft	190.0 ft
Abutment 3 South Pile	238.5 ft	204.0Ft

3) The 2011 subsurface investigation identified loose to medium dense non-cohesive fill material, which consisted of silty sand, sandy silt and silt overlying the sedimentary rock. Due to the non-cohesive nature of the fill material, caving conditions are anticipated in the fill material at the Bent 2 and Abutment 3 locations. The amount of caving the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles. Slurry displacement and/or temporary casing may be necessary to control caving during construction. If the CIDH piles are to be constructed using slurry displacement method, the slurry shall consist of mineral or synthetic slurry only. Water shall not be allowed to be used as slurry. All temporary casing is to be removed during concrete placement.

4) Static groundwater was not encountered during the 2011 and 1962 foundation investigations. However, perched ground water was encountered at boring RC-11-001, near Abutment 3. The amount of perched ground water will vary depending on the amount of precipitation during the season and/or intensity of storm events. If perched ground water is encountered, it can be addressed with pumping methods.

Retaining Walls

5) At Retaining Wall RW6 and RW7 support locations, the bottom of footing is to be constructed on formational material. Concrete for the support footings shall be placed neat against the undisturbed material at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then the bottom of the footing excavation shall be extended down at 0.5 ft intervals until undisturbed formational material is observed and approved by the Engineer. The disturbed native material shall be either replaced with lean concrete or replaced with structurally engineered backfill compacted to 95% relative compaction.

6) At Retaining Wall RW9 and RW10 support locations, the bottom of footing is to be constructed on engineered fill. Concrete for the support footings shall be placed neat against the engineered fill at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then it shall be re-compacted to 95% relative compaction.

7) Retaining walls RW6, RW7, RW9 and RW10, footing excavations are to be inspected and approved by a representative of the Office of Geotechnical Design-South 2, Branch B, prior to placing any steel or concrete for the support footings in the excavations. Once the excavations have been completed to the specified elevations, the contractor is to allow five (5) working days for the inspection. The structure representative is to provide the Office of Geotechnical Design-South 2, Branch B, a one-week notification prior to beginning the five-day contractor waiting period.

8) All retaining wall spread footings that are to be constructed on the embankment slope are to be positioned such that they have a minimum horizontal footing embedment of 4 feet, measured from the top of the footing at the toe to the face of the finished slope.

The recommendations contained in this report are based on specific project information regarding structure type, support locations, and design loads that have been provided by the Simon Wong Engineering. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South 2, Design Branch B, should review those changes to determine if these foundation recommendations are still applicable.

Any questions regarding the above recommendations should be directed to the attention of Fernando De Haro, (916) 227-4556, or Mark DeSalvatore, (916) 227-5391, at the Office of Geotechnical Design-South 2, Branch B.

Prepared by: Date: 5/24/2012

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Office of Geotechnical Design-South 2
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John Stayton – Specs & Estimates
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Yong Pak – District 11, I-5 Corridor
Shira Rajendra – GS Corporate
Abbas Abghari – OGDS-2
Mark Desalvatore – ODGS - 2 Em for MD

State of California **Business, Transportation and Housing Agency**

M e m o r a n d u m

Flex your power!
Be energy independent !

To: CRAIG SHANNON
Senior Bridge Engineer
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Date: May 30, 2012

File: 11-SD -5- PM 29.4
EA 11-022331
Proj. ID: 1100000012
Genesee Ave Pedestrian
Overcrossing (New)
Br. #57-1231

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH 2
DESIGN BRANCH B, MS #5

Subject: Revised Foundation Report for Genesee Avenue Pedestrian Overcrossing

This Revised Foundation Report supercedes and supplements the original Foundation Report, dated May 24, 2012, for the Genesee Avenue Pedestrian Overcrossing (Br. # 57-1231) which was recently sent to your office. This Revised Foundation Report is being provided due to the typographical error in Table 4 – Foundation Design Recommendations at Bent 2. The controlled loading event, in the Design Tip Elevation column, was corrected from b-I (Strength Tension) to a-II (Extreme Compression). Table 4 shows the information that has been changed from the original Foundation Report and is shown in bold.

In a memorandum dated April 17, 2012, the District 11 Design Manager for the I-5 North Coast Corridor requested a Foundation Report (FR) for the proposed Genesee Avenue Pedestrian Overcrossing (POC) (Br. #57-1231), as well as the retaining walls RW6, RW7, RW9 and RW10 adjacent to Abutments 1 and 3 locations. This FR supersedes all previously generated Preliminary Foundation Reports for this structure. The following recommendations are based on information gathered from a subsurface investigation conducted during 2011 for the proposed new Genesee Ave POC and design information from Simon Wong Engineering (SWE). Additional subsurface information was also reviewed from the nearby structure, located approximately 400 feet to the east, which consisted of the 1962 "As-Built" LOTBs for the existing Genesee Ave OC (Br. #57-0527) and the LOTBs from the 2011 subsurface investigation for the proposed replacement of Genesee Ave OC (Br. #57-1224). The elevations referenced within this report are based on the NAVD 88 vertical datum.

Project Description

The proposed POC structure will be located west of Genesee Avenue OC at Interstate 5 (I-5), in the city of San Diego, in San Diego County. The POC will accommodate bicyclists and pedestrians traveling over Genesee Avenue. The Genesee Ave. POC (Br. #57-1231) is one of various proposed bridges along I-5 in the San Diego area that are part of the Cash Management

Improvement Act (CMIA) program. The proposed structure will consist of two-span, cast-in-place, reinforced concrete box girders with monolithic closed-end diaphragm abutments and single column bent, all supported on pile foundations.

Geology

The POC site is located within the Peninsular Range Geomorphic Province of California located in southwestern San Diego County. Based on the "Geologic Map of the San Diego 30' x 60' Quadrangle" (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by the Scripps Formation (middle Eocene), Ardath Shale (middle Eocene), and fill.

In 2011, three mud rotary borings were drilled for the proposed Genesee Ave POC. Soil Borings RC-11-0001 and RC-11-003 were not drilled at the support locations due to drill rig access limitations. Abutment 1 will be located on a cut on existing hillside and Abutment 3 will be located on the existing fill slope. Boring RC-11-001 was drilled about 100 ft southeast of Abutment 3 location, Boring RC-11-002 was drilled near the Bent 2 location and Boring RC-11-003 was drilled about 50 ft north of Abutment 1 location. Boring RC-11-003 revealed siltstone below the pavement section at elev. 244.3 ft and extended to the maximum depth explored of 78.1 ft (elev. 166.6 ft). Boring RC-11-002 revealed fill material consisting of lean clay, loose silty sand and silt from elev. 242.2 to 223.9 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 71.5 ft (elev. 171.7 ft). Boring RC-11-001 revealed medium dense sandy silt and silty sand fill material from elev. 250.4 ft to 232.7 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 100.8 ft (elev. 149.9 ft). Based on the 2011 subsurface investigation and general plan information, it is estimated at the Abutment 3 location that engineered fill will be encountered from the proposed finished grade elev. of 243 to elev. 210. Siltstone will be encountered below the engineered fill. For more detail, please refer to the LOTBs.

Additional subsurface information reviewed consisted of the 1962 "As-Built" Log of Test Borings for the existing Genesee Ave OC (Br. #57-0527) and the recent 2011 borings drilled for proposed replacement of the Genesee Ave OC (Br. #57-1224). The "As-Built" borings consisted of two drive holes advanced to a maximum depth of 5 ft, and one mud-rotary boring advanced to a maximum depth of 80 ft. The 2011 subsurface investigation consisted of four mud rotary borings drilled to a maximum depth of 170.0 ft. All boring information described above was reviewed and considered when developing the geology section of this report.

Ground Water

During the 2011 subsurface exploration, no ground water was encountered in soil borings RC-11-002 and RC-11-003. However, perched ground water was encountered in soil boring RC-11-001 and was measured at elev. 192.7 ft. Perched ground water elevations are subject to seasonal fluctuations and may be encountered at higher or lower elevations depending on current conditions.

Scour Potential

Scour is not considered to be an issue at this bridge site.

Corrosion

Corrosion testing was conducted on composite soil samples during the 2011 subsurface investigation. The laboratory test results indicated that the site is not corrosive to foundation elements. For specific test results, please refer to Table 1.

Table 1 – Corrosion Test Summary

Location	pH	Minimum Resistivity (Ohm-Cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Boring RC-11-001 (Depth 0-30 ft)	8.20	1053	N/A	N/A
Boring RC-11-002 (Depth 5-60 ft)	7.96	805.8	54	201

Note: Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 2000 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE walls, soil and water are not tested for chlorides and sulfates if the minimum resistivity is greater than 1,000 ohm-cm.

Fault and Seismic Data

The structure site is potentially subject to ground motions from nearby earthquake sources during the design life of the new structure. The nearest fault to the site is the Newport-Inglewood-Rose Canyon fault zone (Oceanside section) strike-slip fault with a maximum credible earthquake M_w=7.5, located approximately 2.6 miles southwest of the bridge site. The corresponding peak ground acceleration (PGA) is estimated to be 0.45g.

Seismic design recommendations were provided in a separate memorandum for the proposed pedestrian overcrossing. For more information, please refer to the memorandum concerning Seismic Design Recommendations (dated March 27, 2012), by Anhdan Le (916-227-7211) of the Office of Geotechnical Design South 2.

Liquefaction

The Seismic Design Recommendations memorandum, dated March 27, 2012, states that the potential for soil liquefaction due to strong ground shaking is considered low at the proposed bridge site.

Surface Rupture Potential

The site does not fall within Fault Rupture Hazard Zones in California (Alquist-Priolo Earthquake Fault Maps). Therefore, the surface rupture potential at the bridge site is considered low.

Foundation Recommendations

The following recommendations are for the proposed Genesee Avenue POC (Br. #57-1231), as shown on the General Plan, dated April 10, 2012 and foundation design information provided by SWE.

At Abutments 1 and 3 locations, 48-inch diameter CIDH piles may be used for support. At Bent 2 location, 36-inch diameter CIDH piles may be used for support. The ultimate geotechnical pile capacity for the CIDH pile will meet or exceed the required nominal resistance in compression and tension. Tables 2 and 3, below, show the foundation design information provided by SWE.

Table 2 - Foundation Design Information Provided by SWE

Support Location	Design Method	Pile Type	Finished Grade Elev. (ft)	Pile Cutoff Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles
					B	L		
Abutment 1 West Pile	LRFD	48” CIDH Pile	259.00	251.50	N/A	N/A	1	1
Abutment 1 East Pile	LRFD	48” CIDH Pile	255.00	251.50	N/A	N/A	1	1
Bent 2	LRFD	36” CIDH Pile	243.00	236.25	14	14	1	4
Abutment 3 North Pile	LRFD	48” CIDH Pile	245.00	242.50	N/A	N/A	1	1
Abutment 3 South Pile	LFRD	48” CIDH Pile	246.00	242.50	N/A	N/A	1	1

Table 3 - Foundation Design Loads Provided by SWE

Support Location	Service-I Limit State (Kips)			Strength Limit State (Controlling Group, Kips)				Extreme Event Limit State (Controlling Group, Kips)			
	Total Loads		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut. 1 West Pile	760	760	570	980	980	0	0	930	930	0	0
Abut. 1 East Pile	-100*	-100*	35	150	150	230	230	500	500	450	450
Bent 2	1430	490	1170	1910	670	0	0	1380	680	0	0
Abut. 3 North Pile	840	840	640	1080	1080	0	0	1100	1100	0	0
Abut. 3 South Pile	-130*	-130*	25	160	160	290	290	580	580	540	540

*These piles have a tension load under Service Limit State.

The specified pile tip elevations for Abutments 1 and 3 and Bent 2 supports are listed in Table 4, below.

Table 4 - Foundation Design Recommendations (Br. #57-1231)

Support Location	Pile Type	Pile Cutoff Elev. (ft)	Service-I Limit State Per Support (kips)	Total Permissible Support Settlement (in)	Required Nominal Resistance (kips)				Design Tip Elev. (ft)	Specified Tip Elev. (ft)
					Strength Limit		Extreme Limit			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Abutment 1 West Pile	48" CIDH	251.50	570	1	1400	0	930	0	203.0 (a-I) 214.0 (a-II)	203.0
Abutment 1 East Pile	48" CIDH	251.50	40	1	220	330	500	450	236.0 (a-I) 226.0 (b-I) 225.0 (a-II) 218.0 (b-II)	218.0
Bent 2	36" CIDH	236.25	1170	1	960	0	680	0	191.0 (a-I) 201.0 **(a-II)**	191.0
Abutment 3 North Pile	48" CIDH	242.50	640	1	1550	0	1100	0	188.0 (a-I) 197.0 (a-II)	188.0
Abutment 3 South Pile	48" CIDH	242.50	30	1	230	420	580	540	220.0 (a-I) 206.0 (b-I) 206.0 (a-II) 202.0 (b-II)	202.0

Notes: *Design tip elevations are controlled by* (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Limit), (b-II) Tension (Extreme Limit).

The Pile Data Table for Abutments 1 and 3, and Bent 2, is presented below in Table 5. The ultimate geotechnical pile capacity of the CIDH piles will meet or exceed the required nominal resistance in compression and tension.

Table 5 – Pile Data Table

Support Location	Pile Type	Required Nominal Resistance		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abutment 1 West Pile	48" CIDH Pile	1400	0	203.0 (a)	203.0
Abutment 1 East Pile	48" CIDH Pile	500	450	225.0 (a) 218.0 (b)	218.0
Bent 2	36" CIDH Pile	960	0	191.0 (a)	191.0
Abutment 3 North Pile	48" CIDH Pile	1550	0	188.0 (a)	188.0
Abutment 3 South Pile	48" CIDH Pile	580	540	206.0 (a) 202.0 (b)	202.0

Notes: *Design tip elevation is controlled by* (a) Compression, (b) Tension

Retaining Wall RW6, RW7, RW9 and RW10

Retaining Walls RW6, RW7, RW9 and RW10 may be supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site. The Retaining Wall Layout Sheets 8, 9, 10, 11 and 12 dated April 10, 2012, show two retaining walls (RW 6 and RW 7) at Abutment 1 and two retaining walls (RW 9 and RW 10) at Abutment 3. Retaining Walls RW 6 and RW 7 are Type I Modified and Retaining Walls RW 9 and RW 10 are a combination of Type U and Type I Modified retaining walls. Tables 6, 7 and 8 below, show the design height of the walls, effective footing width, loading type and bottom of footing elevations.

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW6 & RW7

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 6 Abutment 1	Sta. 10+00.00 to Sta. 10+11.25 "RW6" LOL	4	269.00	Service	$q'_o = 0.9$	6.3
				Strength	$q_o = 1.3$	6.3
				Extreme I	$q_o = 0.9$	5.2
				Extreme II	$q_o = 2.2$	2.4
	Sta. 10+11.25 to Sta. 10+23.25 "RW6" LOL	6	267.00	Service	$q'_o = 1.2$	5.8
				Strength	$q_o = 1.7$	5.8
				Extreme I	$q_o = 1.4$	4.3
				Extreme II	$q_o = 2.4$	2.8
	Sta. 10+23.25 to Sta. 10+35.25 "RW6" LOL	8	265.00	Service	$q'_o = 1.7$	5.2
				Strength	$q_o = 2.3$	5.0
				Extreme I	$q_o = 2.6$	3.0
				Extreme II	$q_o = 3.0$	2.7
	Sta. 10+35.25 to Sta. 10+47.25 "RW6" LOL	12	261.50	Service	$q'_o = 2.2$	7.1
				Strength	$q_o = 3.1$	6.8
				Extreme I	$q_o = 3.7$	3.8
				Extreme II	$q_o = 2.6$	5.8
	Pilaster Sta. 10+47.25 to Sta. 10+55.25 "RW6" LOL	15	258.00	Service	$q'_o = 3.2$	9.1
				Strength	$q_o = 4.3$	8.9
				Extreme I	$q_o = 6.4$	4.2
				Extreme II	$q_o = 3.3$	8.4
RW 7 Abutment 1	Sta. 10+00.00 to Sta. 10+37.00 "RW7" LOL	6	264.00	Service	$q'_o = 1.2$	5.8
				Strength	$q_o = 1.7$	5.8
				Extreme I	$q_o = 1.4$	4.3
				Extreme II	$q_o = 2.4$	2.8
	Sta. 10+37.00 to Sta. 10+61.00 "RW7" LOL	8	263.00	Service	$q'_o = 1.7$	5.2
				Strength	$q_o = 2.3$	5.0
				Extreme I	$q_o = 2.6$	3.0
				Extreme II	$q_o = 3.0$	2.7

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW6 & RW7 (Continued)

RW 7 Abutment 1	Sta. 10+61.00 to Sta. 10+85.00 "RW7" LOL	12	261.00	Service	$q'_o = 2.2$	7.1
				Strength	$q_o = 3.1$	6.8
				Extreme I	$q_o = 3.7$	3.8
				Extreme II	$q_o = 2.6$	5.8
	Sta. 10+85.00 to Sta. 10+97.00 "RW7" LOL	14	258.75	Service	$q'_o = 2.6$	8.0
				Strength	$q_o = 3.6$	7.7
				Extreme I	$q_o = 4.7$	4.0
				Extreme II	$q_o = 2.8$	7.1
	Sta. 10+97.00 to Sta. 11+09.00 "RW7" LOL	16	256.50	Service	$q'_o = 2.8$	9.0
				Strength	$q_o = 3.9$	8.7
				Extreme I	$q_o = 5.2$	4.5
				Extreme II	$q_o = 2.9$	8.3
	Sta. 11+09.00 to Sta. 11+21.00 "RW7" LOL	18	254.00	Service	$q'_o = 3.1$	10.1
				Strength	$q_o = 4.3$	9.6
				Extreme I	$q_o = 5.7$	5.0
				Extreme II	$q_o = 3.1$	9.6
	Pilaster Sta. 11+21.00 to Sta. 11+29.00 "RW7" LOL	21	250.50	Service	$q'_o = 4.2$	12.1
				Strength	$q_o = 5.7$	11.8
				Extreme I	$q_o = 8.8$	5.5
				Extreme II	$q_o = 4.2$	11.8

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 8, 9, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 7 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Gross Uniform Bearing Stress (Ksf)	[2] Effective Footing Width (ft)
RW 9 Abutment 3	Sta. 11+04.00 to Sta. 11+16.00 "RW9" LOL	10	252.00	Service	$q'_o = 1.9$	5.9
				Strength	$q_o = 2.7$	5.7
				Extreme I	$q_o = 3.3$	3.1
				Extreme II	$q_o = 2.7$	4.1
	Sta. 11+16.00 to Sta. 11+42.00 "RW9" LOL	6	255.50	Service	$q'_o = 1.2$	5.8
				Strength	$q_o = 1.7$	5.8
				Extreme I	$q_o = 1.4$	4.3
				Extreme II	$q_o = 2.4$	2.8
RW 10 Abutment 3	Sta. 11+04.00 to Sta. 11+40.00 "RW10" LOL	12	250.00	Service	$q'_o = 2.2$	7.1
				Strength	$q_o = 3.1$	6.8
				Extreme I	$q_o = 3.7$	3.8
				Extreme II	$q_o = 2.6$	5.8

Table 7 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10 (Continued)

RW 10 Abutment 3	Sta. 11+40.00 to Sta. 11+76.00 "RW10" LOL	8	252.00	Service	$q'_o = 1.7$	5.2
				Strength	$q_o = 2.3$	5.0
				Extreme I	$q_o = 2.6$	3.0
				Extreme II	$q_o = 3.0$	2.7
	Sta. 11+76.00 to Sta. 12+08.25 "RW10" LOL	4	254.00	Service	$q'_o = 0.9$	6.3
				Strength	$q_o = 1.3$	6.3
				Extreme I	$q_o = 0.9$	5.2
				Extreme II	$q_o = 2.2$	2.4

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 8 – Type U Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 9 / RW 10 Abutment 3	Pilaster Sta. 10+00.00 to Sta. 10+08.00 "Bike Path" LOL	25	241.00	Service	$q'_o = 3.7$	28.0
				Strength	$q_o = 4.9$	28.0
				Extreme I	$q_o = 4.3$	23.0
				Extreme II	$q_o = 3.6$	27.8
	Sta. 10+08.00 to Sta. 10+32.00 "Bike Path" LOL	24	242.00	Service	$q'_o = 3.3$	22.3
				Strength	$q_o = 4.4$	22.3
				Extreme I	$q_o = 4.0$	18.0
				Extreme II	$q_o = 3.5$	22.0
	Sta. 10+32.00 to Sta. 10+56.00 "Bike Path" LOL	21	244.00	Service	$q'_o = 2.9$	21.8
				Strength	$q_o = 3.9$	21.8
				Extreme I	$q_o = 3.4$	18.5
				Extreme II	$q_o = 3.1$	21.5
	Sta. 10+56.00 to Sta. 10+80.00 "Bike Path" LOL	18	246.00	Service	$q'_o = 2.6$	21.3
				Strength	$q_o = 3.5$	21.3
				Extreme I	$q_o = 2.8$	18.8
				Extreme II	$q_o = 2.7$	21.1
	Sta. 10+80.00 to Sta. 11+04.00 "Bike Path" LOL	15	248.00	Service	$q'_o = 2.3$	20.8
				Strength	$q_o = 3.0$	20.8
				Extreme I	$q_o = 2.3$	19.0
				Extreme II	$q_o = 2.3$	20.6

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Retaining wall design shall be in accordance with Section 11 of the LRFD Bridge Design Specifications. Seismic design shall abide with the Mononobe-Okabe method as presented in Appendix A11 which recommends a horizontal acceleration coefficient (k_h) equal to ½A, where A is the peak ground acceleration (PGA = 0.45g).

The gross uniform bearing stresses presented in Tables 6 thru 8, for retaining walls RW 6, RW 7, RW 9 and RW 10, do not exceed the calculated permissible net contact stress (q_{pn}) and factored gross nominal bearing resistances ($q_R = \varphi_b \times q_n$) where $\varphi_b = 0.45$ for strength limit state and φ_b=1.0 for extreme limit state. Retaining walls maybe supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site.

If any of the above wall heights are increased, or bottom of footing elevations raised, or loading parameters changed, the Office of Geotechnical Design South 2, Branch B, is to be contacted for reevaluation.

General Notes:

1) All support locations are to be plotted in plan view on the Log of Test Borings as stated in "Memo to Designers" 4-2. The plotting of support locations should be made prior to requesting a final foundation review.

2) The structure engineer shall show on the plans, in the pile data table, the minimum pile design tip elevation required to meet the lateral load demands. If the specified pile tip elevation required to meet the lateral load demands exceeds the specified pile tip elevation given within this report, the Office of Geotechnical Design South 2, Branch B should be contacted for further recommendations.

3) The specifications engineer shall specify the requirements of Tunnel Safety Orders, for the CIDH shaft work that meets the definition of a tunnel or shaft as described in the Standards Specifications, Section 7-1.02k(6)(c) "Tunnel Safety Orders."

Construction Considerations:

1) Rock core samples from the 2011 Caltrans foundation investigation are available for viewing by bidders at the Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Boulevard, Sacramento, CA. Potential bidders are to allow the State seven (7) days to prepare and display the rock cores.

CIDH Piles

2) The calculated geotechnical capacity of all CIDH piles is based on skin friction only and no end-bearing was considered. The skin friction zones used to calculate geotechnical capacity of the CIDH piles are summarized below in Table 9.

Table 9 - CIDH Pile Skin Friction Zone Elevations

Location	Skin Friction Zone Start Elevation	Skin Friction Zone End Elevation
Abutment 1 West Pile	247.5 ft	205.0 ft
Abutment 1 East Pile	247.5 ft	220.0 ft
Bent 2	231.3 ft	193.0 ft
Abutment 3 North Pile	238.5 ft	190.0 ft
Abutment 3 South Pile	238.5 ft	204.0 Ft

3) The 2011 subsurface investigation identified loose to medium dense non-cohesive fill material, which consisted of silty sand, sandy silt and silt overlying the sedimentary rock. Due to the non-cohesive nature of the fill material, caving conditions are anticipated in the fill material at the Bent 2 and Abutment 3 locations. The amount of caving the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles. Slurry displacement and/or temporary casing may be necessary to control caving during construction. If the CIDH piles are to be constructed using slurry displacement method, the slurry shall consist of mineral or synthetic slurry only. Water shall not be allowed to be used as slurry. All temporary casing is to be removed during concrete placement.

4) Static groundwater was not encountered during the 2011 and 1962 foundation investigations. However, perched ground water was encountered at boring RC-11-001, near Abutment 3. The amount of perched ground water will vary depending on the amount of precipitation during the season and/or intensity of storm events. If perched ground water is encountered, it can be addressed with pumping methods.

Retaining Walls

5) At Retaining Wall RW6 and RW7 support locations, the bottom of footing is to be constructed on formational material. Concrete for the support footings shall be placed neat against the undisturbed material at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then the bottom of the footing excavation shall be extended down at 0.5 ft intervals until undisturbed formational material is observed and approved by the Engineer. The disturbed native material shall be either replaced with lean concrete or replaced with structurally engineered backfill compacted to 95% relative compaction.

6) At Retaining Wall RW9 and RW10 support locations, the bottom of footing is to be constructed on engineered fill. Concrete for the support footings shall be placed neat against the engineered fill at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then it shall be re-compacted to 95% relative compaction.

7) Retaining walls RW6, RW7, RW9 and RW10, footing excavations are to be inspected and approved by a representative of the Office of Geotechnical Design-South 2, Branch B, prior to placing any steel or concrete for the support footings in the excavations. Once the excavations have been completed to the specified elevations, the contractor is to allow five (5) working days for the inspection. The structure representative is to provide the Office of Geotechnical Design-South 2, Branch B, a one-week notification prior to beginning the five-day contractor waiting period.

8) All retaining wall spread footings that are to be constructed on the embankment slope are to be positioned such that they have a minimum horizontal footing embedment of 4 feet, measured from the top of the footing at the toe to the face of the finished slope.

The recommendations contained in this report are based on specific project information regarding structure type, support locations, and design loads that have been provided by Simon Wong Engineering. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South 2, Design Branch B, should review those changes to determine if these foundation recommendations are still applicable.

Any questions regarding the above recommendations should be directed to the attention of Fernando De Haro, (916) 227-4556, or Mark DeSalvatore, (916) 227-5391, at the Office of Geotechnical Design-South 2, Branch B.

Prepared by: Date: 5/30/2012

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State of California **Business, Transportation and Housing Agency**

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Date: July 2, 2012

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Genesee Ave Pedestrian
Overcrossing (New)
Br. #57-1231

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH 2
DESIGN BRANCH B, MS #5

Subject: Second Revised Foundation Report for Genesee Avenue Pedestrian Overcrossing

This Second Revised Foundation Report supercedes and supplements the original Foundation Report, dated May 24, 2012, and Revised Foundation Report, dated May 30, 2012, for the Genesee Avenue Pedestrian Overcrossing (Br. # 57-1231). This Second Revised Foundation Report is being provided due to changes in footing design information for Bent 2, RW6, RW7, RW9 and RW10. Tables 3 thru 8 show the information that has been changed from the previous Foundation Report and is shown in bold.

In a memorandum dated April 17, 2012, the District 11 Design Manager for the I-5 North Coast Corridor requested a Foundation Report (FR) for the proposed Genesee Avenue Pedestrian Overcrossing (POC) (Br. #57-1231), as well as the retaining walls RW6, RW7, RW9 and RW10 adjacent to Abutments 1 and 3 locations. This FR supersedes all previously generated Preliminary Foundation Reports for this structure. The following recommendations are based on information gathered from a subsurface investigation conducted during 2011 for the proposed new Genesee Ave POC and design information from Simon Wong Engineering (SWE). Additional subsurface information was also reviewed from the nearby structure, located approximately 400 feet to the east, which consisted of the 1962 "As-Built" LOTBs for the existing Genesee Ave OC (Br. #57-0527) and the LOTBs from the 2011 subsurface investigation for the proposed replacement of Genesee Ave OC (Br. #57-1224). The elevations referenced within this report are based on the NAVD 88 vertical datum.

Project Description

The proposed POC structure will be located west of Genesee Avenue OC at Interstate 5 (I-5), in the city of San Diego, in San Diego County. The POC will accommodate bicyclists and pedestrians traveling over Genesee Avenue. The Genesee Ave. POC (Br. #57-1231) is one of various proposed bridges along I-5 in the San Diego area that are part of the Cash Management Improvement Act (CMIA) program. The proposed structure will consist of two-span, cast-in-

place, reinforced concrete box girders with monolithic closed-end diaphragm abutments and single column bent, all supported on pile foundations.

Geology

The POC site is located within the Peninsular Range Geomorphic Province of California located in southwestern San Diego County. Based on the "Geologic Map of the San Diego 30' x 60' Quadrangle" (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by the Scripps Formation (middle Eocene), Ardath Shale (middle Eocene), and fill.

In 2011, three mud rotary borings were drilled for the proposed Genesee Ave POC. Soil Borings RC-11-0001 and RC-11-003 were not drilled at the support locations due to drill rig access limitations. Abutment 1 will be located on a cut on existing hillside and Abutment 3 will be located on the existing fill slope. Boring RC-11-001 was drilled about 100 ft southeast of Abutment 3 location, Boring RC-11-002 was drilled near the Bent 2 location and Boring RC-11-003 was drilled about 50 ft north of Abutment 1 location. Boring RC-11-003 revealed siltstone below the pavement section at elev. 244.3 ft and extended to the maximum depth explored of 78.1 ft (elev. 166.6 ft). Boring RC-11-002 revealed fill material consisting of lean clay, loose silty sand and silt from elev. 242.2 to 223.9 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 71.5 ft (elev. 171.7 ft). Boring RC-11-001 revealed medium dense sandy silt and silty sand fill material from elev. 250.4 ft to 232.7 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 100.8 ft (elev. 149.9 ft). Based on the 2011 subsurface investigation and general plan information, it is estimated at the Abutment 3 location that engineered fill will be encountered from the proposed finished grade elev. of 243 ft to elev. 210 ft. Siltstone will be encountered below the engineered fill. For more detail, please refer to the LOTBs.

Additional subsurface information reviewed consisted of the 1962 "As-Built" Log of Test Borings for the existing Genesee Ave OC (Br. #57-0527) and the recent 2011 borings drilled for proposed replacement of the Genesee Ave OC (Br. #57-1224). The "As-Built" borings consisted of two drive holes advanced to a maximum depth of 5 ft, and one mud-rotary boring advanced to a maximum depth of 80 ft. The 2011 subsurface investigation consisted of four mud rotary borings drilled to a maximum depth of 170.0 ft. All boring information described above was reviewed and considered when developing the geology section of this report.

Ground Water

During the 2011 subsurface exploration, no ground water was encountered in soil borings RC-11-002 and RC-11-003. However, perched ground water was encountered in soil boring RC-11-001 and was measured at elev. 192.7 ft. Perched ground water elevations are subject to seasonal fluctuations and may be encountered at higher or lower elevations depending on current conditions.

Scour Potential

Scour is not considered to be an issue at this bridge site.

Corrosion

Corrosion testing was conducted on composite soil samples during the 2011 subsurface investigation. The laboratory test results indicated that the site is not corrosive to foundation elements. For specific test results, please refer to Table 1.

Table 1 – Corrosion Test Summary

Location	pH	Minimum Resistivity (Ohm-Cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Boring RC-11-001 (Depth 0-30 ft)	8.20	1053	N/A	N/A
Boring RC-11-002 (Depth 5-60 ft)	7.96	805.8	54	201

Note: Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 2000 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE walls, soil and water are not tested for chlorides and sulfates if the minimum resistivity is greater than 1,000 ohm-cm.

Fault and Seismic Data

The structure site is potentially subject to ground motions from nearby earthquake sources during the design life of the new structure. The nearest fault to the site is the Newport-Inglewood-Rose Canyon fault zone (Oceanside section) strike-slip fault with a maximum credible earthquake M_w=7.5, located approximately 2.6 miles southwest of the bridge site. The corresponding peak ground acceleration (PGA) is estimated to be 0.45g.

Seismic design recommendations were provided in a separate memorandum for the proposed pedestrian overcrossing. For more information, please refer to the memorandum concerning Seismic Design Recommendations (dated March 27, 2012), by Anhdan Le (916-227-7211) of the Office of Geotechnical Design South 2.

Liquefaction

The Seismic Design Recommendations memorandum, dated March 27, 2012, states that the potential for soil liquefaction due to strong ground shaking is considered low at the proposed bridge site.

Surface Rupture Potential

The site does not fall within Fault Rupture Hazard Zones in California (Alquist-Priolo Earthquake Fault Maps). Therefore, the surface rupture potential at the bridge site is considered low.

Foundation Recommendations

The following recommendations are for the proposed Genesee Avenue POC (Br. #57-1231), as shown on the General Plan, dated April 10, 2012 and foundation design information provided by SWE.

At Abutments 1 and 3 locations, 48-inch diameter CIDH piles may be used for support. At Bent 2 location, 36-inch diameter CIDH piles may be used for support. The ultimate geotechnical pile capacity for the CIDH pile will meet or exceed the required nominal resistance in compression and tension. Tables 2 and 3, below, show the foundation design information provided by SWE.

Table 2 - Foundation Design Information Provided by SWE

Support Location	Design Method	Pile Type	Finished Grade Elev. (ft)	Pile Cutoff Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles
					B	L		
Abutment 1 West Pile	LRFD	48” CIDH Pile	259.00	251.50	N/A	N/A	1	1
Abutment 1 East Pile	LRFD	48” CIDH Pile	255.00	251.50	N/A	N/A	1	1
Bent 2	LRFD	36” CIDH Pile	243.00	236.25	14	14	1	4
Abutment 3 North Pile	LRFD	48” CIDH Pile	245.00	242.50	N/A	N/A	1	1
Abutment 3 South Pile	LFRD	48” CIDH Pile	246.00	242.50	N/A	N/A	1	1

Table 3 - Foundation Design Loads Provided by SWE

Support Location	Service-I Limit State (Kips)			Strength Limit State (Controlling Group, Kips)				Extreme Event Limit State (Controlling Group, Kips)			
	Total Loads		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut. 1 West Pile	760	760	570	980	980	0	0	930	930	0	0
Abut. 1 East Pile	-100*	-100*	35	150	150	230	230	500	500	450	450
Bent 2	1430	490	1170	1910	670	0	0	1380	680	0	**60**
Abut. 3 North Pile	840	840	640	1080	1080	0	0	1100	1100	0	0
Abut. 3 South Pile	-130*	-130*	25	160	160	290	290	580	580	540	540

*These piles have a tension load under Service Limit State.

The specified pile tip elevations for Abutments 1 and 3 and Bent 2 supports are listed in Table 4, below.

Table 4 - Foundation Design Recommendations (Br. #57-1231)

Support Location	Pile Type	Pile Cutoff Elev. (ft)	Service-I Limit State Per Support (kips)	Total Permissible Support Settlement (in)	Required Nominal Resistance (kips)				Design Tip Elev. (ft)	Specified Tip Elev. (ft)
					Strength Limit		Extreme Limit			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Abutment 1 West Pile	48" CIDH	251.50	570	1	1400	0	930	0	203.0 (a-I) 214.0 (a-II)	203.0
Abutment 1 East Pile	48" CIDH	251.50	40	1	220	330	500	450	236.0 (a-I) 226.0 (b-I) 225.0 (a-II) 218.0 (b-II)	218.0
Bent 2	36" CIDH	236.25	1170	1	960	0	680	**60**	191.0 (a-I) 201.0 (a-II) **224.0 (b-II)**	191.0
Abutment 3 North Pile	48" CIDH	242.50	640	1	1550	0	1100	0	188.0 (a-I) 197.0 (a-II)	188.0
Abutment 3 South Pile	48" CIDH	242.50	30	1	230	420	580	540	220.0 (a-I) 206.0 (b-I) 206.0 (a-II) 202.0 (b-II)	202.0

Notes: *Design tip elevations are controlled by* (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Limit), (b-II) Tension (Extreme Limit).

The Pile Data Table for Abutments 1 and 3, and Bent 2, is presented below in Table 5. The ultimate geotechnical pile capacity of the CIDH piles will meet or exceed the required nominal resistance in compression and tension.

Table 5 – Pile Data Table

Support Location	Pile Type	Required Nominal Resistance		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abutment 1 West Pile	48" CIDH Pile	1400	0	203.0 (a)	203.0
Abutment 1 East Pile	48" CIDH Pile	500	450	225.0 (a) 218.0 (b)	218.0
Bent 2	36" CIDH Pile	960	**60**	191.0 (a) **224.0 (b)**	191.0
Abutment 3 North Pile	48" CIDH Pile	1550	0	188.0 (a)	188.0
Abutment 3 South Pile	48" CIDH Pile	580	540	206.0 (a) 202.0 (b)	202.0

Notes: *Design tip elevation is controlled by* (a) Compression, (b) Tension

Retaining Wall RW6, RW7, RW9 and RW10

Retaining Walls RW6, RW7, RW9 and RW10 may be supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site. The Retaining Wall Layout Sheets 8, 9, 10, 11 and 12 dated April 10, 2012, show two retaining walls (RW 6 and RW 7) at Abutment 1 and two retaining walls (RW 9 and RW 10) at Abutment 3. Retaining Walls RW 6 and RW 7 are Type I Modified and Retaining Walls RW 9 and RW 10 are a combination of Type U and Type I Modified retaining walls. Tables 6, 7 and 8 below, show the design height of the walls, effective footing width, loading type and bottom of footing elevations.

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW6 & RW7

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Net / Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 6 Abutment 1	Sta. 10+00.00 to Sta. 10+11.25 "RW6" LOL	4	269.00	Service	q'_o = 0.9	6.3
				Strength	q_o = 1.3	6.3
				Extreme I	q_o = **1.1**	**5.2**
				Extreme II	q_o = **2.3**	**2.3**
	Sta. 10+11.25 to Sta. 10+23.25 "RW6" LOL	6	267.00	Service	q'_o = 1.2	5.8
				Strength	q_o = 1.7	5.8
				Extreme I	q_o = **1.7**	**4.2**
				Extreme II	q_o = **2.5**	**2.6**
	Sta. 10+23.25 to Sta. 10+35.25 "RW6" LOL	8	265.00	Service	q'_o = 1.7	5.2
				Strength	q_o = 2.3	5.0
				Extreme I	q_o = **2.9**	**2.9**
				Extreme II	q_o = 3.0	**2.6**
	Sta. 10+35.25 to Sta. 10+47.25 "RW6" LOL	12	261.50	Service	q'_o = 2.2	7.1
				Strength	q_o = 3.1	6.8
				Extreme I	q_o = **4.3**	**3.6**
				Extreme II	q_o = 2.6	5.8
	Pilaster Sta. 10+47.25 to Sta. 10+55.25 "RW6" LOL	15	258.00	Service	q'_o = 3.2	9.1
				Strength	q_o = 4.3	8.9
				Extreme I	q_o = 6.4	4.2
				Extreme II	q_o = 3.3	8.4
RW 7 Abutment 1	Sta. 10+00.00 to Sta. 10+37.00 "RW7" LOL	6	264.00	Service	q'_o = 1.2	5.8
				Strength	q_o = 1.7	5.8
				Extreme I	q_o = **1.7**	**4.2**
				Extreme II	q_o = **2.5**	**2.6**
	Sta. 10+37.00 to Sta. 10+61.00 "RW7" LOL	8	263.00	Service	q'_o = 1.7	5.2
				Strength	q_o = 2.3	5.0
				Extreme I	q_o = **2.9**	**2.9**
				Extreme II	q_o = 3.0	**2.6**

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW6 & RW7 (Continued)

RW 7 Abutment 1	Sta. 10+61.00 to Sta. 10+85.00 "RW7" LOL	12	261.00	Service	q'_o = 2.2	7.1
				Strength	q_o = 3.1	6.8
				Extreme I	q_o = **4.3**	**3.6**
				Extreme II	q_o = 2.6	5.8
	Sta. 10+85.00 to Sta. 10+97.00 "RW7" LOL	14	258.75	Service	q'_o = 2.6	8.0
				Strength	q_o = 3.6	7.7
				Extreme I	q_o = **5.3**	**3.8**
				Extreme II	q_o = 2.8	7.1
	Sta. 10+97.00 to Sta. 11+09.00 "RW7" LOL	16	256.50	Service	q'_o = 2.8	9.0
				Strength	q_o = 3.9	8.7
				Extreme I	q_o = **5.9**	**4.3**
				Extreme II	q_o =2.9	8.3
	Sta. 11+09.00 to Sta. 11+21.00 "RW7" LOL	18	254.00	Service	q'_o = 3.1	10.1
				Strength	q_o = 4.3	9.6
				Extreme I	q_o = **6.5**	**4.7**
				Extreme II	q_o = 3.1	9.6
	Pilaster Sta. 11+21.00 to Sta. 11+29.00 "RW7" LOL	21	250.50	Service	q'_o = 4.2	12.1
				Strength	q_o = 5.7	11.8
				Extreme I	q_o = **9.0**	5.5
				Extreme II	q_o = 4.2	11.8

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 8, 9, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 7 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Net / Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 9 Abutment 3	Sta. 11+04.00 to Sta. 11+16.00 "RW9" LOL	10	252.00	Service	q'_o = 1.9	5.9
				Strength	q_o = 2.7	5.7
				Extreme I	q_o = **3.8**	**3.0**
				Extreme II	q_o = 2.7	4.1
	Sta. 11+16.00 to Sta. 11+42.00 "RW9" LOL	6	255.50	Service	q'_o = 1.2	5.8
				Strength	q_o = 1.7	5.8
				Extreme I	q_o = **1.7**	**4.2**
				Extreme II	q_o = **2.5**	**2.6**
RW 10 Abutment 3	Sta. 11+04.00 to Sta. 11+40.00 "RW10" LOL	12	250.00	Service	q'_o = 2.2	7.1
				Strength	q_o = 3.1	6.8
				Extreme I	q_o = **4.3**	**3.6**
				Extreme II	q_o = 2.6	5.8

Table 7 – Type 1 Modified Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10 (Continued)

RW 10 Abutment 3	Sta. 11+40.00 to Sta. 11+76.00 "RW10" LOL	8	252.00	Service	q'_o = 1.7	5.2
				Strength	q_o = 2.3	5.0
				Extreme I	q_o = **2.9**	**2.9**
				Extreme II	q_o = 3.0	**2.6**
	Sta. 11+76.00 to Sta. 12+08.25 "RW10" LOL	4	254.00	Service	q'_o = 0.9	6.3
				Strength	q_o = 1.3	6.3
				Extreme I	q_o = **1.1**	5.2
				Extreme II	q_o = **2.3**	**2.3**

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 8 – Type U Retaining Wall Footing Data (LRFD)[1] For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[2] Net / Gross Uniform Bearing Stress (Ksf)	[2]Effective Footing Width (ft)
RW 9 / RW 10 Abutment 3	Pilaster Sta. 10+00.00 to Sta. 10+08.00 "Bike Path" LOL	25	241.00	Service	q'_o = 3.7	28.0
				Strength	q_o = **5.0**	28.0
				Extreme I	q_o = **5.0**	**20.7**
				Extreme II	q_o = 3.6	**27.7**
	Sta. 10+08.00 to Sta. 10+32.00 "Bike Path" LOL	24	242.00	Service	q'_o = 3.3	22.3
				Strength	q_o = 4.4	22.3
				Extreme I	q_o = **4.7**	**15.5**
				Extreme II	q_o = 3.5	22.0
	Sta. 10+32.00 to Sta. 10+56.00 "Bike Path" LOL	21	244.00	Service	q'_o = 2.9	21.8
				Strength	q_o = 3.9	21.8
				Extreme I	q_o = **4.0**	**16.0**
				Extreme II	q_o = 3.1	21.5
	Sta. 10+56.00 to Sta. 10+80.00 "Bike Path" LOL	18	246.00	Service	q'_o = 2.6	21.3
				Strength	q_o = 3.5	21.3
				Extreme I	q_o = **3.3**	**16.5**
				Extreme II	q_o = 2.7	21.1
	Sta. 10+80.00 to Sta. 11+04.00 "Bike Path" LOL	15	248.00	Service	q'_o = 2.3	20.8
				Strength	q_o = 3.0	20.8
				Extreme I	q_o = **2.8**	**16.9**
				Extreme II	q_o = 2.3	20.6

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Load and Resistance Factor Design (LRFD).
[2] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Retaining wall design shall be in accordance with Section 11 of the LRFD Bridge Design Specifications. Seismic design shall abide with the Mononobe-Okabe method as presented in Appendix A11 which recommends a horizontal acceleration coefficient (k_h) equal to ½A, where A is the peak ground acceleration (PGA = 0.45g).

The gross uniform bearing stresses presented in Tables 6 thru 8, for retaining walls RW 6, RW 7, RW 9 and RW 10, do not exceed the calculated permissible net contact stress (q_{pn}) and factored gross nominal bearing resistances ($q_R = \varphi_b \times q_n$) where $\varphi_b = 0.45$ for strength limit state and φ_b=1.0 for extreme limit state. Retaining walls maybe supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site.

If any of the above wall heights are increased, or bottom of footing elevations raised, or loading parameters changed, the Office of Geotechnical Design South 2, Branch B, is to be contacted for reevaluation.

General Notes:

1) All support locations are to be plotted in plan view on the Log of Test Borings as stated in "Memo to Designers" 4-2. The plotting of support locations should be made prior to requesting a final foundation review.

2) The structure engineer shall show on the plans, in the pile data table, the minimum pile design tip elevation required to meet the lateral load demands. If the specified pile tip elevation required to meet the lateral load demands exceeds the specified pile tip elevation given within this report, the Office of Geotechnical Design South 2, Branch B should be contacted for further recommendations.

3) The specifications engineer shall specify the requirements of Tunnel Safety Orders, for the CIDH shaft work that meets the definition of a tunnel or shaft as described in the Standards Specifications, Section 7-1.02k(6)(c) "Tunnel Safety Orders."

Construction Considerations:

1) Rock core samples from the 2011 Caltrans foundation investigation are available for viewing by bidders at the Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Boulevard, Sacramento, CA. Potential bidders are to allow the State seven (7) days to prepare and display the rock cores.

CIDH Piles

2) The calculated geotechnical capacity of all CIDH piles is based on skin friction only and no end-bearing was considered. The skin friction zones used to calculate geotechnical capacity of the CIDH piles are summarized below in Table 9.

Table 9 - CIDH Pile Skin Friction Zone Elevations

Location	Skin Friction Zone Start Elevation	Skin Friction Zone End Elevation
Abutment 1 West Pile	247.5 ft	205.0 ft
Abutment 1 East Pile	247.5 ft	220.0 ft
Bent 2	231.3 ft	193.0 ft
Abutment 3 North Pile	238.5 ft	190.0 ft
Abutment 3 South Pile	238.5 ft	204.0Ft

3) The 2011 subsurface investigation identified loose to medium dense non-cohesive fill material, which consisted of silty sand, sandy silt and silt overlying the sedimentary rock. Due to the non-cohesive nature of the fill material, caving conditions are anticipated in the fill material at the Bent 2 and Abutment 3 locations. The amount of caving the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles. Slurry displacement and/or temporary casing may be necessary to control caving during construction. If the CIDH piles are to be constructed using slurry displacement method, the slurry shall consist of mineral or synthetic slurry only. Water shall not be allowed to be used as slurry. All temporary casing is to be removed during concrete placement.

4) Static groundwater was not encountered during the 2011 and 1962 foundation investigations. However, perched ground water was encountered at boring RC-11-001, near Abutment 3. The amount of perched ground water will vary depending on the amount of precipitation during the season and/or intensity of storm events. If perched ground water is encountered, it can be addressed with pumping methods.

Retaining Walls

5) At Retaining Wall RW6 and RW7 support locations, the bottom of footing is to be constructed on formational material. Concrete for the support footings shall be placed neat against the undisturbed material at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then the bottom of the footing excavation shall be extended down at 0.5 ft intervals until undisturbed formational material is observed and approved by the Engineer. The disturbed native material shall be either replaced with lean concrete or replaced with structurally engineered backfill compacted to 95% relative compaction.

6) At Retaining Wall RW9 and RW10 support locations, the bottom of footing is to be constructed on engineered fill. Concrete for the support footings shall be placed neat against the engineered fill at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then it shall be re-compacted to 95% relative compaction.

7) Retaining walls RW6, RW7, RW9 and RW10, footing excavations are to be inspected and approved by a representative of the Office of Geotechnical Design-South 2, Branch B, prior to placing any steel or concrete for the support footings in the excavations. Once the excavations have been completed to the specified elevations, the contractor is to allow five (5) working days for the inspection. The structure representative is to provide the Office of Geotechnical Design-South 2, Branch B, a one-week notification prior to beginning the five-day contractor waiting period.

8) All retaining wall spread footings that are to be constructed on the embankment slope are to be positioned such that they have a minimum horizontal footing embedment of 4 feet, measured from the top of the footing at the toe to the face of the finished slope.

The recommendations contained in this report are based on specific project information regarding structure type, support locations, and design loads that have been provided by Simon Wong Engineering. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South 2, Design Branch B, should review those changes to determine if these foundation recommendations are still applicable.

Any questions regarding the above recommendations should be directed to the attention of Fernando De Haro, (916) 227-4556, or Mark DeSalvatore, (916) 227-5391, at the Office of Geotechnical Design-South 2, Branch B.

Prepared by: Date: 7/2/2012

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Exp. 09/30/13
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State of California **Business, Transportation and Housing Agency**

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Date: January 28, 2013

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Genesee Ave Pedestrian
Overcrossing (New)
Br. #57-1231

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH 2
DESIGN BRANCH B, MS #5

Subject: Third Revised Foundation Report for Genesee Avenue Pedestrian Overcrossing

Pursuant to an email request by Simon Wong Engineering (SWE), dated January 14, 2013, the following Third Revised Foundation Report is being provided due to changes in footing design information for Abutment 1, Bent 2, RW6, RW7, RW9 and RW10. Tables 2, 4, 6 and 7 show the information that has been changed from the previous Foundation Reports and is shown in bold. This Third Revised Foundation Report supersedes the original Foundation Report, dated May 24, 2012, Revised Foundation Report, dated May 30, 2012, and Second Revised Foundation Report, dated July 2, 2012 for the Genesee Avenue Pedestrian Overcrossing (Br. # 57-1231).

The following recommendations are based on information gathered from a subsurface investigation conducted during 2011 for the proposed new Genesee Ave POC and design information from Simon Wong Engineering. Additional subsurface information was also reviewed from the nearby structure, located approximately 400 feet to the east, which consisted of the 1962 "As-Built" LOTBs for the existing Genesee Ave OC (Br. #57-0527) and the LOTBs from the 2011 subsurface investigation for the proposed replacement of Genesee Ave OC (Br. #57-1224). The elevations referenced within this report are based on the NAVD 88 vertical datum.

Project Description

The proposed POC structure will be located west of Genesee Avenue OC at Interstate 5 (I-5), in the city of San Diego, in San Diego County. The POC will accommodate bicyclists and pedestrians traveling over Genesee Avenue. The Genesee Ave. POC (Br. #57-1231) is one of various proposed bridges along I-5 in the San Diego area that are part of the Cash Management Improvement Act (CMIA) program. The proposed structure will consist of two-span, cast-in-place, reinforced concrete box girders with monolithic closed-end diaphragm abutments and single column bent, all supported on pile foundations.

Geology

The POC site is located within the Peninsular Range Geomorphic Province of California located in southwestern San Diego County. Based on the "Geologic Map of the San Diego 30' x 60' Quadrangle" (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by the Scripps Formation (middle Eocene), Ardath Shale (middle Eocene), and fill.

In 2011, three mud rotary borings were drilled for the proposed Genesee Ave POC. Soil Borings RC-11-0001 and RC-11-003 were not drilled at the support locations due to drill rig access limitations. Abutment 1 will be located on a cut on existing hillside and Abutment 3 will be located on the existing fill slope. Boring RC-11-001 was drilled about 100 ft southeast of Abutment 3 location, Boring RC-11-002 was drilled near the Bent 2 location and Boring RC-11-003 was drilled about 50 ft north of Abutment 1 location. Boring RC-11-003 revealed siltstone below the pavement section at elev. 244.3 ft and extended to the maximum depth explored of 78.1 ft (elev. 166.6 ft). Boring RC-11-002 revealed fill material consisting of lean clay, loose silty sand and silt from elev. 242.2 to 223.9 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 71.5 ft (elev. 171.7 ft). Boring RC-11-001 revealed medium dense sandy silt and silty sand fill material from elev. 250.4 ft to 232.7 ft. Below the fill material, siltstone was encountered and extended to the maximum depth explored of 100.8 ft (elev. 149.9 ft). Based on the 2011 subsurface investigation and general plan information, it is estimated at the Abutment 3 location that engineered fill will be encountered from the proposed finished grade elev. of 243 ft to elev. 210 ft. Siltstone will be encountered below the engineered fill. For more detail, please refer to the LOTBs.

Additional subsurface information reviewed consisted of the 1962 "As-Built" Log of Test Borings for the existing Genesee Ave OC (Br. #57-0527) and the recent 2011 borings drilled for proposed replacement of the Genesee Ave OC (Br. #57-1224). The "As-Built" borings consisted of two drive holes advanced to a maximum depth of 5 ft, and one mud-rotary boring advanced to a maximum depth of 80 ft. The 2011 subsurface investigation consisted of four mud rotary borings drilled to a maximum depth of 170.0 ft. All boring information described above was reviewed and considered when developing the geology section of this report.

Ground Water

During the 2011 subsurface exploration, no ground water was encountered in soil borings RC-11-002 and RC-11-003. However, perched ground water was encountered in soil boring RC-11-001 and was measured at elev. 192.7 ft. Perched ground water elevations are subject to seasonal fluctuations and may be encountered at higher or lower elevations depending on current conditions.

Scour Potential

Scour is not considered to be an issue at this bridge site.

Corrosion

Corrosion testing was conducted on composite soil samples during the 2011 subsurface investigation. The laboratory test results indicated that the site is not corrosive to foundation elements. For specific test results, please refer to Table 1.

Table 1 – Corrosion Test Summary

Location	pH	Minimum Resistivity (Ohm-Cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Boring RC-11-001 (Depth 0-30 ft)	8.20	1053	N/A	N/A
Boring RC-11-002 (Depth 5-60 ft)	7.96	805.8	54	201

Note: Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 2000 ppm or greater, or has a pH of 5.5 or less. With the exception of MSE walls, soil and water are not tested for chlorides and sulfates if the minimum resistivity is greater than 1,000 ohm-cm.

Fault and Seismic Data

The structure site is potentially subject to ground motions from nearby earthquake sources during the design life of the new structure. The nearest fault to the site is the Newport-Inglewood-Rose Canyon fault zone (Oceanside section) strike-slip fault with a maximum credible earthquake M_w=7.5, located approximately 2.6 miles southwest of the bridge site. The corresponding peak ground acceleration (PGA) is estimated to be 0.45g.

Seismic design recommendations were provided in a separate memorandum for the proposed pedestrian overcrossing. For more information, please refer to the memorandum concerning Seismic Design Recommendations (dated March 27, 2012), by Anhdan Le (916-227-7211) of the Office of Geotechnical Design South 2.

Liquefaction

The Seismic Design Recommendations memorandum, dated March 27, 2012, states that the potential for soil liquefaction due to strong ground shaking is considered low at the proposed bridge site.

Surface Rupture Potential

The site does not fall within Fault Rupture Hazard Zones in California (Alquist-Priolo Earthquake Fault Maps). Therefore, the surface rupture potential at the bridge site is considered low.

Foundation Recommendations

The following recommendations are for the proposed Genesee Avenue POC (Br. #57-1231), as shown on the General Plan, dated June 25, 2012 and foundation design information provided by SWE.

At Abutments 1 and 3 locations, 48-inch diameter CIDH piles may be used for support. At Bent 2 location, 36-inch diameter CIDH piles may be used for support. The ultimate geotechnical pile capacity for the CIDH pile will meet or exceed the required nominal resistance in compression and tension. Tables 2 and 3, below, show the foundation design information provided by SWE.

Tables 2 and 4 below, reiterates the CIDH pile data for Abutment 1 and Bent 2 support locations. The only changes from the previous Foundation Reports, are the Bottom of Footing Elevation for Abutment 1 and Bent 2 support locations.

Table 2 - Foundation Design Information Provided by SWE

Support Location	Design Method	Pile Type	Finished Grade Elev. (ft)	Pile Cutoff Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement Under Service Load (in)	Number of Piles
					B	L		
Abutment 1 West Pile	LRFD[1]	48” CIDH Pile	259.00	**250.50**	N/A	N/A	1	1
Abutment 1 East Pile	LRFD[1]	48” CIDH Pile	255.00	**250.50**	N/A	N/A	1	1
Bent 2	LRFD[1]	36” CIDH Pile	243.00	**235.50**	14	14	1	4
Abutment 3 North Pile	LRFD[1]	48” CIDH Pile	245.00	242.50	N/A	N/A	1	1
Abutment 3 South Pile	LFRD[1]	48” CIDH Pile	246.00	242.50	N/A	N/A	1	1

Notes: [1] Load and Resistance Factor Design (LRFD).

Table 3 - Foundation Design Loads Provided by SWE

Support Location	Service-I Limit State (Kips)			Strength Limit State (Controlling Group, Kips)				Extreme Event Limit State (Controlling Group, Kips)			
	Total Loads		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile
Abut. 1 West Pile	760	760	570	980	980	0	0	930	930	0	0
Abut. 1 East Pile	-100*	-100*	35	150	150	230	230	500	500	450	450
Bent 2	1430	490	1170	1910	670	0	0	1380	680	0	60
Abut. 3 North Pile	840	840	640	1080	1080	0	0	1100	1100	0	0
Abut. 3 South Pile	-130*	-130*	25	160	160	290	290	580	580	540	540

*These piles have a tension load under Service Limit State.

The specified pile tip elevations for Abutments 1 and 3 and Bent 2 supports are listed in Table 4, below.

Table 4 - Foundation Design Recommendations (Br. #57-1231)

Support Location	Pile Type	Pile Cutoff Elev. (ft)	Service-I Limit State Per Support (kips)	Total Permissible Support Settlement (in)	Required Nominal Resistance (kips)				Design Tip Elev. (ft)	Specified Tip Elev. (ft)
					Strength Limit		Extreme Limit			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Abutment 1 West Pile	48" CIDH	**250.50**	570	1	1400	0	930	0	203.0 (a-I) 214.0 (a-II)	203.0
Abutment 1 East Pile	48" CIDH	**250.50**	40	1	220	330	500	450	236.0 (a-I) 226.0 (b-I) 225.0 (a-II) 218.0 (b-II)	218.0
Bent 2	36" CIDH	**235.50**	1170	1	960	0	680	60	191.0 (a-I) 201.0 (a-II) 224.0 (b-II)	191.0
Abutment 3 North Pile	48" CIDH	242.50	640	1	1550	0	1100	0	188.0 (a-I) 197.0 (a-II)	188.0
Abutment 3 South Pile	48" CIDH	242.50	30	1	230	420	580	540	220.0 (a-I) 206.0 (b-I) 206.0 (a-II) 202.0 (b-II)	202.0

Notes: *Design tip elevations are controlled by* (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Limit), (b-II) Tension (Extreme Limit).

The Pile Data Table for Abutments 1 and 3, and Bent 2, is presented below in Table 5. The ultimate geotechnical pile capacity of the CIDH piles will meet or exceed the required nominal resistance in compression and tension.

Table 5 – Pile Data Table

Support Location	Pile Type	Required Nominal Resistance		Design Tip Elevation (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abutment 1 West Pile	48" CIDH Pile	1400	0	203.0 (a)	203.0
Abutment 1 East Pile	48" CIDH Pile	500	450	225.0 (a) 218.0 (b)	218.0
Bent 2	36" CIDH Pile	960	60	191.0 (a) 224.0 (b)	191.0
Abutment 3 North Pile	48" CIDH Pile	1550	0	188.0 (a)	188.0
Abutment 3 South Pile	48" CIDH Pile	580	540	206.0 (a) 202.0 (b)	202.0

Notes: Design tip elevation is controlled by (a) Compression, (b) Tension

Retaining Wall RW6, RW7, RW9 and RW10

Retaining Walls RW6, RW7, RW9 and RW10 may be supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site. The Retaining Wall Layout Sheets 8, 9, 10, 11 and 12 dated April 10, 2012, show two retaining walls (RW 6 and RW 7) at Abutment 1 and two retaining walls (RW 9 and RW 10) at Abutment 3. Retaining Walls RW 6 and RW 7 are Type I Modified and Retaining Walls RW 9 and RW 10 are a combination of Type U and Type I Modified retaining walls.

Tables 6 and 7 below, reiterate the Retaining Wall data for Abutments 1 and 3 support locations. The only changes from the previous Foundation Reports are the Wall Support Locations; Bottom of Footing Elevation; Net/Gross Uniform Bearing Stress; and Effective Footing Width for Retaining Walls RW6, RW7, RW9 and RW10. All changes are shown in bold.

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD) For RW6 & RW7

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[1] Net / Gross Uniform Bearing Stress (Ksf)	[1]Effective Footing Width (ft)
RW 6 Abutment 1	Sta. 10+00.00 to Sta. 10+11.25 "RW6" LOL	4	269.00	Service	q'_o = 0.9	6.3
				Strength	q_o = 1.3	6.3
				Extreme I	q_o = 1.1	5.2
				Extreme II	q_o = 2.3	2.3
	Sta. 10+11.25 to Sta. 10+23.25 "RW6" LOL	6	267.00	Service	q'_o = 1.2	5.8
				Strength	q_o = 1.7	5.8
				Extreme I	q_o = 1.7	4.2
				Extreme II	q_o = 2.5	2.6
	Sta. 10+23.25 to Sta. 10+35.25 "RW6" LOL	8	**264.50**	Service	q'_o = 1.7	5.2
				Strength	q_o = 2.3	5.0
				Extreme I	q_o = 2.9	2.9
				Extreme II	q_o = 3.0	2.6
	Sta. 10+35.25 to Sta. 10+47.25 "RW6" LOL	**10**	261.50	Service	q'_o = **1.9**	**5.9**
				Strength	q_o = **2.7**	**5.7**
				Extreme I	q_o = **3.8**	**3.0**
				Extreme II	q_o = **2.7**	**4.1**
	Pilaster Sta. 10+47.25 to Sta. 10+55.25 "RW6" LOL	15	**258.50**	Service	q'_o = 3.2	9.1
				Strength	q_o = 4.3	8.9
				Extreme I	q_o = 6.4	4.2
				Extreme II	q_o = 3.3	8.4
RW 7 Abutment 1	Sta. 10+00.00 to Sta. 10+37.00 "RW7" LOL	**4**	**265.00**	Service	q'_o = **0.9**	**6.3**
				Strength	q_o = **1.3**	**6.3**
				Extreme I	q_o = **1.1**	**5.2**
				Extreme II	q_o = **2.3**	**2.3**
	Sta. 10+37.00 to Sta. 10+61.00 "RW7" LOL	**6**	**264.00**	Service	q'_o = **1.2**	**5.8**
				Strength	q_o = **1.7**	**5.8**
				Extreme I	q_o = **1.7**	**4.2**
				Extreme II	q_o = **2.5**	**2.6**
	Sta. 10+61.00 to Sta. 10+85.00 "RW7" LOL	**10**	**262.00**	Service	q'_o = **1.9**	**5.9**
				Strength	q_o = **2.7**	**5.7**
				Extreme I	q_o = **3.8**	**3.0**
				Extreme II	q_o = **2.7**	**4.1**
	Sta. 10+85.00 to Sta. 10+97.00 "RW7" LOL	**12**	**260.00**	Service	q'_o = **2.2**	**7.1**
				Strength	q_o = **3.1**	**6.8**
				Extreme I	q_o = **4.3**	**3.6**
				Extreme II	q_o = **2.6**	**5.8**
	Sta. 10+97.00 to Sta. 11+09.00 "RW7" LOL	**14**	**257.50**	Service	q'_o = **2.6**	**8.0**
				Strength	q_o = **3.6**	**7.7**
				Extreme I	q_o = **5.3**	**3.8**
				Extreme II	q_o =**2.8**	**7.1**

Table 6 – Type 1 Modified Retaining Wall Footing Data (LRFD) For RW6 & RW7(Continued)

RW 7 Abutment 1	Sta. 11+09.00 to Sta. 11+21.00 "RW7" LOL	18	**254.50**	Service	q'_o = 3.1	10.1
				Strength	q_o = 4.3	9.6
				Extreme I	q_o = 6.5	4.7
				Extreme II	q_o = 3.1	9.6
	Pilaster Sta. 11+21.00 to Sta. 11+29.00 "RW7" LOL	21	**251.00**	Service	q'_o = 4.2	12.1
				Strength	q_o = 5.7	11.8
				Extreme I	q_o = 9.0	5.5
				Extreme II	q_o = 4.2	11.8

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Source: Retaining Wall Project Sheets 4, 8, 9, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 7 – Type 1 Modified Retaining Wall Footing Data (LRFD) For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[1] Net / Gross Uniform Bearing Stress (Ksf)	[1]Effective Footing Width (ft)
RW 9 Abutment 3	Sta. 11+04.00 to **Sta. 11+22.00** "RW9" LOL	10	252.00	Service	q'_o = 1.9	5.9
				Strength	q_o = 2.7	5.7
				Extreme I	q_o = 3.8	3.0
				Extreme II	q_o = 2.7	4.1
	Sta. 11+22.00 to Sta. 11+46.00 "RW9" LOL	6	255.50	Service	q'_o = 1.2	5.8
				Strength	q_o = 1.7	5.8
				Extreme I	q_o = 1.7	4.2
				Extreme II	q_o = 2.5	2.6
RW 10 Abutment 3	Sta. 11+04.00 to **Sta. 11+28.00** "RW10" LOL	12	250.00	Service	q'_o = 2.2	7.1
				Strength	q_o = 3.1	6.8
				Extreme I	q_o = 4.3	3.6
				Extreme II	q_o = 2.6	5.8
	Sta. 11+28.00 to Sta. 11+52.00 "RW10" LOL	**10**	**251.50**	Service	q'_o = **1.9**	**5.9**
				Strength	q_o = **2.7**	**5.7**
				Extreme I	q_o = **3.8**	**3.0**
				Extreme II	q_o = **2.7**	**4.1**
	Sta. 11+52.00 to Sta. 11+76.00 "RW10" LOL	8	**253.00**	Service	q'_o = 1.7	5.2
				Strength	q_o = 2.3	5.0
				Extreme I	q_o = 2.9	2.9
				Extreme II	q_o = 3.0	2.6
	Sta. 11+76.00 to Sta. 11+96.00 "RW10" LOL	**6**	**254.00**	Service	q'_o = **1.2**	**5.8**
				Strength	q_o = **1.7**	**5.8**
				Extreme I	q_o = **1.7**	**4.2**
				Extreme II	q_o = **2.5**	**2.6**
	Sta. 11+96.00 to Sta. 12+21.25 "RW10" LOL	4	254.00	Service	q'_o = 0.9	6.3
				Strength	q_o = 1.3	6.3
				Extreme I	q_o = 1.1	5.2
				Extreme II	q_o = 2.3	2.3

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Table 8 – Type U Retaining Wall Footing Data (LRFD) For RW9 & RW10

Wall Number And Location	Approximate Support Location	Design Height of Wall "H" (ft)	Bottom of Footing Elevation (ft)	Loading Type	[1] Net / Gross Uniform Bearing Stress (Ksf)	[1]Effective Footing Width (ft)
RW 9 / RW 10 Abutment 3	Pilaster Sta. 10+00.00 to Sta. 10+08.00 "Bike Path" LOL	25	241.00	Service	$q'_o = 3.7$	28.0
				Strength	$q_o = 5.0$	28.0
				Extreme I	$q_o = 5.0$	20.7
				Extreme II	$q_o = 3.6$	27.7
	Sta. 10+08.00 to Sta. 10+32.00 "Bike Path" LOL	24	242.00	Service	$q'_o = 3.3$	22.3
				Strength	$q_o = 4.4$	22.3
				Extreme I	$q_o = 4.7$	15.5
				Extreme II	$q_o = 3.5$	22.0
	Sta. 10+32.00 to Sta. 10+56.00 "Bike Path" LOL	21	244.00	Service	$q'_o = 2.9$	21.8
				Strength	$q_o = 3.9$	21.8
				Extreme I	$q_o = 4.0$	16.0
				Extreme II	$q_o = 3.1$	21.5
	Sta. 10+56.00 to Sta. 10+80.00 "Bike Path" LOL	18	246.00	Service	$q'_o = 2.6$	21.3
				Strength	$q_o = 3.5$	21.3
				Extreme I	$q_o = 3.3$	16.5
				Extreme II	$q_o = 2.7$	21.1
	Sta. 10+80.00 to Sta. 11+04.00 "Bike Path" LOL	15	248.00	Service	$q'_o = 2.3$	20.8
				Strength	$q_o = 3.0$	20.8
				Extreme I	$q_o = 2.8$	16.9
				Extreme II	$q_o = 2.3$	20.6

Notes: Wall sections are special designs. All design pressures and effective footing widths were provided by SWE.
[1] Source: Retaining Wall Project Sheets 4, 10, 11 and 12. Gross Uniform Bearing Stress, (q_o) and Net Uniform Bearing Stress, (q'_o).

Retaining wall design shall be in accordance with Section 11 of the LRFD Bridge Design Specifications. Seismic design shall abide with the Mononobe-Okabe method as presented in Appendix A11 which recommends a horizontal acceleration coefficient (k_h) equal to ½A, where A is the peak ground acceleration (PGA = 0.45g).

The gross uniform bearing stresses presented in Tables 6 thru 8, for retaining walls RW 6, RW 7, RW 9 and RW 10, do not exceed the calculated permissible net contact stress (q_{pn}) and factored gross nominal bearing resistances ($q_R = \varphi_b \times q_n$) where $\varphi_b = 0.45$ for strength limit state and φ_b=1.0 for extreme limit state. Retaining walls maybe supported on spread footing foundations that are constructed on formational soil and/or new engineering fills to be placed at the site.

If any of the above wall heights are increased, or bottom of footing elevations raised, or loading parameters changed, the Office of Geotechnical Design South 2, Branch B, is to be contacted for reevaluation.

General Notes:

1) All support locations are to be plotted in plan view on the Log of Test Borings as stated in "Memo to Designers" 4-2. The plotting of support locations should be made prior to requesting a final foundation review.

2) The structure engineer shall show on the plans, in the pile data table, the minimum pile design tip elevation required to meet the lateral load demands. If the specified pile tip elevation required to meet the lateral load demands exceeds the specified pile tip elevation given within this report, the Office of Geotechnical Design South 2, Branch B should be contacted for further recommendations.

3) The specifications engineer shall specify the requirements of Tunnel Safety Orders, for the CIDH shaft work that meets the definition of a tunnel or shaft as described in the Standards Specifications, Section 7-1.02k(6)(c) "Tunnel Safety Orders."

Construction Considerations:

1) Rock core samples from the 2011 Caltrans foundation investigation are available for viewing by bidders at the Geotechnical Services (Transportation Laboratory), Department of Transportation, 5900 Folsom Boulevard, Sacramento, CA. Potential bidders are to allow the State seven (7) days to prepare and display the rock cores.

CIDH Piles

2) The calculated geotechnical capacity of all CIDH piles is based on skin friction only and no end-bearing was considered. The skin friction zones used to calculate geotechnical capacity of the CIDH piles are summarized below in Table 9.

Table 9 - CIDH Pile Skin Friction Zone Elevations

Location	Skin Friction Zone Start Elevation	Skin Friction Zone End Elevation
Abutment 1 West Pile	247.5 ft	205.0 ft
Abutment 1 East Pile	247.5 ft	220.0 ft
Bent 2	231.3 ft	193.0 ft
Abutment 3 North Pile	238.5 ft	190.0 ft
Abutment 3 South Pile	238.5 ft	204.0 Ft

3) The 2011 subsurface investigation identified loose to medium dense non-cohesive fill material, which consisted of silty sand, sandy silt and silt overlying the sedimentary rock. Due to the non-cohesive nature of the fill material, caving conditions are anticipated in the fill material at the Bent 2 and Abutment 3 locations. The amount of caving the contractor will experience will be dependent upon the methods and means the contractor chooses to use to construct the CIDH piles. Slurry displacement and/or temporary casing may be necessary to control caving during construction. If the CIDH piles are to be constructed using slurry displacement method, the slurry shall consist of mineral or synthetic slurry only. Water shall not be allowed to be used as slurry. All temporary casing is to be removed during concrete placement.

4) Static groundwater was not encountered during the 2011 and 1962 foundation investigations. However, perched ground water was encountered at boring RC-11-001, near Abutment 3. The amount of perched ground water will vary depending on the amount of precipitation during the season and/or intensity of storm events. If perched ground water is encountered, it can be addressed with pumping methods.

Retaining Walls

5) At Retaining Wall RW6 and RW7 support locations, the bottom of footing is to be constructed on formational material. Concrete for the support footings shall be placed neat against the undisturbed material at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then the bottom of the footing excavation shall be extended down at 0.5 ft intervals until undisturbed formational material is observed and approved by the Engineer. The disturbed native material shall be either replaced with lean concrete or replaced with structurally engineered backfill compacted to 95% relative compaction.

6) At Retaining Wall RW9 and RW10 support locations, the bottom of footing is to be constructed on engineered fill. Concrete for the support footings shall be placed neat against the engineered fill at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed then it shall be re-compacted to 95% relative compaction.

7) Retaining walls RW6, RW7, RW9 and RW10, footing excavations are to be inspected and approved by a representative of the Office of Geotechnical Design-South 2, Branch B, prior to placing any steel or concrete for the support footings in the excavations. Once the excavations have been completed to the specified elevations, the contractor is to allow five (5) working days for the inspection. The structure representative is to provide the Office of Geotechnical Design-South 2, Branch B, a one-week notification prior to beginning the five-day contractor waiting period.

8) All retaining wall spread footings that are to be constructed on the embankment slope are to be positioned such that they have a minimum horizontal footing embedment of 4 feet, measured from the top of the footing at the toe to the face of the finished slope.

The recommendations contained in this report are based on specific project information regarding structure type, support locations, and design loads that have been provided by Simon Wong Engineering. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South 2, Design Branch B, should review those changes to determine if these foundation recommendations are still applicable.

Any questions regarding the above recommendations should be directed to the attention of Fernando De Haro, (916) 227-4556, or Mark DeSalvatore, (916) 227-5391, at the Office of Geotechnical Design-South 2, Branch B.

Prepared by: Date: 1/28/2013

REGISTERED PROFESSIONAL ENGINEER
FERNANDO DE HARO
No. C 65281
Exp. 09/30/13
CIVIL
STATE OF CALIFORNIA

Fernando De Haro, P.E. 65281
Transportation Engineer
Office of Geotechnical Design-South 2
Design Branch B

cc: RE Pending File
Norbert Gee – Office of Specially Funded Projects
Arturo Jacobo – District 11, Project Manager
Art Padilla – District 11, District Materials Engineer
John Stayton – Specs & Estimates
Majid Kharrati – District 11, Project Manager
Yong Pak – District 11, I-5 Corridor
Shira Rajendra – GS Corporate
Abbas Abghari – OGDS-2
Mark Desalvatore – ODGS - 2 for M.D.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. MAJID KHARRATI
Project Design Manager
I-5 North Coast Corridor

Date: March 27, 2012

File: 11-SD-5-PM 29.46
11-22331
Project # 1100000012
Genesee Avenue Pedestrian
Overcrossing Bridge (new)
Bridge #: 57C-NEW

Attn: Mr. Yong Pak

From: Office of Geotechnical Design South 2
Geotechnical Services – MS 5
Division of Engineering Services

Subject: **Seismic Design Recommendations**

Introduction

This memorandum presents the seismic design recommendations for the above structure. Ground motion recommendation is based on the Caltrans 2009 Seismic Design Procedure (SDP) as described in the Seismic Design Criteria (SDC) version 1.6 Appendix B.

Seismicity

Based on the 2007 Caltrans fault database, the site is located approximately 2.6 miles (4.2 km) east of the Newport Inglewood – Rose Canyon Fault "Oceanside Section" (Fault ID 223, M_{max} = 7.5, strike slip type, dip = 90 deg) which is the controlling fault for the deterministic seismic procedure. The peak ground acceleration (PGA) at the site is estimated around 0.45g. A copy of a map showing the location of the bridge and the controlling fault is attached.

Soil Profile

The bridge site is located within the Peninsular Range Geomorphic Province of California located in southwestern San Diego County. Based on the Geologic Map of the San Diego 30' x 60' Quadrangle (Kennedy, M.P. and Tan, S.S. 2005), the site is underlain primarily by the Scripps Formation (middle Eocene), Ardath Shale (middle Eocene), and artificial fill.

Based on the 1962 As-Built and 2011 logs of test borings, it can be seen that weak to very weak sedimentary rock are present near the ground surface in south of the site (near the proposed Abutment 1). On the other hand, some fill materials are encountered in the north of the site (near the proposed Abutment 3) before reaching to the sedimentary rock layer. The soil profiles vary from loose to dense sand, silty sand with coble or gravel and sedimentary rock underlie the site.

No groundwater was encountered during the 1962 and 2011 subsurface explorations.

Design Response Spectrum

Based on the 2009 SDP, the design response spectrum is the upper envelope of deterministic and probabilistic response spectra, but not to be less than a deterministic response spectrum for a vertical strike-slip fault of M_{max}=6.5 at a distance of 12 km. The deterministic response spectrum is obtained by taking average of the median response spectra calculated using the 2008 Campbell-Bozorgnia and 2008 Chiou-Youngs ground motion prediction equations. Probabilistic response spectrum is obtained for 5% probability of exceedance in 50 years (about 1000 year return period) from the 2008 USGS Seismic Hazard Map (http://earthquake.usgs.gov/hazards/products/conterminous/2008/). Adjustment to account for site condition and near fault effects shall be implemented.

For this site the deterministic procedure controls. However, since the geologic conditions change significantly within the site, the acceleration response spectrum (ARS) recommended for design is the boundary envelope of ARS curves with different values of V_{s30}. The design ARS is the upper envelope of two soil profiles with V_{S30} values ranging from 350 m/s to 560 m/s. A copy of the acceleration response spectrum recommended for design is attached for your reference.

Soil Parameters Used for LPile program

As requested by Mr. Craig Shannon, P.E. with Simon Wong Engineering, the following soil parameters are provided to use in LPile program:

At Abutment 1: The boring drilled near this abutment shows the following soil properties:

Soil Properties for LPile

Location/Zone	Soil Type	Total Unit Weight	Friction Angle	Modulus
		(pcf)	(degree)	(pci)
From 251.5' to 202 feet	Silty Sand (SM)	130	38	225
Below 202'	Silty Sand (SM)	130	38	125

At Abutment 3: The boring drilled near this abutment shows the following soil properties:

Soil Properties for LPile

Location/Zone	Soil Type	Total Unit Weight	Friction Angle	Modulus
		(pcf)	(degree)	(pci)
From Ele. 242.5' to 210'	Engineered Fill-Silty Sand (SM)	125	34	90
From 210'to 202'	Silty Sand (SM)	130	38	225
Below 202'	Silty Sand (SM)	130	38	125

Liquefaction

From the 1962 As-Built, ground water surface was not encountered during subsurface explorations. The ground water was encountered at Elevation 201.9 feet during 2011 geotechnical explorations. The potential for soil liquefaction due to strong ground shaking is considered low for the proposed structure.

Seismic Settlement

Seismic settlement due to strong ground motion is estimated less than one inch.

Subsurface Fault Rupture Hazard

The site is not located within the Earthquake Fault Hazard Zone (EFHZ) in California. The potential for surface fault rupture hazard is considered negligible

If you have any question, please contact AnhDan Le (916) 227-7211 or Angel Perez-Cobo (916) 227-7167, Office of Geotechnical Design South-2.

Prepared by: Date: 3/29/12

AnhDan Q Le, Ph.D, G.E.
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Geotechnical Design South-2

REGISTERED PROFESSIONAL ENGINEER
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GE 2931
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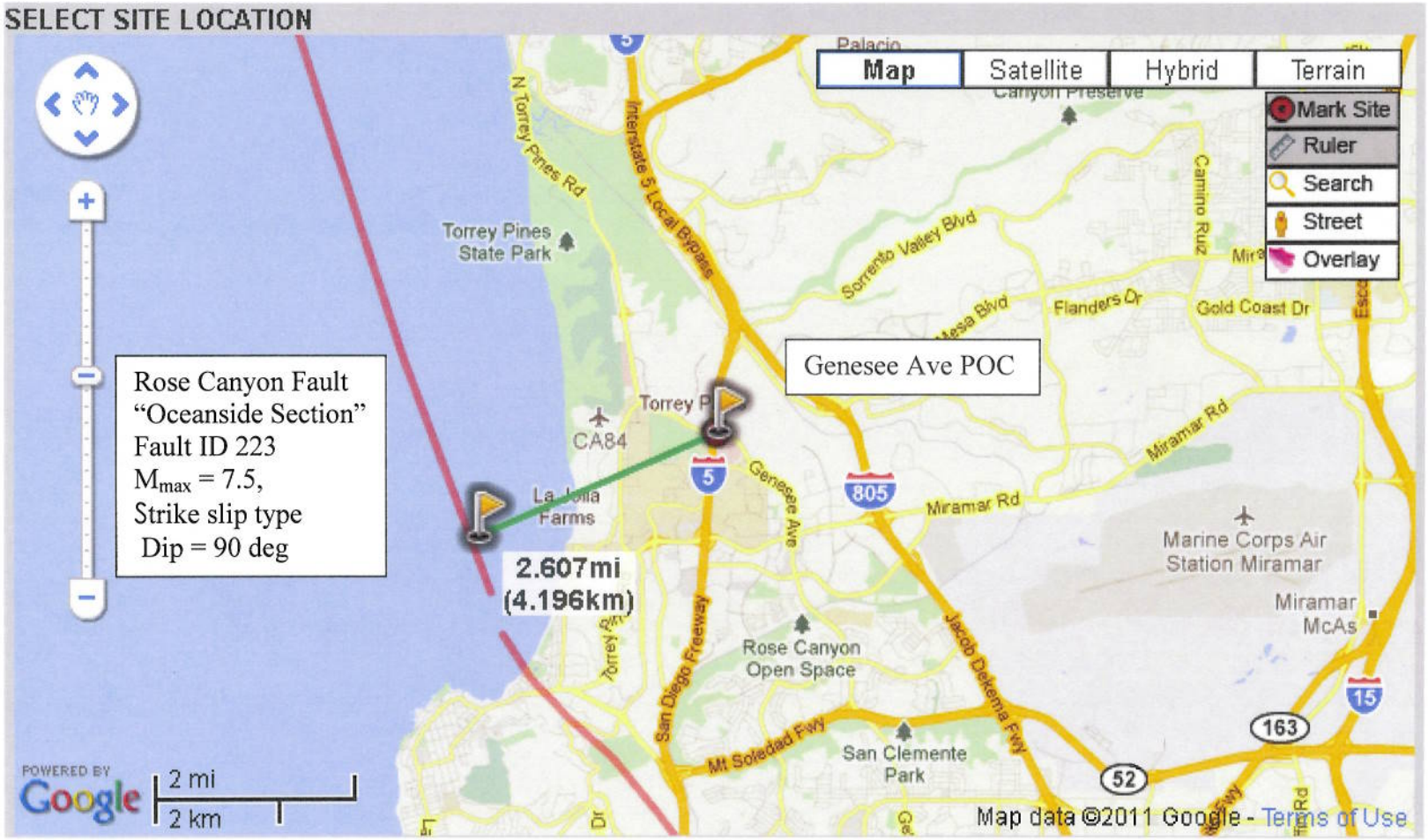
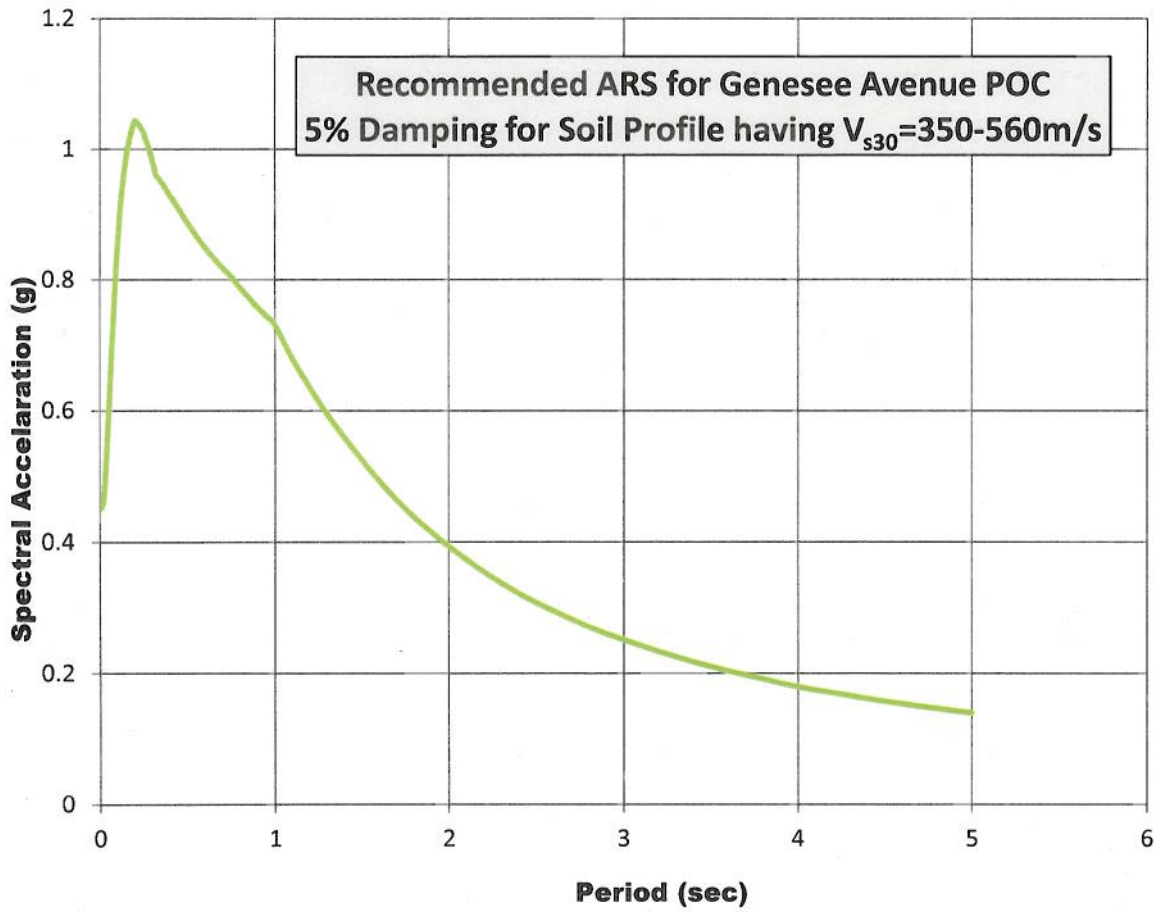
Supervised by: Date: 3/29/12

Angel Perez-Cobo, P.E.
Senior Transportation Engineer
Geotechnical Design South-2

cc: F De Haro - GDS2
M. DeSalvatore - GDS2
C Shannon – Simon Wong Engineering
File

Fault map
Genesee Avenue POC
Bridge # 57-0527





Period (s)	Sa(g)
0.01	0.452
0.02	0.460
0.03	0.493
0.05	0.594
0.08	0.754
0.10	0.846
0.12	0.916
0.15	0.986
0.20	1.043
0.25	1.024
0.30	0.982
0.40	0.928
0.50	0.887
0.75	0.805
1.00	0.732
1.50	0.527
2.00	0.394
3.00	0.251
4.00	0.179
5.00	0.139

REVISED
FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-3

11-SD-5/PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

March 21, 2014

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California

Business, Transportation and Housing Agency

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 21, 2014

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Revised Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-3

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the I-5/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR documents the prevailing site conditions and provides specific foundation recommendations for Retaining Wall-3. The report defines the geotechnical conditions as evaluated from field investigation data and used in the geotechnical analyses and design. This report provides recommendations and specifications for project design and construction. This FR supercedes the FR for Retaining Wall-1(RW-1), Retaining Wall-2(RW-2), and Retaining Wall-3 (RW-3) issued on February 29, 2012, because of changes to the configuration of RW-3 and the elimination of RW-1 and RW-2.

No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared for the retaining walls prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

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Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

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District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
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1.0 SCOPE OF WORK

This Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for Retaining Wall-3 (RW-3) to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project, in the City of San Diego, San Diego County, California hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and to provide recommendations relevant to the design and construction of RW-3. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein.

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, engineering analyses, and retaining wall design. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all stations are referenced to the SD-5 Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Foundation Report Preparation for Retaining Walls, July 2010*. No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) for RW-3 were prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The proposed I-5/Genesee Avenue Improvement Project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the I-5/Genesee Avenue Improvement Project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. This FR also includes the geotechnical evaluation and design of a future retaining wall that will be constructed in a tiered configuration below RW-3 as part of the I-5 North Coast Corridor Widening Project. This FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The I-5/Genesee Avenue Improvement Project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-3, are necessary to accommodate the I-5/Genesee Avenue Improvement Project and the associated features. RW-3 will accommodate the freeway widening and realignment of the onramp in the southwest quadrant of the project.

Figure 1 depicts the approximate locations and alignments of RW-3 and the future retaining wall in plan view. Figure 2A and Figure 2B are the layout sheets utilized in the preparation of this FR as provided by the project design staff that includes Caltrans District 11 Design and Kimley Horne and Associates (KHA). Figure 3 is the profile sheet provided by the project design staff and utilized in the preparation of this FR. Illustrative cross sections perpendicular to the wall alignments are shown in Figure 4. These cross sections represent the most severe cases of wall, multiple wall, and slope geometry.

The proposed soil nail wall RW-3 and the future retaining wall are located west of and parallel to the I-5/Genesee Avenue southbound on-ramp between the Genesee Avenue OC and the Voigt Drive OC. A portion of RW-3, approximately from Station 1572+09 to 1573+76, is proposed to be designed and constructed as soldier pile retaining wall. A discussion of the wall type selection is provided in Section10.0.

RW-3 is the upper wall in the tiered configuration depicted in Figure 4. The future retaining wall is the lower wall depicted in Figure 4. This project will construct RW-3, a sixteen-foot (16ft) wide bike path at the base of RW-3, and a one and one-half horizontal to one vertical (1.5H:1V) cut slope that descends to freeway grade. A later project will construct the future retaining wall in place of the one and one-half horizontal to one vertical (1.5H:1V) cut slope.

RW-3 will be located between Station 1572+09 and Station 1580+61.25. The retaining wall will be approximately eight hundred and forty three-feet (876ft) in length, with a maximum height of approximately twenty two-feet (22ft).

The future I-5 North Coast Corridor Widening Project retaining wall is planned to be located between Station 1571+72 and Station 1583+36. The retaining wall will be approximately one thousand one hundred and seventy four-feet (1,174ft) in length with a maximum height of approximately thirty eight-feet (38ft).

3.0 AS-BUILT FOUNDATION DATA

The south end of RW-3 will be located approximately three hundred twenty three-feet (323ft) to the north of Voigt Drive. The LOTB for the overcrossings include information relevant to the soil conditions at the project site. LOTB for the Genesee Avenue OC and Voigt Drive OC are included in the Appendix I. The construction of RW-3 will not affect the Genesee Avenue OC or Voigt Drive OC bridge foundations.

RW-3 will be located to the east of the University of California, San Diego (UCSD) Campus Services Complex (CSC). Caltrans staff contacted UCSD and requested archived as-built data pertaining to the fueling station, underground fuel tank, and crib wall. Fueling station and underground fuel tank as-built plans were provided and are presented in Appendix I. Crib wall as-built plans were unavailable. UCSD did provide the grading package for the UCSD CSC/BFS. The grading package provided by UCSD is included in Appendix I.

A fueling station and underground fuel tank are located on the eastern side of the CSC. The fueling station and underground storage tank are located in proximity to the proposed state right-of-way. Based on data provided by Caltrans District 11 Design and Utilities Engineering, the approximate location of the underground storage tank is between Stations 1572+06 and 1573+28.

The northern most portion of RW-3, approximately between Station 1579+00 and Station 1580+61.25, will be located adjacent to and below an existing concrete crib wall constructed as part of the CSC. The concrete crib wall appears to be similar in design to a battered Caltrans Standard Plan Concrete Crib Wall. The concrete crib wall appears to be in good condition.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted in December 2008. Three (3) boring were developed for RW-3 and the future retaining wall. The naming convention used for the boring records includes the boring method, the two digit year, and the approximate center line Station along the metric preliminary exploration plan, followed by the notation R or L indicating that the boring was to the right or left of the 11-SD-5 line Station. For example, boring R-08-48260L is a rotary boring conducted in 2008 that was developed to the left of approximate metric Station 482+60 along the 11-SD-5 line. Metric Stationing was utilized because the subsurface investigation was performed prior to Caltrans transition back to U.S. Customary Units. The approximate locations of the borings are depicted in Figure 2A and Figure 2B. The metric plans referenced for the development of the boring records are not included in this report. Borings records for R-08-47860L, R-08-48000L, and R-08-48260L are included in Appendix II. LOTB are in the process of being prepared and will be submitted separately from this report.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to determine the extent of previously unmapped fill thereby delineating the soil conditions

anticipated to impact the design and construction of the retaining walls.

Cut slopes currently exist along the proposed retaining wall alignments. These slopes reveal relatively recent exposures of geologic strata. The exposed geology was utilized to characterize the subsurface soil conditions.

The request for the survey of the I-5/Genesee Avenue Interchange Improvement Project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

Two (2) bulk soil samples were collected to test the corrosivity of the soil in the project site in the vicinity of the retaining wall alignments. Figure 2A and Figure 2B depict the approximate sample locations.

The naming convention used for the bulk laboratory samples collected was comparable to the metric station naming convention used for the boring records. The results of the corrosion tests are summarized and discussed in Section 8.0. Corrosion data provided by the laboratory for the I-5/Genesee Avenue Interchange Improvement Project are presented in Appendix III.

Laboratory test data for the I-5/Genesee Avenue Interchange Improvement Project are included in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site geology was interpreted based on previous field investigations, current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map is a modified version of the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975.* The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining walls and the extent of fill mapped by OGDS2. Figure 6 depicts a profile of the geology beneath the existing grade along the retaining wall alignment. Figure 7 depicts the geology along cross sections at Stations 1579+50 and 1584+00.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine-hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. RW-3 will be located on the west side of I-5 along the east facing slope of the through cut. The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

RW-3 will be founded in both sedimentary formation and artificial fill. The southern portion of RW-3, between Stations 1572+09 and 1579+00, will be constructed in sedimentary formation. The northern

portion of RW-3, between Stations 1579+00 and 1580+61.25, will be constructed in front of and extend below the footing of an existing concrete crib wall. The slope retained by the crib wall is comprised of artificial fill. The slope below the footing of the crib wall is comprised of sedimentary formation.

The future I-5 north coast corridor widening project retaining wall will be founded in both sedimentary formation and artificial fill. The southern portion of the retaining wall between Stations 1571+72 and 1581+15 will be located in a cut slope composed of sedimentary formation. The northern portion of the wall, between Stations 1581+15 and 1583+36, will be located within a slope comprised of artificial fill.

The geologic units in the project area and depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fills in the project area appear to be medium dense engineered fills derived from material excavated from nearby cuts in the sandstone and siltstone.
- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.
- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voight Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the City of San Diego, Seismic Safety Study Geologic Hazards and Faults for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago)

Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC. Additionally, one or more un-named short inactive faults cross the RW-3 and the I-5 north coast corridor widening project retaining wall alignments.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC under the UCSD campus and under the Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault System running on a north-northwest trend and located offshore roughly two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

The project site is underlain by competent engineered fill, sandstone, and siltstone with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible soils, or expansive soils have not been observed along the proposed alignment of RW-3.

Landslides are commonly associated with the Ardath Shale where expansive claystone locally comprises as much as twenty-five-percent (25%) of the geologic unit. Expansive claystone was not observed along the alignments of RW-3 or the future retaining wall. Landslides are not anticipated to be a geologic hazard at the wall locations.

Depth to Bedrock

Based on observations made during the subsurface investigation Sedimentary formation is located at or near the ground surface along the majority of the RW-3 alignment. Artificial fill up to twenty-feet (20ft) in depth is located at the northern end of the RW-3 alignment. The artificial fill at the north end of the RW-3 alignment is retained by an existing concrete crib wall. Sedimentary formation is located at ground surface along the southern portion of the future retaining wall to be located below RW-3.Artificial fill with a maximum depth of approximately sixty-five-feet (65ft) overlies sedimentary formation at the north end of the future retaining wall. The depth of artificial fill varies along the length of the retaining wall. Based on topographic maps and the subsurface investigation, the depth of the fill decreases to the west of the existing slope face.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were

identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-3 and the proposed future retaining wall are not located along a stream course. A scour evaluation for the retaining walls is not applicable to this project.

8.0 CORROSION EVALUATION

Bulk soil samples were collected to test the corrosivity of the soil in the vicinity of the retaining wall. Figure 2A and Figure 2B depicts the approximate sample locations. Corrosion results for these bulk soil samples are included in Table 2. Corrosion data provided by the laboratory for the I-5/Genesee Avenue Interchange Improvement Project are presented in Appendix III. The naming convention used for the bulk laboratory samples collected was comparable to the Metric Station naming convention used for the boring records.

Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

None of the conditions considered to make the site soils corrosive were present in the samples collected and analyzed along the RW-3 and the proposed future retaining wall alignments. Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section includes the seismic study and addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B*.

According to the *Seismic Design Criteria (SDC)Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50). Soil Profile Type D has SPT results with the number of blows per twelve-inches (12in) greater than/or equal to fifteen and less than fifty ($15 \leq N < 50$).

The three (3) borings developed along the alignment of the proposed future retaining wall and RW-3 consistently had SPT results that ranged from as low as fourteen (14) to as high as forty-five (45) blows per twelve-inches (12in) in artificial fill and greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in the Appendix B of the SDC, the appropriate Soil Profile Type is C for sedimentary formation and D for artificial fill.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the Caltrans ARS Online Tool was three hundred and sixty-meters per second (360m/s), which correspond to Soil Profile Type D. The shear wave velocity for soil profile Type D was used to obtain the most conservative results. The closest regional active fault as indicated by the Caltrans ARS Online Tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately fifteen

one hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The retaining walls are located within sedimentary formation and compact artificial fill well above any groundwater table. There is no potential for liquefaction at the project site.

Earthquakes caused by movement along nearby active faults are likely to result in ground motion impacting project features. However, since no active faults transect the project site, there is no potential for surface fault rupture.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

The retaining walls will be constructed within dense sedimentary formation and campact fill. There is no potential for seismically induced settlement.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of the retaining walls do not exist at the project site.

Pseudo-static modeling and slope stability analyses were conducted to assure that the retaining walls will meet stability requirements in a seismic event. Stability analyses are discussed in Section 10.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

RW-3 and the future retaining wall will be developed in a cut slope that abuts active facilities and operations of the UCSD CSC/BFS. A temporary back cut to facilitate the construction of any cast-in-place retaining wall is not feasible. A self-shoring, top-down stage construction retaining wall system is appropriate for the site constraints, slope geometry, sedimentary formation, and fill that exist at the proposed wall location. A soil nail wall is the most economical of such retaining wall systems. The retaining wall design parameters as provided by the project development team and in the project plans are included in Table 3.

The soil nail wall design and global slope stability analyses for RW-3 and the proposed future retaining wall were performed using SnailWin 3.10 and STEDWIN with GSTABL7 v2.0. Both internal stability and global stability were evaluated by modeling various wall heights and adjoining slopes. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of external loading that could result from the construction of low buildings or transient loads were modeled as a distributed vertical load of two hundred forty-pounds per square foot (240psf). The soil strength design parameters utilized in the analyses are presented in Table 4. The basis for the selection of the soil strength parameters was archived data, field test results, and engineering experience and judgment. The soil nail design parameters utilized in the analyses are presented in Table 5A and Table 5B. The graphic results of the stability analyses are presented in Appendix IV. The need to satisfy global stability criteria was found to control the design length of the soil nails.

The earth retained by a soil nail wall must move in order to activate resisting forces along the nails. Minor deflection of the wall face and minor deformation of the earth behind the wall face should be anticipated. The wall face deflection and maximum limit of adjacent ground surface deformation may be estimated based on guidelines presented in the *Manual for Design and Construction Monitoring of Soil Nail Walls, Publication No. FHWA-SA-96-069R*. A horizontal and vertical deflection of about one-half-inch (0.5in) should be anticipated for the upper wall face. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height. Where the soil nail walls are configured in tiers, the horizontal limit of potential ground deformation behind the upper face is anticipated to be about one half (1/2) the combined wall height where the walls retain sedimentary formation and about three quarters (3/4) the combined wall height where the walls retain fill. These

estimated wall movements are not expected to impact the integrity of any facilities located behind the walls.

A portion of RW-3 will be constructed adjacent to the underground storage tank and fueling station located within UCSD CSC. The exact location of the underground storage tank could not be ascertained through review of the available archived information; however, the tank is known to be close to the wall alignment. Underground elements of a soil nail wall would likely conflict with the tank and related underground features.

This southern portion of RW-3 from Station 1572+09 to Station 1573+76.75 is roughly eight to sixteen-feet (8-16ft) in height. The prevailing soil conditions and proposed slope configuration are well suited to accommodate a Soldier Pile retaining wall as an alternative retaining system that may be used to minimize conflicts with adjacent features. The Soldier Pile retaining wall, in combination with the foundation soil and planned wall, slope, and external loading configuration, was found to satisfy all criteria for stability and performance. Internal stability and global stability analyses for the Soldier Pile retaining wall are included in Appendix IV.

The proposed alignment of RW-3 converges on an existing concrete crib wall which is part of the UCSD CSC facility. The crib wall will remain in place during construction of RW-3. Along the northern portion of the crib wall the soil nails will be constructed into and through the crib wall facing and buried elements, and the soil nail wall facing will be constructed on top of the crib wall face.

Along the southern portion of the existing crib wall where the relative alignment of RW-3 gradually diverges from the face of the crib wall, a soldier pile wall may again be utilized as an alternative retaining system to achieve the desired wall face alignment. This portion of RW-3 runs from Station 1579+06 to 1579+50 and is roughly twenty-feet (20ft) in height. The Soldier Pile retaining wall, in combination with the foundation soil and planned wall, slope, and external loading configuration, was found to satisfy all criteria for stability and performance. However, to satisfy internal stability criteria, it will be necessary to place light weight fill between the crib wall and the soldier pile wall. Internal stability and global stability analyses for the Soldier Pile retaining wall are included in Appendix IV.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-3 and the proposed future retaining wall be designed and constructed as soil nail walls, with the exception of a portion of RW-3 adjacent to the underground storage tank. The portions of RW-3 from Station 1572+09 to 1574+90 should be constructed as a Soldier Pile retaining wall.

The parameters that may be used for soil nail wall design are presented in Tables 3 through Table 5B.

The recommended length of soil nails, the design pullout resistance values, and the strength and diameter of reinforcing bars are provided in Table 5A and Table 5B. Soldier pile embedment depth and pile spacing are provided in Table 6.

12.0 NOTES TO DESIGNER

The project site soils are considered non-corrosive.

As currently planned, many soil nails will extend beyond the current freeway right-of-way. The soil nail anchor lengths should be considered when determining the right-of-way requirements.

The design of the retaining walls should incorporate a drainage system behind the wall face such as vertical drainage strips connected to outlet pipes.

Surface runoff from the bike lane should be controlled. The use of drains that collect runoff from the bike lane and transport it away from the walls is recommended.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining walls should be avoided. Features that promote infiltration could have an adverse impact on the performance of the retaining walls.

A soil nail retaining wall may be constructed with either a sculpted shotcrete or cast-in-place facade. Sculpted shotcrete is typically the more economical method.

Allowable bearing capacities which are to be utilized for design of shallow foundations are:

- Sedimentary Formational: 11,000psf
- Artificial Fill: 4,370psf

Pressure Diagrams for design of soldier pile section or RW-3 may be determined as follows:

- Active Lateral Pressure: 35 x (Height + Depth).
- Passive Lateral Pressure: 410 x (Depth). Maximum lateral passive pressure eight thousand five hundred pounds per square foot (8500psf).
- Dynamic Lateral Pressure: 20 x (Height), inverted triangle shape.
- Passive lateral pressure specified to begin at two-feet (2ft0 below ground line.
- Surcharge of two hundred and forty pounds per square foot (240psf).

13.0 CONSTRUCTION CONSIDERATIONS

The sedimentary formation and artificial fill found along the alignment of RW-3 and the future retaining wall may be excavated using standard excavation equipment. Nail shafts may be drilled with conventional nail drilling equipment.

The occurrence of groundwater is not anticipated to impact retaining wall construction.

The occurrence of caving soils is anticipated to be minimal and is not anticipated to significantly impact retaining wall construction except at nail shaft drilling along the existing concrete crib wall.

The face alignment of the northern portion of RW-3 will coincide with the face alignment of the existing concrete crib wall with a maximum height of about fifteen-feet (15ft) and a length of about one hundred and fifty-feet (150ft). The exact underground configuration and design of the crib wall could not be ascertained through review of the available archived information; however, the crib wall is believed to be comparable to the design detailed in the *Caltrans Standard Plan for Reinforced Concrete Crib Wall Type A*.

The existing crib wall will be left in place during construction of RW-3. The soil nail wall face will be constructed upon the crib wall face and the nail shafts will be drilled through the crib wall face and buried wall elements. The nail shaft drilling operation will encounter reinforced concrete crib wall facing, buried reinforced concrete wall elements, and cohesionless granular soil. These difficult drilling conditions should be anticipated by the Contractor.

Buried crib wall elements are likely to be encountered while drilling pile shafts in proximity to the existing crib wall. The lower portions of the crib wall facing are likely to conflict with portions of the soldier pile wall and with pile shaft drilling operations. It may be necessary to remove some outer crib wall elements to facilitate construction of the soldier pile wall.

Potholing should be utilized to ensure that the location of the underground storage tank and all associated utilities at the UCSD CSC do not lie within any proposed project excavation.

Temporary cut slopes proposed by the Contractor should follow the guidelines set forth in the Caltrans Trenching and Shoring Manual. The estimated soil strength parameters presented in Table 3 should be utilized by the contractor to perform any required engineering analyses of proposed temporary slope configurations. The acceptable minimum factor of safety criteria for the stability analyses of a temporary

cut slope is 1.2. Under no circumstances should the inclination of temporary cut slopes greater than ten-feet (10ft) in height within engineered fill be allowed to exceed one and one quarter horizontal to one vertical (1.25H:1V) or be allowed to exceed one horizontal to one vertical (1H:1V) within sedimentary formation.

A horizontal and vertical deflection of about one-half-inch (0.5in) should be anticipated for the upper face of the soil nail walls. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height. Where the soil nail walls are configured in tiers, the horizontal limit of potential ground deformation behind the upper face is anticipated to be about one half (1/2) the combined wall weight where the walls retain sedimentary formation and about three quarters (3/4) the combined wall height where the walls retain artificial fill.

The construction of the soil nail wall is not anticipated to have any adverse effect on existing facilities or utilities. However, a pre-construction survey of the super adjacent facilities should be conducted to document the condition of the facilities prior to construction.

Survey monuments should be placed on the ground surface a horizontal distance of thirty-five-feet (35ft) behind the wall face. The position of these monuments should be measured and recorded prior to any wall excavation and periodically throughout the project in order to monitor and document ground deformation behind the retaining wall.

The Contractor may elect to perform excavation stability testing to verify his proposed lift height and duration of exposure. The site exploration discovered two substantially varying zones that will host the wall, the sedimentary formation and the artificial fill; therefore, two (2) stability testing zones were identified. The wall stability testing zones are described in Table 6.

Production nails may be used as proof and test nails. Eight-percent (8%) of the total nails installed should be proof tested. The proof tested nails should be distributed throughout the wall face. Two verification test nails must be installed and tested in each wall zone.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2010*. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is less than what is prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to abundant geologic exposures available by inspection of the existing cut slope and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and locations that have been provided to OGDS2. If any changes are made to the project features addressed herein, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analyses. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties

related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

Caltrans, *Corrosion Guidelines, Version 1.0*, September 2003

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Caltrans, *Geotechnical Services Design Manual*, Version 1.0, August 2009

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FHWA, *Manual for Design and Construction Monitoring of Soil Nail Walls*, Publication No. FHWA-SA-96-069R

Ninyo & Moore, *Preliminary Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-235800), December 2005

Ninyo & Moore, *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-022330), December 2007

PBS&J, *University of California San Diego Long Range Development Plan, Final Environmental Impact Report*, September 2004

Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

FIGURES

Note: Retaining wall alignments and lengths are approximated.

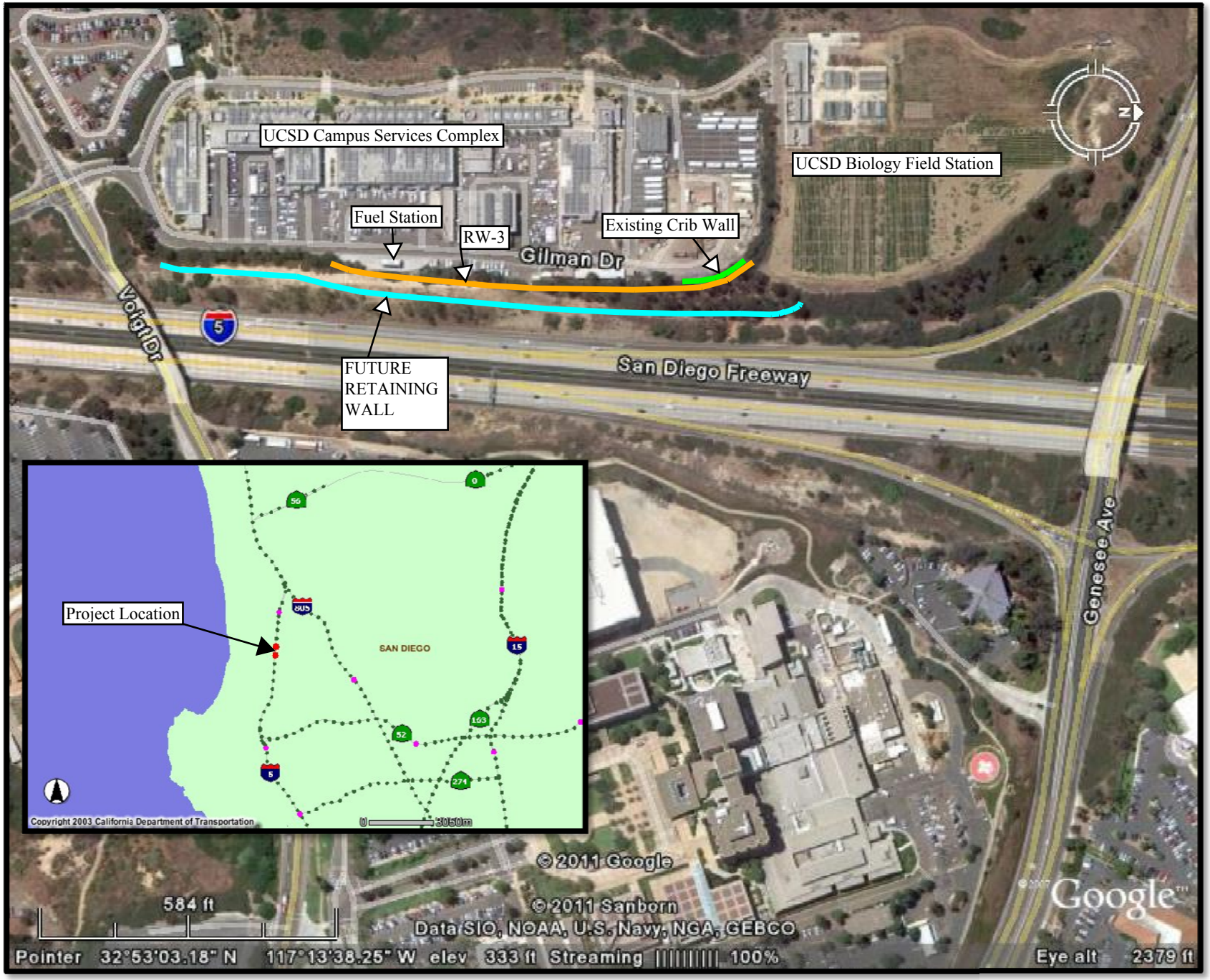


FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5		..

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

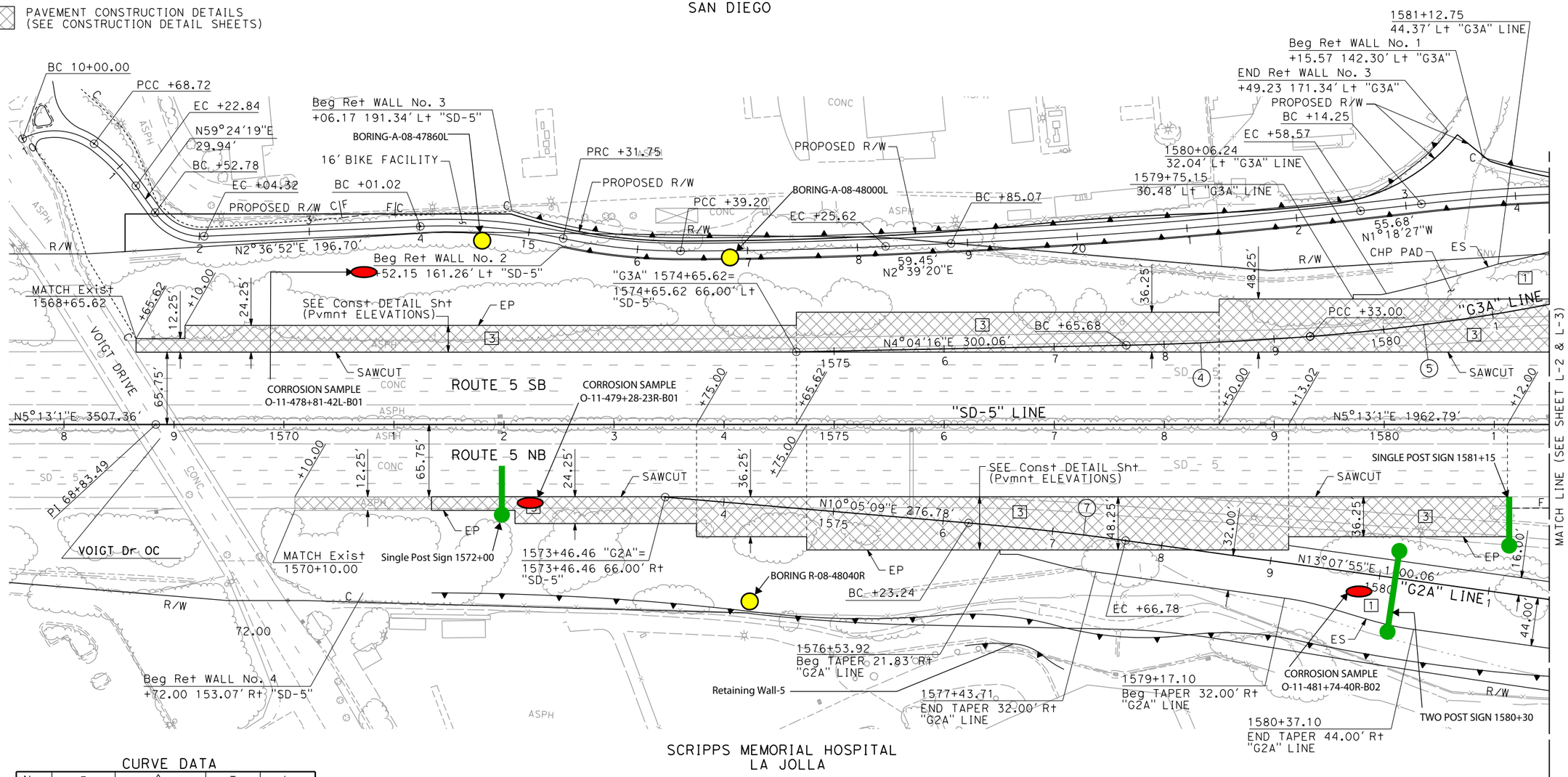
NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

2. FOR ETW AND ES, SEE PAVEMENT DELINEATION SHEETS.

LEGEND:

- (#) METAL BEAM GUARDRAIL (MBGR) SYSTEM
- [X] STRUCTURAL SECTIONS-SEE TYPICAL SECTION FOR STRUCTURAL SECTION TYPES
- (X) CURVE DATA NUMBER
- EJPCP-EDGE OF JOINTED PLAIN CONCRETE PAVEMENT
- PAVEMENT CONSTRUCTION DETAILS (SEE CONSTRUCTION DETAIL SHEETS)



CURVE DATA

No.	R	Δ	T	L
4	3,000.00	3°11'44.25"	83.68	167.32
5	1,900.00	8°32'06.70"	141.78	283.04
7	2,700.00	3°02'45.76"	71.79	143.54

Note:
1) Wall 1 and Wall 2 have been removed from the project.

Revised Foundation Report: Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-3, EA 11-022331/EFIS 1100000012

LAYOUT
SCALE: 1" = 50'

L-1

FIGURE 2A: PROJECT LAYOUT

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
CONSULTANT FUNCTIONAL SUPERVISOR
CALCULATED-DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED

LAST REVISION 12-01-11
DATE PLOTTED => 1/24/2012
TIME PLOTTED => 12:51:36 PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5		..

REGISTERED CIVIL ENGINEER DATE

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600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

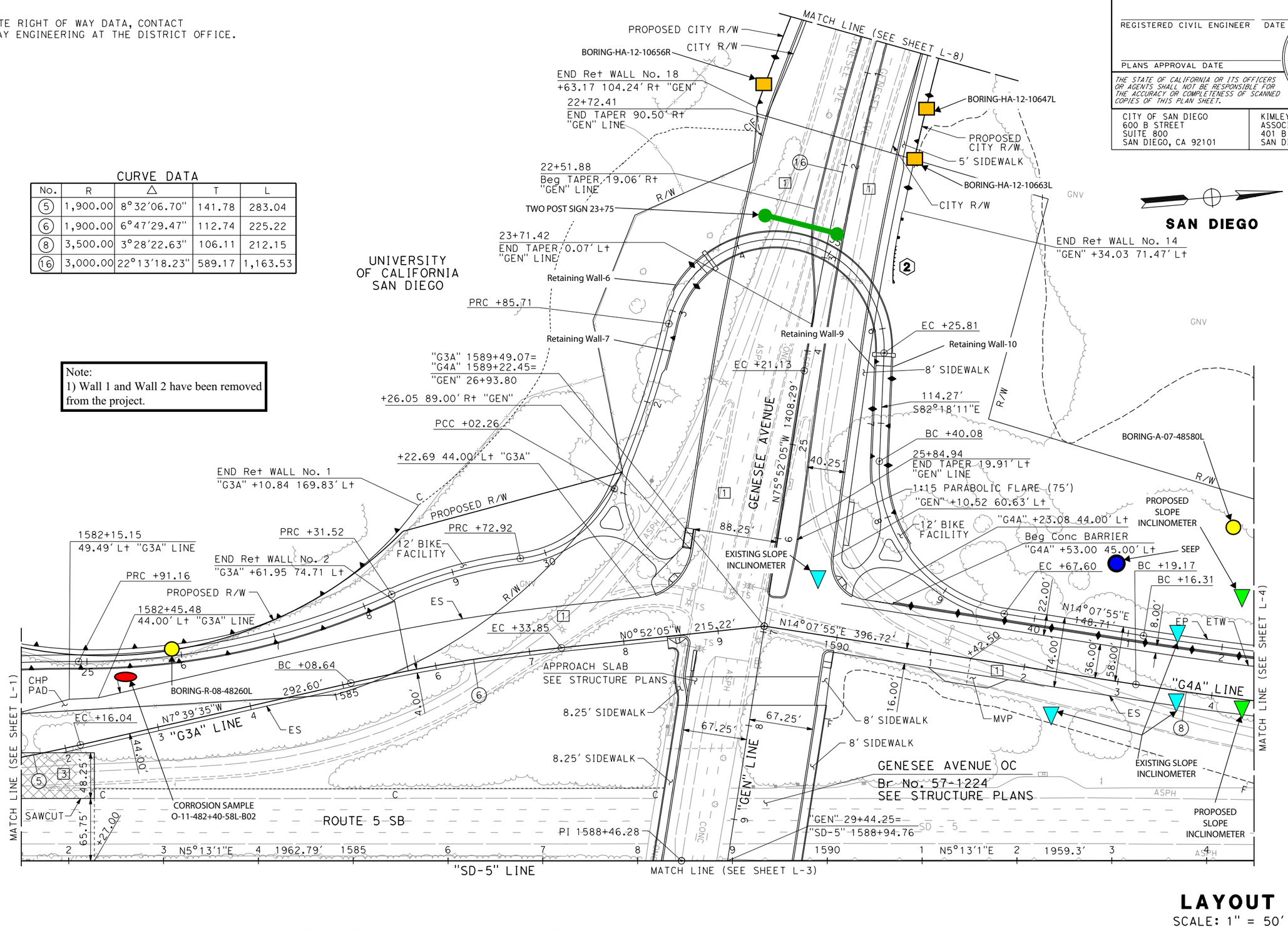
NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
5	1,900.00	8°32′06.70″	141.78	283.04
6	1,900.00	6°47′29.47″	112.74	225.22
8	3,500.00	3°28′22.63″	106.11	212.15
16	3,000.00	22°13′18.23″	589.17	1,163.53

Note:
1) Wall 1 and Wall 2 have been removed from the project.



Foundation Report: Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-1, Retaining Wall-2, and Retaining Wall-3, EA 11-022331/EFIS 1100000012

LAYOUT
SCALE: 1″ = 50′ **L-2**

FIGURE 2B: PROJECT LAYOUT

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans®
CONSULTANT FUNCTIONAL SUPERVISOR
CALCULATED-DESIGNED BY
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REVISED BY
DATE REVISED

LAST REVISION 12-01-11
DATE PLOTTED => 1/24/2012
TIME PLOTTED => 12:51:44 PM

BORDER LAST REVISED 7/2/2010
USERNAME => Jason.adriano
DGN FILE => 1100000012ea002.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 2771
PROJECT NUMBER & PHASE 11000000012

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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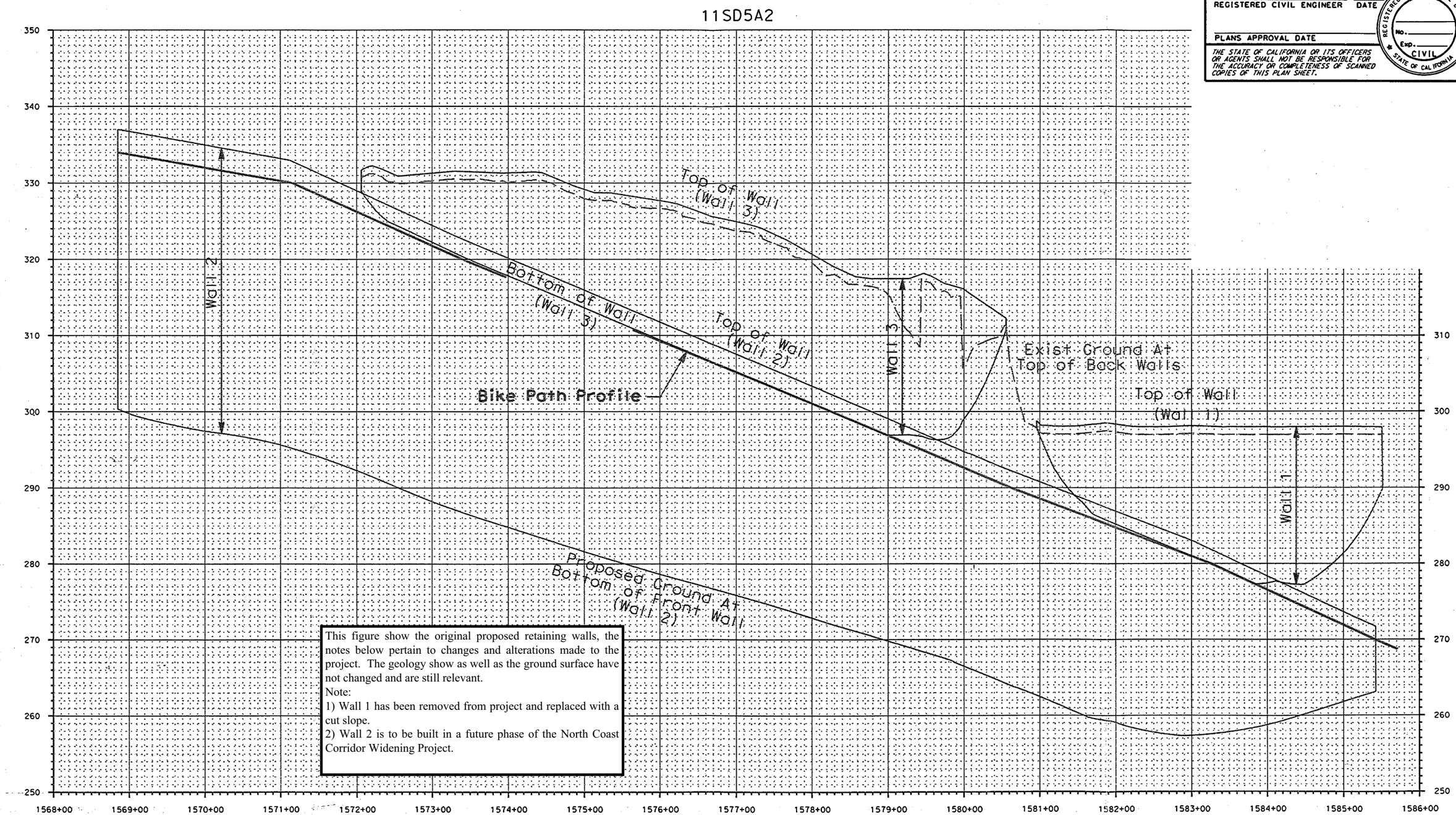

This figure show the original proposed retaining walls, the notes below pertain to changes and alterations made to the project. The geology show as well as the ground surface have not changed and are still relevant.

Note:

1) Wall 1 has been removed from project and replaced with a cut slope.

2) Wall 2 is to be built in a future phase of the North Coast Corridor Widening Project.

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 1100000012

FIGURE 3: PROJECT PROFILE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

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Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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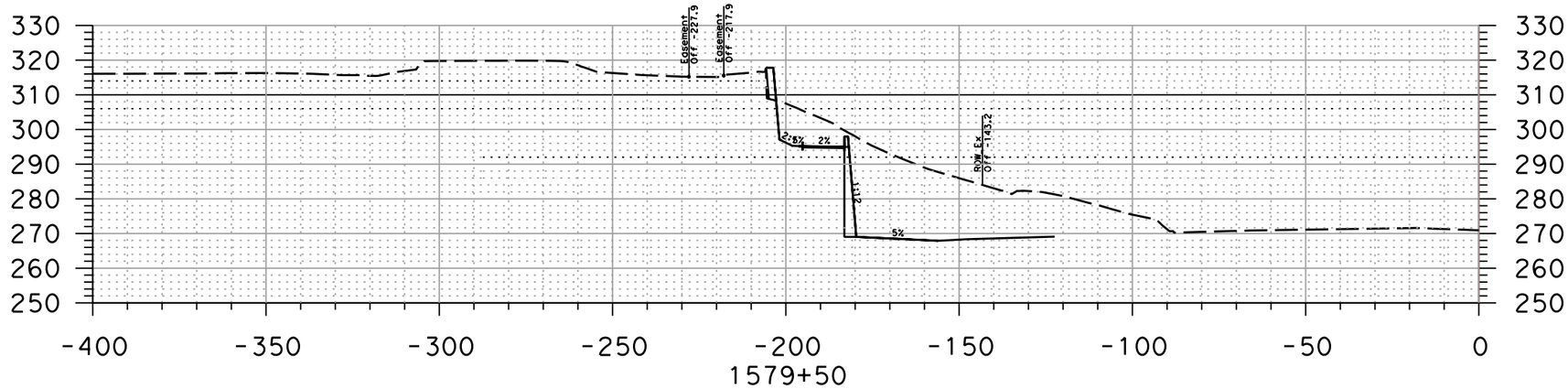
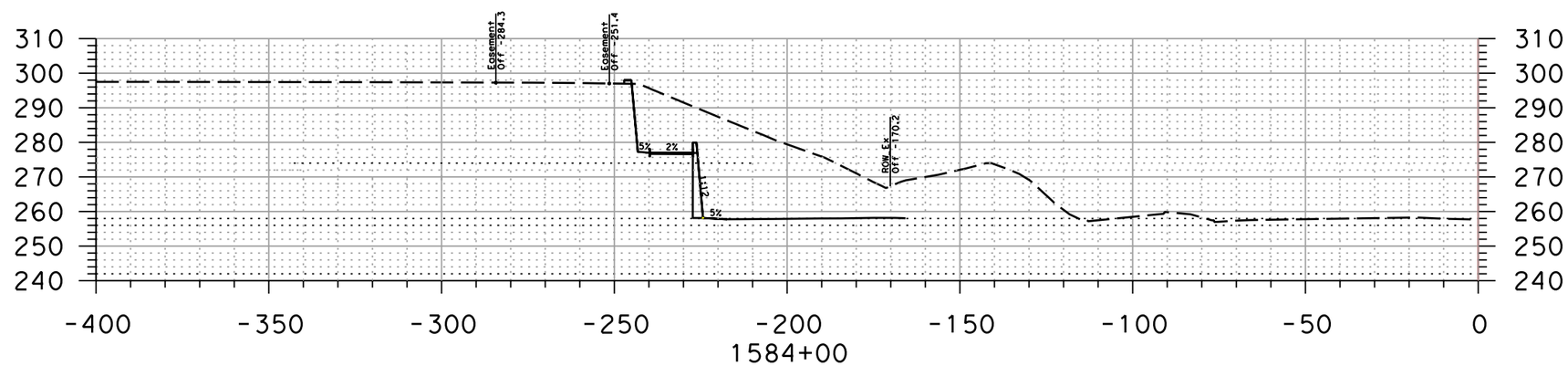




Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-1, Retaining Wall-2, and Retaining Wall-3
EA 11-022331/EFIS 1100000012

FIGURE 4: PROJECT CROSS SECTIONS

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

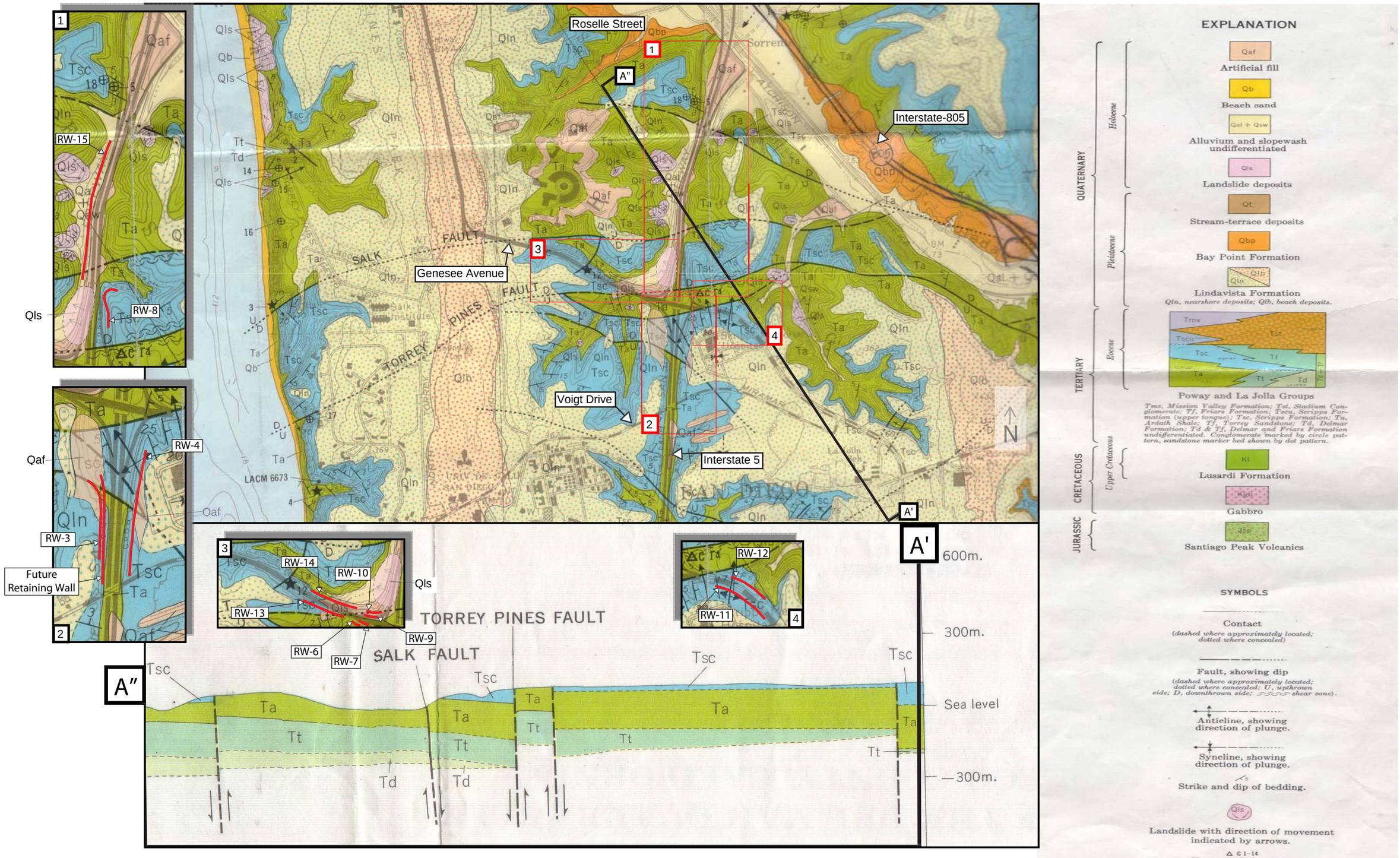
CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => $DATE
TIME PLOTTED => $TIME



Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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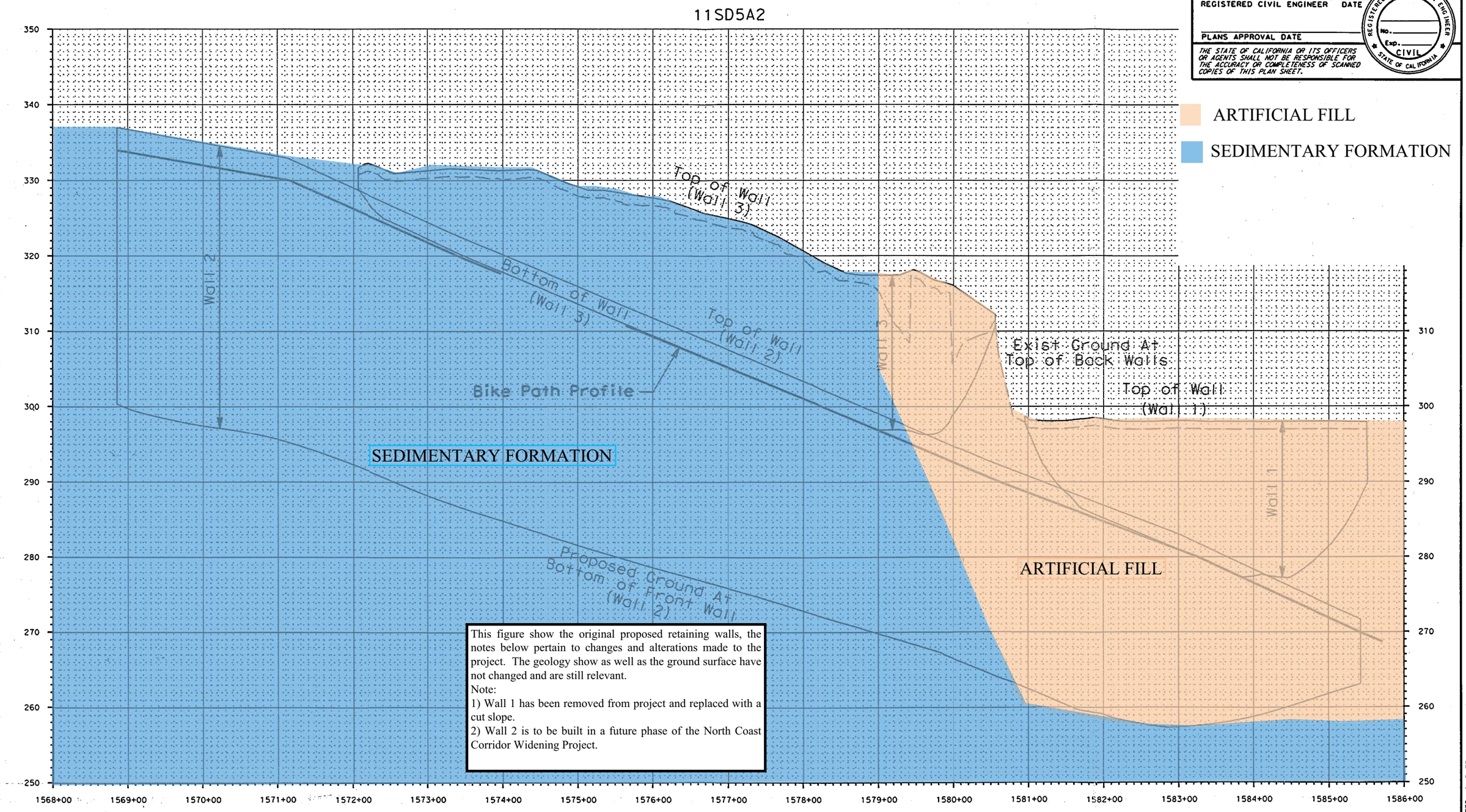

This figure show the original proposed retaining walls, the notes below pertain to changes and alterations made to the project. The geology show as well as the ground surface have not changed and are still relevant.

Note:

1) Wall 1 has been removed from project and replaced with a cut slope.

2) Wall 2 is to be built in a future phase of the North Coast Corridor Widening Project.

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 1100000012

FIGURE 6: GEOLOGIC PROFILE

REVISED BY	DATE REVISED
CALCULATED-DESIGNED BY	CHECKED BY
FUNCTIONAL SUPERVISOR	

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

figure 6.dgn 9/7/2011 2:02:37 PM

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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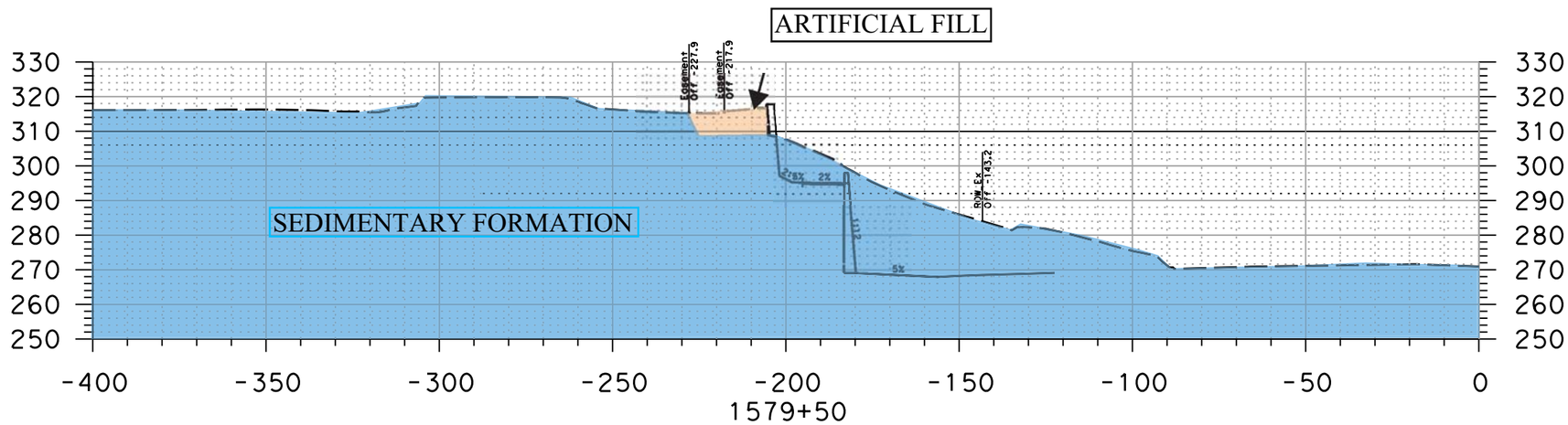
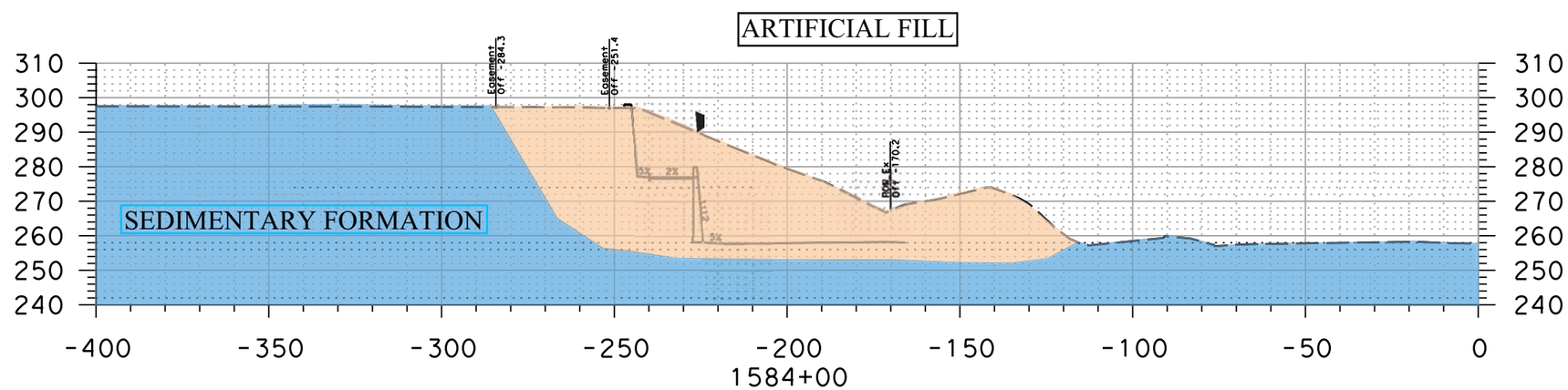


ARTIFICIAL FILL

SEDIMENTARY FORMATION



Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 1100000012

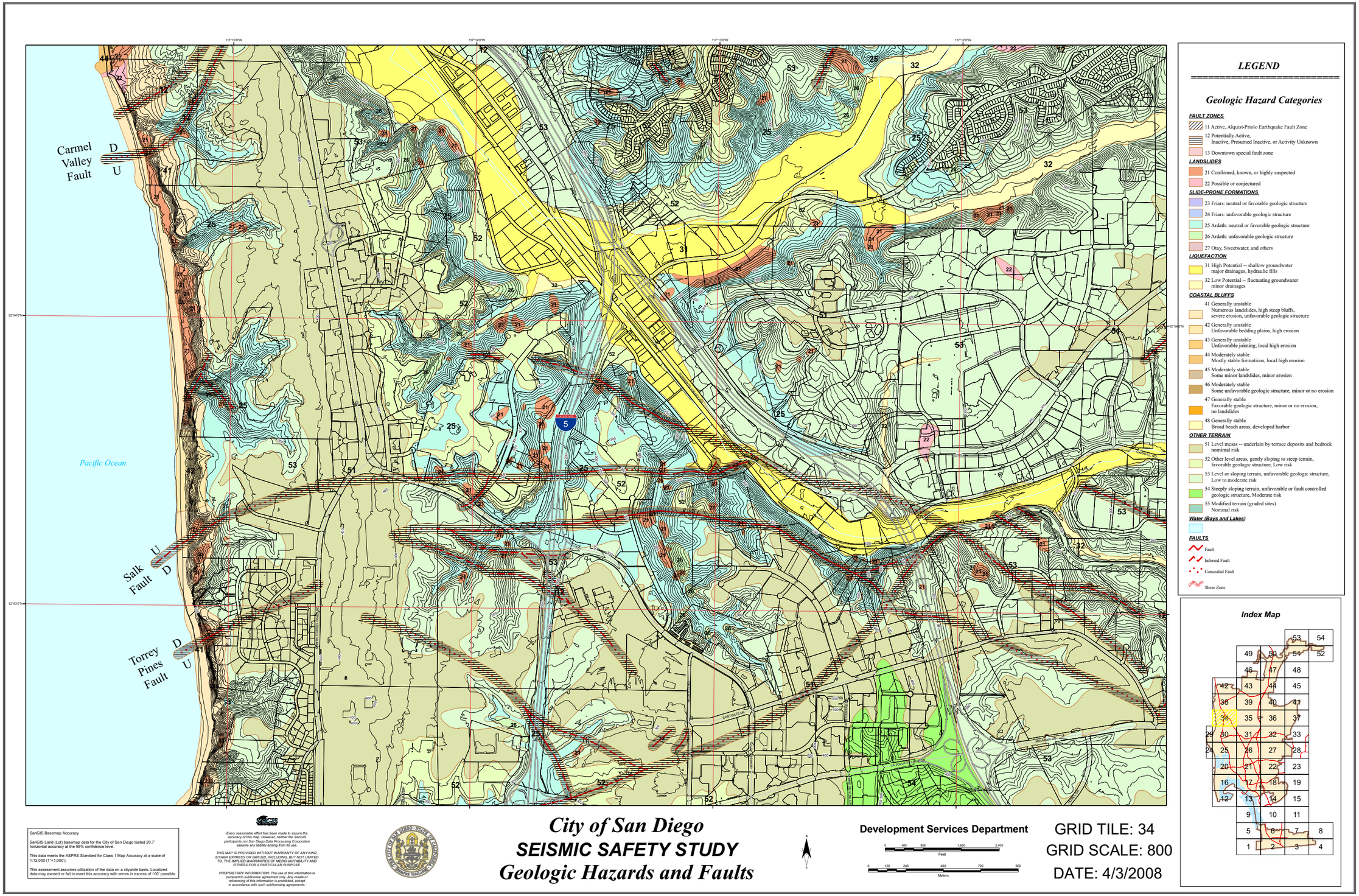
FIGURE 7: GEOLOGIC CROSS SECTIONS

REVISED BY | DATE REVISED | CALCULATED-DESIGNED BY | CHECKED BY | FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

figure 6.dgn 9/23/2011 2:22:38 PM | USERNAME => $USER | DGN FILE => $REQUEST | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

LAST REVISION 00-00-00 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

Every reasonable effort has been made to assure the accuracy of this map. However, neither the SanGIS participants nor San Diego Data Processing Corporation assume any liability arising from its use.

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

Feet: 0 400 800 1,600 2,400

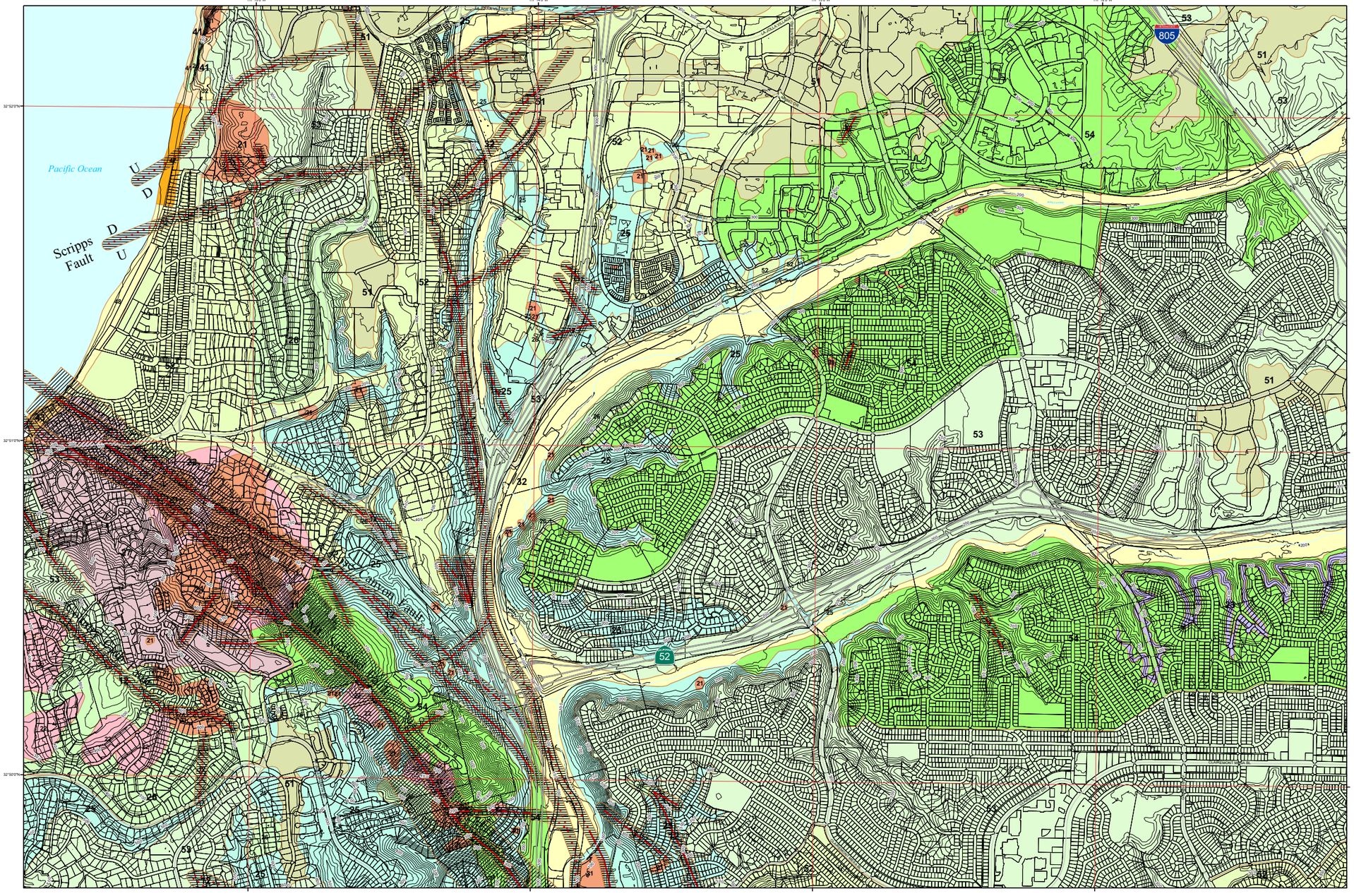
Meters: 0 120 240 480 720 960

GRID TILE: 34

GRID SCALE: 800

DATE: 4/3/2008

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

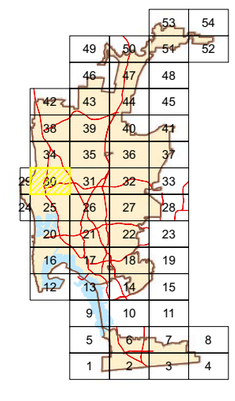
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



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SanGIS

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

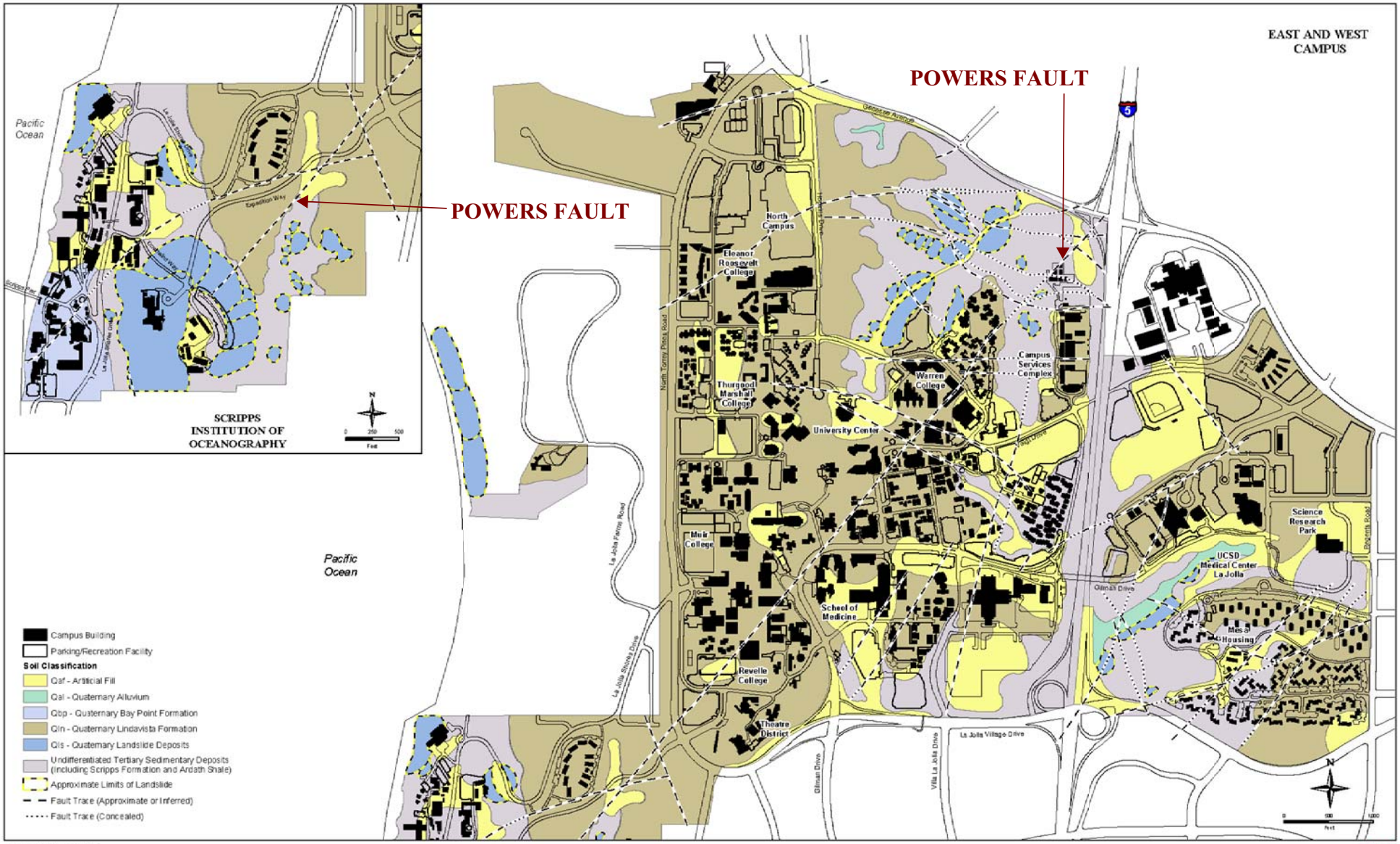
0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 1100000012

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-478+81-42L-B01		940	6.67	177	61
011-482+40-58L-B02		820	6.95	356	210

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: RETAINING WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station SD-5 Line	Ending Station SD-5 Line	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
Future Retaining Wall	Soil Nail	1571+72	1581+15	1174	38	Flat	Flat	1H:12V	Cut
	Soil Nail	1581+15	1583+36		30	Flat	Flat	1H:12V	Cut
RW-3	Cantilever Soldier Pile	1572+09	1573+76.75	876	16	1.5H:1V	Flat	1H:12V	Cut
	Soil Nail	1573+76.75	1579+03.78		22	1.5H:1V	Flat	1H:12V	Cut
	Soil Nail	1579+03.78	1580+61.25		22	1.5H:1V	Flat	1H:12V	Cut

Notes: L = Approximate Wall Length
HMAX =Approximate Maximum Wall Height
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station SD-5 Line	Ending Station SD-5 Line	Soil Type	φ	Coh (psf)	γ (pcf)
Future Retaining Wall	Soil Nail	1571+72	1581+15	Sedimentary Formation	33º	350	121
	Soil Nail	1581+15	1583+36	Artificial Fill	33º	0	115
RW-3	Cantilever Soldier Pile	1572+09	1573+76.75	Sedimentary Formation	33º	350	121
	Soil Nail	1573+76.75	1579+03.78	Sedimentary Formation	33º	350	121
	Soil Nail	1579+03.78	1580+61.25	Artificial Fill	33º	0	115

Notes: φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 5A: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station SD-5 Line	Ending Station SD-5 Line	NS (psi)	AHS (psi)	NHS_{MAX} (ft)	NVS_{MAX} (ft)	NIA (degrees)	$DTOP_{MAX}$ (ft)	$DBOT_{MAX}$ (ft)
Future Retaining Wall	Soil Nail	1571+72	1581+15	36000	30,000	6	6	15	2.5	3
	Soil Nail	1581+15	1583+36	36000	30,000	6	5	15	2.5	3
RW-3	Cantilever Soldier Pile	1572+09	1573+76.75	Not applicable						
	Soil Nail	1573+76.75	1579+03.78	36000	30,000	6	6	15	2.5	3
	Soil Nail	1579+03.78	1580+61.25	36000	30,000	6	6	15	2.5	3

Notes: NS = Nail Strength
AHS = Assumed Head Strength
RBD = Reinforcing Bar Diameter
NHS_{MAX} = Maximum Nail Horizontal Spacing
NVS_{MAX} = Maximum Nail Vertical Spacing
NIA = Nail Inclination Angle from the Horizontal
$DTOP_{MAX}$ = Maximum distance from the top of the wall to the top row of nails.
$DBOT_{MAX}$ = Maximum distance from the bottom of the wall to the bottom row of nails.

TABLE 5B: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station SD-5 Line	Ending Station SD-5 Line	DPR (kips/ft)	RBD (in)	MNL (ft)	MNR
Future Retaining Wall	Soil Nail	1571+72	1573+97	5.4	1.41	35	7
		1573+97	1579+00	5.4	1.25	40	6
		1579+00	1581+15	5.4	1.25	55	5
		1581+15	1583+36	2.7	1.25	35	5
RW-3	Cantilever Soldier Pile	1572+09	1573+76.75	Not applicable			
	Soil Nail	1573+76.75	1579+03.78	5.4	1.25	40	4
		1579+03.78	1580+61.25	5.4	1.25	55	4

Notes: DPR = Design Pullout Resistance
RBD = Reinforcing Bar Diameter
MNL = Minimum Nail Length
MNR = Minimum Number of Rows at Hmax

TABLE 6: SOLDIER PILE DESIGN PARAMETERS

Retaining Wall	Beginning Station	Ending Station	Embedment Length (Feet)	Pile Spacing (Feet)	Comments
RW-3	1572+09 SD-5-Line	1573+76.75 SD-5-Line	11	6	Place in front of UCSD fuel tank

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA

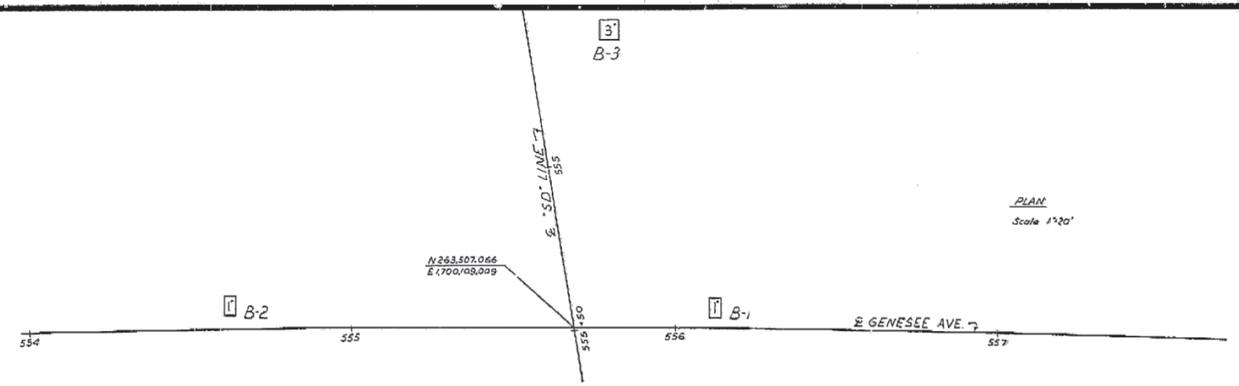
DIST.	COUNTY	ROUTE	PREFIX	NUMBER	TOTAL SHEETS
XI	SD	5	2R(4)(5)	118	197

DATE APPROVED July 20, 1964

BENCH MARK

TBM #1 - ℄ Stake, sta. 554+86 "SD" top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV 278.66



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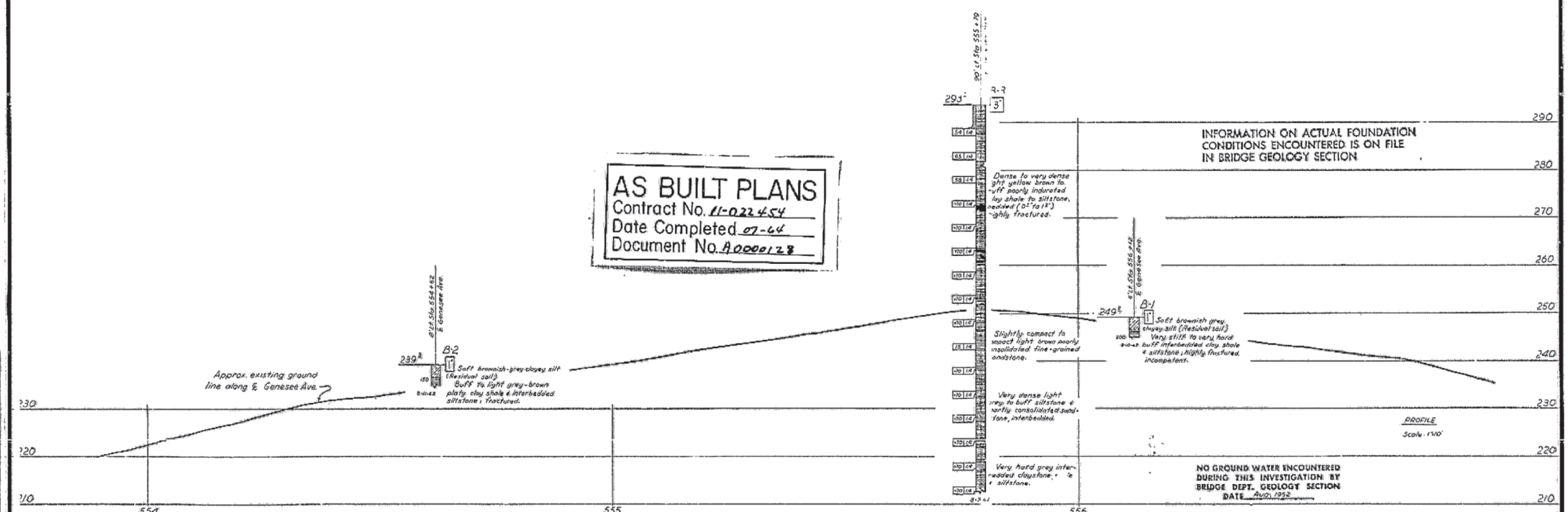


BRIDGE DEPARTMENT

Approved Recommended By: Bridge Geologist

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

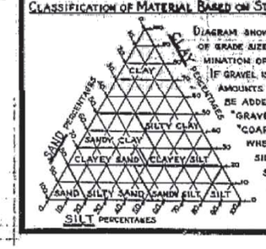


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

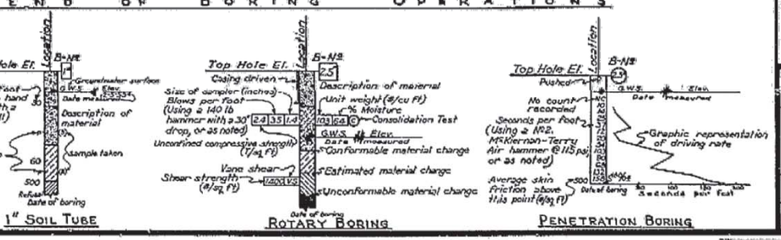
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2 1/4" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

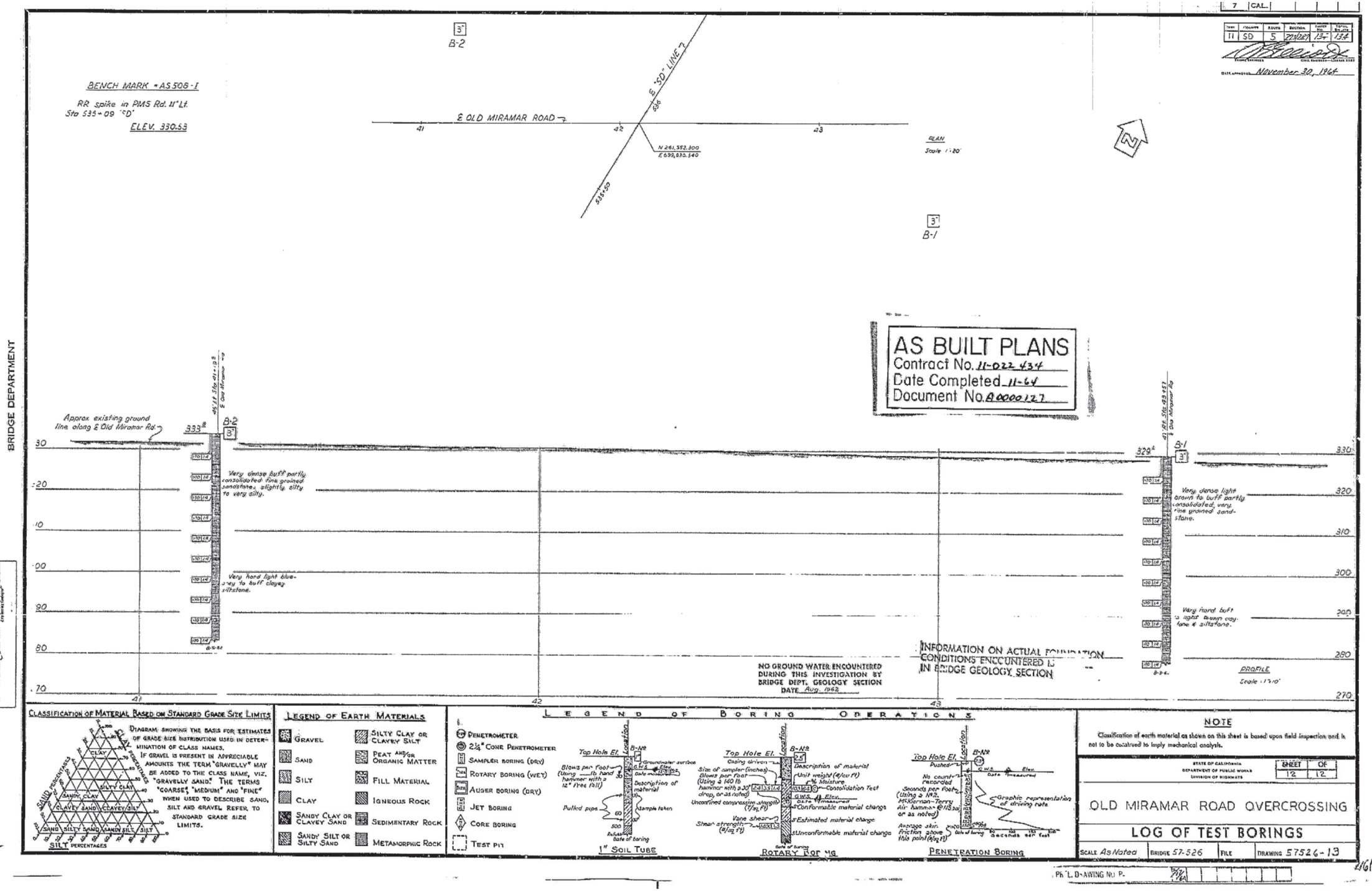
GENESEE AVENUE OVERCROSSING

LOG OF TEST BORINGS

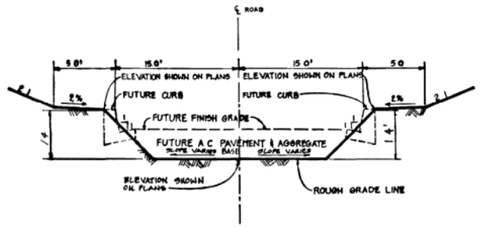
SCALE As Noted	BRIDGE 57-527	FILE	DRAWING 57527-9

PREL. DRAWING NO. P-

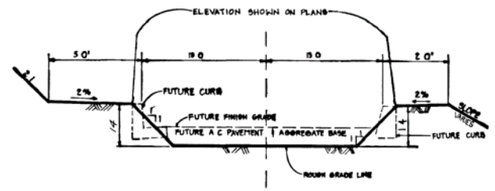
5-4



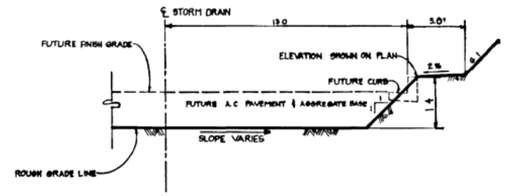
Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-3
EA 11-022331/EFIS 11000000012



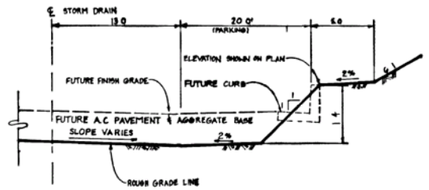
A / C-6 SECTION @ ENTRANCE ROAD
NO SCALE
SEE SHEET C 2



B / C-6 SECTION @ EASTERLY ENTRANCE ROAD
NO SCALE
SEE SHEET C 2



C / C-6 SECTION @ EASTERLY CURB (CUT)
NO SCALE STA 0+00 THRU STA 5+08 87
STA 5+39 86 THRU STA 5+50 01
SEE SHEET C 2



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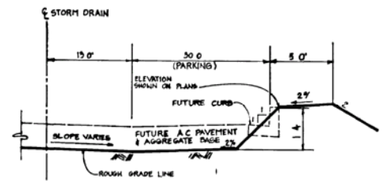
SEE SHEET C 2



E / C-6 SECTION @ EASTERLY CURB (FILL)
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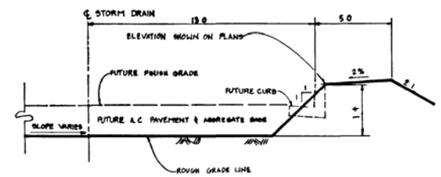
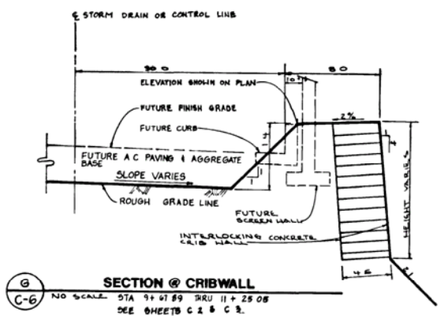
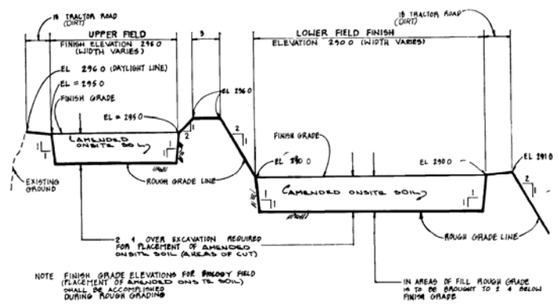
SEE SHEET C 2



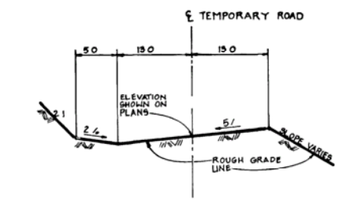
F / C-6 SECTION @ EASTERLY CURB (FILL)
NO SCALE STA 8+14 27 THRU 8+25 89
SEE SHEETS C 2



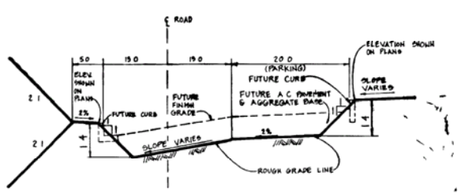
G / C-6 SECTION @ CRIBWALL
NO SCALE STA 9+07 89 THRU 11+25 08
SEE SHEETS C 2 & C 3



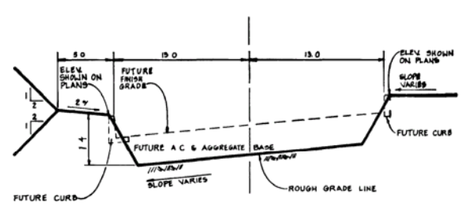
H / C-6 SECTION THROUGH BIOLOGY FIELDS
NO SCALE
SEE SHEET C 3



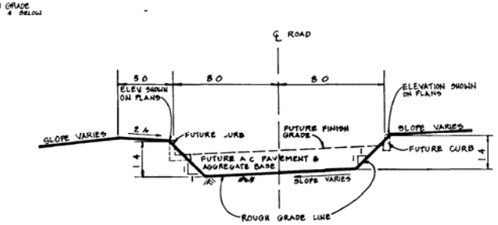
J / C-6 SECTION THROUGH TEMPORARY ROAD
NO SCALE
SEE SHEET C 2



L / C-6 SECTION THROUGH WESTERLY SERVICE ROAD (W/PARKING)
NO SCALE
SEE SHEETS C 2 & C 3



K / C-6 SECTION THROUGH WESTERLY SERVICE ROAD (W/NO PARKING)
NO SCALE
SEE SHEETS C 2 & C 3



M / C-6 SECTION THROUGH BFS ROAD
NO SCALE
SEE SHEET C 3

UNAUTHORIZED CHANGES & USES The engineer preparing these plans will not be responsible for or liable for unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

California Council of Civil Engineers & Land Surveyors

Klaggs-Stevens & Associates, Inc.
Sorrento Mesa Design Center
9909 Huennekens Street
Suite 110
San Diego, California 92121 2928
(619) 455-5225

4/27/89

ANSHEN + ALLEN
ARCHITECTURE
PLANNING
INTERIOR DESIGN
324 N FOOTHILL ROAD
BEVERLY HILLS
CALIFORNIA 90210
213 276 0008

DRAWN BY
CHECKED
APPROVED
CONSULTANTS

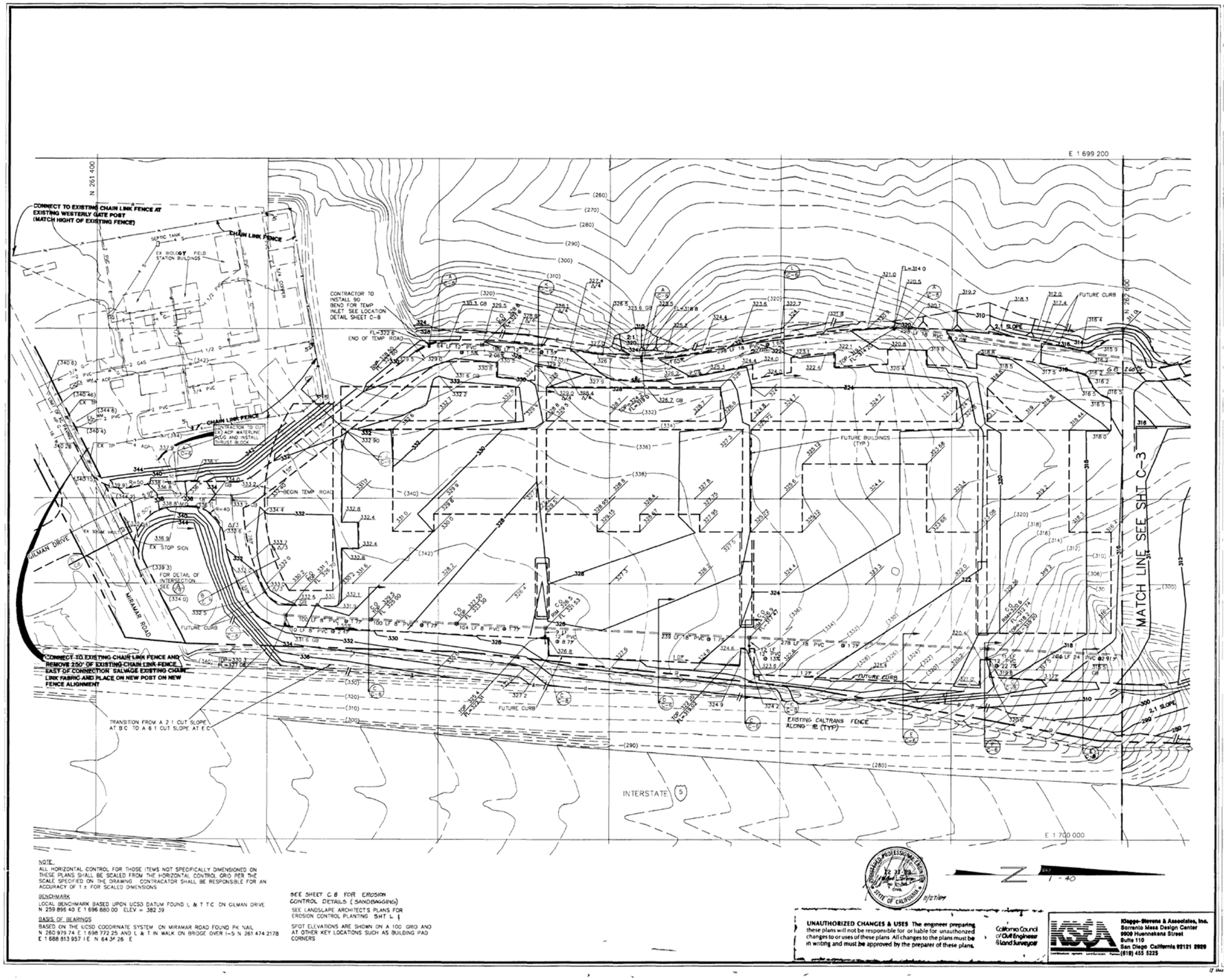
NO	DESCRIPTION	DATE
	REVISIONS	

CAMPUS SERVICES COMPLEX/ BIOLOGY FIELD STATION GRADING PACKAGE

UNIVERSITY OF CALIFORNIA SAN DIEGO

CIVIL DETAILS

SCALE NONE
PROJECT NO 1851 88109 37
DATE 11/27/89
DRAWING NO **C-6**



NOTE
ALL HORIZONTAL CONTROL FOR THOSE ITEMS NOT SPECIFICALLY DIMENSIONED ON THESE PLANS SHALL BE SCALED FROM THE HORIZONTAL CONTROL GRID PER THE SCALE SPECIFIED ON THE DRAWING. CONTRACATOR SHALL BE RESPONSIBLE FOR AN ACCURACY OF 1 ± FOR SCALED DIMENSIONS

BENCHMARK
LOCAL BENCHMARK BASED UPON UCSD DATUM FOUND L & T T C ON GILMAN DRIVE
N 259 896 40 E 1 696 880 00 ELEV = 382 39

BASIS OF BEARINGS
BASED ON THE UCSD COORDINATE SYSTEM ON MIRAMAR ROAD FOUND PK NAIL
N 260 979 74 E 1 698 772 25 AND L & T IN WALK ON BRIDGE OVER I-5 N 261 474 2178 E 1 688 813 957 I E N 64 34' 26" E

SEE SHEET C 8 FOR EROSION CONTROL DETAILS (SANDBAGGING)
SEE LANDSCAPE ARCHITECTS PLANS FOR EROSION CONTROL PLANTING SHT L 1

SPOT ELEVATIONS ARE SHOWN ON A 100' GRID AND AT OTHER KEY LOCATIONS SUCH AS BUILDING PAD CORNERS

REGISTERED PROFESSIONAL ENGINEER 12 31 89 CIVIL STATE OF CALIFORNIA 11/27/89

UNAUTHORIZED CHANGES & USES The engineer preparing these plans will not be responsible for or liable for unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

California Council of Civil Engineers & Land Surveyors

Kleppe-Stevens & Associates, Inc.
Sorrento Mesa Design Center
9909 Huennekens Street
Suite 110
San Diego California 92121 2929
(619) 455 5225

If this bar is not 3/4" then it is not full size and drawing is not to scale

ANSHEN + ALLEN

ARCHITECTURE
PLANNING
INTERIOR DESIGN
324 N. FOOTHILL ROAD
BEVERLY HILLS
CALIFORNIA 90210
213 276 0008

DRAWN BY

CHECKED

APPROVED

CONSULTANTS

KSA Kleppe-Stevens & Associates, Inc. Sorrento Mesa Design Center 9909 Huennekens Street Suite 110 San Diego California 92121-2929 (619) 455 5225

NO	DESCRIPTION	DATE

REVISIONS

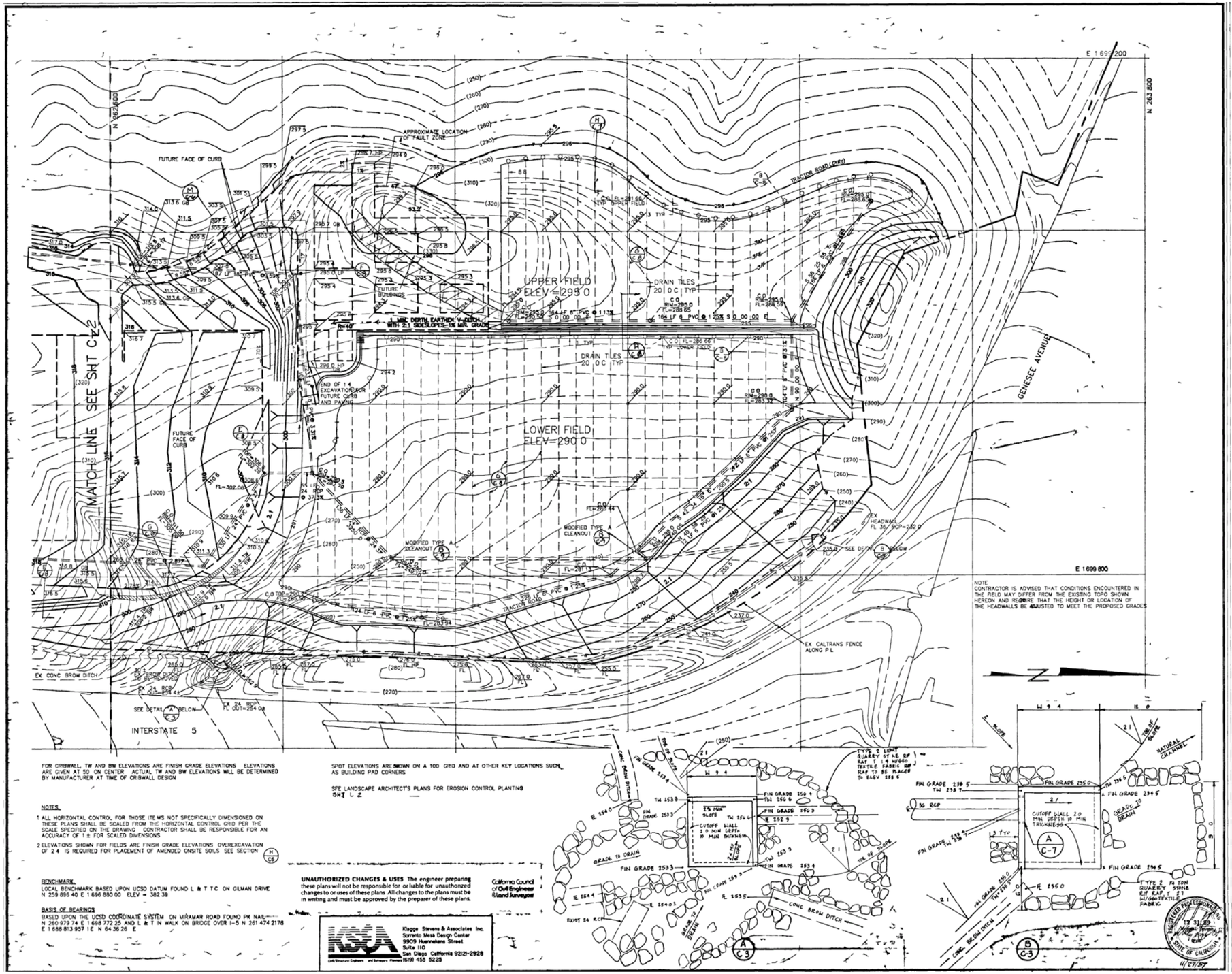
CAMPUS SERVICES COMPLEX/ BIOLOGY FIELD STATION

GRADING PACKAGE

UNIVERSITY OF CALIFORNIA
SAN DIEGO

ROUGH GRADING (CAMPUS SERVICE COMPLEX)

SCALE 1 = 40
PROJECT NO 1881 88109 37
DRAWING NO C-2
DATE 11/27/89


ANSHEN + ALLEN
ARCHITECTURE
PLANNING
INTERIOR DESIGN
324 N FOOTHILL ROAD
BEVERLY HILLS
CALIFORNIA 90210
213 276 0008
DRAWN BY:
CHECKED:
APPROVED:
CONSULTANTS:
KSA
NO DESCRIPTION DATE
REVISIONS
CAMPUS SERVICES COMPLEX/ BIOLOGY FIELD STATION
GRADING PACKAGE
UNIVERSITY OF CALIFORNIA SAN DIEGO
ROUGH GRADING (BIOLOGY FIELD STATION)
SCALE 1 = 40'
PROJECT NO 1861 88109 37
DRAWING NO
DATE 11/27/89
C-3
UPPER FIELD ELEV=295.0
LOWER FIELD ELEV=290.0
DRAIN TILES 20' O.C. TYP
MATCH LINE SEE SHT C-2
FUTURE FACE OF CURB
APPROXIMATE LOCATION OF FAULT ZONE
TRACTOR ROAD (OUT)
GENESEE AVENUE
INTERSTATE 5
EX CONC BROW DITCH
EX CALTRANS FENCE ALONG P.L.
MODIFIED TYPE A CLEANOUT
END OF 1:4 EXCAVATION FOR FUTURE CURB AND PAVING
NOTE
CONTRACTOR IS ADVISED THAT CONDITIONS ENCOUNTERED IN THE FIELD MAY DIFFER FROM THE EXISTING TOPO SHOWN HEREON AND REQUIRE THAT THE HEIGHT OR LOCATION OF THE HEADWALLS BE ADJUSTED TO MEET THE PROPOSED GRADES
FOR CRIBWALL TW AND BW ELEVATIONS ARE FINISH GRADE ELEVATIONS ELEVATIONS ARE GIVEN AT 50' ON CENTER ACTUAL TW AND BW ELEVATIONS WILL BE DETERMINED BY MANUFACTURER AT TIME OF CRIBWALL DESIGN
SPOT ELEVATIONS ARE SHOWN ON A 100' GRID AND AT OTHER KEY LOCATIONS SUCH AS BUILDING PAD CORNERS
SEE LANDSCAPE ARCHITECT'S PLANS FOR EROSION CONTROL PLANTING SHT L-2
NOTES:
1 ALL HORIZONTAL CONTROL FOR THOSE ITEMS NOT SPECIFICALLY DIMENSIONED ON THESE PLANS SHALL BE SCALED FROM THE HORIZONTAL CONTROL GRID PER THE SCALE SPECIFIED ON THE DRAWING CONTRACTOR SHALL BE RESPONSIBLE FOR AN ACCURACY OF 1 ± FOR SCALED DIMENSIONS
2 ELEVATIONS SHOWN FOR FIELDS ARE FINISH GRADE ELEVATIONS OVEREXCAVATION OF 2.4' IS REQUIRED FOR PLACEMENT OF AMENDED ONSITE SOILS SEE SECTION H C6
BENCHMARK
LOCAL BENCHMARK BASED UPON UCSD DATUM FOUND L & T TC ON GILMAN DRIVE N 259 896 40 E 1 696 880 00 ELEV = 382 39
BASIS OF BEARINGS
BASED UPON THE UCSD COORDINATE SYSTEM ON MIRAMAR ROAD FOUND PK NAIL N 260 979 74 E 1 698 772 25 AND L & T IN WALK ON BRIDGE OVER I-5 N 261 474 2178 E 1 688 813 957 1 E N 64 36 26 E
UNAUTHORIZED CHANGES & USES The engineer preparing these plans will not be responsible for or liable for unauthorized changes to or uses of these plans All changes to the plans must be in writing and must be approved by the preparer of these plans.
California Council of Civil Engineers & Land Surveyors
KSA Klagge Stevens & Associates Inc. Sorrento Mesa Design Center 9909 Huennekens Street Suite 110 San Diego California 92121-2928 (619) 455 5225
CONC BROW DITCH
GRADE TO DRAIN
CUTOFF WALL 2.0 MIN DEPTH 10 MIN TRIANGLE
NATURAL CHANNEL
FIN GRADE 239.5
FIN GRADE 235.0
FIN GRADE 234.5
36 RCP
REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA 12 31 89 11/27/89

APPENDIX II

FIELD EXPLORATION DATA

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-47860L
M. Fordham	12/30/08	12/30/08	N579825.785E1908420.610	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			479+10.102, -47.140, 11SD5A2	335.8 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Auger			CME 75	6 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			CME Auto Hammer, 140 lbs, 30-inch drop	82 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				56.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
335.8		0.0	SEDIMENTARY ROCK (Sandstone); medium to fine grained; massive; yellowish brown; intensely weathered; soft; unfractured.												
	1														
	2														
	3														
	4														
330.8	5	5.0				47									Samples collected for USCD
	6				1	22	58								
						36									
	7														
	8														
	9														
325.8	10	10.0				16									Samples collected for USCD
	11				2	28	66								
						38									
	12														
	13														
	14														
320.8	15	15.0				15									Samples collected for USCD
	16				3	27	63								
						36									
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: A-08-47860L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09		SHEET: 1 of 3

47860L-54170R BORING RECORD english template.xls - 47860L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
315.8		20.0				15									
					4	33	70								
	21					37									
	22														
	23														
	24														
310.8	25	25.0	SEDIMENTARY ROCK (Siltstone); fine grained; very thinly bedded; light gray; intensely weathered; moderately soft to soft.			NR									
					5	32	85								
	26					53									
	27														
	28														
	29														
305.8	30	30.0				10									
					6	19	61								
	31					42									
	32														
	33														
	34														
300.8	35	35.0	hard			10									
					7	50/5.5"	50/5.5"								
299.8	36	36.0	moderately soft to soft												
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-47860L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 2 of 3

47860L-54170R BORING RECORD english template.xls - 47860L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
295.8		40.0	hard			9									
295.2		40.6	moderately soft to soft		8	24	60								
	41					36									
	42														
	43														
	44														
	45					9									
	46				9	19	51								
						32									
	47														
	48														
	49														
	50					17									
	51				10	28	65								
						37									
	52														
	53														
	54														
	55					18									
	56				11	49	99/9"								
279.3		56.5				50/3"									
	57		Bottom of Borehole at 56.5 ft. Boring terminated at planned depth. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-47860L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	3 of 3

47860L-54170R BORING RECORD english template.xls - 47860L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: A-08-48000L
M. Fordham	12/30/08	12/30/08	N579893.831E1908425.534	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			479+78.314, -48.423, 11SD5A2	331.6 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Auger			CME 75	6 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			CME Auto Hammer, 140 lbs, 30-inch drop	82 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				56.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
331.6		0.0	SEDIMENTARY ROCK (Sandstone); medium to fine grained; massive; yellowish brown; intensely weathered; soft; unfractured.												
	1														
	2														
	3														
	4														
326.6	5	5.0				16									Samples collected for USCD
	6					37	93								
						56									
	7														
	8														
	9														
321.6	10	10.0				14									Samples collected for USCD
	11					34	83								
						49									
	12														
	13														
	14														
316.6	15	15.0				13									Samples collected for USCD
	16					30	77								
						47									
	17														
	18														
	19														
	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: A-08-48000L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09		SHEET: 1 of 3

47860L-54170R BORING RECORD english template.xls - 48000L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
311.6		20.0				NR									Samples collected for USCD, NR: Not Recorded.
						39	87								
	21					48									
	22														
	23														
	24														
306.6	25	25.0				27									
						52/5.5"	52/5.5"								
	26														
	27														
	28														
	29														
301.6	30	30.0	SEDIMENTARY ROCK (Siltstone); fine grained; very thinly bedded; light gray; Intensely weathered; moderately soft to soft.			15									
						30	80/10"								
	31					50/4"									
	32														
	33														
	34														
296.6	35	35.0	hard: Yellowish brown			28									
						30	80/11"								
	36					50/5"									
295.0		36.6	moderately soft to soft												
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48000L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 2 of 3

47860L-54170R BORING RECORD english template.xls - 48000L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
291.6		40.0				28									
						53/5.5"	53/5.5"								
	41														
	42														
	43														
	44														
286.6	45	45.0				10									
						24	74/10"								
	46					50/4"									
	47														
	48														
	49														
281.6	50	50.0	light gray			30									
						50/5"	50/5"								
	51														
	52														
	53														
	54														
276.6	55	55.0				19									
						50/5"	50/5"								
	56														Hole remained open after removal of augers.
275.1		56.5	Bottom of Borehole at 56.5 ft. Boring terminated 10 ft above planned depth because of consistency of material.												
	57		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: A-08-48000L

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	3 of 3

47860L-54170R BORING RECORD english template.xls - 48000L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-48260R
M. Fordham	07/29/08	07/29/08	N580162.050E1908430.085	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			482+45.836, -68.280, 11SD5A2 (metric)	279.5 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CS 2000	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				77.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
279.5		0.0	Clayey SAND (SC); yellowish brown; moist; medium to fine SAND; little fines; trace Shale fragements; [FILL].												
	1														
	2														
	3														
	4														
274.5	5	5.0	very dense	X		16									
						27	45								
	6					18									
	7														
	8														
	9														
269.5	10	10.0	dense; w/ fragments of Sandstone.	X		7									
						9	22								
	11					13									
	12														
	13														
	14														
264.5	15	15.0		X		5									
						6	14								
	16					8									
	17														
	18														
	19														
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-08-48260R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09	SHEET: 1 of 4	

47860L-54170R BORING RECORD english template.xls - 48260L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
259.5		20.0				3									
						4	12								
	21					8									
257.5	22	22.0	Silty SAND (SM); yellowish brown; moist; medium to fine SAND; some fines; trace Shale fragments.												
	23														
	24														
254.5	25	25.0	medium dense			7									
						11	23								
	26					12									
	27														
	28														
	29														
	30														
	31														
	32														
	33														
	34														
244.5	35	35.0	dense; w/ trace subrounded fine GRAVEL.			16									
						18	28								
	36					10									
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-48260R
DISTRICT: 11 | COUNTY: San Diego | ROUTE: 5 | POSTMILE(KP): R28.8/R55.3 | EA: 235800
PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na | PREPARED BY: M. Fordham | DATE: 10/20/09 | SHEET: 2 of 4

47860L-54170R BORING RECORD english template.xls - 48260L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
239.5		40.0				10									
						12	28								
	41					16									
	42														
	43														
	44														
234.5	45	45.0	dark brown			12									
						14	33								
	46					19									
	47														
	48														
	49														
229.5	50	50.0	medium Dense; yellowish brown.			10									
						9	17								
	51					8									
	52														
	53														
	54														
224.5	55	55.0	with coarse subrounded GRAVEL.			16									
						9	19								
	56					10									
	57														
	58														
	59														
	60														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-48260R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 3 of 4

47860L-54170R BORING RECORD english template.xls - 48260L

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
219.5		60.0	dense.			60									
						18	27								
	61					9									
	62														
	63														
	64														
214.5	65	65.0	SEDIMENTARY ROCK (Sandstone); medium to fine grained; massive; yellowish brown; intensely weathered; soft to very soft; unfractured.			31									
						41	91/7"								
	66					50/1"									
	67														
	68														
	69														
209.5	70	70.0				20									
						32	72								
	71					40									
	72														
	73														
	74														
204.5	75	75.0				7									
						23	65								
	76					42									
202.5	77	77.0	Bottom of Borehole at 77.0 ft. Boring terminated 3ft above target depth of 80 ft. because of site time constraints. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	78														
	79														
	80														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-08-48260R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	4 of 4

47860L-54170R BORING RECORD english template.xls - 48260L

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

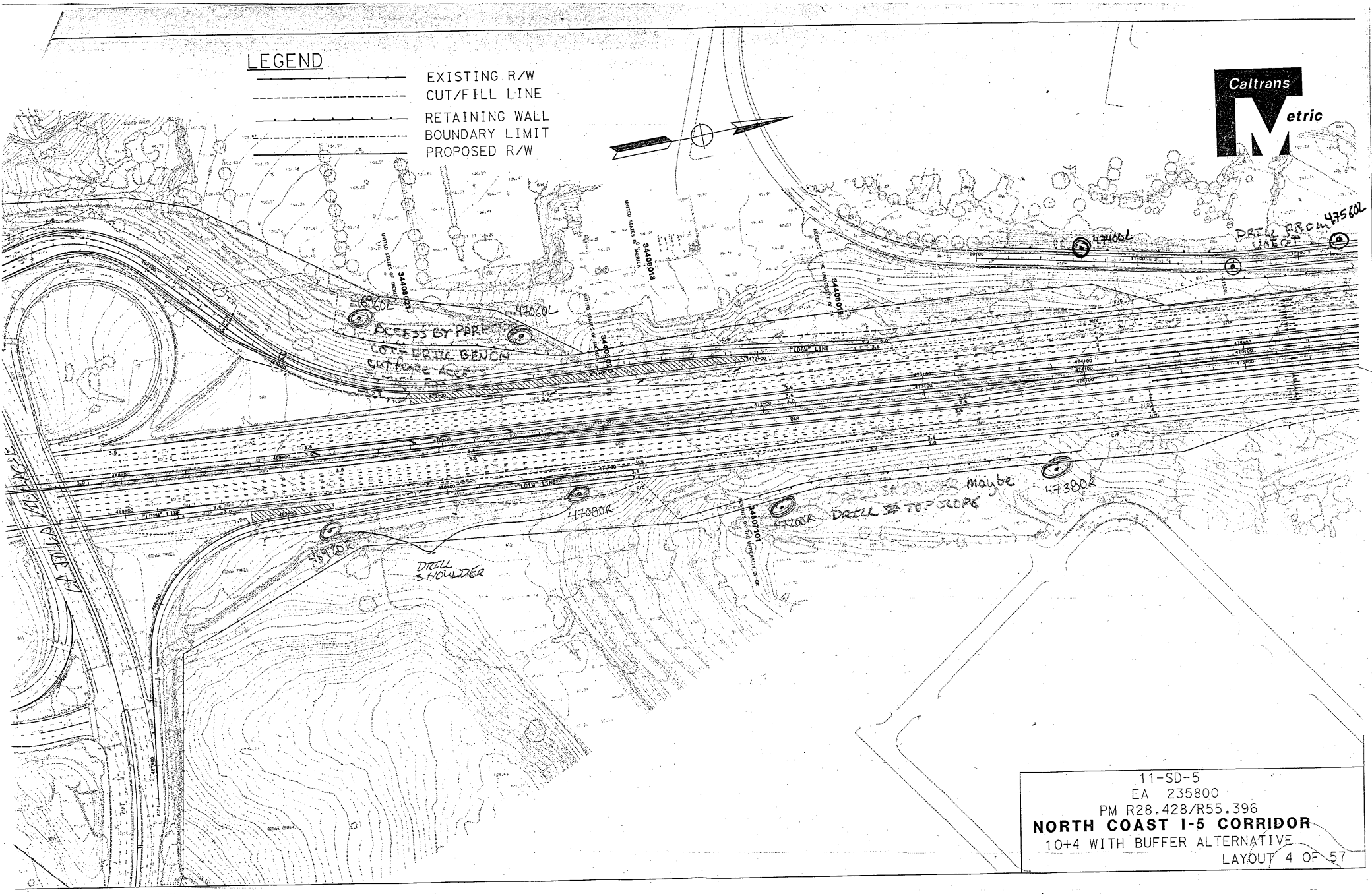
Approved by (Project Engineer or above)

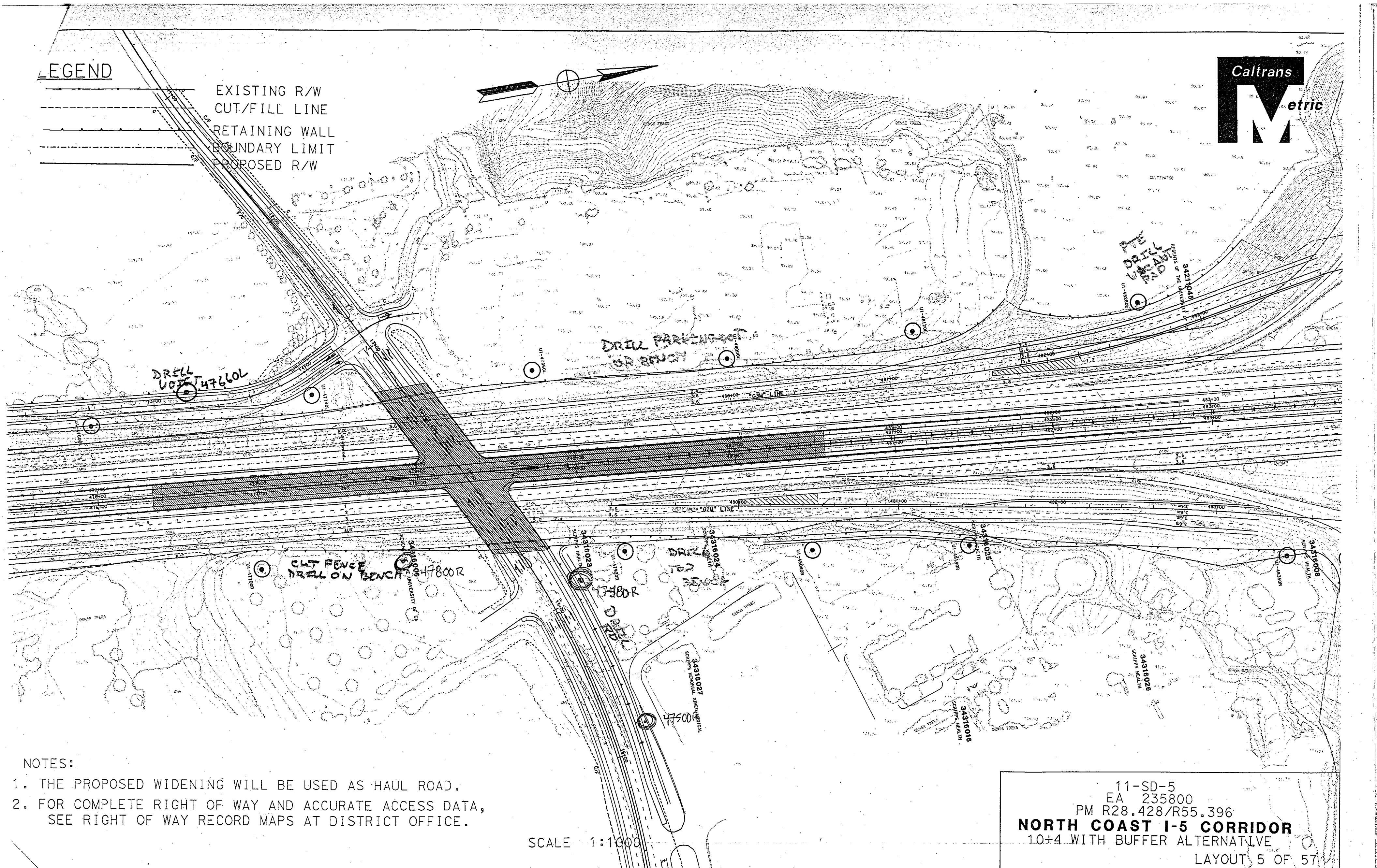
FOR SURVEYS USE ONLY

Date Received: WBS Codes:

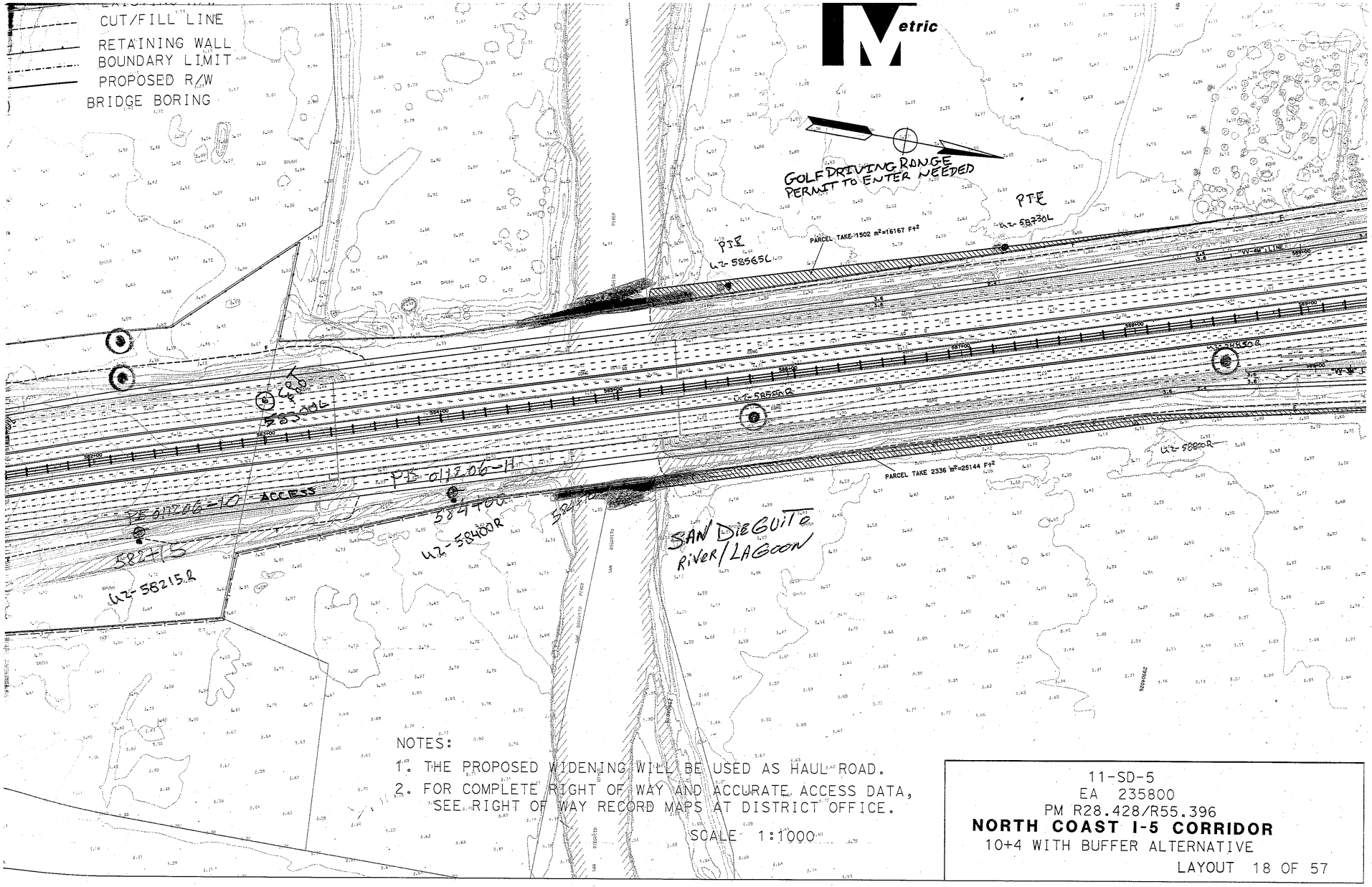
Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

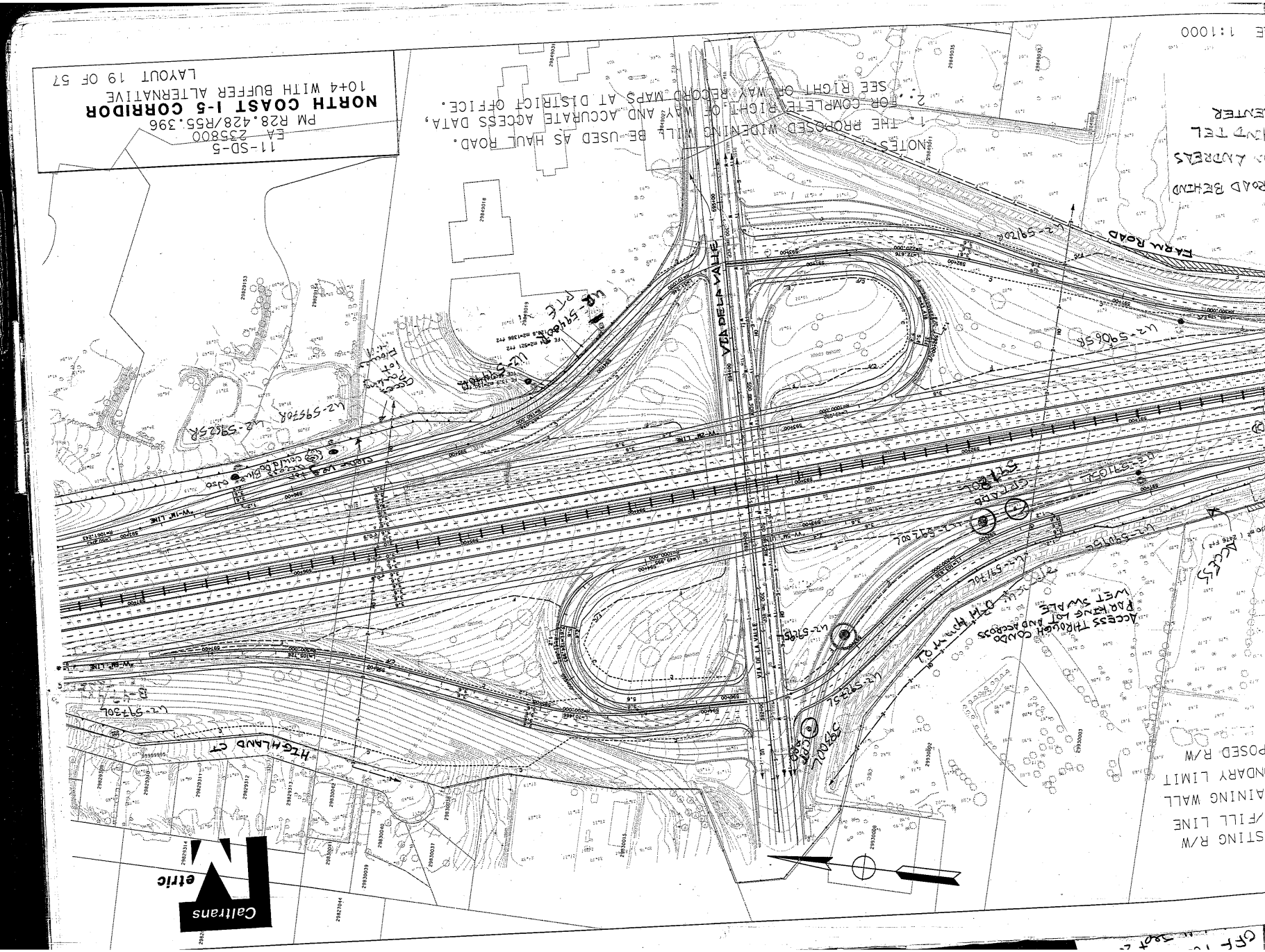
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47080R
47200R
DRILL SHOULDER
maybe
DRILL TOP SLOPE
47380R
47080R
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57



LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
DRILL PARKING LOT OR BENCH
DRILL LOT 47660L
CUT FENCE DRILL ON BENCH 47800R
47580R
DRILL TOP BENCH
47500
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 5 OF 57


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57



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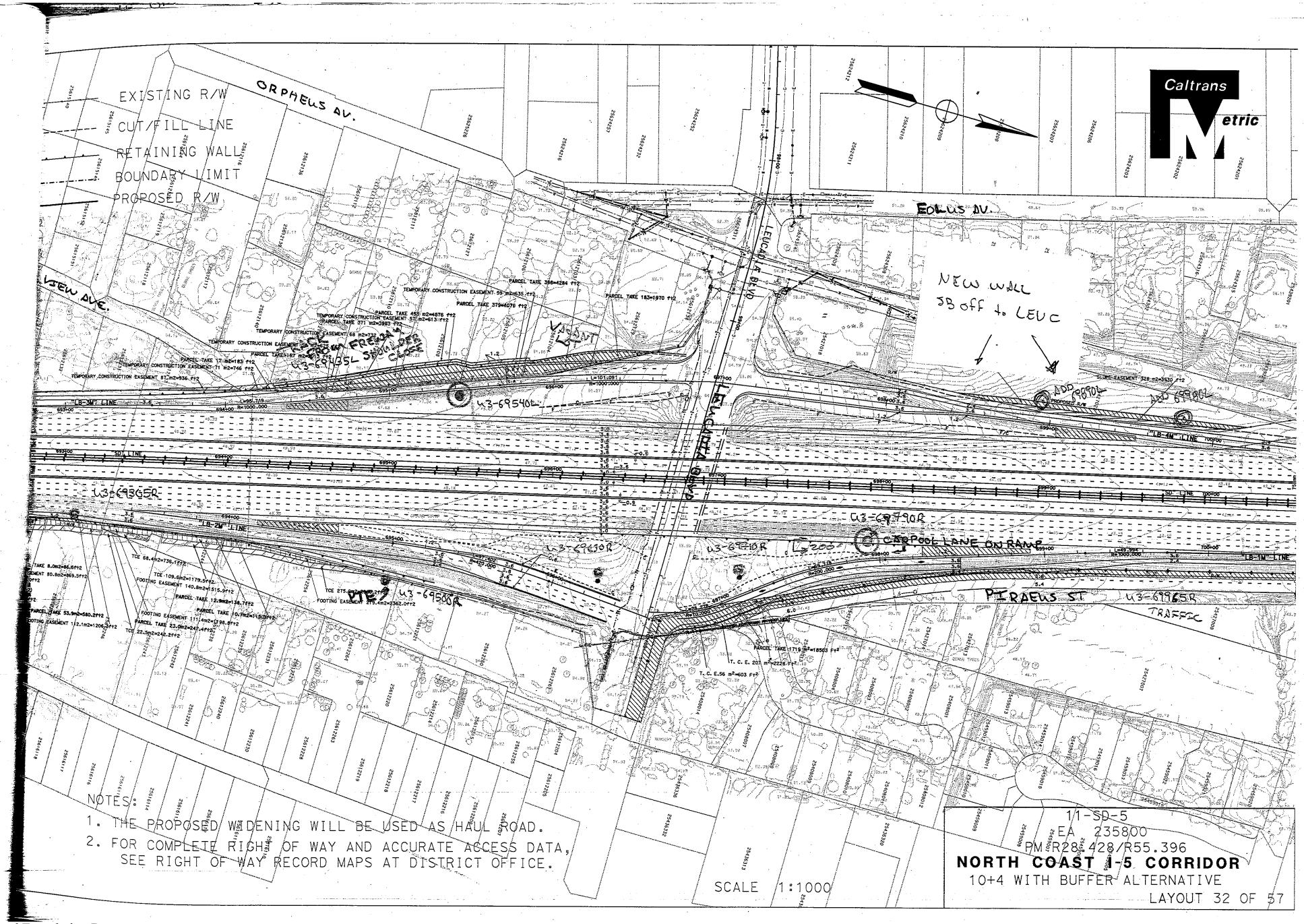
www.under-wraps.com


Caltrans
Metric
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEUCADIA BLVD.
NEW WALL
SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS BUCKETS, ____ PLASTIC BAGS, ____ SHELBY TUBES, ____ BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	JO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11-479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+60 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER 0.11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	5.3	5300
20	1k	2.1	2100
20	1k	1.6	1600
20	1k	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SO

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 7/18/2008

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-022330
GL 08-070

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 1/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 2/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 12/19/2008

To: Mike Fordham / GDS-2

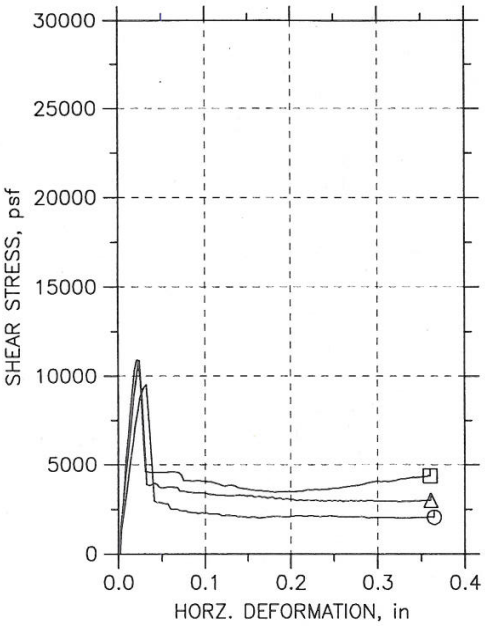
From: Lilibeth C. Purta / (916) 227-5434

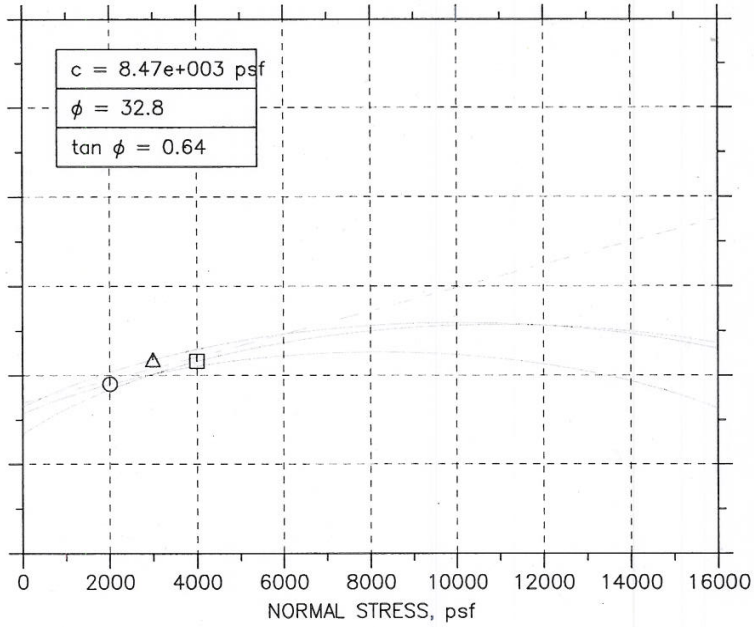
RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

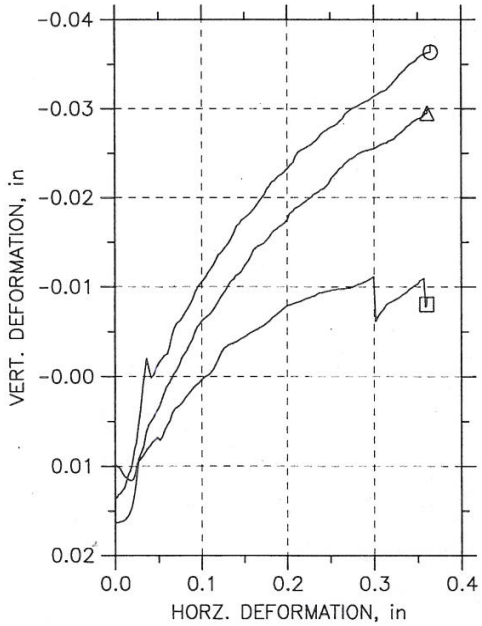
Partial test results.

AASHTO R18

DIRECT SHEAR TEST REPORT



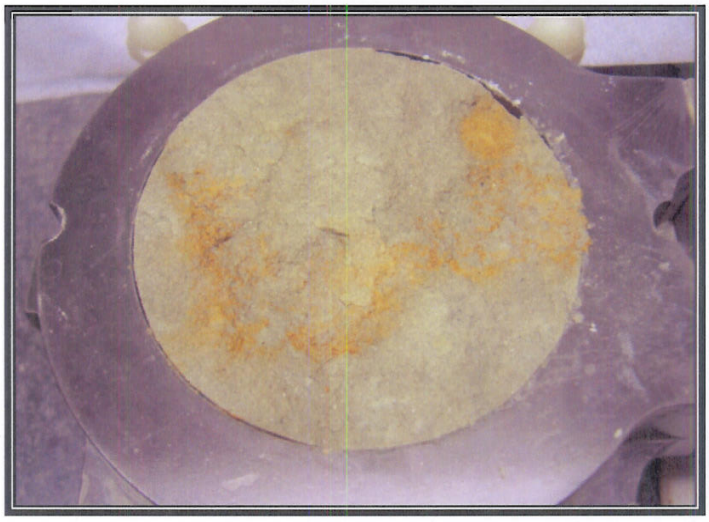




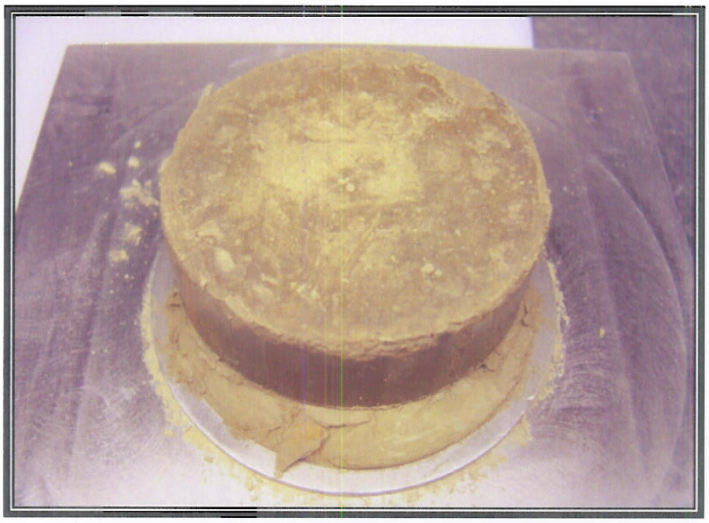
	Symbol	⊙	△	⊡
	Test No.	DS08082A	DS08082B	DS08082C
	Sample No.	4	4	4
	Shape	Circular	Circular	Circular
Initial	Dimension, in	2.37	2.37	2.37
Initial	Area, in^2	4.4115	4.4115	4.4115
Initial	Height, in	1	1	1
Initial	Water Content, %	16.05	17.70	20.80
Initial	Dry Density, pcf	107.08	109.76	105.44
Initial	Saturation, %	73.16	86.29	91.07
Initial	Void Ratio	0.60324	0.56414	0.62819
	Consol. Height, in	0.98676	0.9837	0.99073
	Consol. Void Ratio	0.58201	0.53863	0.6131
Final	Water Content, %	21.61	20.14	22.11
Final	Dry Density, pcf	103.33	106.62	104.6
Final	Saturation, %	89.85	90.77	94.83
Final	Void Ratio	0.66149	0.61022	0.64126
	Normal Stress, psf	2016.4	3000.8	4003.7
	Max. Shear Stress, psf	9518.7	10902	10804
	Ult. Shear Stress, psf	2036.2	2996.2	4359.8
	Time to Failure, min	14.001	11.002	11.002
	Disp. Rate, in/min	0.003	0.003	0.003
	Implied Specific Gravity	2.75	2.75	2.75
	Liquid Limit	0	0	0
	Plastic Limit	0	0	0
	Plasticity Index	0	0	0

Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.	
Remarks: ASTM D3080	WP 12/12

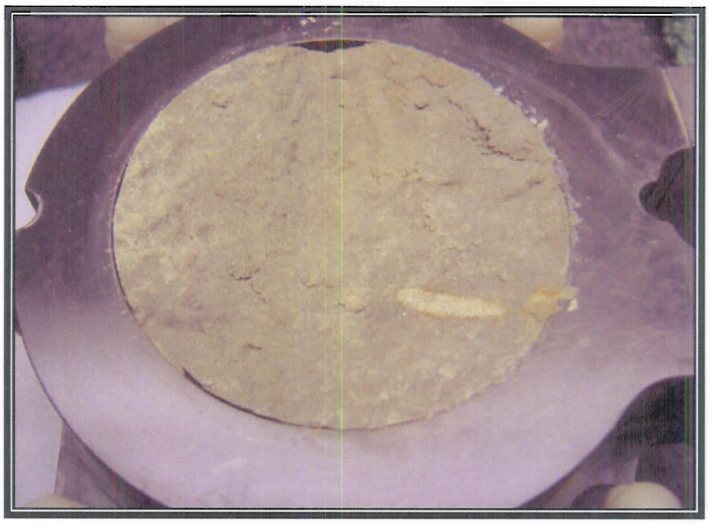
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B



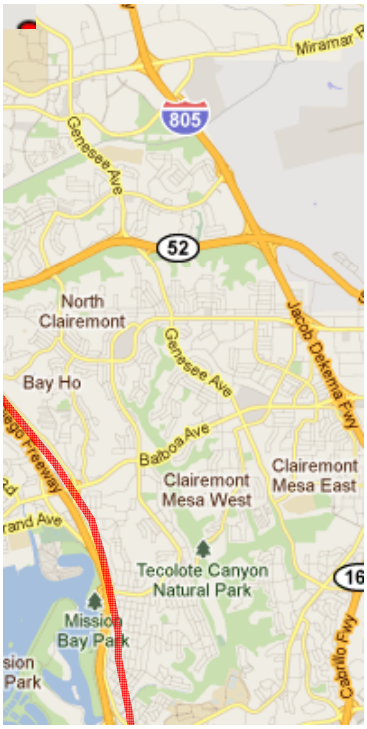
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



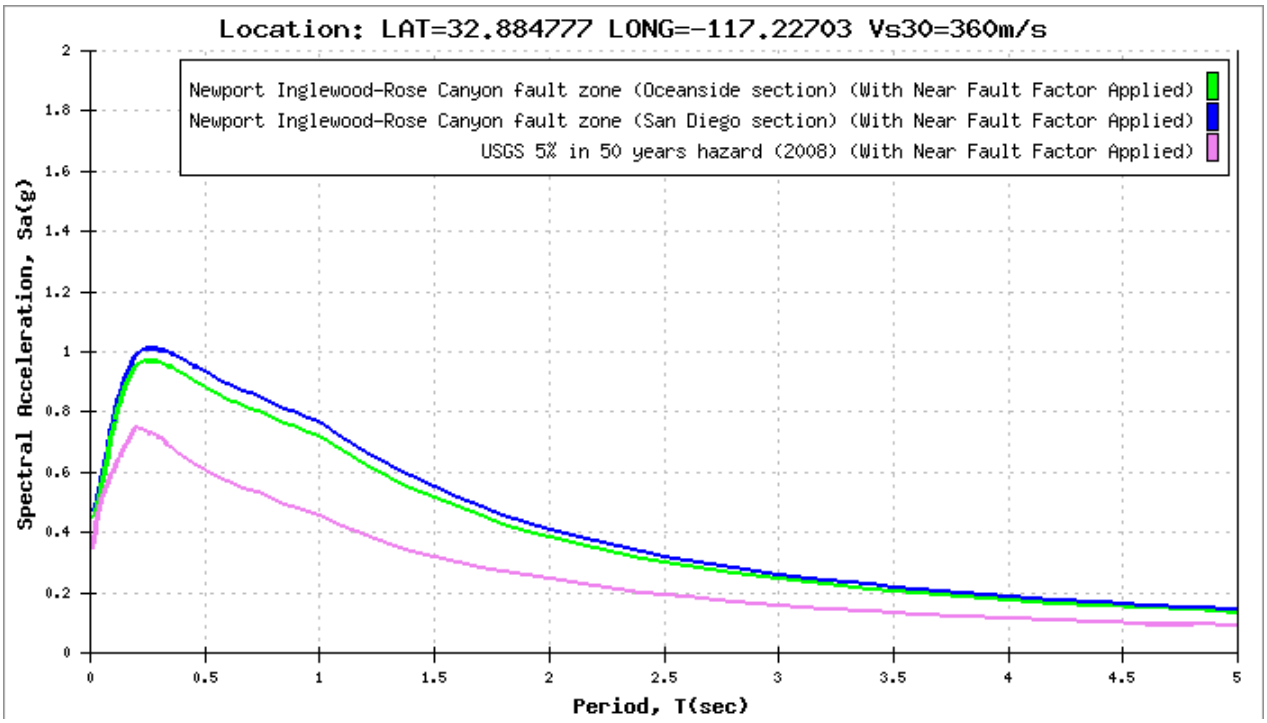
APPENDIX IV

ANALYSES & CALCULATIONS

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	360 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	264 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.460	1.000	1.000	0.460
0.022	0.465	1.000	1.000	0.465
0.025	0.473	1.000	1.000	0.473
0.029	0.483	1.000	1.000	0.483
0.03	0.486	1.000	1.000	0.486
0.032	0.493	1.000	1.000	0.493
0.035	0.503	1.000	1.000	0.503
0.036	0.507	1.000	1.000	0.507
0.04	0.521	1.000	1.000	0.521
0.042	0.528	1.000	1.000	0.528
0.044	0.535	1.000	1.000	0.535
0.045	0.539	1.000	1.000	0.539
0.046	0.543	1.000	1.000	0.543
0.048	0.550	1.000	1.000	0.550
0.05	0.557	1.000	1.000	0.557
0.055	0.577	1.000	1.000	0.577
0.06	0.596	1.000	1.000	0.596

0.065	0.615	1.000	1.000	0.615
0.067	0.623	1.000	1.000	0.623
0.07	0.634	1.000	1.000	0.634
0.075	0.653	1.000	1.000	0.653
0.08	0.672	1.000	1.000	0.672
0.085	0.692	1.000	1.000	0.692
0.09	0.711	1.000	1.000	0.711
0.095	0.730	1.000	1.000	0.730
0.1	0.748	1.000	1.000	0.748
0.11	0.780	1.000	1.000	0.780
0.12	0.810	1.000	1.000	0.810
0.13	0.837	1.000	1.000	0.837
0.133	0.844	1.000	1.000	0.844
0.14	0.859	1.000	1.000	0.859
0.15	0.879	1.000	1.000	0.879
0.16	0.898	1.000	1.000	0.898
0.17	0.915	1.000	1.000	0.915
0.18	0.930	1.000	1.000	0.930
0.19	0.943	1.000	1.000	0.943
0.2	0.955	1.000	1.000	0.955
0.22	0.964	1.000	1.000	0.964
0.24	0.971	1.000	1.000	0.971
0.25	0.973	1.000	1.000	0.973
0.26	0.972	1.000	1.000	0.972
0.28	0.971	1.000	1.000	0.971
0.29	0.968	1.000	1.000	0.968
0.3	0.966	1.000	1.000	0.966
0.32	0.960	1.000	1.000	0.960
0.34	0.953	1.000	1.000	0.953
0.35	0.949	1.000	1.000	0.949
0.36	0.945	1.000	1.000	0.945
0.38	0.936	1.000	1.000	0.936
0.4	0.926	1.000	1.000	0.926
0.42	0.918	1.000	1.000	0.918
0.44	0.909	1.000	1.000	0.909
0.45	0.904	1.000	1.000	0.904
0.46	0.900	1.000	1.000	0.900
0.48	0.891	1.000	1.000	0.891
0.5	0.882	1.000	1.000	0.882
0.55	0.843	1.000	1.020	0.860
0.6	0.808	1.000	1.040	0.841
0.65	0.777	1.000	1.060	0.823
0.667	0.767	1.000	1.067	0.818
0.7	0.748	1.000	1.080	0.808
0.75	0.722	1.000	1.100	0.794
0.8	0.693	1.000	1.120	0.777

0.85	0.667	1.000	1.140	0.761
0.9	0.643	1.000	1.160	0.746
0.95	0.620	1.000	1.180	0.732
1	0.599	1.000	1.200	0.719
1.1	0.557	1.000	1.200	0.668
1.2	0.520	1.000	1.200	0.624
1.3	0.486	1.000	1.200	0.583
1.4	0.456	1.000	1.200	0.547
1.5	0.429	1.000	1.200	0.514
1.6	0.402	1.000	1.200	0.482
1.7	0.378	1.000	1.200	0.453
1.8	0.356	1.000	1.200	0.427
1.9	0.337	1.000	1.200	0.404
2	0.319	1.000	1.200	0.383
2.2	0.287	1.000	1.200	0.344
2.4	0.260	1.000	1.200	0.312
2.5	0.249	1.000	1.200	0.298
2.6	0.238	1.000	1.200	0.286
2.8	0.219	1.000	1.200	0.263
3	0.202	1.000	1.200	0.243
3.2	0.188	1.000	1.200	0.225
3.4	0.175	1.000	1.200	0.210
3.5	0.169	1.000	1.200	0.203
3.6	0.164	1.000	1.200	0.197
3.8	0.154	1.000	1.200	0.184
4	0.145	1.000	1.200	0.174
4.2	0.137	1.000	1.200	0.164
4.4	0.130	1.000	1.200	0.156
4.6	0.123	1.000	1.200	0.148
4.8	0.118	1.000	1.200	0.141
5	0.112	1.000	1.200	0.135

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.473	1.000	1.000	0.473
0.02	0.481	1.000	1.000	0.481
0.022	0.487	1.000	1.000	0.487
0.025	0.495	1.000	1.000	0.495
0.029	0.506	1.000	1.000	0.506
0.03	0.508	1.000	1.000	0.508
0.032	0.516	1.000	1.000	0.516
0.035	0.527	1.000	1.000	0.527
0.036	0.530	1.000	1.000	0.530
0.04	0.545	1.000	1.000	0.545
0.042	0.552	1.000	1.000	0.552
0.044	0.560	1.000	1.000	0.560
0.045	0.563	1.000	1.000	0.563
0.046	0.567	1.000	1.000	0.567
0.048	0.575	1.000	1.000	0.575
0.05	0.582	1.000	1.000	0.582
0.055	0.601	1.000	1.000	0.601
0.06	0.621	1.000	1.000	0.621
0.065	0.640	1.000	1.000	0.640
0.067	0.648	1.000	1.000	0.648
0.07	0.659	1.000	1.000	0.659
0.075	0.678	1.000	1.000	0.678
0.08	0.697	1.000	1.000	0.697
0.085	0.717	1.000	1.000	0.717
0.09	0.736	1.000	1.000	0.736
0.095	0.755	1.000	1.000	0.755
0.1	0.773	1.000	1.000	0.773
0.11	0.806	1.000	1.000	0.806
0.12	0.837	1.000	1.000	0.837
0.13	0.864	1.000	1.000	0.864
0.133	0.871	1.000	1.000	0.871
0.14	0.887	1.000	1.000	0.887
0.15	0.907	1.000	1.000	0.907
0.16	0.928	1.000	1.000	0.928
0.17	0.945	1.000	1.000	0.945
0.18	0.962	1.000	1.000	0.962
0.19	0.976	1.000	1.000	0.976
0.2	0.989	1.000	1.000	0.989
0.22	1.001	1.000	1.000	1.001
0.24	1.010	1.000	1.000	1.010
0.25	1.013	1.000	1.000	1.013
0.26	1.012	1.000	1.000	1.012
0.28	1.012	1.000	1.000	1.012

0.29	1.011	1.000	1.000	1.011
0.3	1.009	1.000	1.000	1.009
0.32	1.005	1.000	1.000	1.005
0.34	0.999	1.000	1.000	0.999
0.35	0.995	1.000	1.000	0.995
0.36	0.991	1.000	1.000	0.991
0.38	0.983	1.000	1.000	0.983
0.4	0.974	1.000	1.000	0.974
0.42	0.966	1.000	1.000	0.966
0.44	0.957	1.000	1.000	0.957
0.45	0.953	1.000	1.000	0.953
0.46	0.949	1.000	1.000	0.949
0.48	0.940	1.000	1.000	0.940
0.5	0.932	1.000	1.000	0.932
0.55	0.893	1.000	1.020	0.911
0.6	0.857	1.000	1.040	0.892
0.65	0.825	1.000	1.060	0.875
0.667	0.815	1.000	1.067	0.870
0.7	0.796	1.000	1.080	0.860
0.75	0.769	1.000	1.100	0.846
0.8	0.739	1.000	1.120	0.828
0.85	0.712	1.000	1.140	0.811
0.9	0.686	1.000	1.160	0.795
0.95	0.662	1.000	1.180	0.781
1	0.639	1.000	1.200	0.767
1.1	0.594	1.000	1.200	0.713
1.2	0.555	1.000	1.200	0.666
1.3	0.519	1.000	1.200	0.623
1.4	0.487	1.000	1.200	0.585
1.5	0.458	1.000	1.200	0.550
1.6	0.430	1.000	1.200	0.516
1.7	0.404	1.000	1.200	0.485
1.8	0.381	1.000	1.200	0.457
1.9	0.360	1.000	1.200	0.432
2	0.341	1.000	1.200	0.410
2.2	0.307	1.000	1.200	0.368
2.4	0.279	1.000	1.200	0.334
2.5	0.266	1.000	1.200	0.319
2.6	0.255	1.000	1.200	0.306
2.8	0.234	1.000	1.200	0.281
3	0.216	1.000	1.200	0.260
3.2	0.201	1.000	1.200	0.241
3.4	0.187	1.000	1.200	0.225
3.5	0.181	1.000	1.200	0.217
3.6	0.175	1.000	1.200	0.210
3.8	0.164	1.000	1.200	0.197

4	0.155	1.000	1.200	0.186
4.2	0.147	1.000	1.200	0.176
4.4	0.139	1.000	1.200	0.167
4.6	0.132	1.000	1.200	0.159
4.8	0.126	1.000	1.200	0.151
5	0.120	1.000	1.200	0.144

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.347	1.000	1.000	0.347
0.02	0.410	1.000	1.000	0.410
0.022	0.419	1.000	1.000	0.419
0.025	0.433	1.000	1.000	0.433
0.029	0.448	1.000	1.000	0.448
0.03	0.452	1.000	1.000	0.452
0.032	0.459	1.000	1.000	0.459
0.035	0.469	1.000	1.000	0.469
0.036	0.472	1.000	1.000	0.472
0.04	0.485	1.000	1.000	0.485
0.042	0.490	1.000	1.000	0.490
0.044	0.496	1.000	1.000	0.496
0.045	0.499	1.000	1.000	0.499
0.046	0.501	1.000	1.000	0.501
0.048	0.507	1.000	1.000	0.507
0.05	0.512	1.000	1.000	0.512
0.055	0.524	1.000	1.000	0.524
0.06	0.535	1.000	1.000	0.535
0.065	0.545	1.000	1.000	0.545
0.067	0.549	1.000	1.000	0.549
0.07	0.555	1.000	1.000	0.555
0.075	0.564	1.000	1.000	0.564
0.08	0.573	1.000	1.000	0.573
0.085	0.582	1.000	1.000	0.582
0.09	0.590	1.000	1.000	0.590
0.095	0.598	1.000	1.000	0.598
0.1	0.605	1.000	1.000	0.605
0.11	0.623	1.000	1.000	0.623
0.12	0.639	1.000	1.000	0.639
0.13	0.655	1.000	1.000	0.655
0.133	0.659	1.000	1.000	0.659

0.14	0.670	1.000	1.000	0.670
0.15	0.684	1.000	1.000	0.684
0.16	0.697	1.000	1.000	0.697
0.17	0.710	1.000	1.000	0.710
0.18	0.723	1.000	1.000	0.723
0.19	0.735	1.000	1.000	0.735
0.2	0.746	1.000	1.000	0.746
0.22	0.740	1.000	1.000	0.740
0.24	0.734	1.000	1.000	0.734
0.25	0.731	1.000	1.000	0.731
0.26	0.728	1.000	1.000	0.728
0.28	0.724	1.000	1.000	0.724
0.29	0.721	1.000	1.000	0.721
0.3	0.719	1.000	1.000	0.719
0.32	0.704	1.000	1.000	0.704
0.34	0.690	1.000	1.000	0.690
0.35	0.683	1.000	1.000	0.683
0.36	0.677	1.000	1.000	0.677
0.38	0.664	1.000	1.000	0.664
0.4	0.653	1.000	1.000	0.653
0.42	0.643	1.000	1.000	0.643
0.44	0.633	1.000	1.000	0.633
0.45	0.628	1.000	1.000	0.628
0.46	0.623	1.000	1.000	0.623
0.48	0.615	1.000	1.000	0.615
0.5	0.606	1.000	1.000	0.606
0.55	0.573	1.000	1.020	0.584
0.6	0.544	1.000	1.040	0.566
0.65	0.519	1.000	1.060	0.550
0.667	0.511	1.000	1.067	0.545
0.7	0.497	1.000	1.080	0.536
0.75	0.477	1.000	1.100	0.524
0.8	0.454	1.000	1.120	0.508
0.85	0.433	1.000	1.140	0.493
0.9	0.414	1.000	1.160	0.480
0.95	0.397	1.000	1.180	0.469
1	0.382	1.000	1.200	0.458
1.1	0.350	1.000	1.200	0.420
1.2	0.323	1.000	1.200	0.388
1.3	0.301	1.000	1.200	0.361
1.4	0.281	1.000	1.200	0.337
1.5	0.264	1.000	1.200	0.317
1.6	0.249	1.000	1.200	0.299
1.7	0.236	1.000	1.200	0.283
1.8	0.224	1.000	1.200	0.268
1.9	0.213	1.000	1.200	0.255

2	0.203	1.000	1.200	0.244
2.2	0.183	1.000	1.200	0.220
2.4	0.167	1.000	1.200	0.200
2.5	0.159	1.000	1.200	0.191
2.6	0.153	1.000	1.200	0.183
2.8	0.141	1.000	1.200	0.169
3	0.130	1.000	1.200	0.157
3.2	0.121	1.000	1.200	0.145
3.4	0.113	1.000	1.200	0.135
3.5	0.109	1.000	1.200	0.131
3.6	0.105	1.000	1.200	0.126
3.8	0.099	1.000	1.200	0.119
4	0.093	1.000	1.200	0.112
4.2	0.089	1.000	1.200	0.107
4.4	0.085	1.000	1.200	0.102
4.6	0.082	1.000	1.200	0.098
4.8	0.079	1.000	1.200	0.094
5	0.076	1.000	1.200	0.091

Envelope Data

Period	SA
0.01	0.451
0.02	0.460
0.022	0.465
0.025	0.473
0.029	0.483
0.03	0.486
0.032	0.493
0.035	0.503
0.036	0.507
0.04	0.521
0.042	0.528
0.044	0.535
0.045	0.539
0.046	0.543
0.048	0.550
0.05	0.557
0.055	0.577
0.06	0.596
0.065	0.615
0.067	0.623
0.07	0.634
0.075	0.653

0.08	0.672
0.085	0.692
0.09	0.711
0.095	0.730
0.1	0.748
0.11	0.780
0.12	0.810
0.13	0.837
0.133	0.844
0.14	0.859
0.15	0.879
0.16	0.898
0.17	0.915
0.18	0.930
0.19	0.943
0.2	0.955
0.22	0.964
0.24	0.971
0.25	0.973
0.26	0.972
0.28	0.971
0.29	0.968
0.3	0.966
0.32	0.960
0.34	0.953
0.35	0.949
0.36	0.945
0.38	0.936
0.4	0.926
0.42	0.918
0.44	0.909
0.45	0.904
0.46	0.900
0.48	0.891
0.5	0.882
0.55	0.860
0.6	0.841
0.65	0.823
0.667	0.818
0.7	0.808
0.75	0.794
0.8	0.777
0.85	0.761
0.9	0.746
0.95	0.732
1	0.719

1.1	0.668
1.2	0.624
1.3	0.583
1.4	0.547
1.5	0.514
1.6	0.482
1.7	0.453
1.8	0.427
1.9	0.404
2	0.383
2.2	0.344
2.4	0.312
2.5	0.298
2.6	0.286
2.8	0.263
3	0.243
3.2	0.225
3.4	0.210
3.5	0.203
3.6	0.197
3.8	0.184
4	0.174
4.2	0.164
4.4	0.156
4.6	0.148
4.8	0.141
5	0.135

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} *(km)*	0	

Distance

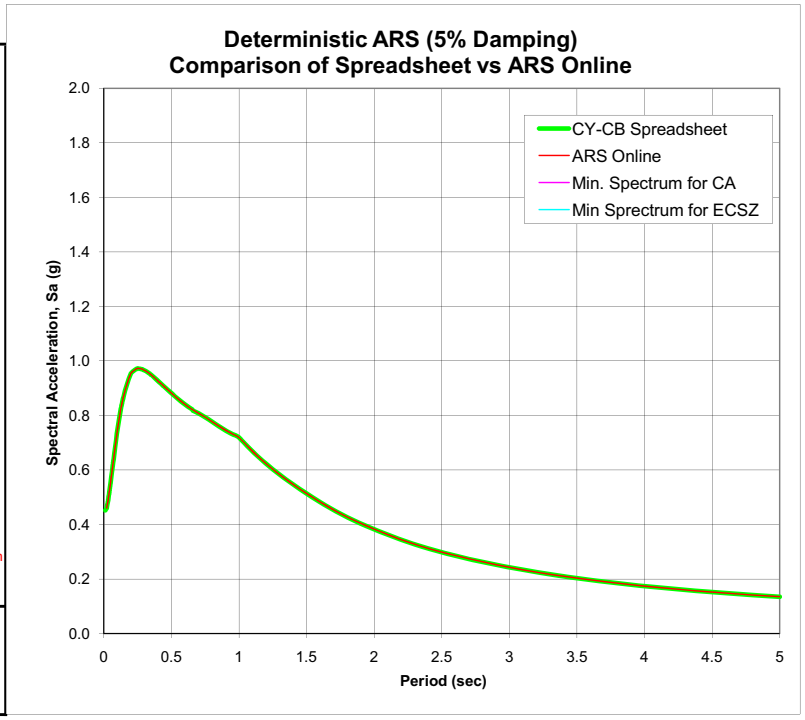
R_{RUP} *(km)*	4.2	
R_{JB} *(km)*	4.2	
R_x *(km)*	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} *(m/sec)*	360	(270 to 1500 m/s)
$Z_{1.0}$ *(m)*	264	(0 - No Basin)
$Z_{2.5}$ *(km)*	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45139
0.020	0.45947
0.022	0.46490
0.025	0.47294
0.029	0.48278
0.030	0.48562
0.032	0.49264
0.035	0.50314
0.036	0.50673
0.040	0.52058
0.042	0.52790
0.044	0.53500
0.045	0.53880
0.046	0.54250
0.048	0.54974
0.050	0.55711
0.055	0.57641
0.060	0.59603
0.065	0.61508
0.067	0.62288
0.070	0.63405
0.075	0.65285
0.080	0.67234
0.085	0.69186
0.090	0.71071
0.095	0.72940
0.100	0.74759
0.110	0.78037
0.120	0.81031
0.130	0.83671
0.133	0.84361
0.140	0.85907
0.150	0.87910
0.160	0.89809
0.170	0.91439

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.46	1	1	0.46	0%
0.022	0.465	1	1	0.465	0%
0.025	0.473	1	1	0.473	0%
0.029	0.483	1	1	0.483	0%
0.03	0.486	1	1	0.486	0%
0.032	0.493	1	1	0.493	0%
0.035	0.503	1	1	0.503	0%
0.036	0.507	1	1	0.507	0%
0.04	0.521	1	1	0.521	0%
0.042	0.528	1	1	0.528	0%
0.044	0.535	1	1	0.535	0%
0.045	0.539	1	1	0.539	0%
0.046	0.543	1	1	0.543	0%
0.048	0.55	1	1	0.55	0%
0.05	0.557	1	1	0.557	0%
0.055	0.577	1	1	0.577	0%
0.06	0.596	1	1	0.596	0%
0.065	0.615	1	1	0.615	0%
0.067	0.623	1	1	0.623	0%
0.07	0.634	1	1	0.634	0%
0.075	0.653	1	1	0.653	0%
0.08	0.672	1	1	0.672	0%
0.085	0.692	1	1	0.692	0%
0.09	0.711	1	1	0.711	0%
0.095	0.73	1	1	0.73	0%
0.1	0.748	1	1	0.748	0%
0.11	0.78	1	1	0.78	0%
0.12	0.81	1	1	0.81	0%
0.13	0.837	1	1	0.837	0%
0.133	0.844	1	1	0.844	0%
0.14	0.859	1	1	0.859	0%
0.15	0.879	1	1	0.879	0%
0.16	0.898	1	1	0.898	0%
0.17	0.915	1	1	0.915	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

Deterministic_Response_Spectrum_072809.xls 9/19/2011 10:51 AM

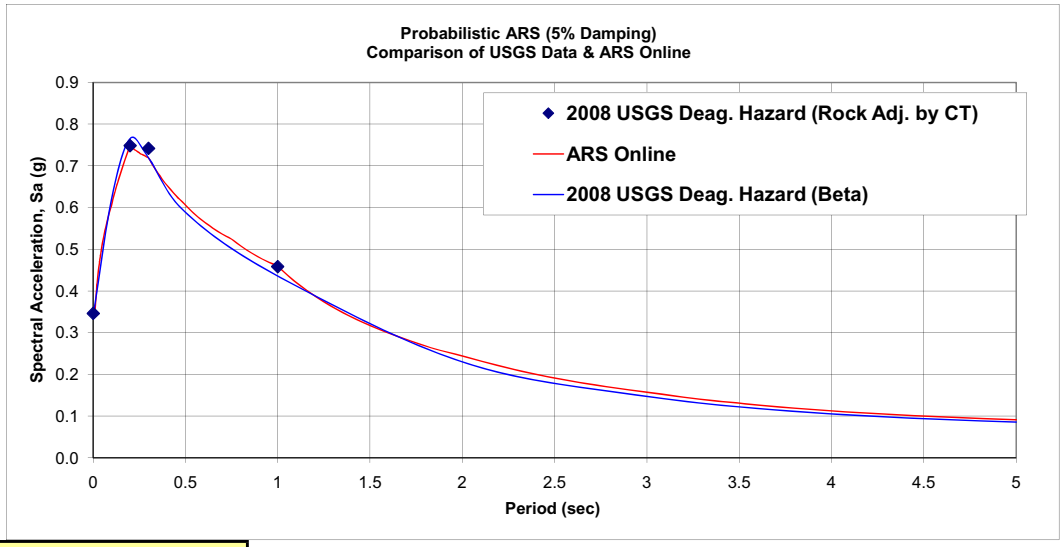
0.180	0.92942
0.190	0.94265
0.200	0.95443
0.220	0.96409
0.240	0.97074
0.250	0.97261
0.260	0.97171
0.280	0.97033
0.290	0.96791
0.300	0.96562
0.320	0.96013
0.340	0.95309
0.350	0.94896
0.360	0.94494
0.380	0.93573
0.400	0.92617
0.420	0.91759
0.440	0.90828
0.450	0.90398
0.460	0.89951
0.480	0.89025
0.500	0.88172
0.550	0.85945
0.600	0.84028
0.650	0.82311
0.660	0.81721
0.700	0.80777
0.750	0.79391
0.800	0.77635
0.850	0.76043
0.900	0.74535
0.950	0.73161
1.000	0.71844
1.100	0.66744
1.200	0.62274
1.300	0.58253
1.400	0.54648
1.500	0.51357
1.600	0.48149
1.700	0.45257
1.800	0.42652
1.900	0.40307
2.000	0.38213
2.200	0.34354
2.400	0.31177
2.500	0.29779
2.600	0.28492
2.800	0.26192
3.000	0.24206
3.200	0.22481
3.400	0.20959
3.500	0.20264
3.600	0.19608
3.800	0.18399
4.000	0.17319
4.200	0.16400
4.400	0.15555
4.600	0.14783
4.800	0.14078
5.000	0.13425

0.18	0.93	1	1	0.93	0%
0.19	0.943	1	1	0.943	0%
0.2	0.955	1	1	0.955	0%
0.22	0.964	1	1	0.964	0%
0.24	0.971	1	1	0.971	0%
0.25	0.973	1	1	0.973	0%
0.26	0.972	1	1	0.972	0%
0.28	0.971	1	1	0.971	0%
0.29	0.968	1	1	0.968	0%
0.3	0.966	1	1	0.966	0%
0.32	0.96	1	1	0.96	0%
0.34	0.953	1	1	0.953	0%
0.35	0.949	1	1	0.949	0%
0.36	0.945	1	1	0.945	0%
0.38	0.936	1	1	0.936	0%
0.4	0.926	1	1	0.926	0%
0.42	0.918	1	1	0.918	0%
0.44	0.909	1	1	0.909	0%
0.45	0.904	1	1	0.904	0%
0.46	0.9	1	1	0.9	0%
0.48	0.891	1	1	0.891	0%
0.5	0.882	1	1	0.882	0%
0.55	0.843	1	1.02	0.86	0%
0.6	0.808	1	1.04	0.841	0%
0.65	0.777	1	1.06	0.823	0%
0.667	0.767	1	1.067	0.818	0%
0.7	0.748	1	1.08	0.808	0%
0.75	0.722	1	1.1	0.794	0%
0.8	0.693	1	1.12	0.777	0%
0.85	0.667	1	1.14	0.761	0%
0.9	0.643	1	1.16	0.746	0%
0.95	0.62	1	1.18	0.732	0%
1	0.599	1	1.2	0.719	0%
1.1	0.557	1	1.2	0.668	0%
1.2	0.52	1	1.2	0.624	0%
1.3	0.486	1	1.2	0.583	0%
1.4	0.456	1	1.2	0.547	0%
1.5	0.429	1	1.2	0.514	0%
1.6	0.402	1	1.2	0.482	0%
1.7	0.378	1	1.2	0.453	0%
1.8	0.356	1	1.2	0.427	0%
1.9	0.337	1	1.2	0.404	0%
2	0.319	1	1.2	0.383	0%
2.2	0.287	1	1.2	0.344	0%
2.4	0.26	1	1.2	0.312	0%
2.5	0.249	1	1.2	0.298	0%
2.6	0.238	1	1.2	0.286	0%
2.8	0.219	1	1.2	0.263	0%
3	0.202	1	1.2	0.243	0%
3.2	0.188	1	1.2	0.225	0%
3.4	0.175	1	1.2	0.21	0%
3.5	0.169	1	1.2	0.203	0%
3.6	0.164	1	1.2	0.197	0%
3.8	0.154	1	1.2	0.184	0%
4	0.145	1	1.2	0.174	0%
4.2	0.137	1	1.2	0.164	0%
4.4	0.13	1	1.2	0.156	0%
4.6	0.123	1	1.2	0.148	0%
4.8	0.118	1	1.2	0.141	0%
5	0.112	1	1.2	0.135	1%

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	360
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.1
$Z_{1.0}$ (m) =	264
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.347	1	1	0.347
0.02	0.41	1	1	0.41
0.022	0.419	1	1	0.419
0.025	0.433	1	1	0.433
0.029	0.448	1	1	0.448
0.03	0.452	1	1	0.452
0.032	0.459	1	1	0.459
0.035	0.469	1	1	0.469
0.036	0.472	1	1	0.472
0.04	0.485	1	1	0.485
0.042	0.49	1	1	0.49
0.044	0.496	1	1	0.496
0.045	0.499	1	1	0.499
0.046	0.501	1	1	0.501
0.048	0.507	1	1	0.507
0.05	0.512	1	1	0.512
0.055	0.524	1	1	0.524
0.06	0.535	1	1	0.535
0.065	0.545	1	1	0.545
0.067	0.549	1	1	0.549
0.07	0.555	1	1	0.555
0.075	0.564	1	1	0.564
0.08	0.573	1	1	0.573
0.085	0.582	1	1	0.582
0.09	0.59	1	1	0.59
0.095	0.598	1	1	0.598
0.1	0.605	1	1	0.605
0.11	0.623	1	1	0.623
0.12	0.639	1	1	0.639
0.13	0.655	1	1	0.655
0.133	0.659	1	1	0.659
0.14	0.67	1	1	0.67
0.15	0.684	1	1	0.684
0.16	0.697	1	1	0.697
0.17	0.71	1	1	0.71
0.18	0.723	1	1	0.723
0.19	0.735	1	1	0.735
0.2	0.746	1	1	0.746
0.22	0.74	1	1	0.74
0.24	0.734	1	1	0.734
0.25	0.731	1	1	0.731
0.26	0.728	1	1	0.728
0.28	0.724	1	1	0.724

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.128	1.000	0.346	0.347	-0.3%
0.2	0.722	1.000	1.037	1.000	0.748	0.746	0.3%
0.3	0.597	1.000	1.242	1.000	0.742	0.719	3.1%
1	0.228	1.200	1.673	1.000	0.458	0.458	0.1%

Max % Difference = 3.1%

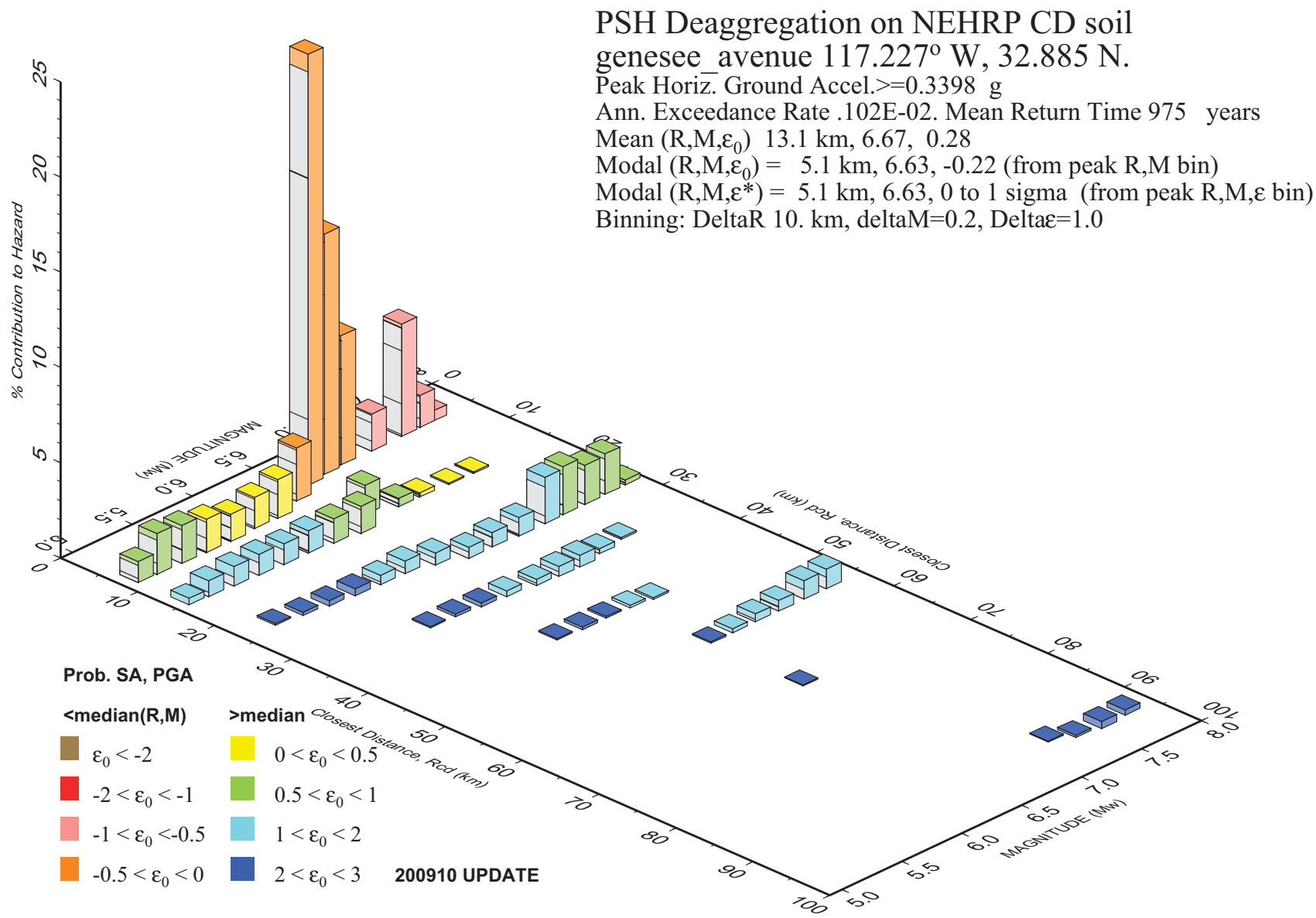
USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.3398	1.000	1.000	0.340	0.347	2.1%
0.1	0.6208	1.000	1.000	0.621	0.605	2.5%
0.2	0.7651	1.000	1.000	0.765	0.746	2.5%
0.3	0.7188	1.000	1.000	0.719	0.719	0.0%
0.5	0.5881	1.000	1.000	0.588	0.606	3.0%
1	0.3631	1.200	1.000	0.436	0.458	5.1%
2	0.1914	1.200	1.000	0.230	0.244	6.2%
3	0.12256	1.200	1.000	0.147	0.157	6.8%
4	0.08762	1.200	1.000	0.105	0.112	6.5%
5	0.07141	1.200	1.000	0.086	0.091	6.2%

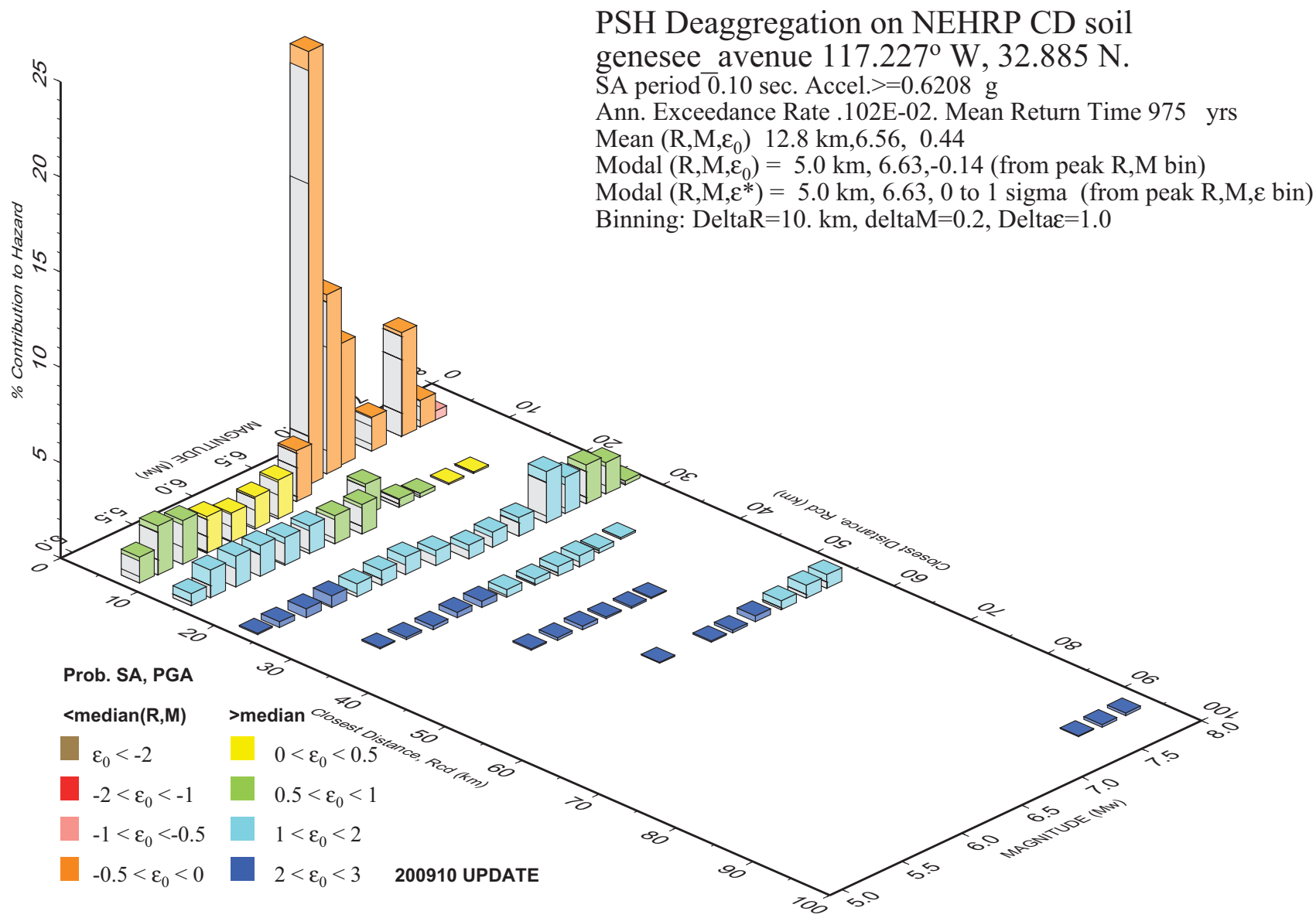
Max % Difference = 6.8%

Probabilistic_Response_Spectrum_080409.xls 9/19/2011 10:55 AM

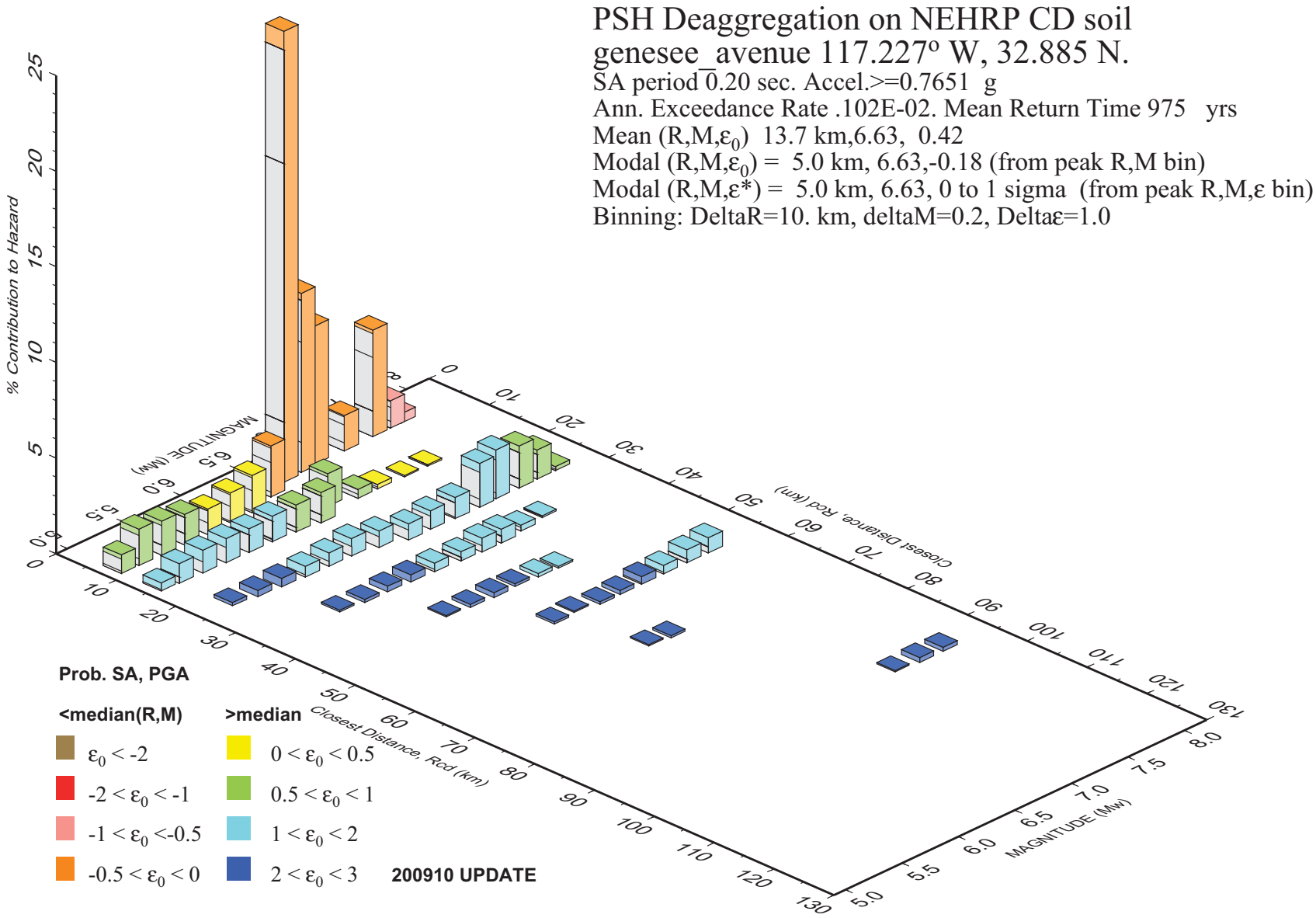
0.29	0.721	1	1	0.721
0.3	0.719	1	1	0.719
0.32	0.704	1	1	0.704
0.34	0.69	1	1	0.69
0.35	0.683	1	1	0.683
0.36	0.677	1	1	0.677
0.38	0.664	1	1	0.664
0.4	0.653	1	1	0.653
0.42	0.643	1	1	0.643
0.44	0.633	1	1	0.633
0.45	0.628	1	1	0.628
0.46	0.623	1	1	0.623
0.48	0.615	1	1	0.615
0.5	0.606	1	1	0.606
0.55	0.573	1	1.02	0.584
0.6	0.544	1	1.04	0.566
0.65	0.519	1	1.06	0.55
0.667	0.511	1	1.067	0.545
0.7	0.497	1	1.08	0.536
0.75	0.477	1	1.1	0.524
0.8	0.454	1	1.12	0.508
0.85	0.433	1	1.14	0.493
0.9	0.414	1	1.16	0.48
0.95	0.397	1	1.18	0.469
1	0.382	1	1.2	0.458
1.1	0.35	1	1.2	0.42
1.2	0.323	1	1.2	0.388
1.3	0.301	1	1.2	0.361
1.4	0.281	1	1.2	0.337
1.5	0.264	1	1.2	0.317
1.6	0.249	1	1.2	0.299
1.7	0.236	1	1.2	0.283
1.8	0.224	1	1.2	0.268
1.9	0.213	1	1.2	0.255
2	0.203	1	1.2	0.244
2.2	0.183	1	1.2	0.22
2.4	0.167	1	1.2	0.2
2.5	0.159	1	1.2	0.191
2.6	0.153	1	1.2	0.183
2.8	0.141	1	1.2	0.169
3	0.13	1	1.2	0.157
3.2	0.121	1	1.2	0.145
3.4	0.113	1	1.2	0.135
3.5	0.109	1	1.2	0.131
3.6	0.105	1	1.2	0.126
3.8	0.099	1	1.2	0.119
4	0.093	1	1.2	0.112
4.2	0.089	1	1.2	0.107
4.4	0.085	1	1.2	0.102
4.6	0.082	1	1.2	0.098
4.8	0.079	1	1.2	0.094
5	0.076	1	1.2	0.091



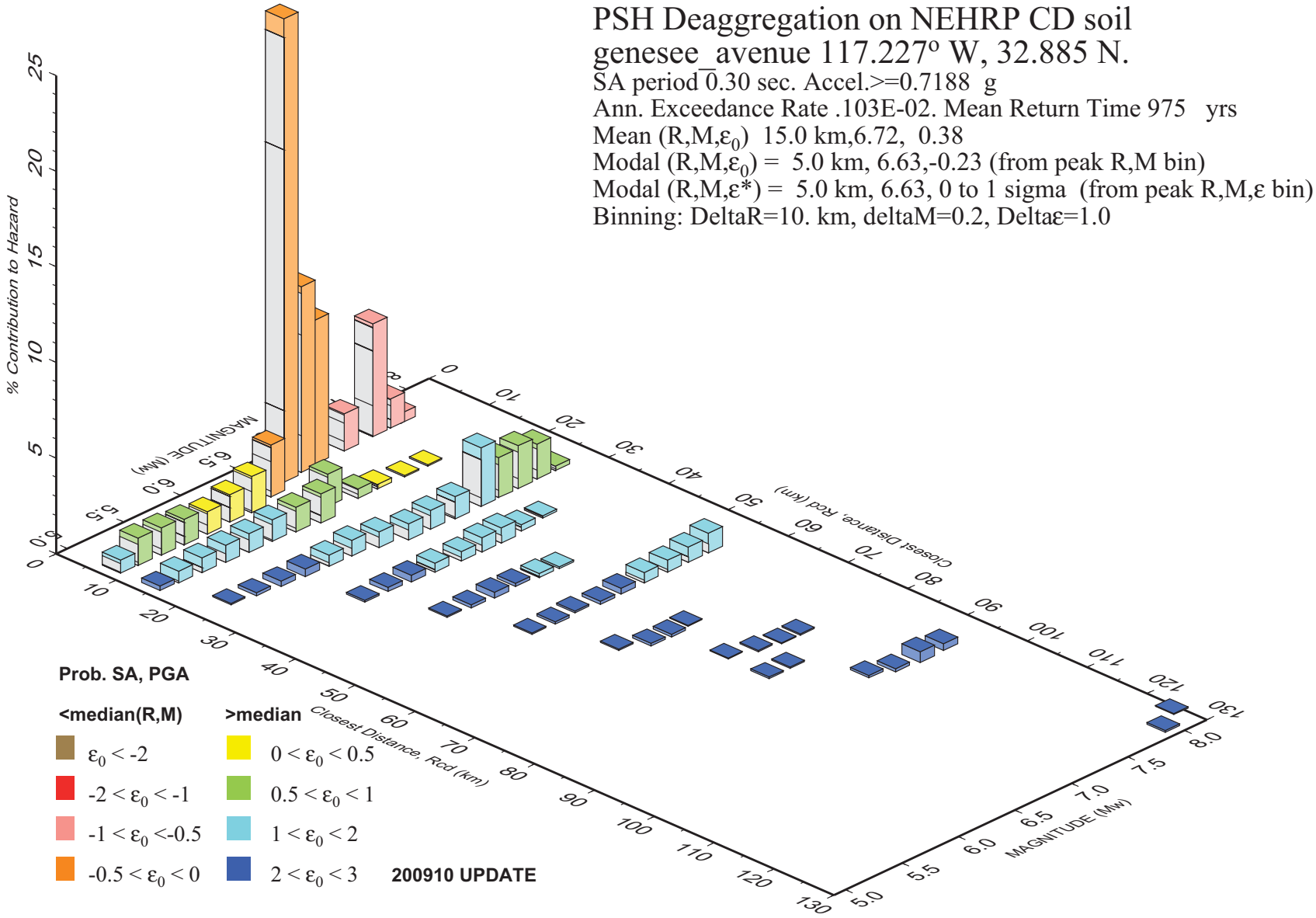
GMT 2011 Jul 20 16:39:21 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:47:02 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



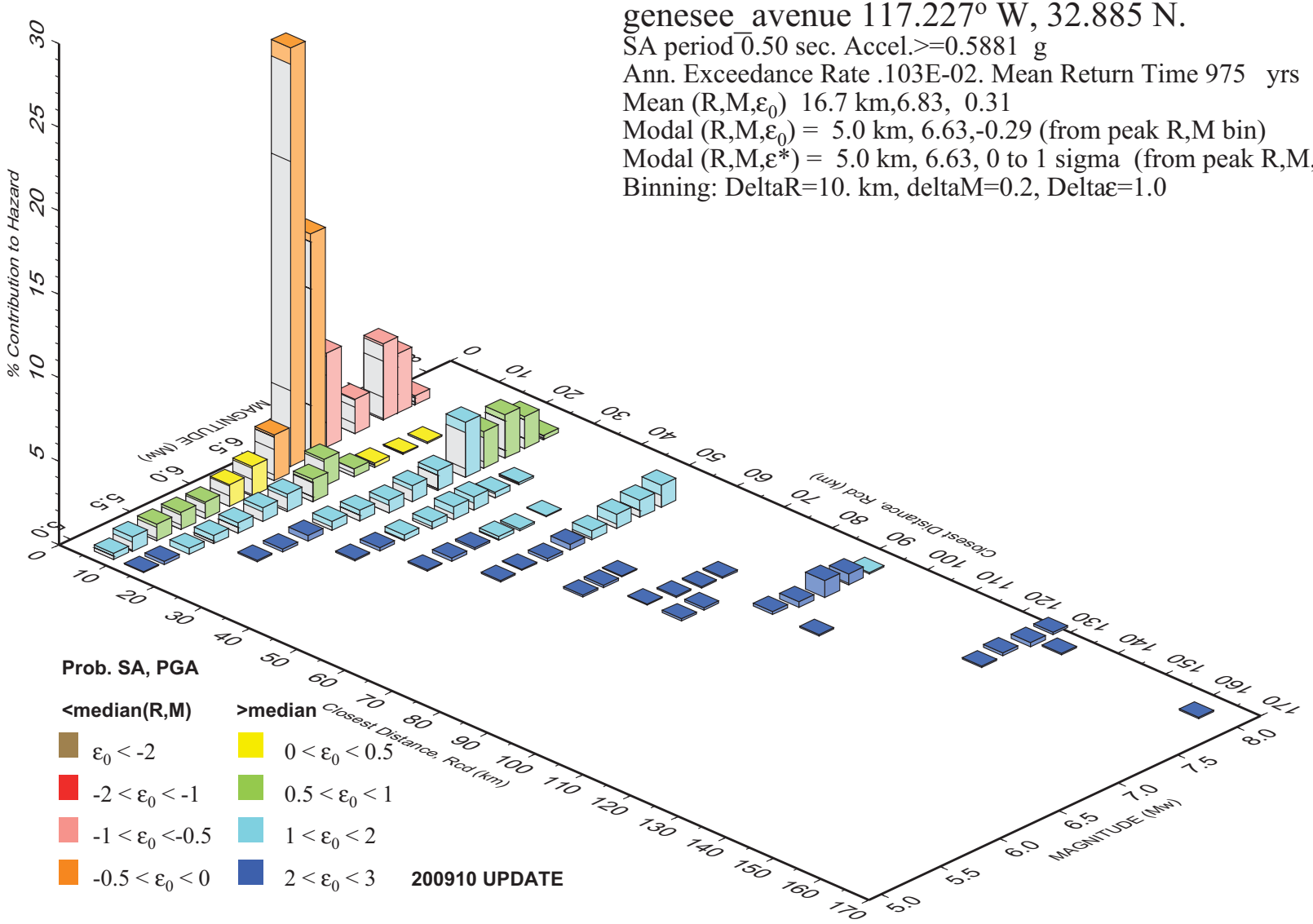
GMT 2011 Jul 20 16:48:40 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:49:49 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

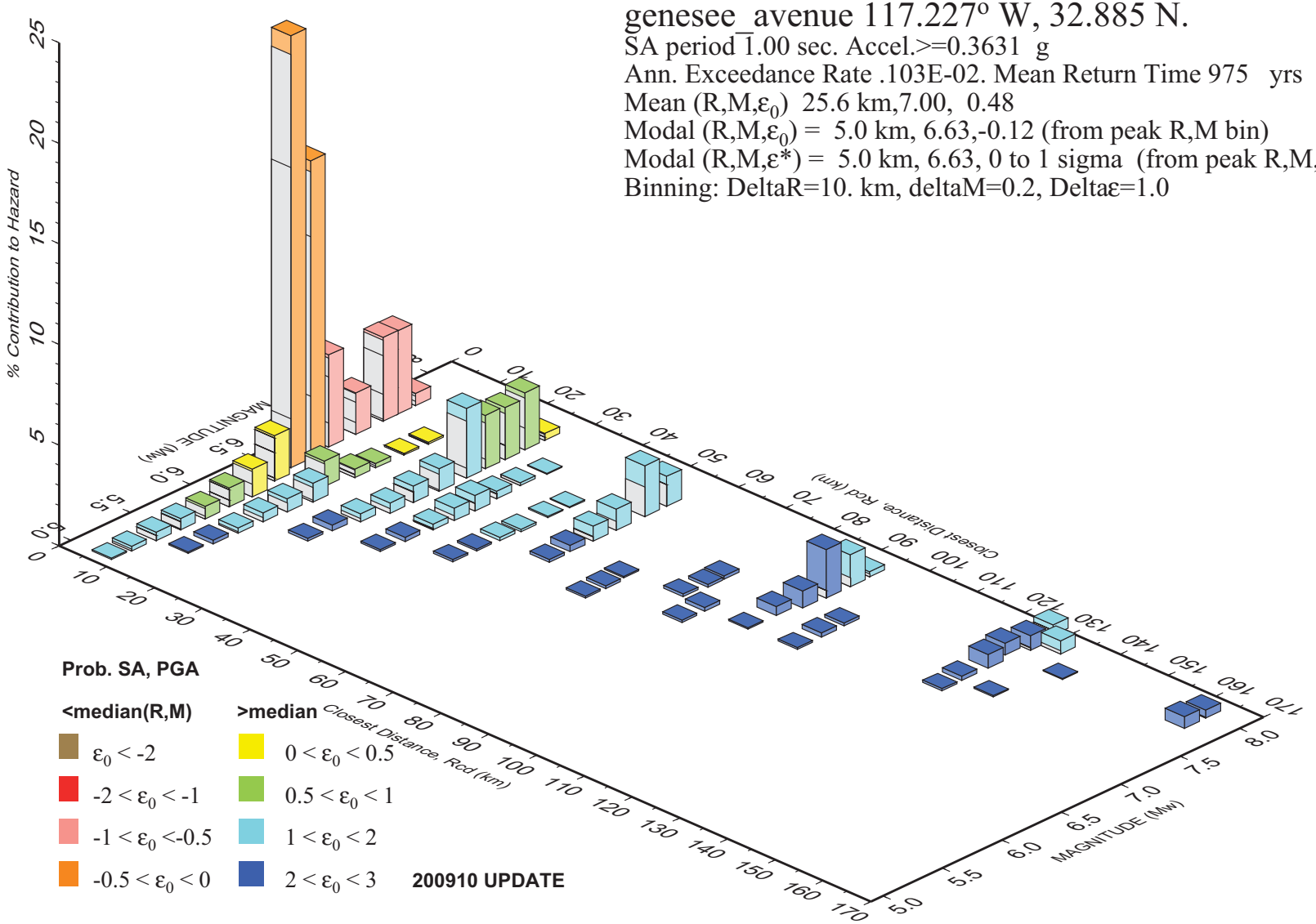
SA period 0.50 sec. Accel.>=0.5881 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 16.7 km,6.83, 0.31
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



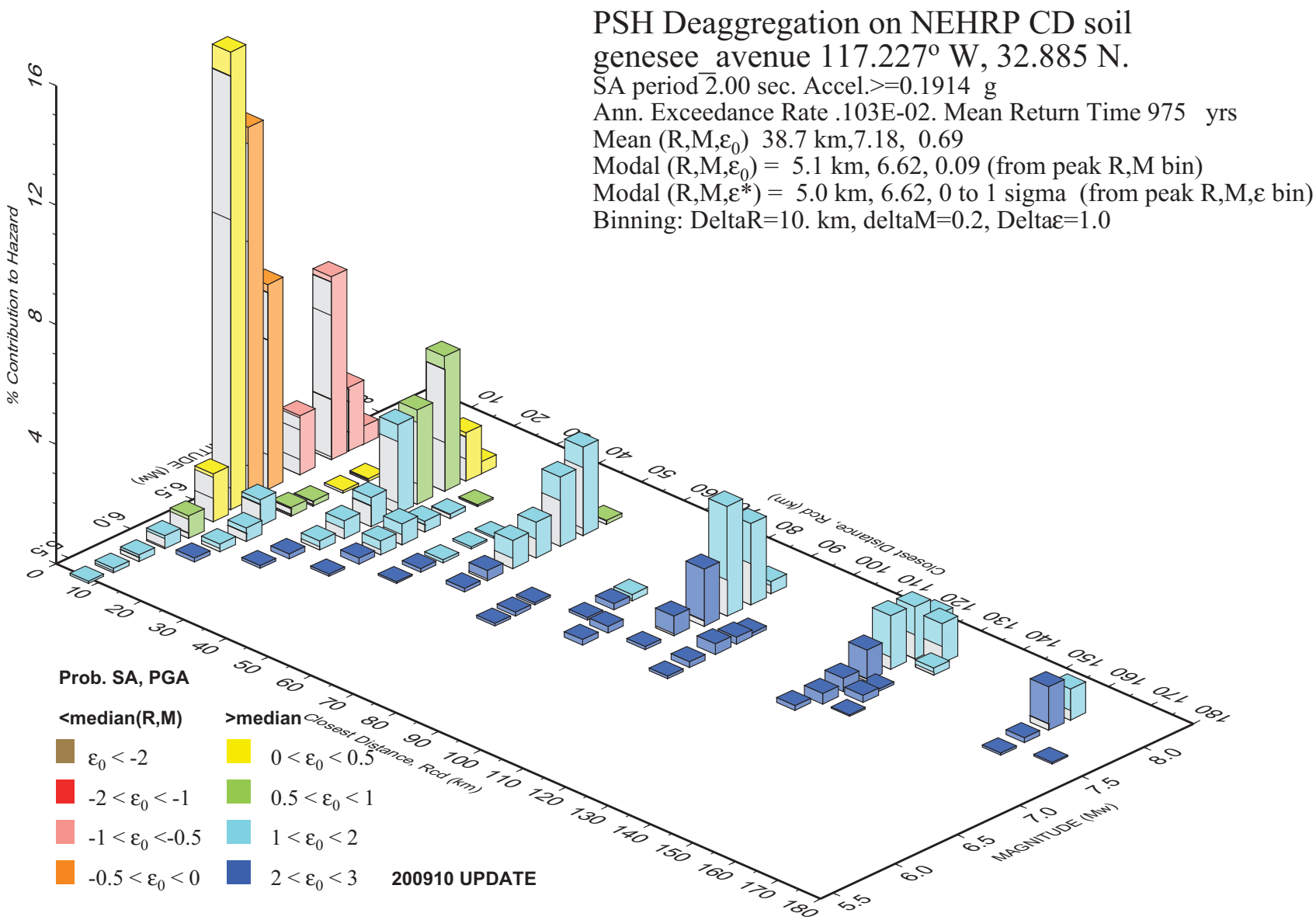
GMT 2011 Jul 20 16:50:55 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

SA period 1.00 sec. Accel.>=0.3631 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 25.6 km,7.00, 0.48
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.12 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



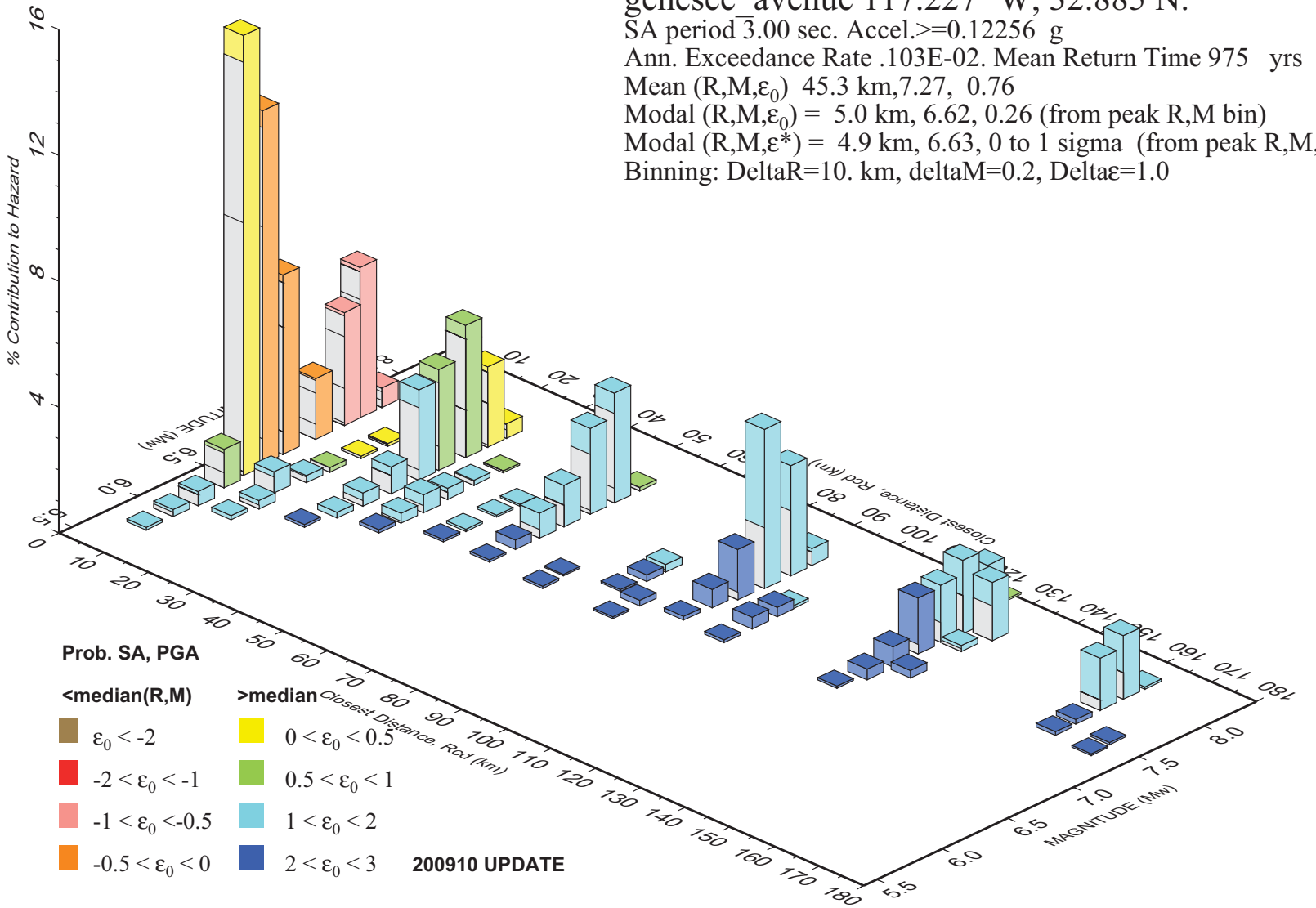
GMT 2011 Jul 20 16:52:12 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:53:10 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

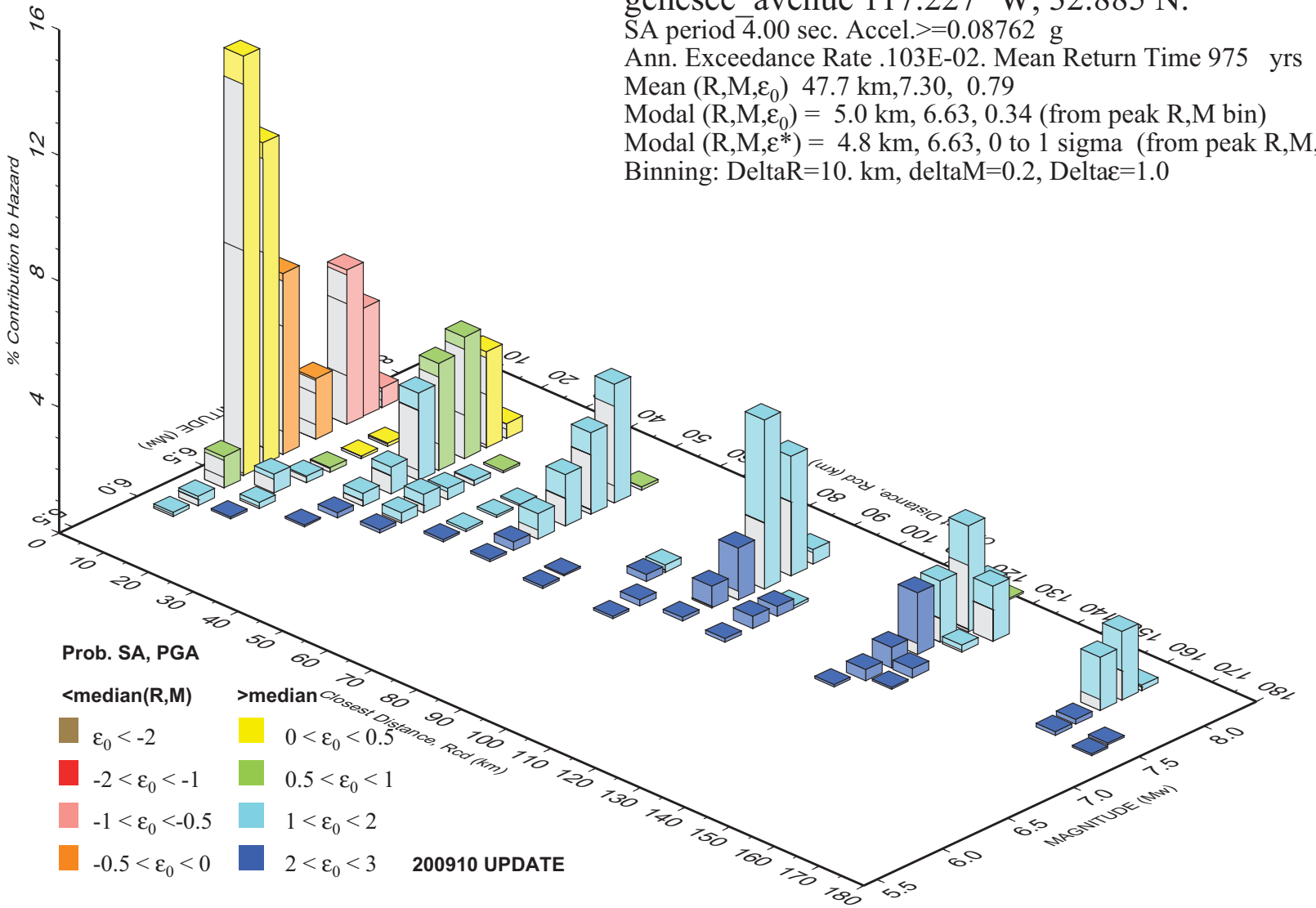
SA period 3.00 sec. Accel.>=0.12256 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 45.3 km,7.27, 0.76
Modal (R,M,ε_0) = 5.0 km, 6.62, 0.26 (from peak R,M bin)
Modal (R,M,ε*) = 4.9 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



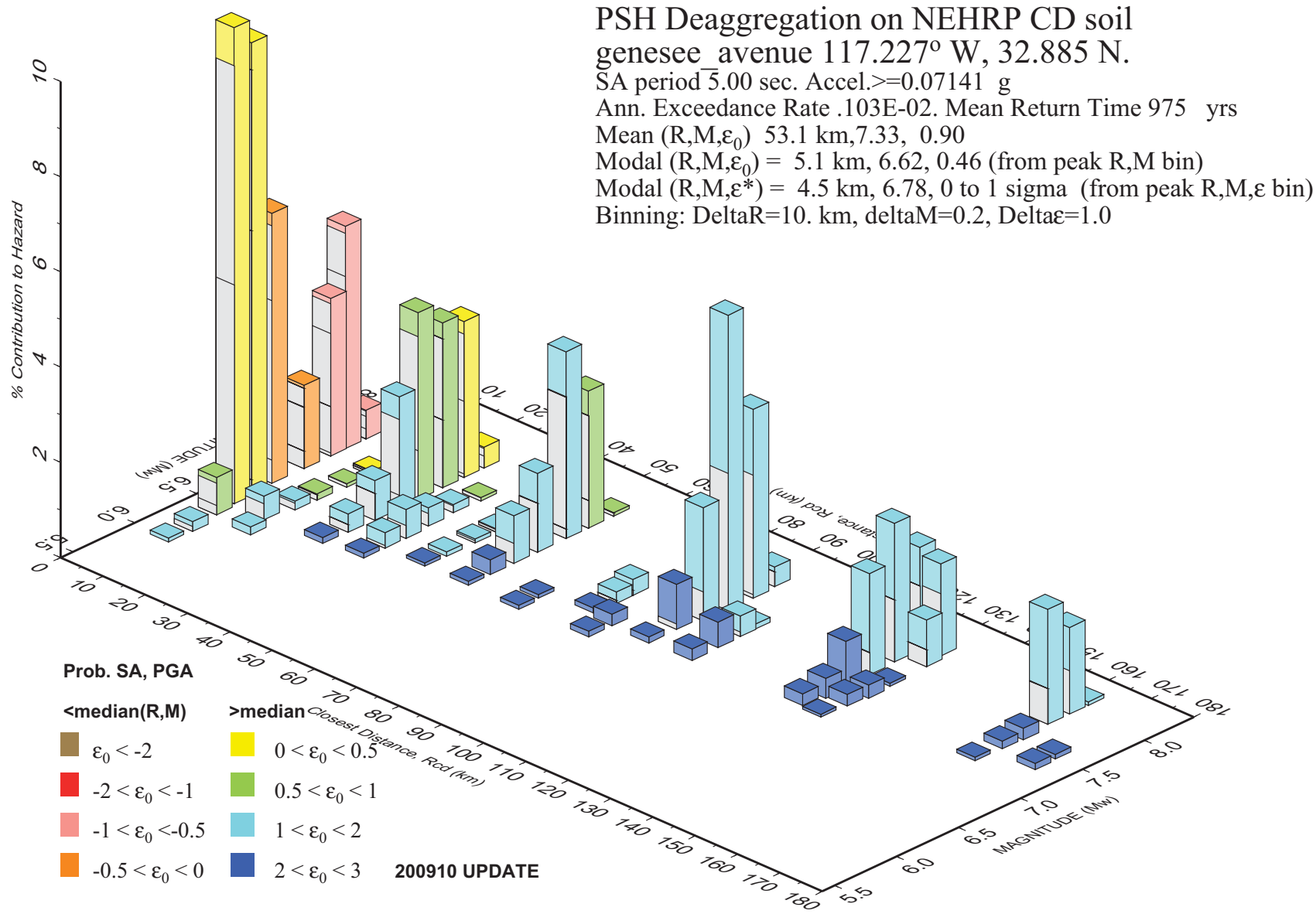
GMT 2011 Jul 20 16:54:05 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

SA period 4.00 sec. Accel.>=0.08762 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 47.7 km,7.30, 0.79
Modal (R,M,ε_0) = 5.0 km, 6.63, 0.34 (from peak R,M bin)
Modal (R,M,ε*) = 4.8 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:54:57 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:55:47 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: R-1,2,and3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

Fault Information (#1)

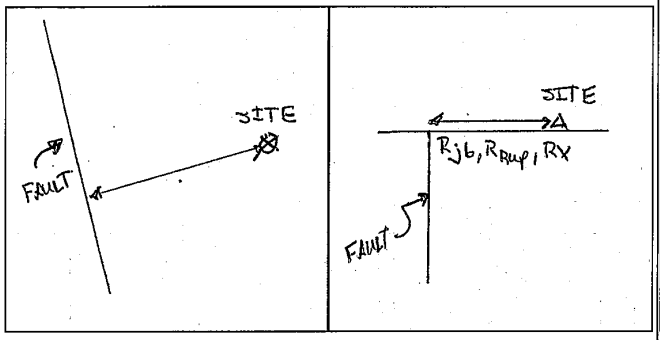
Fault Name: Newport Inglewood (Oceanside) Fault ID#: 223

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.00

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 4.21

R_{JB}: 4.21

R_X: 4.21

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

Fault Information (#2)

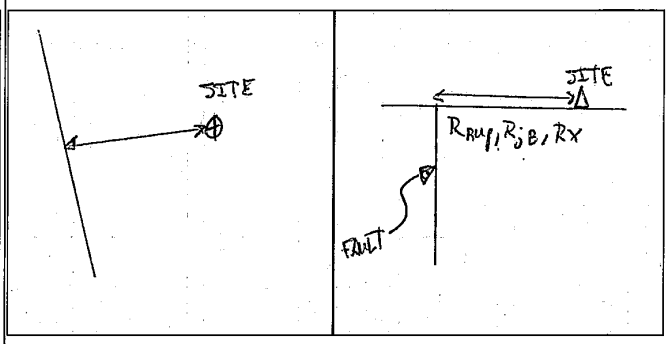
Fault Name: Newport Inglewood (San Diego) Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.0

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: RW-1, 2 and 3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

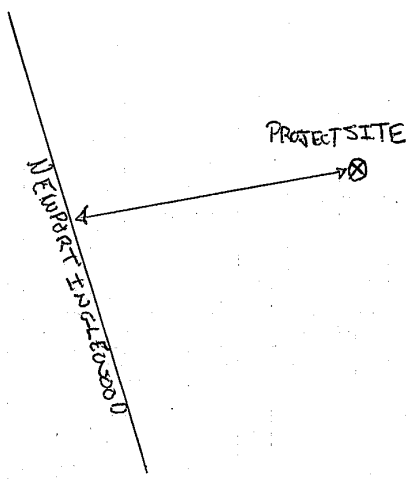
Deterministic Fault Information

Fault Name: New Port Inglewood Rose Canyon Fault ID#: 223 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13.00 km

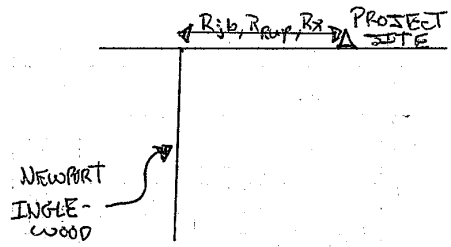
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	4.21 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT Correlation (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 2.0km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☒	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

ZIA YAZDANI — 11-7-11
Checker (Print) — Title

Checker (Signature) — 11-7-11
Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

BRIAN HINMAN — SENIOR TE
Functional Supervisor (Print) — Title

Functional Supervisor (Signature) — 11/8/11
Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Bishop Modified sta 1581+90 RW1a/1b soil nail wall bike lane

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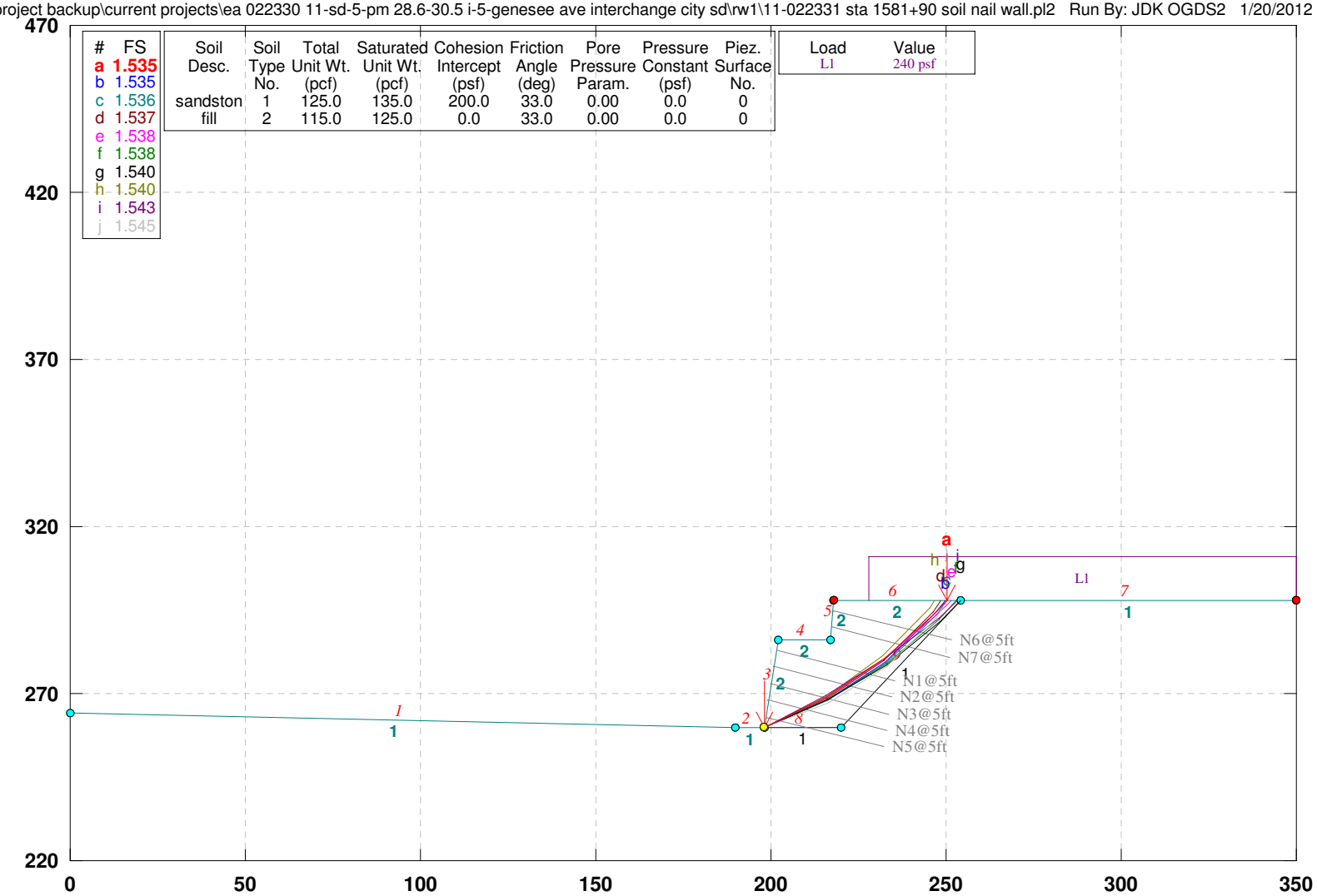

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1582+40 RW1a/1b soil nail wall bike lane

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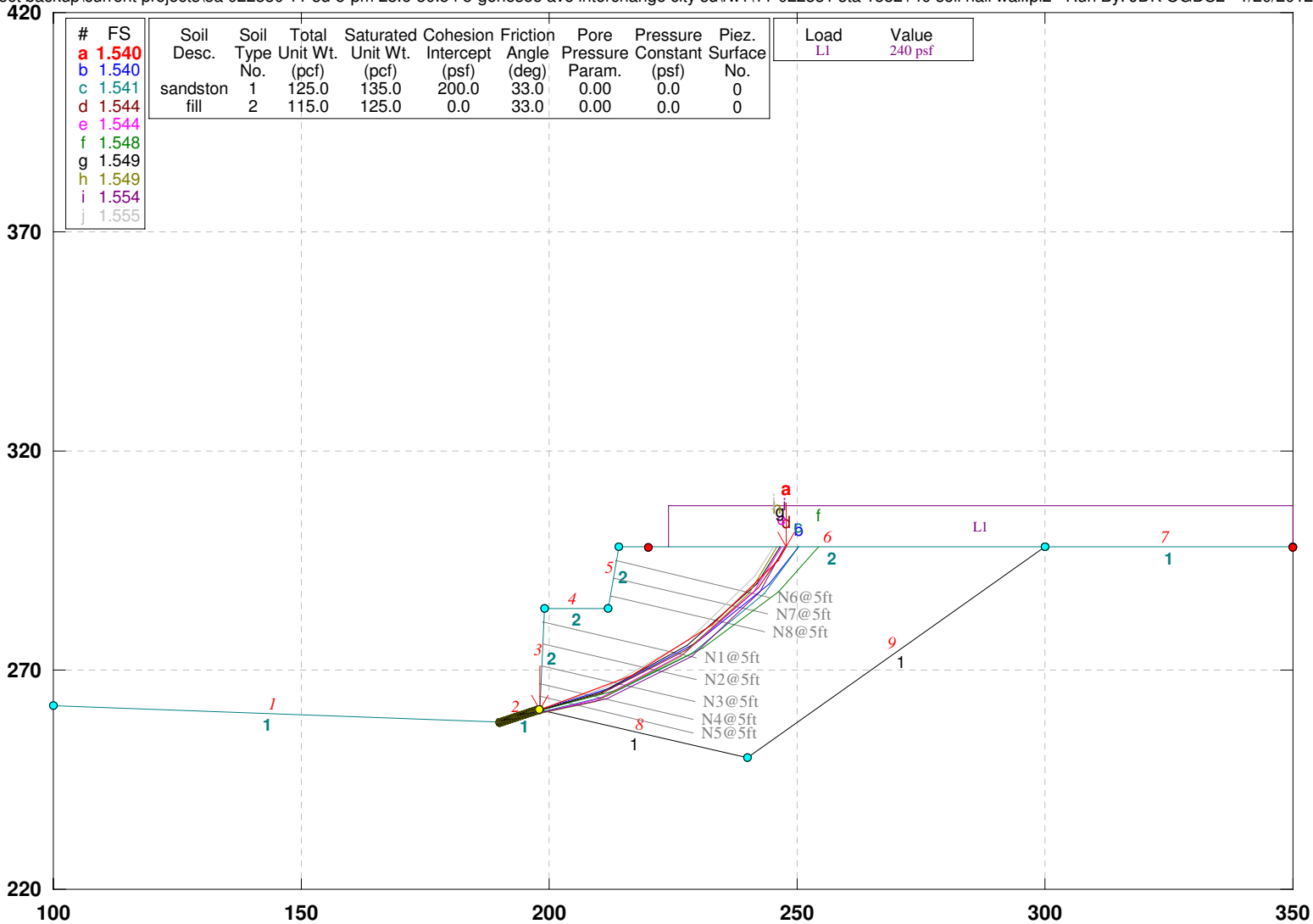

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1582+70 RW1a/1b soil nail wall bike lane

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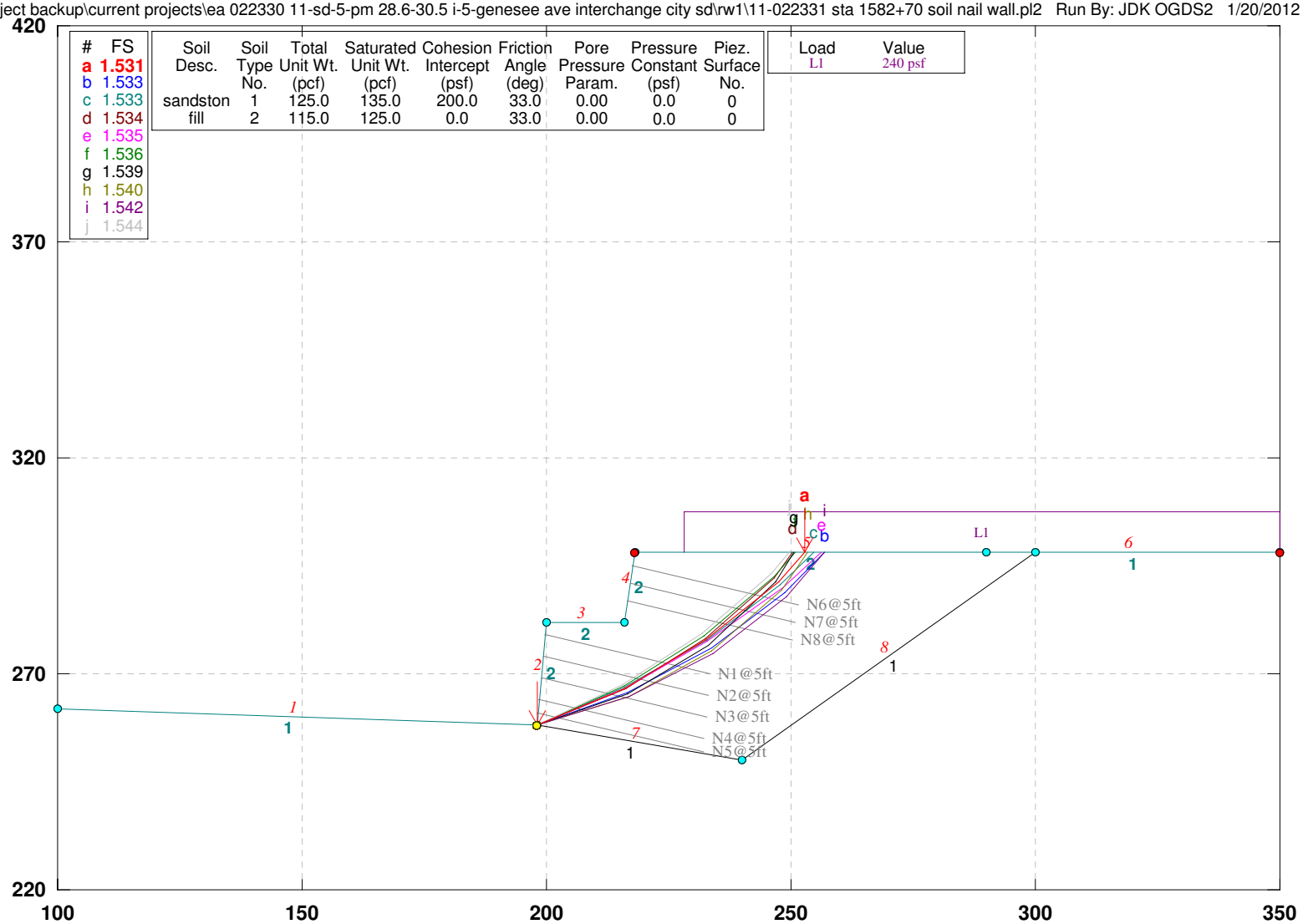

GSTABL7 v.2 FSmin=1.531

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1583+50 RW1a/1b soil nail wall bike lane

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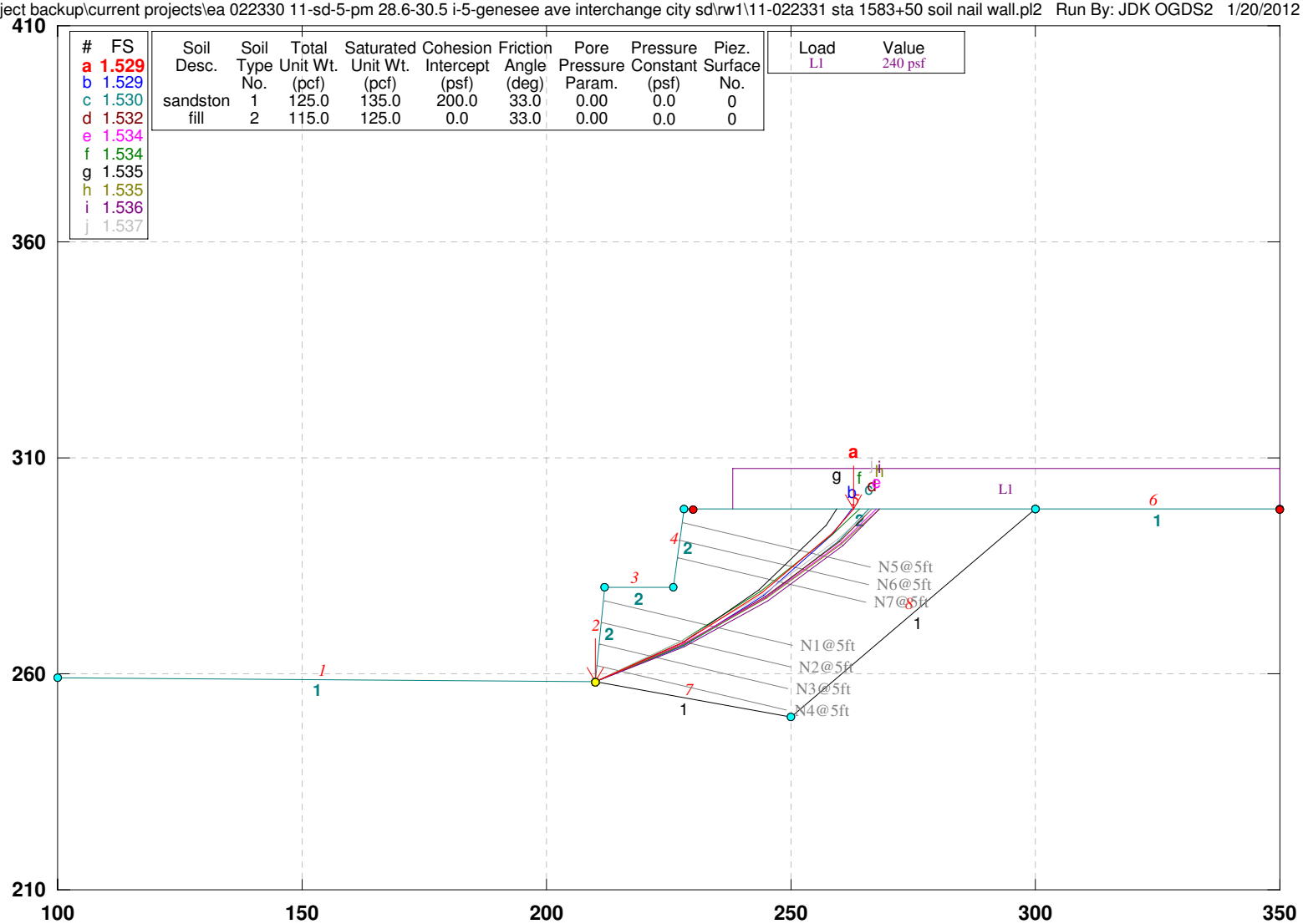

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Safety Factors Are Calculated By The Modified Bishop Method

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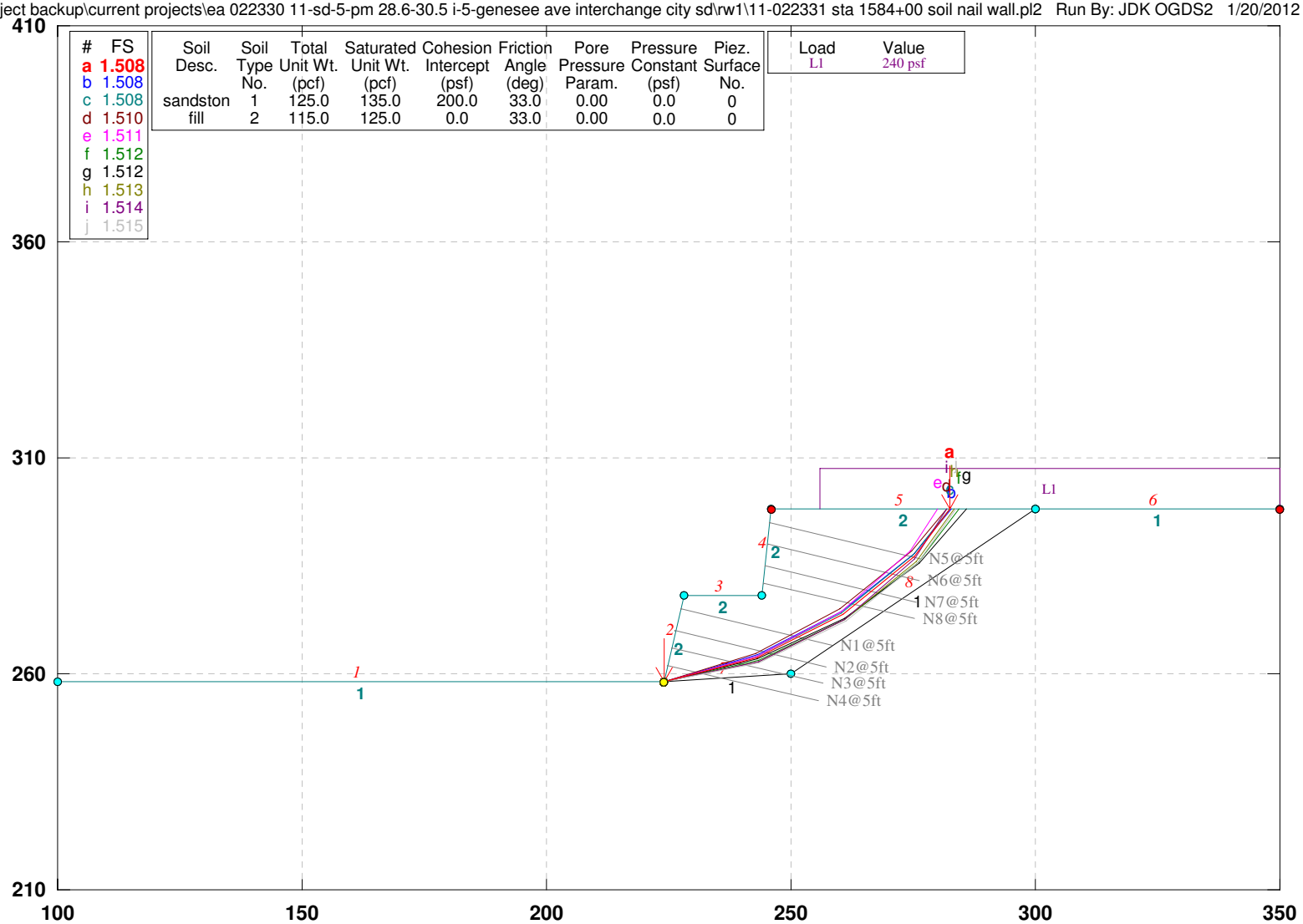

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1584+40 RW1a/1b soil nail wall bike lane

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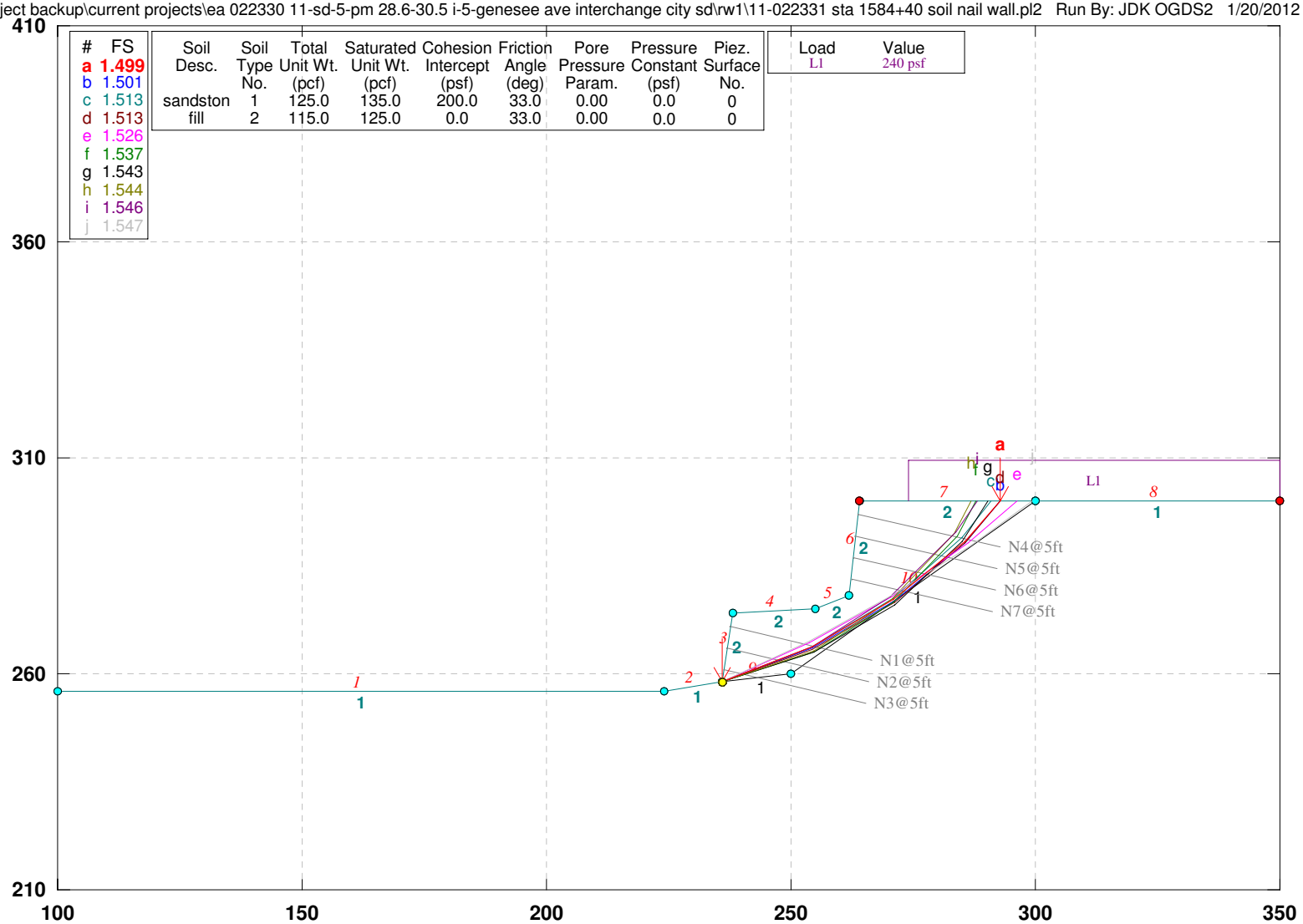

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Safety Factors Are Calculated By The Modified Bishop Method

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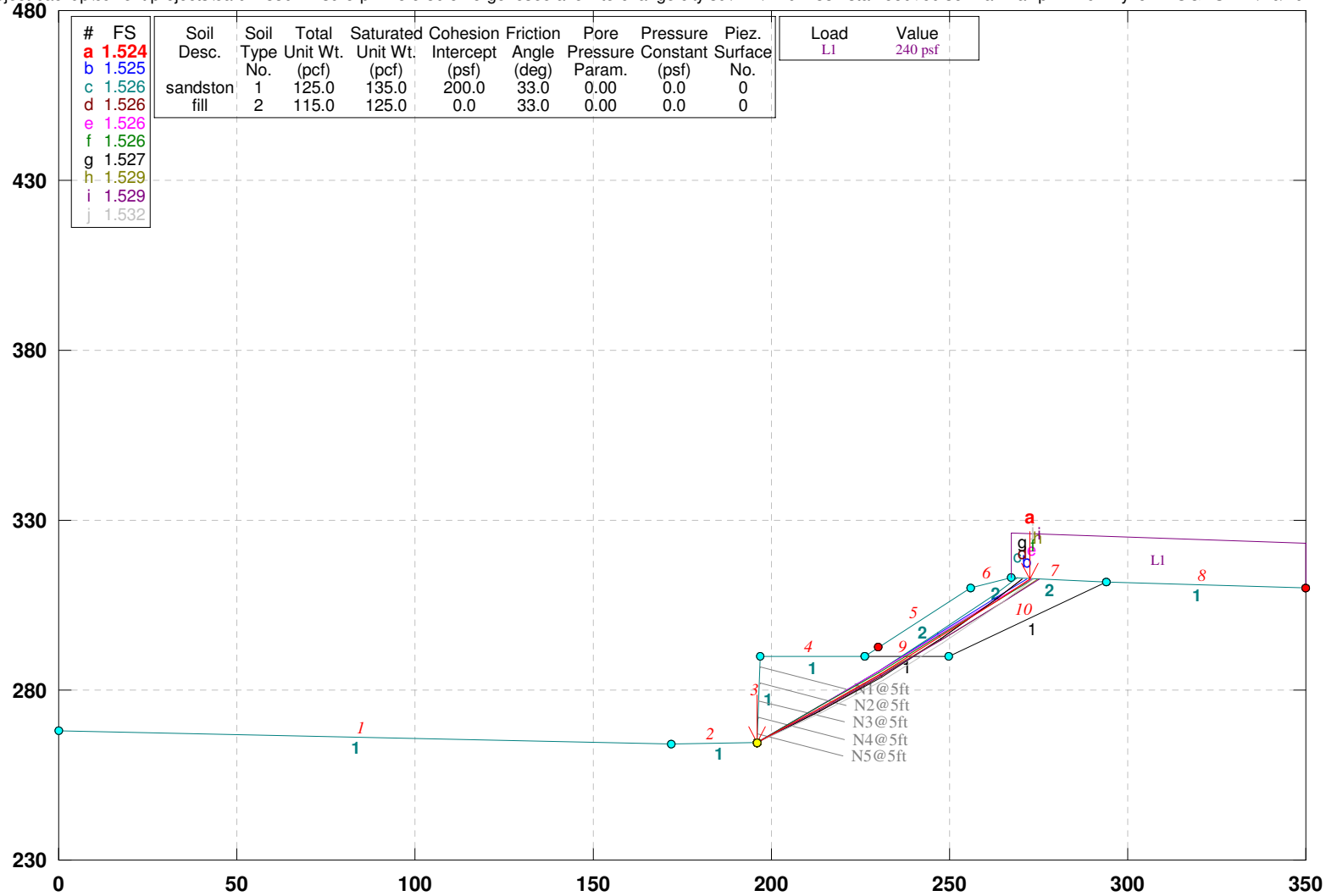

GSTABL7 v.2 FSmin=1.524

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1581+50 RW1a/1b soil nail wall bike lane

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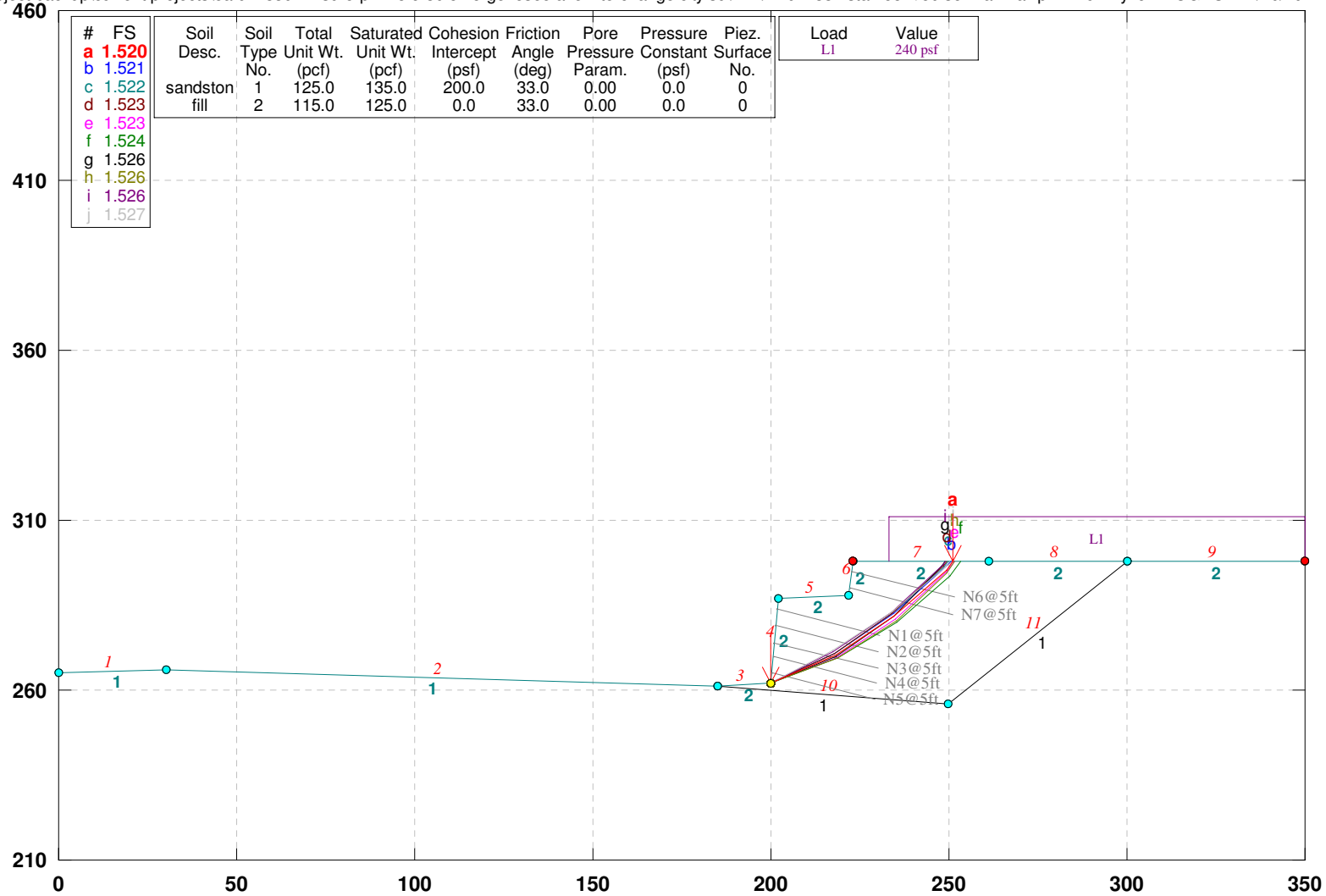

GSTABL7 v.2 FSmin=1.520

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1569+50 RW3a soil nail wall bike lane

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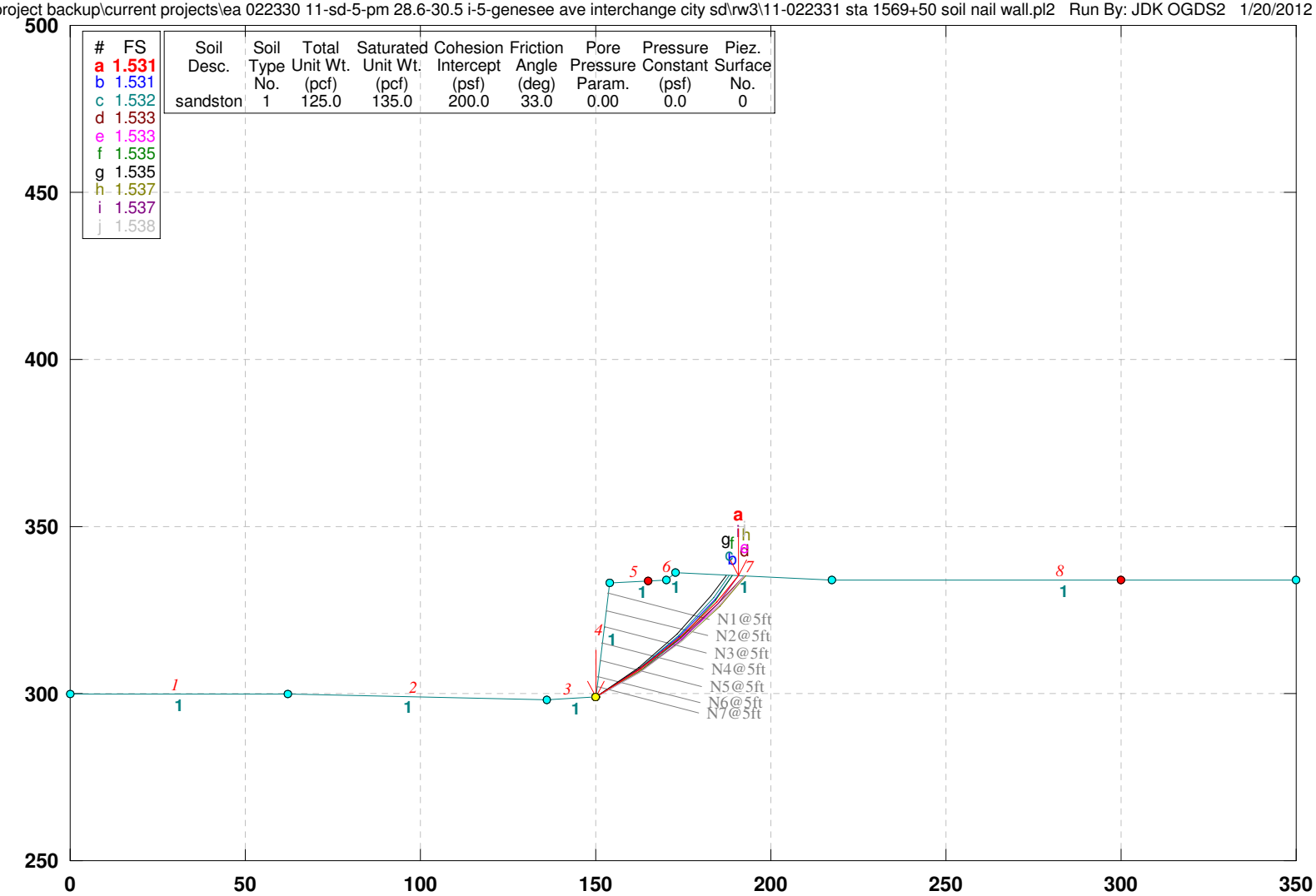

GSTABL7 v.2 FSmin=1.531

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1573+30 RW3a/3b soil nail wall bike lane

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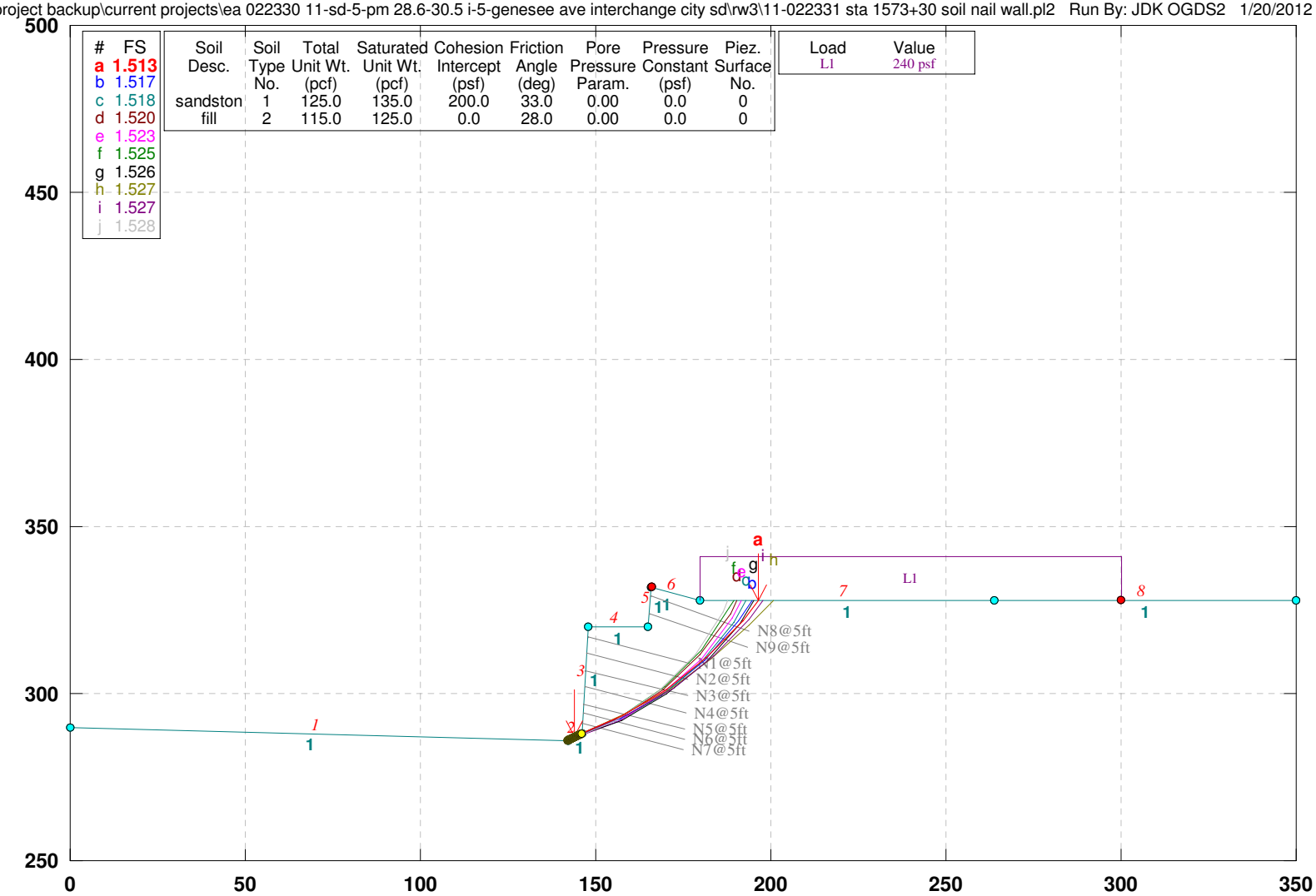

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Safety Factors Are Calculated By The Modified Bishop Method

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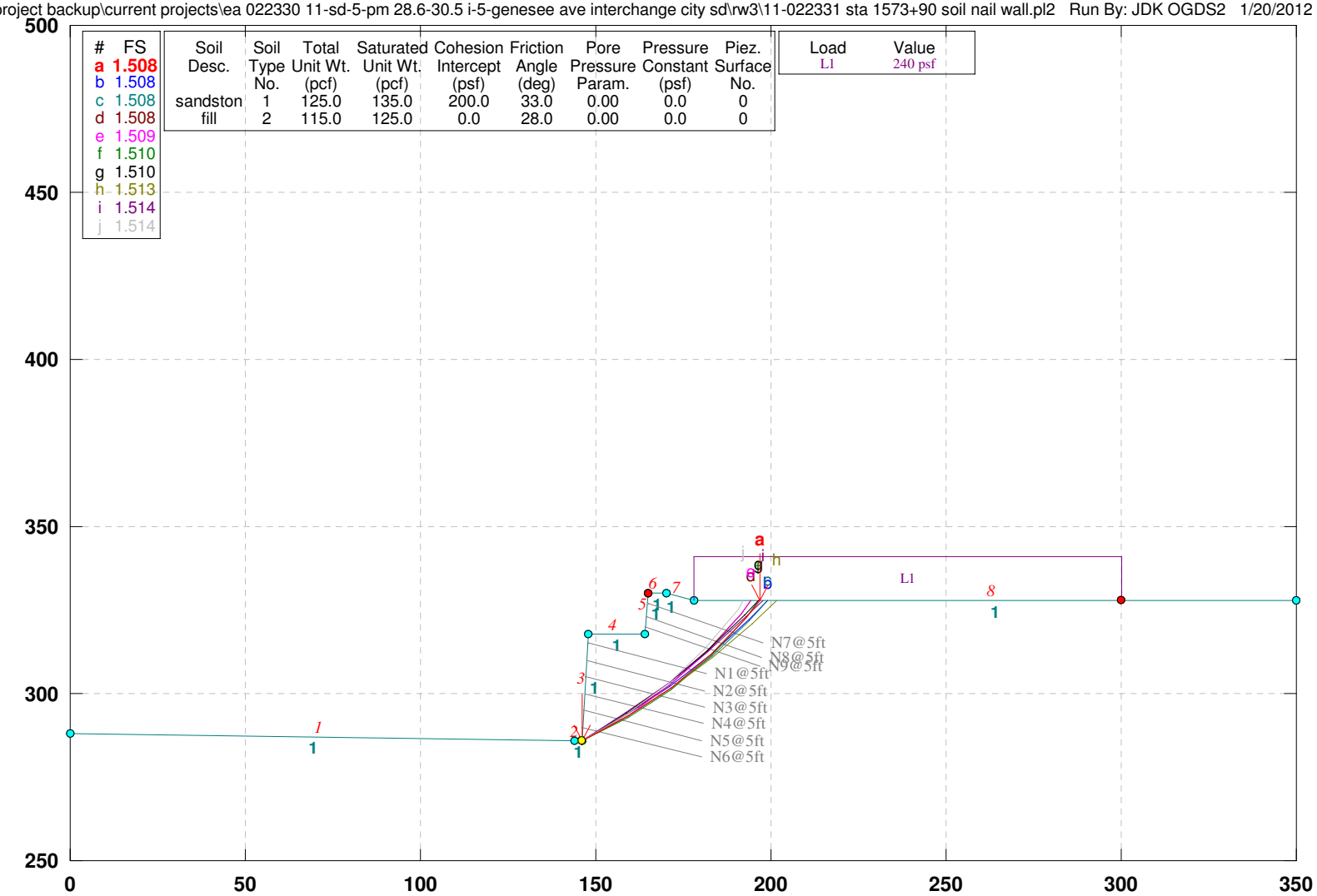

GSTABL7 v.2 FSmin=1.508

Safety Factors Are Calculated By The Modified Bishop Method

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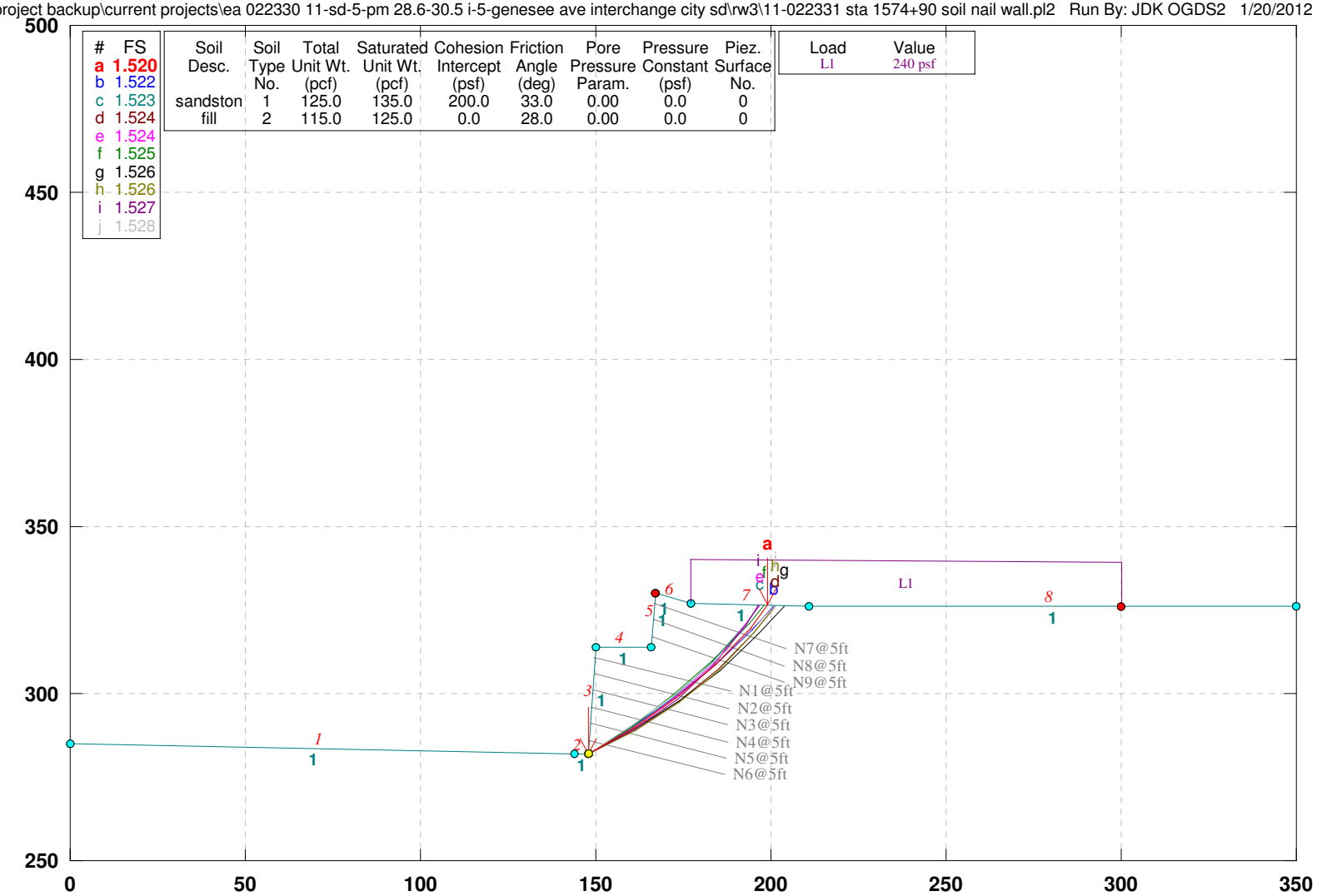

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Safety Factors Are Calculated By The Modified Bishop Method

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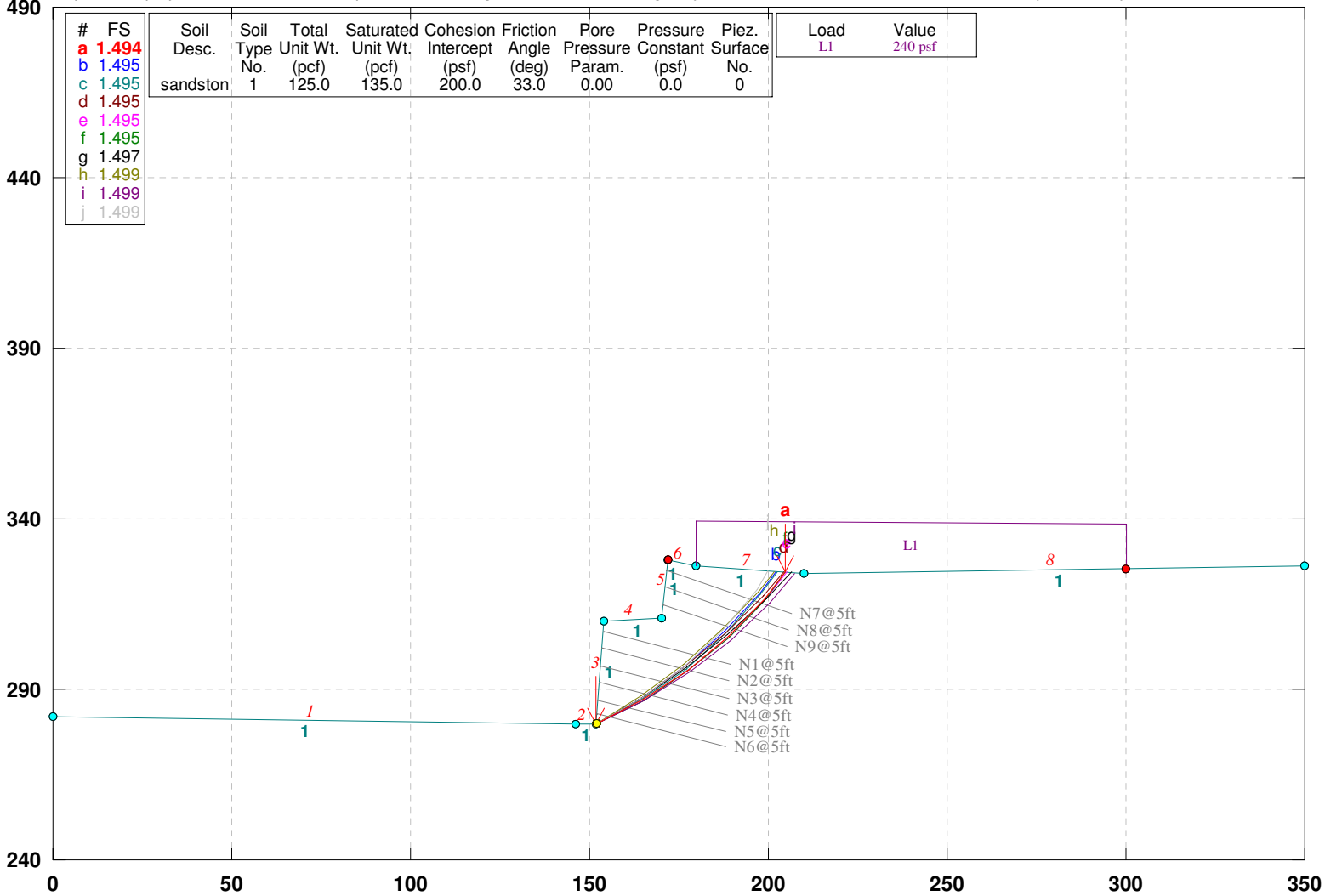

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Safety Factors Are Calculated By The Modified Bishop Method

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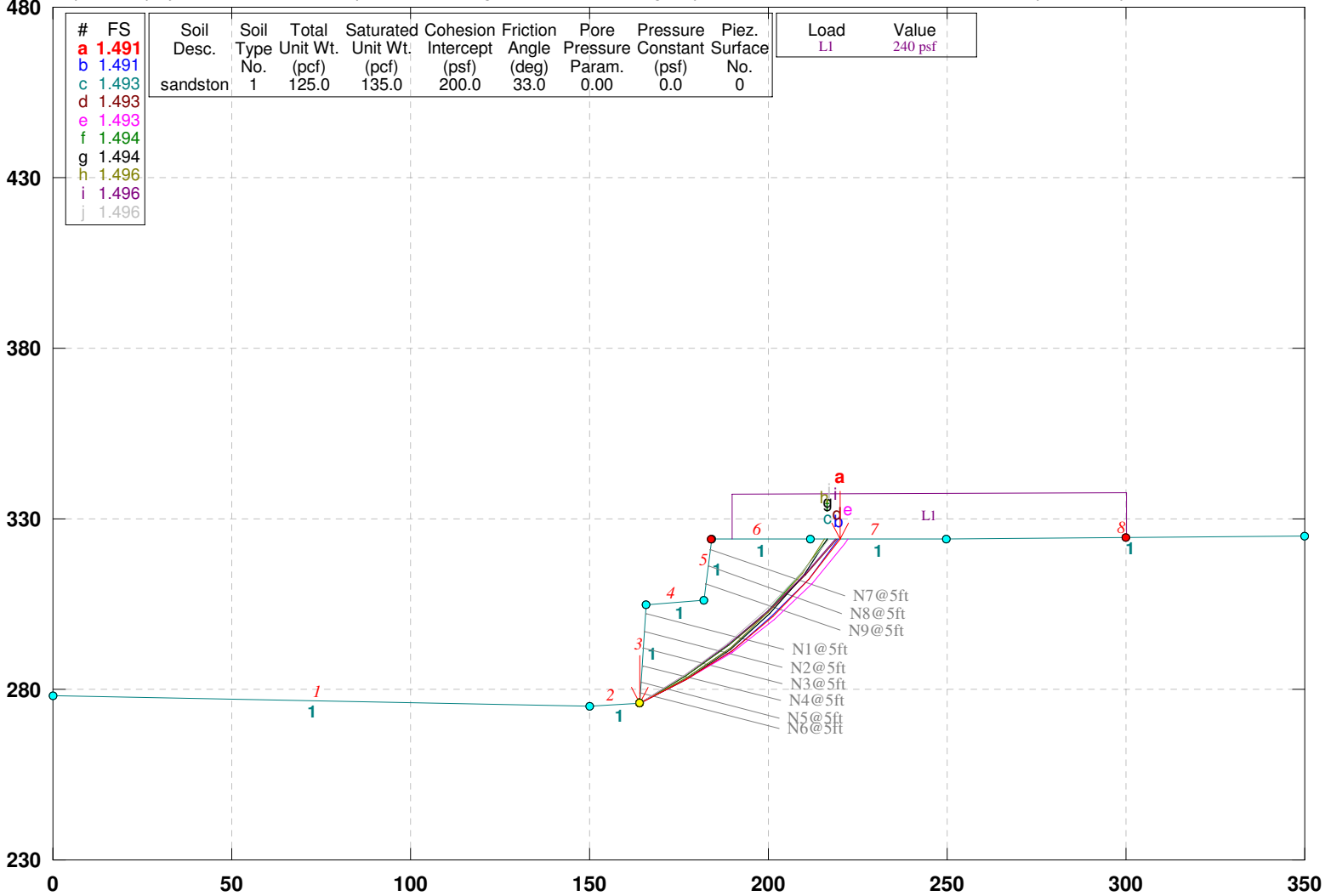

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1579+50 RW3a/3b soil nail wall bike lane

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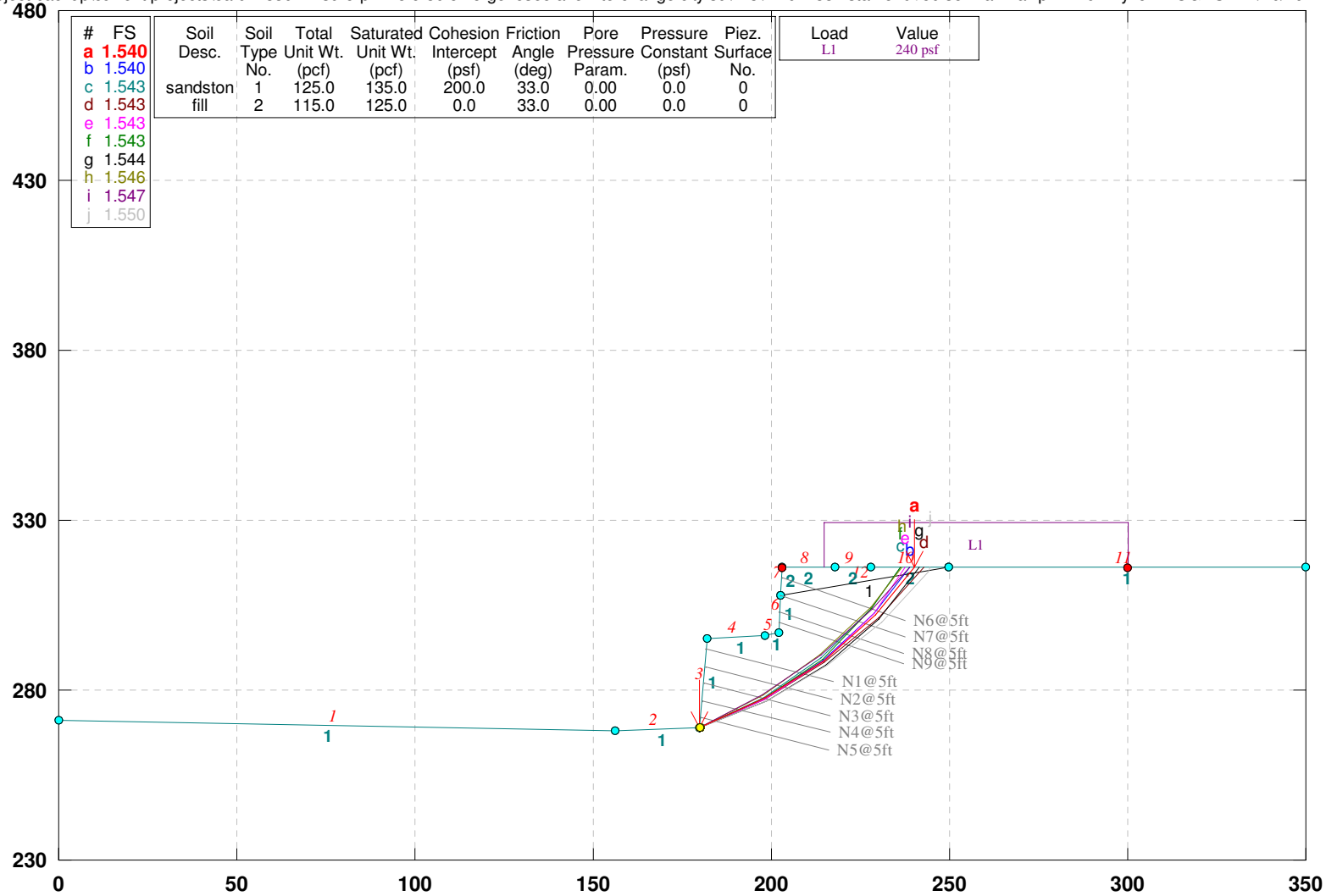

GSTABL7 v.2 FSmin=1.540

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX V

PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stokoe
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

http://www.dot.ca.gov/hq/esc/geotech/specification/specis.html

Specifications

The Non-Standard Special Provisions are provided by Geotechnical Services as templates for the preparation of project special provisions. Users of these templates must be licensed professionals acting in their area of expertise and must make any necessary changes before use and verify that the provisions reflect the current state of the practice. Non-Standard Special Provisions require approval by Geotechnical Services Deputy Division Chief for each project.

10-1.__ IMPORTED BORROW (LIGHTWEIGHT AGGREGATE)

Imported borrow (lightweight aggregate) shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Imported borrow (lightweight aggregate) shall consist of a rotary kiln expanded shale aggregate of the extruded type or a processed, naturally-occurring volcanic aggregate.

Imported borrow (lightweight aggregate) material, when deposited in place, shall conform to the following requirements:

Grading Requirements

Sieve Sizes	Percentage Passing
37.5-mm	100
25-mm	95 - 100
19-mm	90 - 100
9.5-mm	15 - 85
75-µm	0 - 9

Grading will be determined in conformance with the requirements of California Test 202, except shaking in the sieves shall be limited to 5 minutes.

Quality Requirements

Test	Requirement
Resistance (R-Value)	50 min
Durability Index	35 min

When imported borrow (lightweight aggregate) is used as structure backfill for galvanized steel or reinforced concrete pipe culverts, the imported borrow (lightweight aggregate) shall have a minimum resistivity greater than or equal to _____ ohm-cm and a pH greater than or equal to _____. For reinforced concrete pipe culverts, if the minimum resistivity of the native soil is less than 1,000 ohm-cm, imported borrow (lightweight aggregate) used as structure backfill shall have a chloride content less than or equal to _____ parts per million and a sulfate content less than or equal to_____ parts per million. For aluminum or aluminum-coated steel culverts, imported borrow (lightweight aggregate) used for structure backfill shall have a minimum resistivity greater than 1,500 ohm-cm and a pH between 5.5 and 8.5. Minimum resistivity and pH shall be determined in conformance with the requirements of California Test Method 643, chloride content shall be determined in conformance with the requirements of California Test Method 422, and sulfate content shall be determined in conformance with the requirements of California Test Method 417.

At locations directed by the Engineer, the material used to backfill the outer 0.6-m portion of structure backfill adjacent to pipe and culvert inlets and outlets shall be a compacted impervious

material, conforming to the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

At locations directed by the Engineer, the structure backfill placed within 0.6-m of finished ground around abutments, abutment wingwalls, retaining walls, and other portions of structures shall be a compacted impervious material, conforming to the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications. If the minimum resistivity of the native soil is less than 1,000 ohm-cm, then the imported borrow (lightweight aggregate) shall have a chloride content less than or equal to _____ parts per million and a sulfate content less than or equal to_____ parts per million.

When imported borrow (lightweight aggregate) is used as embankment material for geosynthetically reinforced embankments, the pH shall be between 4.5 and 9 as determined in conformance with the requirements of California Test Method 643.

Imported borrow (lightweight aggregate) shall have a maximum calculated saturated surface dry unit weight of 960 kg/m^3. The saturated surface dry unit weight shall be calculated using the dry loose unit weight and the absorption of the coarse and fine aggregates. Dry loose unit weight shall be determined in conformance with the requirements in California Test Method 212, using test procedure (b) Compaction Method (by jigging). Absorption of the coarse and fine aggregates shall be determined in conformance with the requirements in California Test Methods 206 and 207, except that the samples shall be oven dry before soaking and shall be soaked for 24 hours plus or minus 30 minutes. Saturated surface dry unit weight shall be calculated as follows:

1. multiply the percent coarse aggregate by the absorption of the coarse aggregate;
2. multiply the percent fine aggregate by the absorption of the fine aggregate;
3. add the two values from 1. and 2. and divide by 10000;
4. add one (1) to the result from 3. and multiply by the dry loose unit weight.

Imported borrow (lightweight aggregate) shall be placed and compacted to the designated dimensions in conformance with the provisions in Sections 19-1.03, "Grade Tolerance," and 19-6, "Embankment Construction," of the Standard Specifications. The provisions in Section 19-5, "Compaction," of the Standard Specifications shall not apply.

Initial layers of imported borrow (lightweight aggregate) may be placed by end dumping from trucks, or by any other method approved by the Engineer.

Imported borrow (lightweight aggregate) shall be spread or placed in such manner that will prevent bulking of the material and minimize particle breakdown. Imported borrow (lightweight aggregate) shall be compacted in uniform layers not to exceed 0.2-m thickness before compaction. Compaction shall be obtained by a minimum of 3 complete coverage passes using smooth drum steel roller compaction equipment imposing contact force of 1,000 kg per-meter-width of the roller face. Track type equipment which imposes the equivalent contact pressure as that specified for steel drum rollers, as determined by the Engineer, may be used provided the 3 complete coverages of the tracks of the track type equipment are achieved. Sufficient moisture treatment shall be made to aid the compactive effort. Compaction using pneumatic-tired equipment or compaction within trenches or other limited-access areas, or compaction in areas of low confining pressure, shall be by a method approved by the Engineer.

When alternative compaction equipment and methods of compaction (including use of pneumatic-tired equipment in trenches, in limited-access areas, and areas of low confining pressure) are proposed by the Contractor, a test site placing and compacting lightweight aggregate material shall be constructed. The alternative compaction equipment and methods of compaction shall not be used until, evaluation of the test site by the Engineer and the alternative methods and equipment have been approved by the Engineer.

Quantities of imported borrow (lightweight aggregate) shall be paid for by the cubic meter calculated on the basis of the mass, measured in place in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications divided by the 95 percent of the dry unit weight measured in conformance with the requirements in California Test Method 212, using test procedure (b) Compaction Method (by jigging).

The contract price paid per cubic meter for imported borrow (lightweight aggregate) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing imported borrow (lightweight aggregate), complete in place (including constructing and removing any test sites required), as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

CALIFORNIA DEPARTMENT OF TRANSPORTATION

REVISED
FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-4

11-SD-5 PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

March 21, 2014

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California **Business, Transportation and Housing Agency**

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 21, 2014

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Revised Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-4

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the Interstate-5 (I-5)/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR documents existing foundation conditions and provides specific seismic and foundation recommendations for Retaining Wall-4 (RW-4). The report defines the geotechnical conditions as evaluated from field investigation data and used in the development of the geotechnical design. This report provides recommendations and specifications for project design and construction. This FR supersedes the FR for RW-4 issued on February 29, 2012 and all associated addendums (May 30, 2012; June 7, 2012; and December 14, 2012) because of the reconfiguration of the retaining wall.

A Structure Preliminary Geotechnical Report (SPGR) was prepared for RW-4 and submitted April 8, 2010. No Preliminary Foundation Report (PFR) was prepared prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

Mike Fordham P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

REGISTERED PROFESSIONAL ENGINEER
MICHAEL M. FORDHAM
C61341
EXP. 06/2015
CIVIL
STATE OF CALIFORNIA

CARBON COPY (CC) LIST

Arturo Jacobo	District Project Manager
Yonk Pak	Project Engineer
Art Padilla	District Materials Engineer
Abbas Abghari	Office Chief, OGDS2
Geotechnical Archive	
District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending Files.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
Mike Ross	Kimley Horn and Associates
Craig Shannon	Simon Wong Engineering

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FIGURE 3: PROJECT PROFILE

FIGURE 4A-4I: PROJECT CROSS SECTION

FIGURE 5: GEOLOGIC OVERVIEW MAP

FIGURE 6: GEOLOGIC PROFILE

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1.0 SCOPE OF WORK

This Revised Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for Retaining Wall-4 (RW-4), to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project limits, in the City of San Diego, San Diego County, California, hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and provide recommendations relevant to the design and construction of RW-4. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein.

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, and engineering analyses. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all stations are referenced to the SD-5 Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Draft Foundation Report Preparation for Retaining Walls, July 2010,* and supersedes SPGR, FR and, FR addendums. A Structure Preliminary Geotechnical Report (SPGR) was prepared for this project and submitted April 8, 2010. A Foundation Report for this project was submitted on February 29, 2012. Three addendum to the February 29, 2012 Foundation Report (May 30, 2012; June 7, 2012; and December 14, 2012) were submitted because of design changes. No Preliminary Foundation Report (PFR) was prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The proposed I-5/Genesee Avenue Improvement Project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the I-5/Genesee Avenue Improvement Project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. Therefore, this FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The I-5/Genesee Avenue Improvement Project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-4, are necessary to accommodate the I-5/Genesee Avenue Improvement Project and the associated features. RW-4 will accommodate the freeway widening and realignment of the northbound Genesee Avenue off ramp located in the southeast quadrant of the project.

Figure 1 depicts the approximate location and alignment of RW-4. Figure 2A and Figure 2B are layout sheets provided by Caltrans District 11 Design and utilized in the preparation of this FR. Figure 3 is the profile sheets provided by Caltrans District 11 Design and utilized in the preparation of this FR. Figure 3 show the current and ultimate finish grade for RW-4. Cross sections perpendicular to the wall alignment are shown in Figure 4A through Figure 4I. These cross sections represent the most severe case of wall and slope geometry.

RW-4 is proposed to be a combination soil nail and diaphragm ground anchor retaining wall located on a hillside cut along the northbound I-5 Genesee Avenue off ramp. The wall type selection is discussed in Section 10.0 of this report. The SPGR prepared for RW-4 includes a discussion of project planning

considerations and phased wall construction.

RW-4 will begin seven hundred fifty seven-feet (757ft) north of Voigt Drive and extend northward approximately eight hundred eighty four and one half-feet (884.5ft) to approximately one hundred fifty two-feet (152ft) south of Genesee Avenue. The maximum wall height will be approximately sixty two and one half-feet (62.5ft) occurring near the north end of the wall.

Preliminary plans for the I-5 North Coast Corridor Widening Project include a retaining wall extending south of Voigt Drive on a similar alignment as RW-4. However, this FR applies only to the wall located north of Voigt Drive.

A Caltrans Standard Type 1 retaining wall, RW-5 will be located above RW-4 along the access road to the Scripps Memorial Hospital-La Jolla parking garage between Stations 1576+10 and 1577+10. RW-5 will be approximately one hundred-feet (100ft) in length with a maximum height of the eight-feet (8ft). The wall height will taper to less than three-feet (3ft) at either end. RW-5 will be located outside Caltrans Right of Way on Scripps Memorial Hospital-La Jolla property.

Preliminary planning, design, and coordination between Caltrans and Scripps Memorial Hospital-La Jolla are discussed in the SPGR. It was previously believed that the construction of a retaining wall on the Scripps Memorial Hospital-La Jolla property, referred to as the Scripps RW in the SPGR, would precede the construction of RW-4. However, it is now apparent that the interchange project will precede improvements planned for the Scripps Memorial Hospital-La Jolla. Therefore, the construction of RW-5 is necessary to provide continued access to the Scripps Memorial Hospital-La Jolla parking garage.

3.0 AS-BUILT FOUNDATION DATA

RW-4 will be located near the Genesee Avenue and Voigt Drive Overcrossings. The LOTB for these structures include information relevant to the soil conditions at the project site. The LOTB for the Genesee Avenue OC and Voigt Drive OC are included in Appendix I. The construction of RW-4 will not affect the Genesee Avenue OC or Voigt Drive OC bridge foundations.

Approximately five hundred-feet (500ft) of RW-4 will be located on a fault block that is down-dropped relative to the blocks beneath the Genesee Avenue OC and the Voigt Drive OC. The relative position of horizontal sedimentary strata should therefore be anticipated to occur at different elevations between the overcrossings and the site of RW-4.

Foundation data for structures located outside Caltrans right-of-way and in the proximity of RW-4 were provided by Scripps Memorial Hospital-La Jolla and are included in Appendix I. Existing facilities to the southeast of the Genesee Avenue OC include: Scripps Memorial Hospital-La Jolla multi-story medical office buildings and parking structure. A portion of the parking structure is constructed on GEOPIER® foundations. The GEOPIERS extend through artificial fill from the base of the parking structure to competent formation below. GEOPIER® foundations are piles consisting of Rammed Aggregate Piers® (RAP). A RAP is constructed by layering aggregate into a pre-drilled shaft and tamping the layers with vertical impact ramming energy. Plans depicting the parking structure foundations are included in Appendix I.

Scripps Memorial Hospital-La Jolla is concurrently designing and/or constructing improvements including: a Central Energy Plant (CEP), the Scripps XiMED II Medical Office Building (MOB), a walking path, perimeter access roads, and the Burtec parking lot. Plans depicting the proposed improvements developed by Scripps Memorial Hospital-La Jolla are included in Appendix I.

Construction of the CEP commenced in June 2011 and is near completion at the time of this report. As conveyed through the plans in Appendix I, the CEP is being constructed to the southeast of the Genesee Avenue OC. The Scripps XiMED II MOB will be constructed to the north of the parking structure. The walking path and an access road will be constructed between the parking structure, the Scripps XiMED

MOB, and Caltrans right-of-way. The Burtec parking lot will be constructed to the south of the parking structure.

A right-of-way swap with Scripps Memorial Hospital-La Jolla is anticipated to occur to accommodate the construction of RW-4. Plans depicting the estimated areas of the right-of-way swap are included in Appendix I.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted between July and December 2008. Two (2) boring were developed for RW-4. The naming convention used for the boring records includes the boring method, the two digit year, and the approximate centerline Station of the metric preliminary exploration plan, followed by the notation R or L indicating the boring was to the right or left of the 11-SD-5 line Station. For example, boring R-08-47700R is a rotary boring conducted in 2008 that was developed to the right of approximate metric Station 477+00 along the 11-SD-5 line. Metric Stationing was utilized because the subsurface investigation was performed prior to Caltrans transition back to U.S. Customary Units. Boring records for R-08-47700R and R-08-48040R are included in Appendix II. LOTB have been prepared and have been submitted separately from this report. The metric plans referenced for the development of the boring records are not included in this report.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to delineate the soil conditions anticipated to impact the design and construction of RW-4.

The request for the survey of the I-5/Genesee Avenue Interchange Improvement Project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

Bulk soil samples were collected to test the corrosivity of the soil in the project site in the vicinity of the retaining wall alignments. Figure 2A and Figure 2B depict the approximate sample locations.

The naming convention used for the bulk laboratory samples collected was comparable to the metric Station naming convention used for the boring records. The results of the corrosion tests are summarized and discussed in Section 8.0. Corrosion data provided by the laboratory for the I-5/Genesee Avenue Interchange Improvement Project are presented in Appendix III.

Laboratory test data for the I-5/Genesee Avenue Interchange Improvement Project are included in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

This section describes the project site geology and subsurface conditions. The project site geology was interpreted based on previous field investigations, current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map was acquired from the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975*. The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining wall and the extent of fill mapped by OGDS2. Figure 6A and Figure 6B depicts a profile of the geology beneath the existing grade along the alignment of RW-4 and RW-5. Figure 7A through Figure 7J depicts the geology of cross sections at the most severe case of wall and slope geometry.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. RW-4 will be located on the east side of I-5 along the west facing slope of the through cut. The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

The entire length of RW-4 will be located in a cut slope composed of sedimentary formation. The majority of the sedimentary formation that will host RW-4 is comprised of weakly indurated, interbedded sandstone and siltstone mostly mantled by a thin veneer of young soil. Lenses of indurated sandstone, cobbles in a sandstone matrix, and clay clasts in a sandstone matrix outcrop along the bottom of the cut slope, while weakly indurated sandstone is exposed in erosion rills higher on the slope. Concretions were not encountered in the exploratory borings; however, concretions were observed at the base of the cut slope near Genesee Avenue. The concretions are well cemented nodules and lenses ranging from a few inches to a few feet in dimension. Photographs of concretions exposed during construction of the CEP at Scripps Memorial Hospital-La Jolla, which is located to the north of the RW-4 and RW-5 alignments, are depicted in Appendix II.

The geologic units in the project area as depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fill in the project area appear to be derived from material excavated from nearby cuts in the sandstone and siltstone. Artificial fill encountered during the field investigation were determined to be engineered fill that conforms to Caltrans standards.
- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.
- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the

overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voigt Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the I-5/Genesee Avenue Improvement Project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the *City of San Diego, Seismic Safety Study Geologic Hazards and Faults* for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand-years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC through the UCSD campus and into Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault system running on a north-northwest trend and located offshore approximately two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

The project site is underlain by competent sandstone and siltstone with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible, or expansive soils have not been observed along the proposed alignment of RW-4.

Landslides are commonly associated with the Ardath Shale where expansive claystone locally comprises as much as twenty-five-percent (25%) of the geologic unit. Expansive claystone was not observed along the alignment of RW-4. Landslides are not anticipated to be a geologic hazard at the location.

Depth to Bedrock

Sedimentary formation is located at the ground surface along the alignment of RW-4. A thin veneer of sand and silt sloughed off the parent rock overlies the slope. Some fill up to thirty-feet (30ft) in depth lies within relic canyons beneath the parking structure.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-4 is not located along a stream course. A scour evaluation for the retaining wall is not applicable to this project.

8.0 CORROSION EVALUATION

Bulk soil samples were collected to test the corrosivity of the soil in the vicinity of the retaining wall alignments. Corrosion results for RW-4 are included in Table 2. Corrosion data provided by the laboratory for the I-5/Genesee Avenue Interchange Improvement Project are presented in Appendix III. The naming convention used for the bulk laboratory samples collected was comparable to the metric Station naming convention used for the boring records.

Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

One of the samples collected in the vicinity of the retaining wall alignments had a pH of five and forty-three one hundredths (5.43), which are slightly less than the limit of five and one-half (5.5). However no other indicator of corrosive conditions were present in the samples collected and analyzed in the vicinity of RW-4 or in samples collected for other retaining walls in the I-5/Genesee Avenue Improvement Project area. Additionally, a pH of five and forty-three one hundredths (5.43) is also very close the limit of five and one-half (5.5). Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set for in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B.*

According to the *Seismic Design Criteria (SDC) Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50).

The two (2) borings developed in the vicinity of the retaining wall alignments consistently had SPT results that were generally greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in Appendix B of the SDC, the Soil Profile Type is “C” for sedimentary formation.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the ARS online tool was five hundred and sixty-meters per second (560m/s), which correspond to Soil Profile Type C. The closest regional active fault as indicated by the Caltrans ARS Online tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately fifteen one hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The project site is located within sedimentary formation and well above any groundwater table. There is no potential for liquefaction at the project site.

Since active faults are in the vicinity of the project site, ground motion may result from an earthquake. However, since no active faults transect the project site, there is no potential for surface fault rupture at the project site.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

RW-4 will be constructed within dense sedimentary formation. There is no potential for seismically induced settlement. RW-5 will be constructed within artificial fill without the presence of water. The potential for seismically induced settlement is minimal.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of RW-4 do not exist at the project site.

Pseudo static modeling and slope stability analyses were conducted to assure that RW-4 will meet stability requirements in a seismic event. Stability analyses are discussed in Section 11.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

Wall selection considerations are presented in detail in the SPGR. In summary, RW-4 will be a large retaining wall developed in cut on a sizable slope capped by buildings and facilities associated with Scripps Memorial Hospital-La Jolla. A temporary back cut to facilitate the construction of any cast-in-place retaining wall of the proposed height is not feasible. A self-shoring, top-down stage construction retaining wall system is appropriate for the site constraints, slope geometry, and sedimentary formation that exist at the proposed wall location. A combination soil nail/diaphragm ground anchor wall is the most economical of such retaining wall systems for this site. The retaining wall parameters as provided by the project development team and as determined through the evaluation of site soils are presented in Table 4A and Table 5A.

The wall design and global slope stability analyses for the diaphragm ground anchor segment of RW-4 was performed using STEDWIN with GSTABL7 v2.0. The wall design and global slope stability analyses for the soil nail segment of RW-4 was performed using STEDWIN with GSTABL 7 v.2.0 and SnailWin v.3.10. Both internal stability and global stability were evaluated by modeling various wall heights and adjoining slopes. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of external loading such as the weight of buildings and possible transient loads above the wall was factored into the wall type and stability analyses. The criteria found to control the design length of the ground anchors and soil nails was the need to satisfy global slope stability. The soil strength design parameters utilized in the analyses are presented in Table 3. The basis

for the selection of the soil strength parameters was archived data, field test results, laboratory test data, and engineering experience and judgment. The ground anchors and soil nail design parameters utilized in the analyses are presented in Table 4B and Table 5B through Table 5C.

In the stability analyses performed, permanent structures were modeled as a one thousand-pound per square foot (1000psf) distributed vertical load, undefined transient loads were modeled as a two hundred and forty-pound per square foot (240psf) vertical load, and seismic loads were modeled as one third (1/3) the Peak Ground Acceleration (PGA)anticipated for the site. The location and magnitude of the transient and building loads are presented in Table 6. These loads are depicted on the graphical plats included in Appendix IV.

The graphic results of the stability analyses and graphic results of Snailwin v3.10 analyses are presented in Appendix IV.

The earth retained by a diaphragm ground anchor wall does not require movement in order to activate resisting forces along the ground anchor. Deflection of the wall face and deformation of the earth behind the wall face are anticipated to be minimal. Therefore, construction and performance of RW-4 should have no adverse impact on nearby facilities.

The earth retained by a soil nail wall must move in order to activate resisting forces along the nails. Minor deflections of the wall face and minor deformations of the earth behind the wall face should be anticipated along the soil nail portion of RW-4. The wall face deflection and maximum limits of adjacent ground surface deformation maybe estimated based on guidelines presented in the *Manual for Design and Construction Monitoring of Soil Nail Walls, Publication No. FHWA A-SA-96-069R*. A horizontal and vertical deflection of about one half-inch (0.5in) should be anticipated for the wall face. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height. These estimated wall movements are not anticipated to have an adverse impact on any facilities located behind the wall.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-4 be designed and constructed as a combination soil nail/diaphragm ground anchor wall. The parameters that may be used for the structure design are presented in Table 4A and Table 4B; and Table 5A through Table 5C. The necessity to provide slope stability was found to govern the unbonded lengths of ground anchors and the length of the soil nails. The unbonded lengths and the ground anchor forces required to provide slope stability for the ground anchor segment are provided in Table 4B. The apparent earth pressures utilized for design are presented in Table 7.The soil nail design data necessary to provide slope stability for the soil nail segment are provided in Table 5B and Table 5C. The nail length and minimum stress per unit length of nail to provide slope stability are presented in Table 5C.

The southern end of the RW-4 will not be constructed to its ultimate height. The ultimate wall will be completed during the North Coast Corridor Widening Project. The ground anchor wall design parameters provided in Table 3A are applicable to the current wall height as well as the planned ultimate wall height

The project site soils are considered non-corrosive. RW-4 may be designed accordingly.

12.0 NOTES TO DESIGNER

As currently planned, many ground anchors will extend beyond the current freeway right-of-way. The unbonded length of the ground anchors provided in Table 4B should be used for determining the right-of-way requirements only.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining wall should be avoided. Features that promote infiltration could have an adverse impact on the performance of the retaining walls.

A diaphragm ground anchor wall and a soil nail wall may be constructed with either a sculpted shotcrete or cast-in-place facade. Sculpted shotcrete is typically more economical.

Temporary unsupported slopes of one horizontal to twelve vertical (1H:12V) with a maximum height of six-feet (6 ft) are stable in formation along the alignment of RW-4. Vertical slopes of a maximum height of six-feet (6ft) are stable in formation.

The coefficient of dissimilar materials, Delta (δ) used in the design of the diaphragm ground anchor portion of RW-4 is 0.55 between concrete and formational sandstone.

The bearing capacity of formation soils along the alignment of RW-4 is sufficient to accommodate the design pressures applied to the slope by the ground anchors. The bearing capacity of the formation is sufficient to accommodate the applied load during all phases of RW-4 construction.

The allowable bearing capacity of the two strata that will be encountered along the length of RW-4 are:

- Sedimentary Formation – 11,000psf
- Artificial Fill – 4,370psf

The ultimate bearing capacity of the two strata that will be encountered along the length of RW-4 are two time the allowable bearing capacity.

The Dynamic Lateral Pressure used for the design of the diaphragm ground anchor portion of RW-4 is 28 x (Height of Wall) and is represented as an inverted triangle shape.

13.0 CONSTRUCTION CONSIDERATIONS

The sedimentary formation found along the alignment of RW-4 may generally be excavated using standard excavation equipment. Nail shafts may generally be drilled with conventional nail drilling equipment.

Rock like material (cobbles and concretions) exists within the sedimentary formation. Excavation and drilling equipment capable of cutting through sporadic concretions up to a few feet in dimension should be utilized. It should be anticipated that one or more concretions may be encountered during the drilling of one quarter (1/4) of the tieback shafts, particularly at the lower wall elevations along the Genesee Avenue off ramp.

The occurrence of groundwater is not anticipated to significantly impact retaining wall construction.

The occurrence of caving soils is anticipated to be minimal and is not anticipated to significantly impact retaining wall construction.

The construction of the diaphragm ground anchor wall and soil nail wall are not anticipated to have any adverse effect on existing facilities or utilities. However, a pre-construction survey of the super adjacent Scripps Memorial Hospital-La Jolla facilities should be conducted to document the condition of the facilities prior to construction.

Survey monuments should be placed on the ground surface a horizontal distance of fifteen-feet (15ft) behind the wall face. The position of these monuments should be measured and recorded prior to any wall excavation and periodically throughout the project in order to monitor and document ground deformation behind the retaining wall.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2010*. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is somewhat less than prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to abundant geologic exposures available by inspection in the existing cut slope and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and locations that have been provided to OGDS2. If any changes are made during final project design, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analysis. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

Caltrans, *Corrosion Guidelines*, Version 1.0, September 2003

Caltrans, *District Preliminary Geotechnical Report, I-5 North Coast Corridor Widening Project*, EA 11-235800, October 2005

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Caltrans, *Geotechnical Services Design Manual*, Version 1.0, August 2009

Caltrans, *Memorandum, Geotechnical Recommendation for Concrete Median Barrier, Interstate-5 Post Mile 28.2-29.5*, EA 11-24370K

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Caltrans, *Seismic Design Criteria, Appendix B*, August 2009

Caltrans, *Soil and Rock Logging, Classification and Presentation Manual*, June 2010

Caltrans, Structure Preliminary *Geotechnical Report, Interstate-5/Genesee Avenue Interchange Improvement Project & Interstate-5 North Coast Corridor Widening Project Retaining Wall-4*, EA 11-022330 & 11-235800, April 2008

FHWA, *Manual for Design and Construction Monitoring of Soil Nail Walls*, Publication No. FHWA-SA-96-069R

Ninyo & Moore, *Preliminary Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-235800), December 2005

Ninyo & Moore, *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-022330), December 2007

PBS&J, *University of California San Diego Long Range Development Plan, Final Environmental Impact Report,* September 2004

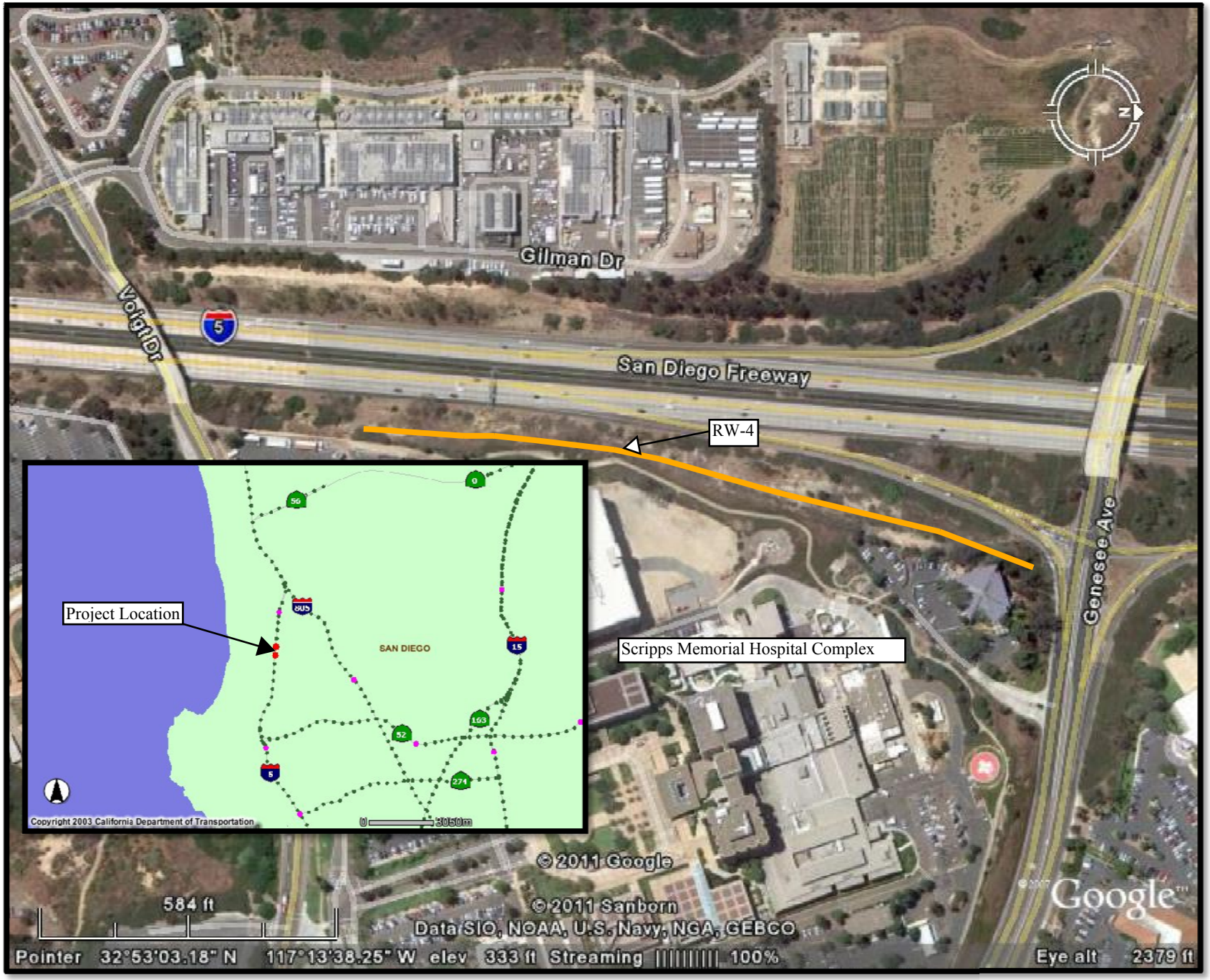
Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

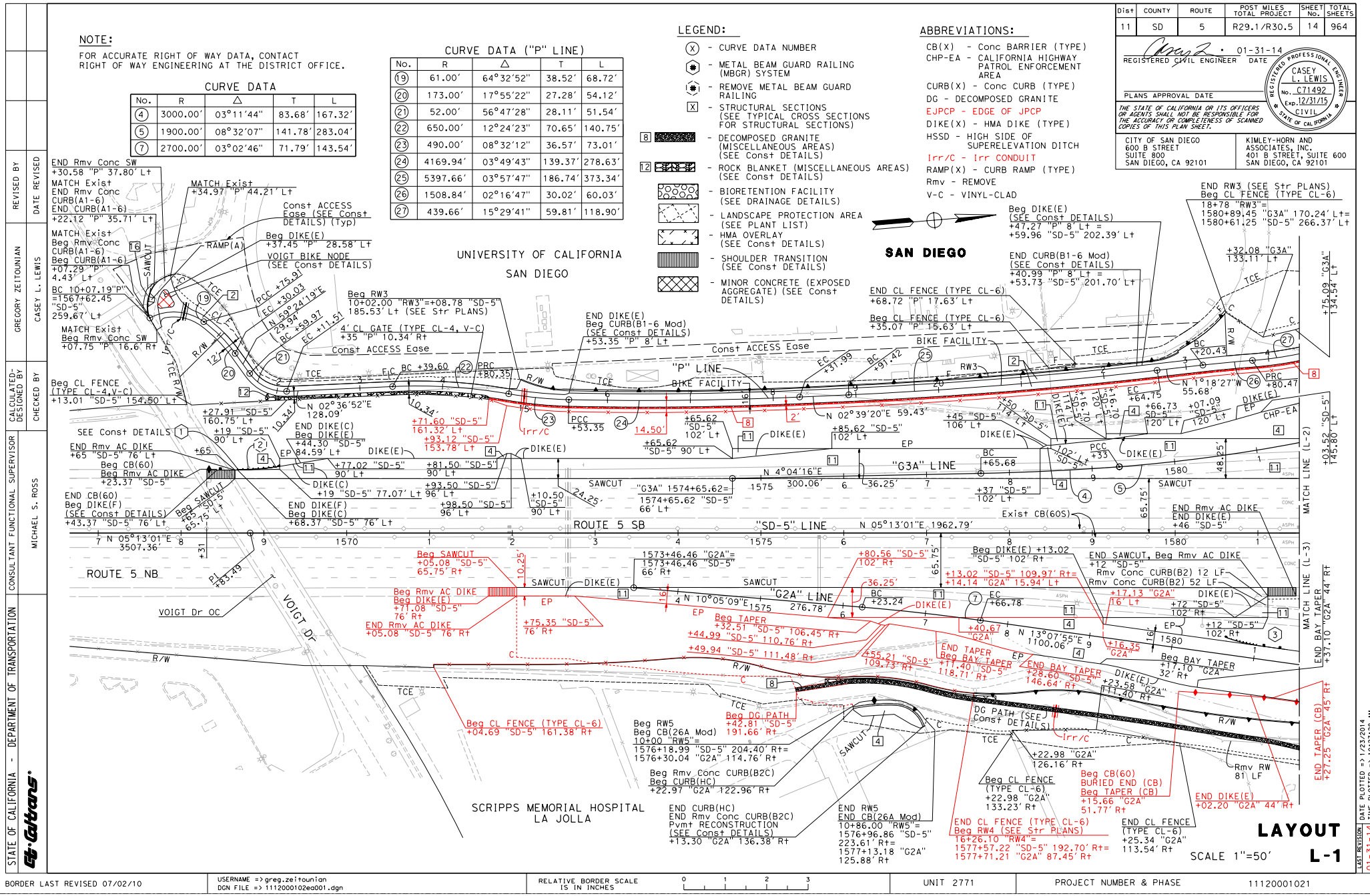
FIGURES

Note: Retaining wall alignments and lengths are approximated.



Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 1100000012

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH



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Retaining Wall-4
EA 11-022331/EFIS 1100000012

FIGURE 2A: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	16	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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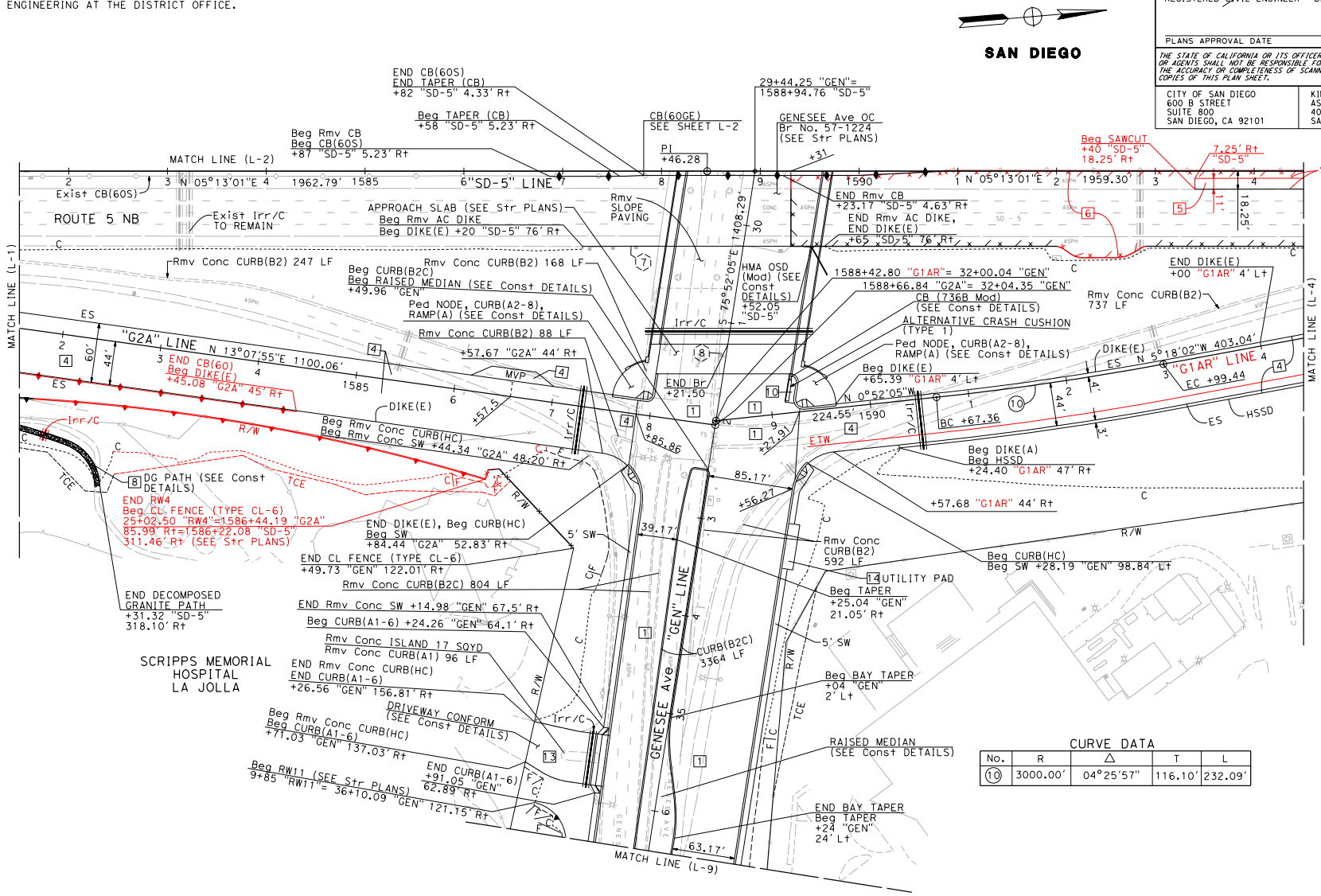
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



CURVE DATA

No.	R	Δ	T	L
10	3000.00'	04°25'57"	116.10'	232.09'

LAYOUT

SCALE 1"=50' **L-3**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN — CHECKED BY: CASEY L. LEWIS

REVISED BY — DATE REVISED

LAST REVISION 01-31-14 — DATE PLOTTED => 1/23/2014 — TIME PLOTTED => 10:22:35 AM

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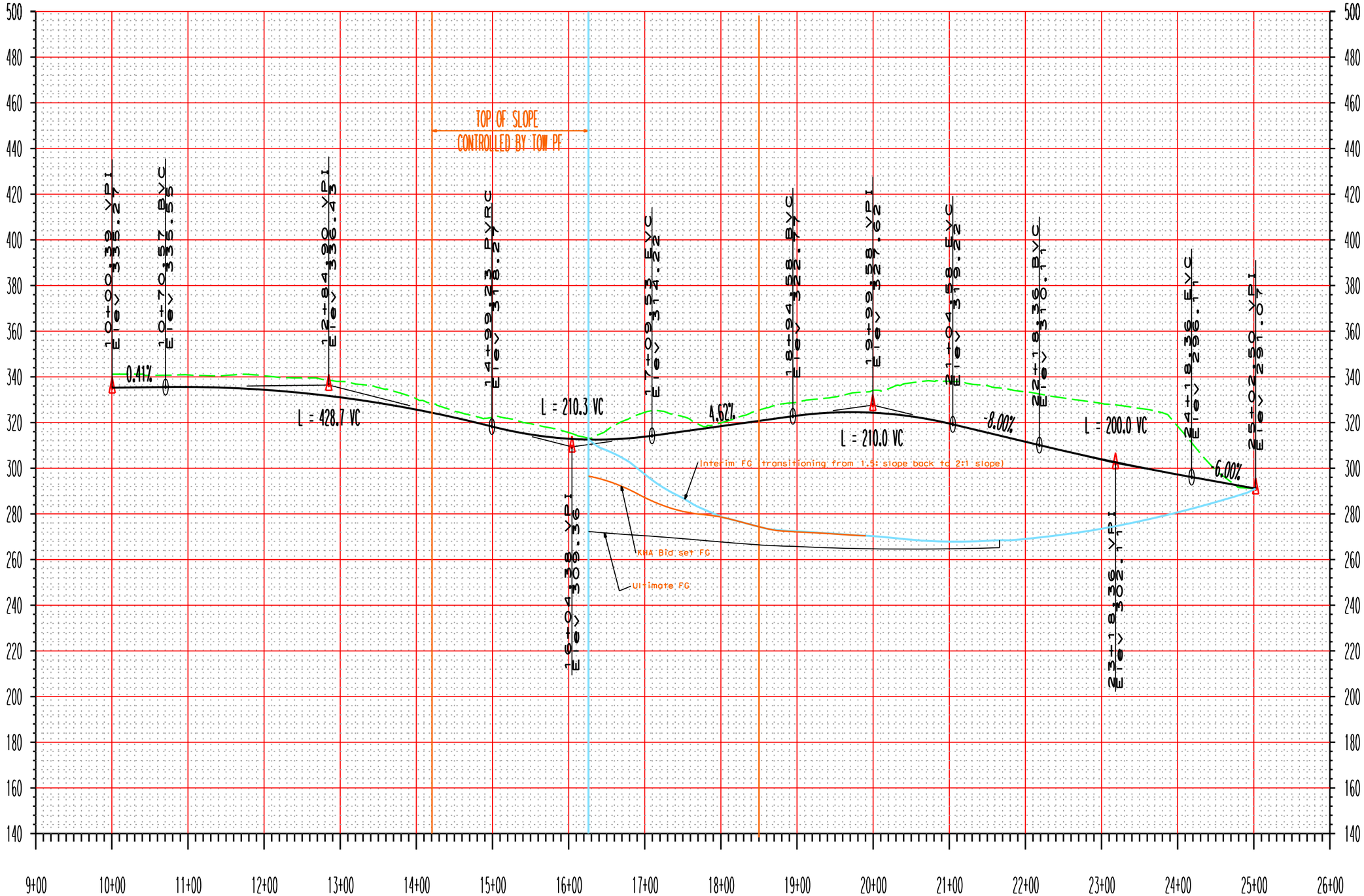
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 1100000012

FIGURE 2B: PROJECT LAYOUT

WALL 4_Cut Cost



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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

FIGURE 3: PROJECT PROFILE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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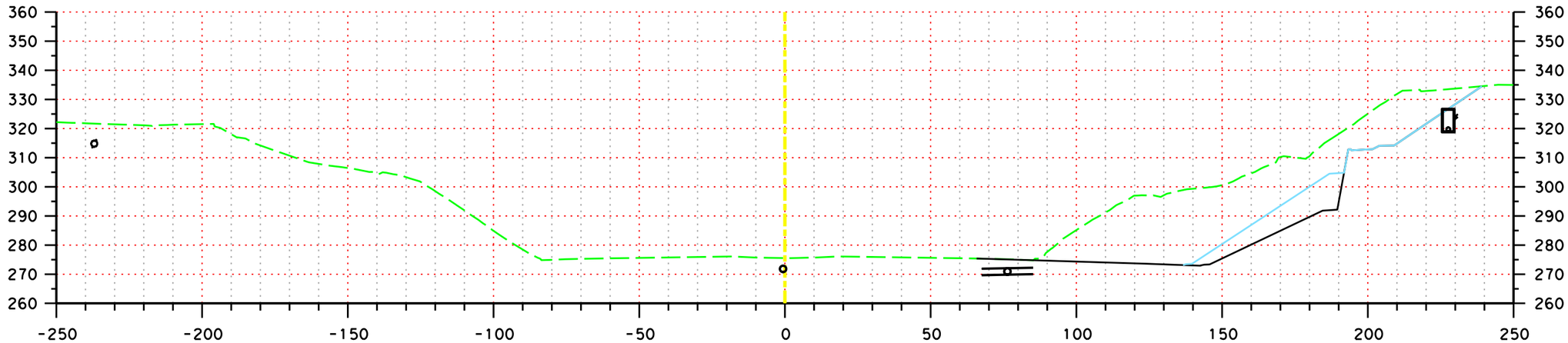
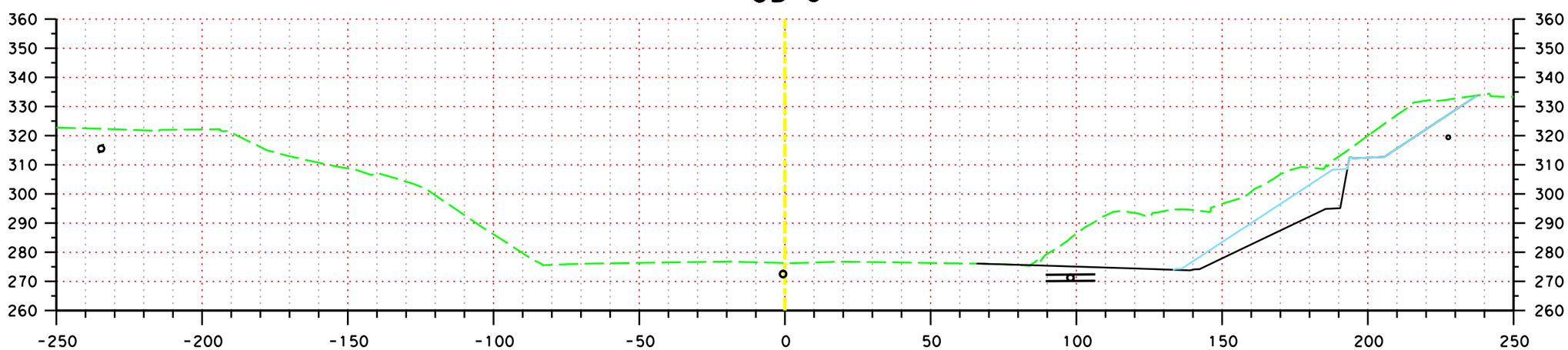
"SD-5"



1578+00.00

"SD-5"



16+60 RW-4-LINE

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1577+75.00 TO STA 1578+00.00

FIGURE 4A: PROJECT CROSS SECTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => $DATE

TIME PLOTTED => $TIME

USERNAME => $USER

REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000

PROJECT NUMBER & PHASE 00000000001

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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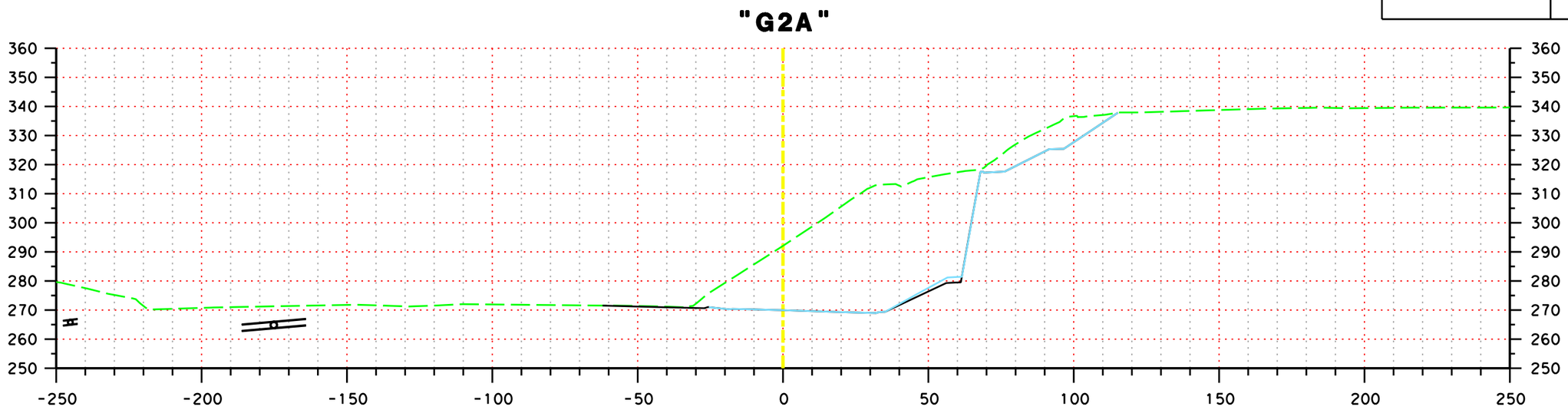

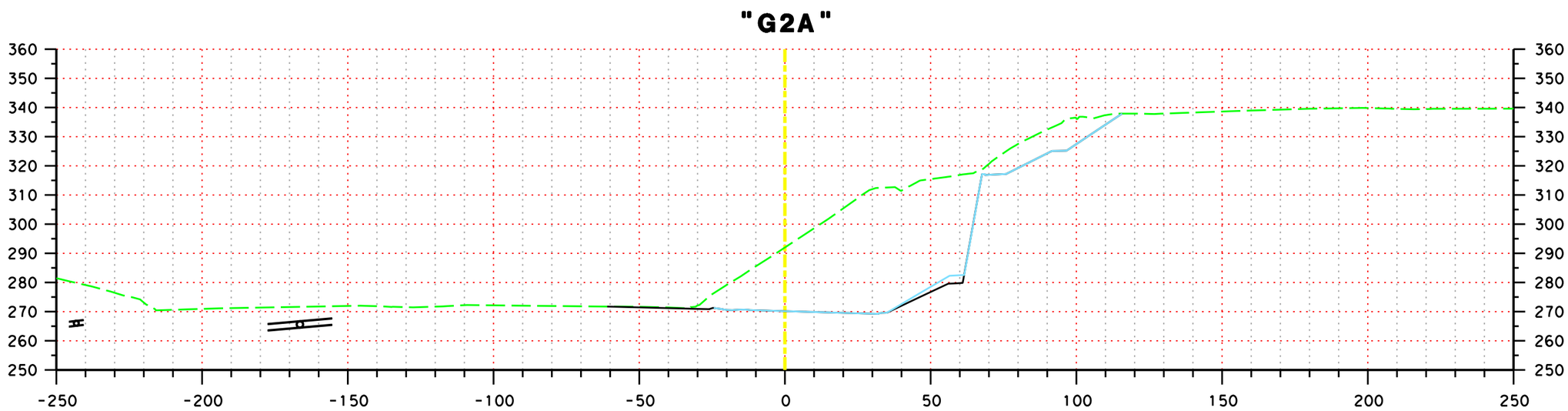

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Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1579+17.10 TO STA 1579+25.00

FIGURE 4B: PROJECT CROSS SECTION

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UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

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REGISTERED CIVIL ENGINEER DATE

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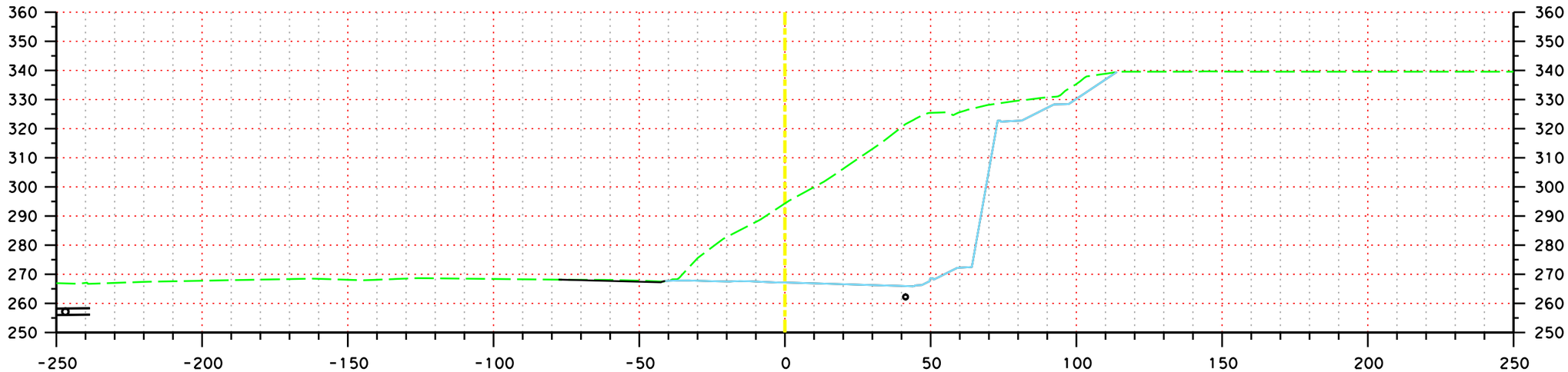
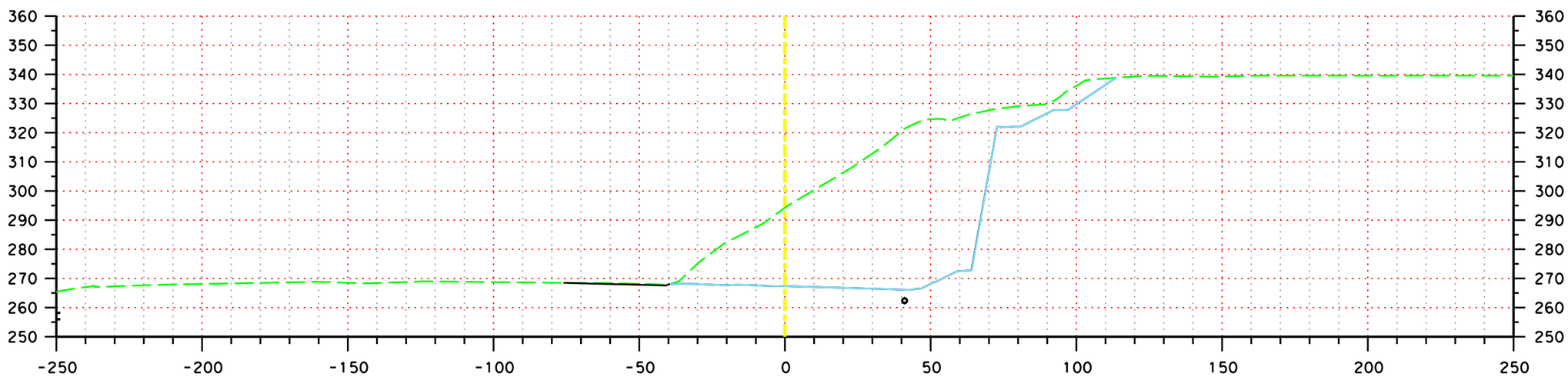
"G2A"



19+00 RW-4-LINE

"G2A"



1580+25.00

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Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1580+25.00 TO STA 1580+37.10

FIGURE 4C: PROJECT CROSS SECTION

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

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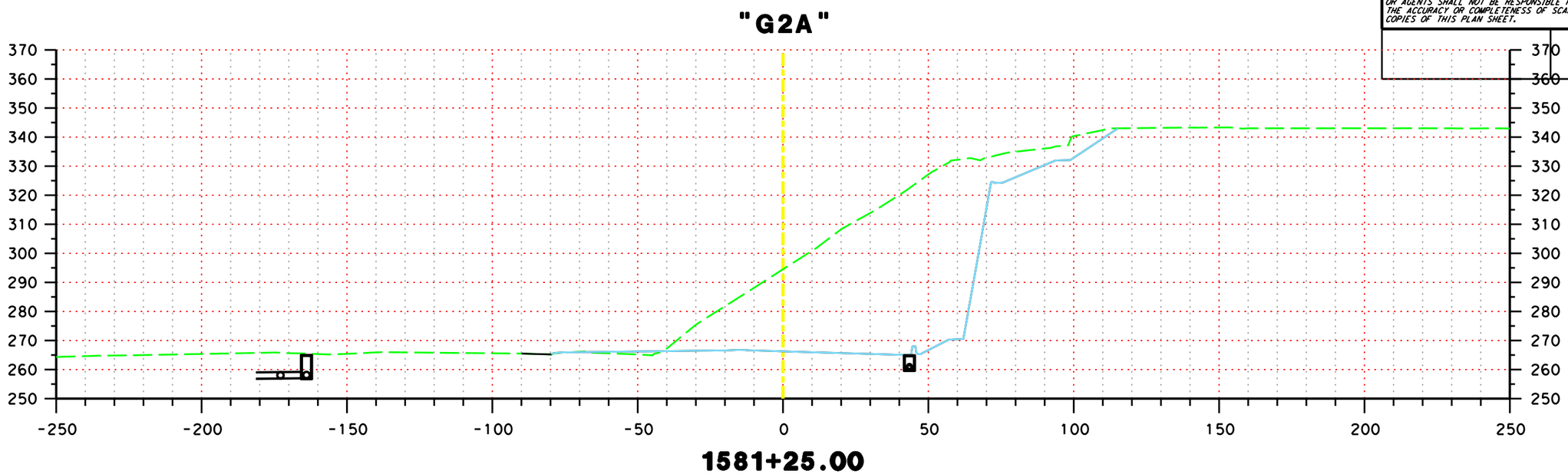

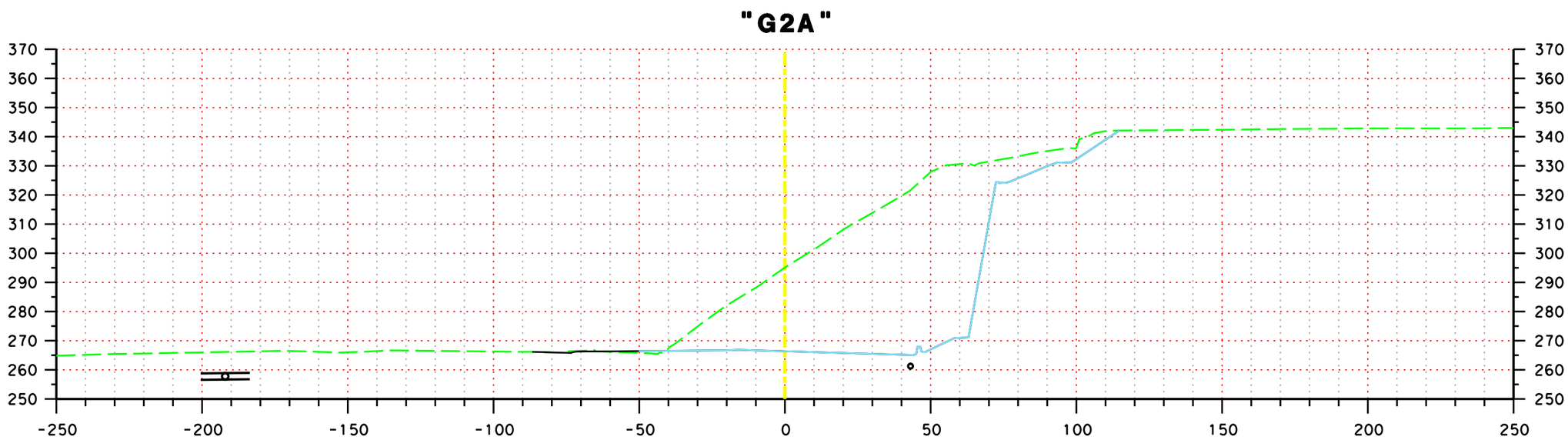

19+90 RW-4-LINE

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1581+02.20 TO STA 1581+25.00

FIGURE 4D: PROJECT CROSS SECTION

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CONSULTANT FUNCTIONAL SUPERVISOR

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UNIT 0000

PROJECT NUMBER & PHASE 00000000001

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

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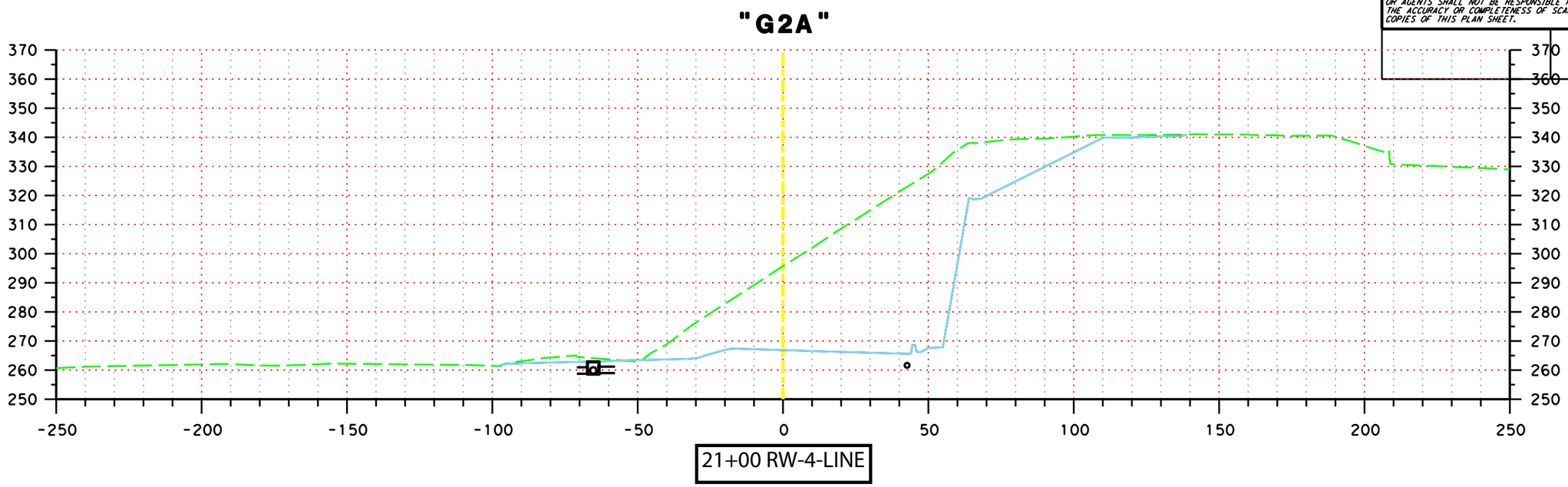

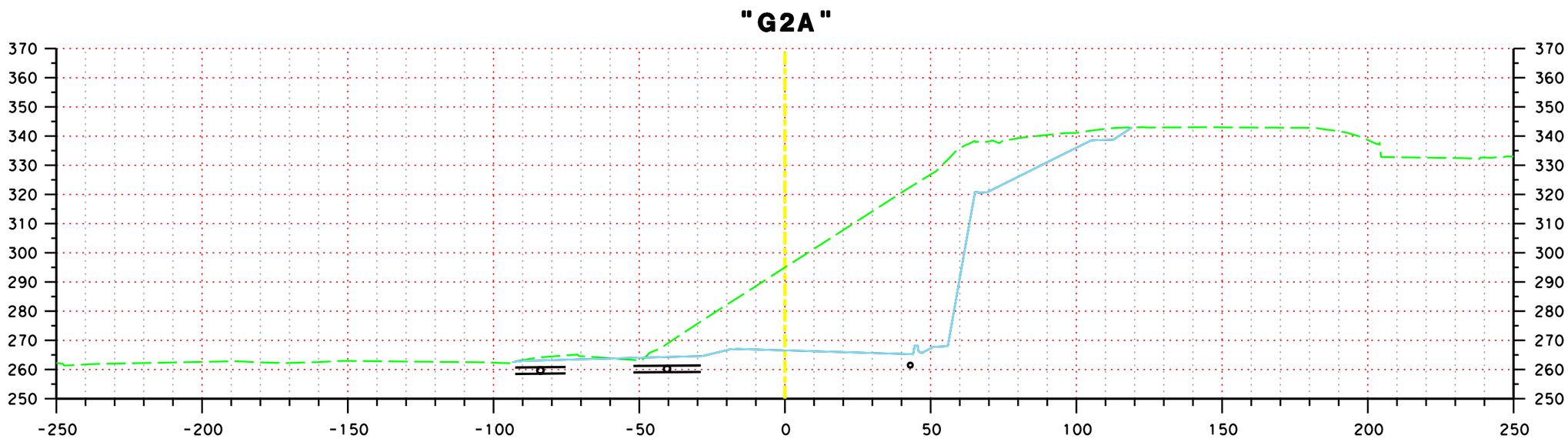

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Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1582+25.00 TO STA 1582+50.00

FIGURE 4E: PROJECT CROSS SECTION

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PROJECT NUMBER & PHASE 00000000001

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

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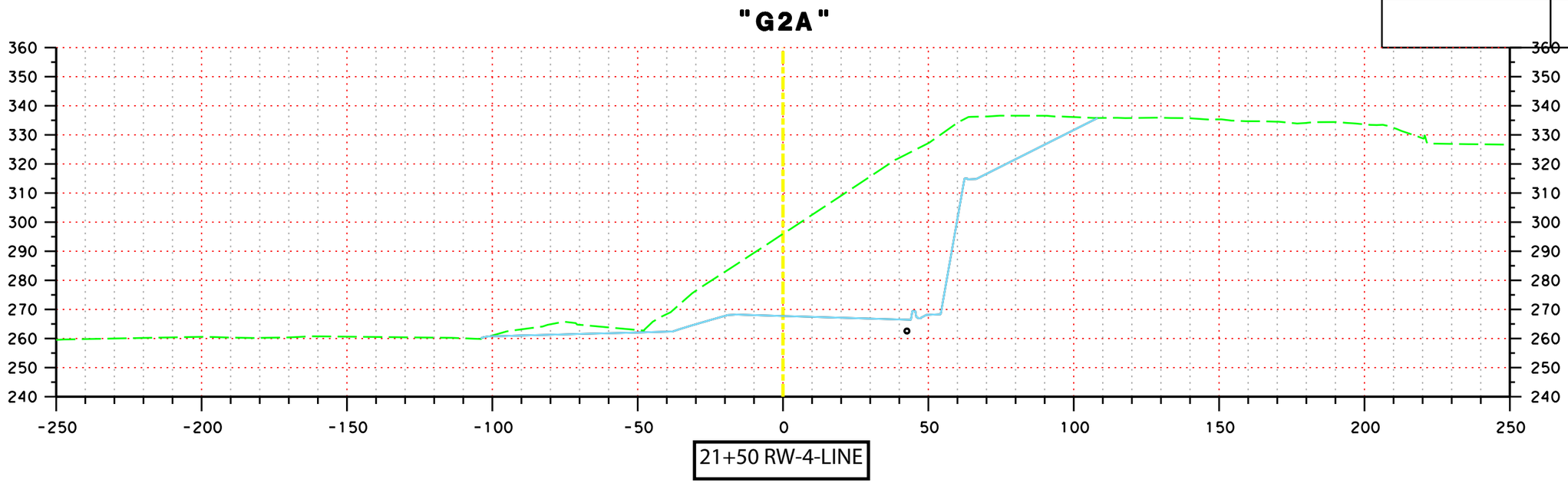

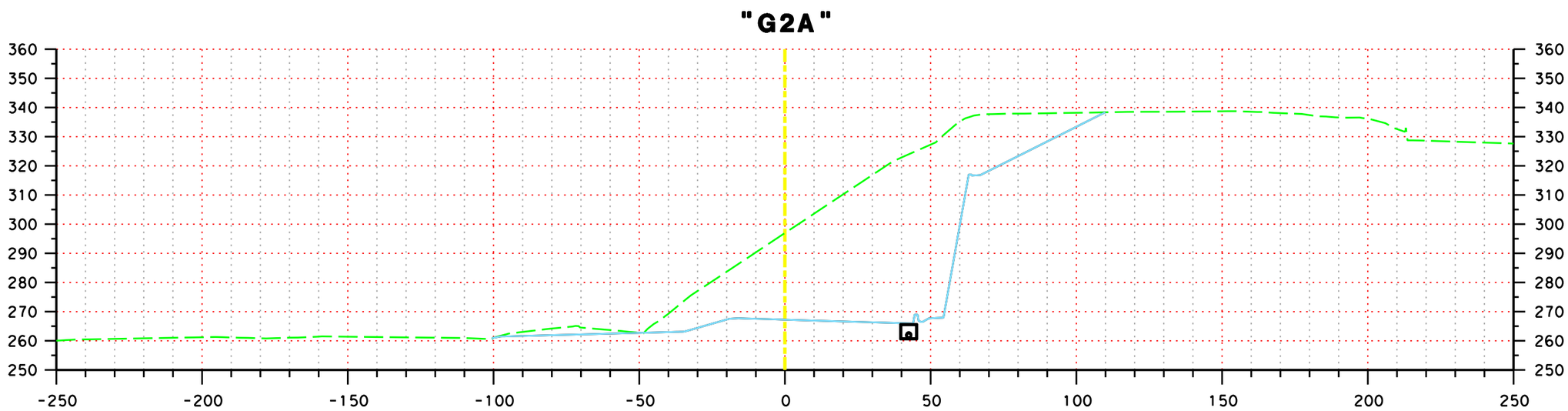

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1582+75.00 TO STA 1583+00.00

FIGURE 4F: PROJECT CROSS SECTION

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

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REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

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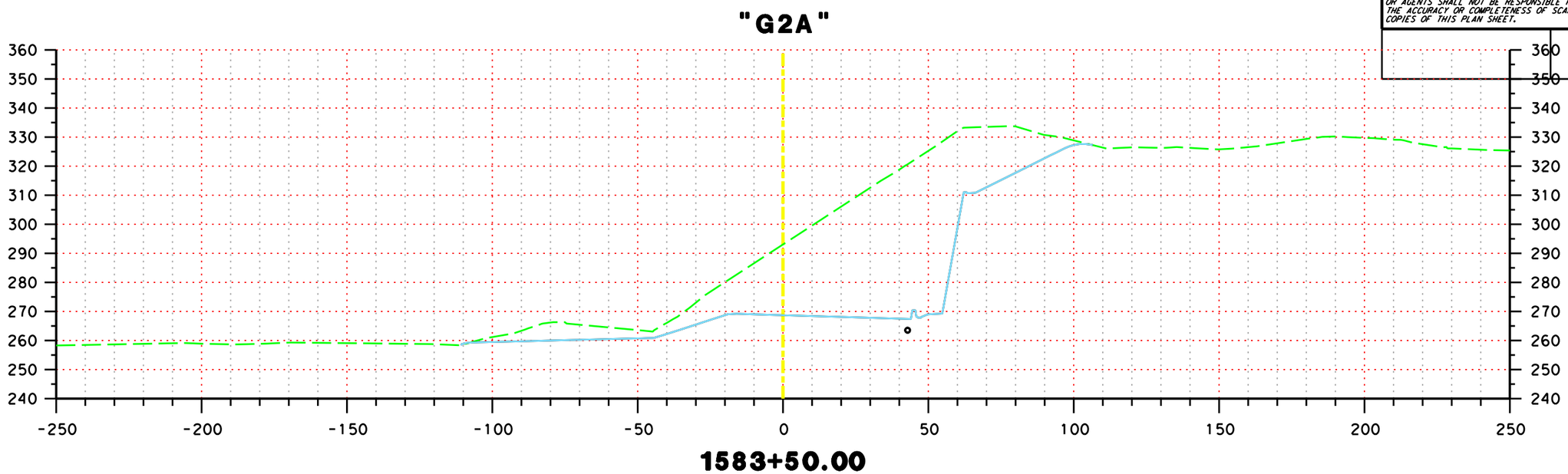

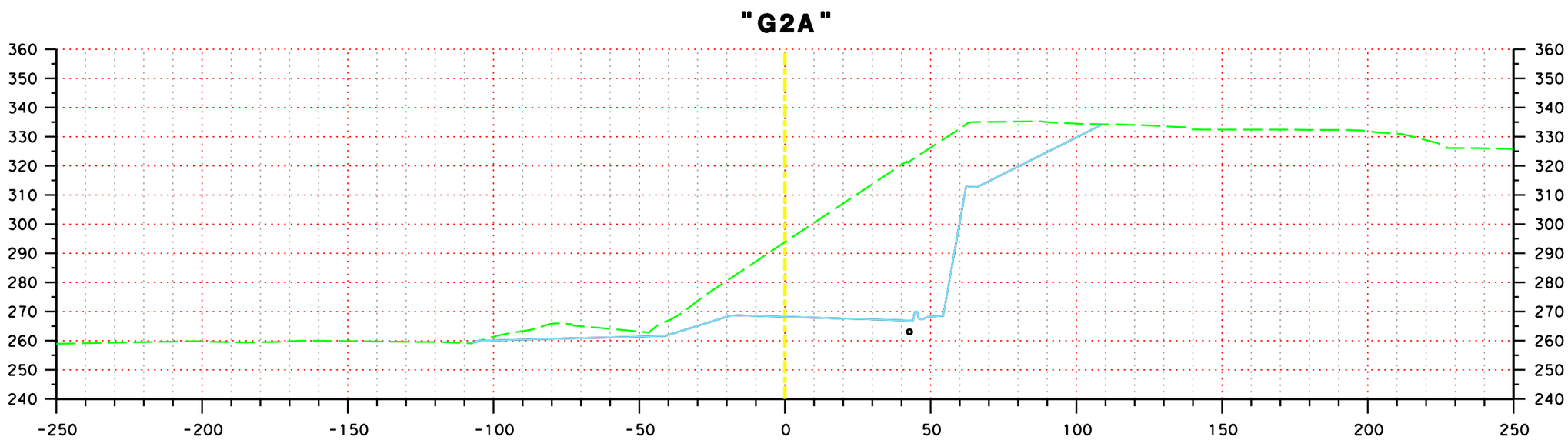

22+20 RW-4-LINE

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1583+25.00 TO STA 1583+50.00

FIGURE 4G: PROJECT CROSS SECTION

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CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00

DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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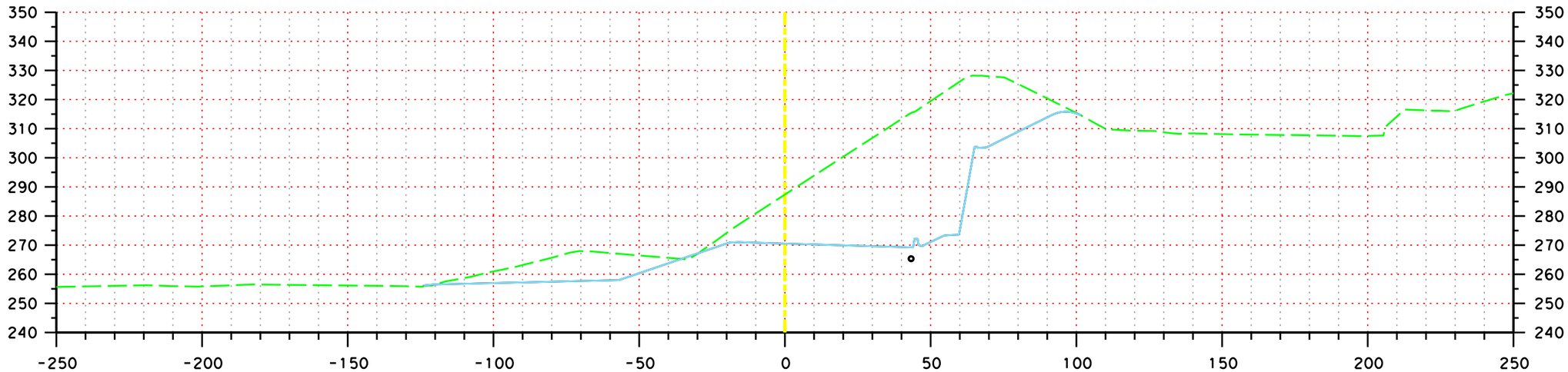
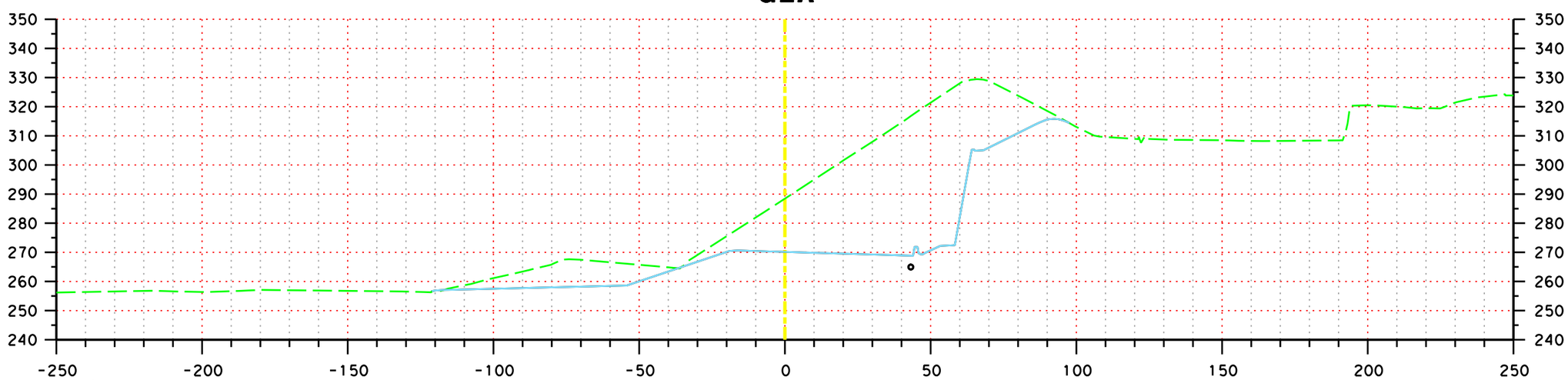
"G2A"



23+00 RW-4-LINE

"G2A"



1584+25.00

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1584+25.00 TO STA 1584+45.06

FIGURE 4H: PROJECT CROSS SECTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => $DATE
TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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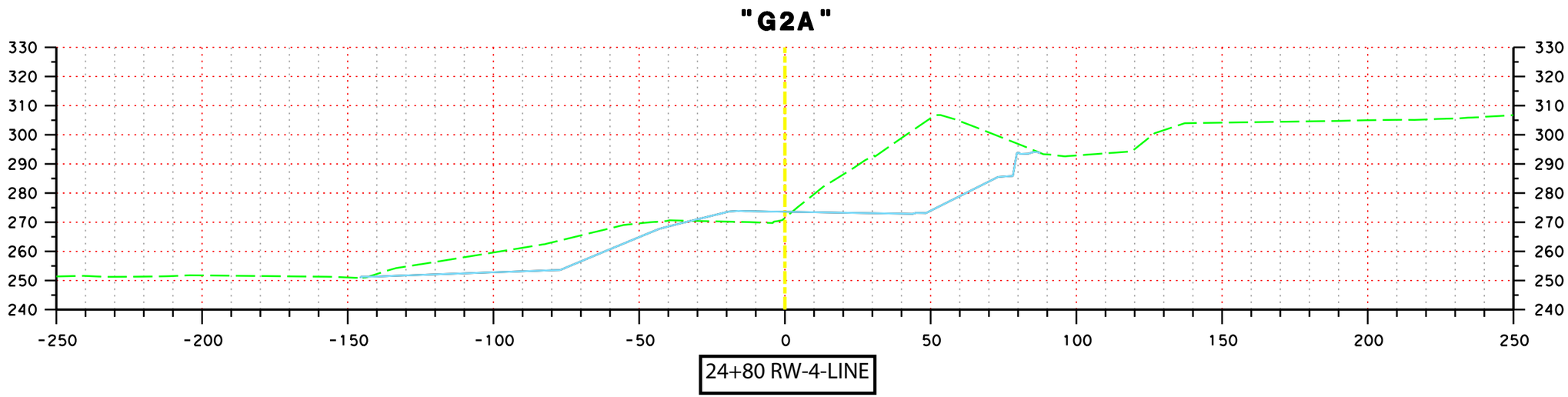

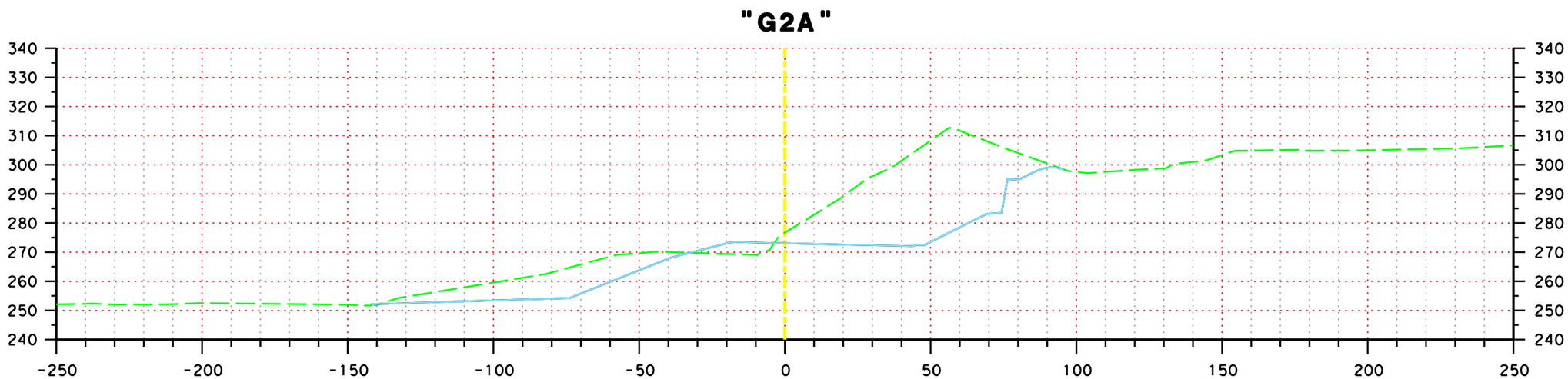

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1585+75.00 TO STA 1586+00.00

FIGURE 4I: PROJECT CROSS SECTION

REVISED BY | DATE REVISED

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CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 00-00-00 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME

USERNAME => $USER
REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE | 00000000001

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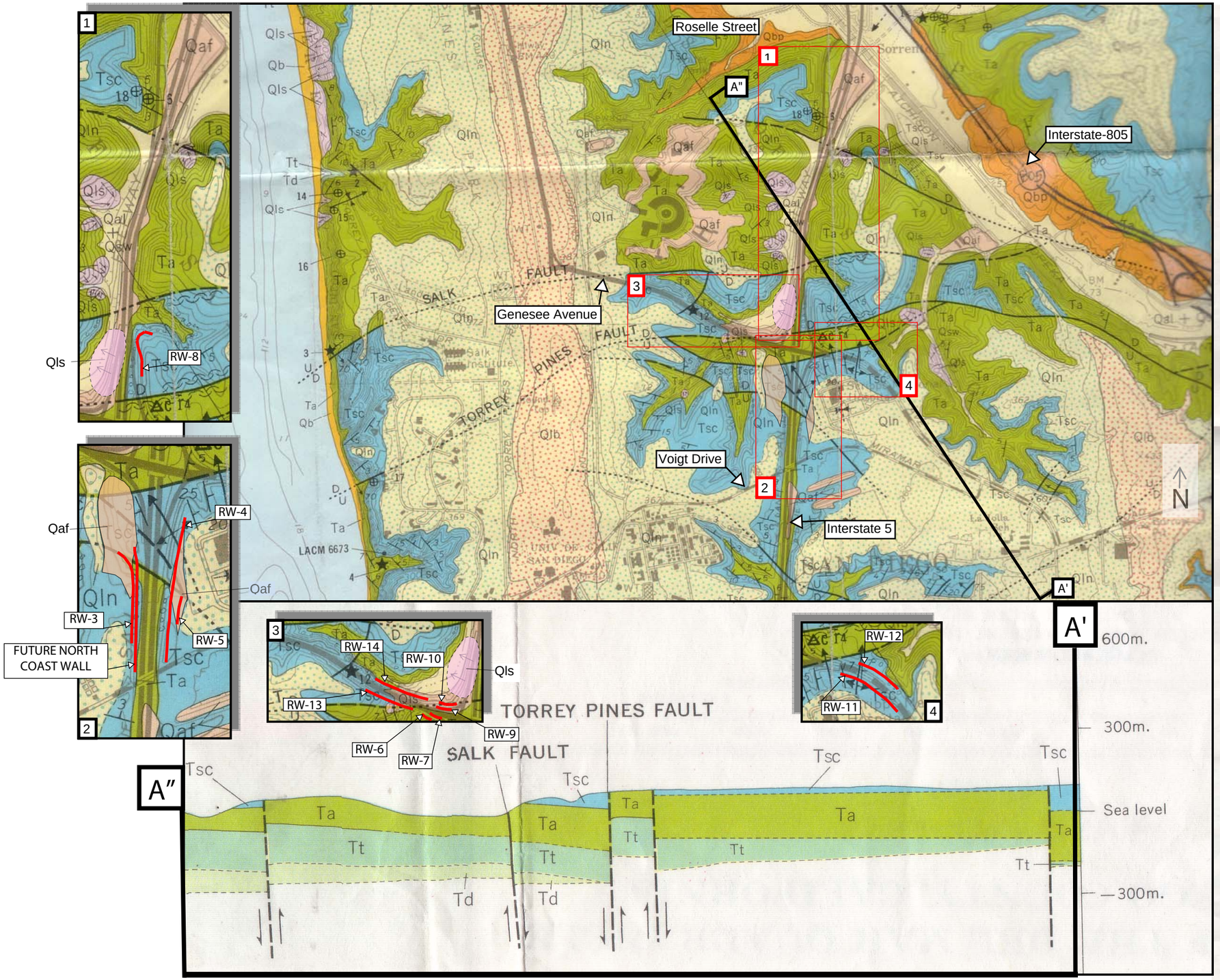
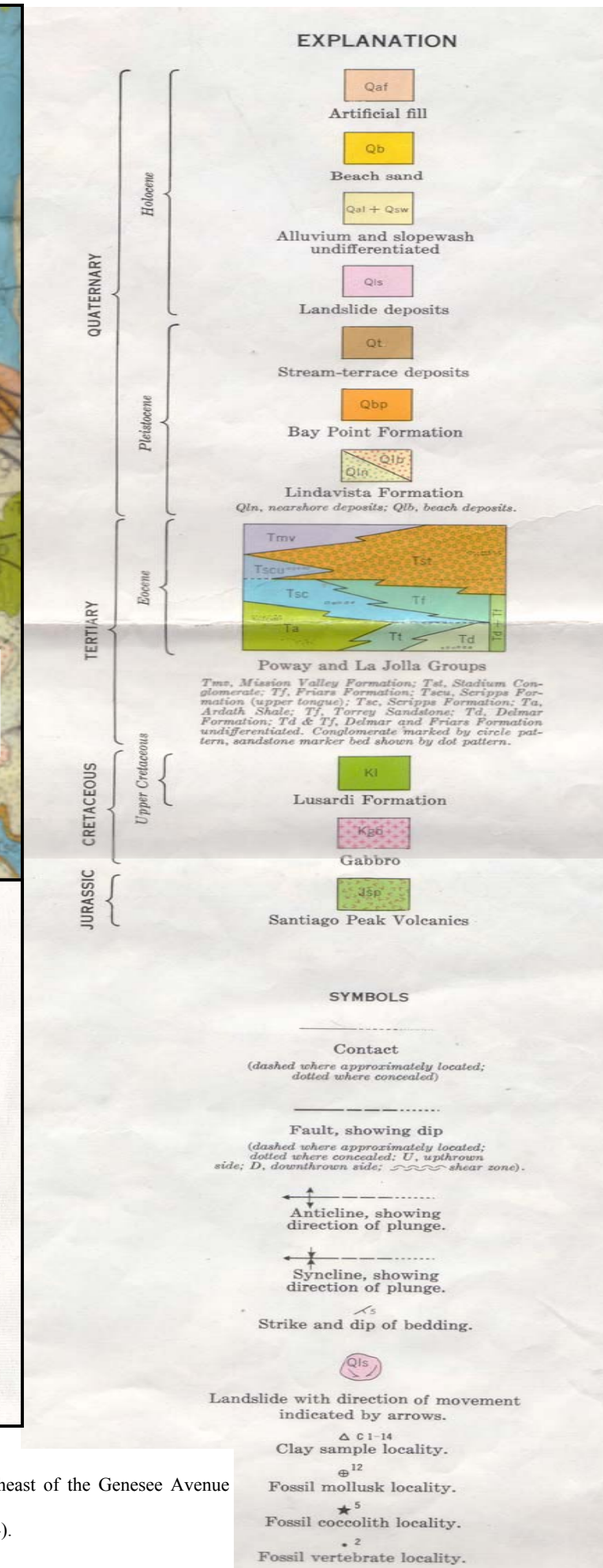


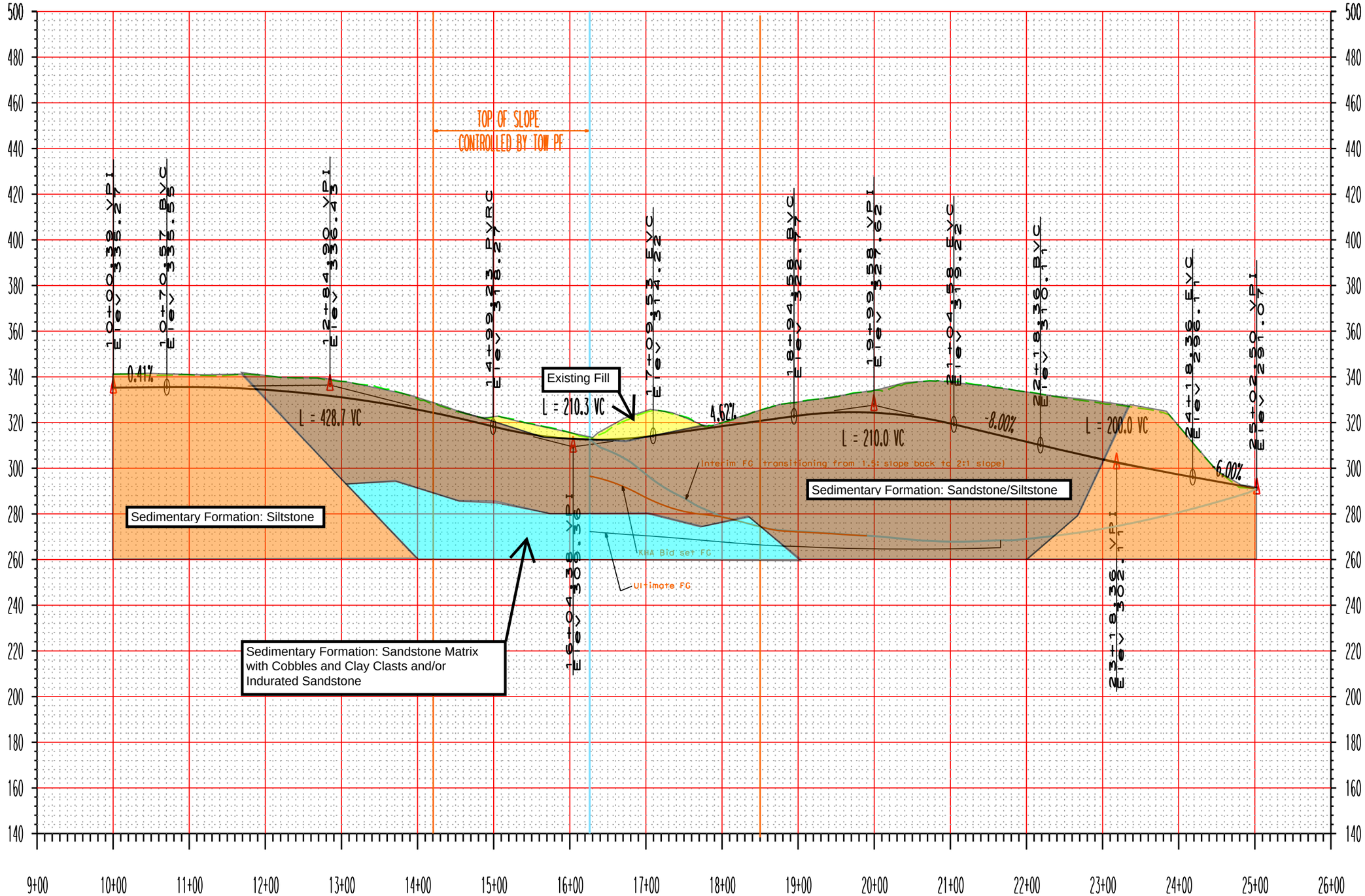


Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP

WALL 4_Cut Cost



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Retaining Wall-4
EA 11-022331/EFIS 11000000012

FIGURE 6: GEOLOGIC PROFILE

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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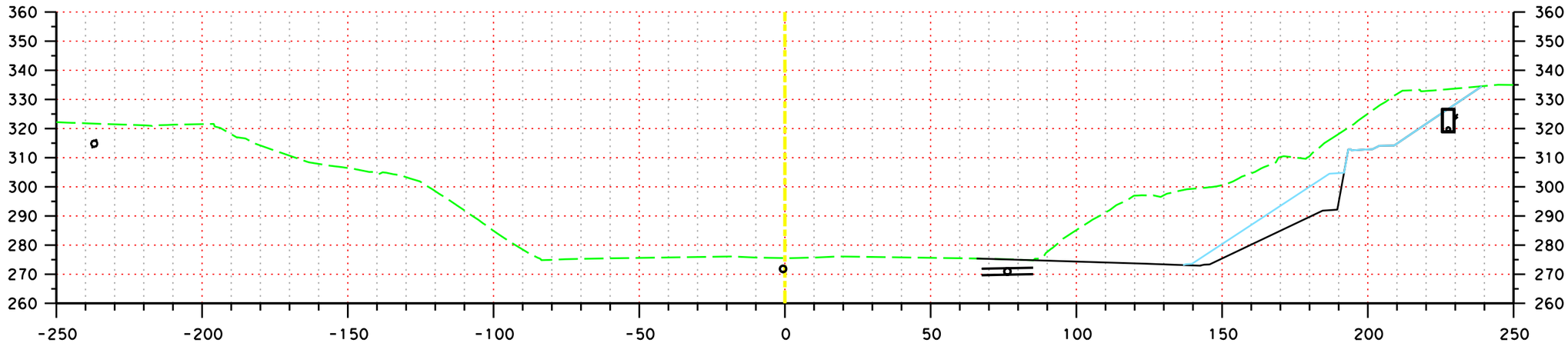

1578+00.00

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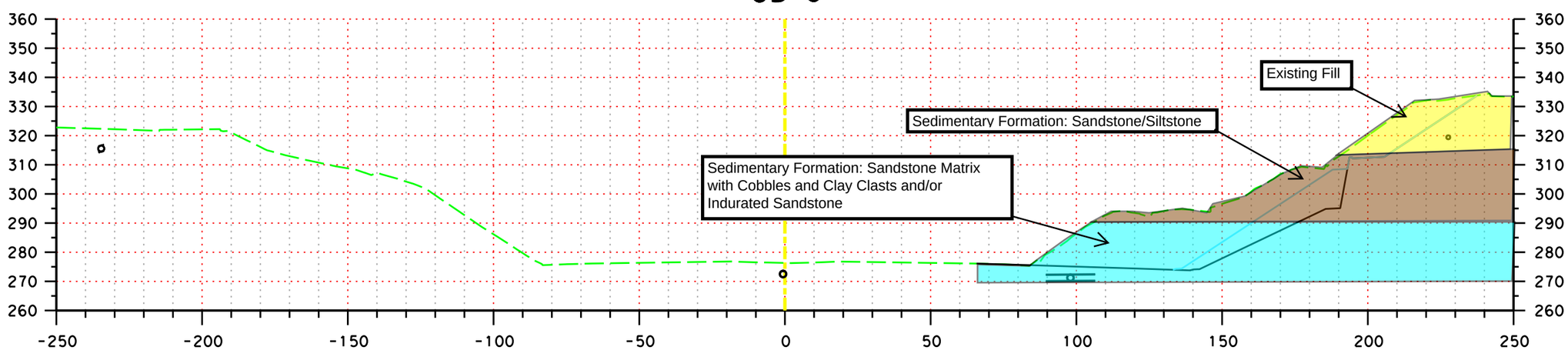

16+60 RW-4-LINE

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1577+75.00 TO STA 1578+00.00

FIGURE 7A: GEOLOGIC CROSS SECTION

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 DATE PLOTTED => $DATE TIME PLOTTED => $TIME

USERNAME => $USER REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000

PROJECT NUMBER & PHASE 00000000001

CUT COST_Wall 4_Alt-10-1-13.dgn 1/24/2014 8:17:45 AM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

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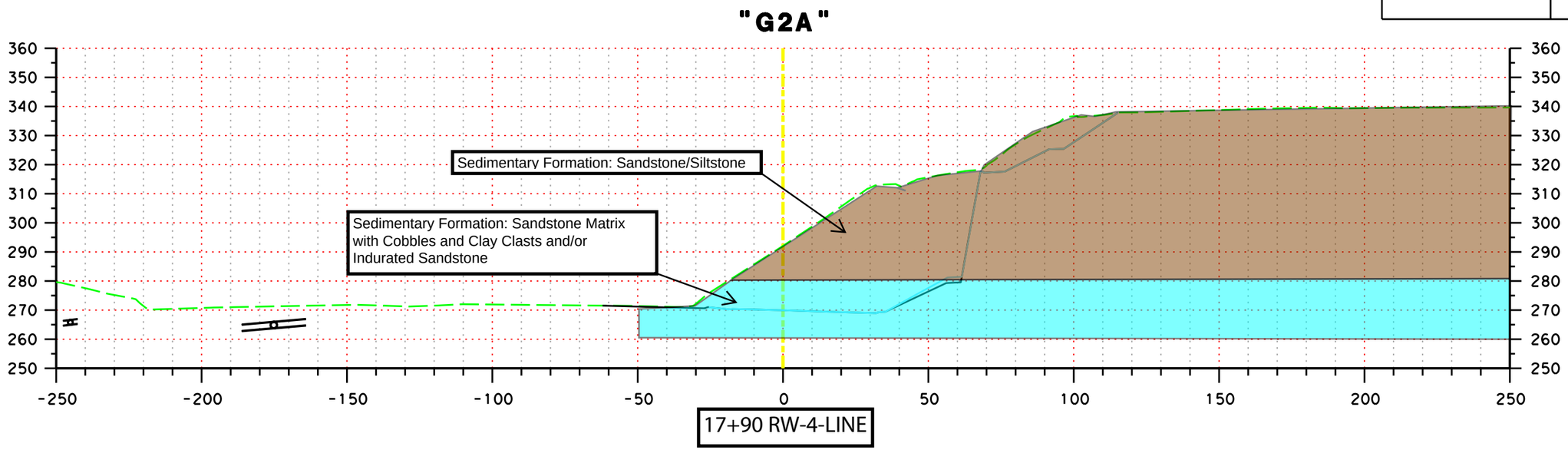

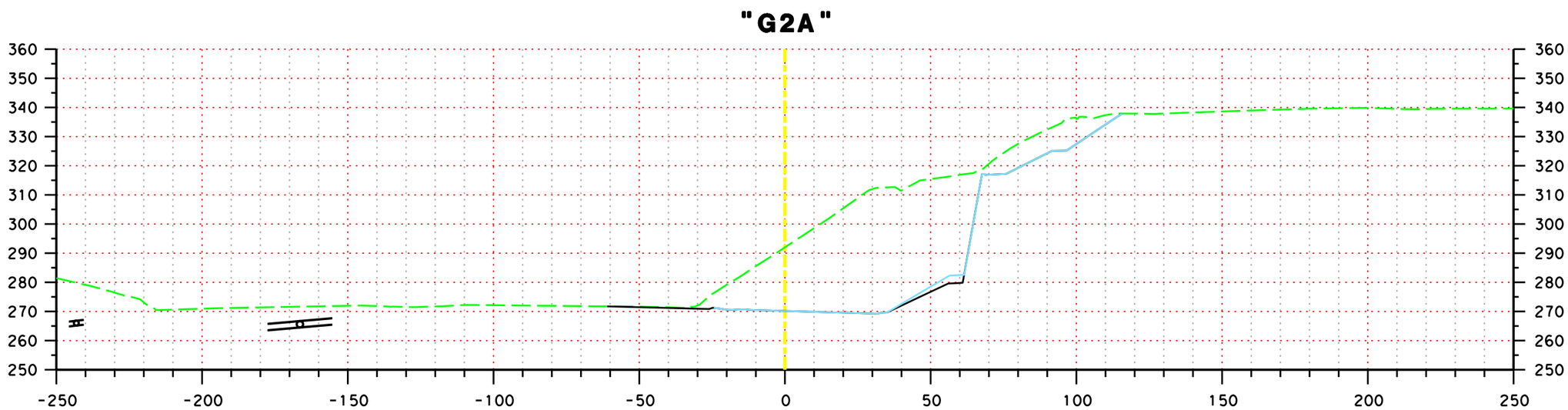

1579+17.10

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1579+17.10 TO STA 1579+25.00

FIGURE 7B: GEOLOGIC CROSS SECTION

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CONSULTANT FUNCTIONAL SUPERVISOR

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CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00

DATE PLOTTED => $DATE

TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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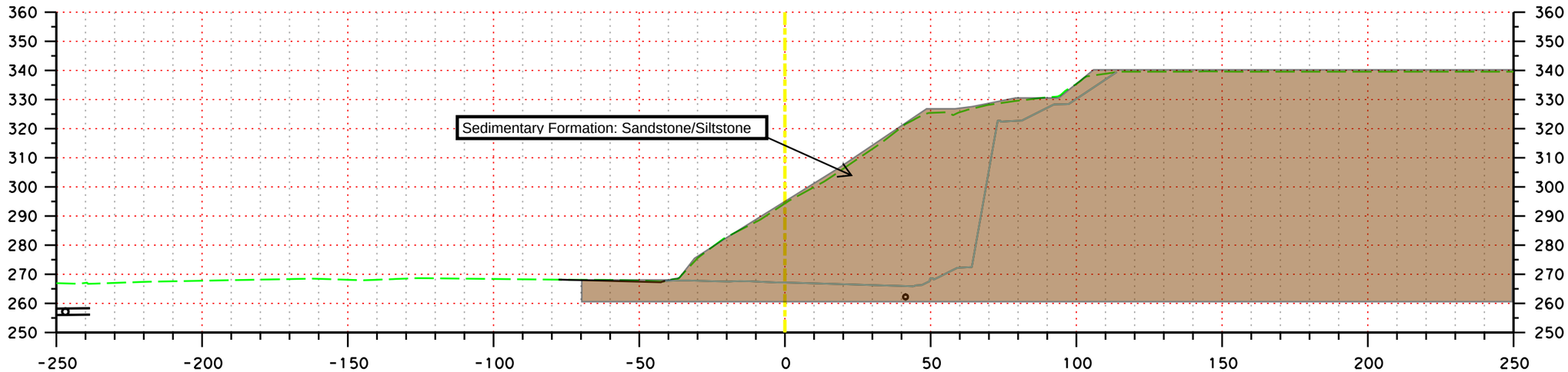

19+00 RW-4-LINE

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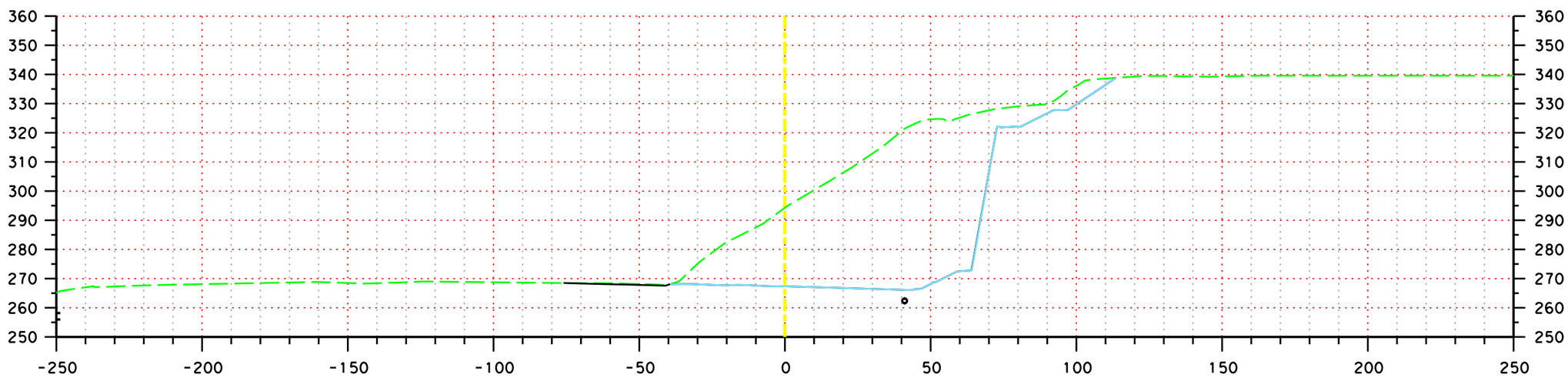

1580+25.00

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1580+25.00 TO STA 1580+37.10

FIGURE 7C: GEOLOGIC CROSS SECTION

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UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

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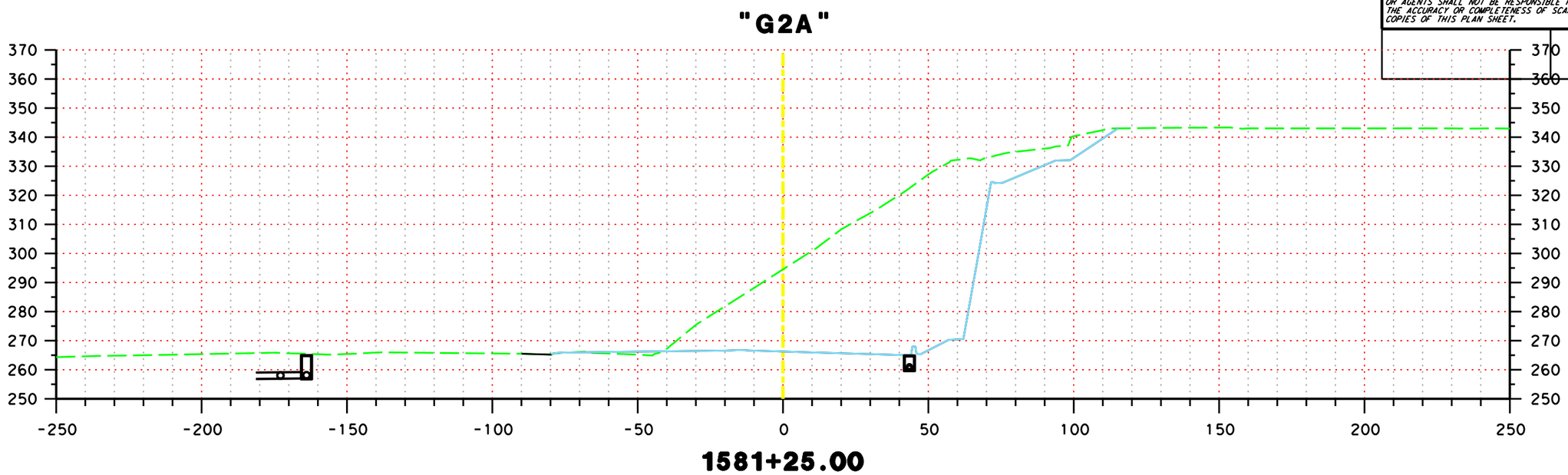

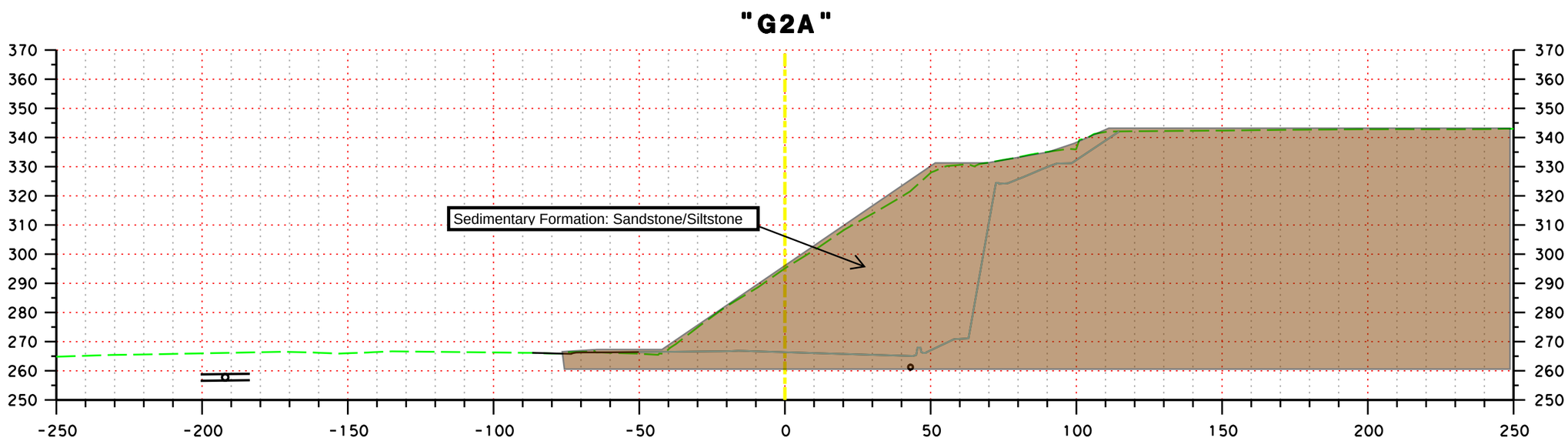

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1581+02.20 TO STA 1581+25.00

FIGURE 7D: GEOLOGIC CROSS SECTION

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CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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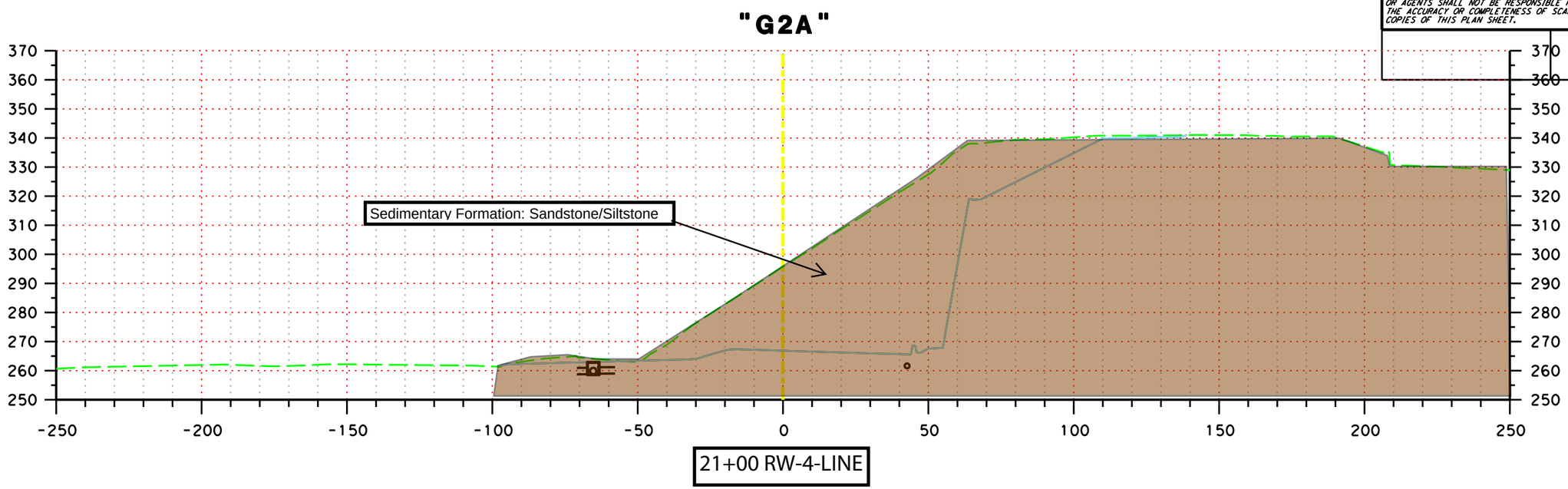

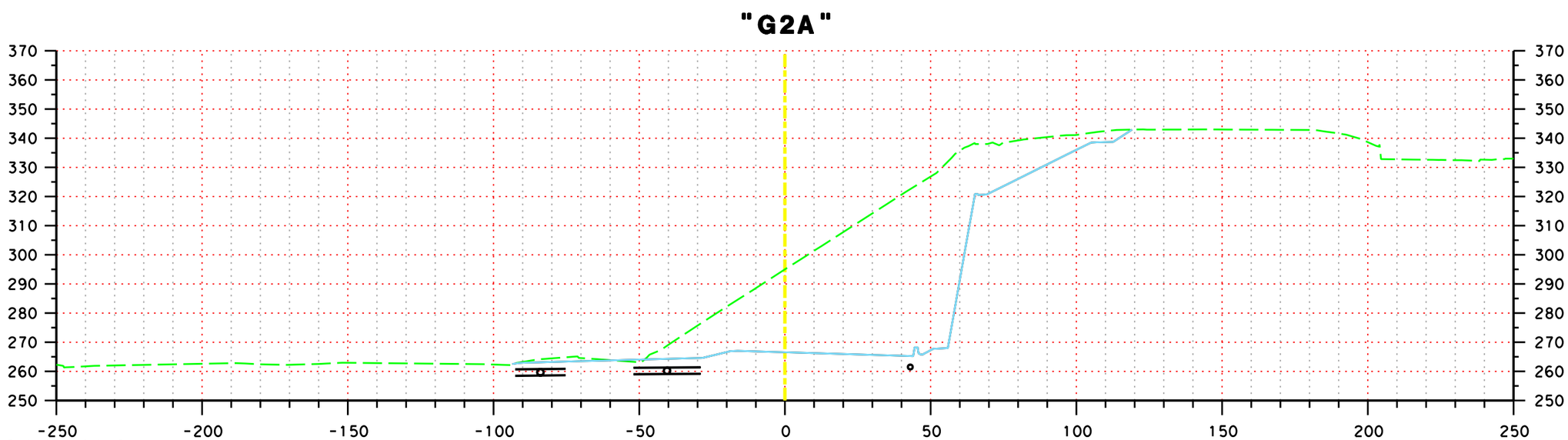

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1582+25.00 TO STA 1582+50.00

FIGURE 7E: GEOLOGIC CROSS SECTION

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CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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USERNAME => $USER REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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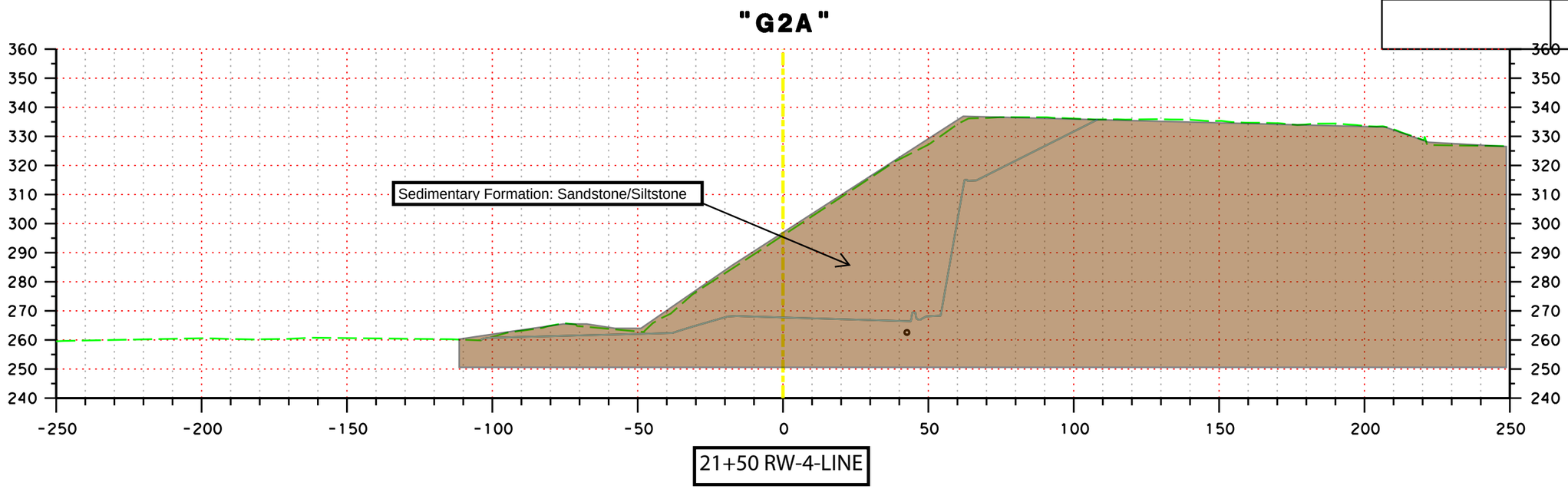

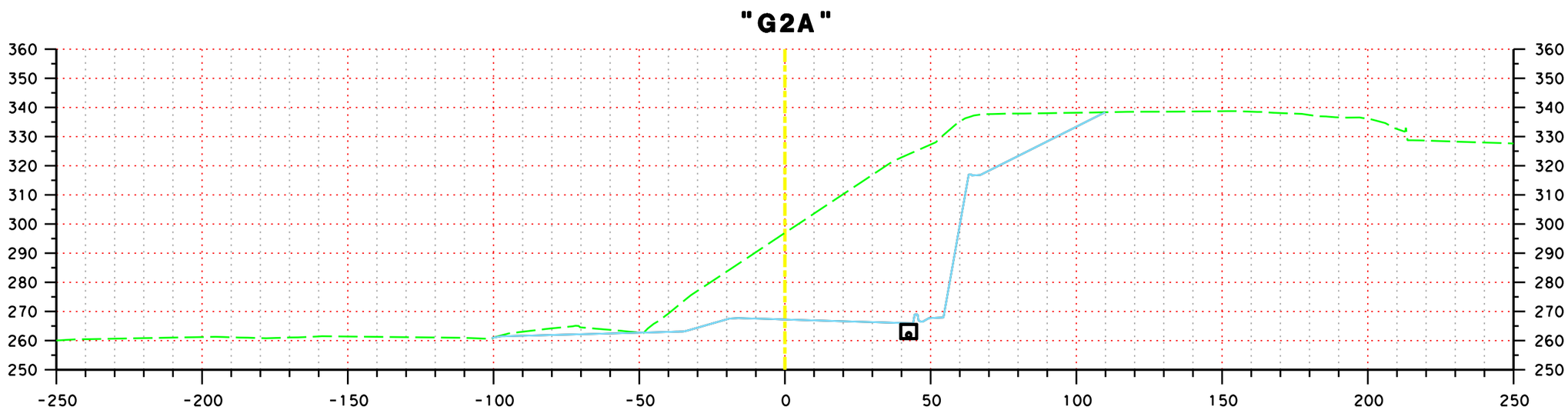

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1582+75.00 TO STA 1583+00.00

FIGURE 7F: GEOLOGIC CROSS SECTION

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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USERNAME => $USER
REQUEST

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UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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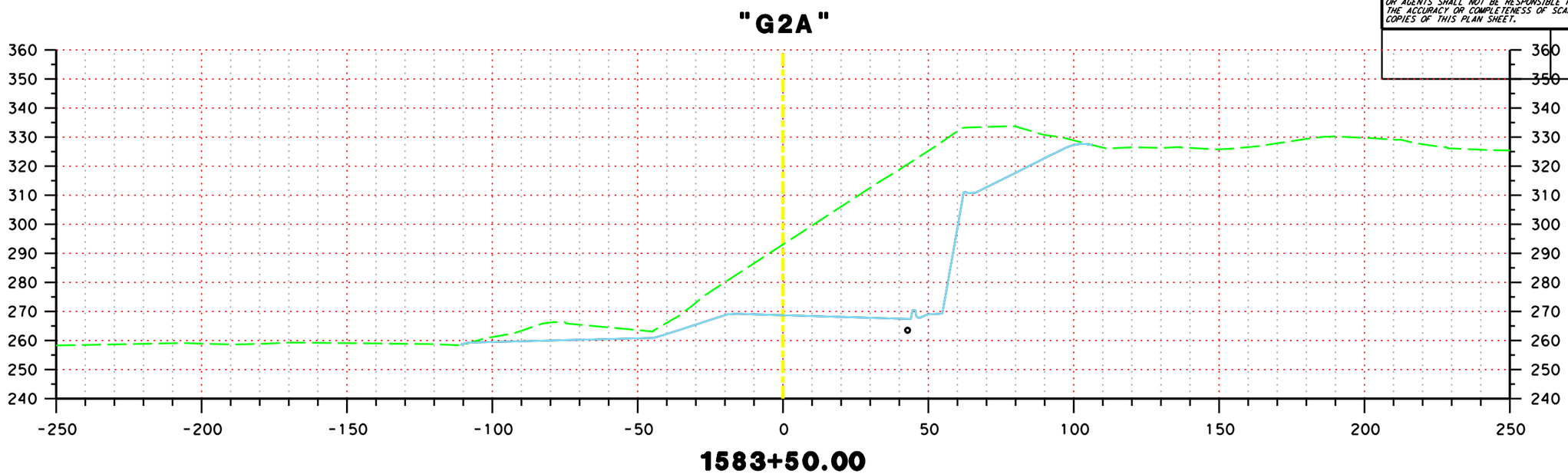

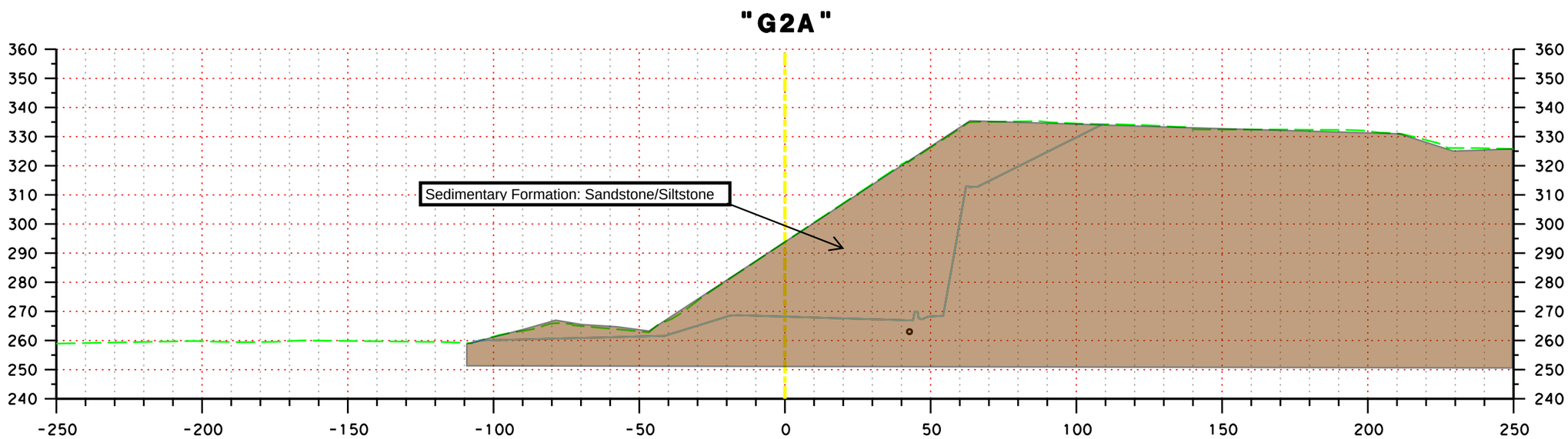

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1583+25.00 TO STA 1583+50.00

FIGURE 7G: GEOLOGIC CROSS SECTION

REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

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USERNAME => $USER REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE 00000000001

CUT COST_Wall 4_Alt-10-1-13.dgn 1/24/2014 8:39:10 AM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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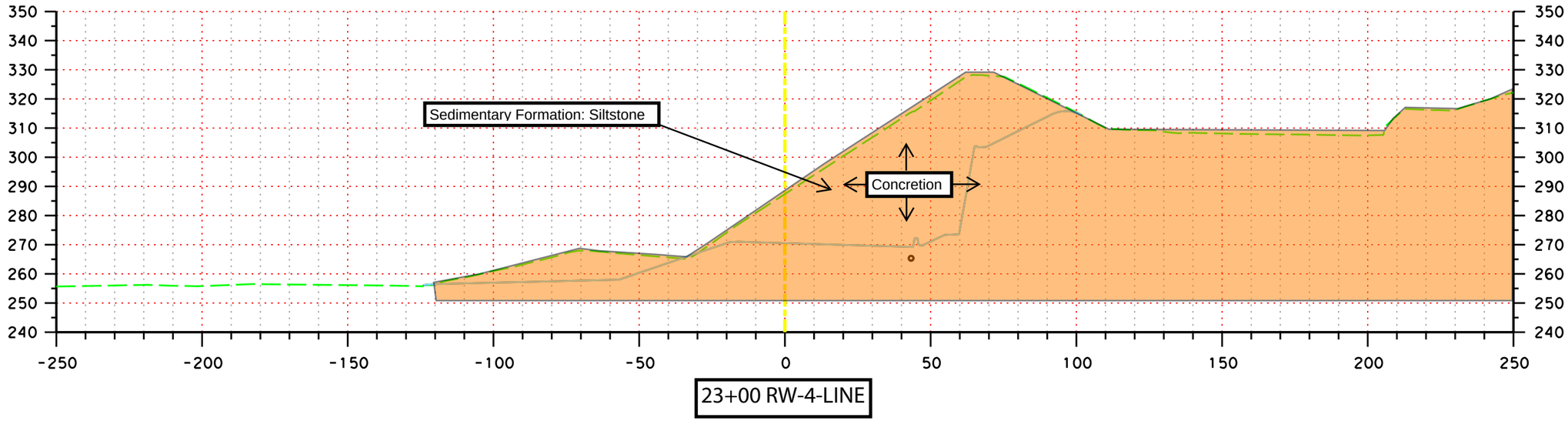

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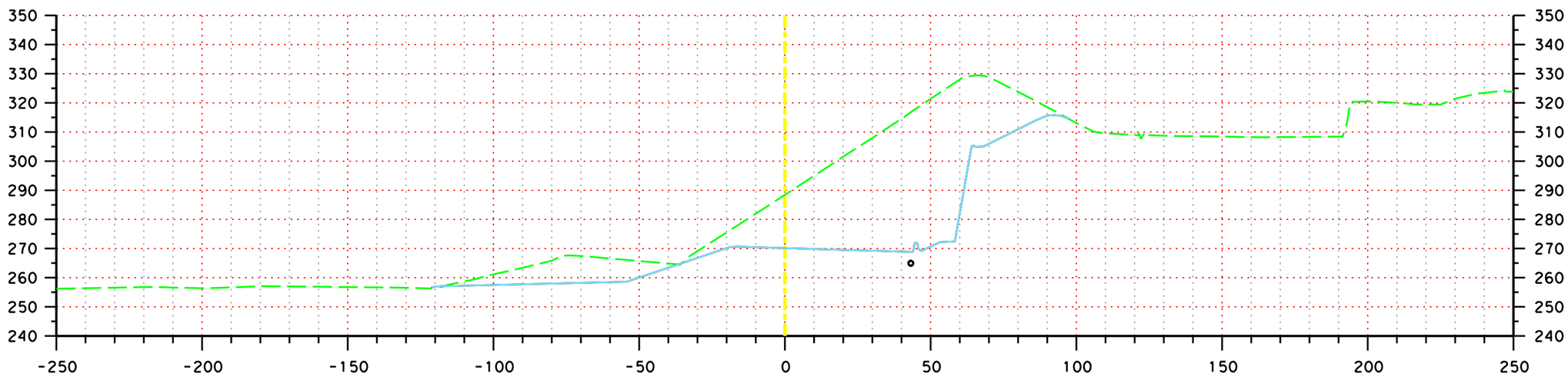

1584+25.00

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1584+25.00 TO STA 1584+45.06

FIGURE 7H: GEOLOGIC CROSS SECTION

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LAST REVISION 00-00-00 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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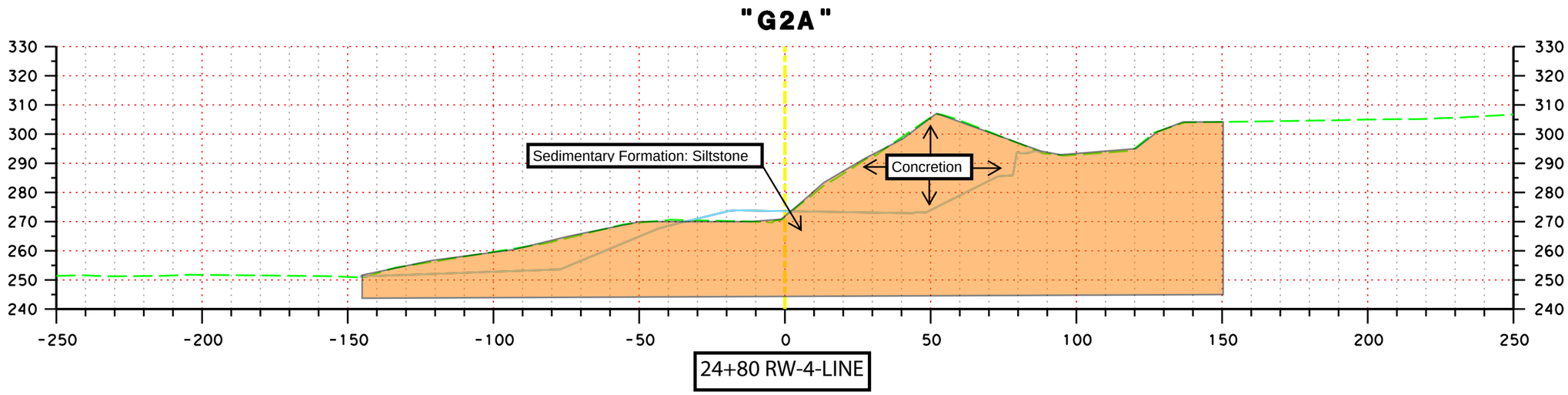
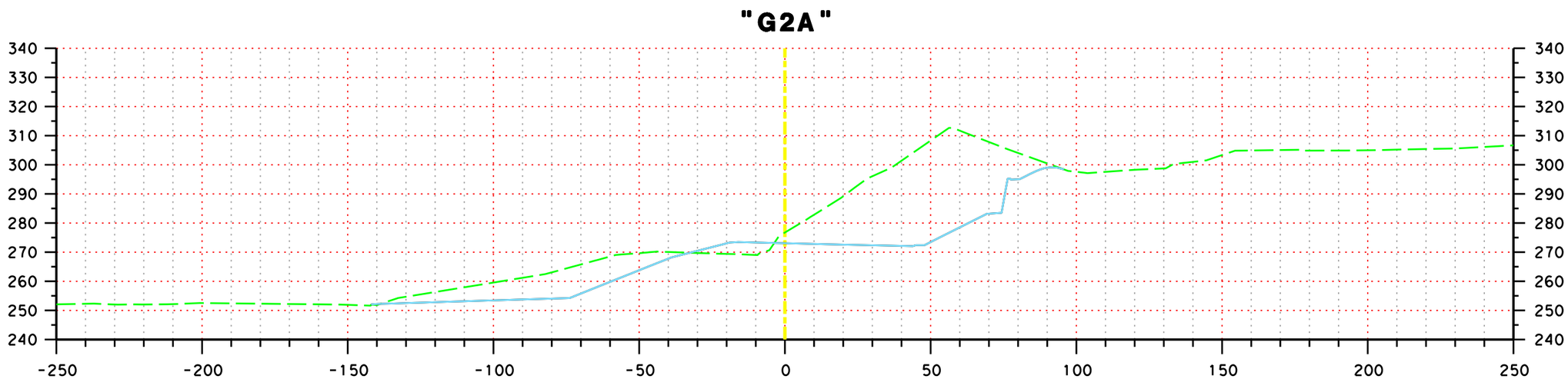
REVISED BY | DATE REVISED

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION





Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

STA 1585+75.00 TO STA 1586+00.00

FIGURE 7I: GEOLOGIC CROSS SECTION

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USERNAME => $USER
REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE | 00000000001

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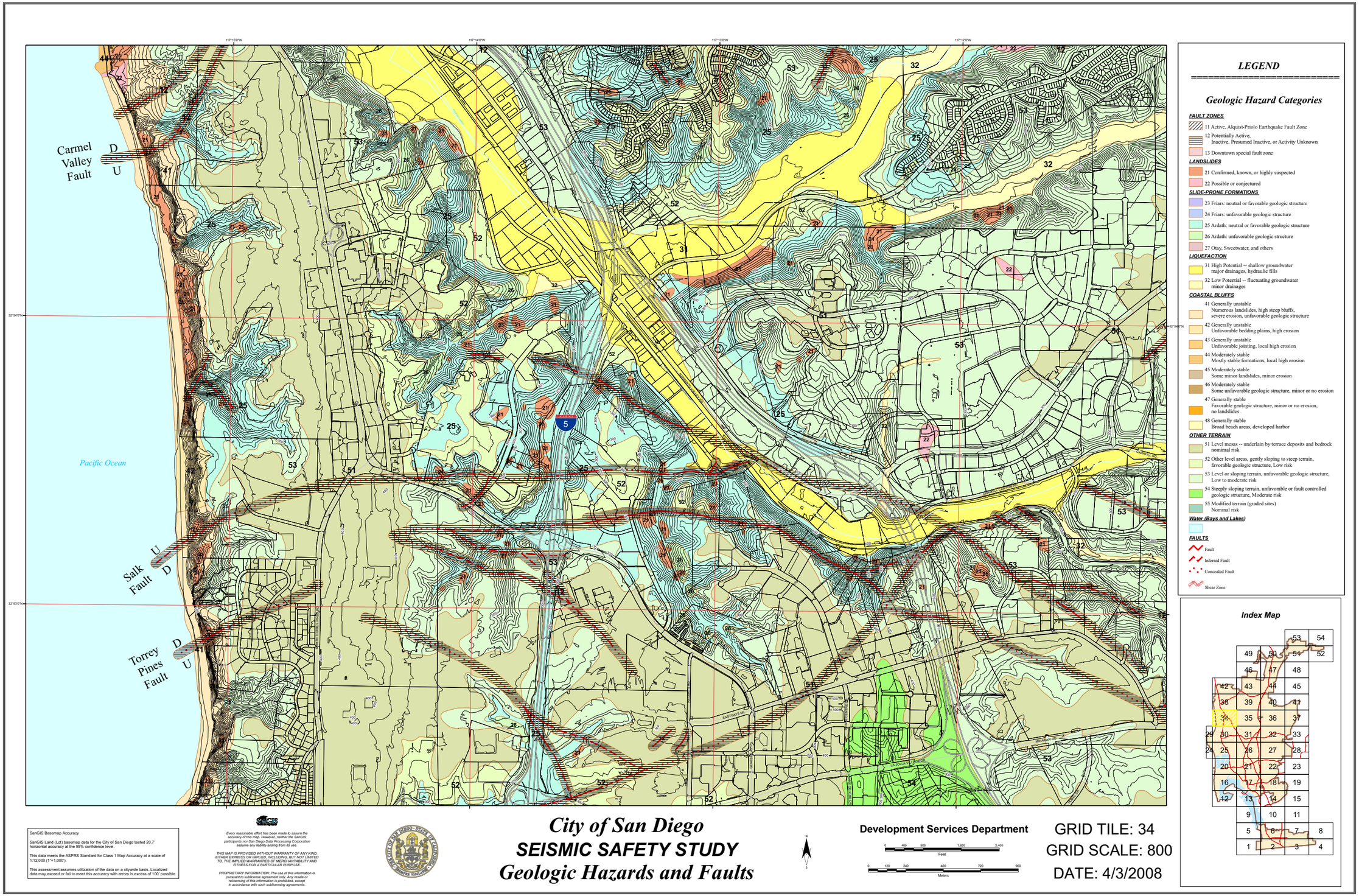

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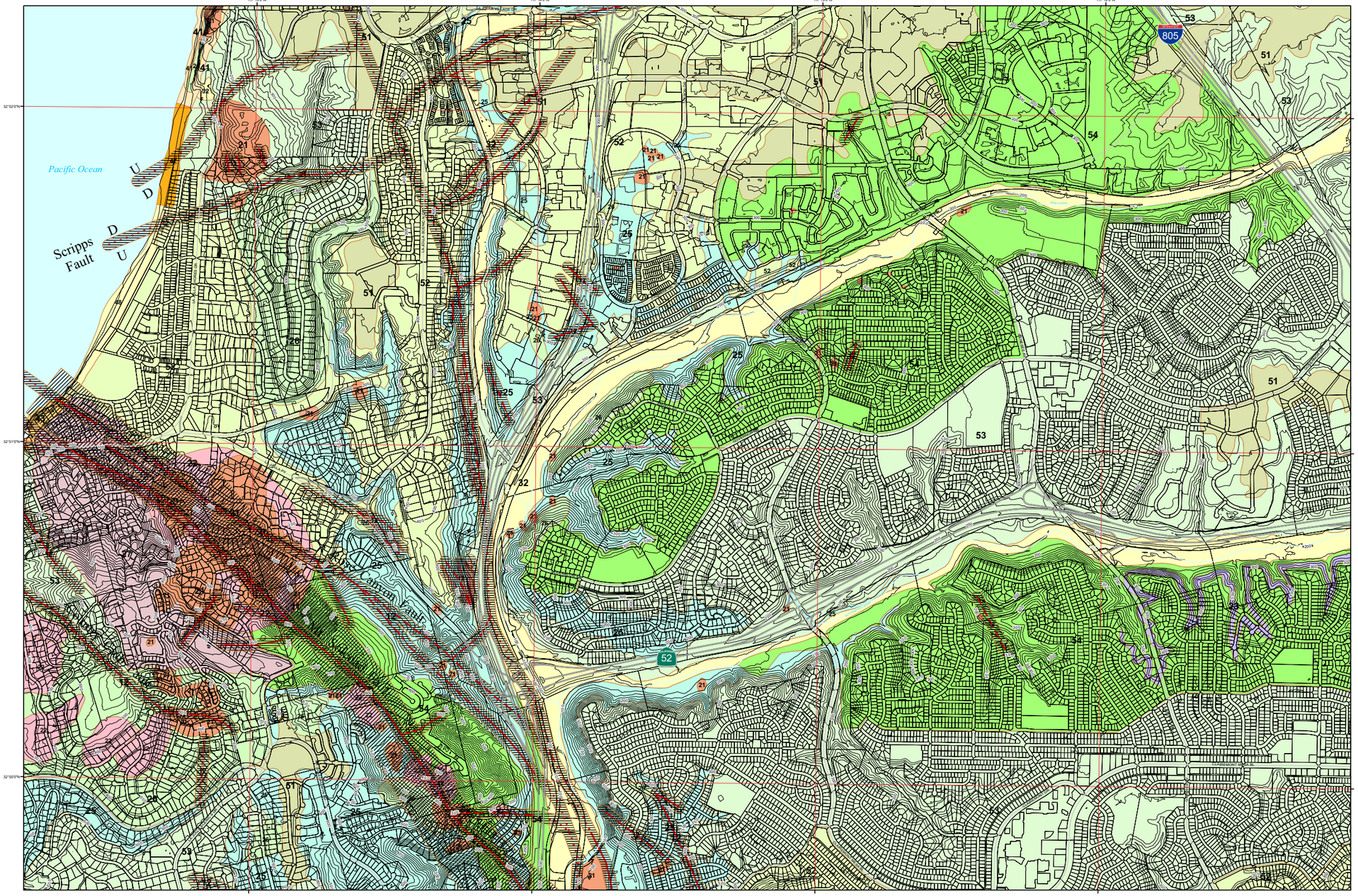
EA 11-022331/EFIS 1100000012

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

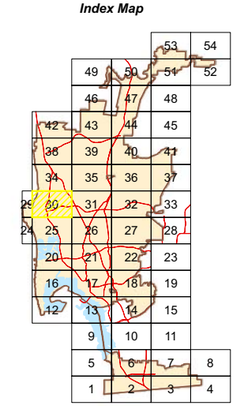
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

SanGIS

Every reasonable effort has been made to assure the accuracy of this map. However, neither the SanGIS participants nor San Diego Data Processing Corporation assume any liability arising from its use.

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

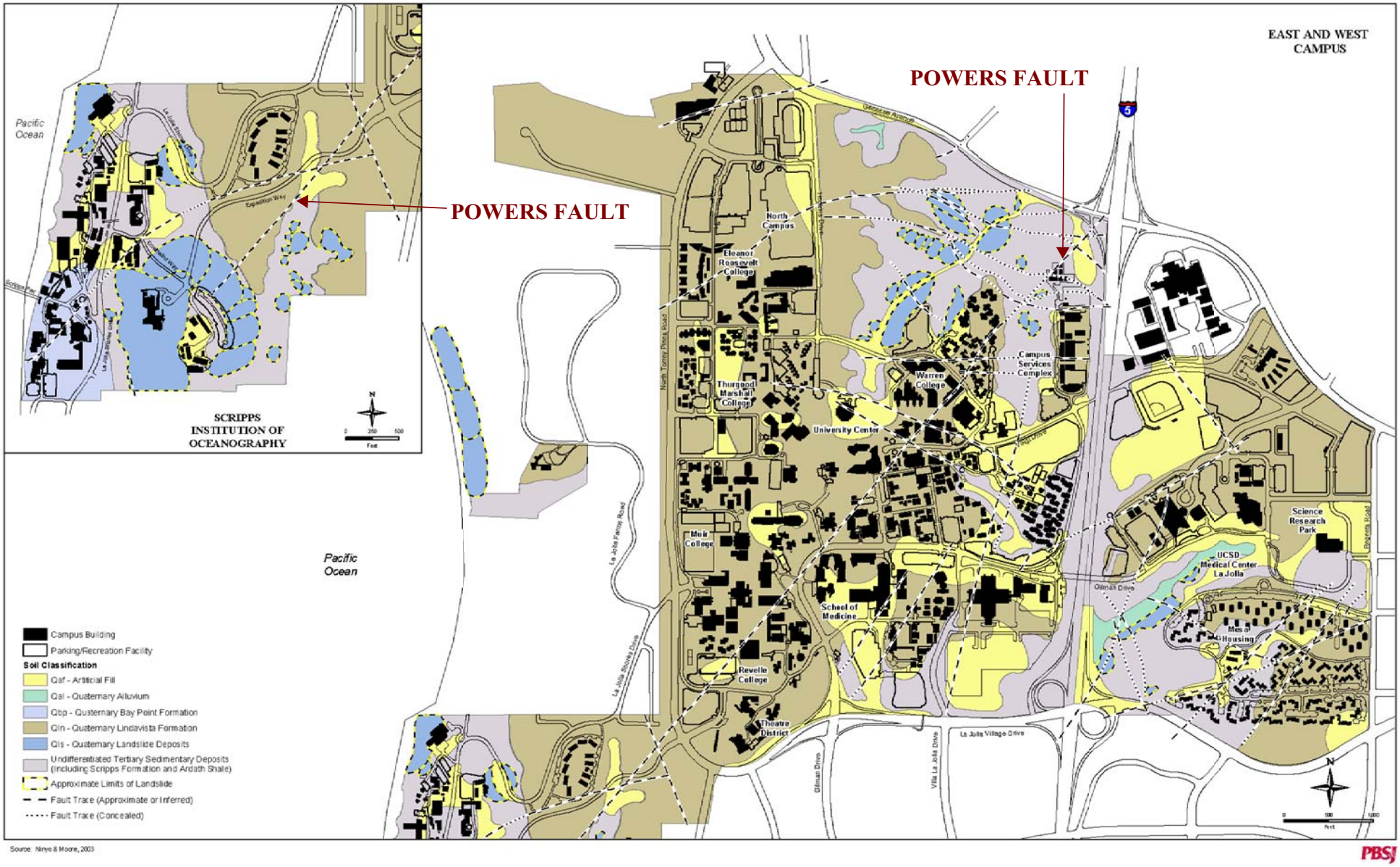
Development Services Department

0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



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Retaining Wall-4
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-479+28-23R-B01	1,300	7.50	150	298
011-481+74-40R-B02	2,600	5.43	56	191

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-4	Diaphragm Ground Anchor	16+18 RW-4-Line	22+13.50 RW-4-Line	Sedimentary Formation	33	350	121
RW-4	Soil Nail	22+13.50 RW-4-Line	23+02.50 RW-4-Line	Sedimentary Formation	33	350	121
		23+02.50 RW-4-Line	25+02.50 RW-4-Line	Sedimentary Formation	28	350	121

Notes: φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 4A: DIAPHRAGM GROUND ANCHOR WALL PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-4	Diaphragm Ground Anchor	16+18 RW-4-Line	16+60 RW-4-Line	42	16.5	1.5:1	1.5:1	10°	Cut
		16+60 RW-4-Line	18+00 RW-4-Line	140	47.5	1.5:1	1.5:1	10°	Cut
		18+00 RW-4-Line	19+00 RW-4-Line	100	60.5	1.5:1	1.5:1	10°	Cut
		19+00 RW-4-Line	21+00 RW-4-Line	200	63	Flat	1.5:1	10°	Cut
		21+00 RW-4-Line	21+50 RW-4-Line	50	58	Flat	1.5:1	10°	Cut
		21+50 RW-4-Line	22+13.50 RW-4-Line	63.5	54	Flat	1.5:1	10°	Cut

Notes: L = Wall Length
H_{MAX} =Approximate Maximum Wall Height
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4B: DIAPHRAGM GROUND ANCHOR WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Vertical Spacing (Feet)	Horizontal Spacing (Feet)	Tieback Inclination (°)	Anchor Tension (lbs)	Unbonded Length (Feet)
RW-4	Diaphragm Ground Anchor	16+18 RW-4-Line	16+60 RW-4-Line	6	10	10	160000	50
		16+60 RW-4-Line	18+00 RW-4-Line	6	10	10	165000	55
		18+00 RW-4-Line	19+00 RW-4-Line	6	10	10	175000	55
		19+00 RW-4-Line	21+00 RW-4-Line	6	10	10	215000	60
		21+00 RW-4-Line	21+50 RW-4-Line	6	10	10	180000	60
		21+50 RW-4-Line	22+13.50 RW-4-Line	6	10	10	185000	60

TABLE 5A: SOIL NAIL WALL PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	Hmax (ft)	Slope Below	Slope Above	Wall Batter (degrees)	Cut/Fill
RW-4	Soil Nail	22+13.50 RW-4 LINE	22+20 RW-4 LINE	6.5	47	Flat	2:1	10°	Cut
		22+20 RW-4 LINE	22+40 RW-4 LINE	20	46	Flat	2:1	10°	Cut
		22+40 RW-4 LINE	22+60 RW-4 LINE	20	44	Flat	2:1	10°	Cut
		22+60 RW-4 LINE	23+02 RW-4 LINE	42	41	Flat	2:1	10°	Cut
		23+02 RW-4 LINE	23+20 RW-4 LINE	18	36	Flat	2:1	10°	Cut
		23+20 RW-4 LINE	23+80 RW-4 LINE	60	33	2:1	2:1	10°	Cut
		23+80 RW-4 LINE	24+00 RW-4 LINE	20	25	2:1	2:1	10°	Cut
		24+00 RW-4 LINE	24+40 RW-4 LINE	40	22	2:1	2:1	10°	Cut
		24+40 RW-4 LINE	24+80 RW-4 LINE	40	16	2:1	2:1	10°	Cut
		24+80 RW-4 LINE	25+02.50 RW-4 LINE	22.5	10	2:1	2:1	10°	Cut

Notes: L = Wall Length
Hmax = Approximate Max Wall Height
Wall Batter = Angle with Vertical

TABLE 5B: SOIL NAIL WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	NS (psi)	AHS (lbs)	NHS_{MAX} (ft)	NVS_{MAX} (ft)	NIA (degrees)	$DTOP_{MAX}$ (ft)	$DBOT_{MAX}$ (ft)
RW-4	Soil Nail	22+13.50 RW-4 LINE	22+20 RW-4 LINE	36,000	30,000	5	5	15	2.5	3
		22+20 RW-4 LINE	22+40 RW-4 LINE	36,000	30,000	5	5	15	2.5	3
		22+40 RW-4 LINE	22+60 RW-4 LINE	36,000	30,000	5	5	15	2.5	3
		22+60 RW-4 LINE	23+02 RW-4 LINE	36,000	30,000	5	5	15	2.5	3
		23+02 RW-4 LINE	23+20 RW-4 LINE	36,000	30,000	5	5	15	2.5	3
		23+20 RW-4 LINE	23+80 RW-4 LINE	36,000	30,000	5	5	15	2.5	3
		23+80 RW-4 LINE	24+00 RW-4 LINE	36000	30000	5	5	15	2.5	3
		24+00 RW-4 LINE	24+40 RW-4 LINE	36000	30000	5	5	15	2.5	3
		24+40 RW-4 LINE	24+80 RW-4 LINE	36000	30000	6	6	15	2.5	3
		24+80 RW-4 LINE	25+02.50 RW-4 LINE	36000	30000	6	6	15	2.5	3

Notes: NS = Nail Strength
AHS = Assumed Head Strength
NHS_{MAX} = Maximum Nail Horizontal Spacing
NVS_{MAX} = Maximum Nail Vertical Spacing
NIA = Nail Inclination Angle from the Horizontal
$DTOP_{MAX}$ = Maximum distance from the top of the wall to the top row of nails.
$DBOT_{MAX}$ = Maximum distance from the bottom of the wall to the bottom row of nails.

TABLE 5C: SOIL NAIL WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	DPR (kips/ft)	RBD (in)	MNL (ft)	MNR
RW-4	Soil Nail	22+13.50 RW-4 LINE	22+20 RW-4 LINE	5.4	1.41	40	10
		22+20 RW-4 LINE	22+40 RW-4 LINE	5.4	1.41	35	10
		22+40 RW-4 LINE	22+60 RW-4 LINE	5.4	1.41	32	9
		22+60 RW-4 LINE	23+02 RW-4 LINE	5.4	1.27	28	9
		23+02 RW-4 LINE	23+20 RW-4 LINE	5.4	1.27	32	8
		23+20 RW-4 LINE	23+80 RW-4 LINE	5.4	1.27	34	7
		23+80 RW-4 LINE	24+00 RW-4 LINE	5.4	1.27	26	5
		24+00 RW-4 LINE	24+40 RW-4 LINE	5.4	1.27	20	5
		24+40 RW-4 LINE	24+80 RW-4 LINE	5.4	1.128	15	3
		24+80 RW-4 LINE	25+02.50 RW-4 LINE	5.4	1.128	15	2

Notes: DPR = Design Pullout Resistance
RBD = Reinforcing Bar Diameter
MNL = Minimum Nail Length
MNR = Minimum Number of Rows at Hmax

TABLE 6: APPLIED TRANSIENT AND BUILDING LOADS USED FOR DESIGN

	Beginning Station	Ending Station	L1 (ft)	L2 (ft)	Load Qs (psf)
Transient Loads	16+18	16+60	20	100	240
	16+60	18+00	20	100	240
	18+00	19+00	20	100	240
	19+00	21+00	25	150	240
	21+00	21+50	25	150	240
	21+50	22+13.50	20	100	240
	22+13.50	23+02	0	0	0
	23+02	25+02.50	Varies	Varies	240
Building Load	16+18	16+60	100	500	1000
	16+60	18+00	100	500	1000
	18+00	19+00	101	500	1000
	19+00	21+00	150	300	1000
	21+00	21+50	0	0	0
	21+50	22+13.50	101	500	1000
	22+13.50	22+63.50	40	500	1000
	22+63.50	25+02.50	0	0	0

L1 and L2 = distance behind wall between which the load (Q_s) is applied

TABLE 7: APPARENT EARTH PRESSURE LOADS USED FOR DESIGN

Pressure Diagram cross section station	Station Range	Lateral Pressure (psf)
16+60	16+18 to 16+60	2761
17+90	16+60 to 18+00	3353
19+00	18+00 to 19+00	3708
19+90	19+00 to 21+00	3929
21+00	21+00 to 21+50	3726
21+50	21+50 to 22+13.50	3576

Note: Shape trapezoidal

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA

DIST.	COUNTY	ROUTE	PREF.	SHEET NO.	TOTAL SHEETS
XI	SD	5	284/819	118	197

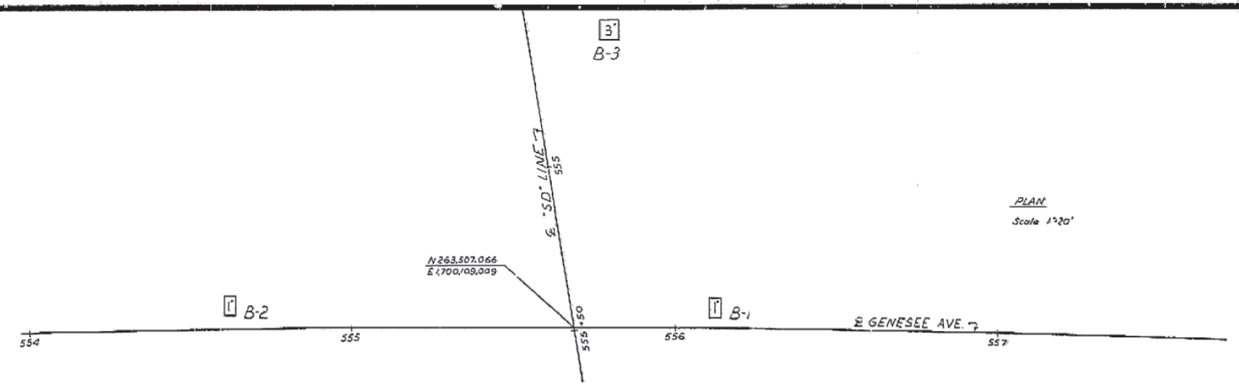
BRIDGE ENGINEER — CIVIL ENGINEER—LICENSE NO.

DATE APPROVED July 20, 1964

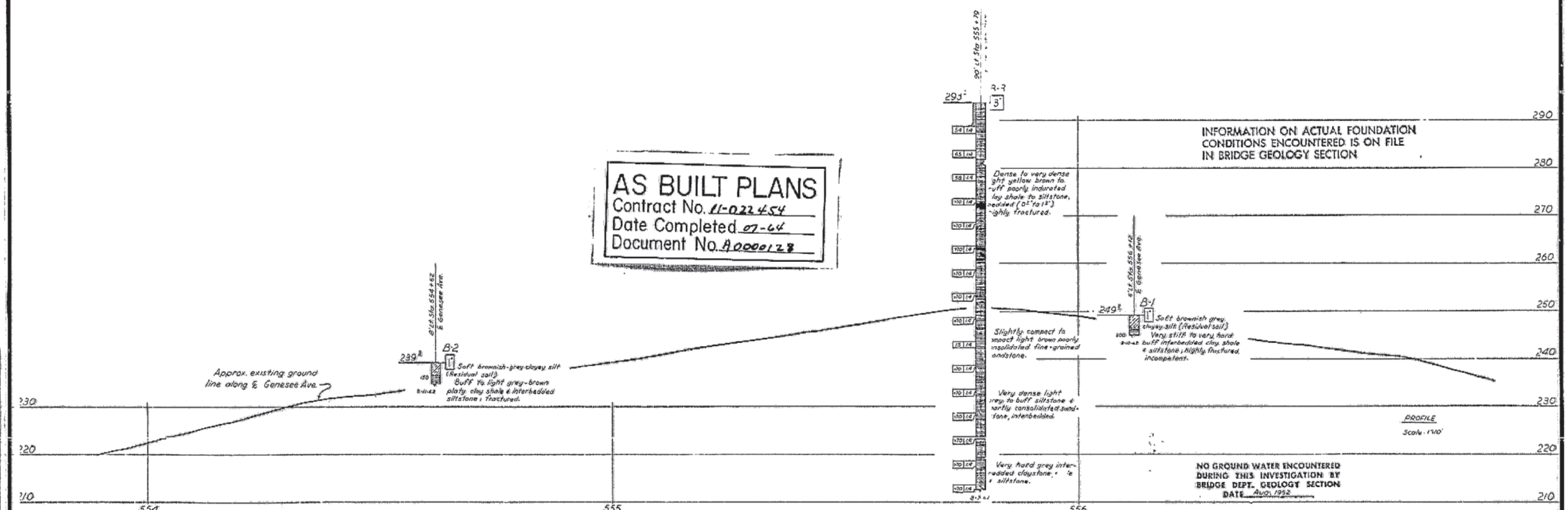
BENCH MARK

TBM #1 - ℄ Stake, sta. 554+86 "SD" top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV 278.66



PLAN
Scale 1"=20'



AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128

BRIDGE DEPARTMENT

Approved Recommended By — Bridge Engineer

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

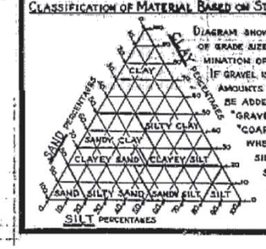


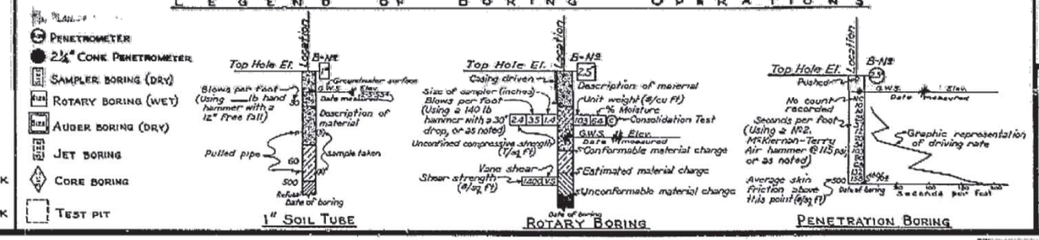
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2 1/4" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

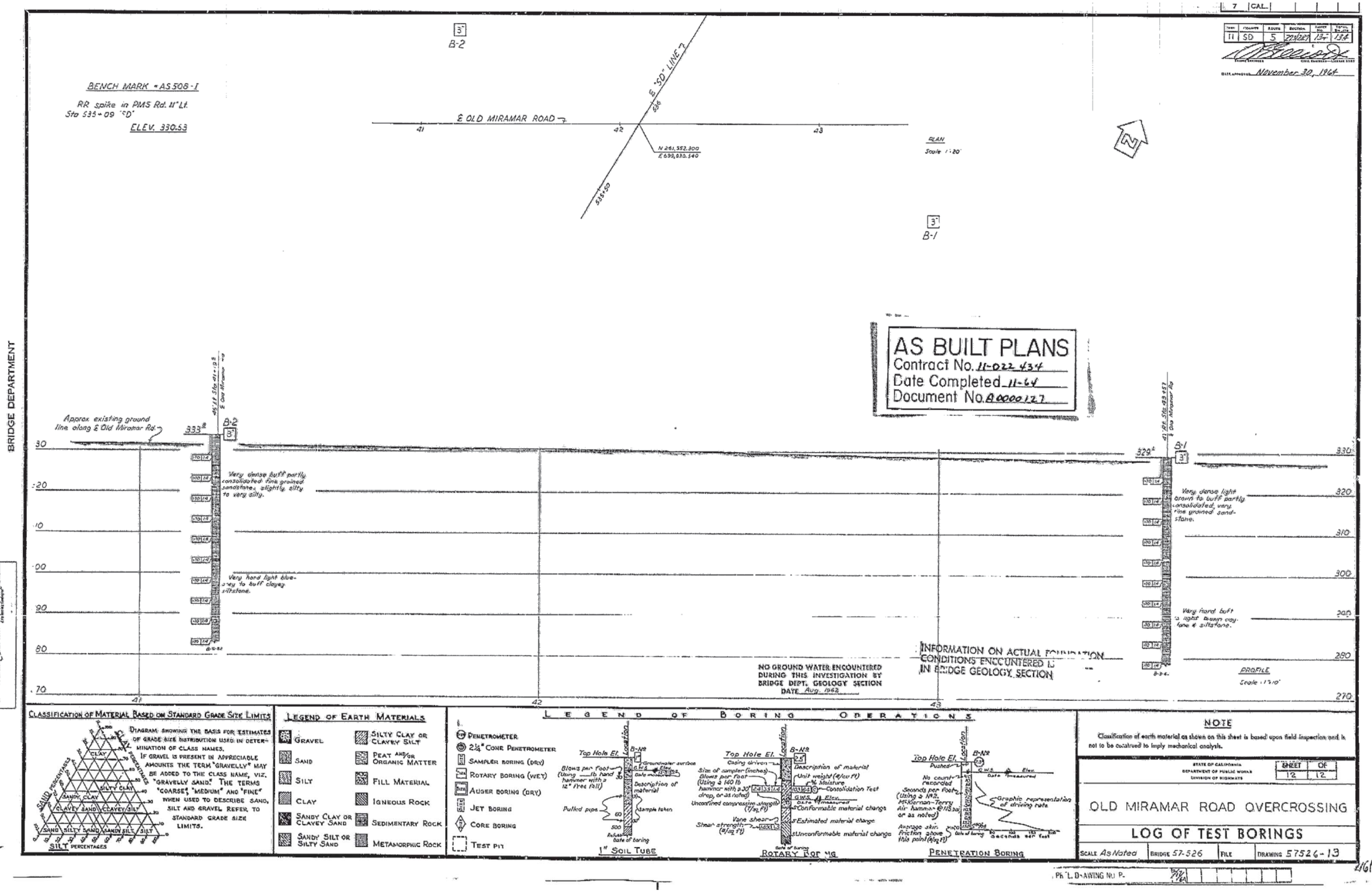
GENESEE AVENUE OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-527	FILE	DRAWING 57527-9

PREL. DRAWING NO. P-

5-4



Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

GEOPIER® Foundation Company – West

9385 S.W. Heikes Drive, Hillsboro, OR 97123

(503) 628-0341 www.geopier.com (503) 628-8806 *fax*

June 13, 2007

Ms. Lora McBay
ARB
26000 Commercentre Dr.
Lake Forest, Ca. 92630

RE: As-Built Report
GEOPIER Intermediate Foundation System
Scripps Memorial Hospital Parking Structure
La Jolla, California

Dear Ms. McBay,

All Geopier elements for the Scripps Memorial Hospital Parking Structure in La Jolla, California, have been installed and approved by our firm for support of the design loads. The design called for 30-inch diameter Geopier elements with 10' to 25' shaft lengths.

The piers as-built were at least 30" diameter, and all pier groups were drilled to an average that exceeds the design pier length by at least 3" or were terminated in bedrock. The dynamic penetration tests conducted during Geopier element construction exceeded the specified penetration of 15 blows. Each lift was stabilized by refusal of the tamper. The procedures followed during construction were identical to those used in the modulus test piers that proved sufficient capacity(see load test report dated 5-31-2007).

The attached Daily Aggregate Pier Progress Report documents as-built information for each of the piers installed and sheet G1.00 of the Geopier plans shows the final as-built location of all piers. The piers were installed at locations staked by your surveyor.

Very truly yours,
GEOPIER FOUNDATION COMPANY-WEST, INC.

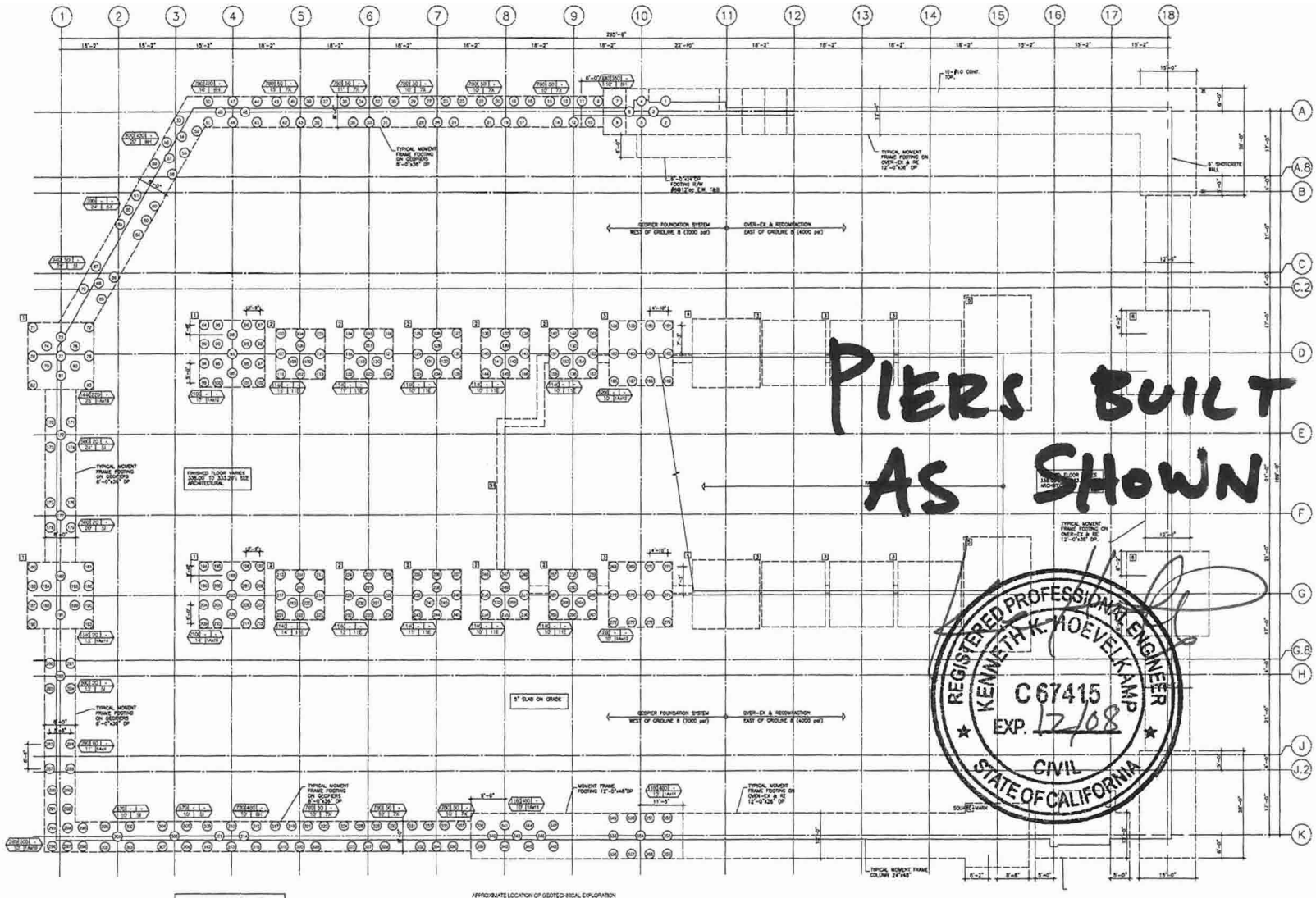
Ken Hoevelkamp, PE
RCE C67415
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
KENNETH K. HOEVELKAMP
C 67415
EXP. 12/08
CIVIL
STATE OF CALIFORNIA

Attachments: Daily Aggregate Pier Progress Report (25 pages)
Plan (Geopier As-Built, dated 6-13-07)
Pier bottom elevations (2 pages)

State Contractors License: AZ: 165389 CA: 786540 NM: 82027 OR: 146399 WA: GEOPIFC980BZ

geopier™



FOOTING SCHEDULE	
TYPE	FOOTING SIZE
1	11'-6" x 11'-6" x 50" DP.
2	13'-0" x 13'-0" x 36" DP.
3	17'-0" x 17'-0" x 36" DP.
4	18'-0" x 18'-0" x 40" DP.
5	16'-0" x 20'-0" x 50" DP.
6	22'-0" x 22'-0" x 60" DP.

FTG SCHEDULE FROM S2.1 BY BPA GROUP

NORTH

NOTES AND SYMBOL KEY

1. THE SOLE PURPOSE OF THIS DRAWING IS TO INDICATE THE LOCATIONS, ORIENTATION, AND OTHER INFORMATION PERTINENT TO THE INSTALLATION OF GEOPIER® ELEMENTS. ALL OTHER INFORMATION IS FROM SHEET S2.1, RECEIVED BY ELECTRONIC TRANSMISSION 11/20/2006, BY BPA GROUP, INC., IRVINE, CALIFORNIA.
2. REFER TO SHEET G2.00 FOR DIMENSIONING OF GEOPIER LAYOUTS AND SPECIFICATIONS
3. INDICATES DEAD LOAD + LIVE LOAD IN kips. (PROVIDED BY BPA GROUP)
4. INDICATES SEISMIC IN kips.(PROVIDED BY BPA GROUP)
5. INDICATES ESTIMATED NET UPLIFT IN kips.(N/A THIS PROJECT)
6. INDICATES GEOPIER® LAYOUT NUMBER (SEE SHEET G2.00)
7. INDICATES MINIMUM GEOPIER® ELEMENT DRILL DEPTH BELOW BOTTOM-OF-FOOTING ELEVATION
8. INDICATES TENSION GEOPIER® ELEMENT (N/A THIS PROJECT)
9. INDICATES 30" DIAMETER GEOPIER® ELEMENT FOR FOUNDATION SUPPORT
10. INDICATES GEOPIER® REFERENCE NUMBER
11. SITE GRADE AT TIME OF GEOTECHNICAL EXPLORATION = ELEV. 33'7" TO 33'2" PER BORINGS B1-B6 BY KLEINFELDER DATED 1/23/2006
12. ALL GEOPIER® DRILL DEPTHS TO EXTEND TO AT LEAST 10' BELOW BOTTOM-OF-FOOTING ALL GEOPIER® DRILL DEPTHS DESIGNED FOR TENSION LOADING TO EXTEND TO AT LEAST 11' BELOW BOTTOM OF FOOTING. DRILL DEPTH TO COMPLETELY PENETRATE ALL FILL AND/OR COLLUVIUM.
13. THE DESIGNER OF THE GEOPIER SYSTEM HAS RELIED ON GEOTECHNICAL DATA AND STRUCTURAL LOADING INFORMATION PROVIDED BY OTHERS. NEITHER GFC-W NOR GFC, INC. IS RESPONSIBLE FOR VERIFYING THE COMPLETENESS OR ACCURACY OF THE INFORMATION PROVIDED.

geopier® Foundation Company – West

GEOPIER PLAN

SCRIPPS PARKING STRUCTURE
LA JOLLA, CA

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9365 SW Heikes Drive, Hillsboro, Oregon 97123 (503) 628-0341 (503) 628-8806 Fax

geopier®

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Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

APPENDIX I: LOG OF TEST BORING AND SITE DATA

PIER TIP ELEVATIONS ALONG WEST PERIMETER OF STRUCTURE

Pier #	Existing Grade	Pier Depth	Tip Elevation
52	332.19	25	307.19
53	334.06	24	310.06
54	331.24	22	309.24
55	332.12	21.5	310.62
56	330.84	22.5	308.34
57	331.16	21	310.16
58	332.22	23	309.22
59	330.64	23	307.64
60	332.16	24	308.16
61	330.45	23	307.45
62	332.09	24	308.09
63	330.44	22.5	307.94
64	331.88	22	309.88
65	330.36	23	307.36
66	330.74	25	305.74
67	330.19	25	305.19
68	330.41	24	306.41
69	330.66	25	305.66
70	330.12	25	305.12
71	330.26	32	298.26
72	330.62	26	304.62
73	330.31	28.5	301.81
74	330.16	30	300.16
75	330.54	28	302.54
76	330.22	31	299.22
77	333.32	30	303.32
78	332.82	27.5	305.32
79	330.35	31.5	298.85
80	331.88	27	304.88
81	330.9	30	300.9
82	333.2	29.5	303.7
83	332.87	30.5	302.37
170	332.46	28	304.46
171	332.82	30	302.82
172	332.78	30	302.78
173	332.78	28	304.78
174	332.81	29.5	303.31
175	332.78	27	305.78
176	332.75	28.5	304.25
177	332.81	26	306.81
178	332.8	25.5	307.3
179	332.77	25	307.77

180	332.76	22	310.76
181	332.72	23	309.72
182	332.88	22	310.88
183	332.72	21	311.72
184	332.88	20	312.88
185	332.85	21	311.85
186	332.7	21.5	311.2
187	332.77	20.5	312.27
188	332.91	20	312.91
189	332.88	21	311.88
190	332.78	19	313.78
191	332.98	20	312.98
192	332.89	18	314.89
193	332.83	19	313.83
280	333.15	18	315.15
281	333.13	19	314.13
282	333.1	19	314.1
283	333.2	18.5	314.7
284	333.2	17.5	315.7
285	333.2	16.5	316.7
286	333.2	17	316.2
287	333.45	17	316.45
288	333.55	17.5	316.05
289	333.5	15.5	318
290	333.52	15.5	318.02
291	333.55	16	317.55
292	333.58	17	316.58
293	333.58	16	317.58
294	333.62	15.5	318.12
295	333.65	15	318.65
296	333.53	15	318.53
297	333.64	16	317.64

Daily Aggregate Pier Progress Report

Project: Scripps Parking, La Jolla, CA

Job # / Permit #: 222W

geopier™

Soil Condition: Firm/Soft: SOFT

Run Date: 6/13/07

		(Compression/Tension)	Piers Completed					
Number of Piers (as designed) ---	359	(359/0)	5/21/07	31	5/28/07	6/4/07	6/11/07	6/18/07
Geopier Diameter (in)	30	(Average)	5/22/07	46	5/29/07	40	6/5/07	6/12/07	6/19/07
Completed:	359		5/23/07	53	5/30/07	50	6/6/07	6/13/07	6/20/07
To Be Completed:	0		5/24/07	50	5/31/07	39	6/7/07	6/14/07	6/21/07
Average/Day:	44.9		5/25/07	50	6/1/07		6/8/07	6/15/07	6/22/07
Sheet G1.00 and G1.01 (Dated 2/23/2006)			5/26/07		6/2/07		6/9/07	6/16/07	6/23/07
			5/27/07		6/3/07		6/10/07	6/17/07	6/24/07

Installation Notes:

If QA inspector is present, has he/she observed subsurface conditions AND concluded that they ARE OR ARE NOT in general agreement with the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
0	0.0	*10*	*329.43*	*336.19*	319.43	16.76	6.26	1	17.5	4	10.74	5/24/07	14		rb	0-10-brown fill/alluvian; 10-15'- black fill/alluvian; 15-17.5'- scripps formation, clean sand
30"Piers	0.0	*10*	*329.52*	*336.28*	319.52	16.76	6.26	2	17.5	3.5	10.74	5/24/07	15	y		typ 1
	0.0	*10*	*329.43*	*336.19*	319.43	16.76	6.26	3	18	3	11.24	5/25/07	15	y	rb	typ 1
	0.0	*10*	*329.34*	*336.10*	319.34	16.76	6.26	4	19	3	12.24	5/24/07	17	y		typ 1
	0.0	*10*	*329.43*	*336.19*	319.43	16.76	6.26	5	18	2.5	11.24	5/24/07	16		rb	typ 1
	0.0	*10*	*329.25*	*336.01*	319.25	16.76	6.26	6	18.5	3	11.74	5/25/07	18	y	rb	typ 1
	0.0	*10*	*329.24*	*336.00*	319.24	16.76	6.26	7	18	2.5	11.24	5/24/07	15		rb	typ 1
	0.0	*10*	*329.24*	*336.00*	319.24	16.76	6.26	8	18	3	11.24	5/24/07	16		rb	typ 1

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
0	0.0	*10*	*329.89*	*335.88*	319.89	15.99	5.49	9	17	3	11.01	5/24/07	14	rb		0-10'- brown fill/alluvian; 10-15'- black fill/alluvian; 15-17'- scripps formation w/sand
30"Piers	0.0	*10*	*329.89*	*335.88*	319.89	15.99	5.49	10	17.5	4	11.51	5/24/07	16	rb		typ 9
	0.0	*10*	*329.86*	*335.85*	319.86	15.99	5.49	11	17.5	3	11.51	5/25/07	15	y		typ 9
	0.0	*10*	*329.81*	*335.80*	319.81	15.99	5.49	12	17	4	11.01	5/25/07	13	y		typ 9
30"Piers	0.0	*10*	*329.74*	*335.73*	319.74	15.99	5.49	13	17	3	11.01	5/25/07	15	y		typ 9
	0.0	*10*	*329.74*	*335.73*	319.74	15.99	5.49	14	17	4	11.01	5/25/07	13		rb	typ 9
	0.0	*10*	*329.83*	*335.82*	319.83	15.99	5.49	15	17.5	3.5	11.51	5/25/07	14	y		typ 11
0	0.0	*10*	*331.29*	*335.59*	321.29	14.30	3.80	16	16	3	11.70	5/25/07	13	y	rb	0-10'- brown fill w/alluvian; 10'-14'- black fill w/alluvian; 14'-16'- scripps formation
30"Piers	0.0	*10*	*331.25*	*335.55*	321.25	14.30	3.80	17	16	3	11.70	5/25/07	13	y		typ 16
	0.0	*10*	*331.15*	*335.45*	321.15	14.30	3.80	18	16	2.5	11.70	5/25/07	14	y		typ 16
	0.0	*10*	*331.11*	*335.41*	321.11	14.30	3.80	19	16.5	3	12.20	5/25/07	14		rb	typ 16
30"Piers	0.0	*10*	*331.08*	*335.38*	321.08	14.30	3.80	20	16	3	11.70	5/25/07	13	y		typ 16

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*10*	*331.05*	*335.35*	321.05	14.30	3.80	21	16.5	3	12.20	5/25/07	14	y		0-10'- brown fill w/alluvian; 10'-14'- black fill w/alluvian; 14'-16.5'- scripps formation
	0.0	*10*	*331.00*	*335.30*	321.00	14.30	3.80	22	16	2.5	11.70	5/25/07	15		rb	typ 21
0	0.0	*10*	*330.51*	*335.33*	320.51	14.82	4.32	23	16	2.5	11.18	5/25/07	15	y		typ 21
30"Piers	0.0	*10*	*330.32*	*335.14*	320.32	14.82	4.32	24	16.5	2.5	11.68	5/25/07	15	y		typ 21
	0.0	*10*	*330.30*	*335.12*	320.30	14.82	4.32	25	17	2.5	12.18	5/25/07	16	y		0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-17'- scripps formation
30"Piers	0.0	*10*	*330.26*	*335.80*	320.26	14.82	4.32	26	17	3	11.46	5/25/07	15		rb	typ 25
	0.0	*10*	*329.78*	*334.60*	319.78	14.82	4.32	27	16.5	2	11.68	5/25/07	16	y		typ 25
30"Piers	0.0	*10*	*330.12*	*334.94*	320.12	14.82	4.32	28	16	2.5	11.18	5/25/07	14	y		typ 21
	0.0	*10*	*330.00*	*334.82*	320.00	14.82	4.32	29	16.5	2.5	11.68	5/25/07	14	y		typ 21
0	0.0	*11*	*330.44*	*334.84*	319.44	16.40	3.40	30	17	2.5	12.60	5/25/07	15	y		typ 25
30"Piers	0.0	*11*	*330.44*	*334.84*	319.44	16.40	3.40	31	17	2	12.60	5/25/07	17		rb	typ 25
	0.0	*11*	*330.44*	*334.84*	319.44	16.40	3.40	32	17	2.5	12.60	5/25/07	16	y		typ 25

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*11*	*330.44*	*334.84*	319.44	16.40	3.40	33	18.5	3	14.10	5/25/07	15	y		0-10'- brown fill w/alluvian; 10'-16'- black fill w/alluvian; 16'-18.5'- scripps formation
	0.0	*11*	*330.44*	*334.84*	319.44	16.40	3.40	34	17	3	12.60	5/25/07	16	y		typ 33
30"Piers	0.0	*11*	*330.14*	*334.54*	319.14	15.40	3.90	35	17.5	3	13.10	5/25/07	15		rb	typ 33
	0.0	*11*	*330.14*	*334.54*	319.14	15.40	3.90	36	17	2.5	12.60	5/25/07	17	y		typ 33
0	0.0	*13*	*330.40*	*334.34*	317.40	16.94	3.44	37	20	2	16.06	5/25/07	19	y		0-10'- brown fill w/alluvian; 10'-18'- black fill w/alluvian; 18'-20'- scripps formation
30"Piers	0.0	*13*	*330.35*	*334.29*	317.35	16.94	3.44	38	18	2	14.06	5/25/07	19	y	rb	typ 33
	0.0	*13*	*330.35*	*334.29*	317.35	16.94	3.44	39	19	2	15.06	5/25/07	16	y		typ 37
30"Piers	0.0	*13*	*330.23*	*334.17*	317.23	16.94	3.44	40	19	2	15.06	5/25/07	17		rb	typ 37
	0.0	*13*	*330.26*	*334.20*	317.26	16.94	3.44	41	18	2	14.06	5/25/07	19	y		typ 33
30"Piers	0.0	*13*	*330.13*	*334.07*	317.13	16.94	3.44	42	19	2	15.06	5/25/07	18	y		typ 37
	0.0	*13*	*330.20*	*334.14*	317.20	16.94	3.44	43	18	2	14.06	5/25/07	16	y		typ 33
0	0.0	*16*	*329.48*	*333.96*	313.48	20.48	3.98	44	22.5	2	18.02	5/25/07	19		rb	0-10'- brown fill w/alluvian; 10'-18'- black fill w/alluvian; 18-20'- tan sand; 20'-22.5'- scripps formation

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*16*	*329.42*	*333.90*	313.42	20.48	3.98	45	23	3	18.52	5/25/07	20	y		0-15'- brown fill w/alluvian; 15'-20'- black fill w/alluvian; 20'-23'- scripps formation
	0.0	*16*	*329.47*	*333.95*	313.47	20.48	3.98	46	21.5	3	17.02	5/25/07	21	y		typ 45
30"Piers	0.0	*16*	*329.51*	*333.94*	313.51	20.48	3.98	47	22	2.5	17.57	5/25/07	20		rb	typ 45
	0.0	*16*	*329.36*	*333.42*	313.36	21.06	3.06	48	22.5	3	18.44	5/25/07	19	y		typ 45
30"Piers	0.0	*16*	*329.41*	*333.89*	313.41	20.48	3.98	49	22	3	17.52	5/25/07	20	y		typ 45
	0.0	*16*	*327.90*	*332.38*	311.90	20.48	3.98	50	20	2.5	**15.52**	5/25/07	20	y		typ 45
30"Piers	0.0	*16*	*329.36*	*333.84*	313.36	21.48	3.48	51	22	3	17.52	5/25/07	19	y	rb	typ 45
0	0.0	*20*	*327.35*	*332.19*	307.35	24.84	4.34	52	25	3	20.16	5/25/07	24	y		0-15'- brown fill w/alluvian; 15'-22'- black fill w/alluvian; 22'-25'- scripps formation
30"Piers	0.0	*20*	*329.22*	*334.06*	309.22	24.84	4.34	53	24	2.5	**19.16**	5/25/07	23	y		typ 52
	0.0	*20*	*326.40*	*331.24*	306.40	24.84	4.34	54	22	2	**17.16**	5/29/07	20		rb	typ 45
	0.0	*20*	*327.28*	*332.12*	307.28	24.84	4.34	55	21.5	3	**16.66**	5/29/07	18	y		typ 45
	0.0	*20*	*326.00*	*330.84*	306.00	24.84	4.34	56	22.5	2.5	**17.66**	5/25/07	20	y		typ 45
30"Piers	0.0	*20*	*326.32*	*331.16*	306.32	24.84	4.34	57	21	2	**16.16**	5/29/07	19		rb	typ 45

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*20*	*327.38*	*332.22*	307.38	24.84	4.34	58	23	3	**18.16**	5/25/07	20		rb	0-15'- brown fill w/alluvian; 15'-20'- black fill w/alluvian; 20'-23'- scripps formation
	0.0	*20*	*325.80*	*330.64*	305.80	24.84	4.34	59	23	3	**18.16**	5/25/07	22	y		typ 58
0	0.0	*24*	*327.71*	*332.16*	303.71	28.45	3.95	60	24	3	**19.55**	5/25/07	23		rb	typ 58
30"Piers	0.0	*24*	*326.00*	*330.45*	302.00	28.45	3.95	61	23	3	**18.55**	5/25/07	21	y		typ 58
	0.0	*24*	*327.64*	*332.09*	303.64	28.45	3.95	62	24	2	**19.55**	5/29/07	23	y		typ 58
	0.0	*24*	*325.99*	*330.44*	301.99	28.45	3.95	63	22.5	2	**18.05**	5/29/07	21		rb	typ 58
	0.0	*24*	*327.43*	*331.88*	303.43	28.45	3.95	64	22	3	**17.55**	5/29/07	18		rb	typ 58
	0.0	*24*	*325.91*	*330.36*	301.91	28.45	3.95	65	23	2	**18.55**	5/29/07	21	y		typ 58
0	0.0	*25*	*326.04*	*330.74*	301.04	29.70	4.20	66	25	2.5	**20.30**	5/29/07	24	y		typ 58
30"Piers	0.0	*25*	*325.49*	*330.19*	300.49	29.70	4.20	67	25	2.5	**20.30**	5/29/07	23		rb	typ 58
	0.0	*25*	*325.71*	*330.41*	300.71	29.70	4.20	68	24	3	**19.30**	5/29/07	21		rb	typ 58
	0.0	*25*	*325.96*	*330.66*	300.96	29.70	4.20	69	25	2.5	**20.30**	5/29/07	23	y		typ 58

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*25*	*325.42*	*330.12*	300.42	29.70	4.20	70	25	2.5	**20.30**	5/29/07	23		rb	0-15'- brown fill w/ alluvian; 15'-23'- black fill w/alluvian; 23'-25'- scripps formation
0	0.0	*25*	*323.89*	*330.26*	298.89	31.37	5.87	71	32	3.5	25.63	5/29/07	28		rb	typ 74
30"Piers	0.0	*25*	*324.25*	*330.62*	299.25	31.37	5.87	72	26	4	**19.63**	5/29/07	22		rb	typ 70
	0.0	*25*	*323.94*	*330.31*	298.94	31.37	5.87	73	28.5	4	**22.13**	5/29/07	25	y		typ 74
	0.0	*25*	*323.79*	*330.16*	298.79	31.37	5.87	74	30	4	**23.63**	5/29/07	26	y		0-15'- brown fill w/alluvian; 15'-28'- black fill w/alluvian; 28'-30'- scripps formation
	0.0	*25*	*324.17*	*330.54*	299.17	31.37	5.87	75	28	4	**21.63**	5/29/07	24	y		typ 70
30"Piers	0.0	*25*	*323.85*	*330.22*	298.85	31.37	5.87	76	31	4	**24.63**	5/29/07	27		rb	typ 74
	0.0	*25*	*326.45*	*333.32*	301.45	31.37	5.87	77	30	4	**23.13**	5/29/07	26		rb	typ 74
	0.0	*25*	*326.45*	*332.82*	301.45	31.37	5.87	78	27.5	4	**21.13**	5/29/07	22	y		typ 70
	0.0	*25*	*323.48*	*330.35*	298.98	31.37	5.87	79	31.5	4	**24.63**	5/29/07	29		rb	typ 74
	0.0	*25*	*325.51*	*331.88*	300.51	31.37	5.87	80	27	3	**20.63**	5/30/07	25	y	rb	0-18'- brown fill w/alluvian; 18'-25'- black fill w/alluvian; 25'-27'- scripps formation
	0.0	*25*	*324.53*	*330.90*	299.53	31.37	5.87	81	30	4	**23.63**	5/29/07	26	y		typ 74
	0.0	*25*	*326.83*	*333.20*	301.83	32.37	5.37	82	29.5	4	**23.13**	5/29/07	26	y		typ 74

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*25*	*326.50*	*332.87*	301.50	31.37	5.87	83	30.5	4	**24.13**	5/29/07	26		rb	0-15'- brown fill w/alluvian; 15'-28'- black fill w/alluvian; 28'-30.5'+Q181 scripps formation'
0	0.0	*17*	*325.62*	*332.88*	308.62	24.30	5.80	84	23.5	5	**16.24**	5/22/07	18	y		alluvian 0-15'; scripps formation 15-23.5'
30"Piers	0.0	*17*	*325.58*	*332.84*	308.58	24.26	6.76	85	20	5	**12.74**	5/22/07	16		rb	typ 84
	0.0	*17*	*325.62*	*332.88*	308.62	24.76	6.76	86	20	5	**12.74**	5/22/07	15		rb	typ 84
	0.0	*17*	*325.32*	*332.58*	308.32	24.26	6.76	87	20	3.5	**12.74**	5/23/07	17		rb	0-10'- alluvian fill; 10-15'- black fill- alluvian; 15'-20'- scripps formation
	0.0	*17*	*325.66*	*332.92*	309.58	23.34	5.84	88	20	5	**12.74**	5/22/07	19	y		typ 84
30"Piers	0.0	*17*	*325.57*	*332.83*	309.58	23.25	5.75	89	20.5	5	**13.24**	5/22/07	18	y		alluvian 0-19'- scripps formation- 19-20.5'
	0.0	*17*	*325.55*	*332.81*	308.55	24.26	6.76	90	21	5	**13.74**	5/22/07	17	y		typ 89
	0.0	*17*	*325.59*	*332.85*	308.59	24.26	6.76	91	20	5	**12.74**	5/22/07	18		rb	typ 19
	0.0	*17*	*325.72*	*332.98*	309.58	23.40	5.90	92	19	6	**11.74**	5/21/07	16	y		0-10'- sand w/clay; 10'-19'- sandstone
	0.0	*17*	*325.51*	*332.77*	309.58	23.19	5.89	93	20	5	**12.74**	5/22/07	19	y		typ 89
	0.0	*17*	*325.50*	*332.76*	309.58	23.18	5.68	94	21	5	**13.74**	5/22/07	17	y		typ 89
	0.0	*17*	*325.54*	*332.80*	308.58	23.22	5.72	95	20	6	**12.74**	5/21/07	16	y		typ 92

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*17*	*325.72*	*332.98*	309.58	23.40	5.90	96	20	5	**12.74**	5/21/07	15	y		typ 106
	0.0	*17*	*325.64*	*332.90*	309.58	23.32	6.26	97	19.5	5	**12.24**	5/22/07	17		rb	alluvian 0-17' ; scripps formation 17-19.5
	0.0	*17*	*325.71*	*332.97*	309.58	23.39	5.89	98	21	5	**13.74**	5/22/07	18	y		alluvian 0-19'; scripps formation 19-21'
	0.0	*17*	*325.50*	*332.76*	309.58	23.18	5.68	99	21	4	**13.74**	5/21/07	16	y		typ 106
	0.0	*17*	*325.52*	*332.78*	308.52	24.26	6.26	100	20	5	**12.74**	5/22/07	18		rb	typ 98
	0.0	*17*	*325.66*	*332.92*	309.58	23.34	5.84	101	19	6	**11.74**	5/21/07	17	y		typ 106
30"Piers	0.0	*17*	*325.64*	*332.90*	309.58	23.32	5.82	102	19.5	5.5	**12.24**	5/22/07	18	y		alluvian 0-17' ; scripps formation 17-19.5'
0	0.0	*15*	*328.82*	*333.15*	313.82	19.33	3.83	103	18	3	**13.67**	5/22/07	16	y		typ 102
30"Piers	0.0	*15*	*329.02*	*333.35*	314.02	19.33	3.83	104	19	3	**14.67**	5/22/07	15		rb	typ 102
	0.0	*15*	*329.20*	*333.53*	318.53	15.00	3.83	105	16	2.5	**11.67**	5/22/07	15	y		typ 102
	0.0	*15*	*329.05*	*333.38*	314.05	18.87	3.37	106	18	2	**13.67**	5/21/07	16	y		0-12'- sandy silt w/clay; 12'-18'- sandstone
	0.0	*15*	*329.51*	*333.09*	314.51	18.58	3.08	107	19	3	15.42	5/21/07	15	y		typ 106
30"Piers	0.0	*15*	*328.87*	*333.20*	314.51	18.69	3.19	108	18	3	**13.67**	5/22/07	14	y		alluvian 0-16.5' ; scripps formation 16.5-18'

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*15*	*328.91*	*333.24*	314.51	18.73	3.23	109	17	3	**12.67**	5/22/07	13	y		alluvian 0-16' ; scripps formation 16-17'
	0.0	*15*	*329.51*	*333.33*	314.51	18.82	3.32	110	17.5	2	**13.68**	5/21/07	15	y		0-10'- sandy clay; 10'-17.5'- sandstone
	0.0	*15*	*329.51*	*333.12*	314.51	18.61	3.11	111	18	3	**14.39**	5/21/07	15	y	rb	typ 110
	0.0	*15*	*329.51*	*333.30*	314.51	18.79	3.29	112	18	2.5	**14.21**	5/21/07	14	y		typ 110
	0.0	*15*	*329.10*	*333.43*	314.51	18.92	3.42	113	17.5	3	**13.17**	5/21/07	15	y		typ 110
0	0.0	*11*	*328.76*	*333.63*	317.76	15.87	4.37	114	19	3	14.13	5/22/07	16	y		0-13' - alluvian; 13'-19'- scripps formation
30"Piers	0.0	*11*	*328.93*	*333.80*	317.93	15.87	4.37	115	19	3	14.13	5/22/07	16		rb	typ 114
	0.0	*11*	*329.08*	*333.95*	318.08	15.87	4.37	116	16.5	3	11.63	5/22/07	17	y		typ 109
	0.0	*11*	*328.96*	*333.83*	318.97	14.86	3.36	117	15	2	**10.13**	5/21/07	16	y		typ 110
	0.0	*11*	*329.97*	*333.63*	318.97	14.66	3.16	118	16	3	12.34	5/21/07	14	y		typ 110
30"Piers	0.0	*11*	*329.13*	*334.00*	318.97	15.03	3.53	119	15.5	3	**10.63**	5/22/07	13		rb	alluvian 0-13' ; scripps formation 13-15.5';
	0.0	*11*	*328.84*	*333.71*	318.97	14.74	3.24	120	15	2	**10.13**	5/22/07	13	y		alluvian 0-14' ; scripps formation 14-15'
	0.0	*11*	*329.03*	*333.90*	318.97	14.93	3.43	121	15	3	**10.13**	5/21/07	14	y		typ 110

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*11*	*328.78*	*333.65*	318.97	14.68	3.18	122	16	2.5	11.13	5/21/07	15	y		0-10'- silty sand; 10'-16'- sandstone
	0.0	*11*	*329.97*	*333.83*	318.97	14.86	3.36	123	16	3	12.14	5/21/07	14	y		typ 122
	0.0	*11*	*329.03*	*333.90*	318.97	14.93	3.43	124	15	3	**10.13**	5/21/07	13	y		typ 122
0	0.0	*10*	*328.70*	*334.06*	318.70	15.36	4.86	125	16	3	10.64	5/22/07	14	y		typ 131
30"Piers	0.0	*10*	*328.89*	*339.25*	318.89	15.36	4.86	126	16	3	**5.64**	5/22/07	13		rb	typ 131
	0.0	*10*	*329.07*	*334.43*	319.07	15.36	4.86	127	17	4	11.64	5/22/07	14	y		0-13'- alluvian; 13'-17'- scripps formation
	0.0	*10*	*328.86*	*334.22*	318.86	15.36	4.86	128	16.5	3	11.14	5/23/07	15	y	rb	0-10'- alluvian; 10-12'- reddish oxygenated formation; 12 16.5'- scripps formation
	0.0	*10*	*328.70*	*334.06*	320.44	13.62	3.12	129	13.5	3	**8.14**	5/21/07	14	y		0-5'- dirt w/sand; 5'-13.5'- sandstone
30"Piers	0.0	*10*	*328.89*	*334.25*	318.89	15.36	4.86	130	16.5	4	11.14	5/22/07	14		rb	typ 127
	0.0	*10*	*328.73*	*334.09*	318.73	15.36	4.86	131	16	3	10.64	5/22/07	14	y		alluvian 0-14' ; scripps formation 14-16'
	0.0	*10*	*328.82*	*334.18*	318.82	15.36	4.86	132	16	2	10.64	5/22/07	16		rb	typ 131, DPT 38 blows
	0.0	*10*	*328.67*	*334.03*	320.44	13.59	3.09	133	13	3	**7.64**	5/21/07	12	y		typ 122
	0.0	*10*	*330.44*	*334.11*	320.44	13.67	3.17	134	14	**4**	10.33	5/21/07	11	y		typ 122

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*10*	*328.87*	*334.23*	318.87	13.79	3.29	135	14	3.5	**8.64**	5/21/07	13	y		0-10'- silty sand; 10'-14'- sandstone
0	0.0	*10*	*329.49*	*334.45*	319.49	14.96	4.46	136	16	3	11.04	5/22/07	14	y		typ 140
30"Piers	0.0	*10*	*329.64*	*334.60*	319.64	14.96	4.46	137	16	3	11.04	5/22/07	14		rb	typ 140
	0.0	*10*	*329.73*	*334.69*	319.73	14.96	4.46	138	16	3	11.04	5/22/07	14		rb	typ 140
	0.0	*10*	*329.59*	*334.55*	319.59	14.96	4.46	139	16	3	11.04	5/23/07	14	y	rb	0-10'- alluvian; 10-12'- reddish oxyginated sand formation; 12'-16'- scripps formation
	0.0	*10*	*329.49*	*334.45*	319.49	14.96	4.46	140	16	3	11.04	5/22/07	17	y		alluvian 0-14.5; scripps formation 14.5-16'
30"Piers	0.0	*10*	*329.65*	*334.61*	319.65	14.96	4.46	141	15	3	10.04	5/22/07	15		rb	alluvian 0-14' ; scripps formation 14'-15'
	0.0	*10*	*329.52*	*334.48*	319.52	14.96	4.46	142	15	3	10.04	5/22/07	16	y		typ 141
	0.0	*10*	*329.73*	*334.69*	319.73	14.96	4.46	143	16	3	11.04	5/22/07	16		rb	typ 140
	0.0	*10*	*329.47*	*334.43*	319.47	13.59	3.09	144	14	2	**9.04**	5/21/07	14	y		typ 135
	0.0	*10*	*329.62*	*334.58*	319.62	13.74	3.24	145	14	2	**9.04**	5/21/07	13	y		typ 135, DPT 42 blows @ 2'
	0.0	*10*	*329.70*	*334.66*	319.70	13.82	3.32	146	14	3	**9.04**	5/21/07	14	y		typ 135

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
0	0.0	*10*	*329.39*	*334.85*	319.39	15.46	4.96	147	16	3	10.54	5/22/07	14	y		typ 154
30"Piers	0.0	*10*	*329.49*	*334.95*	319.49	15.46	4.96	148	16	3	10.54	5/22/07	15		rb	typ 154
	0.0	*10*	*329.63*	*335.09*	319.63	15.46	4.96	149	16	4	10.54	5/22/07	14		rb	typ 154
	0.0	*10*	*329.44*	*334.90*	319.44	15.46	4.96	150	17	3	11.54	5/23/07	15	y		typ 159
	0.0	*10*	*329.36*	*339.82*	319.36	15.46	4.96	151	15.5	4	**5.04**	5/22/07	18	y		typ 154
30"Piers	0.0	*10*	*329.57*	*335.03*	319.57	15.46	4.96	152	16	4	10.54	5/23/07	13		rb	typ 159
	0.0	*10*	*329.53*	*334.81*	319.35	15.46	4.96	153	16	4	10.72	5/22/07	12	y		typ 154
	0.0	*10*	*329.52*	*334.98*	319.52	15.46	4.96	154	16	4	10.54	5/22/07	17		rb	0-12'- alluvian; 12'-16'- scripps formation
	0.0	*10*	*329.39*	*334.85*	319.39	13.51	3.01	155	14	3	**8.54**	5/21/07	11	y		0-12'- sandy clay; 12'-14'- sandstone
	0.0	*10*	*329.47*	*334.93*	319.47	13.59	3.09	156	14	3	**8.54**	5/21/07	11	y		typ 155
	0.0	*10*	*329.61*	*335.07*	319.61	13.37	3.23	157	14	2	**8.54**	5/21/07	11	y		typ 155
0	0.0	*10*	*330.15*	*335.25*	320.15	15.10	4.60	158	16	3	10.90	5/23/07	14	y		typ 159
30"Piers	0.0	*10*	*330.27*	*335.37*	320.27	15.10	4.60	159	16.5	3	11.40	5/23/07	14	y		0-10'- alluvian; 10-12'- reddish oxyginated sand formation; 12'-16.5 '- clean sand

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*10*	*330.33*	*335.43*	320.33	15.10	4.60	160	16	4	10.90	5/23/07	14		rb	0-10'- alluvian; 10-12'- reddish oxyginated sand formation; 12-16'- clean sand
	0.0	*10*	*330.58*	*335.68*	320.58	15.10	4.60	161	16	4	10.90	5/23/07	13	y		typ 160
	0.0	*10*	*330.10*	*335.20*	320.10	15.10	4.60	162	15.5	3	10.40	5/22/07	14	y		0-12'- alluvian; 12'-15.5'- scripps formation
	0.0	*10*	*330.20*	*335.30*	320.20	15.10	4.60	163	15.5	3	10.40	5/22/07	14	y		typ 162
	0.0	*10*	*330.33*	*335.43*	320.33	15.10	4.60	164	16	3	10.90	5/22/07	15		rb	0-12'- alluvian; 12'-16'- scripps formation
	0.0	*10*	*330.40*	*335.50*	320.40	15.10	4.60	165	15.5	3	10.40	5/22/07	13	y		typ 162
	0.0	*10*	*330.08*	*335.18*	320.08	15.10	4.60	166	14	3.5	**8.90**	5/21/07	12	y		0-10'- sandy clay; 10'-14'- sandstone
	0.0	*10*	*330.19*	*335.29*	320.19	15.10	4.60	167	14	4	**8.90**	5/21/07	12	y		typ 155
	0.0	*10*	*330.50*	*335.40*	320.50	15.10	4.60	168	14	4	**9.10**	5/21/07	13	y		typ 155
	0.0	*10*	*331.70*	*335.48*	321.70	13.78	3.28	169	14	3	10.22	5/21/07	14	y		typ 155
0 30"Piers	0.0	*24*	*327.26*	*332.46*	303.26	29.20	4.70	170	28	4	**22.80**	5/29/07	24		rb	0-15'- brown fill w/alluvian; 15'-26'- black fill w/alluvian; 26'-28'- scripps formation
	0.0	*24*	*327.62*	*332.82*	303.62	29.20	4.70	171	30	4	24.80	5/29/07	26		rb	typ 170
	0.0	*24*	*327.58*	*332.78*	303.58	29.20	4.70	172	30	3	24.80	5/30/07	27	y	rb	typ 170

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*24*	*327.58*	*332.78*	303.58	29.20	4.70	173	28	4	**22.80**	5/29/07	24		rb	0-15'- brown fill w/alluvian; 15'-26'- black fill w/alluvian; 26'-28'- scrippd formation
	0.0	*24*	*327.61*	*332.81*	303.61	29.20	4.70	174	29.5	4	24.30	5/29/07	25	y		typ 173
0	0.0	*20*	*327.58*	*332.78*	307.58	25.20	4.70	175	27	4	21.80	5/29/07	24		rb	typ 173
30"Piers	0.0	*20*	*327.55*	*332.75*	307.55	25.20	4.70	176	28.5	3.5	23.30	5/29/07	23	y		typ 173
	0.0	*20*	*327.61*	*332.81*	307.61	25.20	4.70	177	26	3	20.80	5/30/07	23		rb	0-18'- brown fill w/alluvian; 18'-24'- black fill w/alluvian; 24'-26'- scripps formation
	0.0	*20*	*327.60*	*332.80*	307.60	25.20	4.70	178	25.5	3.5	20.30	5/29/07	25		rb	0-15'- brown fill w/alluvian; 15'-23'- black fill w/alluvian; 23'-25.5'- scripps formation
	0.0	*20*	*327.57*	*332.77*	307.57	25.20	4.70	179	25	4	**19.80**	5/29/07	20			typ 178
0	0.0	*15*	*327.39*	*332.76*	312.39	20.37	4.87	180	22	4	16.63	5/29/07	19		rb	0-15'- brown fill w/alluvian; 15'-20'- black fill w/alluvian; 20'-22'- scripps fromation
30"Piers	0.0	*15*	*327.35*	*332.72*	312.35	20.37	4.87	181	23	4	17.63	5/29/07	18	y		typ 180
	0.0	*15*	*327.51*	*332.88*	312.51	20.37	4.87	182	22	4	16.63	5/29/07	20	y		typ 180
30"Piers	0.0	*15*	*327.35*	*332.72*	312.35	20.37	4.87	183	21	3.5	15.63	5/29/07	20	y		typ 180
	0.0	*15*	*327.51*	*332.88*	312.51	20.37	4.87	184	20	3	**14.63**	5/30/07	17	y	rb	0-10'- brown fill w/alluvian; 10'-18'- black fill w/alluvian; 18'20'- scripps formation

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*15*	*327.48*	*332.85*	312.48	20.37	4.87	185	21	3	15.63	5/30/07	18	y		typ 194
	0.0	*15*	*327.33*	*332.70*	312.33	20.37	4.87	186	21.5	4	16.13	5/29/07	18		rb	0-15'- brown fill w/alluvian; 15'-19'- black fill w/alluvian; 19'-21.5'- scripps formation
30"Piers	0.0	*15*	*327.40*	*332.77*	312.40	20.37	4.87	187	20.5	3.5	15.13	5/29/07	16	y		typ 186
	0.0	*15*	*327.54*	*332.91*	312.54	20.37	4.87	188	20	3	**14.63**	5/30/07	17		rb	typ 194
30"Piers	0.0	*15*	*327.51*	*332.88*	312.51	20.37	4.87	189	21	4	15.63	5/29/07	18		rb	typ 186
	0.0	*15*	*327.41*	*332.78*	312.41	20.37	4.87	190	19	3	**13.63**	5/30/07	16	y	rb	typ 194
30"Piers	0.0	*15*	*327.61*	*332.98*	312.61	20.37	4.87	191	20	3	**14.63**	5/30/07	17	y		typ 194
	0.0	*15*	*327.52*	*332.89*	312.52	20.37	4.87	192	18	3	**12.63**	5/30/07	16		rb	typ 194
30"Piers	0.0	*15*	*327.46*	*332.83*	312.46	20.37	4.87	193	19	4	**13.63**	5/29/07	16		rb	typ 186
0	0.0	*14*	*324.87*	*332.48*	310.87	21.61	7.11	194	22	3	14.39	5/23/07	19		rb	0-10'- brown fill/ alluvian; 10-20'- black fill/ alluvian; 20-22'- scripps formation
30"Piers	0.0	*14*	*324.87*	*332.48*	310.87	21.61	7.11	195	23	4.5	15.39	5/24/07	18	y		0-10'- brown fill/alluvian; 10-20'- black fill/alluvian; 20-23'- scripps formation
	0.0	*14*	*325.02*	*332.63*	311.02	21.61	7.11	196	21	4.5	**13.39**	5/24/07	17		rb	typ 195
	0.0	*14*	*325.10*	*332.71*	311.10	21.61	7.11	197	20	4	**12.39**	5/23/07	17		rb	typ 194

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*14*	*324.85*	*332.46*	310.85	21.61	7.11	198	22	4	14.39	5/23/07	18		rb	typ 209
30"Piers	0.0	*14*	*324.85*	*332.46*	310.85	21.61	7.11	199	23	4	15.39	5/23/07	19	y		typ 209
	0.0	*14*	*324.87*	*332.48*	310.87	21.61	7.11	200	23	4.5	15.39	5/24/07	19	y		typ 210
	0.0	*14*	*324.97*	*332.58*	310.97	21.61	7.11	201	22	4	14.39	5/24/07	19		rb	typ 210
	0.0	*14*	*325.09*	*332.70*	311.09	21.61	7.11	202	21	3.5	**13.39**	5/23/07	19		rb	typ 209
30"Piers	0.0	*14*	*324.86*	*332.47*	310.86	21.61	7.11	203	22.5	4.5	14.89	5/24/07	19	y	rb	typ 210
	0.0	*14*	*324.99*	*332.60*	310.99	21.61	7.11	204	23	4	15.39	5/23/07	19	y		typ 209
	0.0	*14*	*324.97*	*332.58*	310.97	21.61	7.11	205	23	4	15.39	5/24/07	20	y		typ 210
	0.0	*14*	*325.05*	*332.66*	311.05	21.61	7.11	206	21.5	4.5	**13.89**	5/24/07	18	y		typ 210
30"Piers	0.0	*14*	*325.12*	*332.73*	311.12	21.61	7.11	207	21	4.5	**13.39**	5/24/07	18		rb	typ 210
	0.0	*14*	*324.94*	*332.55*	310.94	21.61	7.11	208	22	4	14.39	5/24/07	18	y		typ 210
	0.0	*14*	*325.09*	*332.70*	311.09	21.61	7.11	209	22	4	14.39	5/23/07	18		rb	0-10'- brown fill/alluvian; 10-20-black fill/alluvian; 20-22'- scripps formation
	0.0	*14*	*325.12*	*332.73*	311.12	21.61	7.11	210	22	4	14.39	5/24/07	21	y	rb	0-10'- brown fill/alluvian; 10-20'-black fill/alluvian; 20-22'- scripps formation
	0.0	*14*	*325.19*	*332.80*	311.19	21.61	7.11	211	21.5	4.5	**13.89**	5/24/07	21	y		typ 210

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*14*	*325.24*	*332.85*	311.24	21.61	7.11	212	22.5	4	14.89	5/24/07	19	y		typ 221
0	0.0	*14*	*328.08*	*332.85*	314.08	18.77	4.27	213	20.5	3	15.73	5/23/07	18		rb	typ 217
30"Piers	0.0	*14*	*328.28*	*333.05*	314.28	18.77	4.27	214	20	3	15.23	5/23/07	17			typ 217
	0.0	*14*	*328.38*	*333.15*	314.38	18.77	4.27	215	19.5	3	14.73	5/23/07	18		rb	typ 217
	0.0	*14*	*328.23*	*333.00*	314.23	18.77	4.27	216	20	3	15.23	5/24/07	19		rb	typ 221; tamper shaft broke
	0.0	*14*	*327.96*	*332.73*	313.96	18.77	4.27	217	20	3	15.23	5/23/07	17		rb	0-10'- brown fill/alluvian; 10-18'- black fill/alluvian; 18-20'- scripps formation
30"Piers	0.0	*14*	*328.33*	*333.10*	314.33	18.77	4.27	218	19	3	14.23	5/23/07	17		rb	typ 217
	0.0	*14*	*328.20*	*332.47*	314.20	18.77	4.27	219	20	3	15.73	5/24/07	18	y		typ 221
	0.0	*14*	*328.23*	*333.00*	314.23	18.77	4.27	220	21	3	16.23	5/24/07	18		rb	typ 221
	0.0	*14*	*328.16*	*332.93*	314.16	18.77	4.27	221	20	3	15.23	5/24/07	18	y		0-10'- brown fill/alluvian; 10-18'- black fill/alluvian; 18-20'- scripps formation
	0.0	*14*	*328.30*	*333.07*	314.30	18.77	4.27	222	21	3	16.23	5/24/07	18		rb	typ 221
	0.0	*14*	*328.38*	*333.15*	314.38	18.77	4.27	223	20	3	15.23	5/24/07	18	y		typ 221

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
0	0.0	*13*	*328.31*	*333.41*	315.31	18.10	4.60	224	19	4	13.90	5/23/07	16	y		typ 228
30"Piers	0.0	*13*	*328.41*	*333.51*	315.41	18.10	4.60	225	17.5	4	**12.40**	5/23/07	14		rb	typ 228
	0.0	*13*	*328.51*	*333.61*	315.51	18.10	4.60	226	17	3.5	**11.90**	5/23/07	14	y		0-10'- brown fill/alluvian; 10-15'- black fill/alluvian; 15-17"- scripps formation
	0.0	*13*	*328.38*	*333.48*	315.38	18.10	4.60	227	18.5	3	13.40	5/24/07	16		rb	0-10'- brown fill/alluvian; 10-16'- black fill/alluvian; 16-18.5'- scripps formation
	0.0	*13*	*328.18*	*333.28*	315.18	18.10	4.60	228	19	3.5	13.90	5/23/07	16		rb	0-10'- brown fill/alluvian; 10-17'- black fill/alluvian; 17-19'-scripps formation
30"Piers	0.0	*13*	*328.19*	*333.29*	315.19	18.10	4.60	229	17	3.5	**11.90**	5/23/07	16	y		typ 226
	0.0	*13*	*328.29*	*333.39*	315.29	18.10	4.60	230	19	3	13.90	5/24/07	16	y		typ 227
	0.0	*13*	*328.38*	*333.48*	315.38	18.10	4.60	231	18.5	3	13.40	5/24/07	16	y		typ 227
	0.0	*13*	*328.31*	*333.41*	315.31	18.10	4.60	232	20	3	14.90	5/24/07	17	y		0-10'- brown fill/alluvian; 10-18'- black fill/alluvian; 18-20'- scripps formation
	0.0	*13*	*328.41*	*333.51*	315.41	18.10	4.60	233	19	3	13.90	5/24/07	17	y		typ 227
	0.0	*13*	*328.51*	*333.61*	315.51	18.10	4.60	234	17	2	**11.90**	5/24/07	15		rb	0-10'-brown fill/alluvian; 10-15'- black fill/alluvian; 15-17'- scripps formation
0	0.0	*11*	*329.19*	*333.79*	318.19	15.60	4.10	235	16.5	3	11.90	5/23/07	16		rb	0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16.5-scripps formation
30"Piers	0.0	*11*	*329.39*	*333.99*	318.39	15.60	4.10	236	16	2.5	11.40	5/23/07	15	y		typ 235

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*11*	*329.49*	*334.09*	318.49	15.60	4.10	237	16	3	11.40	5/23/07	14		rb	typ 239
	0.0	*11*	*329.30*	*333.90*	318.30	15.60	4.10	238	16.5	3	11.90	5/24/07	14		rb	0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16.5'- scripps formation
	0.0	*11*	*329.15*	*333.75*	318.15	15.60	4.10	239	16	3	11.40	5/23/07	14	y		0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16'- scripps formation
	0.0	*11*	*329.44*	*334.09*	318.44	15.60	4.10	240	16.5	3	11.85	5/23/07	14		rb	typ 239
	0.0	*11*	*329.31*	*333.91*	318.31	15.60	4.10	241	16.5	3	11.90	5/24/07	14	y		typ 238
	0.0	*11*	*329.39*	*333.99*	318.39	15.60	4.10	242	16.5	3	11.90	5/24/07	14	y	rb	typ 238
	0.0	*11*	*329.22*	*333.82*	318.22	15.60	4.10	243	17	3	12.40	5/24/07	15	y		typ 238
	0.0	*11*	*329.37*	*333.97*	318.37	15.60	4.10	244	16.5	3	11.90	5/24/07	14	y		typ 245
	0.0	*11*	*329.47*	*334.07*	318.47	15.60	4.10	245	16.5	2.5	11.90	5/24/07	15	y	rb	0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16.5'- scripps formation
0	0.0	*10*	*329.38*	*334.31*	319.38	14.93	4.43	246	16.5	3	11.57	5/23/07	14	y		0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16.5'- scripps formation
30"Piers	0.0	*10*	*329.60*	*334.53*	319.60	14.93	4.43	247	15.5	2.5	10.57	5/23/07	14		rb	typ 246
	0.0	*10*	*329.72*	*334.65*	319.72	14.93	4.43	248	16.5	2.5	11.57	5/23/07	15	y		typ 246
	0.0	*10*	*329.46*	*334.39*	319.46	14.93	4.43	249	16	2.5	11.07	5/24/07	14		rb	typ 245

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*10*	*329.35*	*334.28*	319.35	14.93	4.43	250	16.5	3	11.57	5/23/07	14		rb	0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16.5- scripps formation
	0.0	*10*	*329.66*	*334.59*	319.66	14.93	4.43	251	16.5	3	11.57	5/23/07	14	y		typ 250
	0.0	*10*	*329.42*	*334.35*	319.42	14.93	4.43	252	16	2.5	11.07	5/24/07	14		rb	0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16'- scripps formation
	0.0	*10*	*329.60*	*334.53*	319.60	14.93	4.43	253	16.5	3	11.57	5/24/07	15	y		typ 252
	0.0	*10*	*329.38*	*334.31*	319.38	14.93	4.43	254	16.5	2.5	11.57	5/24/07	15	y		typ 252
	0.0	*10*	*329.52*	*334.45*	319.52	14.93	4.43	255	17	3	12.07	5/24/07	15		rb	typ 256
	0.0	*10*	*329.68*	*334.61*	319.68	14.93	4.43	256	17	2.5	12.07	5/24/07	15	y		0-10'- brown fill/alluvian; 10-15'- black fill/alluvian; 15-17'-scripps formation
0	0.0	*10*	*330.69*	*334.92*	320.69	14.23	3.73	257	15.5	3	11.27	5/23/07	13	y	rb	0-10'- brown fill/alluvian; 10-13'- black fill/alluvian; 13-15.5'- scripp formation
30"Piers	0.0	*10*	*330.84*	*335.07*	320.84	14.23	3.73	258	16	3	11.77	5/23/07	14		rb	typ 257
	0.0	*10*	*331.01*	*335.24*	321.01	14.23	3.73	259	16	3	11.77	5/23/07	15	y		typ 257
30"Piers	0.0	*10*	*330.71*	*334.44*	320.71	14.23	3.73	260	17	3	13.27	5/24/07	15		rb	typ 256
	0.0	*10*	*330.57*	*334.80*	320.57	14.23	3.73	261	16.5	3	12.27	5/23/07	14	y	rb	typ 250
30"Piers	0.0	*10*	*331.04*	*335.27*	321.04	14.23	3.73	262	17	2.5	12.77	5/23/07	16			typ 250

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*10*	*330.68*	*334.91*	320.68	14.23	3.73	263	16	2.5	11.77	5/24/07	15		rb	0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16'- scripps formation
30"Piers	0.0	*10*	*330.84*	*335.77*	320.84	14.23	3.73	264	16	3	11.07	5/24/07	14	y		typ 263
	0.0	*10*	*330.59*	*334.82*	320.59	14.23	3.73	265	17	2.5	12.77	5/24/07	15	y		typ 263
30"Piers	0.0	*10*	*330.81*	*335.04*	320.81	14.23	3.73	266	15.5	2.5	11.27	5/24/07	14	y		typ 263
	0.0	*10*	*330.99*	*335.22*	320.99	14.23	3.73	267	17	2.5	12.77	5/24/07	15		rb	typ 263
0	0.0	*10*	*331.50*	*335.42*	321.50	13.92	3.42	268	15.5	2.5	11.58	5/23/07	15		rb	typ 272
30"Piers	0.0	*10*	*331.62*	*335.54*	321.62	13.42	3.42	269	15.5	2.5	11.58	5/23/07	16	y		typ 272
	0.0	*10*	*331.62*	*335.54*	321.62	13.92	3.42	270	15.5	2.5	11.58	5/23/07	14	y		typ 272
30"Piers	0.0	*10*	*331.82*	*335.74*	321.82	13.92	3.42	271	15.5	2.5	11.58	5/23/07	13		rb	typ 272
	0.0	*10*	*331.52*	*335.44*	321.52	13.92	3.42	272	16	2.5	12.08	5/23/07	16	y		0-10'- brown fill/alluvian; 10-14'- black fill/alluvian; 14-16'- scripps formation
30"Piers	0.0	*10*	*331.63*	*335.55*	321.63	13.92	3.42	273	15	2.5	11.08	5/23/07	15	y		typ 272
	0.0	*10*	*331.75*	*335.67*	321.75	13.92	3.42	274	17	2.5	13.08	5/23/07	14		rb	0-10'- brown fill/alluvian; 10-15'- black fill/alluvian; 15-17"- scripps formation
30"Piers	0.0	*10*	*331.81*	*335.75*	321.81	13.92	3.42	275	16	2.5	12.06	5/23/07	14	y		typ 272

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*10*	*331.47*	*335.39*	321.47	13.92	3.42	276	15.5	2.5	11.58	5/23/07	15		rb	0-10'- brown fill/alluvian; 10-13'- black fill/alluvian; 13-15.5'- scripp formation
	0.0	*10*	*331.63*	*335.55*	321.63	13.92	3.42	277	15.5	2.5	11.58	5/23/07	14		rb	typ 276
	0.0	*10*	*331.76*	*335.68*	321.76	13.42	3.42	278	16	2.5	12.08	5/23/07	16	y		typ 276
	0.0	*10*	*331.90*	*335.82*	321.90	13.92	3.42	279	15	2.5	11.08	5/23/07	15		rb	typ 276
0 30"Piers	0.0	*13*	*328.95*	*333.15*	315.95	17.20	3.70	280	18	3	13.80	5/30/07	16		rb	0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-18'- scripps formation
	0.0	*13*	*328.93*	*333.13*	315.93	17.20	3.70	281	19	3	14.80	5/30/07	16	y		typ 280
	0.0	*13*	*328.90*	*333.10*	315.90	17.20	3.70	282	19	2.5	14.80	5/30/07	17		rb	typ 280
	0.0	*13*	*329.00*	*333.20*	316.00	18.20	3.20	283	18.5	3	14.30	5/30/07	16	y		typ 280
	0.0	*13*	*329.00*	*333.20*	316.00	18.20	3.20	284	17.5	2.5	13.30	5/30/07	16	y		typ 280
0 30"Piers	0.0	*11*	*329.00*	*333.20*	318.00	16.20	3.20	285	16.5	3	12.30	5/30/07	14		rb	typ 280
	0.0	*11*	*329.00*	*333.20*	318.00	16.20	3.20	286	17	2.5	12.80	5/30/07	15	y		typ 280, hyd hose broke on anderson drill, r and r
	0.0	*11*	*329.25*	*333.45*	318.25	15.20	3.70	287	17	2.5	12.80	5/30/07	15		rb	typ 280

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*11*	*329.35*	*333.55*	318.35	15.20	3.70	288	17.5	3	13.30	5/30/07	15		rb	0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-17.5'- scripps formation
0	0.0	*10*	*330.30*	*333.50*	320.30	13.20	2.70	289	15.5	2	12.30	5/31/07	14	y	rb	typ 294
30"Piers	0.0	*10*	*330.32*	*333.52*	320.32	13.20	2.70	290	15.5	3	12.30	5/30/07	15	y		typ 294
	0.0	*10*	*330.35*	*333.55*	320.35	13.20	2.70	291	16	2	12.80	5/31/07	15		rb	typ 294
	0.0	*10*	*330.38*	*333.58*	320.38	13.20	2.70	292	17	2	13.80	5/30/07	15	y		typ 288
	0.0	*10*	*330.38*	*333.58*	320.38	13.20	2.70	293	16	2	12.80	5/31/07	16	y	rb	typ 294
30"Piers	0.0	*10*	*330.42*	*333.62*	320.42	13.20	2.70	294	15.5	2	12.30	5/30/07	15	y		0-10'- brown fill w/alluvian; 10'-13'- black fill w/alluvian; 13'-15.5'- scripps formation
	0.0	*10*	*330.45*	*333.65*	320.45	13.20	2.70	295	15	1.5	11.80	5/31/07	15	y		typ 294
	0.0	*10*	*330.33*	*333.53*	320.33	13.20	2.70	296	15	2	11.80	5/30/07	16		rb	typ 294
	0.0	*10*	*330.44*	*333.64*	320.44	13.20	2.70	297	16	2	12.80	5/31/07	16	y	rb	typ 294
	0.0	*10*	*330.40*	*333.60*	320.40	13.20	2.70	298	15	2	11.80	5/30/07	13	y		typ 294
0	0.0	*10*	*329.84*	*333.76*	319.84	13.92	3.42	299	15.5	2	11.58	5/30/07	13		rb	typ 294

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*10*	*329.91*	*333.83*	319.91	13.92	3.42	300	15.5	2	11.58	5/30/07	14	y		0-10'- brown fill w/alluvian; 10'-13'- black fill w/alluvian; 13'-15.5'- scripps formation
	0.0	*10*	*329.88*	*333.80*	319.88	13.92	3.42	301	15	2	11.08	5/31/07	15	y	rb	typ 300
	0.0	*10*	*329.86*	*333.78*	319.86	13.92	3.42	302	16	2	12.08	5/30/07	14		rb	typ 300
	0.0	*10*	*329.91*	*333.83*	319.91	13.92	3.42	303	15	2	11.08	5/30/07	13	y		typ 300
0	0.0	*10*	*330.10*	*333.84*	320.10	13.74	3.24	304	16	2	12.26	5/30/07	14	y		0-10'- brown fill w/alluvian; 10'-14'- black fill w/alluvian; 14'-16'- scripps formation
30"Piers	0.0	*10*	*330.10*	*333.84*	320.10	13.74	3.24	305	16	2	12.26	5/30/07	13	y		typ 304
	0.0	*10*	*330.06*	*333.80*	320.06	13.74	3.24	306	16	2	12.26	5/31/07	16	y	rb	typ 304
	0.0	*10*	*330.04*	*333.78*	320.04	13.74	3.24	307	15	2	11.26	5/30/07	13		rb	typ 304
	0.0	*10*	*330.15*	*333.89*	320.15	13.74	3.24	308	15	2	11.26	5/30/07	13	y		typ 304
0	0.0	*10*	*330.37*	*333.93*	320.37	13.56	3.06	309	15.5	2	11.94	5/30/07	13	y		0-10'- brown fill w/alluvian; 10'-13'- black fill w/alluvian; 13'-15.5'- scripps formation
30"Piers	0.0	*10*	*330.48*	*334.04*	320.48	13.56	3.06	310	15.5	2	11.94	5/30/07	14		rb	typ 309
	0.0	*10*	*330.39*	*333.95*	320.39	13.56	3.06	311	15.5	2	11.94	5/31/07	16	y	rb	typ 309

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
30"Piers	0.0	*10*	*330.45*	*334.01*	320.45	13.56	3.06	312	15	2	11.44	5/30/07	14		rb	0-10'- brown fill w/alluvian; 10'-13'- black fill w/alluvian; 13'-15'- scripps formation
	0.0	*10*	*330.46*	*334.02*	320.46	13.56	3.06	313	15.5	2	11.94	5/30/07	16	y		typ 312
	0.0	*10*	*330.56*	*334.12*	320.56	13.56	3.06	314	15.5	2	11.94	5/31/07	14	y	rb	typ 312
	0.0	*10*	*330.70*	*334.26*	320.70	13.56	3.06	315	16	2	12.44	5/30/07	15		rb	typ 312
	0.0	*10*	*330.69*	*334.25*	320.69	13.56	3.06	316	16	2	12.44	5/30/07	14		rb	typ 312
0 30"Piers	0.0	*10*	*330.02*	*334.26*	320.02	14.24	3.74	317	17	2.5	12.76	5/30/07	15	y		0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-17'- scripps formation
	0.0	*10*	*330.03*	*334.27*	320.03	14.24	3.74	318	17	2	12.76	5/31/07	16	y	rb	typ 317
	0.0	*10*	*329.99*	*334.23*	319.99	14.24	3.74	319	16	2.5	11.76	5/31/07	13	y		typ 317
	0.0	*10*	*330.05*	*334.29*	320.05	14.24	3.74	320	17	2.5	12.76	5/30/07	15		rb	typ 317
	0.0	*10*	*330.03*	*334.27*	320.03	14.24	3.74	321	18	2.5	13.76	5/30/07	16	y		typ 317
	0.0	*10*	*330.10*	*334.34*	320.10	14.24	3.74	322	19	2	14.76	5/31/07	17	y	rb	typ 317
	0.0	*10*	*330.06*	*334.30*	320.06	14.24	3.74	323	17	2	12.76	5/31/07	16		rb	typ 317

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
0	0.0	*10*	*330.28*	*334.37*	320.28	14.09	3.59	324	17	2.5	12.91	5/30/07	15		rb	0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-17'- scripps formation
30"Piers	0.0	*10*	*330.34*	*334.43*	320.34	14.09	3.59	325	18	3	13.91	5/30/07	15	y		typ 324
	0.0	*10*	*330.36*	*334.45*	320.36	14.09	3.59	326	16.5	2.5	12.41	5/30/07	14		rb	typ 324
	0.0	*10*	*330.42*	*334.51*	320.42	14.09	3.59	327	16.5	2.5	12.41	5/31/07	15	y	rb	typ 324
	0.0	*10*	*330.45*	*334.54*	320.45	14.09	3.59	328	18	2	13.91	5/31/07	16	y		typ 324
	0.0	*10*	*330.50*	*334.59*	320.50	14.09	3.59	329	17	2.5	12.91	5/30/07	15		rb	typ 324
	0.0	*10*	*330.46*	*334.55*	320.46	14.09	3.59	330	16	2.5	11.91	5/30/07	16	y		typ 324
0	0.0	*10*	*330.79*	*334.72*	320.79	13.93	3.43	331	15	2	11.07	5/30/07	16		rb	0-10'- brown fill w/alluvian; 10'-13'- black fill w/alluvian; 13'-15'- scripps formation
30"Piers	0.0	*10*	*330.74*	*334.72*	320.79	13.93	3.43	332	15	2	11.02	5/30/07	17	y		typ 331
	0.0	*10*	*330.84*	*334.77*	320.84	13.93	3.43	333	15.5	2	11.57	5/30/07	15	y		typ 331
	0.0	*10*	*330.84*	*334.77*	320.84	13.93	3.43	334	16	1.5	12.07	5/31/07	15	y	rb	typ 331
	0.0	*10*	*330.84*	*334.77*	320.84	13.93	3.43	335	15	1.5	11.07	5/31/07	14	y	rb	typ 331
	0.0	*10*	*330.80*	*334.73*	320.80	13.43	3.43	336	15	2	11.07	5/30/07	16	y		typ 331

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	0.0	*10*	*330.78*	*334.71*	320.78	13.93	3.43	337	15.5	2	11.57	5/30/07	16	y		0-10'- brown fill w/alluvian; 10'-13'- black fill w/alluvian; 13'-15.5'- scripps formation
0	0.0	*10*	*328.83*	*334.60*	318.83	15.77	5.27	338	17	3	11.23	5/31/07	15	y	rb	0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-17'- scripps formation
30"Piers	0.0	*10*	*328.71*	*334.48*	318.71	15.77	5.27	339	18	3	12.23	5/31/07	15		rb	typ 338
	0.0	*10*	*328.55*	*334.32*	318.55	15.77	5.27	340	17	3	11.23	5/31/07	15	y	rb	typ 338
	0.0	*10*	*328.60*	*334.37*	318.60	15.77	5.27	341	17	3	11.23	5/31/07	14	y		typ 338
	0.0	*10*	*328.77*	*334.54*	318.77	16.77	5.27	342	17	3	11.23	5/31/07	15	y		typ 338
	0.0	*10*	*328.73*	*334.50*	318.73	15.77	5.27	343	19	3	13.23	5/31/07	16		rb	typ 338
	0.0	*10*	*329.00*	*334.77*	319.00	15.77	5.27	344	17	3	11.23	5/31/07	14	y		typ 338
	0.0	*10*	*328.98*	*334.75*	318.98	15.77	5.27	345	17.5	3	11.73	5/31/07	15	y	rb	typ 338
	0.0	*10*	*329.11*	*334.88*	319.11	15.77	5.27	346	18	3	12.23	5/31/07	15	y		typ 347
	0.0	*10*	*329.26*	*335.03*	319.26	15.77	5.27	347	17	3	11.23	5/31/07	14		rb	0-10'- brown fill w/alluvian; 10'-15'- black fill w/alluvian; 15'-17'- scripps formation
	0.0	*10*	*329.30*	*335.07*	319.30	15.77	5.27	348	17	3	11.23	5/31/07	15	y		typ 347

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Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
0	0.0	*10*	*329.66*	*335.43*	319.66	15.77	5.27	349	18	3.5	12.23	5/31/07	16	y	rb	0-10'- brown fill w/alluvian; 10'-16'- black fill w/alluvian; 16'-18'- scripps formation
30"Piers	0.0	*10*	*329.83*	*335.60*	319.83	15.77	5.27	350	17	3	11.23	5/31/07	14		rb	typ 349
	0.0	*10*	*329.99*	*335.76*	319.99	16.77	5.27	351	17	3.5	11.23	5/31/07	15	y		typ 349
	0.0	*10*	*330.17*	*335.94*	320.17	15.77	5.27	352	17	3	11.23	5/31/07	16	y		typ 349
	0.0	*10*	*329.73*	*335.50*	319.73	15.77	5.27	353	18	3.5	12.23	5/31/07	16		rb	typ 349
	0.0	*10*	*329.92*	*335.64*	319.92	15.77	5.27	354	17.5	3	11.78	5/31/07	15		rb	typ 349
	0.0	*10*	*330.12*	*335.89*	320.12	15.77	5.27	355	17.5	3	11.73	5/31/07	15	y		typ 349
	0.0	*10*	*329.76*	*335.53*	319.76	15.77	5.27	356	17	3	11.23	5/31/07	14	y		typ 349
	0.0	*10*	*329.96*	*335.73*	319.96	15.77	5.27	357	17.5	3	11.73	5/31/07	15		rb	typ 349
	0.0	*10*	*330.12*	*335.89*	320.12	15.77	5.27	358	17	3	11.23	5/31/07	15	y		typ 349
	0.0	*10*	*330.31*	*336.08*	320.31	15.77	5.27	359	17	3	11.23	5/31/07	14	y		typ 349

the geotechnical explorations?

Location	Design Pier&Soil Load(kips)	A Design Pier Length (A)	B BOF Grade (B)	C Existing Grade (C)	D Design Tip Elev. (B - A)	Design Tip Depth (C - D)	Planned Top Depth (C - B - 0.5)	Geopier No.	As-Built Measured Tip Depth	As-Built Measured Top Depth	As-Built Measured Pier Length	As-Built Date Installed	No. Lifts	QA Present Yes / No	QA Agrees? Yes / No (initials)	As-Built Notes
	#N/A	*0*	*#N/A*		#N/A			2			0.00					

SUMMARY

Production Data:

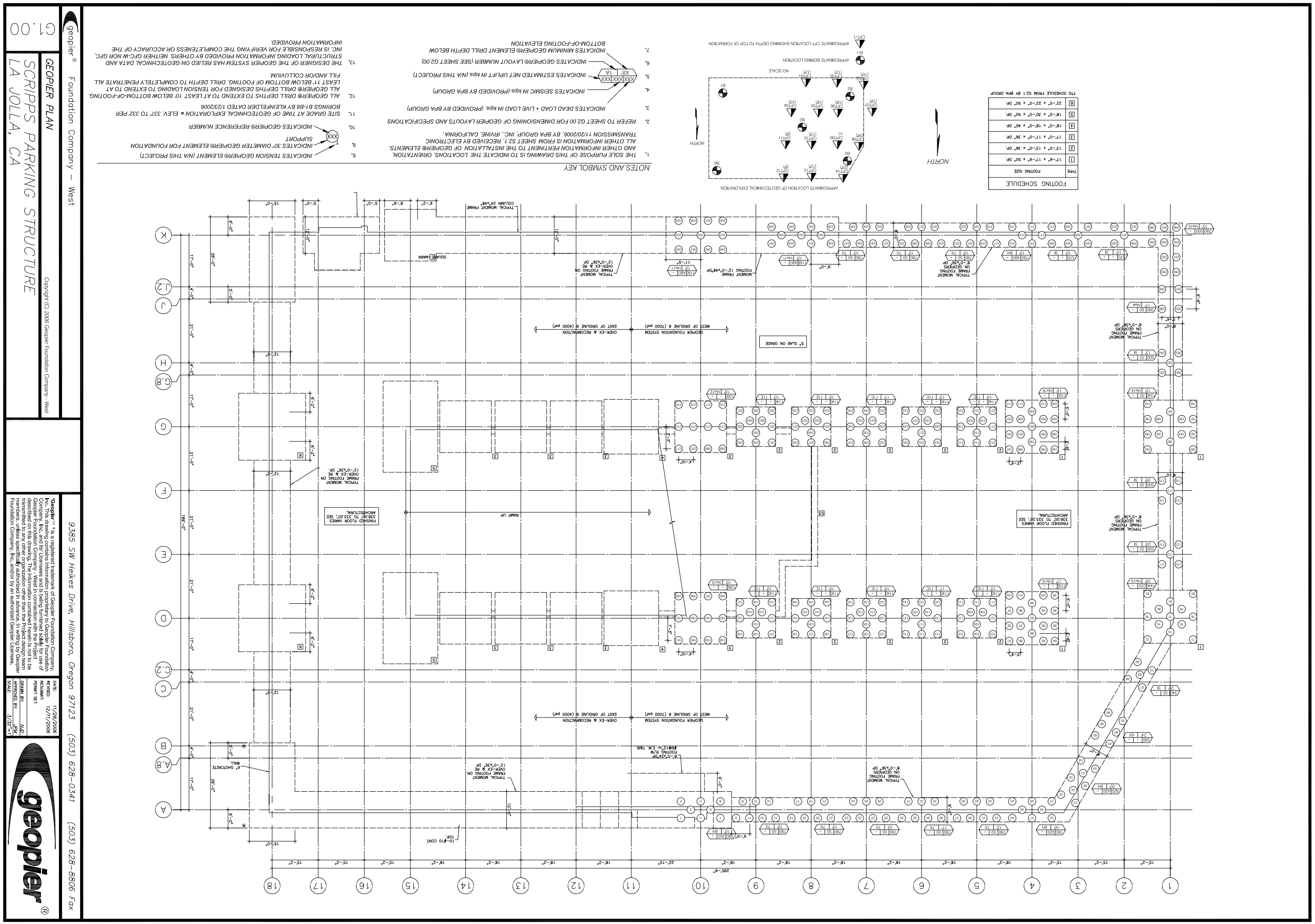
	As Designed	To-date	Overage	
Installation Days	7.80435	8.00	0.20	2.51%
Piers/day (avg)	46.00	44.88	-1.13	-2.45%
Feet/day (avg)	0.00	603.10	603.10	#DIV/0!
Feet/pier (avg)	0.00	13.44	13.44	#DIV/0!

Pier Data :

	As Designed	To-date	Overage	
Total Installed	359	359	0	0.00%
Neat Height (ft)	0	4,825	4,825	#DIV/0!
Total Height (ft)	-	5,564	739	15.32%
Neat Volume (yards)	0	877	877	#DIV/0!
Neat Rock Use (tons)	0	1,140	1,140	#DIV/0!
Total Rock Use (tons)	-	1,314	174.62	15.32%
Total Rock Delivered (tons)	-		0.00	Rock Factor-Neat/Useable Pier Length
			0.00	Rock Factor-Total Built Pier Length

Revised Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-4
EA 11-022331/EFIS 11000000012

APPENDIX I: LOG OF TEST BORING AND SITE DATA



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DATE: 11/28/2006
REVISED: 12/11/2006
RESUBMIT:
PERMIT SET:
DRAWN BY: MJD
APPROVED BY: JPM
SCALE: 1/32"=1'

geopier®

geopier® Foundation Company - West

GEOPIER PLAN
SCRIPPS PARKING STRUCTURE
LA JOLLA, CA

G1.00

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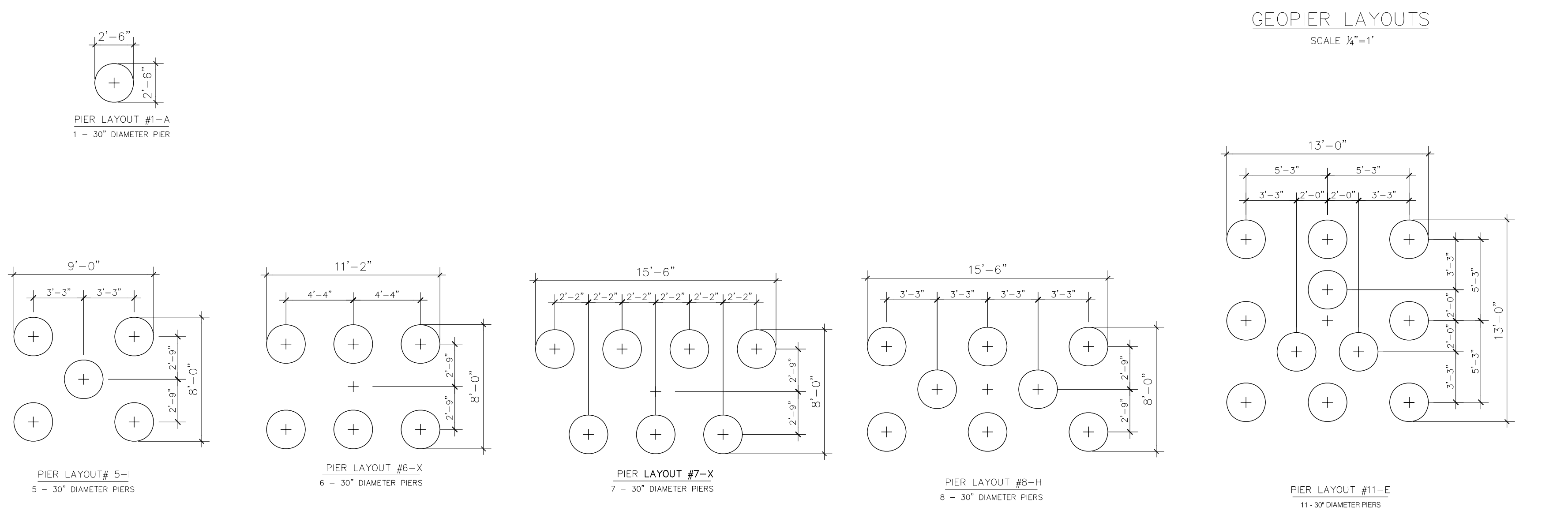
GEOPIER LAYOUTS

SCALE ¼"=1'



NOTES

1. All Geopier® elements to be minimum 30-inch diameter, U.N.O
2. Allowable individual pier-cell capacity = 105 kips for Geopier elements beneath spread footings. Applies to gravity dead plus permanently and/or frequently applied live loads, and may be increased by 1/3 to include seismic.
3. Allowable pullout capacity of individual Geopier elements designated for tension loading on sheet G1.00 is 50 kips.
4. Allowable design bearing pressure for reinforced soil strength = 7000 pounds per square foot for gravity dead plus permanently and/or frequently applied live loads. A 1/3 increase may be applied to include edge pressures due to wind and/or seismic.
5. Structural loads to be supported by Geopier soil reinforcement are noted on sheet G1.00.
6. All Geopier elements to have minimum drill depths as designated on sheet G1.00, U.N.O.
7. Geopier soil reinforcement beneath spread footings to control settlement resulting from the design structural dead plus live loads to 1" total, and 3/4" differential.
8. Geopier installer may adjust pier element locations in the field as needed to accommodate field conditions. The Geopier designer shall approve adjustments of more than 6" horizontally in any direction.
9. U.N.O., the Geopier soil reinforcement design does not address liquefaction or other potential seismic hazards.
10. U.N.O., the Geopier soil reinforcement design is intended to provide settlement control for the building foundations only. For large areal loads (such as site fills and/or heavily loaded slabs/mats) where the depth of stress influence exceeds the Geopier-reinforced depth, the Geopier design is intended to control settlement within the Geopier-reinforced depth only. Settlements caused by fills placed prior to Geopier installation should be monitored by the project Geotechnical Engineer-of-Record and should have reached completion before commencement of Geopier installation. It is not the responsibility of either Geopier Foundation Company - West or Geopier Foundation Company, Inc. to confirm that this condition has been met prior to pier installation.
11. The benefits of lateral soil stress increase and resultant footing settlement performance may be significantly diminished by nearby, temporary excavations (see Detail #2) and/or movement of retaining walls within a 15-foot horizontal distance (see Detail #4) that occur after installation of the Geopier elements.
12. Notwithstanding any contractual or other provision, GFC-W has no responsibility to determine the subsurface conditions at the site, and has relied upon the project geotechnical investigation report by Kleinfelder, dated March 1, 2006 as representing subsurface conditions at the location where the foundation system is to be installed. Kleinfelder is responsible for confirming, that subsurface conditions revealed in the pier cavities are generally as expected from their various geotechnical explorations. However, this shall not relieve GFC-W of Quality Control responsibility for the Geopier installation, nor from responsibility for design modifications needed in the event that subsurface conditions vary from those indicated by the geotechnical explorations.
13. It is not the responsibility of GFC-W to confirm that work done after Geopier installation (such as trenching, excavation, elevator casing installation, footing excavation and footing bottom protection) satisfies the requirements outlined in the Specification and Details presented hereon.
14. The Geopier soil reinforcement design is intended to provide settlement control of the building foundations and may not completely address or mitigate potential for hydro-collapse of the matrix soil, if such is identified in the project geotechnical report as being a potential issue. While the Geopier elements themselves are not subject to collapse, if the matrix soils are prone to collapse (per the geotechnical report) then appropriate precautions should be taken to minimize the exposure of the soils to water infiltration, per conventional practice and as recommended by the project Geotechnical Engineer.
15. The Geopier design presented on these drawings is copyrighted by Geopier Foundation Company - West and is not applicable in any way to any other soil reinforcement or intermediate foundations system. Use of this design in any way for any system other than the Geopier system is an express violation of U.S. copyright law.

SECTION 02360

SHORT AGGREGATE PIERS
(SOIL REINFORCEMENT AND FOUNDATION SYSTEM)

PART 1 GENERAL

1.01 WORK INCLUDED

A. In accordance with the Contract Documents, provide all equipment, material, labor and supervision to design and install short aggregate piers for the Soil Reinforcement and Intermediate Foundation System. Design shall rely on subsurface information presented in the project geotechnical report. Removal of spoils from the site (which result from aggregate element construction), footing excavation and subgrade preparation following pier installation are not included.

1.02 RELATED WORK BY OTHERS

A. Prior to any pier installation, the aggregate pier installer shall be provided with written confirmation that settlement caused by any fill placed on the site prior to pier installation has stopped. Such confirmation shall come from or be approved by the project Geotechnical Engineer.
B. Layout of footings, mats, grade beams and staking of all aggregate pier locations prior to aggregate pier installation shall be the responsibility of the General Contractor. If layout and pier staking is not conducted by a licensed surveyor, then General Contractor shall assume full responsibility. Information provided shall include existing ground surface elevations (± 3") within 50 feet of each aggregate pier element. General Contractor shall assume full responsibility for any and all costs associated with piers that may be found later to have been mislocated or constructed to the wrong elevation control.
C. Foundation excavations to expose the tops of aggregate piers shall be made in a workmanlike manner, and shall be protected until concrete placement, with procedures and equipment best suited to (1) preventing softening of the matrix soil between and around aggregate piers prior to pouring structural concrete, and (2) achieving suitable contact between the dense, undisturbed aggregate piers and the concrete footing.
Procedures that can be employed for the purpose of achieving these goals include but are not limited to (1) excavate using a smooth bucket, (2) prevent excavation below scheduled bottom-of-footing elevation, (3) place footing concrete or suitable concrete seal ("mud mat") immediately after footing excavation is made and approved.
Footing excavations shall be inspected by the project Geotechnical Engineer . The following criteria shall apply, and a written inspection report sealed by the project Geotechnical Engineer shall be furnished the aggregate pier installer confirming that:
a) water (which may have softened unconfined matrix soil between and around aggregate piers, and may have detrimental effects on the supporting capability of the pier-reinforced subgrade) has not been allowed to pond in any footing excavation at any time;
b) all aggregate pier elements designed for each footing have been exposed in the footing excavation;
c) immediately prior to footing construction, the tops of all aggregate piers exposed in each footing excavation have been inspected by the Geotechnical Engineer and recompacted, as necessary, with mechanical (*not vibratory*) compaction equipment; and that the tops of any pier elements which may have been disturbed by footing excavation and related activity have been recompacted to a dry density equivalent to at least 95 % of the maximum dry density obtainable by the modified AASHTO compaction procedure (ASTM D1557);
d) any structural fill placed between the tops of aggregate pier elements and the bottoms of foundations consists of the same quality and gradation material, or better, as used in constructing the piers; and that the fill has been compacted to a dry density equivalent to at least 95 % of the maximum dry density obtainable by the modified AASHTO compaction procedure (ASTM D1557); and
e) no excavations or drilled shafts have been made after installation of aggregate pier elements within a horizontal distance of 10' from the edge of any pier, without the written approval of the aggregate pier installer.
D. All above and below ground utilities shall be located, clearly marked, and relocated as necessary prior to installation of aggregate pier elements.
e. Failure to provide the above items, which are beyond the responsibility of the aggregate pier installer, may void any written or implied warranty on the performance of the aggregate pier system.

1.03 QUALITY CONTROL / QUALITY ASSURANCE

A. The installer of the aggregate pier system shall maintain Quality Control (QC) records during pier installation. This work shall be conducted under the supervision of a registered professional engineer. A testing agency or Geotechnical Engineer shall be retained by the Architect/Owner for Quality Assurance (QA) services.
B. The installer of the aggregate pier system and/or testing agency/Geotechnical Engineer shall provide and install all test dial indicators and other measuring devices and shall conduct tests as required.
C. The testing agency/Geotechnical Engineer, shall monitor installation procedures relative to these specifications, and shall confirm that subsurface conditions across the installation area as revealed by the pier drilling are in general agreement with the project geotechnical explorations.
D. A Daily Aggregate Pier Progress Report shall be completed by the installer during each day of installation, and shall consist of the following:
a) Date of installation and summary of installation equipment and installation procedures.
b) Pier location, length, and diameter.
c) Final elevations of the pier top and bottom.
d) Documentation of any unusual subsurface conditions encountered.
e) Soil and groundwater observations, if any.
f) The results of any field Quality Control testing done.
E. The installer of the aggregate pier system shall provide evidence of satisfactory experience with the design and installation of Aggregate Pier Soil Reinforcement and Intermediate Foundation systems, including examples of at least 3 previous projects for which the installer has achieved at least the design bearing pressure, supported comparable structural loads and controlled settlement to the project tolerances. The design and installation shall be conducted and overseen by a registered professional engineer employed by the installer.
F. The designer of the aggregate pier system shall carry Errors and Omissions Insurance with coverage of at least $2 Million.
G. The installer of the aggregate pier system shall provide credible research data to confirm that the rammer design to be used for constructing the aggregate piers develops nearly full passive lateral pressure in the soil surrounding the aggregate pier for a distance of at least 4 feet horizontally beyond the edge of the pier.

H. A calibrated dynamic penetration test (ASTM STP 399) shall be performed on representative aggregate pier elements. A minimum of 15 blows per 1.75 inch vertical movement shall be the minimum average penetration resistance of compacted, graded aggregate base course stone. On lifts of open graded aggregate, lower values may be approved by the system designer as appropriate.

1.04 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
1. ASTM D1143 Pile Load Test Procedures
2. ASTM D1194 Spread Footing Load Test
3. ASTM D1557 Aggregate Densification
4. ASTM D1241 Aggregate Quality
5. ASTM STP 399 Dynamic Penetrometer Testing
6. ASTM D3689 Uplift Load Test

1.05 SUBMITTALS

A. Make submittals in accordance with requirements of Division 1 and as specified in this section.
B. When load tests are authorized, the installer shall furnish within 5 working days of the completion of the test, a report including a description of the installation, test data, and any changes in design parameters based on the load test results. The report shall be prepared by or under the direct supervision of a registered professional engineer experienced in modulus testing, performance and analysis of the aggregate pier system.
C. A Daily Aggregate Pier Progress Report shall be furnished by the installer to the General Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Any materials ordered or delivered to the project site before approval will be at the aggregate pier installer's risk.
B. Deliver materials to project site in quantities and at times to assure conformity of activities with the installation schedule for the aggregate pier system.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate for the piers shall typically consist of materials that are in general conformance with gradation requirements for State DOT highway base course and/or drainage materials, or as approved by the aggregate pier designer. During wet weather conditions, the aggregate shall contain less than 5 percent fines (silt and clay particles passing the No. 200 sieve). The aggregate pier system designer and installer shall make the determination of acceptable materials to be used in pier construction.
B. A suitable washed, open graded aggregate may be used in wet conditions or as initial lifts where soft soils are present at the bottom of the aggregate pier.
C. Potable water or other suitable source shall be used to increase aggregate moisture content as needed for workability. Water shall be made available on-site to the installer of the aggregate pier system for his use in moisture conditioning aggregate for compaction, as needed. The need for moisture conditioning aggregate shall be made by the aggregate pier system installer based on workability and/or dust control; however, moisture content of aggregate is not a requirement for pier acceptance.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which aggregate pier elements are to be installed.
B. Notify Architect of conditions detrimental to proper and timely completion of Work.
C. Do not proceed with Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 PREPARATION

A. The General Contractor shall locate and protect underground and above ground utilities, and other structures from damage during installation of the aggregate pier system.
B. Install aggregate pier elements after Earthwork in the installation area has been completed as follows:
a) Site subgrade established by General Contractor shall be within 6 inches of finish subgrade, or as approved by installer of the aggregate pier system.
b) Any fills needed to establish finish subgrade have been installed, and settlement resulting from fill loads is complete (unless specifically approved in writing by the aggregate pier designer prior to installation).
c) A working surface has been established by General Contractor to provide wet weather protection of subgrade and to provide a base for efficient operation of pier installation equipment.

3.03 INSTALLATION

A. The locations, size, and spacing of aggregate pier elements are described on the appropriate drawings or details. Any modifications in size and spacing of the aggregate pier element layout shall be approved by the system designer.
B. Should any obstruction, including but not limited to boulders, timber, concrete, asphalt, large roots etc., be encountered which prevents placing the elements to the required depth, or causes the aggregate pier to drift from the required location, the obstruction shall be removed by the General Contractor. The excavation shall be backfilled by General Contractor with suitable materials and sufficiently compacted, in order to continue with installation of the aggregate pier element. Piers may be terminated short of design depth on rock, gravel or other suitable materials. Additional aggregate pier elements shall be installed when required by the presence of obstacles.
C. Special high-energy impact apparatus shall be used to construct the aggregate pier elements. Specially designed rammers per paragraph 1.03,G of this specification shall be used. Approval of constructed pier lifts shall be based on observed vertical deflection of the rammer over the last several blows of ramming.
D. The bottom of the pier excavation shall be rammed prior to the placement of aggregate. If wet, soft or sensitive soils are present, open graded aggregate shall be placed and rammed to stabilize the pier bottom and may serve as the initial pier lift.
A. The center of each constructed aggregate pier element shall be within 6 inches of the design location, as located and staked in accordance with Article 1.02.A. Foundation elements installed outside of the above tolerance and deemed not to be acceptable, shall be either rebuilt or other remedial measures taken as approved by the aggregate pier system designer.
B. Casing for elevator jack shafts located within 10 feet horizontally of any aggregate element shall be installed by others prior to aggregate pier installation, and shall be grouted in-place for the full length of the casing.
C. Acceptable constructed lift thickness shall be established by the aggregate pier designer and confirmed by the aggregate pier installer for each lift installed.
D. Required ramming time per lift, or terminal rammer deflection per blow, shall be established by the aggregate pier designer, and (if a test pier is constructed) shall be consistent with the time or deflection criteria used for the test pier construction.

3.04 AGGREGATE PIER ELEMENT MODULUS TESTING

A. When modulus tests on aggregate pier element(s) are included, they shall be of the type and installed in a manner specified herein. Modulus test data shall be used by the aggregate pier system designer to confirm aggregate pier element design parameters for the project.
B. Aggregate pier elements used for modulus testing which are located within tolerance and provide a safe design capacity may, upon approval of the aggregate pier system designer, be used in the finished work.
C. Compressive load test procedures shall be conducted in general accordance with ASTM D1143 and D1194, as appropriate. A test pier shall be loaded to 150 percent of the estimated element design pressure. Alternatively, at the discretion of the aggregate pier designer, the modulus test may be terminated when a modulus equal to 150 percent of the modulus used in the design is achieved.
D. The modulus test shall be conducted as follows:

1. ASTM D1143 general test procedures shall be used as a guide to establishing load increments, load increment duration, load decrements, and total applied load.

2. In order to evaluate bulging of the aggregate pier element itself under loading, the test pier shall be constructed in such a manner that deflections at both the bottom and top of the pier can be measured at each increment of loading.

3. With the exception of the load increment representing approximately 112 % of the design maximum aggregate pier element stress, all load increments shall be held for a minimum of 15 minutes, a maximum of 1 hour, and until the rate of deflection reduces to 0.01 inch per hour, or less.

4. The load increment which represents approximately 112 % of the design maximum aggregate pier element stress shall be held for a minimum of 15 minutes, a maximum of 4 hours, and until the rate of deflection reduces to 0.01 inch per hour, or less.

5. A seating load equal to 5 percent of the total load shall be applied to the loaded steel plate prior to application of load increments and prior to measurement of deflections to compensate for surficial disturbance.

6. The test data shall be presented as a graph showing deflection of the pier top and bottom under each load increment.

7. At the design load, deflection measured at the top of the pier shall not exceed the design settlement for the aggregate pier-reinforced soil zone, and the ratio of bottom plate deflection to top plate deflection shall not exceed 0.25 unless specifically approved by the aggregate pier designer.

3.05 AGGREGATE PIER ELEMENT UPLIFT TESTING ***(NOT APPLICABLE THIS PROJECT)***

A. When field uplift tests are performed on aggregate pier elements, ASTM D-3687 shall serve as a basis. Uplift deflections shall be measured for both the reaction plate installed at the bottom of the aggregate pier element shaft and for a steel plate installed at the top of the element. Dial gages accurate to at least 0.001" shall be used and shall be supported on independent reference supported beams. Unloading shall be in at least four equal decrements, if possible.

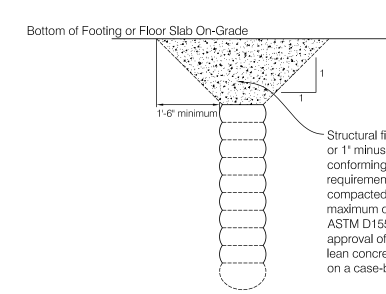
B. The following procedure shall be followed in performance of field tests to confirm uplift design parameters for aggregate pier elements designed to resist seismic uplift, as required.

1. The pier shall be constructed in such a manner that deflections at each load increment can be measured for the top of the pier as well as the bottom of the pier.
2. Apply a seating load to the top plate not to exceed 5 kips
3. Zero dial gages following application of seating load
4. Rapidly apply loads in approximately equal increments of at least 5 kips each, with a maximum of 8 increments between the seating load and 200 percent of the element design load. Record deflections at each load increment.
5. The final increment of loading shall be equal to at least 200 percent of the design load
6. Unload to approximately 5 kips in 4 approximately equal increments, and record rebound for each increment
7. Repeat the load-unload cycle at least 3 times

C. For tests conducted to evaluate performance under sustained uplift conditions (such as hydrostatic), the loading procedure shall be generally as described in B. above, except that only one load-unload cycle is required. Additionally, each load shall be maintained for a minimum of 10 minutes and until the rate of deflection equals 0.01 inch per hour, or less.
D. The deflections recorded during the test shall be averaged, and a load vs. deflection curve plotted for the top plate and the bottom plate. The ultimate uplift capacity for the aggregate pier element shall be defined as the load at which the rate of deflection measured at the top of the element is approximately equal to the rate of deflection at the bottom of the element. Loading beyond 200 percent of the design load is not required.

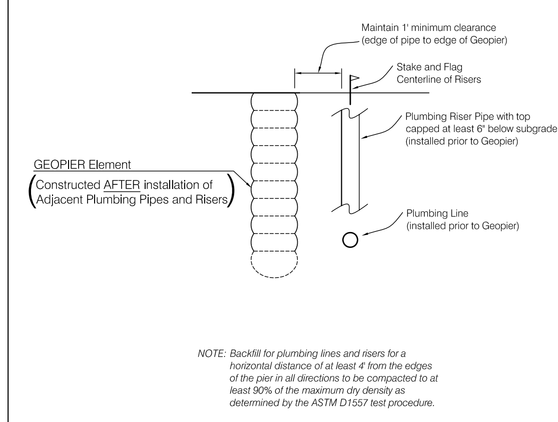
SPEC1006.DOC

REQUIREMENTS FOR STRUCTURAL FILL PLACED OVER GEOPIER ELEMENTS



DETAIL #1

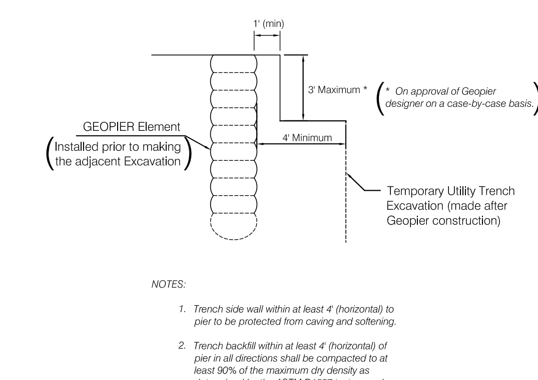
CLEARANCES FOR *PLUMBING LINES AND RISERS* INSTALLED PRIOR TO CONSTRUCTION OF ADJACENT **GEOPIER** ELEMENTS



NOTE: Backfill for plumbing lines and risers for a horizontal distance of at least 4' from the edges of the pier in all directions to be compacted to at least 90% of the maximum dry density as determined by the ASTM D1557 test procedure.

DETAIL #3

CLEARANCES FOR *TEMPORARY UTILITY TRENCH EXCAVATIONS* MADE ADJACENT TO PREVIOUSLY CONSTRUCTED **GEOPIER** ELEMENTS

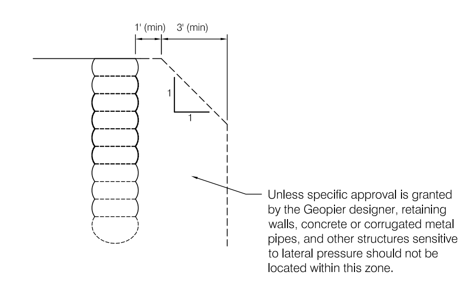


NOTES:

1. *Trench side wall within at least 4' (horizontal) to pier to be protected from caving and softening.*
2. *Trench backfill within at least 4' (horizontal) of pier in all directions shall be compacted to at least 90% of the maximum dry density as determined by the ASTM D1557 test procedure.*

DETAIL #2

CLEARANCES FOR *PRE-EXISTING* RETAINING WALLS, CONCRETE OR CORRUGATED METAL PIPES AND OTHER STRUCTURES SENSITIVE TO LATERAL PRESSURE RESULTING FROM **GEOPIER** CONSTRUCTION



DETAIL #4

geopier® Foundation Company - West

9385 SW Heikes Drive, Hillsboro, Oregon 97123 (503) 628-0341 (503) 628-8806 Fax

GEOPIER DETAILS AND SPECIFICATIONS

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SCRIPPS PARKING STRUCTURE
LA JOLLA, CA

G2.00

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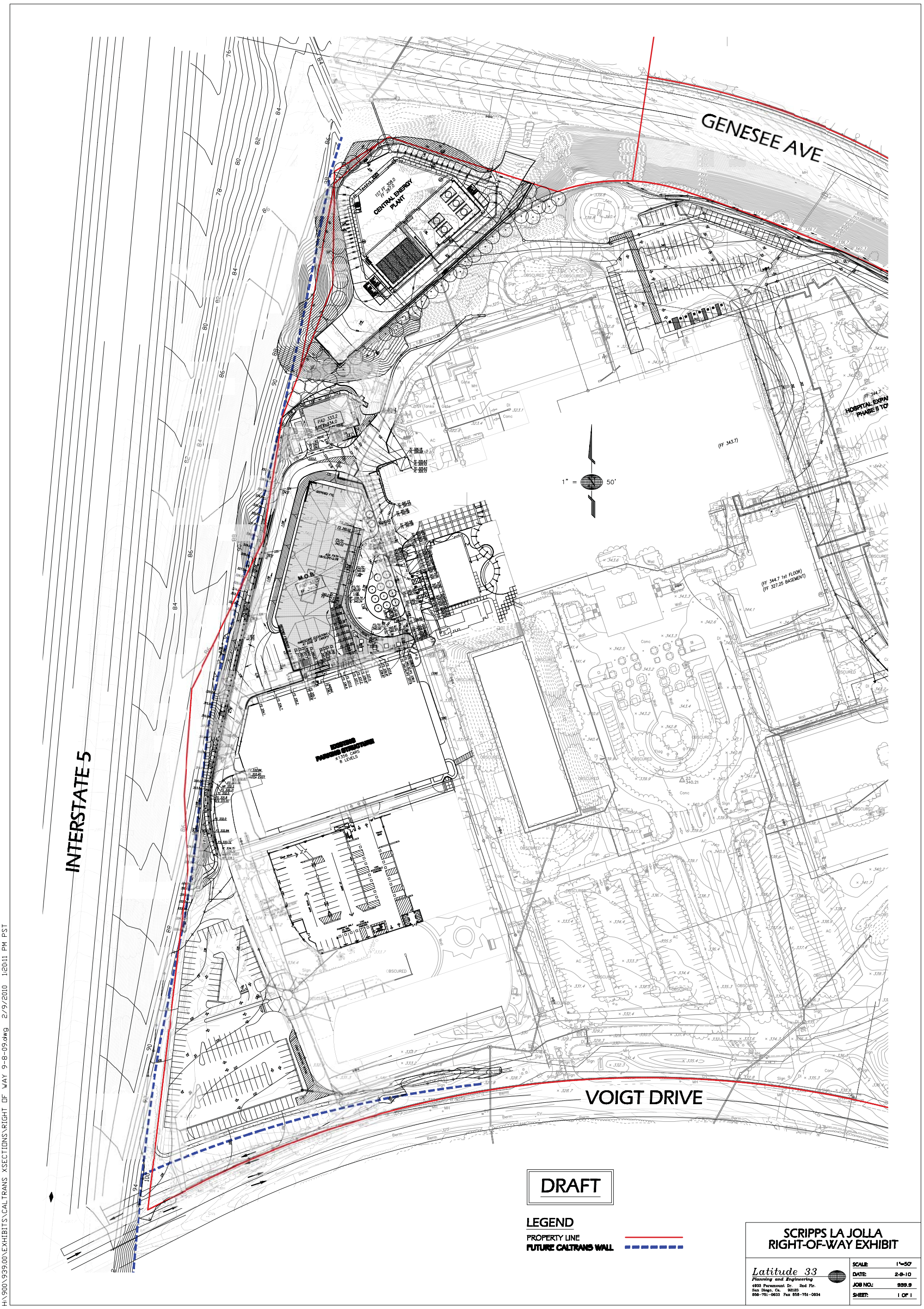
DATE:	11/28/2006
REVISED:	12/11/2006
RESUBMIT:	
PERMIT SET:	
DRAWN BY:	NJD
APPROVED BY:	JPM
SCALE:	Varies

geopier®


GENESEE AVE
INTERSTATE 5
VOIGT DRIVE
CENTRAL ENERGY PLANT
1" = 50'
DRAFT
LEGEND
PROPERTY LINE
FUTURE CALTRANS WALL
SCRIPPS LA JOLLA
RIGHT-OF-WAY EXHIBIT
Latitude 33
Planning and Engineering
4933 Paramount Dr. 2nd Flr.
San Diego, Ca. 92123
858-751-0633 Fax 858-751-0634
SCALE: 1"=50'
DATE: 2-9-10
JOB NO.: 939.9
SHEET: 1 OF 1
H:\900\939.00\EXHIBITS\CALTRANS XSECTIONS\RIGHT OF WAY 9-8-09.dwg 2/9/2010 1:20:11 PM PST

GENESEE AVE
VOIGT DRIVE
INTERSTATE 5
A5
AREA=600sf±
A4
AREA=3,800sf±
A3
AREA=2,000sf±
A2
AREA=9,900sf±
A1
AREA=4,700sf±
CENTRAL ENERGY PLANT
EXISTING PARKING STRUCTURE
±356 CARS
8 LEVELS
HOSPITAL EXPAN
PHASE II TO
(FF 343.7)
(FF 344.7 1st FLOOR)
(FF 327.25 BASEMENT)
1" = 50'
LEGEND
PROPERTY LINE
FUTURE CALTRANS WALL
CALTRAN'S LAND ACQUISITION
AREA RELINQUISHED TO SCRIPPS
NOTE: FUTURE WORK WITHIN CALTRAN'S RIGHT-OF-WAY IS APPROXIMATE IN NATURE AND SHOWN FOR REFERENCE ONLY. ELEVATIONS ARE IN METRIC AND ON DIFFERENT DATUM THAN AERIAL TOPOGRAPHY. CONVERSION FACTOR = -2.13'
LAND "SWAP" SUMMARY
CALTRAN'S LAND ACQUISITION
NO. | AREA(sf) | TOTAL AREA(sf)
A2 | 9,900 | 10,500±
A5 | 660
SCRIPP'S LAND ACQUISITION
A1 | 4,700 | 10,500±
A3 | 2,000
A4 | 3,800
DRAFT
SCRIPPS LA JOLLA
RIGHT-OF-WAY EXHIBIT
Latitude 33
Planning and Engineering
4933 Paramount Dr. 2nd Flr.
San Diego, Ca. 92123
858-751-0633 Fax 858-751-0634
SCALE: 1"=50'
DATE: 9-08-09
JOB NO.: 939.9
SHEET: 1 OF 1
H:\900\939.00\EXHIBITS\CALTRANS XSECTIONS\RIGHT OF WAY 8-10-09.dwg 9/8/2009 5:37:34 PM PDT

APPENDIX II

FIELD EXPLORATION DATA

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-47700R
M. Fordham	12/16/08	12/16/08	N579624.542E1908493.880	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1565+49.72, 144.76, SD5	322.3 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CME 75	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			CME Auto Hammer, 140 lbs, 30-inch drop	82 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				37.5 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
322.3		0.0	Silty SAND (SM); light brown; moist; medium to fine SAND; some fines [FILL].												
	1														
	2														
	3														
	4														
	5														
316.3	6	6.0	SEDIMENTARY ROCK (Shale); fine-grained; laminated; light gray; slightly weathered; soft; unfractured.		1										Samples collected for USCD. UCSD requested subsurface samples be collected to at 5, 10 and 15 feet for use in determining natural background levels of arsnic.
	7														
314.8		7.5				21									
	8				2	26	56								
						30									
	9														
	10														
311.3	11	11.0													Samples collected for USCD
	12				3										
309.8		12.5				16									
	13				4	33	72								
	14					39									
	15														
306.3	16	16.0													Samples collected for USCD
	17				5										
304.8		17.5				25									
	18				6	45	90								
	19					45									
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-08-47700R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09		SHEET: 1 of 2

10580R-47700R BORING RECORD english template.xls - 47700R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	21														
	22														
	23														
	24														
	25														
296.3	26	26.0				19									
	27				7	38	88/10"								
						50/4"									
	28														
	29														
	30														
291.3	31	31.0				20									
	32				8	37	87								
						50									
	33														
	34														
	35														
286.3	36	36.0				23									
	37				9	40	90/10"								
						50/4"									
284.8		37.5	Bottom of Borehole at 37.5 ft. Boring terminated at planned depth.												
	38														
	39		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	40														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-47700R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	10/20/09	2 of 2

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-08-48040R
M. Fordham	07/20/08	07/30/08	N579889.662E1908521.689	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1574+24.22, 156.5, SD5	338.6 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CS 2000	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Diedrich Auto Hammer, 140 lbs, 30-inch drop	84 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS — DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				55.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
338.6		0.0	Silty SAND (SM); dark brown; moist; medium to fine SAND; some fines.												
337.6	1	1.0	SEDIMENTARY ROCK (Sandstone); fine grained; massive; yellowish brown; moderately weathered; soft to very soft; slightly fractured.												
	2														
	3														
	4														
333.6	5	5.0				4									
	6				1	15	41								
						26									
	7														
	8														
	9														
328.6	10	10.0				11									
	11				2	17	41								
						24									
	12														
	13														
	14														
323.6	15	15.0				19									
	16				3	30	73								
						43									
	17														
	18														
	19														
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-08-48040R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 10/20/09	SHEET: 1 of 3	

47860L-54170R BORING RECORD english template.xls - 48040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	21														
	22														
	23														
	24														
	25														
	26														
311.6	27	27.0	SEDIMENTARY ROCK (Siltstone); silt; laminated; light gray; moderately weathered; soft; unfractured,												
	28														
	29														
308.6	30	30.0				12									
	31				4	19	53			16%	107				
						34									
	32														
	33														
	34														
	35														
	36														Lost Water Circulation
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-08-48040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	235800

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 10/20/09
SHEET: 2 of 3

47860L-54170R BORING RECORD english template.xls - 48040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	41														
	42														Water circulation returned
	43														
	44														
293.6	45	45.0	slightly fractured			5									
	46				5	15	43								
						28									
	47														
	48														
	49														
	50														
	51														
	52														
	53														
	54														
283.6	55	55.0	Bottom of Borehole at 55.0 ft. Boring terminated at planned depth.												
	56		This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	57														
	58														
	59														
	60														

DEPARTMENT OF TRANSPORTATION	REPORT TITLE Boring Record			HOLE ID:	R-08-48040R
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POSTMILE(KP) R28.8/R55.3	EA 235800
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER na	PREPARED BY M. Fordham	DATE 10/20/09	SHEET 3 of 3	

47860L-54170R BORING RECORD english template.xls - 48040R

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

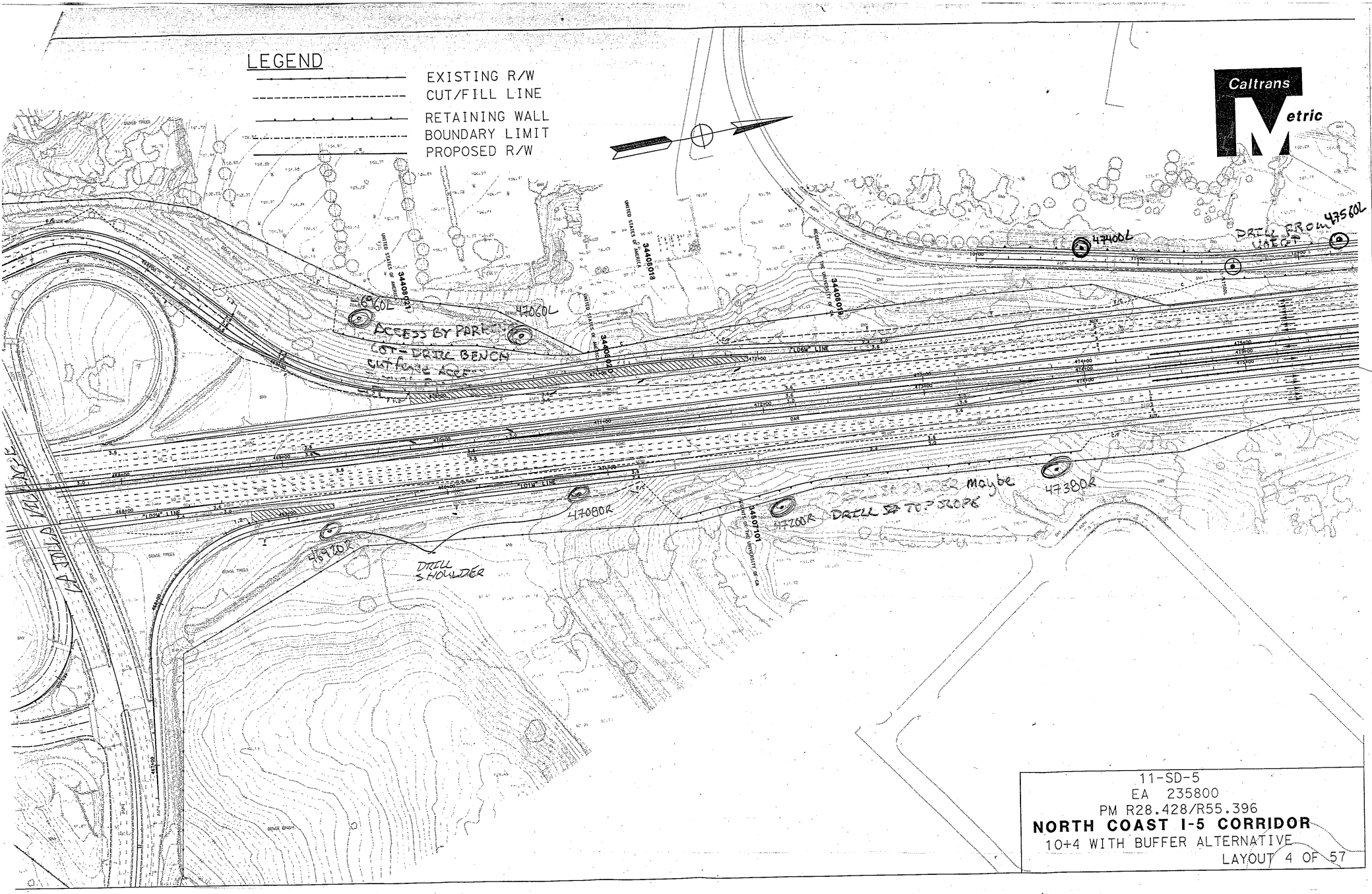
Approved by (Project Engineer or above)

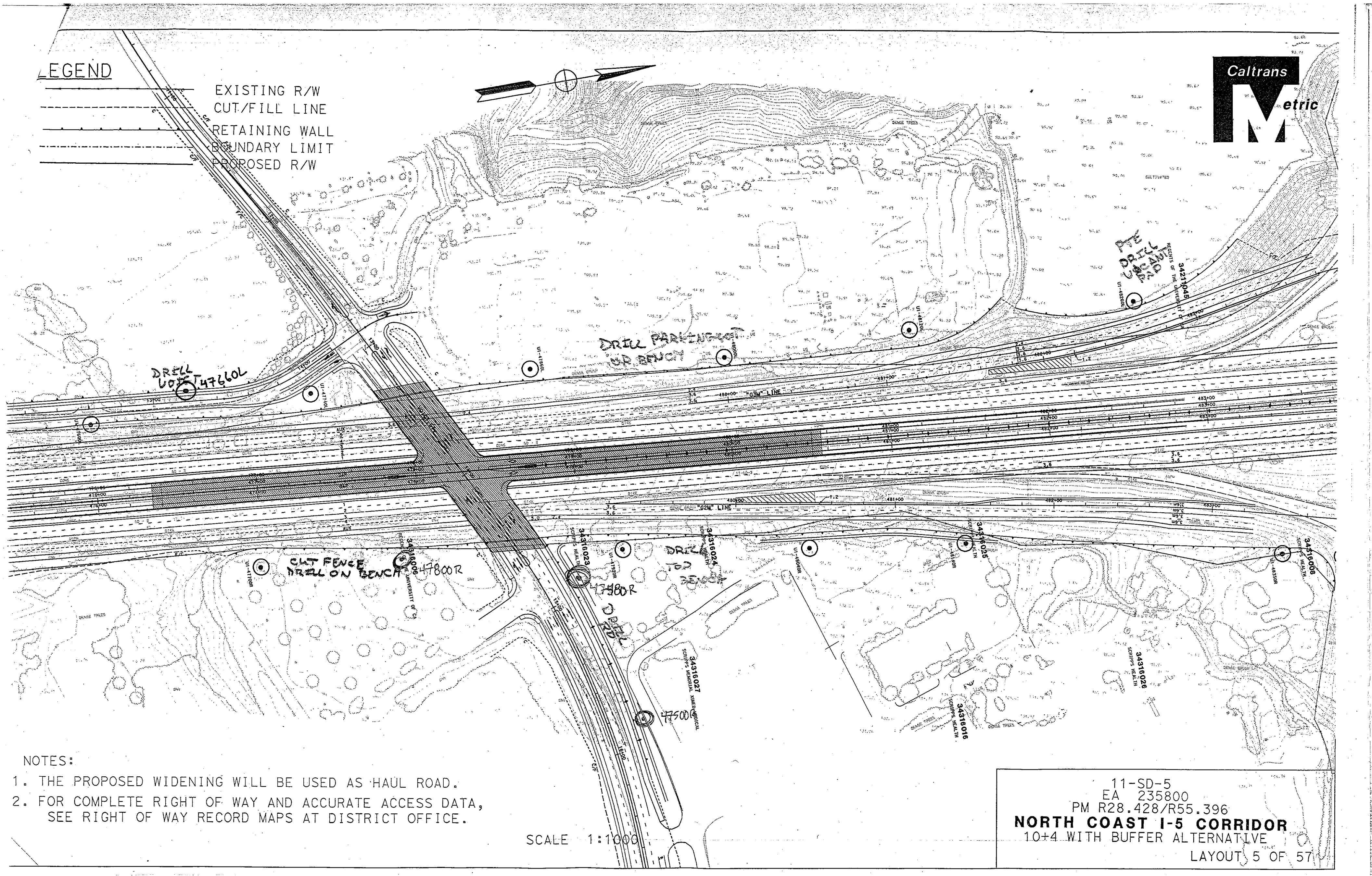
FOR SURVEYS USE ONLY

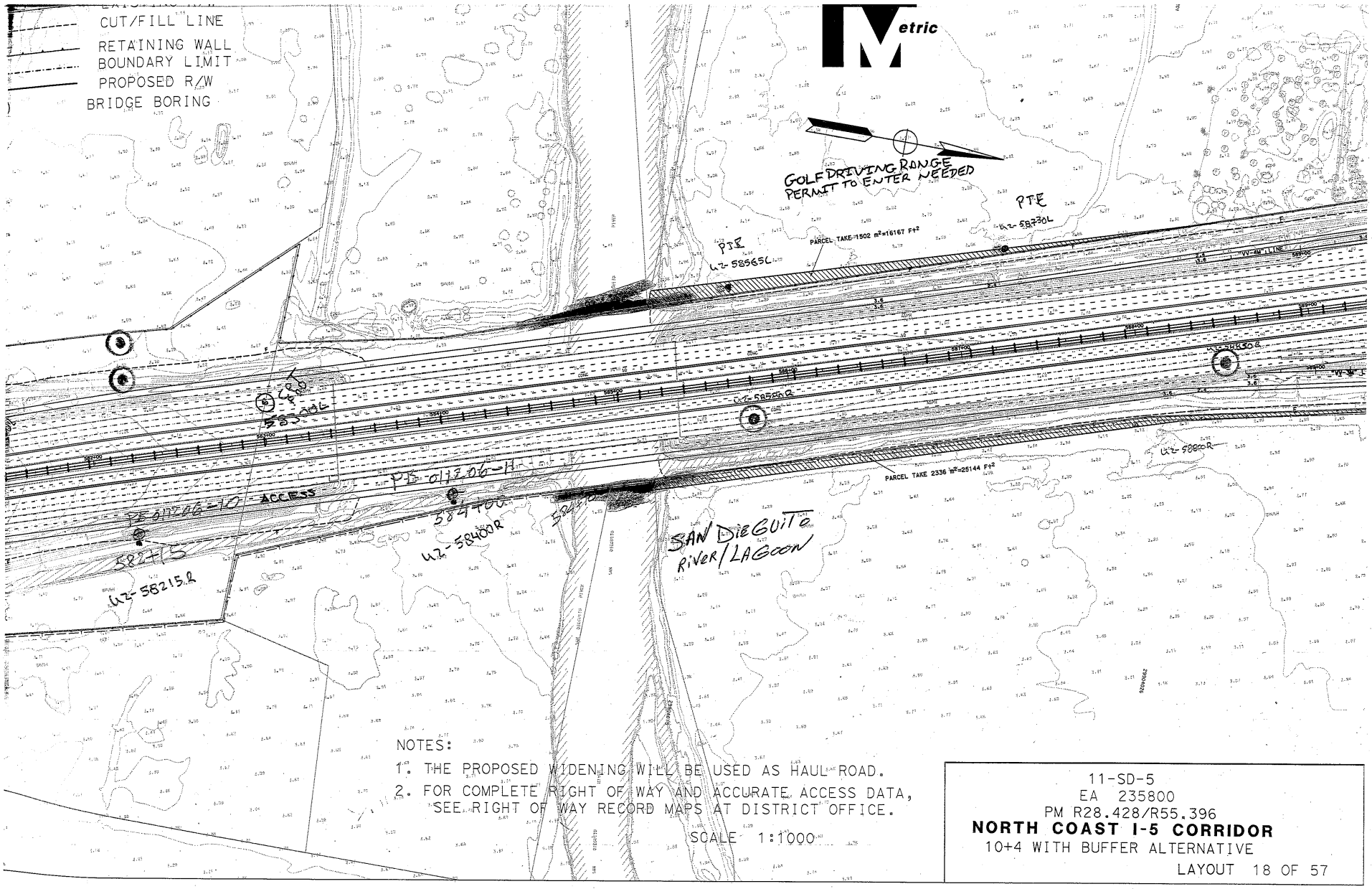
Date Received: WBS Codes:

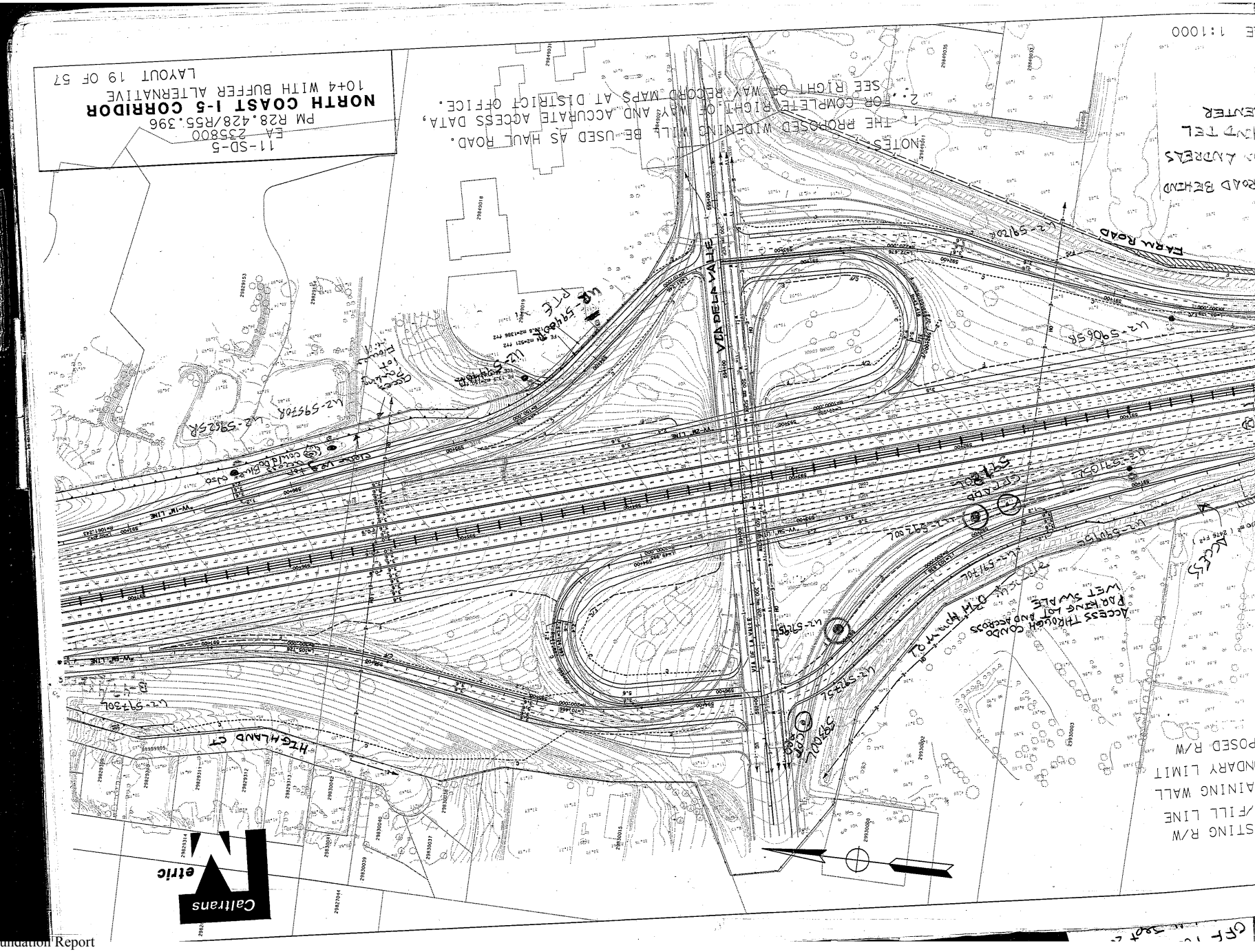
Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE

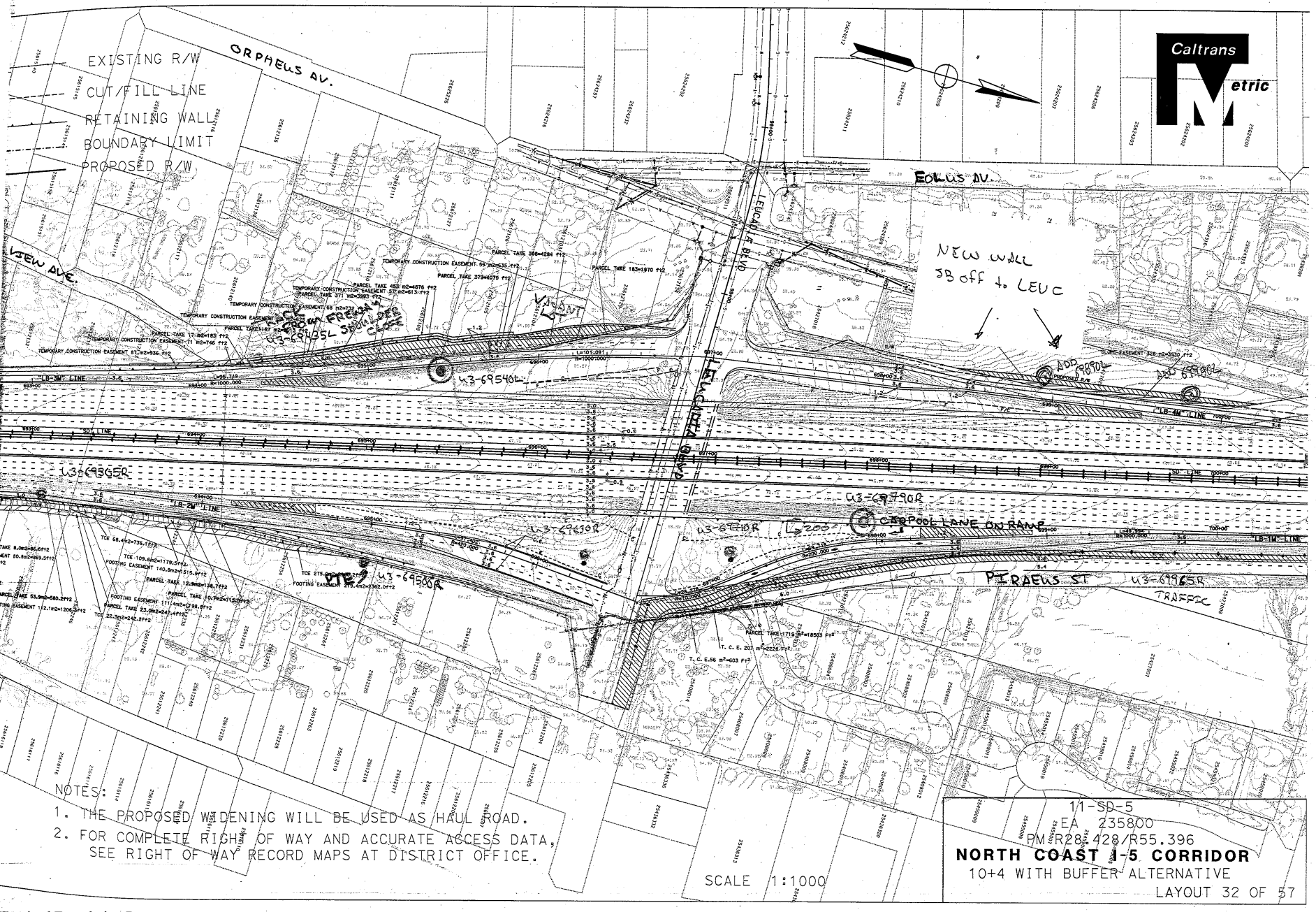

LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47400L
DRILL FROM 47560L
LOCGT
47080R
DRILL SHOULDER
47200R
DRILL SHOULDER maybe
DRILL TOP SLOPE
47380R
34409001
34409018
34408010
34407001
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
DRILL PARKING LOT OR BENCH
DRILL LOT 47660L
PTE DRILL USE AS LEAD
CUT FENCE DRILL ON BENCH 47800R
47580R
DRILL TOP BENCH
DRILL PDL
47500
"G3M" LINE
"G2M" LINE
3431045
3431023
3431024
3431025
3431008
3431027
3431026
3431016
3431006
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 5 OF 57


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57



Under-Wraps
Blueprint Covers and Accessories
www.under-wraps.com


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEUCADIA BLVD.
NEW WALL
SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69670R
U3-69965R
ADD 69890L
ADD 69986L
"LB-4M" LINE
"LB-1M" LINE
"LB-2W" LINE
"LB-3W" LINE
SD LINE
Caltrans
Metric
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

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CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

WERNER

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS, BUCKETS,

PLASTIC BAGS, SHELBY TUBES, BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	JO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11-479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+60 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER B-11-482 + 40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	5.3	5300
20	1k	2.1	2100
20	1k	1.6	1600
20	1k	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SO

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 7/18/2008

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-022330
GL 08-070

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 1/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 2/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 12/19/2008

To: Mike Fordham / GDS-2

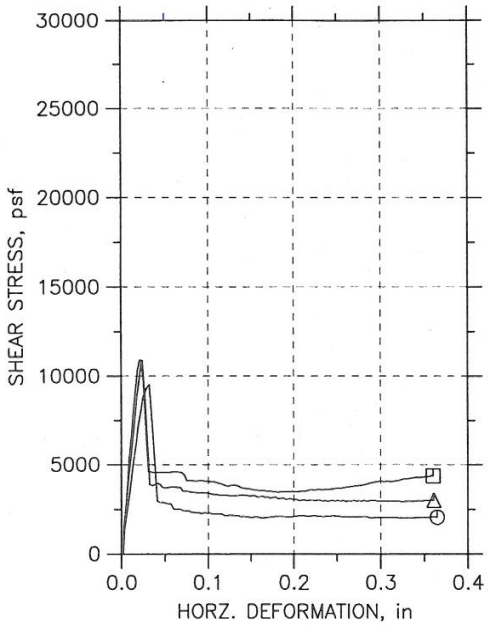
From: Lilibeth C. Purta / (916) 227-5434

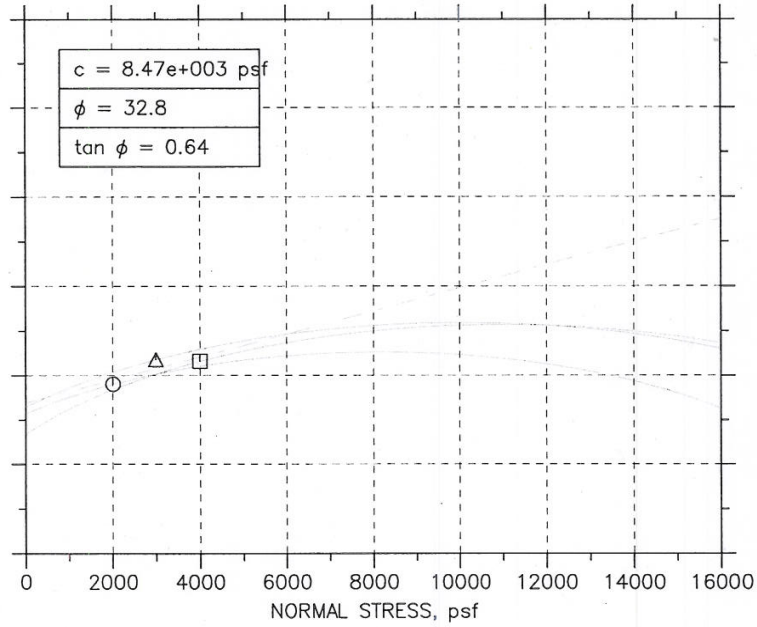
RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

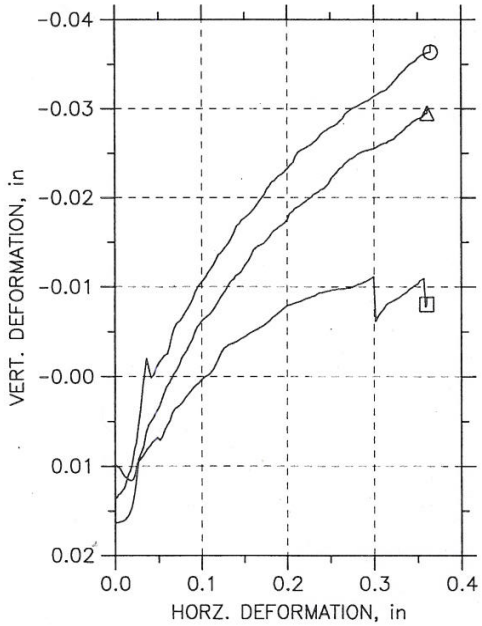
Partial test results.

AASHTO R18

DIRECT SHEAR TEST REPORT







Symbol		⊙	△	⊡	
Test No.		DS08082A	DS08082B	DS08082C	
Sample No.		4	4	4	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.37	2.37	2.37	
	Area, in^2	4.4115	4.4115	4.4115	
	Height, in	1	1	1	
	Water Content, %	16.05	17.70	20.80	
	Dry Density, pcf	107.08	109.76	105.44	
	Saturation, %	73.16	86.29	91.07	
	Void Ratio	0.60324	0.56414	0.62819	
Consol. Height, in		0.98676	0.9837	0.99073	
Consol. Void Ratio		0.58201	0.53863	0.6131	
Final	Water Content, %	21.61	20.14	22.11	
	Dry Density, pcf	103.33	106.62	104.6	
	Saturation, %	89.85	90.77	94.83	
	Void Ratio	0.66149	0.61022	0.64126	
Normal Stress, psf		2016.4	3000.8	4003.7	
Max. Shear Stress, psf		9518.7	10902	10804	
Ult. Shear Stress, psf		2036.2	2996.2	4359.8	
Time to Failure, min		14.001	11.002	11.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	

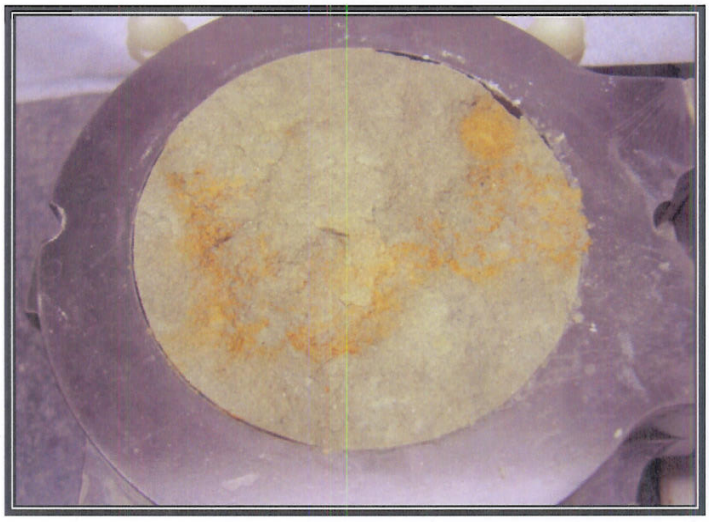
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.

Remarks: ASTM D3080

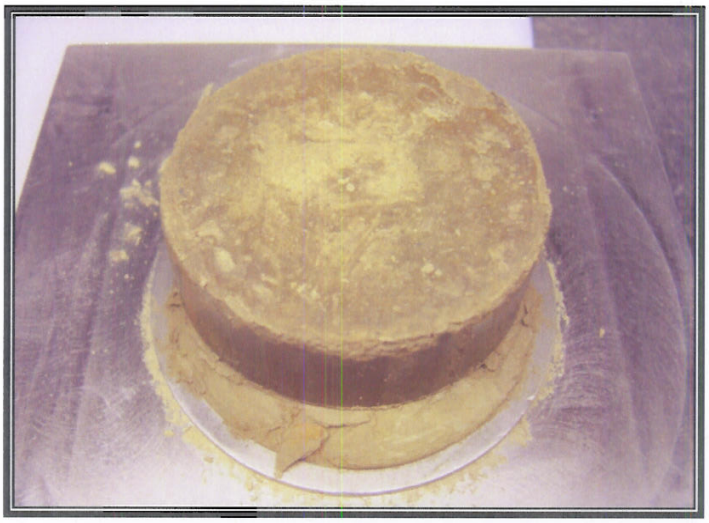
WP 12/12

Thu, 04-DEC-2008 16:56:12

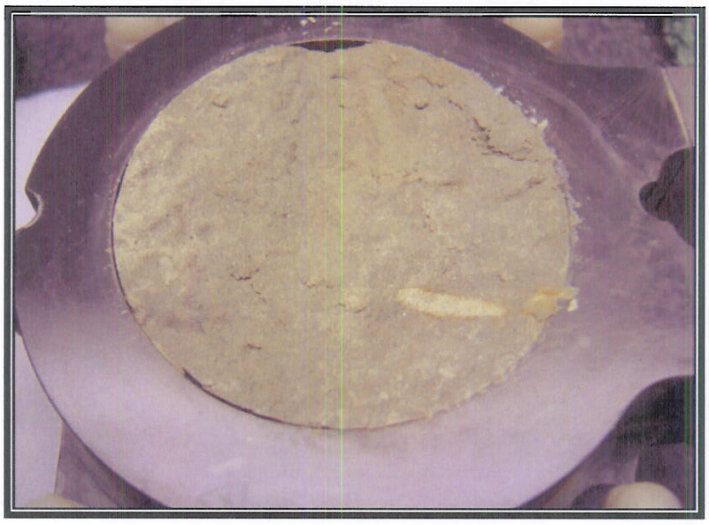
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B



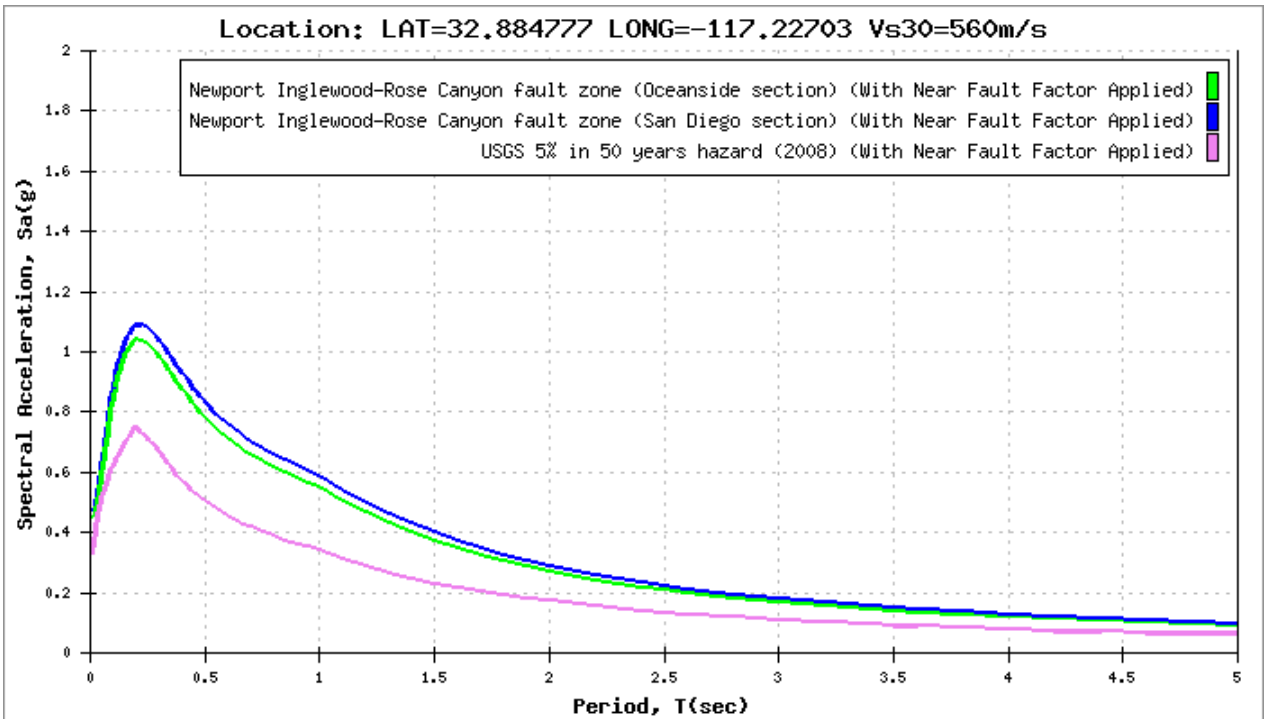
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



APPENDIX IV
ANALYSES AND CALCULATIONS

SELECT SITE LOCATION

CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	560 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	74 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.459	1.000	1.000	0.459
0.022	0.466	1.000	1.000	0.466
0.025	0.476	1.000	1.000	0.476
0.029	0.489	1.000	1.000	0.489
0.03	0.493	1.000	1.000	0.493
0.032	0.502	1.000	1.000	0.502
0.035	0.517	1.000	1.000	0.517
0.036	0.522	1.000	1.000	0.522
0.04	0.542	1.000	1.000	0.542
0.042	0.552	1.000	1.000	0.552
0.044	0.563	1.000	1.000	0.563
0.045	0.568	1.000	1.000	0.568
0.046	0.573	1.000	1.000	0.573
0.048	0.584	1.000	1.000	0.584
0.05	0.595	1.000	1.000	0.595
0.055	0.622	1.000	1.000	0.622
0.06	0.650	1.000	1.000	0.650

0.065	0.677	1.000	1.000	0.677
0.067	0.688	1.000	1.000	0.688
0.07	0.704	1.000	1.000	0.704
0.075	0.729	1.000	1.000	0.729
0.08	0.754	1.000	1.000	0.754
0.085	0.779	1.000	1.000	0.779
0.09	0.802	1.000	1.000	0.802
0.095	0.825	1.000	1.000	0.825
0.1	0.846	1.000	1.000	0.846
0.11	0.883	1.000	1.000	0.883
0.12	0.916	1.000	1.000	0.916
0.13	0.944	1.000	1.000	0.944
0.133	0.951	1.000	1.000	0.951
0.14	0.966	1.000	1.000	0.966
0.15	0.986	1.000	1.000	0.986
0.16	1.002	1.000	1.000	1.002
0.17	1.015	1.000	1.000	1.015
0.18	1.027	1.000	1.000	1.027
0.19	1.036	1.000	1.000	1.036
0.2	1.044	1.000	1.000	1.044
0.22	1.038	1.000	1.000	1.038
0.24	1.030	1.000	1.000	1.030
0.25	1.025	1.000	1.000	1.025
0.26	1.016	1.000	1.000	1.016
0.28	1.001	1.000	1.000	1.001
0.29	0.992	1.000	1.000	0.992
0.3	0.983	1.000	1.000	0.983
0.32	0.961	1.000	1.000	0.961
0.34	0.940	1.000	1.000	0.940
0.35	0.929	1.000	1.000	0.929
0.36	0.918	1.000	1.000	0.918
0.38	0.897	1.000	1.000	0.897
0.4	0.876	1.000	1.000	0.876
0.42	0.855	1.000	1.000	0.855
0.44	0.835	1.000	1.000	0.835
0.45	0.825	1.000	1.000	0.825
0.46	0.816	1.000	1.000	0.816
0.48	0.797	1.000	1.000	0.797
0.5	0.780	1.000	1.000	0.780
0.55	0.728	1.000	1.020	0.742
0.6	0.683	1.000	1.040	0.710
0.65	0.644	1.000	1.060	0.682
0.667	0.631	1.000	1.067	0.673
0.7	0.609	1.000	1.080	0.657
0.75	0.578	1.000	1.100	0.635
0.8	0.549	1.000	1.120	0.615

0.85	0.523	1.000	1.140	0.597
0.9	0.500	1.000	1.160	0.580
0.95	0.478	1.000	1.180	0.564
1	0.458	1.000	1.200	0.550
1.1	0.421	1.000	1.200	0.505
1.2	0.388	1.000	1.200	0.466
1.3	0.359	1.000	1.200	0.431
1.4	0.334	1.000	1.200	0.401
1.5	0.311	1.000	1.200	0.374
1.6	0.290	1.000	1.200	0.348
1.7	0.271	1.000	1.200	0.325
1.8	0.254	1.000	1.200	0.305
1.9	0.239	1.000	1.200	0.287
2	0.225	1.000	1.200	0.270
2.2	0.201	1.000	1.200	0.241
2.4	0.181	1.000	1.200	0.217
2.5	0.173	1.000	1.200	0.207
2.6	0.165	1.000	1.200	0.198
2.8	0.151	1.000	1.200	0.181
3	0.139	1.000	1.200	0.167
3.2	0.129	1.000	1.200	0.155
3.4	0.120	1.000	1.200	0.144
3.5	0.116	1.000	1.200	0.139
3.6	0.112	1.000	1.200	0.135
3.8	0.105	1.000	1.200	0.126
4	0.099	1.000	1.200	0.119
4.2	0.094	1.000	1.200	0.112
4.4	0.089	1.000	1.200	0.107
4.6	0.084	1.000	1.200	0.101
4.8	0.080	1.000	1.200	0.097
5	0.077	1.000	1.200	0.092

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.474	1.000	1.000	0.474
0.02	0.484	1.000	1.000	0.484
0.022	0.491	1.000	1.000	0.491
0.025	0.501	1.000	1.000	0.501
0.029	0.515	1.000	1.000	0.515
0.03	0.519	1.000	1.000	0.519
0.032	0.529	1.000	1.000	0.529
0.035	0.544	1.000	1.000	0.544
0.036	0.550	1.000	1.000	0.550
0.04	0.571	1.000	1.000	0.571
0.042	0.582	1.000	1.000	0.582
0.044	0.592	1.000	1.000	0.592
0.045	0.598	1.000	1.000	0.598
0.046	0.603	1.000	1.000	0.603
0.048	0.614	1.000	1.000	0.614
0.05	0.626	1.000	1.000	0.626
0.055	0.654	1.000	1.000	0.654
0.06	0.683	1.000	1.000	0.683
0.065	0.710	1.000	1.000	0.710
0.067	0.721	1.000	1.000	0.721
0.07	0.737	1.000	1.000	0.737
0.075	0.763	1.000	1.000	0.763
0.08	0.788	1.000	1.000	0.788
0.085	0.814	1.000	1.000	0.814
0.09	0.838	1.000	1.000	0.838
0.095	0.861	1.000	1.000	0.861
0.1	0.883	1.000	1.000	0.883
0.11	0.921	1.000	1.000	0.921
0.12	0.955	1.000	1.000	0.955
0.13	0.984	1.000	1.000	0.984
0.133	0.991	1.000	1.000	0.991
0.14	1.008	1.000	1.000	1.008
0.15	1.028	1.000	1.000	1.028
0.16	1.046	1.000	1.000	1.046
0.17	1.060	1.000	1.000	1.060
0.18	1.073	1.000	1.000	1.073
0.19	1.083	1.000	1.000	1.083
0.2	1.092	1.000	1.000	1.092
0.22	1.089	1.000	1.000	1.089
0.24	1.082	1.000	1.000	1.082
0.25	1.077	1.000	1.000	1.077
0.26	1.069	1.000	1.000	1.069
0.28	1.054	1.000	1.000	1.054

0.29	1.045	1.000	1.000	1.045
0.3	1.037	1.000	1.000	1.037
0.32	1.015	1.000	1.000	1.015
0.34	0.993	1.000	1.000	0.993
0.35	0.982	1.000	1.000	0.982
0.36	0.972	1.000	1.000	0.972
0.38	0.950	1.000	1.000	0.950
0.4	0.928	1.000	1.000	0.928
0.42	0.907	1.000	1.000	0.907
0.44	0.886	1.000	1.000	0.886
0.45	0.877	1.000	1.000	0.877
0.46	0.867	1.000	1.000	0.867
0.48	0.848	1.000	1.000	0.848
0.5	0.830	1.000	1.000	0.830
0.55	0.775	1.000	1.020	0.791
0.6	0.728	1.000	1.040	0.757
0.65	0.687	1.000	1.060	0.728
0.667	0.674	1.000	1.067	0.719
0.7	0.650	1.000	1.080	0.702
0.75	0.618	1.000	1.100	0.680
0.8	0.587	1.000	1.120	0.658
0.85	0.560	1.000	1.140	0.638
0.9	0.535	1.000	1.160	0.620
0.95	0.512	1.000	1.180	0.604
1	0.490	1.000	1.200	0.589
1.1	0.450	1.000	1.200	0.540
1.2	0.415	1.000	1.200	0.498
1.3	0.385	1.000	1.200	0.461
1.4	0.357	1.000	1.200	0.429
1.5	0.333	1.000	1.200	0.400
1.6	0.310	1.000	1.200	0.373
1.7	0.290	1.000	1.200	0.348
1.8	0.272	1.000	1.200	0.326
1.9	0.256	1.000	1.200	0.307
2	0.241	1.000	1.200	0.289
2.2	0.215	1.000	1.200	0.258
2.4	0.194	1.000	1.200	0.233
2.5	0.185	1.000	1.200	0.222
2.6	0.176	1.000	1.200	0.212
2.8	0.162	1.000	1.200	0.194
3	0.149	1.000	1.200	0.179
3.2	0.138	1.000	1.200	0.166
3.4	0.129	1.000	1.200	0.154
3.5	0.124	1.000	1.200	0.149
3.6	0.120	1.000	1.200	0.144
3.8	0.113	1.000	1.200	0.135

4	0.106	1.000	1.200	0.127
4.2	0.100	1.000	1.200	0.120
4.4	0.095	1.000	1.200	0.114
4.6	0.090	1.000	1.200	0.109
4.8	0.086	1.000	1.200	0.103
5	0.082	1.000	1.200	0.099

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.330	1.000	1.000	0.330
0.02	0.400	1.000	1.000	0.400
0.022	0.410	1.000	1.000	0.410
0.025	0.425	1.000	1.000	0.425
0.029	0.443	1.000	1.000	0.443
0.03	0.447	1.000	1.000	0.447
0.032	0.455	1.000	1.000	0.455
0.035	0.466	1.000	1.000	0.466
0.036	0.470	1.000	1.000	0.470
0.04	0.484	1.000	1.000	0.484
0.042	0.491	1.000	1.000	0.491
0.044	0.497	1.000	1.000	0.497
0.045	0.500	1.000	1.000	0.500
0.046	0.503	1.000	1.000	0.503
0.048	0.509	1.000	1.000	0.509
0.05	0.515	1.000	1.000	0.515
0.055	0.529	1.000	1.000	0.529
0.06	0.541	1.000	1.000	0.541
0.065	0.553	1.000	1.000	0.553
0.067	0.558	1.000	1.000	0.558
0.07	0.565	1.000	1.000	0.565
0.075	0.576	1.000	1.000	0.576
0.08	0.586	1.000	1.000	0.586
0.085	0.596	1.000	1.000	0.596
0.09	0.606	1.000	1.000	0.606
0.095	0.615	1.000	1.000	0.615
0.1	0.623	1.000	1.000	0.623
0.11	0.640	1.000	1.000	0.640
0.12	0.655	1.000	1.000	0.655
0.13	0.670	1.000	1.000	0.670
0.133	0.674	1.000	1.000	0.674

0.14	0.683	1.000	1.000	0.683
0.15	0.696	1.000	1.000	0.696
0.16	0.708	1.000	1.000	0.708
0.17	0.720	1.000	1.000	0.720
0.18	0.731	1.000	1.000	0.731
0.19	0.742	1.000	1.000	0.742
0.2	0.753	1.000	1.000	0.753
0.22	0.733	1.000	1.000	0.733
0.24	0.716	1.000	1.000	0.716
0.25	0.708	1.000	1.000	0.708
0.26	0.700	1.000	1.000	0.700
0.28	0.686	1.000	1.000	0.686
0.29	0.679	1.000	1.000	0.679
0.3	0.673	1.000	1.000	0.673
0.32	0.649	1.000	1.000	0.649
0.34	0.627	1.000	1.000	0.627
0.35	0.617	1.000	1.000	0.617
0.36	0.607	1.000	1.000	0.607
0.38	0.589	1.000	1.000	0.589
0.4	0.572	1.000	1.000	0.572
0.42	0.556	1.000	1.000	0.556
0.44	0.541	1.000	1.000	0.541
0.45	0.535	1.000	1.000	0.535
0.46	0.528	1.000	1.000	0.528
0.48	0.515	1.000	1.000	0.515
0.5	0.504	1.000	1.000	0.504
0.55	0.467	1.000	1.020	0.476
0.6	0.436	1.000	1.040	0.453
0.65	0.409	1.000	1.060	0.434
0.667	0.401	1.000	1.067	0.427
0.7	0.386	1.000	1.080	0.417
0.75	0.365	1.000	1.100	0.402
0.8	0.345	1.000	1.120	0.387
0.85	0.328	1.000	1.140	0.374
0.9	0.312	1.000	1.160	0.362
0.95	0.298	1.000	1.180	0.351
1	0.285	1.000	1.200	0.342
1.1	0.259	1.000	1.200	0.311
1.2	0.238	1.000	1.200	0.286
1.3	0.220	1.000	1.200	0.264
1.4	0.205	1.000	1.200	0.246
1.5	0.191	1.000	1.200	0.230
1.6	0.180	1.000	1.200	0.216
1.7	0.169	1.000	1.200	0.203
1.8	0.160	1.000	1.200	0.192
1.9	0.152	1.000	1.200	0.182

2	0.144	1.000	1.200	0.173
2.2	0.129	1.000	1.200	0.155
2.4	0.117	1.000	1.200	0.141
2.5	0.112	1.000	1.200	0.134
2.6	0.107	1.000	1.200	0.128
2.8	0.098	1.000	1.200	0.118
3	0.091	1.000	1.200	0.109
3.2	0.084	1.000	1.200	0.101
3.4	0.078	1.000	1.200	0.094
3.5	0.076	1.000	1.200	0.091
3.6	0.073	1.000	1.200	0.088
3.8	0.069	1.000	1.200	0.082
4	0.064	1.000	1.200	0.077
4.2	0.062	1.000	1.200	0.074
4.4	0.059	1.000	1.200	0.071
4.6	0.057	1.000	1.200	0.068
4.8	0.054	1.000	1.200	0.065
5	0.052	1.000	1.200	0.063

Envelope Data

Period	SA
0.01	0.451
0.02	0.459
0.022	0.466
0.025	0.476
0.029	0.489
0.03	0.493
0.032	0.502
0.035	0.517
0.036	0.522
0.04	0.542
0.042	0.552
0.044	0.563
0.045	0.568
0.046	0.573
0.048	0.584
0.05	0.595
0.055	0.622
0.06	0.650
0.065	0.677
0.067	0.688
0.07	0.704
0.075	0.729

0.08	0.754
0.085	0.779
0.09	0.802
0.095	0.825
0.1	0.846
0.11	0.883
0.12	0.916
0.13	0.944
0.133	0.951
0.14	0.966
0.15	0.986
0.16	1.002
0.17	1.015
0.18	1.027
0.19	1.036
0.2	1.044
0.22	1.038
0.24	1.030
0.25	1.025
0.26	1.016
0.28	1.001
0.29	0.992
0.3	0.983
0.32	0.961
0.34	0.940
0.35	0.929
0.36	0.918
0.38	0.897
0.4	0.876
0.42	0.855
0.44	0.835
0.45	0.825
0.46	0.816
0.48	0.797
0.5	0.780
0.55	0.742
0.6	0.710
0.65	0.682
0.667	0.673
0.7	0.657
0.75	0.635
0.8	0.615
0.85	0.597
0.9	0.580
0.95	0.564
1	0.550

1.1	0.505
1.2	0.466
1.3	0.431
1.4	0.401
1.5	0.374
1.6	0.348
1.7	0.325
1.8	0.305
1.9	0.287
2	0.270
2.2	0.241
2.4	0.217
2.5	0.207
2.6	0.198
2.8	0.181
3	0.167
3.2	0.155
3.4	0.144
3.5	0.139
3.6	0.135
3.8	0.126
4	0.119
4.2	0.112
4.4	0.107
4.6	0.101
4.8	0.097
5	0.092

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} (km)	0	

Distance

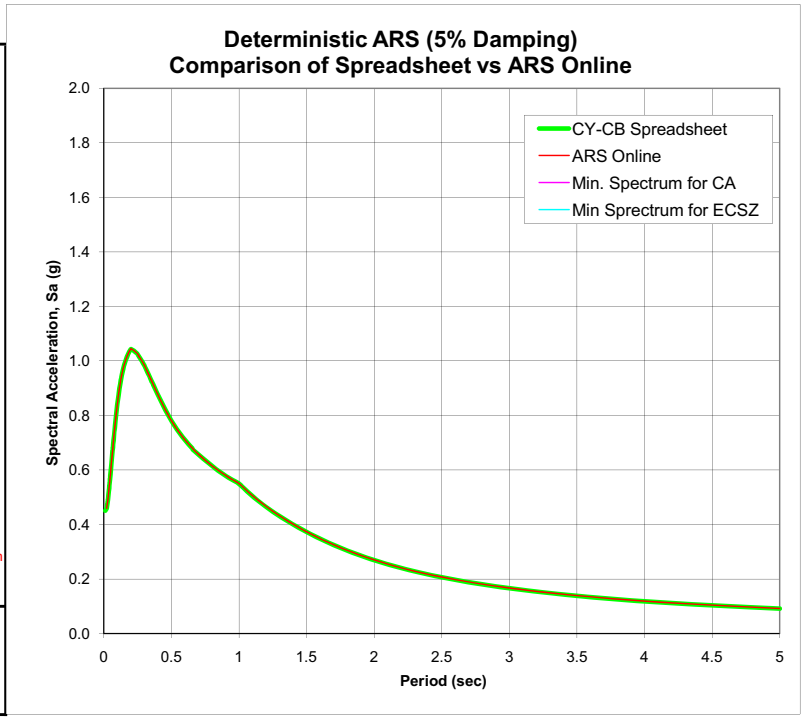
R_{RUP} (km)	4.2	
R_{JB} (km)	4.2	
R_x (km)	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} (m/sec)	560	(270 to 1500 m/s)
$Z_{1.0}$ (m)	74	(0 - No Basin)
$Z_{2.5}$ (km)	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45070
0.020	0.45934
0.022	0.46594
0.025	0.47600
0.029	0.48900
0.030	0.49272
0.032	0.50226
0.035	0.51688
0.036	0.52196
0.040	0.54186
0.042	0.55233
0.044	0.56256
0.045	0.56796
0.046	0.57323
0.048	0.58368
0.050	0.59435
0.055	0.62212
0.060	0.65018
0.065	0.67711
0.067	0.68797
0.070	0.70340
0.075	0.72907
0.080	0.75396
0.085	0.77862
0.090	0.80182
0.095	0.82448
0.100	0.84620
0.110	0.88308
0.120	0.91575
0.130	0.94352
0.133	0.95048
0.140	0.96611
0.150	0.98568
0.160	1.00215
0.170	1.01515

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.459	1	1	0.459	0%
0.022	0.466	1	1	0.466	0%
0.025	0.476	1	1	0.476	0%
0.029	0.489	1	1	0.489	0%
0.03	0.493	1	1	0.493	0%
0.032	0.502	1	1	0.502	0%
0.035	0.517	1	1	0.517	0%
0.036	0.522	1	1	0.522	0%
0.04	0.542	1	1	0.542	0%
0.042	0.552	1	1	0.552	0%
0.044	0.563	1	1	0.563	0%
0.045	0.568	1	1	0.568	0%
0.046	0.573	1	1	0.573	0%
0.048	0.584	1	1	0.584	0%
0.05	0.595	1	1	0.595	0%
0.055	0.622	1	1	0.622	0%
0.06	0.65	1	1	0.65	0%
0.065	0.677	1	1	0.677	0%
0.067	0.688	1	1	0.688	0%
0.07	0.704	1	1	0.704	0%
0.075	0.729	1	1	0.729	0%
0.08	0.754	1	1	0.754	0%
0.085	0.779	1	1	0.779	0%
0.09	0.802	1	1	0.802	0%
0.095	0.825	1	1	0.825	0%
0.1	0.846	1	1	0.846	0%
0.11	0.883	1	1	0.883	0%
0.12	0.916	1	1	0.916	0%
0.13	0.944	1	1	0.944	0%
0.133	0.951	1	1	0.951	0%
0.14	0.966	1	1	0.966	0%
0.15	0.986	1	1	0.986	0%
0.16	1.002	1	1	1.002	0%
0.17	1.015	1	1	1.015	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

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0.180	1.02656
0.190	1.03574
0.200	1.04325
0.220	1.03775
0.240	1.02969
0.250	1.02431
0.260	1.01591
0.280	1.00052
0.290	0.99129
0.300	0.98241
0.320	0.96110
0.340	0.93946
0.350	0.92845
0.360	0.91792
0.380	0.89636
0.400	0.87547
0.420	0.85500
0.440	0.83470
0.450	0.82517
0.460	0.81574
0.480	0.79698
0.500	0.77970
0.550	0.74216
0.600	0.71003
0.650	0.68189
0.660	0.67365
0.700	0.65717
0.750	0.63518
0.800	0.61450
0.850	0.59608
0.900	0.57909
0.950	0.56375
1.000	0.54942
1.100	0.50387
1.200	0.46482
1.300	0.43038
1.400	0.39999
1.500	0.37270
1.600	0.34732
1.700	0.32461
1.800	0.30423
1.900	0.28589
2.000	0.26958
2.200	0.24042
2.400	0.21683
2.500	0.20657
2.600	0.19719
2.800	0.18057
3.000	0.16634
3.200	0.15422
3.400	0.14357
3.500	0.13872
3.600	0.13416
3.800	0.12577
4.000	0.11830
4.200	0.11198
4.400	0.10622
4.600	0.10099
4.800	0.09622
5.000	0.09182

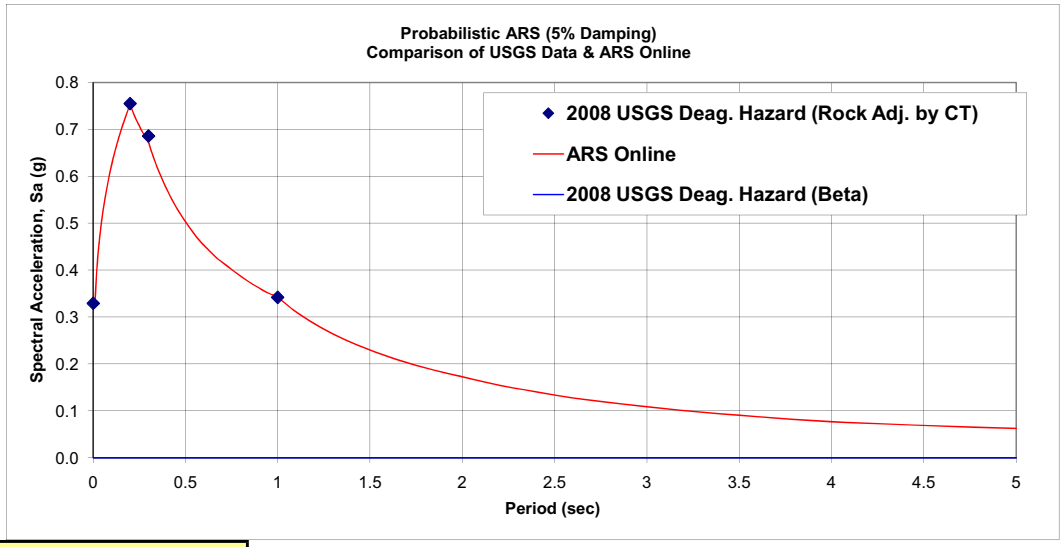
95

0.18	1.027	1	1	1.027	0%
0.19	1.036	1	1	1.036	0%
0.2	1.044	1	1	1.044	0%
0.22	1.038	1	1	1.038	0%
0.24	1.03	1	1	1.03	0%
0.25	1.025	1	1	1.025	0%
0.26	1.016	1	1	1.016	0%
0.28	1.001	1	1	1.001	0%
0.29	0.992	1	1	0.992	0%
0.3	0.983	1	1	0.983	0%
0.32	0.961	1	1	0.961	0%
0.34	0.94	1	1	0.94	0%
0.35	0.929	1	1	0.929	0%
0.36	0.918	1	1	0.918	0%
0.38	0.897	1	1	0.897	0%
0.4	0.876	1	1	0.876	0%
0.42	0.855	1	1	0.855	0%
0.44	0.835	1	1	0.835	0%
0.45	0.825	1	1	0.825	0%
0.46	0.816	1	1	0.816	0%
0.48	0.797	1	1	0.797	0%
0.5	0.78	1	1	0.78	0%
0.55	0.728	1	1.02	0.742	0%
0.6	0.683	1	1.04	0.71	0%
0.65	0.644	1	1.06	0.682	0%
0.667	0.631	1	1.067	0.673	0%
0.7	0.609	1	1.08	0.657	0%
0.75	0.578	1	1.1	0.635	0%
0.8	0.549	1	1.12	0.615	0%
0.85	0.523	1	1.14	0.597	0%
0.9	0.5	1	1.16	0.58	0%
0.95	0.478	1	1.18	0.564	0%
1	0.458	1	1.2	0.55	0%
1.1	0.421	1	1.2	0.505	0%
1.2	0.388	1	1.2	0.466	0%
1.3	0.359	1	1.2	0.431	0%
1.4	0.334	1	1.2	0.401	0%
1.5	0.311	1	1.2	0.374	0%
1.6	0.29	1	1.2	0.348	0%
1.7	0.271	1	1.2	0.325	0%
1.8	0.254	1	1.2	0.305	0%
1.9	0.239	1	1.2	0.287	0%
2	0.225	1	1.2	0.27	0%
2.2	0.201	1	1.2	0.241	0%
2.4	0.181	1	1.2	0.217	0%
2.5	0.173	1	1.2	0.207	0%
2.6	0.165	1	1.2	0.198	0%
2.8	0.151	1	1.2	0.181	0%
3	0.139	1	1.2	0.167	0%
3.2	0.129	1	1.2	0.155	1%
3.4	0.12	1	1.2	0.144	0%
3.5	0.116	1	1.2	0.139	0%
3.6	0.112	1	1.2	0.135	1%
3.8	0.105	1	1.2	0.126	0%
4	0.099	1	1.2	0.119	1%
4.2	0.094	1	1.2	0.112	0%
4.4	0.089	1	1.2	0.107	1%
4.6	0.084	1	1.2	0.101	0%
4.8	0.08	1	1.2	0.097	1%
5	0.077	1	1.2	0.092	0%

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	560
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.11
$Z_{1.0}$ (m) =	74
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.33	1	1	0.33
0.02	0.4	1	1	0.4
0.022	0.41	1	1	0.41
0.025	0.425	1	1	0.425
0.029	0.443	1	1	0.443
0.03	0.447	1	1	0.447
0.032	0.455	1	1	0.455
0.035	0.466	1	1	0.466
0.036	0.47	1	1	0.47
0.04	0.484	1	1	0.484
0.042	0.491	1	1	0.491
0.044	0.497	1	1	0.497
0.045	0.5	1	1	0.5
0.046	0.503	1	1	0.503
0.048	0.509	1	1	0.509
0.05	0.515	1	1	0.515
0.055	0.529	1	1	0.529
0.06	0.541	1	1	0.541
0.065	0.553	1	1	0.553
0.067	0.558	1	1	0.558
0.07	0.565	1	1	0.565
0.075	0.576	1	1	0.576
0.08	0.586	1	1	0.586
0.085	0.596	1	1	0.596
0.09	0.606	1	1	0.606
0.095	0.615	1	1	0.615
0.1	0.623	1	1	0.623
0.11	0.64	1	1	0.64
0.12	0.655	1	1	0.655
0.13	0.67	1	1	0.67
0.133	0.674	1	1	0.674
0.14	0.683	1	1	0.683
0.15	0.696	1	1	0.696
0.16	0.708	1	1	0.708
0.17	0.72	1	1	0.72
0.18	0.731	1	1	0.731
0.19	0.742	1	1	0.742
0.2	0.753	1	1	0.753
0.22	0.733	1	1	0.733
0.24	0.716	1	1	0.716
0.25	0.708	1	1	0.708
0.26	0.7	1	1	0.7
0.28	0.686	1	1	0.686

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.073	1.000	0.329	0.33	-0.2%
0.2	0.722	1.000	1.046	1.000	0.755	0.753	0.2%
0.3	0.597	1.000	1.149	1.000	0.686	0.673	1.9%
1	0.228	1.200	1.249	1.000	0.342	0.342	0.1%

Max % Difference = 1.9%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0		1.000	1.000		0.33	0.0%
0.1		1.000	1.000		0.623	0.0%
0.2		1.000	1.000		0.753	0.0%
0.3		1.000	1.000		0.673	0.0%
0.5		1.000	1.000		0.504	0.0%
1		1.200	1.000		0.342	0.0%
2		1.200	1.000		0.173	0.0%
3		1.200	1.000		0.109	0.0%
4		1.200	1.000		0.077	0.0%
5		1.200	1.000		0.063	0.0%

Max % Difference = 0.0%

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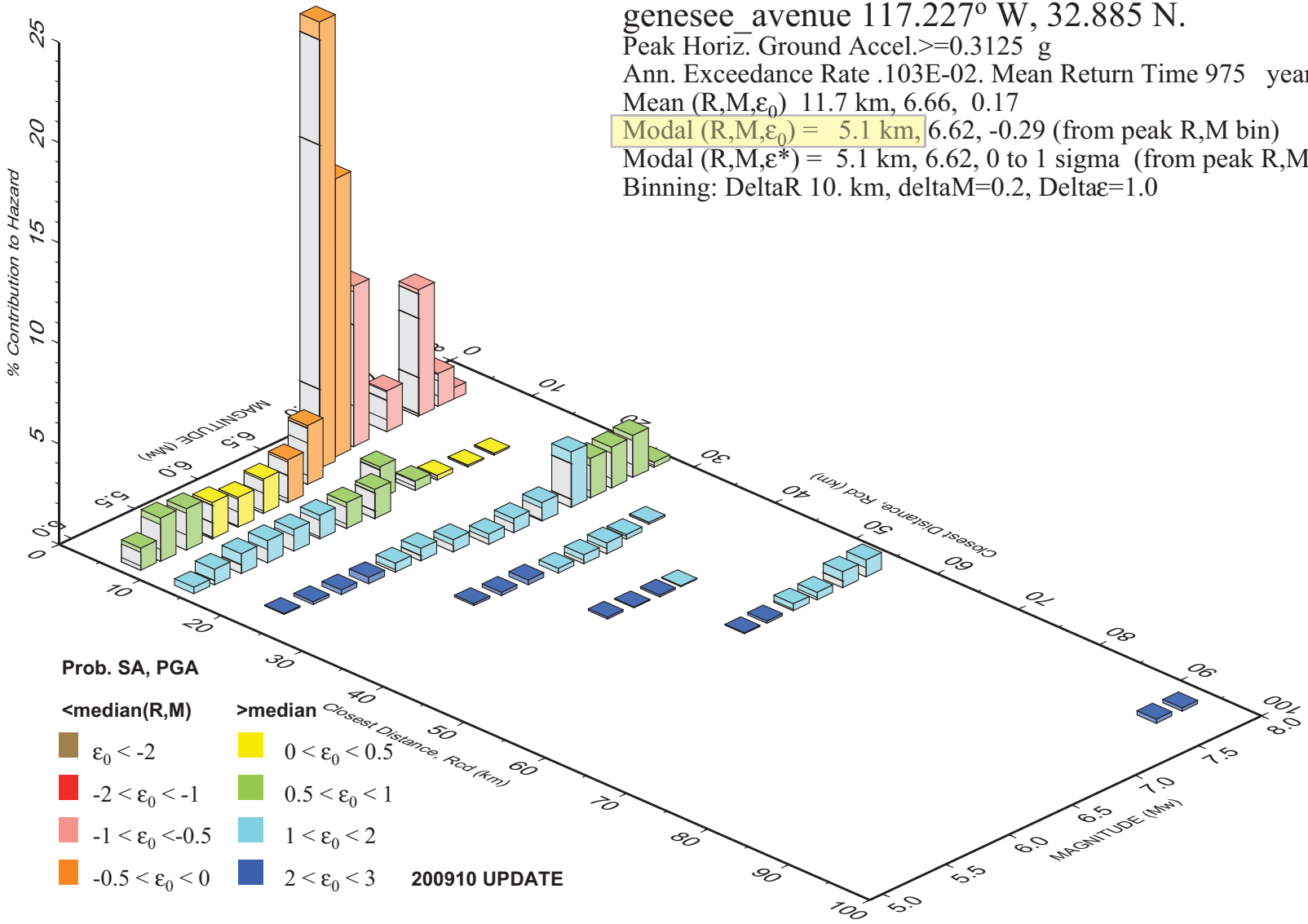
0.29	0.679	1	1	0.679
0.3	0.673	1	1	0.673
0.32	0.649	1	1	0.649
0.34	0.627	1	1	0.627
0.35	0.617	1	1	0.617
0.36	0.607	1	1	0.607
0.38	0.589	1	1	0.589
0.4	0.572	1	1	0.572
0.42	0.556	1	1	0.556
0.44	0.541	1	1	0.541
0.45	0.535	1	1	0.535
0.46	0.528	1	1	0.528
0.48	0.515	1	1	0.515
0.5	0.504	1	1	0.504
0.55	0.467	1	1.02	0.476
0.6	0.436	1	1.04	0.453
0.65	0.409	1	1.06	0.434
0.667	0.401	1	1.067	0.427
0.7	0.386	1	1.08	0.417
0.75	0.365	1	1.1	0.402
0.8	0.345	1	1.12	0.387
0.85	0.328	1	1.14	0.374
0.9	0.312	1	1.16	0.362
0.95	0.298	1	1.18	0.351
1	0.285	1	1.2	0.342
1.1	0.259	1	1.2	0.311
1.2	0.238	1	1.2	0.286
1.3	0.22	1	1.2	0.264
1.4	0.205	1	1.2	0.246
1.5	0.191	1	1.2	0.23
1.6	0.18	1	1.2	0.216
1.7	0.169	1	1.2	0.203
1.8	0.16	1	1.2	0.192
1.9	0.152	1	1.2	0.182
2	0.144	1	1.2	0.173
2.2	0.129	1	1.2	0.155
2.4	0.117	1	1.2	0.141
2.5	0.112	1	1.2	0.134
2.6	0.107	1	1.2	0.128
2.8	0.098	1	1.2	0.118
3	0.091	1	1.2	0.109
3.2	0.084	1	1.2	0.101
3.4	0.078	1	1.2	0.094
3.5	0.076	1	1.2	0.091
3.6	0.073	1	1.2	0.088
3.8	0.069	1	1.2	0.082
4	0.064	1	1.2	0.077
4.2	0.062	1	1.2	0.074
4.4	0.059	1	1.2	0.071
4.6	0.057	1	1.2	0.068
4.8	0.054	1	1.2	0.065
5	0.052	1	1.2	0.063

PSH Deaggregation on NEHRP C soil
genesee_avenue 117.227° W, 32.885 N.

Peak Horiz. Ground Accel.>=0.3125 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 years
Mean (R,M,ε_0) 11.7 km, 6.66, 0.17
Modal (R,M,ε_0) = 5.1 km, 6.62, -0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.1 km, 6.62, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 17:21:00 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 560. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.1

Bridge/Facility Name: RW-8 Bridge/Facility No.: RW-8

Latitude: 32.8847777 Longitude: -117.22703

Fault Information (#1)

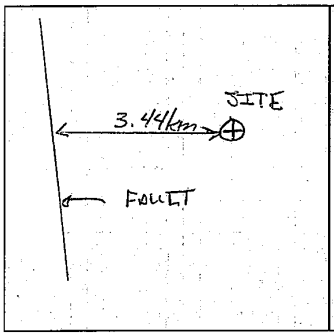
Fault Name: NEWPORT ENGLEWOOD ROSE CANYON Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

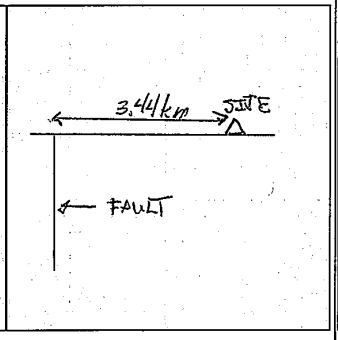
Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13 km

Plan View



Elevation View



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 580

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 7.4km

$Z_{2.5}$ (km/s): 2.0km

Notes:

Fault Information (#2)

Fault Name: _____ Fault ID#: _____

MMax: _____ Fault Type: _____

Fault Dip: _____ Dip Direction: _____

Top of Rupture: _____ Bottom of Rupture: _____

Plan View

Elevation View

Calculated or Measure Distances

R_{RUP}: _____

R_{JB}: _____

R_X: _____

Determination of V_{S30}

V_{S30} (m/s): _____

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): _____

$Z_{2.5}$ (km/s): _____

Notes:

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11- 022331 County: SD Route: 5 PM: 28.6

Bridge/Facility Name: RW-8 Bridge/Facility No.: RW-8

Latitude: 32.884777 Longitude: -117.22703

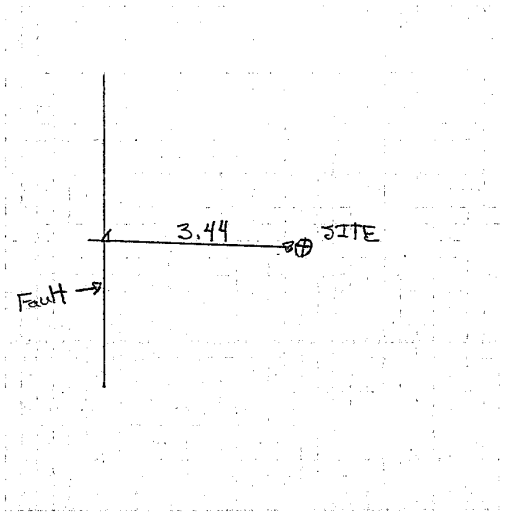
Deterministic Fault Information

Fault Name: ~~ROSE CANYON FAULT ZONE~~ NEWPORT-INGLEWOOD Fault ID#: ~~224~~ M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: ~~[illegible]~~ 0 km Bottom of Rupture: 13 km

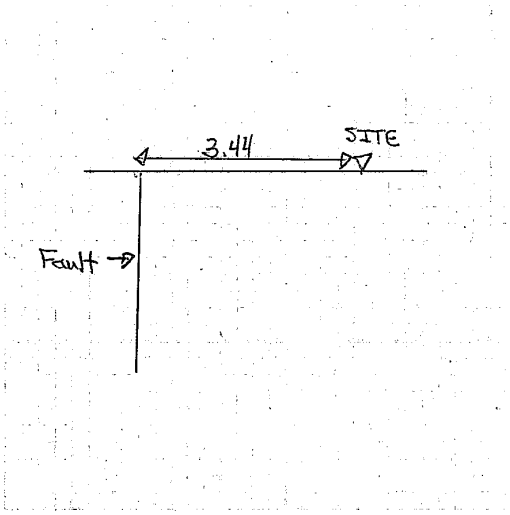
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	3.44 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	3.44 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	3.44 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 2.0 km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS Online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☑	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☑	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☐	☐	☑	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☑	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☑	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☑	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☑	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☑	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☐	☐	☑	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☑	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☑	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☑	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☑	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

RICHARD RUSNAK — TRANSPORTATION ENGINEER (CIVIL)

Checker (Print) — Title

11/7/2011

Checker (Signature) — Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

BRIAN HINMAN — SENIOR TE

Functional Supervisor (Print) — Title

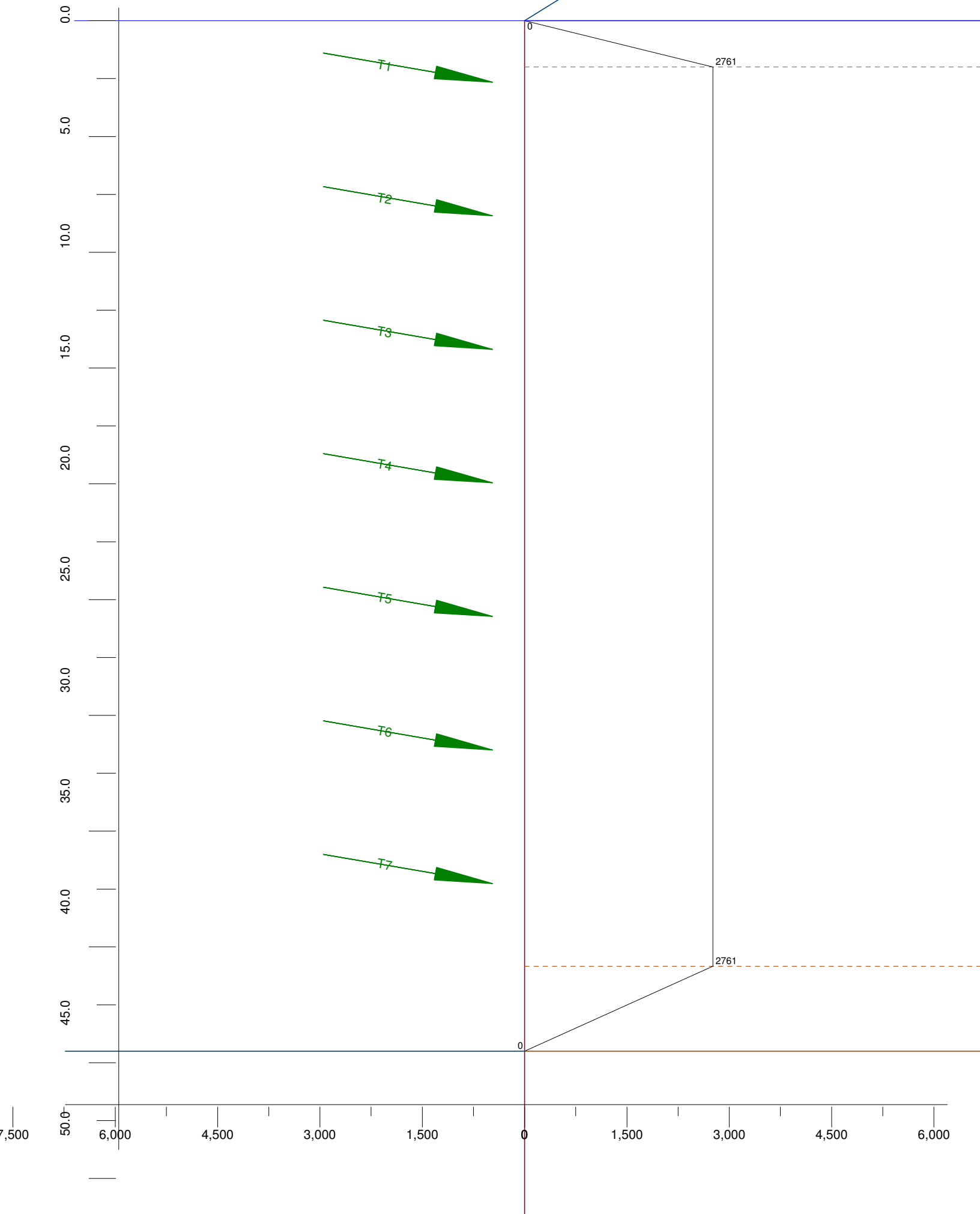
11/8/11

Functional Supervisor (Signature) — Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Soil Geometry Input Pressure Diagram - [Station 16+60]

Run Date: March 07, 2012 02:13 pm Ver.CT-TSP Vs 2.2.2 08/28/2007



Soil Geometry Input Pressure Diagram - [Station 16+60]

Run Date: March 07, 2012 02:13 pm Ver:CT-TSP Vs 2.2.2 08/28/2007

Soil Geometry Input Data Method

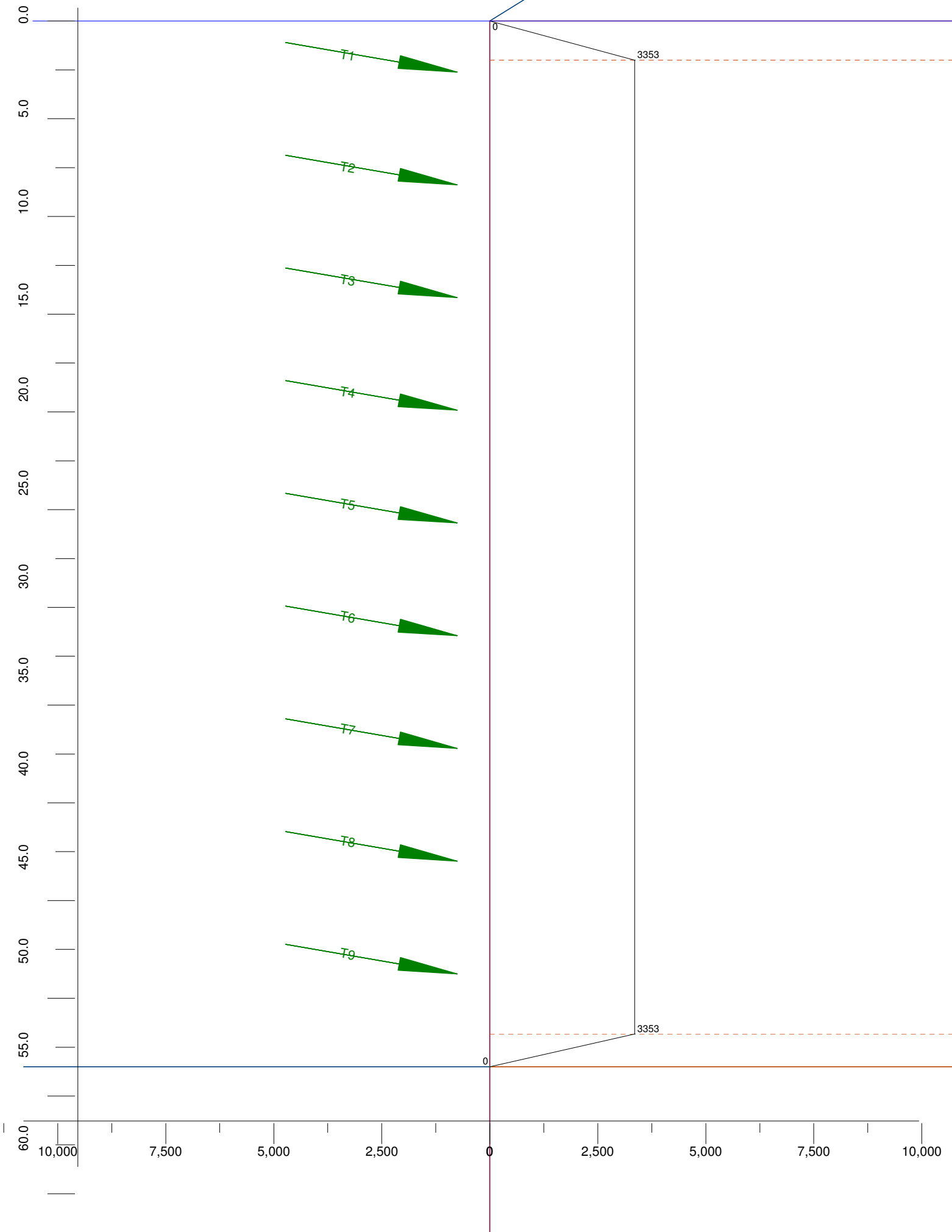
Layer	Thick.	ϕ	δ	γ	Coh	Method to Calculate K	
	ft	°	°	pcf	psf	Active	Passive
1	65.00	33.00	10.00	121.00	200	Log Spiral	Log Spiral

Tie Back Data Table

Tie back	Depth	Angle	H Spcg
	ft	°	ft
1	3.00	10.00	10.00
2	9.00	10.00	10.00
3	15.00	10.00	10.00
4	21.00	10.00	10.00
5	27.00	10.00	10.00
6	33.00	10.00	10.00
7	39.00	10.00	10.00

Soil Geometry Input Pressure Diagram - [Station 18+00]

Run Date: March 07, 2012 02:15 pm Ver.CT-TSP Vs 2.2.2 08/28/2007



Soil Geometry Input Pressure Diagram - [Station 18+00]

Run Date: March 07, 2012 02:15 pm Ver:CT-TSP Vs 2.2.2 08/28/2007

Soil Geometry Input Data Method

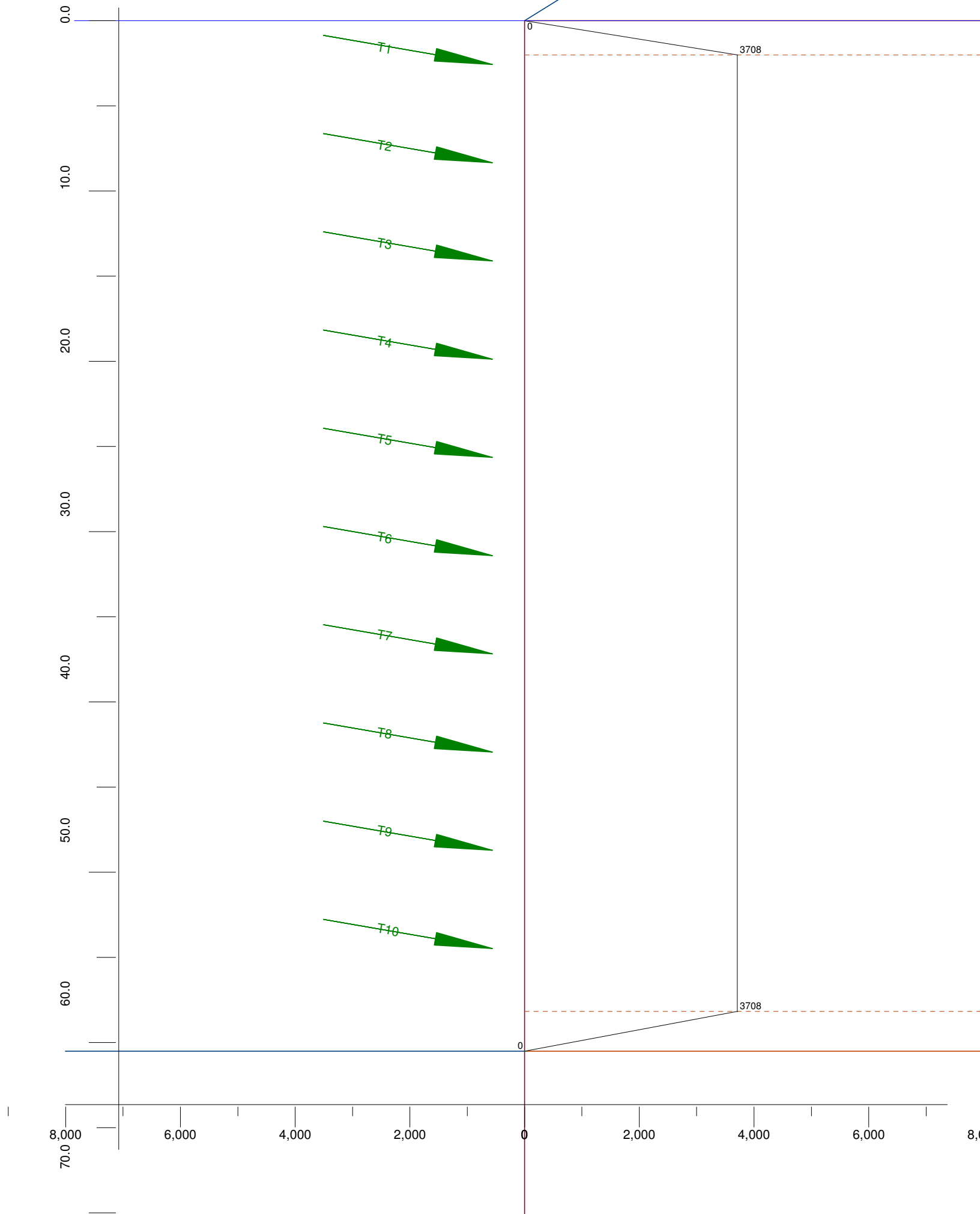
Layer	Thick.	ϕ	δ	γ	Coh	Method to Calculate K	
	ft	°	°	pcf	psf	Active	Passive
1	100.00	33.00	10.00	121.00	200	Log Spiral	Log Spiral

Tie Back Data Table

Tie back	Depth	Angle	H Spcg
	ft	°	ft
1	3.00	10.00	10.00
2	9.00	10.00	10.00
3	15.00	10.00	10.00
4	21.00	10.00	10.00
5	27.00	10.00	10.00
6	33.00	10.00	10.00
7	39.00	10.00	10.00
8	45.00	10.00	10.00
9	51.00	10.00	10.00

Soil Geometry Input Pressure Diagram - [Station 19+00]

Run Date: March 07, 2012 02:16 pm Ver.CT-TSP Vs 2.2.2 08/28/2007



Soil Geometry Input Pressure Diagram - [Station 19+00]

Run Date: March 07, 2012 02:16 pm Ver:CT-TSP Vs 2.2.2 08/28/2007

Soil Geometry Input Data Method

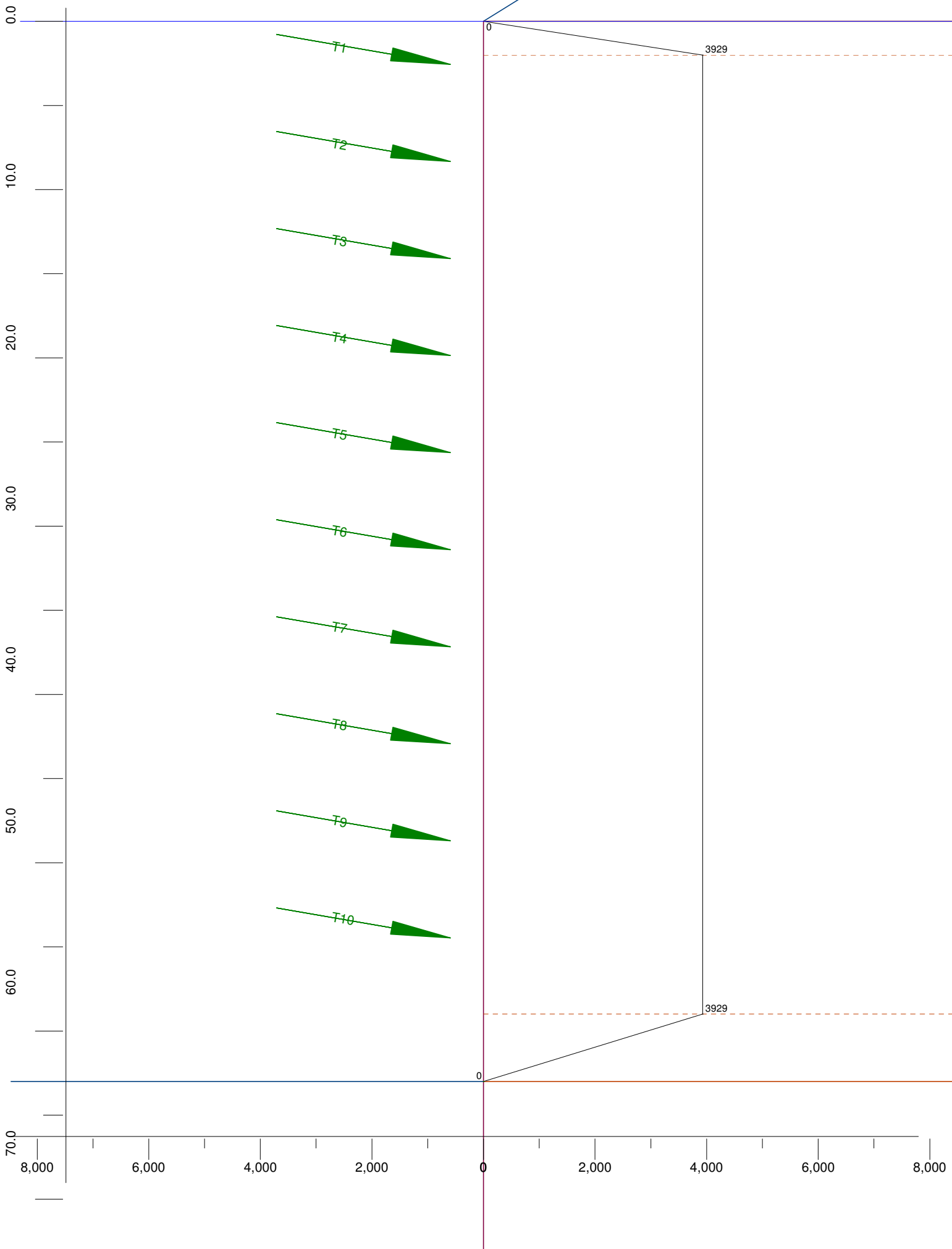
Layer	Thick.	ϕ	δ	γ	Coh	Method to Calculate K	
	ft	°	°	pcf	psf	Active	Passive
1	76.00	33.00	10.00	121.00	200	Log Spiral	Log Spiral

Tie Back Data Table

Tie back	Depth	Angle	H Spcg
	ft	°	ft
1	3.00	10.00	10.00
2	9.00	10.00	10.00
3	15.00	10.00	10.00
4	21.00	10.00	10.00
5	27.00	10.00	10.00
6	33.00	10.00	10.00
7	39.00	10.00	10.00
8	45.00	10.00	10.00
9	51.00	10.00	10.00
10	57.00	10.00	10.00

Soil Geometry Input Pressure Diagram - [Station 19+90

Run Date: March 07, 2012 02:17 pm Ver.CT-TSP Vs 2.2.2 08/28/2007



Soil Geometry Input Pressure Diagram - [Station 19+90]

Soil Geometry Input Data Method

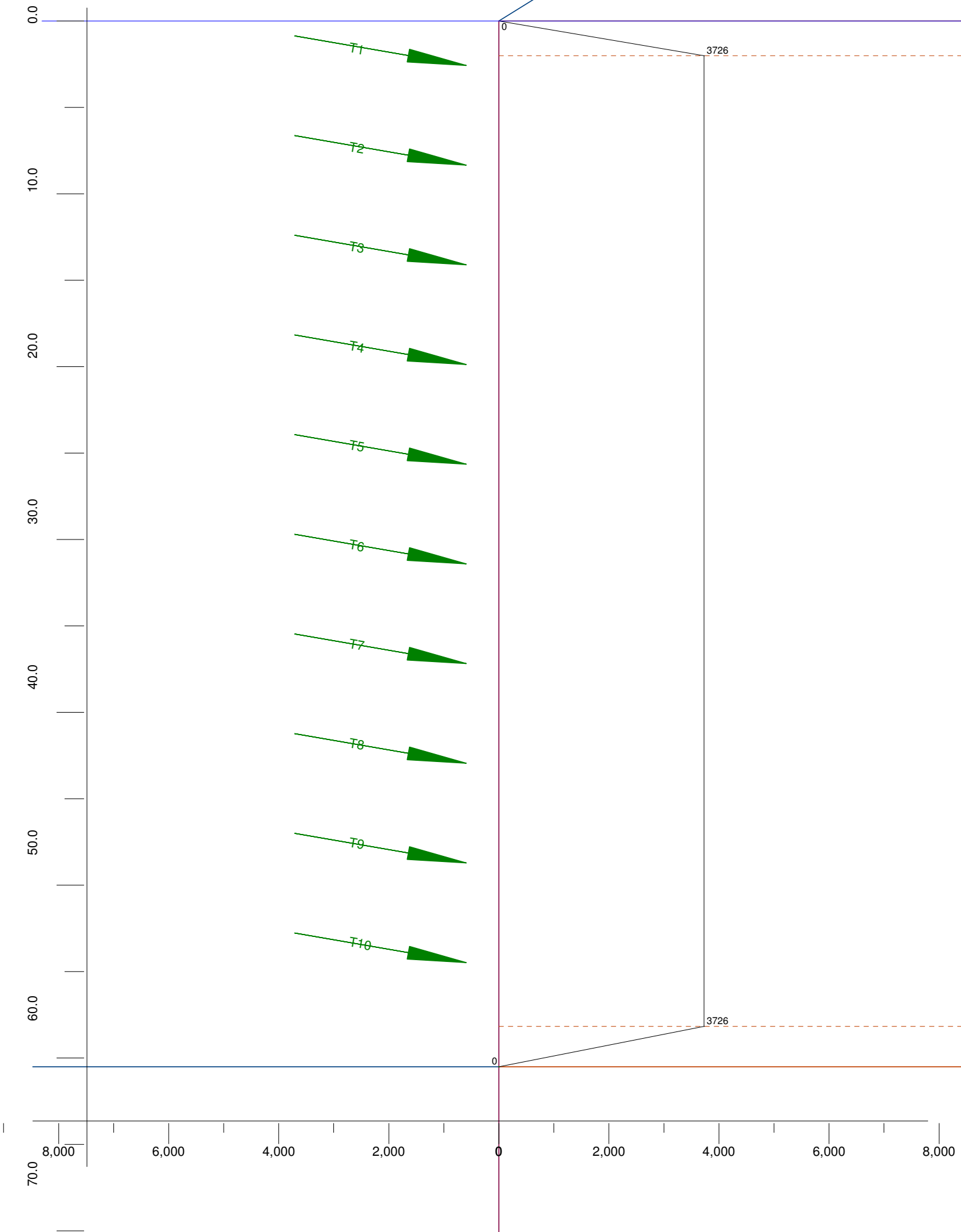
Layer	Thick.	ϕ	δ	γ	Coh	Method to Calculate K	
	ft	°	°	pcf	psf	Active	Passive
1	80.00	33.00	10.00	121.00	200	Log Spiral	Log Spiral

Tie Back Data Table

Tie back	Depth	Angle	H Spcg
	ft	°	ft
1	3.00	10.00	10.00
2	9.00	10.00	10.00
3	15.00	10.00	10.00
4	21.00	10.00	10.00
5	27.00	10.00	10.00
6	33.00	10.00	10.00
7	39.00	10.00	10.00
8	45.00	10.00	10.00
9	51.00	10.00	10.00
10	57.00	10.00	10.00

Soil Geometry Input Pressure Diagram - [Station 21+00]

Run Date: March 07, 2012 02:18 pm Ver.CT-TSP Vs 2.2.2 08/28/2007



Soil Geometry Input Pressure Diagram - [Station 21+00]

Run Date: March 07, 2012 02:18 pm Ver:CT-TSP Vs 2.2.2 08/28/2007

Soil Geometry Input Data Method

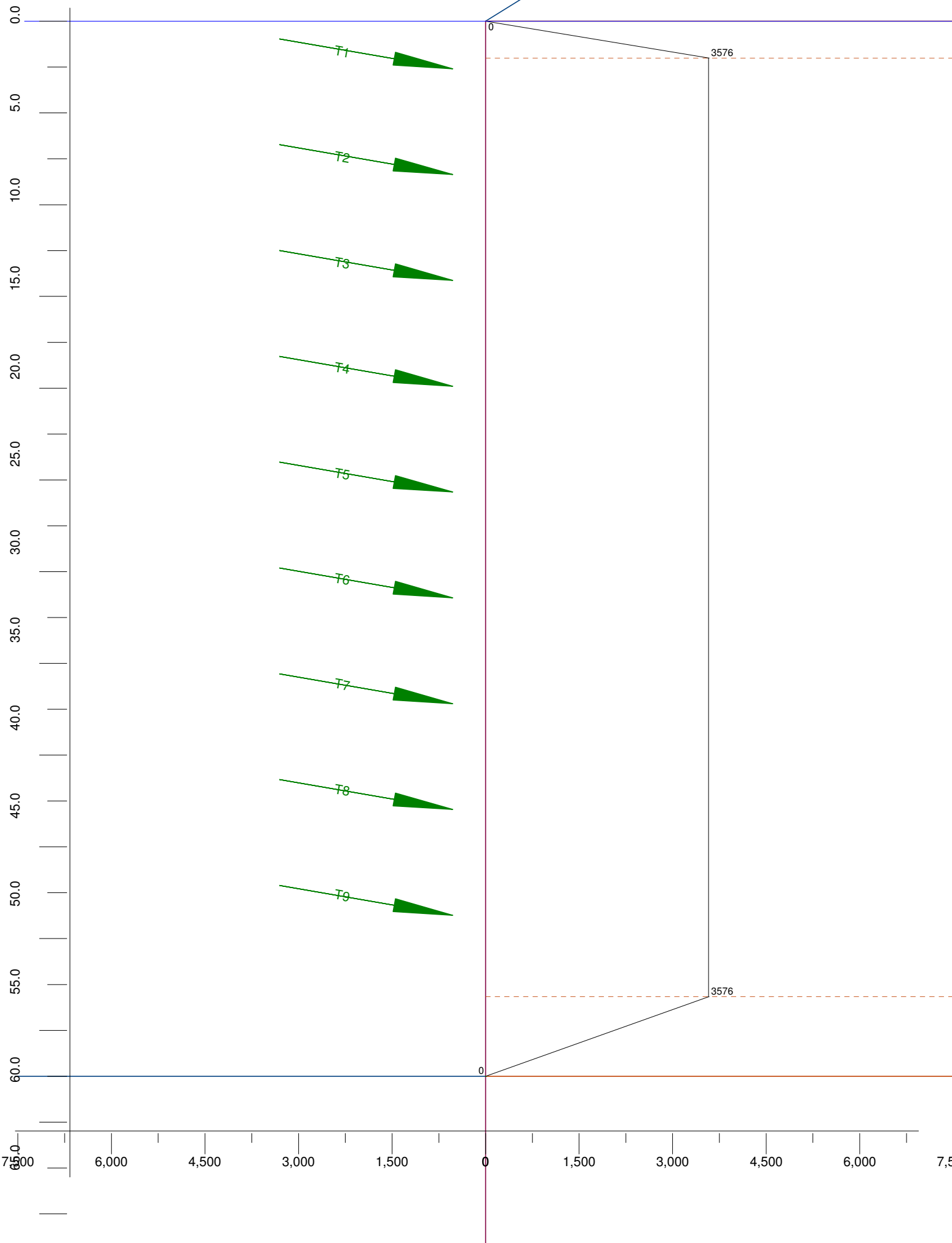
Layer	Thick.	ϕ	δ	γ	Coh	Method to Calculate K	
	ft	°	°	pcf	psf	Active	Passive
1	80.00	33.00	10.00	121.00	200	Log Spiral	Log Spiral

Tie Back Data Table

Tie back	Depth	Angle	H Spcg
	ft	°	ft
1	3.00	10.00	10.00
2	9.00	10.00	10.00
3	15.00	10.00	10.00
4	21.00	10.00	10.00
5	27.00	10.00	10.00
6	33.00	10.00	10.00
7	39.00	10.00	10.00
8	45.00	10.00	10.00
9	51.00	10.00	10.00
10	57.00	10.00	10.00

Soil Geometry Input Pressure Diagram - [Station 21+50]

Run Date: March 07, 2012 02:19 pm Ver.CT-TSP Vs 2.2.2 08/28/2007



Soil Geometry Input Pressure Diagram - [Station 21+50]

Run Date: March 07, 2012 02:19 pm Ver:CT-TSP Vs 2.2.2 08/28/2007

Soil Geometry Input Data Method

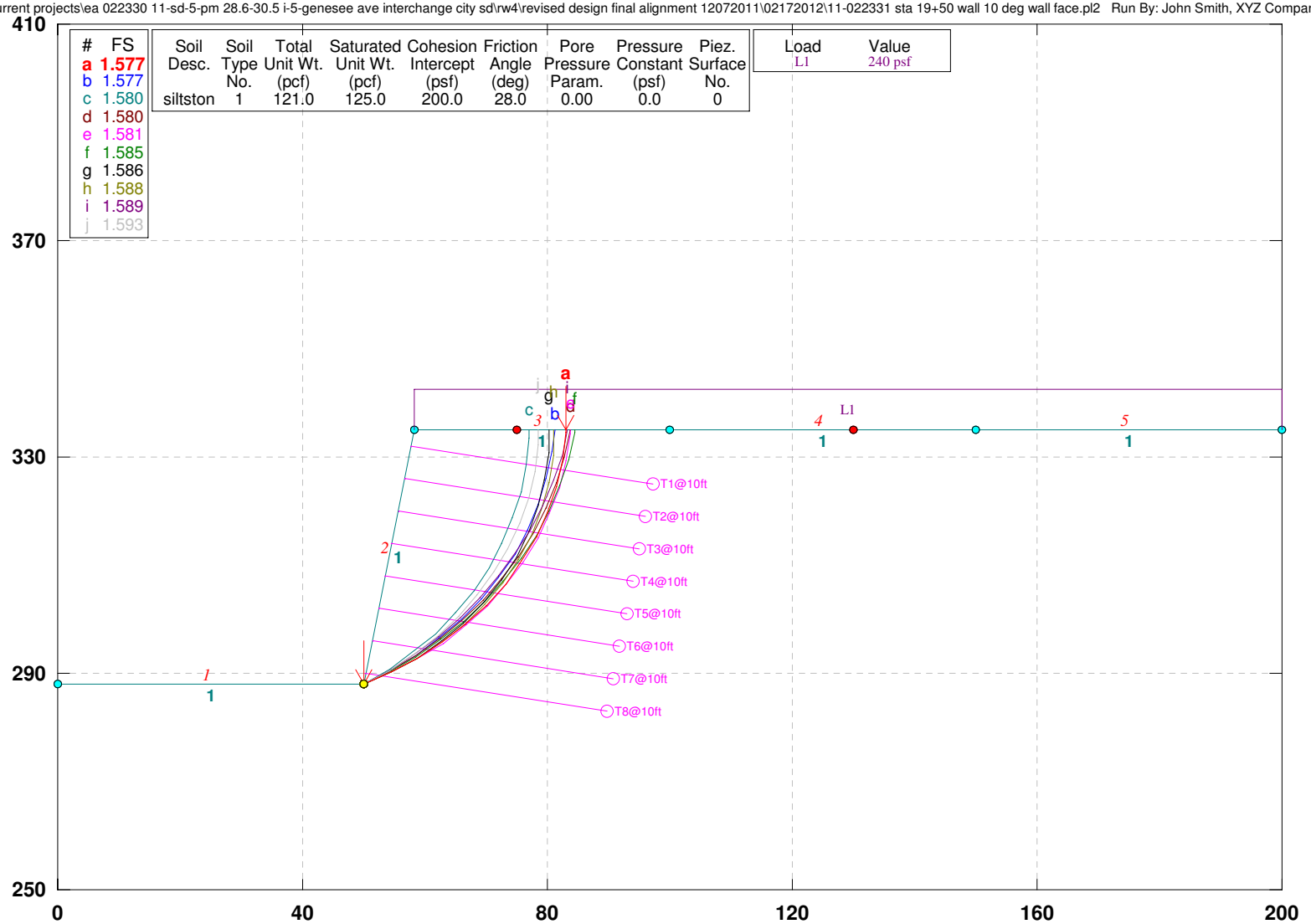
Layer	Thick.	ϕ	δ	γ	Coh	Method to Calculate K	
	ft	°	°	pcf	psf	Active	Passive
1	72.00	33.00	10.00	121.00	200	Log Spiral	Log Spiral

Tie Back Data Table

Tie back	Depth	Angle	H Spcg
	ft	°	ft
1	3.00	10.00	10.00
2	9.00	10.00	10.00
3	15.00	10.00	10.00
4	21.00	10.00	10.00
5	27.00	10.00	10.00
6	33.00	10.00	10.00
7	39.00	10.00	10.00
8	45.00	10.00	10.00
9	51.00	10.00	10.00

Bishop Modified sta 11+50,19+50 02172012RW4 tieback wall 10 degree batter

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw4\revised design final alignment 12072011\02172012\11-022331 sta 19+50 wall 10 deg wall face.pl2 Run By: John Smith, XYZ Company 2/28/2012

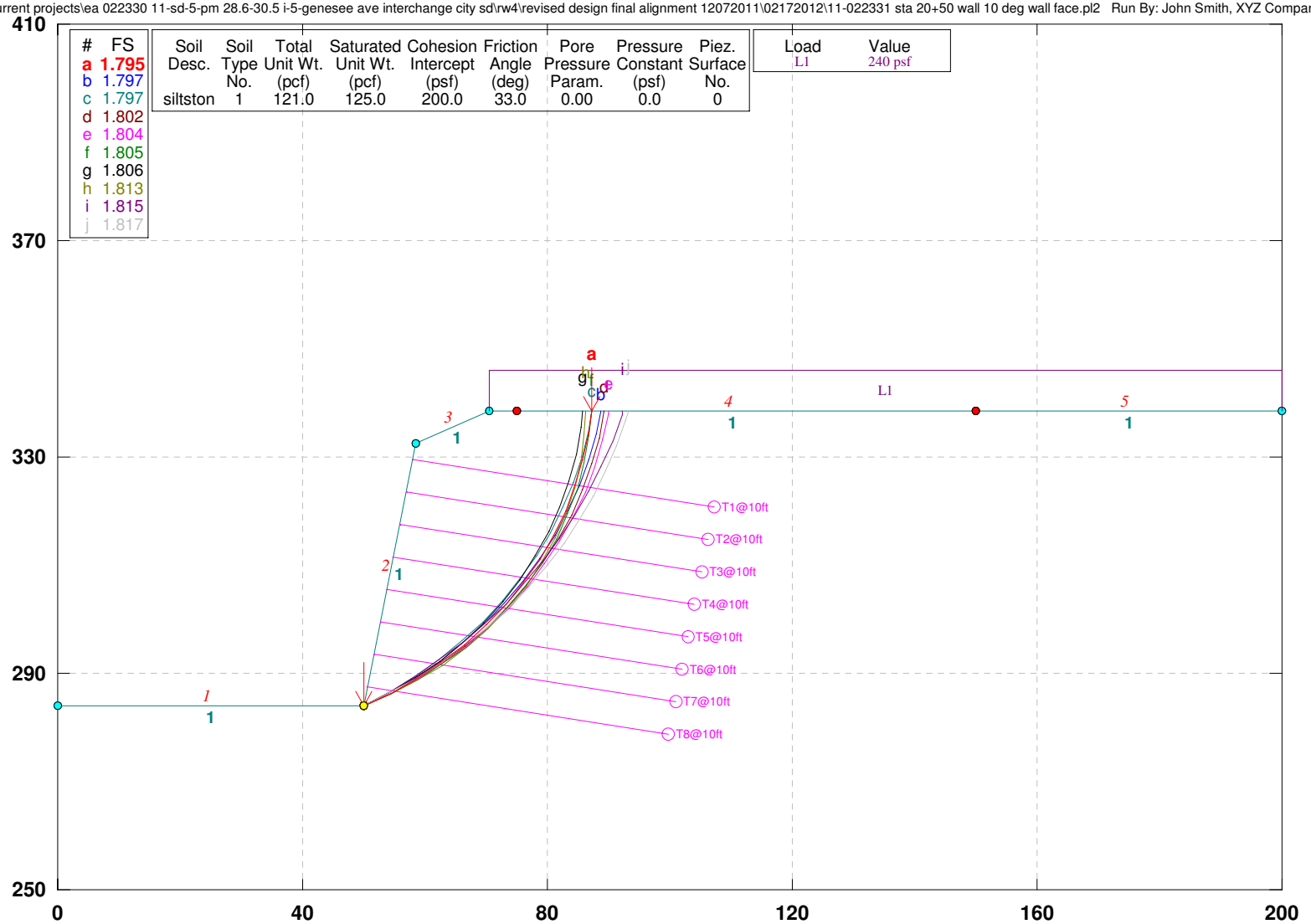


GSTABL7 v.2 FSmin=1.577

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 20+50 02172012 RW4 tieback wall 10 degree batter siesm

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw4\revised design final alignment 12072011\02172012\11-022331 sta 20+50 wall 10 deg wall face.pl2 Run By: John Smith, XYZ Company 2/24/2012



GSTABL7 v.2 FSmin=1.795

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 16+60,24+60 02172012RW4 tieback wall 10 degree batter

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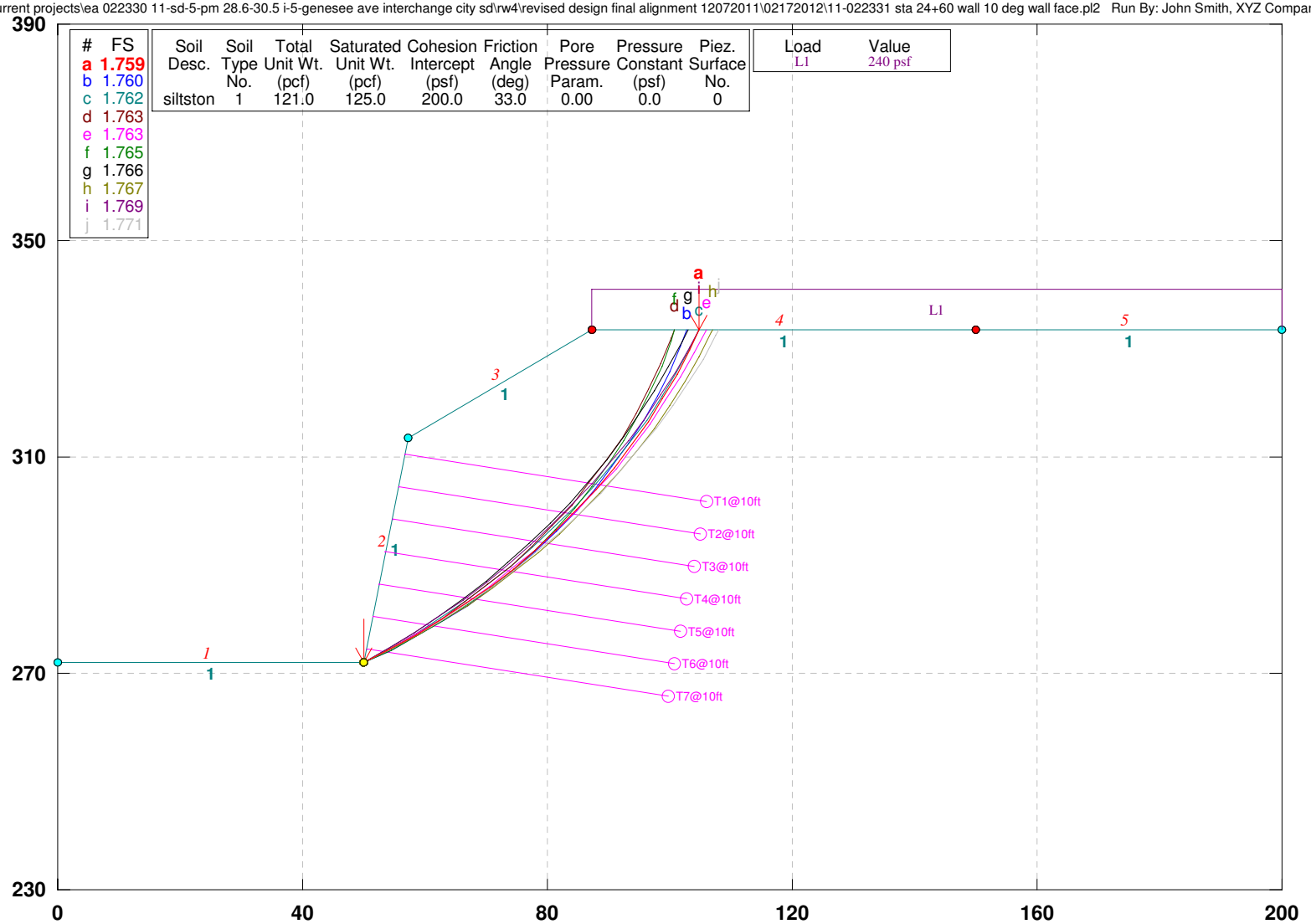

GSTABL7 v.2 FSmin=1.759

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 17+90,25+90 02172012RW4 tieback wall 10 degree batter

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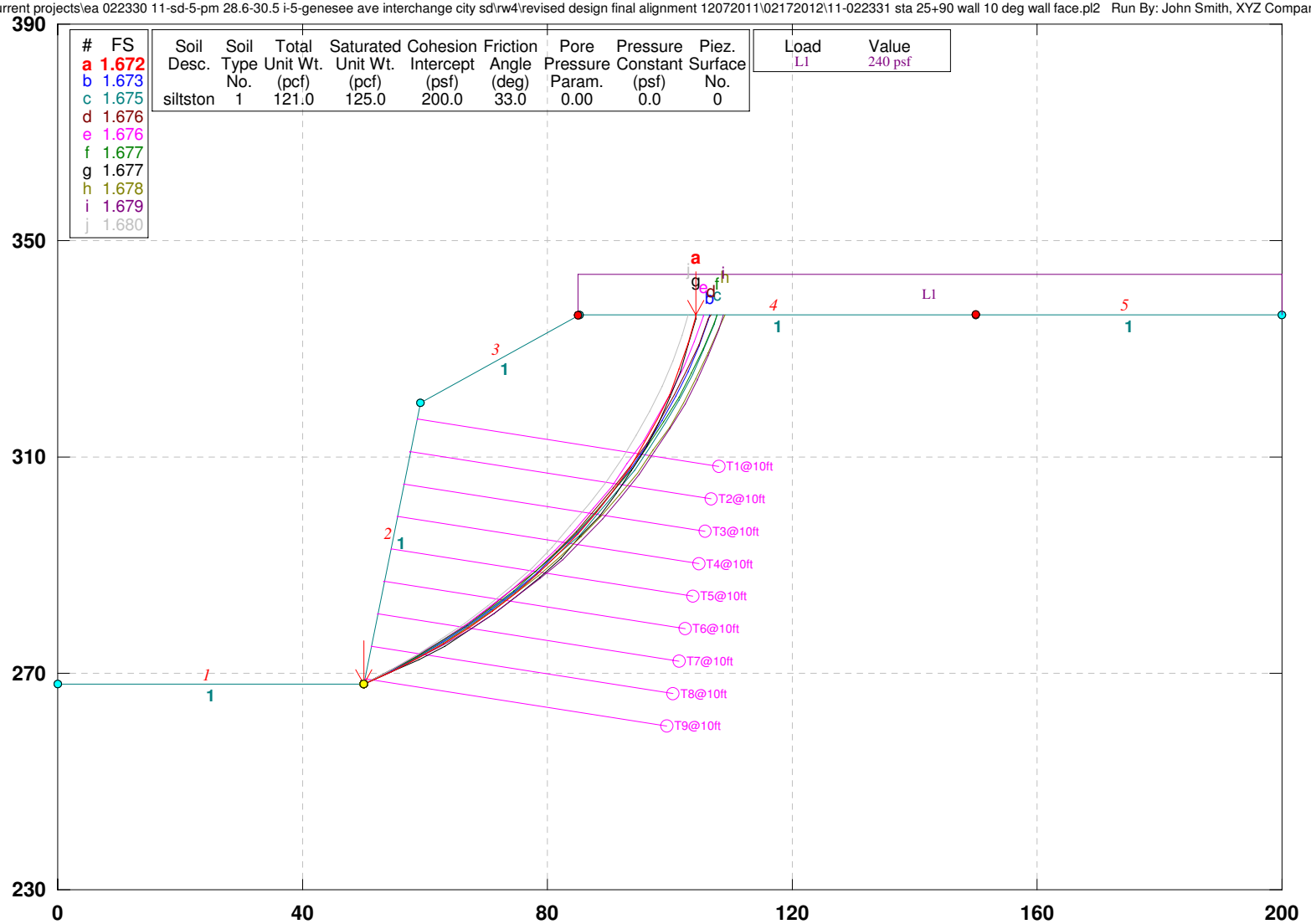
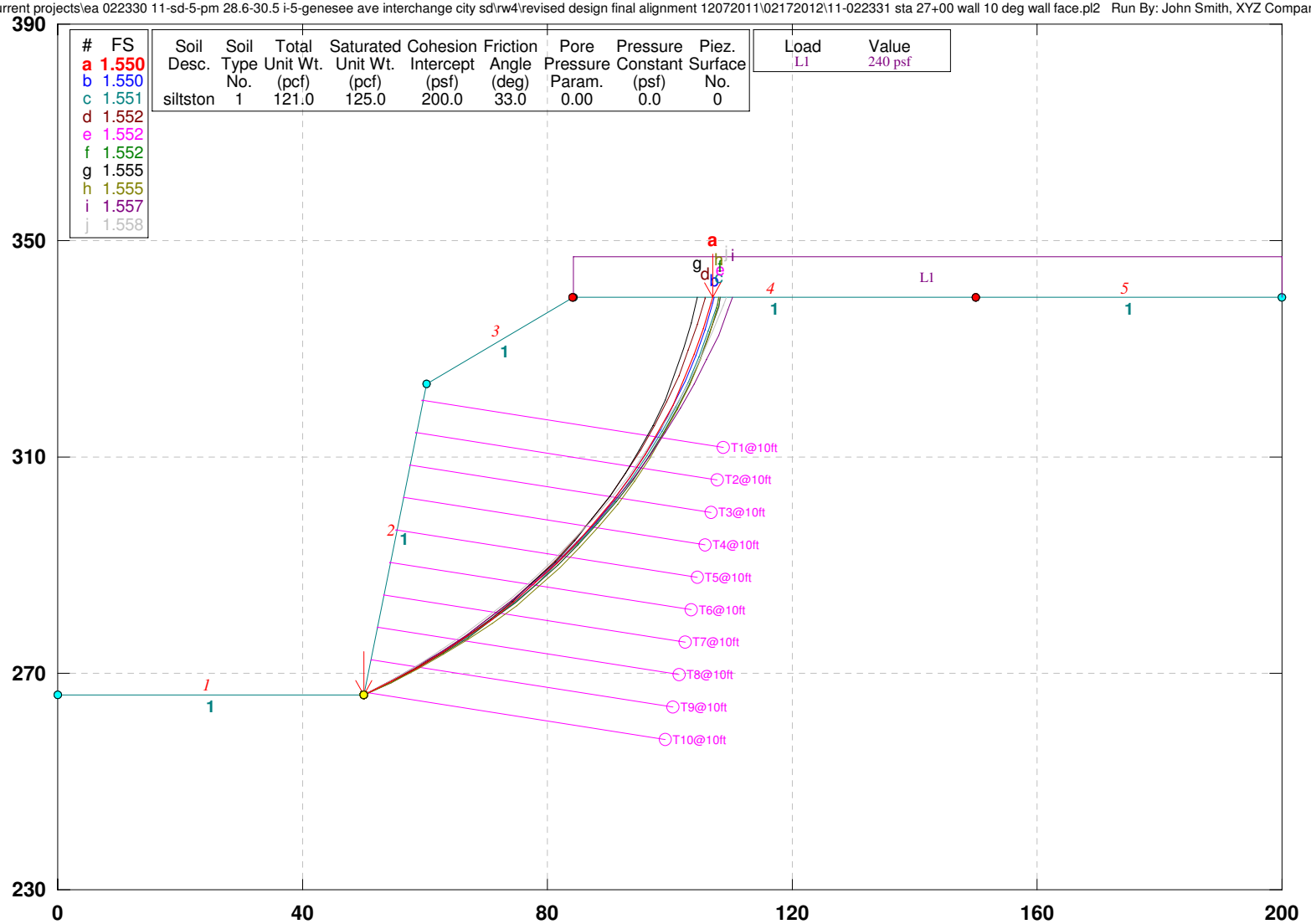


GSTABL7 v.2 FSmin=1.672

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 19+00 27+00 02172012RW4 tieback wall 10 degree batter

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw4\revised design final alignment 12072011\02172012\11-022331 sta 27+00 wall 10 deg wall face.pl2 Run By: John Smith, XYZ Company 2/28/2012

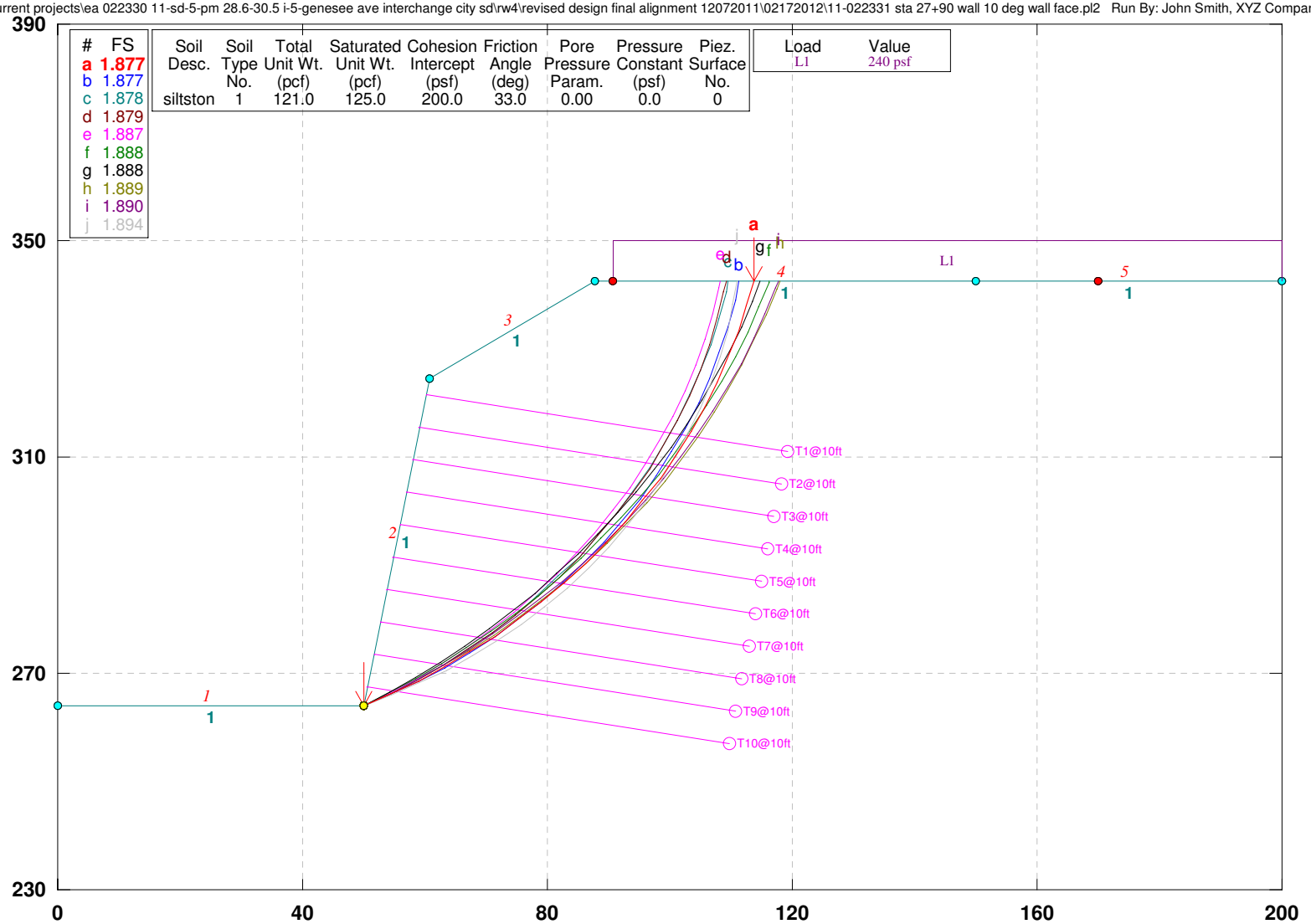


GSTABL7 v.2 FSmin=1.550

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 19+90,27+90 02172012RW4 tieback wall 10 degree batter

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw4\revised design final alignment 12072011\02172012\11-022331 sta 27+90 wall 10 deg wall face.pl2 Run By: John Smith, XYZ Company 2/28/2012

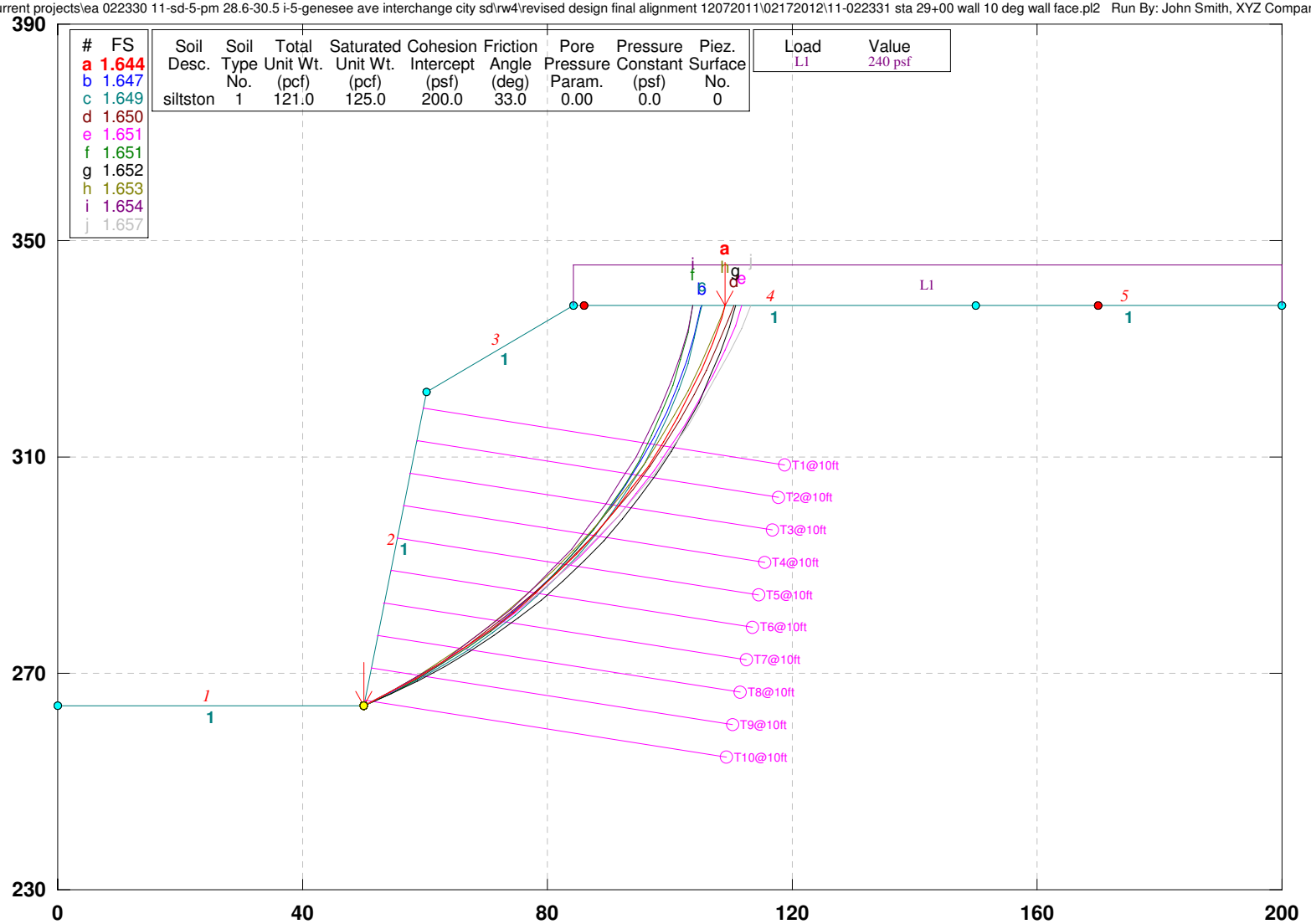


GSTABL7 v.2 FSmin=1.877

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 21+00,29+00 02172012RW4 tieback wall 10 degree batter

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw4\revised design final alignment 12072011\02172012\11-022331 sta 29+00 wall 10 deg wall face.pl2 Run By: John Smith, XYZ Company 2/28/2012



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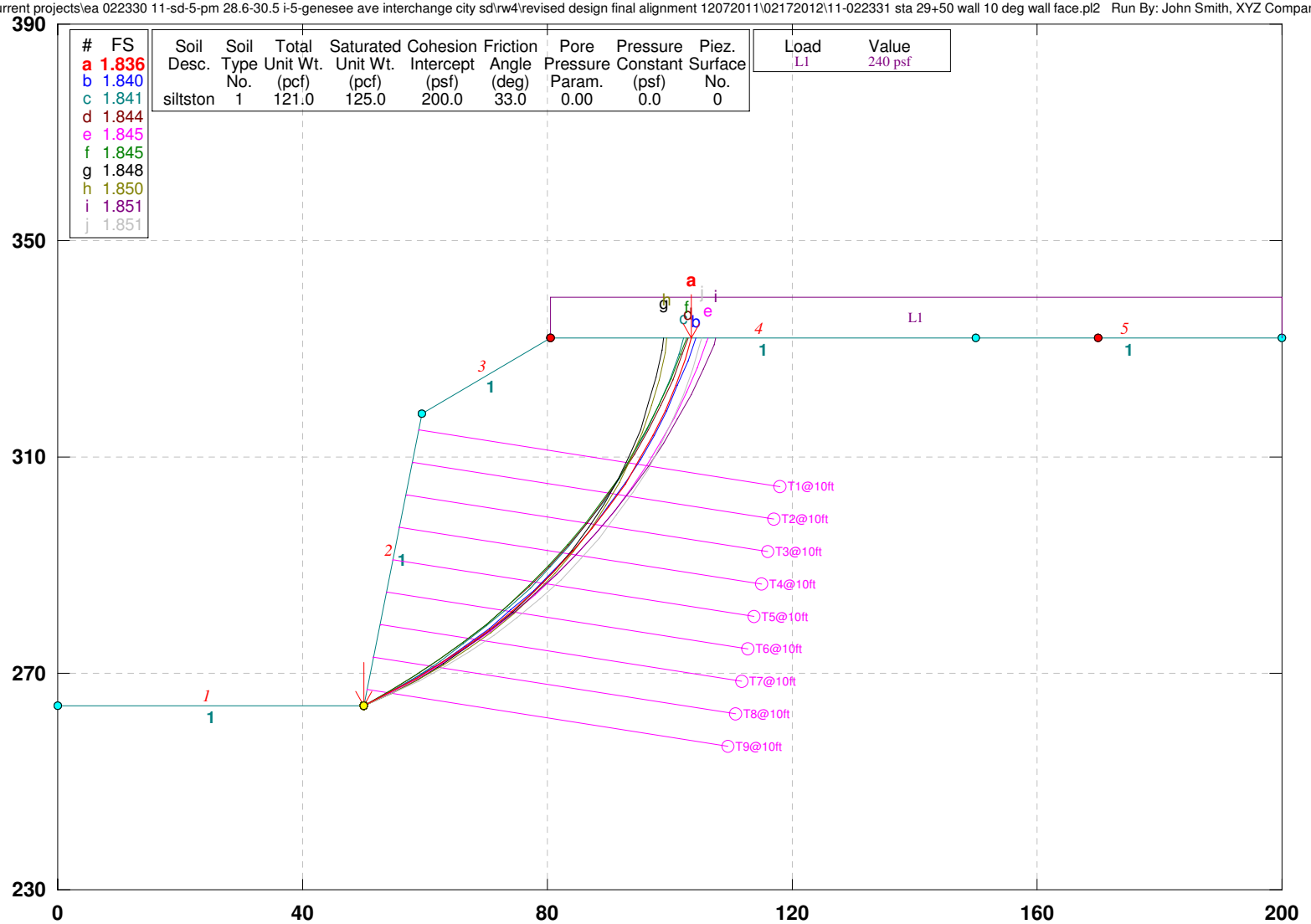

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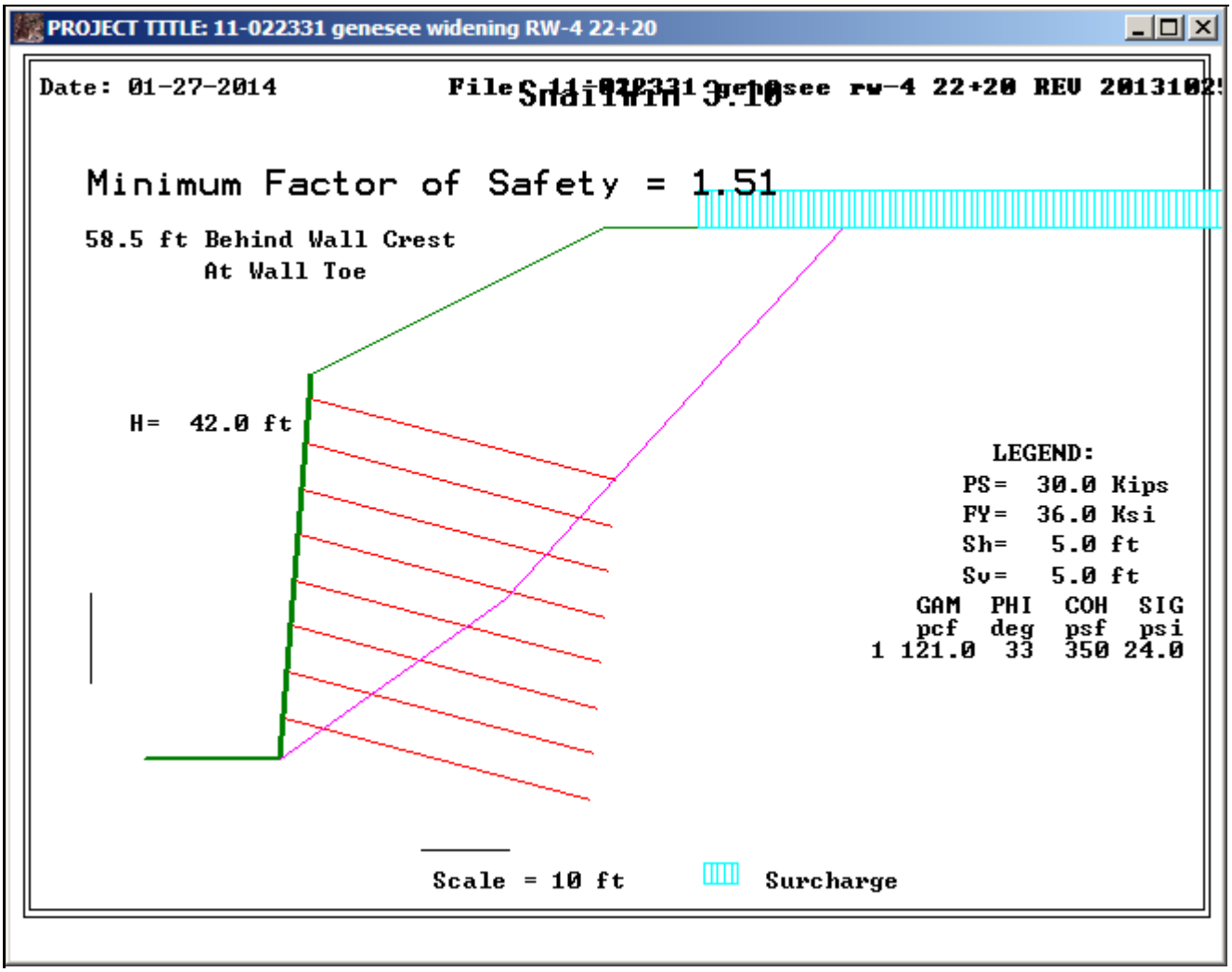
GSTABL7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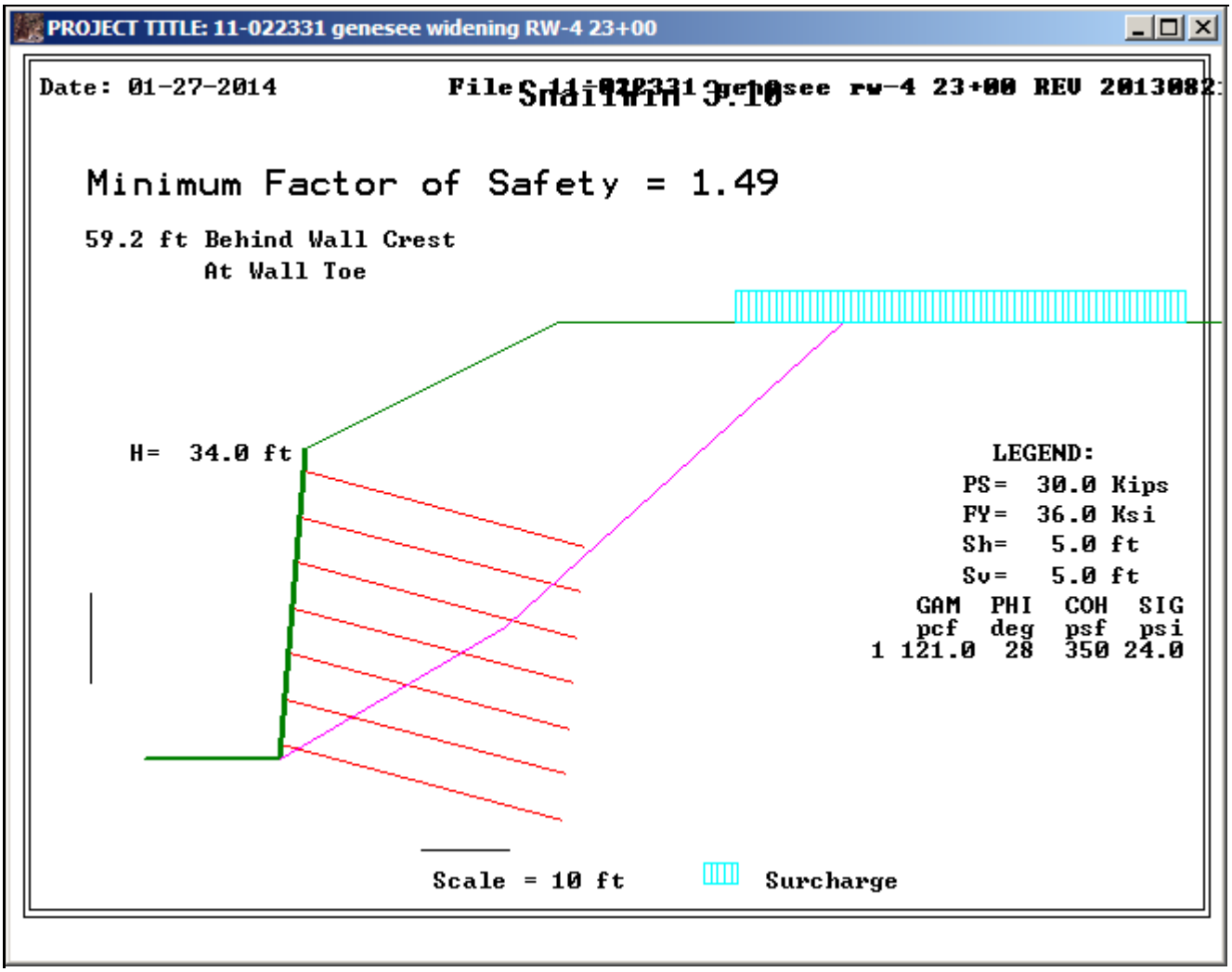
Date: 01-27-2014
File: 11-022331 genesee rw-4 22+20 REV 20131025
Slide Win 5.10
Minimum Factor of Safety = 1.51
58.5 ft Behind Wall Crest
At Wall Toe
H= 42.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 5.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 121.0 33 350 24.0
Scale = 10 ft
Surcharge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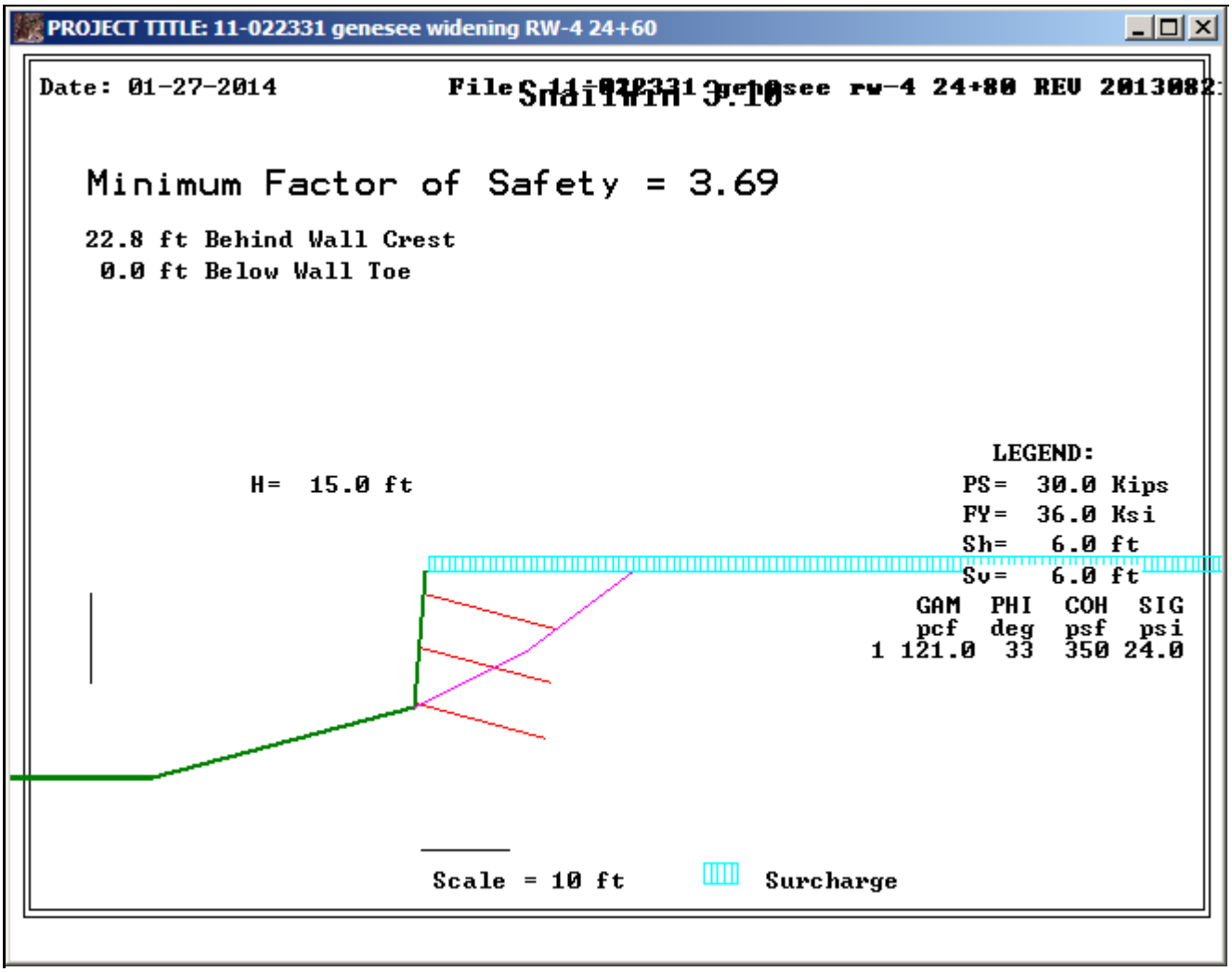
Date: 01-27-2014
Minimum Factor of Safety = 1.49
59.2 ft Behind Wall Crest
At Wall Toe
H= 34.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 5.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 121.0 28 350 24.0
Scale = 10 ft
Surcharge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Date: 01-27-2014
Minimum Factor of Safety = 3.69
22.8 ft Behind Wall Crest
0.0 ft Below Wall Toe
H= 15.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 121.0 33 350 24.0
Scale = 10 ft
Surcharge

APPENDIX V

PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stokoski
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-8

11-SD-5 /PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

March 08, 2012

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California | Business, Transportation and Housing Agency

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 08, 2012

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-8

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the I-5/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR documents existing foundation conditions and provides specific seismic and foundation recommendations for Retaining Wall-8 (RW-8). The report defines the geotechnical conditions as evaluated from field investigation data and used in the development of the geotechnical design. This report provides recommendations and specifications for project design and construction.

No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

Mike Fordham P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

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CARBON COPY (CC) LIST

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District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
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1.0 SCOPE OF WORK

This Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for Retaining Wall-8 (RW-8), to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project, in the City of San Diego, San Diego County, California, hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and to provide recommendations relevant to the design and construction of RW-8. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein.

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, engineering analyses, and retaining wall design. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all stations are referenced to the SD-5 Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Foundation Report Preparation for Retaining Walls, July 2010.* No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The proposed I-5/Genesee Avenue Improvement Project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the I-5/Genesee Avenue Improvement Project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. Therefore, this FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The I-5/Genesee Avenue Improvement Project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-8 is necessary to accommodate the I-5/Genesee Avenue Improvement Project and the associated features. RW-8 will accommodate the freeway widening and realignment of the onramp in the northeast quadrant of the project.

Figure 1 depicts the approximate location and alignment of RW-8. Figure 2 is the layout sheet provided by Caltrans District 11 Design and utilized in the preparation of this FR. Figure 3 is the profile sheet provided by Caltrans District 11 Design and utilized in the preparation of this FR. A cross section at 1598+46 perpendicular to the wall alignment is shown in Figure 4. This cross section represents the most severe case of wall and slope geometry.

RW-8 is proposed to be a soil nail wall. Refer to Section 10.0 for the discussion of wall type selection.

RW-8 will be located on a hillside cut between stations 1595+65 and Station 1600+11. The retaining wall will be approximately four hundred and ninety-feet (489ft) in length with a maximum height of approximately thirty nine-feet (39ft) near the wall center. The wall height will taper to under five-feet (5.0ft) at both ends.

3.0 AS-BUILT FOUNDATION DATA

RW-8 will be located approximately three hundred-feet (300ft) to the north of Genesee Avenue on a fault block that is down-dropped relative to the block beneath the overcrossing. The relatively position of horizontal sedimentary strata should therefore be anticipated to occur at different elevations between the overcrossing and the site of RW-8. The LOTB for the Genesee Avenue OC are included in Appendix I.

A low rise office building occupied by Science Applications International Corporation (SAIC) is located on the graded mesa above the proposed location of RW-8. Foundation data for structures located outside Caltrans right-of-way and in the proximity of RW-8 were provided by SAIC and are included in the Appendix I.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted in June 2011. Two (2) borings were developed for RW-8. The naming convention used for the boring records includes the boring method, the two digit year, and the approximate centerline station of the metric preliminary exploration plan, followed by the notation R or L indicating the boring was to the right or left of the 11-SD-5 line station. For example, boring R-11-48980R is a rotary boring conducted in 2011 that was developed to the right of approximate metric station 489+80 along the 11-SD-5 line. For consistency of the boring record Metric stationing was utilized because the earlier subsurface investigation was performed utilizing the Metric plans prior to Caltrans transition back to U.S. Customary Units. The approximate locations of the borings are depicted in Figure 2. Boring records for R-11-48980R and R-11-49040R are included in Appendix II. LOTB are in the process of being prepared and will be submitted separately from this report. The metric plans referenced for the development of the boring records are not included in this report.

Cut slopes currently exist along the proposed retaining wall alignment. These slopes reveal relatively recent exposures of geologic strata. To augment the data developed by exploratory borings, slope logs were also developed as part of the field investigation program. The slope logs were developed by scraping, pot holing, or hand augering along lines running perpendicular to the proposed retaining wall alignment and down the cut slope faces. The naming convention used for the slope logs is comparable to the naming convention used for the exploratory borings. The data gathered are presented in records similar to those prepared for exploratory borings. The slope log records are presented in Appendix II.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to delineate the soil conditions anticipated to impact the design and construction of RW-8.

The request for the survey of the I-5/Genesee Avenue Interchange Improvement Project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

One (1) bulk soil sample was collected to test the corrosivity of the soil in the project site along the retaining wall alignment. Figure 2 depicts the approximate location of the sample collected.

The naming convention used for the bulk laboratory sample collected was comparable to the metric stationing naming convention used for the boring records. The results of the corrosion test(s) are summarized and discussed in Section 8.0.

Laboratory test data for the I-5/Genesee Avenue Interchange Improvement Project are included in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

This section describes the project site geology and subsurface conditions. The project site geology was

interpreted based on previous field investigations, the current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map was acquired from the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975*. The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining wall. Field mapping conducted for this investigation resulted in no modifications to the geology depicted at the proposed retaining wall site. Figure 6 depicts a profile of the geology beneath the existing grade along the alignment of RW-8. Figure 7 depicts the geology of the cross section at station 1598+46.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. RW-8 will be located on the east side of I-5 along the west facing slope of the through cut. The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

The entire length of RW-8 will be located in a cut slope composed of sedimentary formation. The cut slope is mantled by a thin veneer of young soil. The formation beneath is comprised of weakly indurated, interbedded sandstone and siltstone with sporadic concretions. The concretions are well cemented nodules and lenses ranging from a few inches to a several feet in dimension. Concretions were encountered in the exploratory borings drilled at the wall site. The boring records provide an indication of the size, frequency, and distribution of concretions.

The geologic units in the project area as depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fill in the project area appear to be derived from material excavated from nearby cuts in the sandstone and siltstone. Artificial fill encountered during the field investigation were determined to be engineered fill that conforms to Caltrans standards.
- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.

- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and the Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voight Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the I-5/Genesee Avenue Improvement Project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego. However, the alignment of RW-8 is underlain by competent sandstone and siltstone that is not laterally truncated by faults or compromised by unfavorable or adverse structure.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the *City of San Diego, Seismic Safety Study Geologic Hazards and Faults* for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand-years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC through the UCSD campus and into Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault system running on a north-northwest trend and located offshore approximately two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

The project site is underlain by competent sandstone and siltstone with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible, or expansive soils have not been observed along the proposed alignment of RW-8.

Landslides are commonly associated with the Ardath Shale where expansive claystone locally comprises as much as twenty-five-percent (25%) of the geologic unit. Expansive claystone was not observed along the alignment of RW-8. Landslides are not anticipated to be a geologic hazard at the location.

Depth to Bedrock

Sedimentary formation is located at the ground surface along the entire alignment of RW-8.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-8 is not located along a stream course. A scour evaluation for the retaining wall is not applicable to this project.

8.0 CORROSION EVALUATION

One (1) bulk soil sample was collected to test the corrosivity of the soil in the project site along the retaining wall alignment. Figure 2 depicts the approximate sample location. Corrosion results for RW-8 are included in Table 2. Corrosion data provided by the laboratory are presented in Appendix III. The naming convention used for the bulk laboratory sample collected was comparable to the metric stationing naming convention used for the boring records.

Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

None of the conditions considered to make the site soils corrosive were present in the sample collected and analyzed along the RW-8 alignment. Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section includes the seismic study and addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set for in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B*.

According to the *Seismic Design Criteria (SDC) Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50). The two (2) borings developed along the alignment of the RW-8

had SPT results that were generally greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in Appendix B of the SDC, the Soil Profile Type is "C" for sedimentary formation.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the ARS online tool was five hundred and sixty-meters per second (560m/s), which correspond to Soil Profile Type C. The closest regional active fault as indicated by the Caltrans ARS Online tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately fifteen one hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The project site is located within sedimentary formation and well above any groundwater table. There is no potential for liquefaction at the project site.

Since active faults are in the vicinity of the project site, ground motion will be produced by an earthquake. However, since no active faults transect the project site, there is no potential for surface fault rupture at the project site.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

RW-8 will be constructed within dense sedimentary formation. There is no potential for seismically induced settlement.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of RW-8 do not exist at the project site.

Pseudo-static modeling and slope stability analyses were conducted to assure that RW-8 will meet stability requirements in a seismic event. Stability analyses are discussed in Section 10.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

RW-8 will be developed in cut on a sizable slope capped by a low rise office building and surrounding facility. A temporary back cut to facilitate the construction of any cast-in-place retaining wall of the proposed height is not feasible. A self-shoring, top-down stage construction retaining wall system is appropriate for the site constraints, slope geometry, and sedimentary formation that exist at the proposed wall location. A soil nail wall is the most economical of such retaining wall systems. The retaining wall design parameters as provided by the project development team and as determined through the evaluation of site soils are presented in Table 3.

The soil nail wall design and global slope stability analyses for RW-8 were performed using SnailWin 3.10 and STEDWIN with GSTABL7 v2.0. Both internal stability and global stability were evaluated by modeling various wall heights and adjoining slopes. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of external loading such as the weight of buildings, equal to one thousand pounds per square foot (1000psf) and possible transient loads, equal to two hundred forty pounds per square foot (240psf) above the wall was factored into the stability analyses. The criteria found to control the design length of the soil nails was the need to satisfy the global stability. The soil strength design parameters utilized in the analyses are presented in Table 4. The basis for the

selection of the soil strength parameters was archived data, field test results, laboratory test data developed from nearby borings, and engineering experience and judgment. The soil nail design parameters utilized in the analyses are presented in Table 5A and Table 5B. The graphic results of the stability analyses are presented in Appendix IV.

The earth retained by a soil nail wall must move in order to activate resisting forces along the nails. Minor deflection of the wall face and minor deformation of the earth behind the wall face should be anticipated. The wall face deflection and maximum limit of adjacent ground surface deformation may be estimated based on guidelines presented in the *Manual for Design and Construction Monitoring of Soil Nail Walls, Publication No. FHWA-SA-96-069R*. A horizontal and vertical deflection of approximately one-half-inch (0.5in) should be anticipated for the upper wall face. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height. . These estimated wall movements are not expected to impact the integrity of any improvements behind the walls. The SAIC office facility is located outside the zone of potential ground deformation and thus not likely to be impacted.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-8 be designed and constructed as a soil nail retaining wall. The parameters that may be used for the structure design are presented in Table 3 through Table 5B.

The recommended length of soil nails, the design pullout resistance values, and the strength and diameter of the reinforcing bars are provided in Table 5A and Table 5B.

Project site soils are considered non-corrosive. It is not necessary to factor the potential for corrosion into the design of the retaining walls.

12.0 NOTES TO DESIGNER

As currently planned, many soil nails will extend beyond the current freeway right-of-way. The soil nail anchor lengths should be considered when determining the right-of-way requirements.

The designs of RW-8 should incorporate a drainage system behind the wall face such as vertical drainage strips connected to outlet pipes.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining wall should be avoided. Features that promote infiltration could have an adverse impact on the performance of the retaining wall.

A soil nail retaining wall may be constructed with either a sculpted shotcrete or cast-in-place facade. Sculpted shotcrete is typically more economical.

13.0 CONSTRUCTION CONSIDERATIONS

The sedimentary formation found along the alignment of RW-8 may generally be excavated using standard excavation equipment. Nail shafts may generally be drilled with conventional nail drilling equipment.

Rock like material (concretions) exists within the sedimentary formation. Excavation and drilling equipment capable of cutting through sporadic concretions up to a few feet in dimension should be utilized. It should be anticipated that one or more concretions may be encountered during the drilling of each nail shaft.

The occurrence of groundwater is not anticipated to significantly impact retaining wall construction.

The occurrence of caving soils is anticipated to be minimal and is not anticipated to significantly impact retaining wall construction.

A horizontal and vertical deflection of about one-half-inch (0.5in) should be anticipated for the upper wall face at the tallest portion of the retaining wall. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height.

The construction of the soil nail wall is not anticipated to have any adverse effect on existing facilities or utilities. However, a pre-construction survey of the super adjacent office facility should be conducted to document the condition of the facility prior to construction.

Survey monuments should be placed on the ground surface a horizontal distance of thirty-five-feet (35ft) behind the wall face. The position of these monuments should be measured and recorded prior to any wall excavation and periodically throughout the project in order to monitor and document ground deformation behind the retaining wall.

The Contractor may elect to perform excavation stability testing to verify his proposed lift height and duration of exposure. The site exploration discovered no substantially varying zones within the sedimentary formation that will host the wall; therefore, only one stability testing zone is identified. The wall stability testing zone is described in Table 6.

Production nails may be used as proof and test nails. Eight percent (8%) of the total nails installed should be proof tested. The proof tested nails should be distributed throughout the wall face. Two verification test nails must be installed and tested in each wall zone.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2010*. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is somewhat less than prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to abundant geologic exposures available by inspection in the existing cut slope and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and locations that have been provided to OGDS2. If any conceptual changes are made during final project design, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analysis. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

Caltrans, *Corrosion Guidelines*, Version 1.0, September 2003

Caltrans, *District Preliminary Geotechnical Report, I-5 North Coast Corridor Widening Project*, EA 11-235800, October 2005

Caltrans, *Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction*, EA 11-06500, January 2009

Caltrans, *Geotechnical Services Design Manual*, Version 1.0, August 2009

Caltrans, *Memorandum, Geotechnical Recommendation for Concrete Median Barrier, Interstate-5 Post Mile 28.2-29.5*, EA 11-24370K

Caltrans, *Memorandum to Designers 20-10, Surface Fault Rupture Displacement Hazard Investigations*, January 2007

Caltrans, *Seismic Design Criteria, Appendix B*, August 2009

Caltrans, *Soil and Rock Logging, Classification and Presentation Manual*, June 2007 or 2010 or Both

Caltrans, Structure Preliminary *Geotechnical Report, Interstate-5/Genesee Avenue Interchange Improvement Project & Interstate-5 North Coast Corridor Widening Project Retaining Wall-4*, EA 11-022330 & 11-235800, April 2008

FHWA, *Manual for Design and Construction Monitoring of Soil Nail Walls*, Publication No. FHWA-SA-96-069R

Ninyo & Moore, *Preliminary Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-235800), December 2005

Ninyo & Moore, *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-022330), December 2007

PBS&J, *University of California San Diego Long Range Development Plan, Final Environmental Impact Report,* September 2004

Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

FIGURES

Note: Retaining wall alignment and length is approximated.

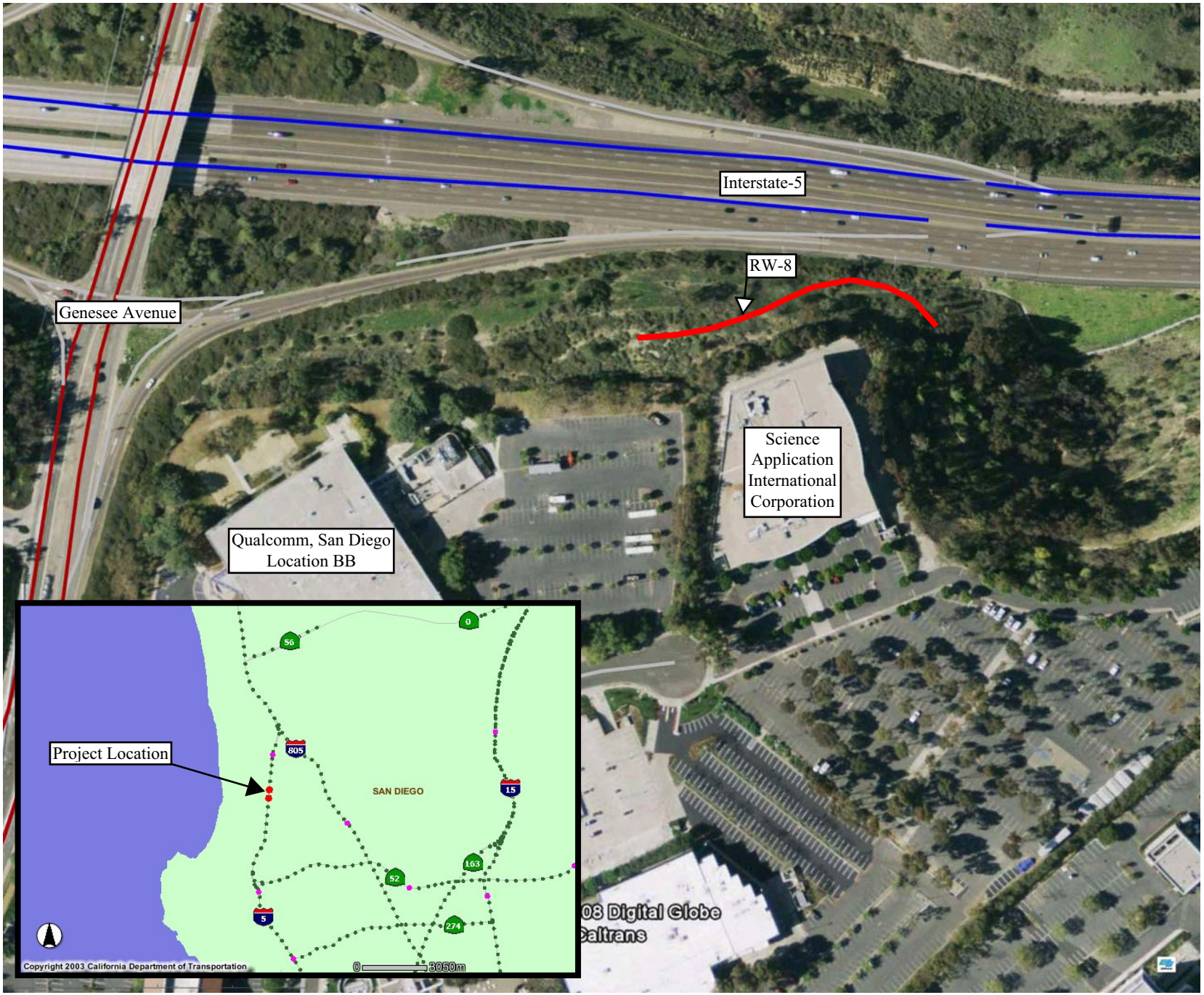

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5		..

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

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CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

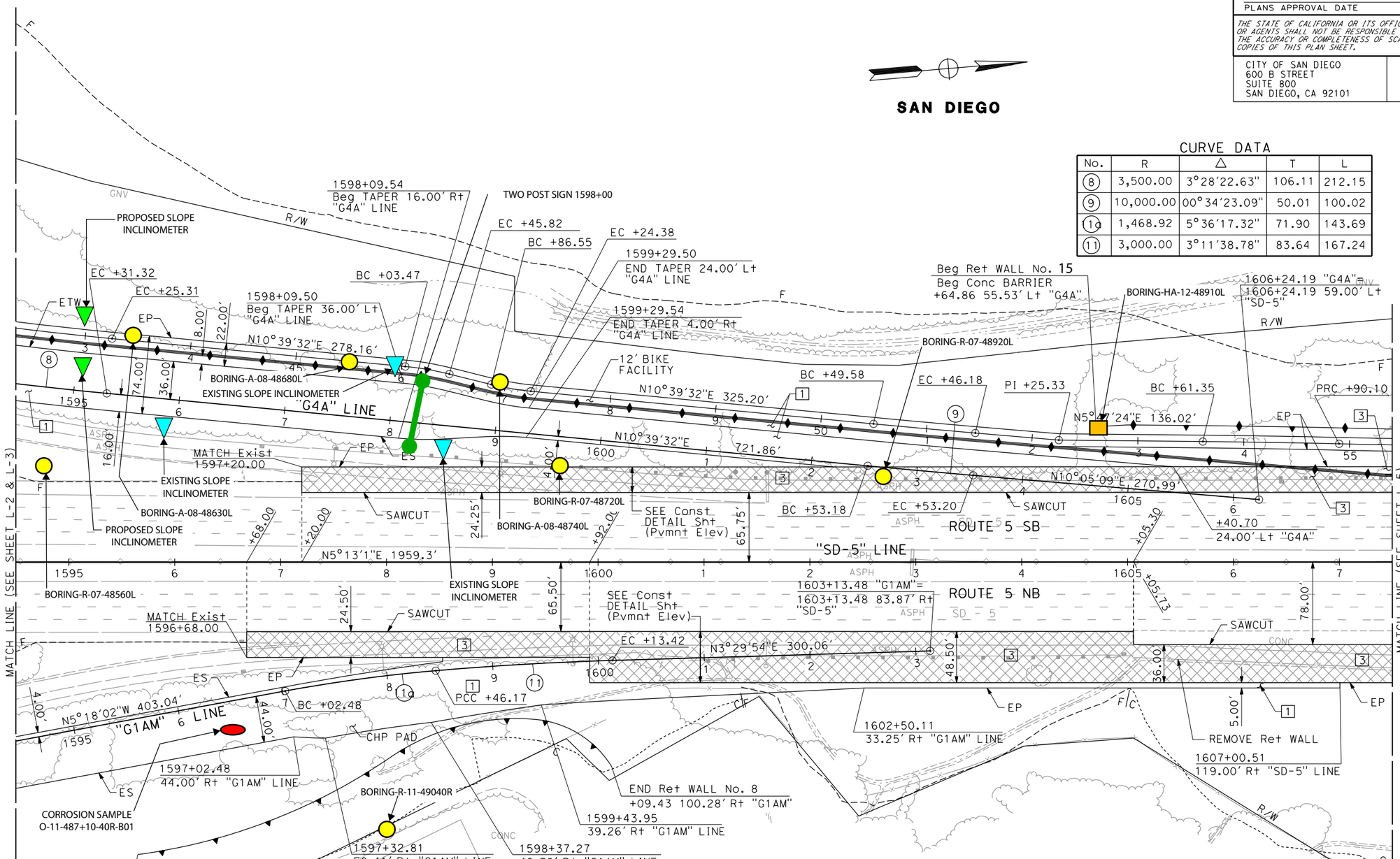
NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

SAN DIEGO

CURVE DATA

No.	R	Δ	T	L
8	3,500.00	3°28′22.63″	106.11	212.15
9	10,000.00	00°34′23.09″	50.01	100.02
10	1,468.92	5°36′17.32″	71.90	143.69
11	3,000.00	3°11′38.78″	83.64	167.24



LAYOUT

SCALE: 1″ = 50′

L-4

FIGURE 2: PROJECT LAYOUT

Foundation Report: Interstate-5/Genesee Avenue Interchange Improvement Project, Retaining Wall-8, EA 11-022331/EFIS 1100000012

REVISED BY | DATE REVISED | CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 12-01-11 | DATE PLOTTED => 1/24/2012 TIME PLOTTED => 12:52:01 PM

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Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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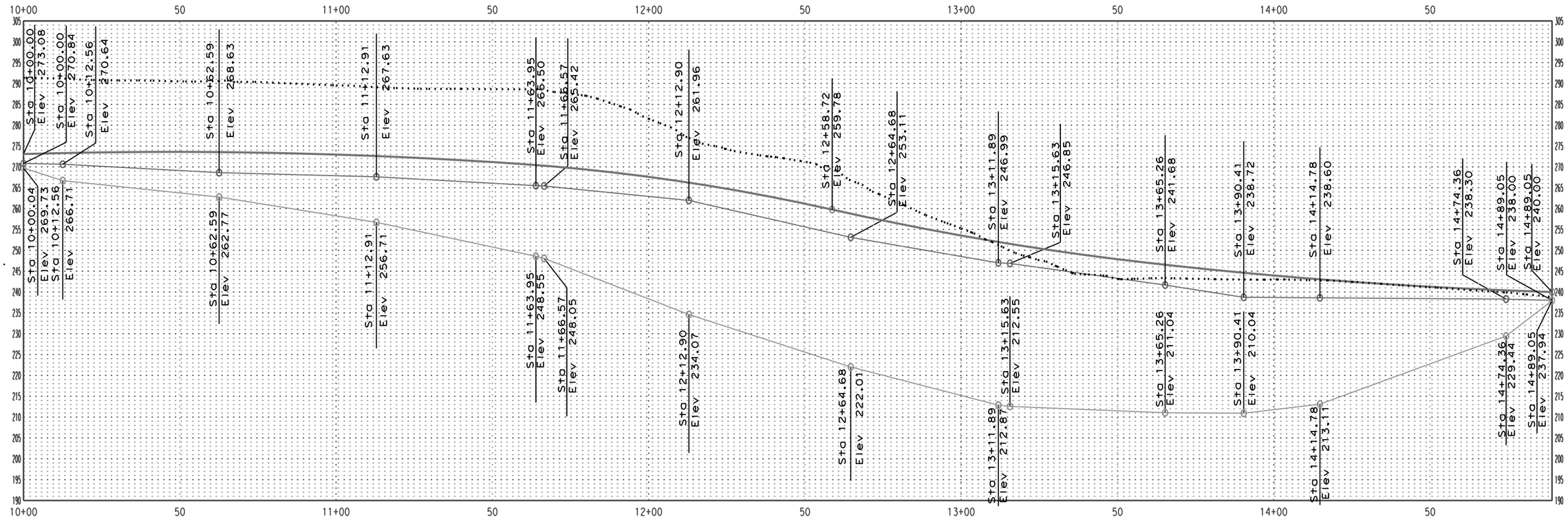

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-8
EA 11-022331/EFIS 1100000012

FIGURE 3: PROJECT PROFILE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 00-00-00 DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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FILE => $REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000

PROJECT NUMBER & PHASE 00000000001

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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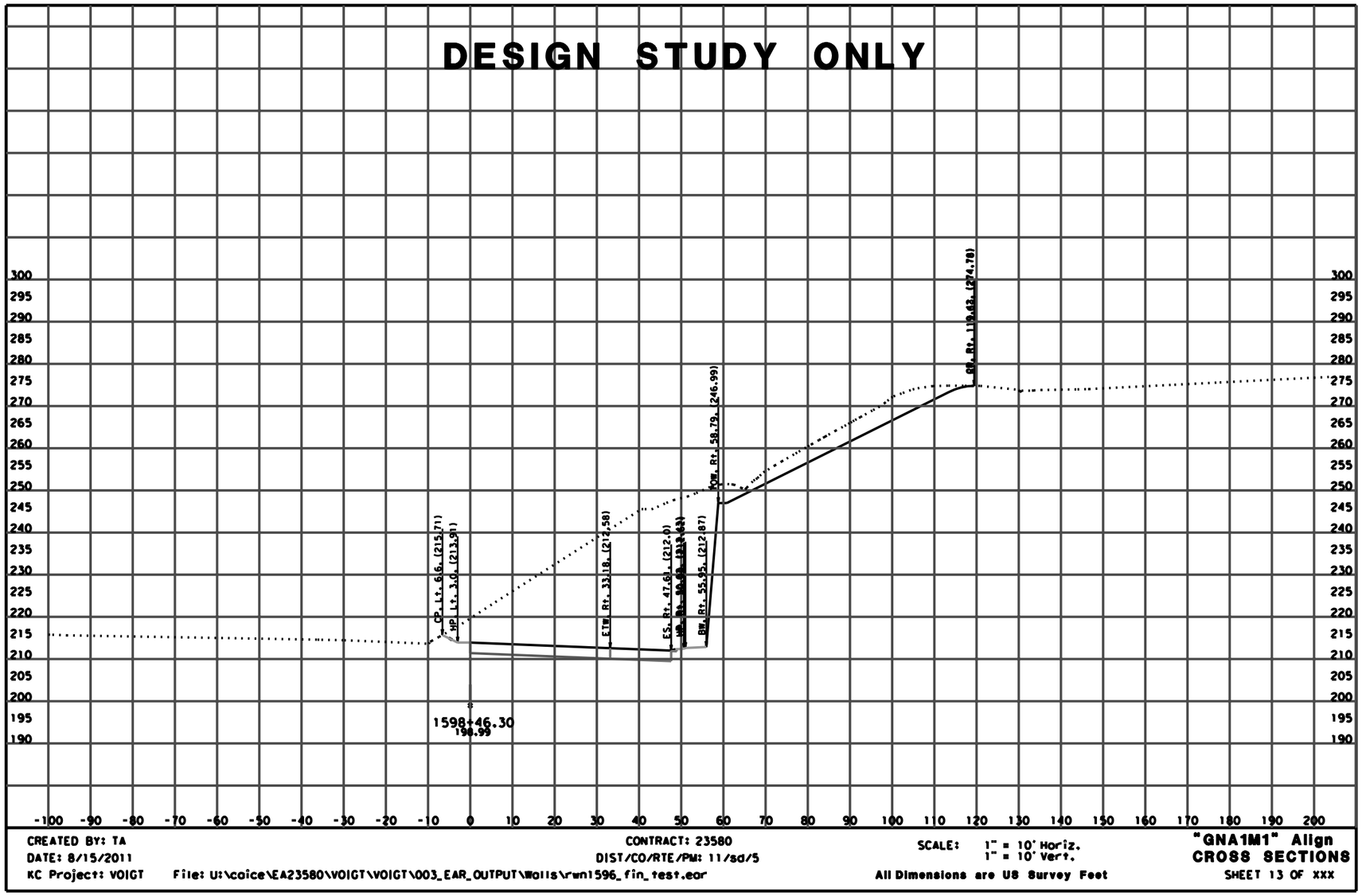

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Retaining Wall-8
EA 11-022331/EFIS 1100000012

FIGURE 4: PROJECT CROSS SECTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY | CHECKED BY

REVISED BY | DATE REVISED

LAST REVISION 00-00-00 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME

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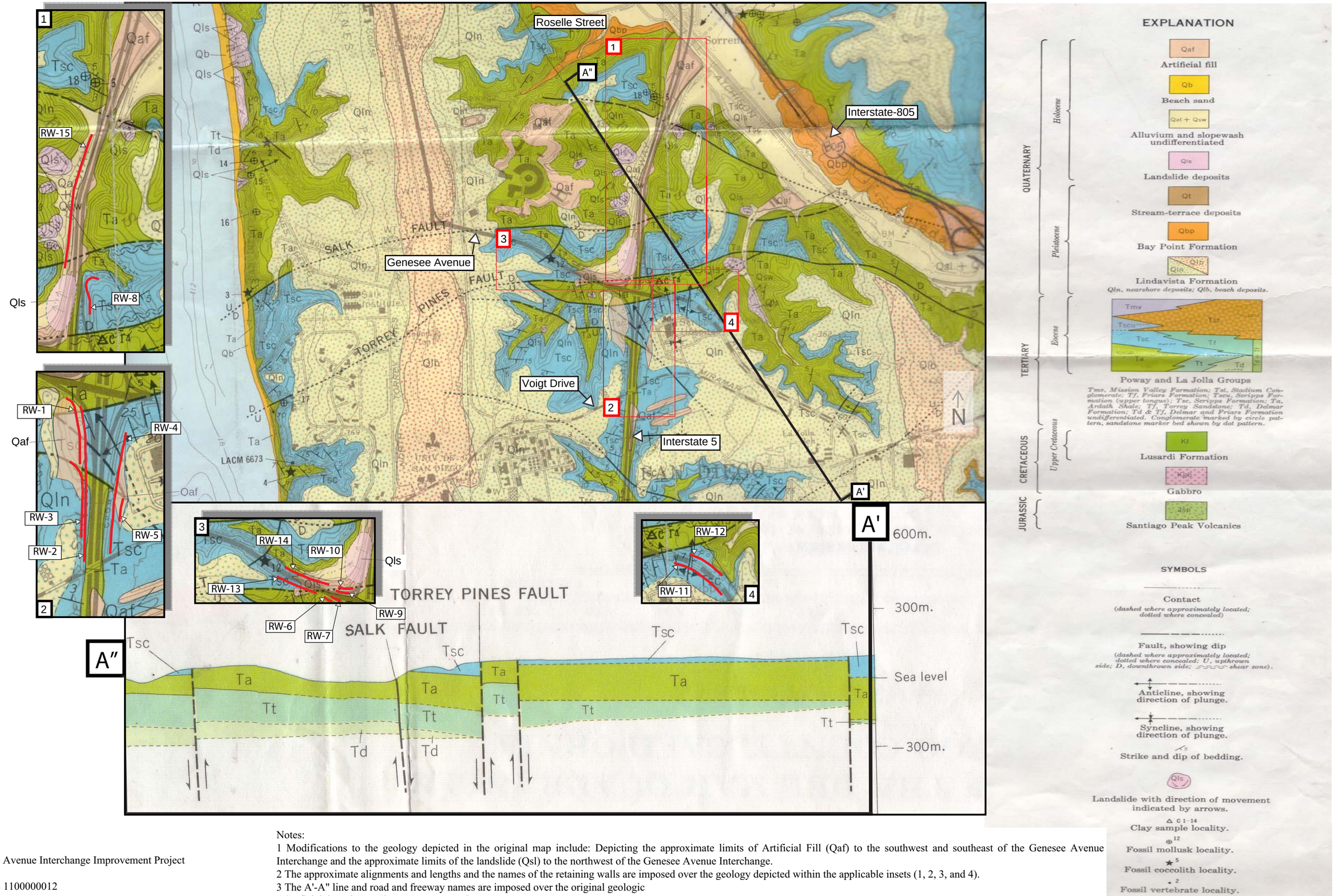
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE 00000000001



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-8
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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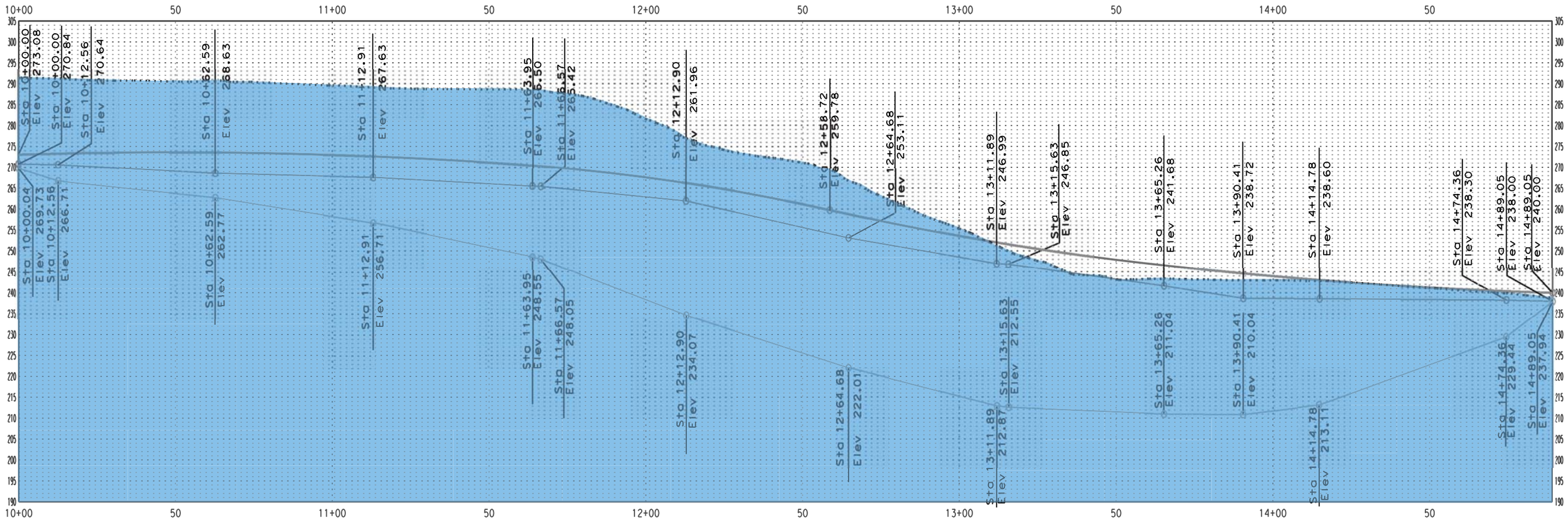

SEDIMENTARY FORMATION

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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-8
EA 11-022331/EFIS 1100000012

FIGURE 6: GEOLOGIC PROFILE

REVISED BY	CALCULATED-DESIGNED BY	FUNCTIONAL SUPERVISOR
DATE REVISED	CHECKED BY	

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 00-00-00 DATE PLOTTED => $DATE TIME PLOTTED => $TIME

USERNAME => $USER
FILE => $REQUEST

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000 | PROJECT NUMBER & PHASE | 00000000001

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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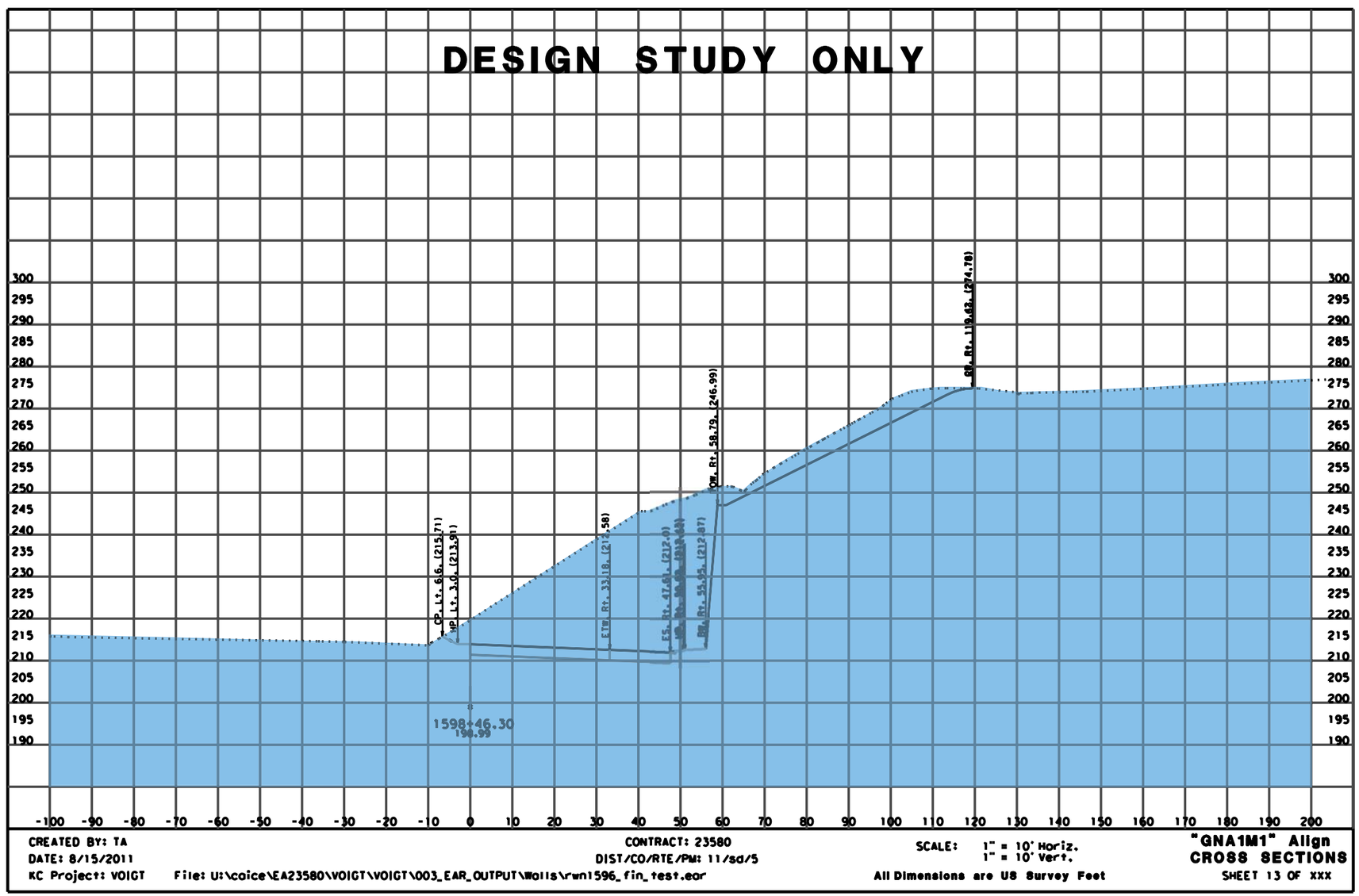

SEDIMENTARY FORMATION

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-8
EA 11-022331/EFIS 1100000012

FIGURE 7: GEOLOGIC CROSS SECTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

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DATE REVISED

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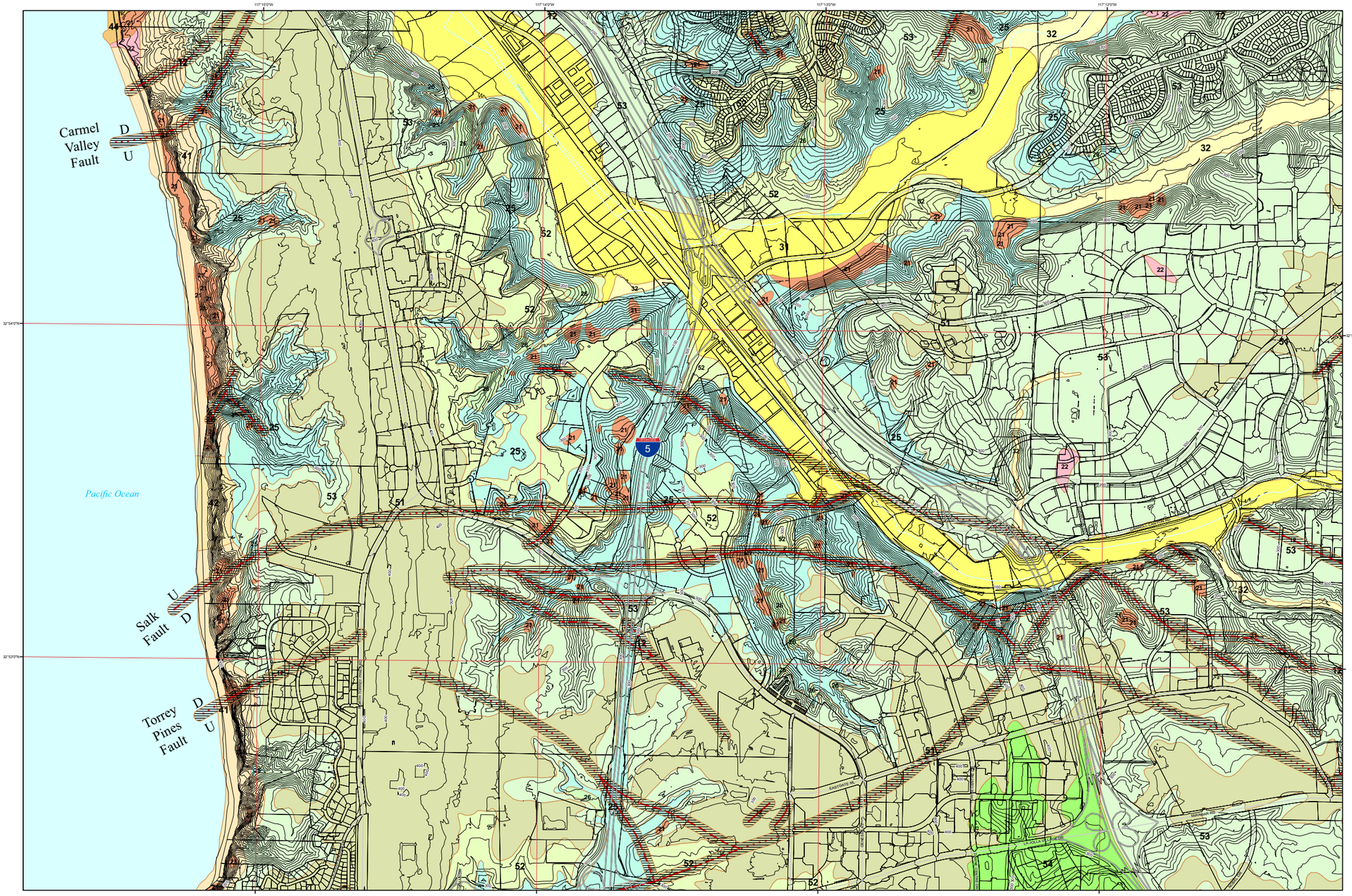


LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

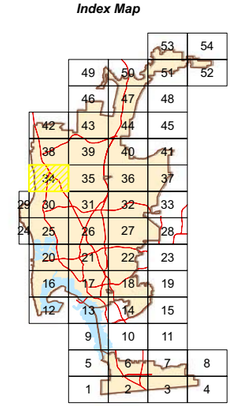
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

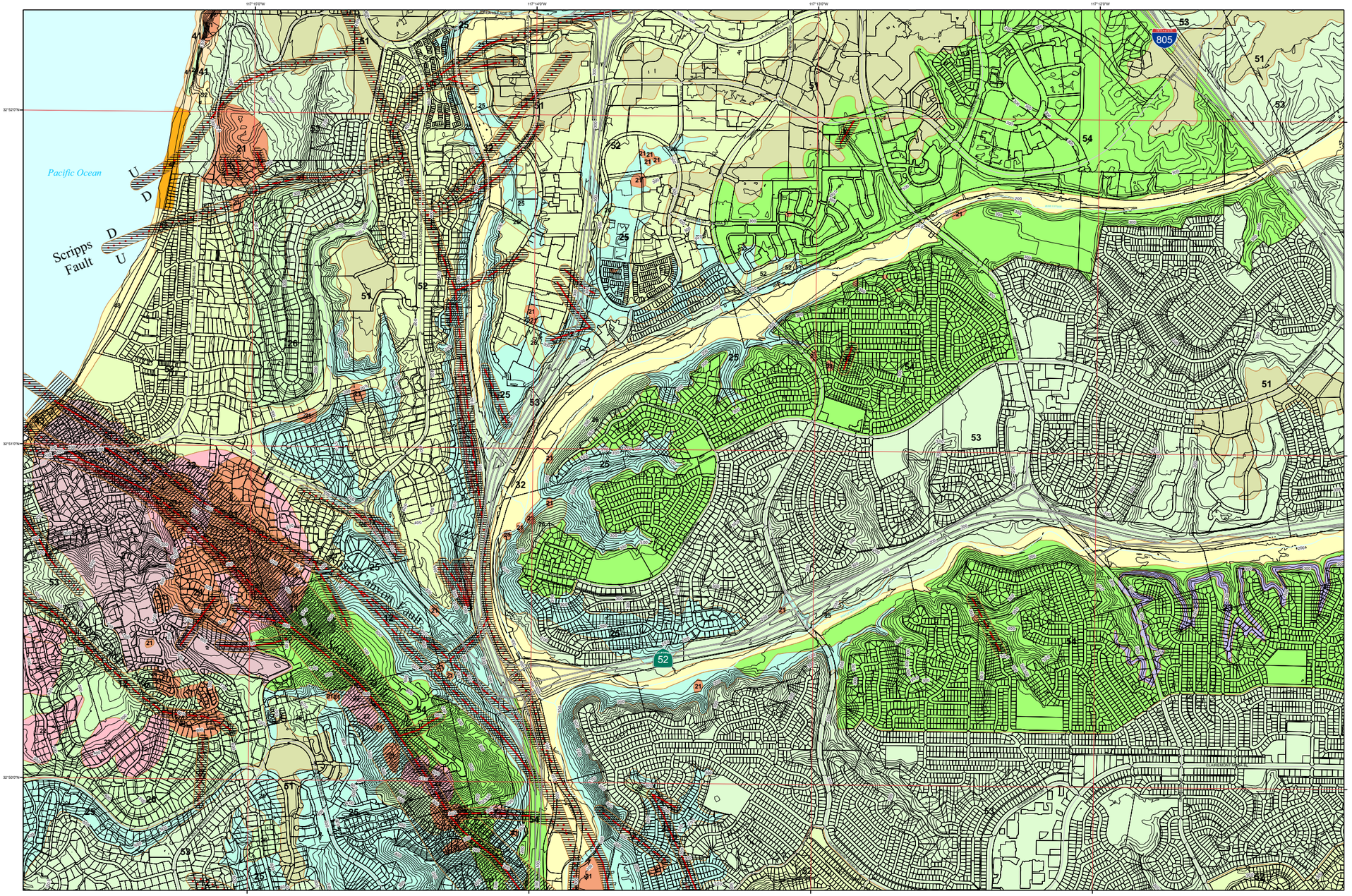
0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 34
GRID SCALE: 800
DATE: 4/3/2008

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-8
EA 11-022331/EFIS 11000000012

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



LEGEND

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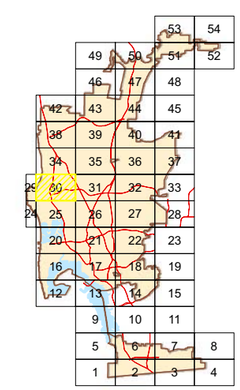
FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

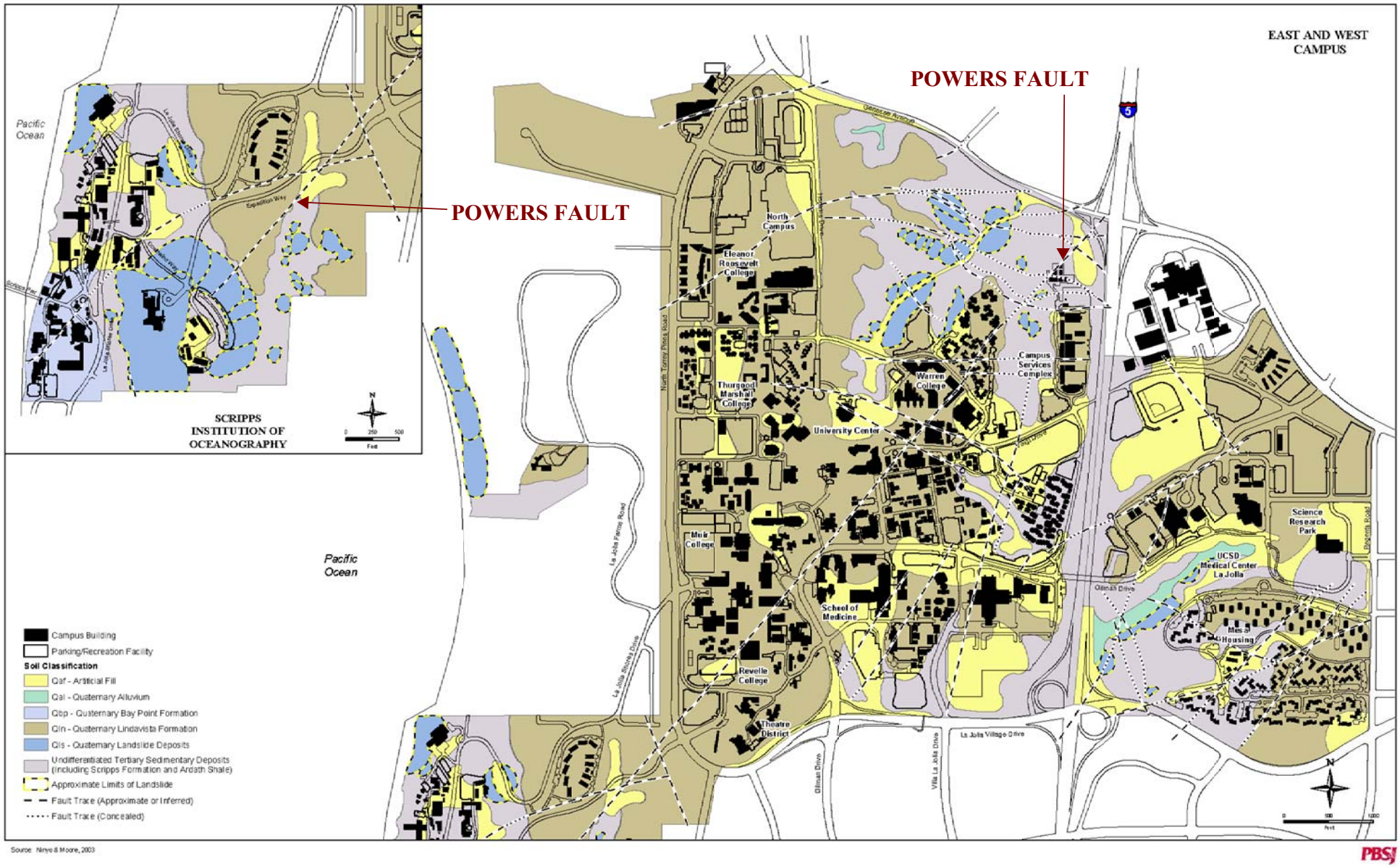
0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-8
EA 11-022331/EFIS 11000000012

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



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Retaining Wall-8
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: RETAINING WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-8	Soil Nail	1595+65 SD-5-Line 10+00 RW-8-Line	1596+65 SD-5-Line 11+00 RW-8-Line	100	14	2:1	2:1	1H:12V	Cut
		1596+65 SD-5-Line 11+00 RW-8-Line	1597+23 SD-5-Line 11+60 RW-8-Line	60	22	2:1	2:1	1H:12V	Cut
		1597+23 SD-5-Line 11+60 RW-8-Line	1598+18 SD-5-Line 12+75 RW-8-Line	115	37	Varies	2:1	1H:12V	Cut
		1598+18 SD-5-Line 12+75 RW-8-Line	1599+15 SD-5-Line 13+75 RW-8-Line	100	39	Flat	2:1	1H:12V	Cut
		1599+15 SD-5-Line 13+75 RW-8-Line	1600+11 SD-5-Line 14+89 RW-8-Line	114	39	Varies	2:1	1H:12V	Cut

Notes: L = Wall Length
H_{MAX} =Approximate Maximum Wall Height
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-8	Soil Nail	1594+65 SD-5-Line 10+00 RW-8-Line	1600+11 SD-5-Line 14+89 RW-8-Line	Sedimentary Formation	33	350	121

Notes:

Global slope stability calculations were performed using a Coh of 200 psf.
φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 5A: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	NS (psi)	AHS (psi)	NHS_{MAX} (ft)	NVS_{MAX} (ft)	NIA (degrees)	$DTOP_{MAX}$ (ft)	$DBOT_{MAX}$ (ft)
RW-8	Soil Nail	1594+65 SD-5-Line 10+00 RW-8-Line	1600+11 SD-5-Line 14+89 RW-8-Line	3,6000	30,000	6	6	15	2.5	3

Notes: NS = Nail Strength
AHS = Assumed Head Strength
NHS_{MAX} = Maximum Nail Horizontal Spacing
NVS_{MAX} = Maximum Nail Vertical Spacing
NIA = Nail Inclination Angle from the Horizontal
$DTOP_{MAX}$ = Maximum distance from the top of the wall to the top row of nails.
$DBOT_{MAX}$ = Maximum distance from the bottom of the wall to the bottom row of nails.

TABLE 5B: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	DPR (pcf)	RBD (in)	MNL (ft)	MNR
RW-8	Soil Nail	1595+65 SD-5-Line 10+00 RW-8-Line	1596+65 SD-5-Line 11+00 RW-8-Line	3,456	1.128	25	3
		1596+65 SD-5-Line 11+00 RW-8-Line	1597+23 SD-5-Line 11+60 RW-8-Line	3,456	1.25	45	4
		1597+23 SD-5-Line 11+60 RW-8-Line	1598+18 SD-5-Line 12+75 RW-8-Line	3,456	1.50	60	7
		1598+18 SD-5-Line 12+75 RW-8-Line	1599+15 SD-5-Line 13+75 RW-8-Line	3,456	1.25	50	7
		1599+15 SD-5-Line 13+75 RW-8-Line	1600+11 SD-5-Line 14+89 RW-8-Line	3,456	1.128	45	6

Notes: DPR = Design Pullout Resistance
RBD = Reinforcing Bar Diameter
MNL = Minimum Nail Length
MNR = Maximum Number of Rows at Hmax

TABLE 6: WALL STABILITY TESTING ZONE(S)

Wall Zone	Beginning Station	Ending Station	Upper Elevation (ft)	Lower Elevation (ft)
1	1594+65 SD-5-Line 10+00 RW-8-Line	1600+11 SD-5-Line 14+89 RW-8-Line	268.63	212.87

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA

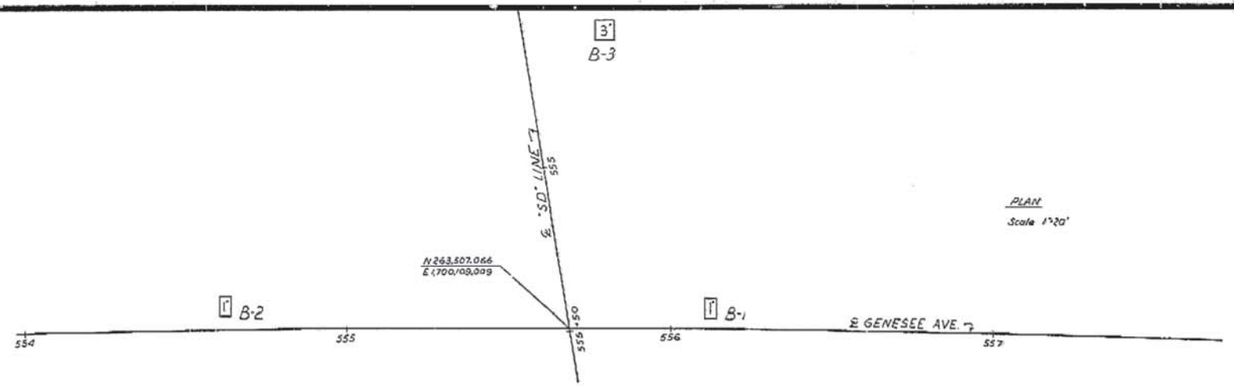
Prefix	County	Route	Post Mile	Sheet No.	Total Sheets
XI	SD	5	12.4/13.9	118	197

July 20, 1964

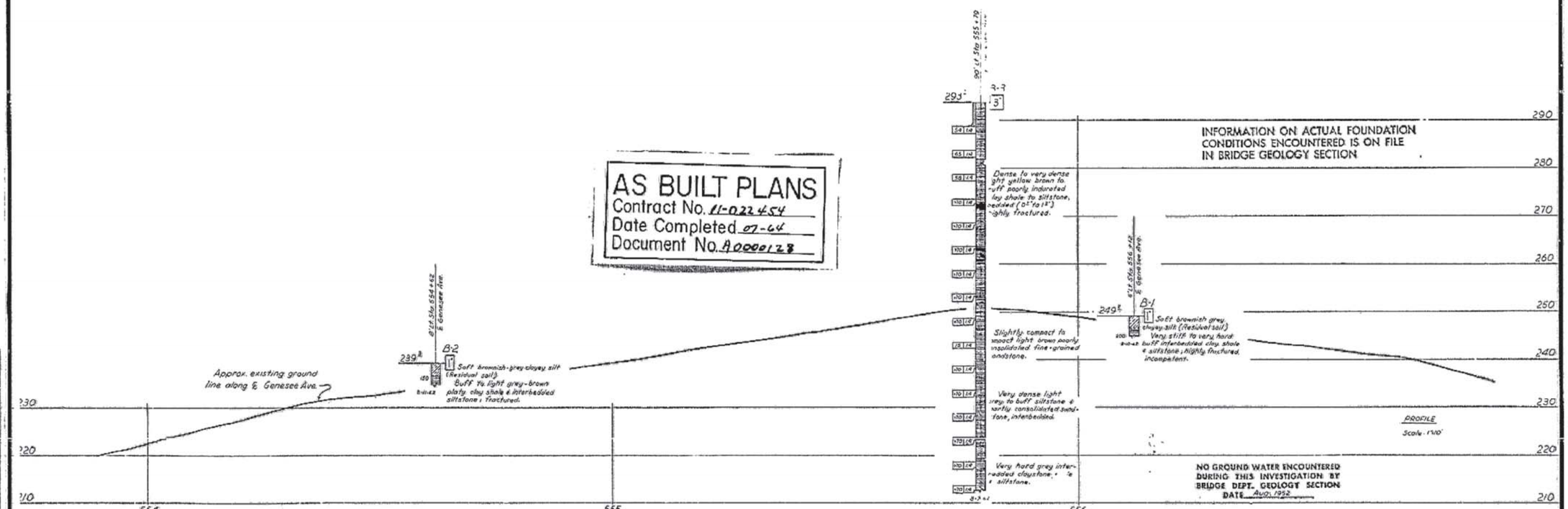
BENCH MARK

TBM #1 - ℄ Stake, sta. 554+86 "SD" Top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV. 278.66



PLAN
Scale 1"=20'



AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128

BRIDGE DEPARTMENT

Approved Recommended By: J. L. Wood, Bridge Geologist

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

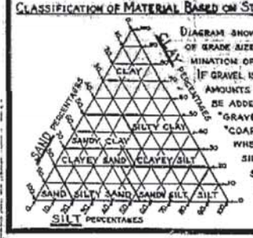


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

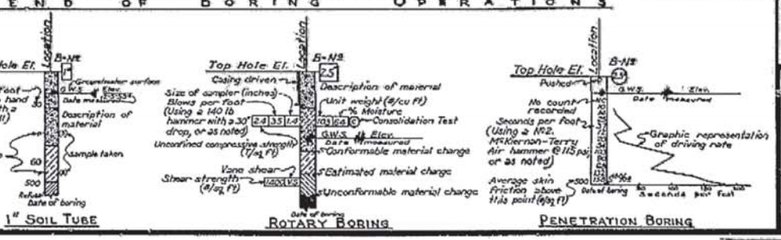
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2 1/4" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

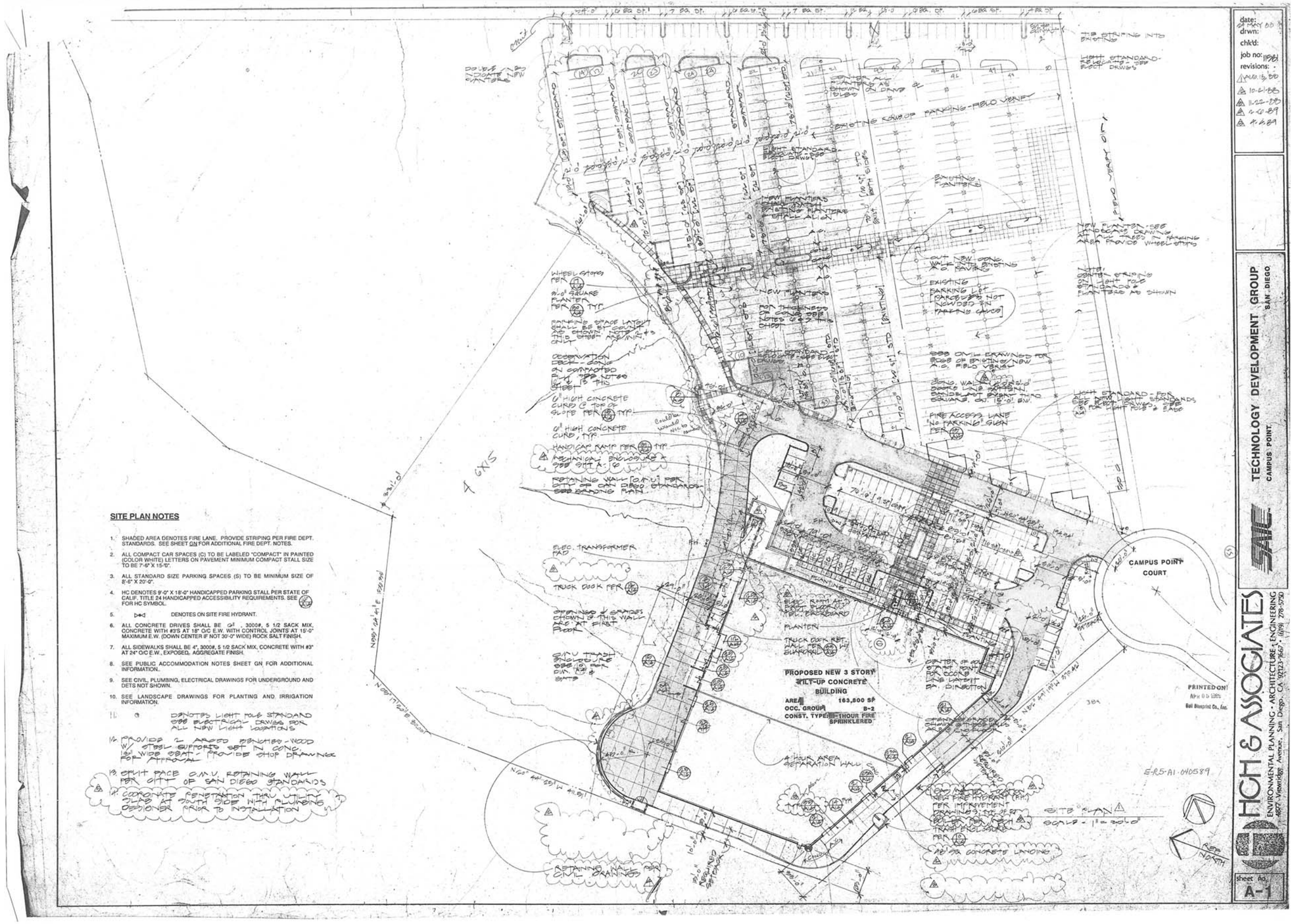
GENESEE AVENUE OVERCROSSING

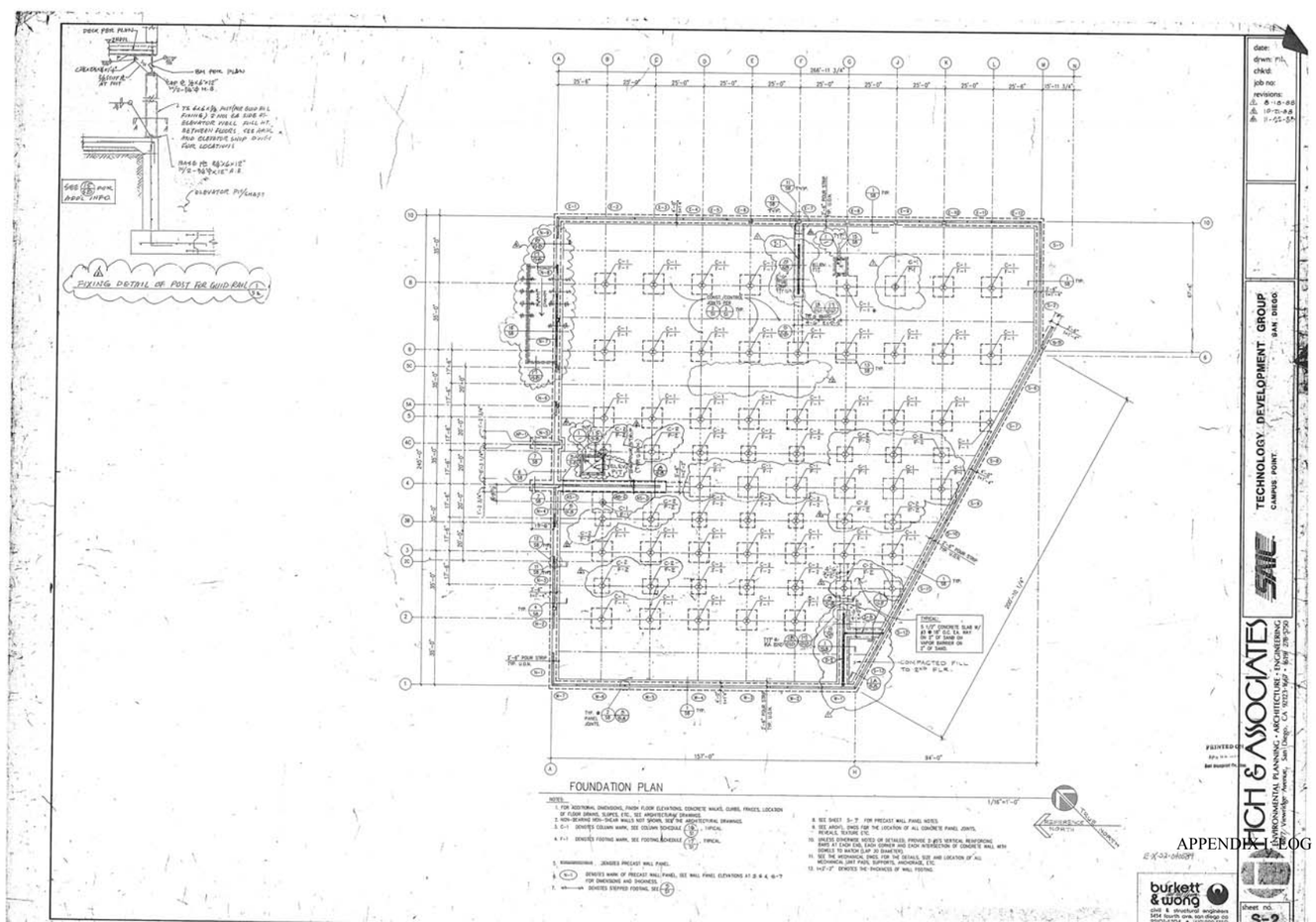
LOG OF TEST BORINGS

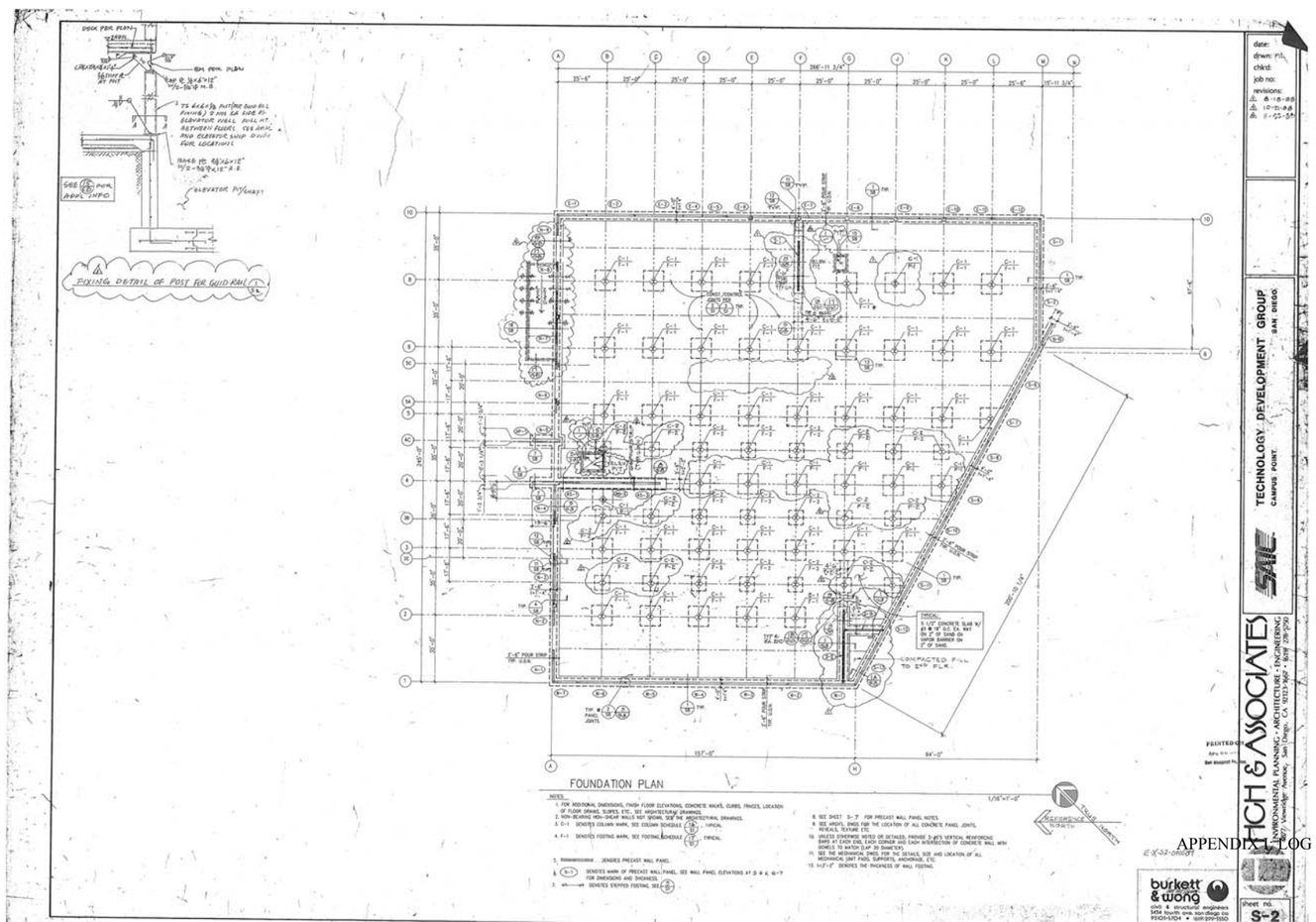
Scale	Bridge	File	Drawing
As Noted	57-527		57527-9

PREL. DRAWING NO. P-

5-4


SITE PLAN NOTES
1. SHADED AREA DENOTES FIRE LANE. PROVIDE STRIPING PER FIRE DEPT. STANDARDS. SEE SHEET G1 FOR ADDITIONAL FIRE DEPT. NOTES.
2. ALL COMPACT CAR SPACES (C) TO BE LABELED "COMPACT" IN PAINTED (COLOR WHITE) LETTERS ON PAVEMENT MINIMUM COMPACT STALL SIZE TO BE 7'-6" X 15'-0".
3. ALL STANDARD SIZE PARKING SPACES (S) TO BE MINIMUM SIZE OF 8'-6" X 20'-0".
4. HC DENOTES 9'-0" X 18'-0" HANDICAPPED PARKING STALL PER STATE OF CALIF. TITLE 24 HANDICAPPED ACCESSIBILITY REQUIREMENTS. SEE FOR HC SYMBOL.
5. DENOTES ON SITE FIRE HYDRANT.
6. ALL CONCRETE DRIVES SHALL BE 6", 3000#, 5 1/2 SACK MIX, CONCRETE WITH #3'S AT 18" O/C E.W. WITH CONTROL JOINTS AT 15'-0" MAXIMUM E.W. (DOWN CENTER IF NOT 30'-0" WIDE) ROCK SALT FINISH.
7. ALL SIDEWALKS SHALL BE 4", 3000#, 5 1/2 SACK MIX, CONCRETE WITH #3" AT 24" O/C E.W., EXPOSED, AGGREGATE FINISH.
8. SEE PUBLIC ACCOMMODATION NOTES SHEET GN FOR ADDITIONAL INFORMATION.
9. SEE CIVIL, PLUMBING, ELECTRICAL DRAWINGS FOR UNDERGROUND AND DETS NOT SHOWN.
10. SEE LANDSCAPE DRAWINGS FOR PLANTING AND IRRIGATION INFORMATION.
11. DENOTES LIGHT POLE STANDARD SEE ELECTRICAL DRWGS FOR ALL NEW LIGHT LOCATIONS
12. PROVIDE 2" ARCHED PENTHOUSE - WOOD W/ STEEL SUPPORTS SET IN CONC. 12" WIDE CONT. PROVIDE SHOP DRAWING FOR APPROVAL
13. SPLIT FACE C.M.U. RETAINING WALL PER CITY OF SAN DIEGO STANDARDS
14. CONCRETE PENETRATION THRU UTILITY SLAB AT SOUTH SIDE WITH PLUMBING DESIGNER PRIOR TO INSTALLATION
PROPOSED NEW 3 STORY TILT-UP CONCRETE BUILDING
AREA 163,800 SF
OCC. GROUP B-2
CONST. TYPE III-1HOUR FIRE SPRINKLERED
CAMPUS POINT COURT
SITE PLAN
SCALE - 1"=20'-0"
NORTH
PRINTED ON
Bell Blueprint Co., Inc.
E-R5-A1-040589
date: 04 MAY 00
drwn:
chkd:
job no: 11981
revisions:
TECHNOLOGY DEVELOPMENT GROUP
CAMPUS POINT
SAN DIEGO
HIGH & ASSOCIATES
ENVIRONMENTAL PLANNING • ARCHITECTURE • ENGINEERING
4825 Viewridge Avenue, San Diego, CA 92123-1662 (619) 278-5750
sheet no. A-1


FIXING DETAIL OF POST FOR GUID RAIL
FOUNDATION PLAN
TECHNOLOGY DEVELOPMENT GROUP
CAMPUS POINT
SAN DIEGO
HICH & ASSOCIATES
ENVIRONMENTAL PLANNING · ARCHITECTURE · ENGINEERING
burkett & wong


FIXING DETAIL OF POST FOR GUIDERAIL
FOUNDATION PLAN
TECHNOLOGY DEVELOPMENT GROUP
CAMPUS POINT
SAN DIEGO
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S-2

APPENDIX II
FIELD EXPLORATION DATA

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-11-48980R
M. Fordham	06/08/11	06/08/11	Lat 32.88920957 Long -117.22670674	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1595+98, 340 ft, SD5	322.0 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CME 75 (5677)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Automatic Hammer	79 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING Not Encountered; AFTER DRILLING (DATE) Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				85.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
322.0		0.0	SEDIMENTARY ROCK (SANDSTONE); fine to meduim grained; thickly bedded; light brown; moderately weathered; soft; unfractured; poorly indurated.												
	1														
	2														
	3														
	4														
317.0	5	5.0				29									
	6				SPT1	64	\								
						50/4"									
	7														
	8														
	9														
312.0	10	10.0				18									
	11				SPT2	24	43								
						19									
	12														
	13														
	14														
307.0	15	15.0				16									
	16				SPT3	28	65								
						37									
	17														
	18														
	19														
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Boring Record				HOLE ID: R-11-48980R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POSTMILE(KP): R28.8/R55.3	EA: 065000
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: I-5 Widening				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: na	PREPARED BY: M. Fordham	DATE: 06/08/11	SHEET: 1 of 5	

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
302.0		20.0	SEDIMENTARY ROCK (SANDSTONE); moderately bedded with thin interbeds of SILTSTONE. SANDSTONE; fine to meduim grained; light brown; moderately weathered; soft; unfractured. SILTSTONE; light gray; moderately weathered; moderately hard.			23									
	21				SPT4	29	54								
						25									
	22														
	23														
	24														
	25														
	26														
	27														
	28														
	29														
292.0	30	30.0				22									
					SPT5	21	58								
	31					37									
	32														
	33														
	34														
	35														
286.0	36	36.0	6" Concretion fragments present.												
	37														
	38														
	39														
	40														

(continued)

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/08/11
SHEET: 2 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
282.0		40.0	SEDIMENTARY ROCK (SANDSTONE); meduim grained; moderately bedded; yellowish orange and light brown; moderately weathered; soft; unfractured.		SPT6	11 20 65	85								
	41														
	42														
	43														
	44														
	45														
	46														
	47														
	48														
	49														
272.0	50	50.0			SPT7	34 50\5" \	\								
	51														
	52														
	53														
	54														
	55														
	56														
	57														
	58														
	59														
	60		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening
BRIDGE NUMBER: na
PREPARED BY: M. Fordham
DATE: 06/08/11
SHEET: 3 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
262.0		60.0	SEDIMENTARY ROCK (SILTSTONE); moderately bedded; light brown; moderately weathered; moderately hard; slighty fractured; 8" concretion fragement.			21									
	61				SPT8	36	82								
						46									
	62														
	63														
	64														
257.0	65	65.0	SEDIMENTARY ROCK (SANDSTONE); medium grained; moderately bedded; light brown and yellowish orange; moderately weathered; soft; unfractured.												
	66														
	67														
	68														
	69														
252.0	70	70.0				37									
	71				SPT9	50/3"	\								
						\									
	72														
	73														
	74														
	75														
	76														
	77														
	78														
	79														
	80		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/08/11	4 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
	81														
	82														
	83														
	84														
237.0	85	85.0	Bottom of Borehole at 85ft. Boring terminated 5ft below planned depth. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).												
	86														
	87														
	88														
	89														
	90														
	91														
	92														
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-48980R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/08/11	5 of 5

47860L-54170R BORING RECORD english template.xls - 48980R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-11-49040R
M. Fordham	06/07/11	06/07/11	Lat 32.88948885 Long -117.22670674	
DRILLING CONTRACTOR			BOREHOLE LOCATION (Station, Offset, and Line)	SURFACE ELEVATION
Caltrans			1597+96, 253 feet, SD5	291.0 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DAIMETER
Mud Rotary			CME 75 (5677)	4 in.
SAMPLER TYPE(S) AND SIZE(S) [ID]			SPT HAMMER TYPE	HAMMER EFFICIENCY (ER_i)
SPT (1.4")			Automatic Hammer	79 %
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING Not Encountered; AFTER DRILLING (DATE) Not Encountered	TOTAL DEPTH OF BORING
Bentonite Chip				80.0 ft

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
291.0		0.0	SEDIMENTARY ROCK (SANDSTONE); fine grained; thickly bedded; yellowish brown; moderately weathered; very soft; unfractured; poorly indurated.												
	1														
	2														
	3														
	4														
	5														
285.0	6	6.0	Concretion fragment (8 inches thick)		SPT1	13 22 22	44								
	7														
	8														
	9														
	10														
280.0	11	11.0	SEDIMENTARY ROCK (SANDSTONE); fine grained; thickly bedded; light gray; moderately weathered; soft; moderately fractured.		SPT2	8 8 17	25								
	12														
	13														
	14														
	15														
275.0	16	16.0			SPT3	11 12 15	27								
	17														
	18														
	19														
	20		(continued)												

DEPARTMENT OF TRANSPORTATION	REPORT TITLE Boring Record			HOLE ID: R-11-49040R
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POSTMILE(KP) R28.8/R55.3	EA 065000
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME I-5 Widening			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER na	PREPARED BY M. Fordham	DATE 06/07/11	SHEET 1 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
270.0	21	21.0	Concretion fragments		SPT4	4 5 6	11								
	22														
	23														
	24														
	25														
265.0	26	26.0	SEDIMENTARY ROCK (SANDSTONE); moderately bedded with thin interbeds of SILTSTONE. SANDSTONE; meduim grained; light brown; moderately weathered; soft; unfractured. SILTSTONE; light gray; moderately weathered; moderately hard.		SPT5	4 6 13	19								
	27														
	28														
	29														
	30														
260.0	31	31.0			SPT6	24 36 53	89								
	32														
	33														
	34														
256.0	35	35.0			SPT7	40 30 51	81								Change drill pit from punch core to diamond core
	36														
	37														
	38														
	39														
	40		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/07/11	2 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
251.0		40.0				31									
					SPT6	51	\								
	41					50/4"									
	42														
	43														
	44														
246.0	45	45.0				26									
					SPT9	61	\								
	46					50/2"									
	47														
	48														
	49														
241.0	50	50.0				38									
					SPT10	73/6"	\								
	51					\									
	52														
	53														
	54														
236.0	55	55.0				20									
					SPT11	39	84								
	56					45									
	57														
	58														
	59														
	60		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE: Boring Record
HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME: I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/07/11	3 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
231.0		60.0				28									
					SPT8	57/4"	\								
	61					\									
	62														
	63														
	64														
226.0	65	65.0	Concretion Fragments (1 to 4 inches thick)												
	66														
	67														
	68														
	69														
221.0	70	70.0	Concretion Fragments (1' thick)												
	71														
	72														
	73														
	74														
	75														
	76														
	77														
	78														
	79														
	80		(continued)												

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/07/11	4 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

ELEVATION (ft)	DEPTH (ft)	Depth (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
211.0		80.0	Bottom of Borehole at 80 ft. Boring terminated at planned depth.												
			This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)												
	81														
	82														
	83														
	84														
	85														
	86														
	87														
	88														
	89														
	90														
	91														
	92														
	93														
	94														
	95														
	96														
	97														
	98														
	99														
	100														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Boring Record

HOLE ID: R-11-49040R

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	San Diego	5	R28.8/R55.3	065000

PROJECT OR BRIDGE NAME
I-5 Widening

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
na	M. Fordham	06/07/11	5 of 5

47860L-54170R BORING RECORD english template.xls - 49040R

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

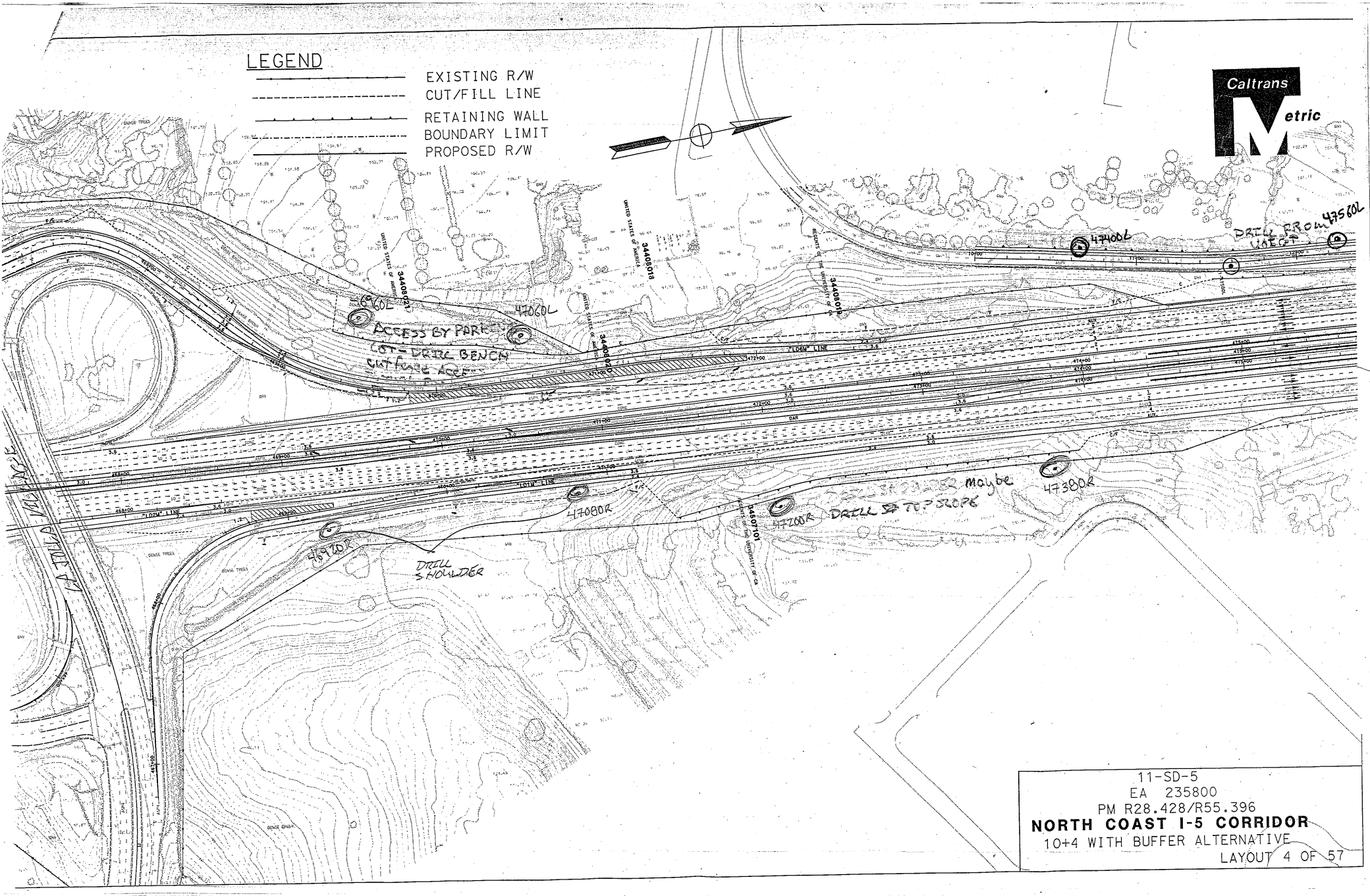
Approved by (Project Engineer or above)

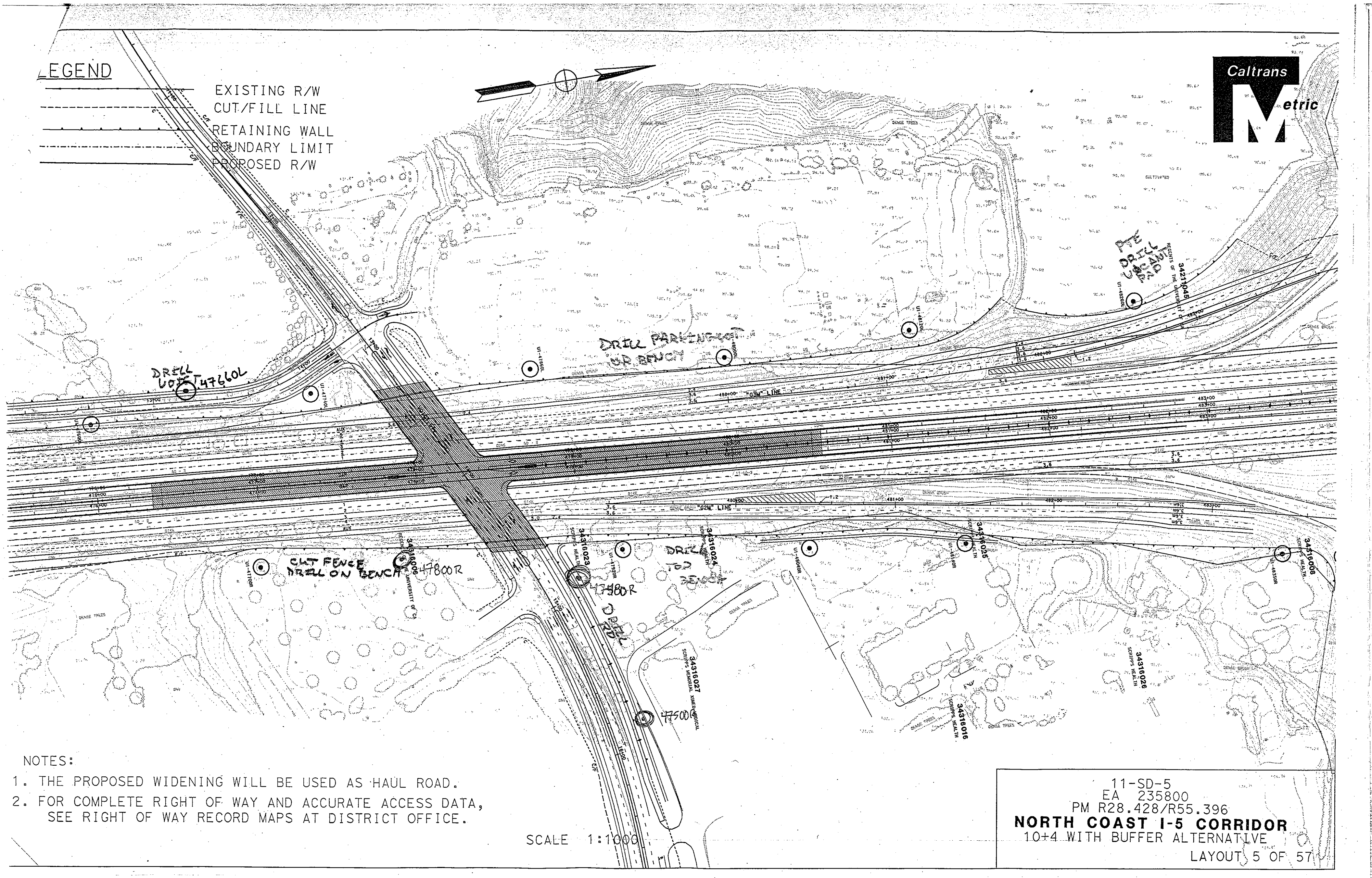
FOR SURVEYS USE ONLY

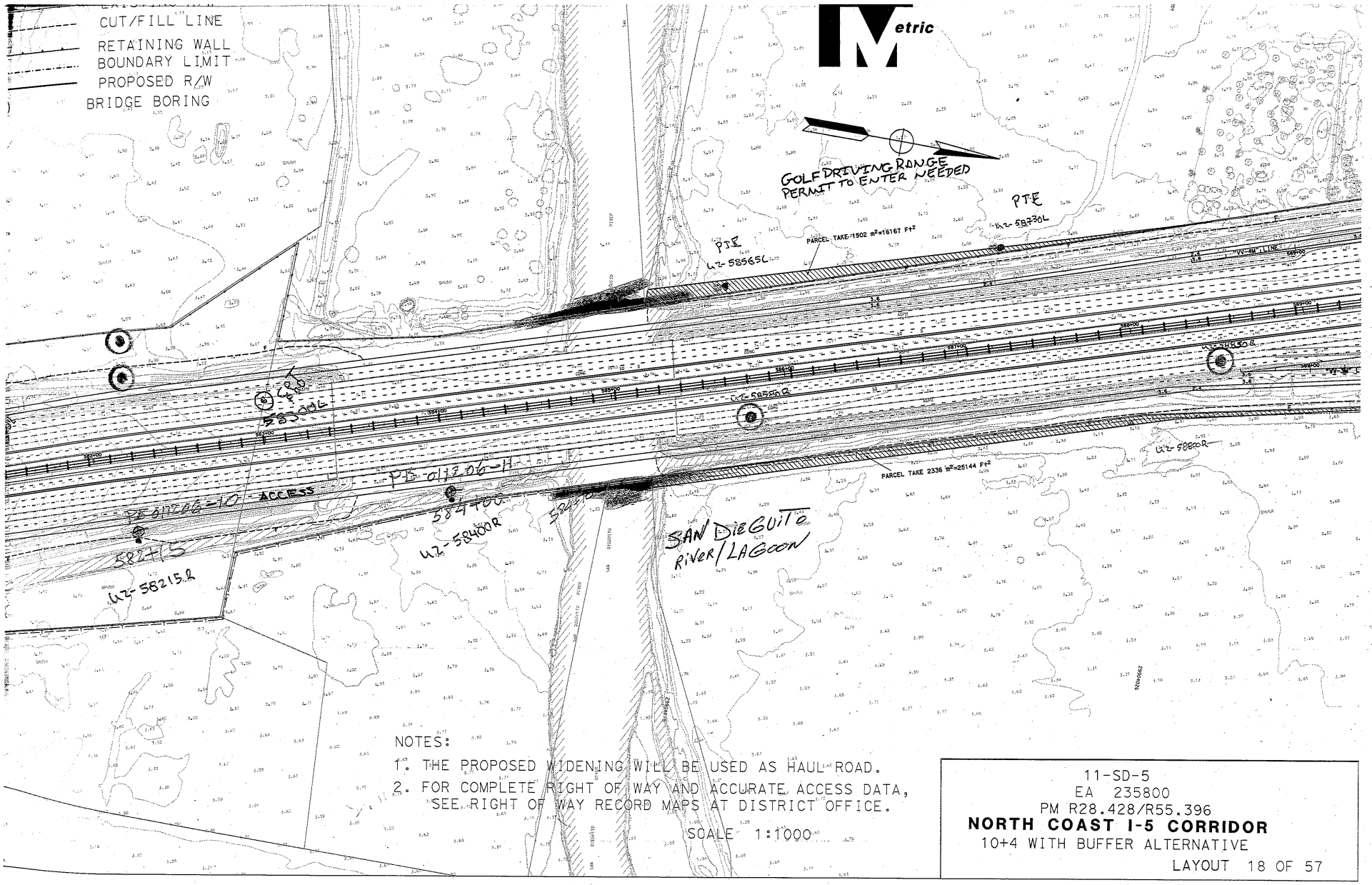
Date Received: WBS Codes:

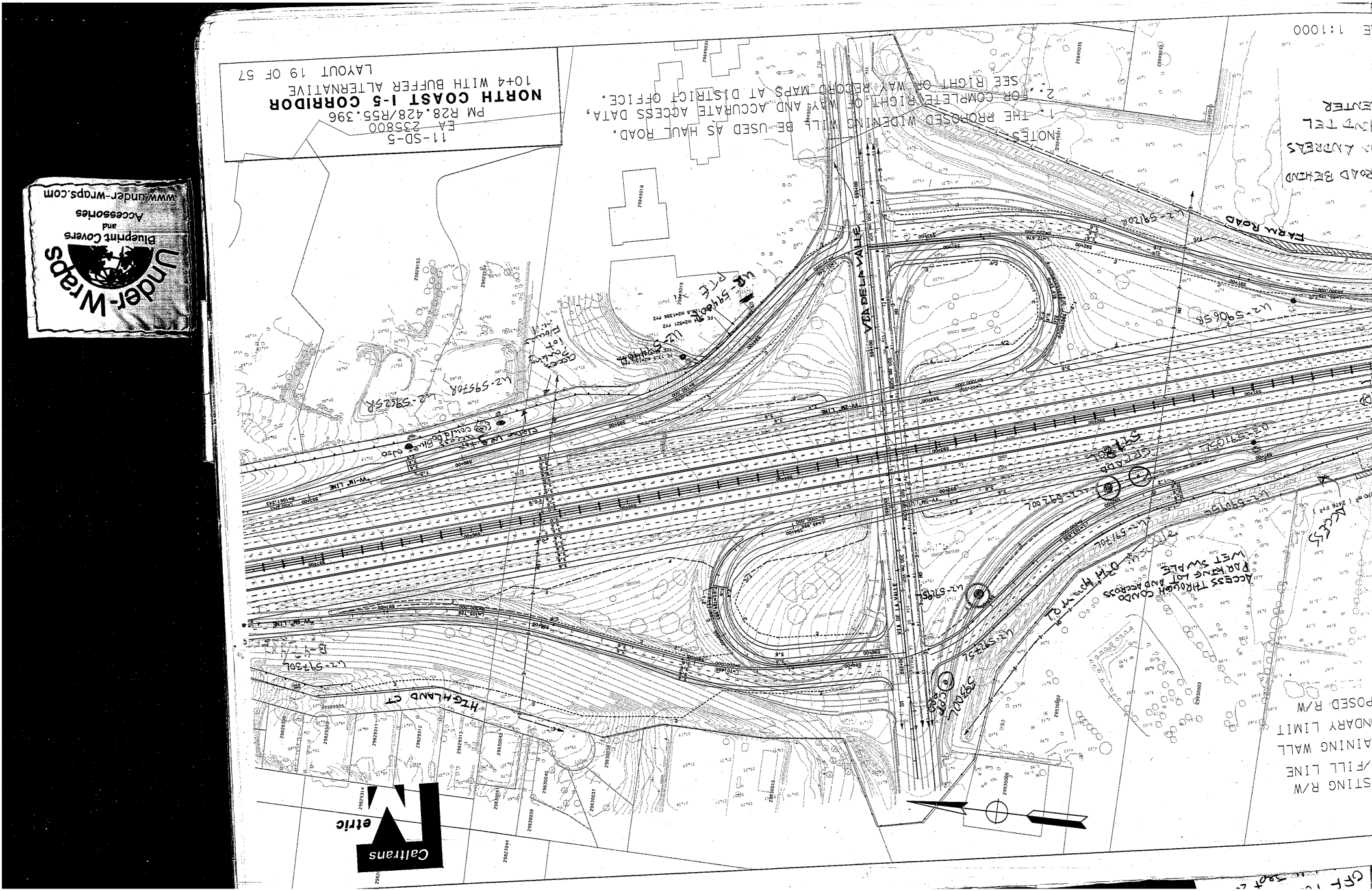
Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

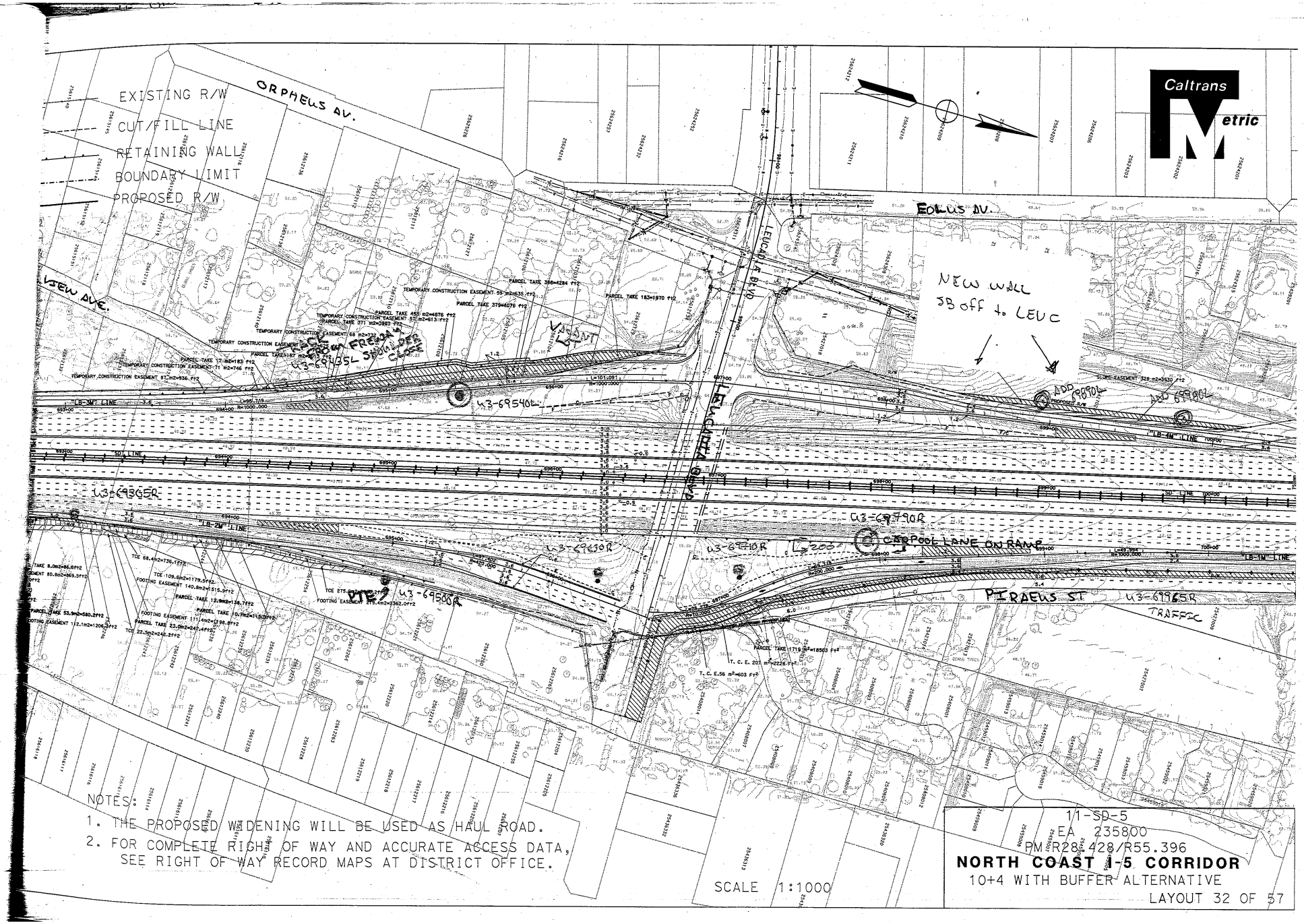
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47080R
47200R
DRILL SHOULDER
maybe
DRILL TO TOP SLOPE
47380R
47020R
DRILL SHOULDER
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
DRILL PARKING LOT OR BENCH
DRILL LOT 47660L
PTE DRILL UCSD
CUT FENCE DRILL ON BENCH 47800R
47580R
DRILL TOP BENCH
DRILL PDL
47500
"G3M" LINE
"G2M" LINE
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 5 OF 57


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57


Caltrans
Metric
NORTH COAST I-5 CORRIDOR
PM R28.428/R55.396
EA 235800
11-SD-5
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 19 OF 57
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
VIA DE LA VALLE
FARM ROAD
HIGHLAND CT
ACCESS THROUGH CULDE PARKING LOT AND ACCESS WEST SWALE
Under-Wraps
Blueprint Covers and Accessories
www.under-wraps.com


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST
LEUCADIA BLVD
NEW WALL
SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69670R
U3-69965R
ADD 69890L
ADD 69860L
"LB-4W" LINE
"LB-2W" LINE
"LB-1W" LINE
SD LINE
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS BUCKETS, ____ PLASTIC BAGS, ____ SHELBY TUBES, ____ BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT.) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	DO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11-479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+60 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER B-11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	5.3	5300
20	1k	2.1	2100
20	1k	1.6	1600
20	1k	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SO

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 7/18/2008

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-022330
GL 08-070

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 1/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 2/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 12/19/2008

To: Mike Fordham / GDS-2

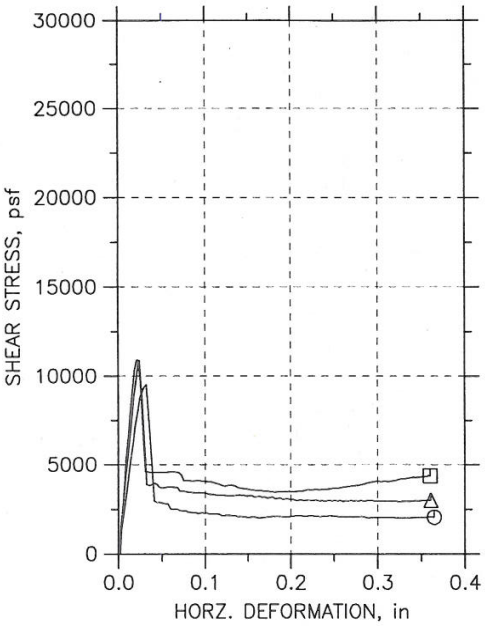
From: Lilibeth C. Purta / (916) 227-5434

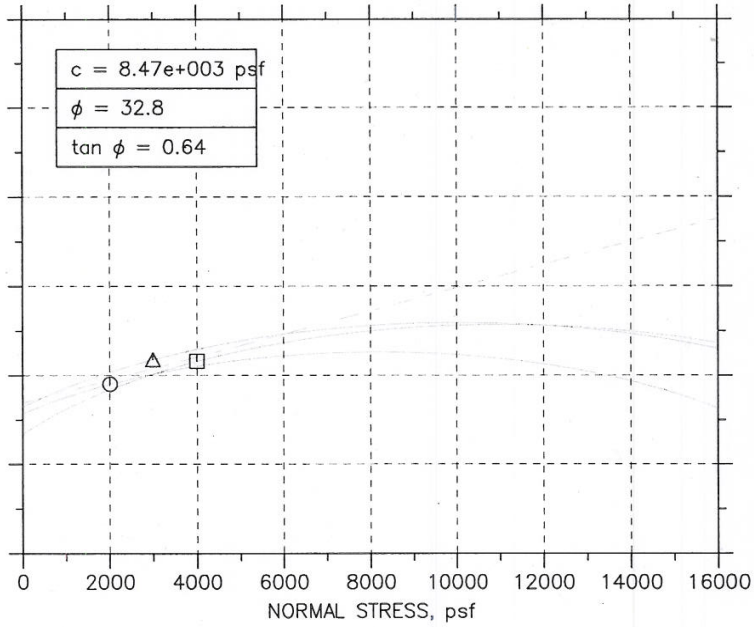
RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

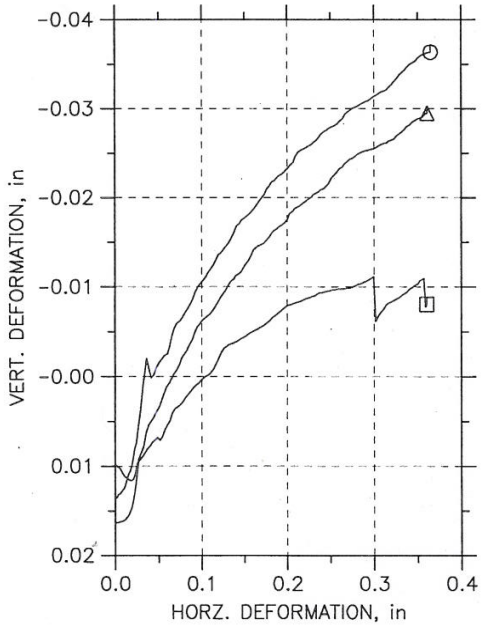
Partial test results.

AASHTO R18

DIRECT SHEAR TEST REPORT







Symbol		⦶	△	⊡	
Test No.		DS08082A	DS08082B	DS08082C	
Sample No.		4	4	4	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.37	2.37	2.37	
	Area, in^2	4.4115	4.4115	4.4115	
	Height, in	1	1	1	
	Water Content, %	16.05	17.70	20.80	
	Dry Density, pcf	107.08	109.76	105.44	
	Saturation, %	73.16	86.29	91.07	
	Void Ratio	0.60324	0.56414	0.62819	
Consol. Height, in		0.98676	0.9837	0.99073	
Consol. Void Ratio		0.58201	0.53863	0.6131	
Final	Water Content, %	21.61	20.14	22.11	
	Dry Density, pcf	103.33	106.62	104.6	
	Saturation, %	89.85	90.77	94.83	
	Void Ratio	0.66149	0.61022	0.64126	
Normal Stress, psf		2016.4	3000.8	4003.7	
Max. Shear Stress, psf		9518.7	10902	10804	
Ult. Shear Stress, psf		2036.2	2996.2	4359.8	
Time to Failure, min		14.001	11.002	11.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	

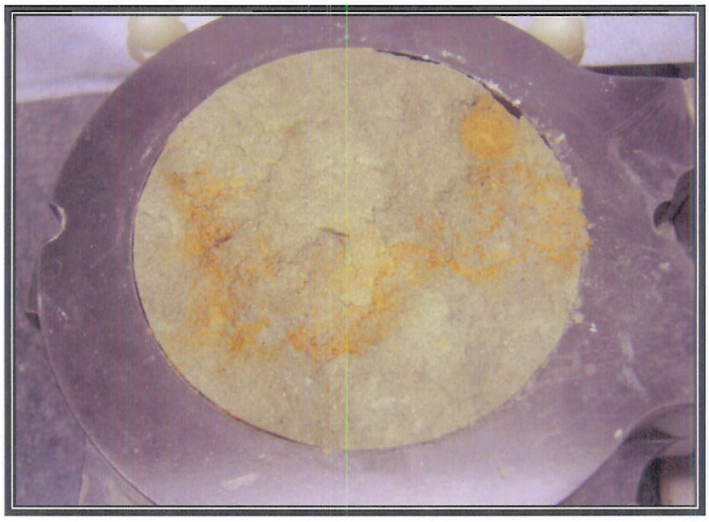
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.

Remarks: ASTM D3080

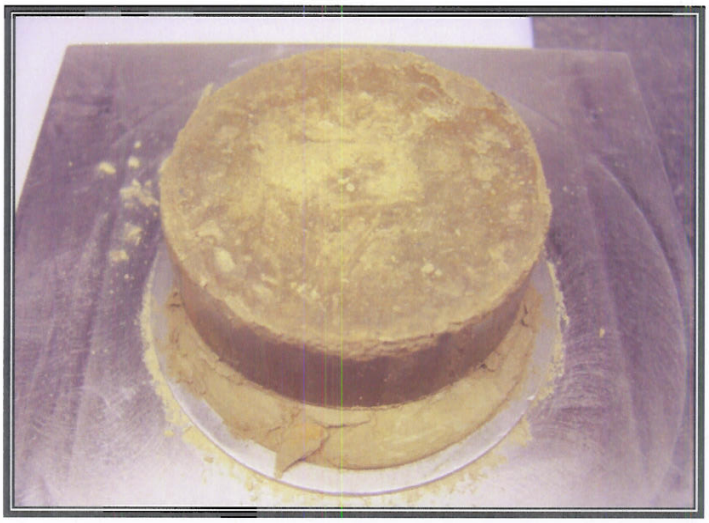
WP 12/12

Thu, 04-DEC-2008 16:56:12

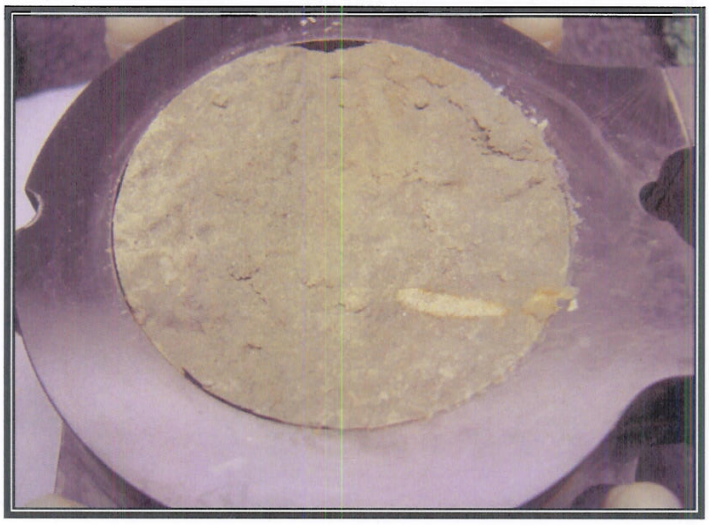
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B



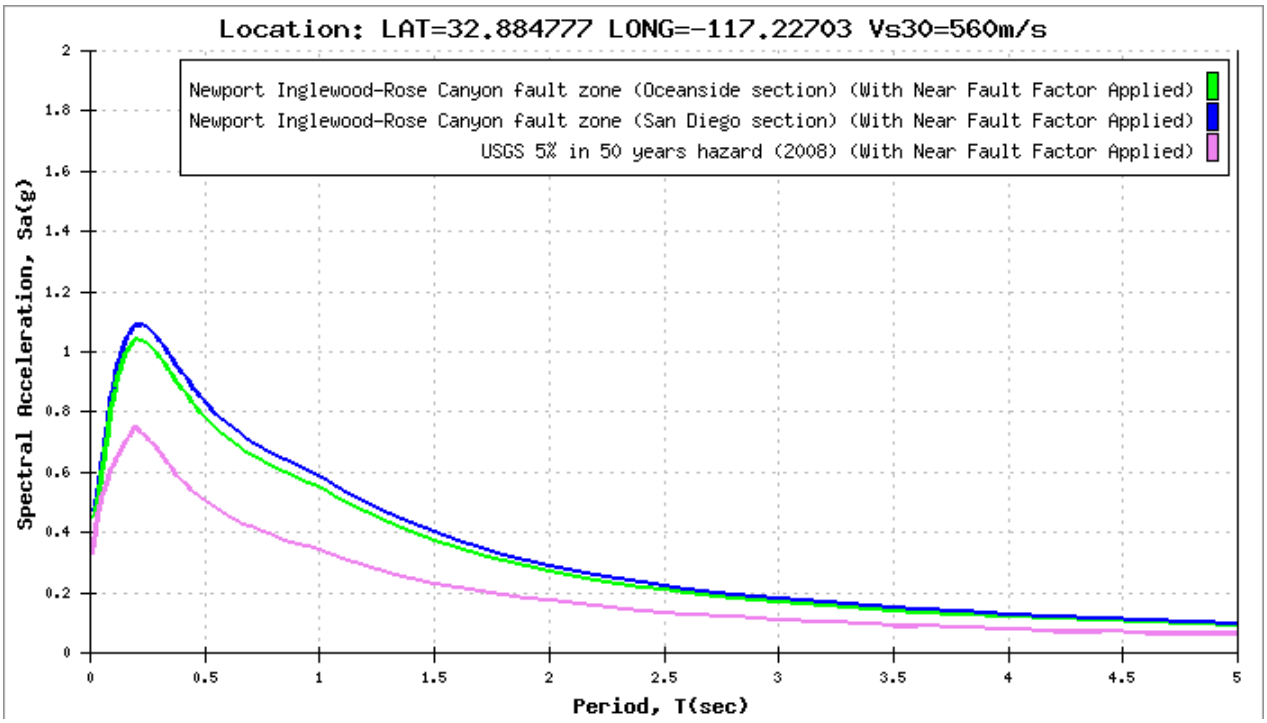
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



APPENDIX IV
ANALYSES AND CALCULATIONS

SELECT SITE LOCATION

CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	560 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	74 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.459	1.000	1.000	0.459
0.022	0.466	1.000	1.000	0.466
0.025	0.476	1.000	1.000	0.476
0.029	0.489	1.000	1.000	0.489
0.03	0.493	1.000	1.000	0.493
0.032	0.502	1.000	1.000	0.502
0.035	0.517	1.000	1.000	0.517
0.036	0.522	1.000	1.000	0.522
0.04	0.542	1.000	1.000	0.542
0.042	0.552	1.000	1.000	0.552
0.044	0.563	1.000	1.000	0.563
0.045	0.568	1.000	1.000	0.568
0.046	0.573	1.000	1.000	0.573
0.048	0.584	1.000	1.000	0.584
0.05	0.595	1.000	1.000	0.595
0.055	0.622	1.000	1.000	0.622
0.06	0.650	1.000	1.000	0.650

0.065	0.677	1.000	1.000	0.677
0.067	0.688	1.000	1.000	0.688
0.07	0.704	1.000	1.000	0.704
0.075	0.729	1.000	1.000	0.729
0.08	0.754	1.000	1.000	0.754
0.085	0.779	1.000	1.000	0.779
0.09	0.802	1.000	1.000	0.802
0.095	0.825	1.000	1.000	0.825
0.1	0.846	1.000	1.000	0.846
0.11	0.883	1.000	1.000	0.883
0.12	0.916	1.000	1.000	0.916
0.13	0.944	1.000	1.000	0.944
0.133	0.951	1.000	1.000	0.951
0.14	0.966	1.000	1.000	0.966
0.15	0.986	1.000	1.000	0.986
0.16	1.002	1.000	1.000	1.002
0.17	1.015	1.000	1.000	1.015
0.18	1.027	1.000	1.000	1.027
0.19	1.036	1.000	1.000	1.036
0.2	1.044	1.000	1.000	1.044
0.22	1.038	1.000	1.000	1.038
0.24	1.030	1.000	1.000	1.030
0.25	1.025	1.000	1.000	1.025
0.26	1.016	1.000	1.000	1.016
0.28	1.001	1.000	1.000	1.001
0.29	0.992	1.000	1.000	0.992
0.3	0.983	1.000	1.000	0.983
0.32	0.961	1.000	1.000	0.961
0.34	0.940	1.000	1.000	0.940
0.35	0.929	1.000	1.000	0.929
0.36	0.918	1.000	1.000	0.918
0.38	0.897	1.000	1.000	0.897
0.4	0.876	1.000	1.000	0.876
0.42	0.855	1.000	1.000	0.855
0.44	0.835	1.000	1.000	0.835
0.45	0.825	1.000	1.000	0.825
0.46	0.816	1.000	1.000	0.816
0.48	0.797	1.000	1.000	0.797
0.5	0.780	1.000	1.000	0.780
0.55	0.728	1.000	1.020	0.742
0.6	0.683	1.000	1.040	0.710
0.65	0.644	1.000	1.060	0.682
0.667	0.631	1.000	1.067	0.673
0.7	0.609	1.000	1.080	0.657
0.75	0.578	1.000	1.100	0.635
0.8	0.549	1.000	1.120	0.615

0.85	0.523	1.000	1.140	0.597
0.9	0.500	1.000	1.160	0.580
0.95	0.478	1.000	1.180	0.564
1	0.458	1.000	1.200	0.550
1.1	0.421	1.000	1.200	0.505
1.2	0.388	1.000	1.200	0.466
1.3	0.359	1.000	1.200	0.431
1.4	0.334	1.000	1.200	0.401
1.5	0.311	1.000	1.200	0.374
1.6	0.290	1.000	1.200	0.348
1.7	0.271	1.000	1.200	0.325
1.8	0.254	1.000	1.200	0.305
1.9	0.239	1.000	1.200	0.287
2	0.225	1.000	1.200	0.270
2.2	0.201	1.000	1.200	0.241
2.4	0.181	1.000	1.200	0.217
2.5	0.173	1.000	1.200	0.207
2.6	0.165	1.000	1.200	0.198
2.8	0.151	1.000	1.200	0.181
3	0.139	1.000	1.200	0.167
3.2	0.129	1.000	1.200	0.155
3.4	0.120	1.000	1.200	0.144
3.5	0.116	1.000	1.200	0.139
3.6	0.112	1.000	1.200	0.135
3.8	0.105	1.000	1.200	0.126
4	0.099	1.000	1.200	0.119
4.2	0.094	1.000	1.200	0.112
4.4	0.089	1.000	1.200	0.107
4.6	0.084	1.000	1.200	0.101
4.8	0.080	1.000	1.200	0.097
5	0.077	1.000	1.200	0.092

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.474	1.000	1.000	0.474
0.02	0.484	1.000	1.000	0.484
0.022	0.491	1.000	1.000	0.491
0.025	0.501	1.000	1.000	0.501
0.029	0.515	1.000	1.000	0.515
0.03	0.519	1.000	1.000	0.519
0.032	0.529	1.000	1.000	0.529
0.035	0.544	1.000	1.000	0.544
0.036	0.550	1.000	1.000	0.550
0.04	0.571	1.000	1.000	0.571
0.042	0.582	1.000	1.000	0.582
0.044	0.592	1.000	1.000	0.592
0.045	0.598	1.000	1.000	0.598
0.046	0.603	1.000	1.000	0.603
0.048	0.614	1.000	1.000	0.614
0.05	0.626	1.000	1.000	0.626
0.055	0.654	1.000	1.000	0.654
0.06	0.683	1.000	1.000	0.683
0.065	0.710	1.000	1.000	0.710
0.067	0.721	1.000	1.000	0.721
0.07	0.737	1.000	1.000	0.737
0.075	0.763	1.000	1.000	0.763
0.08	0.788	1.000	1.000	0.788
0.085	0.814	1.000	1.000	0.814
0.09	0.838	1.000	1.000	0.838
0.095	0.861	1.000	1.000	0.861
0.1	0.883	1.000	1.000	0.883
0.11	0.921	1.000	1.000	0.921
0.12	0.955	1.000	1.000	0.955
0.13	0.984	1.000	1.000	0.984
0.133	0.991	1.000	1.000	0.991
0.14	1.008	1.000	1.000	1.008
0.15	1.028	1.000	1.000	1.028
0.16	1.046	1.000	1.000	1.046
0.17	1.060	1.000	1.000	1.060
0.18	1.073	1.000	1.000	1.073
0.19	1.083	1.000	1.000	1.083
0.2	1.092	1.000	1.000	1.092
0.22	1.089	1.000	1.000	1.089
0.24	1.082	1.000	1.000	1.082
0.25	1.077	1.000	1.000	1.077
0.26	1.069	1.000	1.000	1.069
0.28	1.054	1.000	1.000	1.054

0.29	1.045	1.000	1.000	1.045
0.3	1.037	1.000	1.000	1.037
0.32	1.015	1.000	1.000	1.015
0.34	0.993	1.000	1.000	0.993
0.35	0.982	1.000	1.000	0.982
0.36	0.972	1.000	1.000	0.972
0.38	0.950	1.000	1.000	0.950
0.4	0.928	1.000	1.000	0.928
0.42	0.907	1.000	1.000	0.907
0.44	0.886	1.000	1.000	0.886
0.45	0.877	1.000	1.000	0.877
0.46	0.867	1.000	1.000	0.867
0.48	0.848	1.000	1.000	0.848
0.5	0.830	1.000	1.000	0.830
0.55	0.775	1.000	1.020	0.791
0.6	0.728	1.000	1.040	0.757
0.65	0.687	1.000	1.060	0.728
0.667	0.674	1.000	1.067	0.719
0.7	0.650	1.000	1.080	0.702
0.75	0.618	1.000	1.100	0.680
0.8	0.587	1.000	1.120	0.658
0.85	0.560	1.000	1.140	0.638
0.9	0.535	1.000	1.160	0.620
0.95	0.512	1.000	1.180	0.604
1	0.490	1.000	1.200	0.589
1.1	0.450	1.000	1.200	0.540
1.2	0.415	1.000	1.200	0.498
1.3	0.385	1.000	1.200	0.461
1.4	0.357	1.000	1.200	0.429
1.5	0.333	1.000	1.200	0.400
1.6	0.310	1.000	1.200	0.373
1.7	0.290	1.000	1.200	0.348
1.8	0.272	1.000	1.200	0.326
1.9	0.256	1.000	1.200	0.307
2	0.241	1.000	1.200	0.289
2.2	0.215	1.000	1.200	0.258
2.4	0.194	1.000	1.200	0.233
2.5	0.185	1.000	1.200	0.222
2.6	0.176	1.000	1.200	0.212
2.8	0.162	1.000	1.200	0.194
3	0.149	1.000	1.200	0.179
3.2	0.138	1.000	1.200	0.166
3.4	0.129	1.000	1.200	0.154
3.5	0.124	1.000	1.200	0.149
3.6	0.120	1.000	1.200	0.144
3.8	0.113	1.000	1.200	0.135

4	0.106	1.000	1.200	0.127
4.2	0.100	1.000	1.200	0.120
4.4	0.095	1.000	1.200	0.114
4.6	0.090	1.000	1.200	0.109
4.8	0.086	1.000	1.200	0.103
5	0.082	1.000	1.200	0.099

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.330	1.000	1.000	0.330
0.02	0.400	1.000	1.000	0.400
0.022	0.410	1.000	1.000	0.410
0.025	0.425	1.000	1.000	0.425
0.029	0.443	1.000	1.000	0.443
0.03	0.447	1.000	1.000	0.447
0.032	0.455	1.000	1.000	0.455
0.035	0.466	1.000	1.000	0.466
0.036	0.470	1.000	1.000	0.470
0.04	0.484	1.000	1.000	0.484
0.042	0.491	1.000	1.000	0.491
0.044	0.497	1.000	1.000	0.497
0.045	0.500	1.000	1.000	0.500
0.046	0.503	1.000	1.000	0.503
0.048	0.509	1.000	1.000	0.509
0.05	0.515	1.000	1.000	0.515
0.055	0.529	1.000	1.000	0.529
0.06	0.541	1.000	1.000	0.541
0.065	0.553	1.000	1.000	0.553
0.067	0.558	1.000	1.000	0.558
0.07	0.565	1.000	1.000	0.565
0.075	0.576	1.000	1.000	0.576
0.08	0.586	1.000	1.000	0.586
0.085	0.596	1.000	1.000	0.596
0.09	0.606	1.000	1.000	0.606
0.095	0.615	1.000	1.000	0.615
0.1	0.623	1.000	1.000	0.623
0.11	0.640	1.000	1.000	0.640
0.12	0.655	1.000	1.000	0.655
0.13	0.670	1.000	1.000	0.670
0.133	0.674	1.000	1.000	0.674

0.14	0.683	1.000	1.000	0.683
0.15	0.696	1.000	1.000	0.696
0.16	0.708	1.000	1.000	0.708
0.17	0.720	1.000	1.000	0.720
0.18	0.731	1.000	1.000	0.731
0.19	0.742	1.000	1.000	0.742
0.2	0.753	1.000	1.000	0.753
0.22	0.733	1.000	1.000	0.733
0.24	0.716	1.000	1.000	0.716
0.25	0.708	1.000	1.000	0.708
0.26	0.700	1.000	1.000	0.700
0.28	0.686	1.000	1.000	0.686
0.29	0.679	1.000	1.000	0.679
0.3	0.673	1.000	1.000	0.673
0.32	0.649	1.000	1.000	0.649
0.34	0.627	1.000	1.000	0.627
0.35	0.617	1.000	1.000	0.617
0.36	0.607	1.000	1.000	0.607
0.38	0.589	1.000	1.000	0.589
0.4	0.572	1.000	1.000	0.572
0.42	0.556	1.000	1.000	0.556
0.44	0.541	1.000	1.000	0.541
0.45	0.535	1.000	1.000	0.535
0.46	0.528	1.000	1.000	0.528
0.48	0.515	1.000	1.000	0.515
0.5	0.504	1.000	1.000	0.504
0.55	0.467	1.000	1.020	0.476
0.6	0.436	1.000	1.040	0.453
0.65	0.409	1.000	1.060	0.434
0.667	0.401	1.000	1.067	0.427
0.7	0.386	1.000	1.080	0.417
0.75	0.365	1.000	1.100	0.402
0.8	0.345	1.000	1.120	0.387
0.85	0.328	1.000	1.140	0.374
0.9	0.312	1.000	1.160	0.362
0.95	0.298	1.000	1.180	0.351
1	0.285	1.000	1.200	0.342
1.1	0.259	1.000	1.200	0.311
1.2	0.238	1.000	1.200	0.286
1.3	0.220	1.000	1.200	0.264
1.4	0.205	1.000	1.200	0.246
1.5	0.191	1.000	1.200	0.230
1.6	0.180	1.000	1.200	0.216
1.7	0.169	1.000	1.200	0.203
1.8	0.160	1.000	1.200	0.192
1.9	0.152	1.000	1.200	0.182

2	0.144	1.000	1.200	0.173
2.2	0.129	1.000	1.200	0.155
2.4	0.117	1.000	1.200	0.141
2.5	0.112	1.000	1.200	0.134
2.6	0.107	1.000	1.200	0.128
2.8	0.098	1.000	1.200	0.118
3	0.091	1.000	1.200	0.109
3.2	0.084	1.000	1.200	0.101
3.4	0.078	1.000	1.200	0.094
3.5	0.076	1.000	1.200	0.091
3.6	0.073	1.000	1.200	0.088
3.8	0.069	1.000	1.200	0.082
4	0.064	1.000	1.200	0.077
4.2	0.062	1.000	1.200	0.074
4.4	0.059	1.000	1.200	0.071
4.6	0.057	1.000	1.200	0.068
4.8	0.054	1.000	1.200	0.065
5	0.052	1.000	1.200	0.063

Envelope Data

Period	SA
0.01	0.451
0.02	0.459
0.022	0.466
0.025	0.476
0.029	0.489
0.03	0.493
0.032	0.502
0.035	0.517
0.036	0.522
0.04	0.542
0.042	0.552
0.044	0.563
0.045	0.568
0.046	0.573
0.048	0.584
0.05	0.595
0.055	0.622
0.06	0.650
0.065	0.677
0.067	0.688
0.07	0.704
0.075	0.729

0.08	0.754
0.085	0.779
0.09	0.802
0.095	0.825
0.1	0.846
0.11	0.883
0.12	0.916
0.13	0.944
0.133	0.951
0.14	0.966
0.15	0.986
0.16	1.002
0.17	1.015
0.18	1.027
0.19	1.036
0.2	1.044
0.22	1.038
0.24	1.030
0.25	1.025
0.26	1.016
0.28	1.001
0.29	0.992
0.3	0.983
0.32	0.961
0.34	0.940
0.35	0.929
0.36	0.918
0.38	0.897
0.4	0.876
0.42	0.855
0.44	0.835
0.45	0.825
0.46	0.816
0.48	0.797
0.5	0.780
0.55	0.742
0.6	0.710
0.65	0.682
0.667	0.673
0.7	0.657
0.75	0.635
0.8	0.615
0.85	0.597
0.9	0.580
0.95	0.564
1	0.550

1.1	0.505
1.2	0.466
1.3	0.431
1.4	0.401
1.5	0.374
1.6	0.348
1.7	0.325
1.8	0.305
1.9	0.287
2	0.270
2.2	0.241
2.4	0.217
2.5	0.207
2.6	0.198
2.8	0.181
3	0.167
3.2	0.155
3.4	0.144
3.5	0.139
3.6	0.135
3.8	0.126
4	0.119
4.2	0.112
4.4	0.107
4.6	0.101
4.8	0.097
5	0.092

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} (km)	0	

Distance

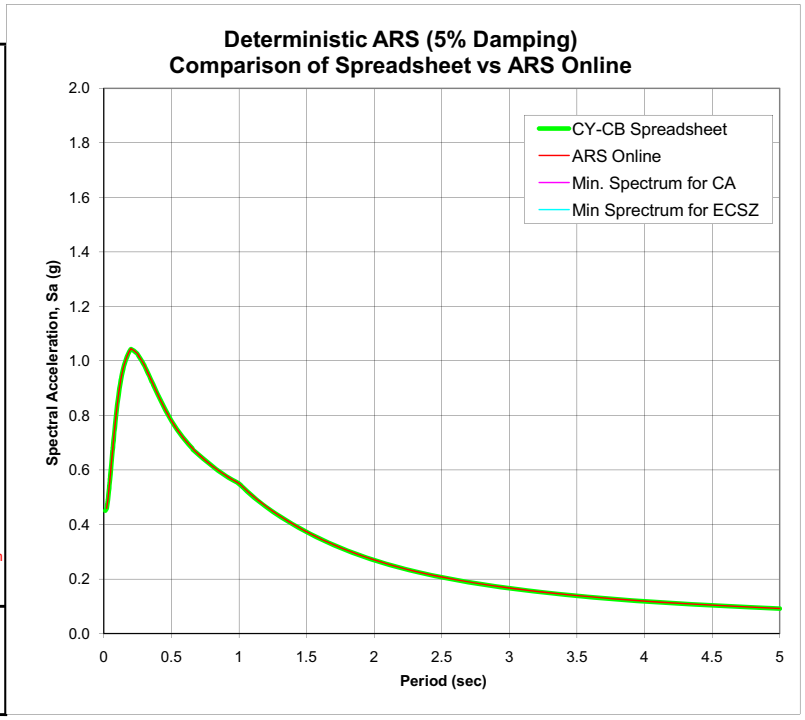
R_{RUP} (km)	4.2	
R_{JB} (km)	4.2	
R_x (km)	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} (m/sec)	560	(270 to 1500 m/s)
$Z_{1.0}$ (m)	74	(0 - No Basin)
$Z_{2.5}$ (km)	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45070
0.020	0.45934
0.022	0.46594
0.025	0.47600
0.029	0.48900
0.030	0.49272
0.032	0.50226
0.035	0.51688
0.036	0.52196
0.040	0.54186
0.042	0.55233
0.044	0.56256
0.045	0.56796
0.046	0.57323
0.048	0.58368
0.050	0.59435
0.055	0.62212
0.060	0.65018
0.065	0.67711
0.067	0.68797
0.070	0.70340
0.075	0.72907
0.080	0.75396
0.085	0.77862
0.090	0.80182
0.095	0.82448
0.100	0.84620
0.110	0.88308
0.120	0.91575
0.130	0.94352
0.133	0.95048
0.140	0.96611
0.150	0.98568
0.160	1.00215
0.170	1.01515

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.459	1	1	0.459	0%
0.022	0.466	1	1	0.466	0%
0.025	0.476	1	1	0.476	0%
0.029	0.489	1	1	0.489	0%
0.03	0.493	1	1	0.493	0%
0.032	0.502	1	1	0.502	0%
0.035	0.517	1	1	0.517	0%
0.036	0.522	1	1	0.522	0%
0.04	0.542	1	1	0.542	0%
0.042	0.552	1	1	0.552	0%
0.044	0.563	1	1	0.563	0%
0.045	0.568	1	1	0.568	0%
0.046	0.573	1	1	0.573	0%
0.048	0.584	1	1	0.584	0%
0.05	0.595	1	1	0.595	0%
0.055	0.622	1	1	0.622	0%
0.06	0.65	1	1	0.65	0%
0.065	0.677	1	1	0.677	0%
0.067	0.688	1	1	0.688	0%
0.07	0.704	1	1	0.704	0%
0.075	0.729	1	1	0.729	0%
0.08	0.754	1	1	0.754	0%
0.085	0.779	1	1	0.779	0%
0.09	0.802	1	1	0.802	0%
0.095	0.825	1	1	0.825	0%
0.1	0.846	1	1	0.846	0%
0.11	0.883	1	1	0.883	0%
0.12	0.916	1	1	0.916	0%
0.13	0.944	1	1	0.944	0%
0.133	0.951	1	1	0.951	0%
0.14	0.966	1	1	0.966	0%
0.15	0.986	1	1	0.986	0%
0.16	1.002	1	1	1.002	0%
0.17	1.015	1	1	1.015	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

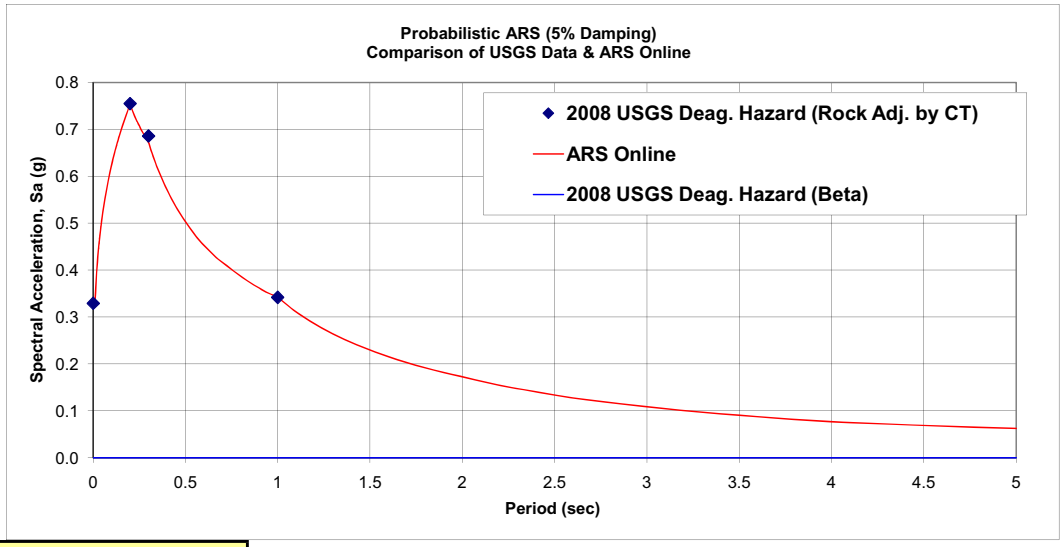
Deterministic_Response_Spectrum_072809 v30 560.xls 11/1/2011 10:38 AM

0.180	1.02656	0.18	1.027	1	1	1.027	0%				
0.190	1.03574	0.19	1.036	1	1	1.036	0%				
0.200	1.04325	0.2	1.044	1	1	1.044	0%				
0.220	1.03775	0.22	1.038	1	1	1.038	0%				
0.240	1.02969	0.24	1.03	1	1	1.03	0%				
0.250	1.02431	0.25	1.025	1	1	1.025	0%				
0.260	1.01591	0.26	1.016	1	1	1.016	0%				
0.280	1.00052	0.28	1.001	1	1	1.001	0%				
0.290	0.99129	0.29	0.992	1	1	0.992	0%				
0.300	0.98241	0.3	0.983	1	1	0.983	0%				
0.320	0.96110	0.32	0.961	1	1	0.961	0%				
0.340	0.93946	0.34	0.94	1	1	0.94	0%				
0.350	0.92845	0.35	0.929	1	1	0.929	0%				
0.360	0.91792	0.36	0.918	1	1	0.918	0%				
0.380	0.89636	0.38	0.897	1	1	0.897	0%				
0.400	0.87547	0.4	0.876	1	1	0.876	0%				
0.420	0.85500	0.42	0.855	1	1	0.855	0%				
0.440	0.83470	0.44	0.835	1	1	0.835	0%				
0.450	0.82517	0.45	0.825	1	1	0.825	0%				
0.460	0.81574	0.46	0.816	1	1	0.816	0%				
0.480	0.79698	0.48	0.797	1	1	0.797	0%				
0.500	0.77970	0.5	0.78	1	1	0.78	0%				
0.550	0.74216	0.55	0.728	1	1.02	0.742	0%				
0.600	0.71003	0.6	0.683	1	1.04	0.71	0%				
0.650	0.68189	0.65	0.644	1	1.06	0.682	0%				
0.660	0.67365	0.667	0.631	1	1.067	0.673	0%				
0.700	0.65717	0.7	0.609	1	1.08	0.657	0%				
0.750	0.63518	0.75	0.578	1	1.1	0.635	0%				
0.800	0.61450	0.8	0.549	1	1.12	0.615	0%				
0.850	0.59608	0.85	0.523	1	1.14	0.597	0%				
0.900	0.57909	0.9	0.5	1	1.16	0.58	0%				
0.950	0.56375	0.95	0.478	1	1.18	0.564	0%				
1.000	0.54942	1	0.458	1	1.2	0.55	0%				
1.100	0.50387	1.1	0.421	1	1.2	0.505	0%				
1.200	0.46482	1.2	0.388	1	1.2	0.466	0%				
1.300	0.43038	1.3	0.359	1	1.2	0.431	0%				
1.400	0.39999	1.4	0.334	1	1.2	0.401	0%				
1.500	0.37270	1.5	0.311	1	1.2	0.374	0%				
1.600	0.34732	1.6	0.29	1	1.2	0.348	0%				
1.700	0.32461	1.7	0.271	1	1.2	0.325	0%				
1.800	0.30423	1.8	0.254	1	1.2	0.305	0%				
1.900	0.28589	1.9	0.239	1	1.2	0.287	0%				
2.000	0.26958	2	0.225	1	1.2	0.27	0%				
2.200	0.24042	2.2	0.201	1	1.2	0.241	0%				
2.400	0.21683	2.4	0.181	1	1.2	0.217	0%				
2.500	0.20657	2.5	0.173	1	1.2	0.207	0%				
2.600	0.19719	2.6	0.165	1	1.2	0.198	0%				
2.800	0.18057	2.8	0.151	1	1.2	0.181	0%				
3.000	0.16634	3	0.139	1	1.2	0.167	0%				
3.200	0.15422	3.2	0.129	1	1.2	0.155	1%				
3.400	0.14357	3.4	0.12	1	1.2	0.144	0%				
3.500	0.13872	3.5	0.116	1	1.2	0.139	0%				
3.600	0.13416	3.6	0.112	1	1.2	0.135	1%				
3.800	0.12577	3.8	0.105	1	1.2	0.126	0%				
4.000	0.11830	4	0.099	1	1.2	0.119	1%				
4.200	0.11198	4.2	0.094	1	1.2	0.112	0%				
4.400	0.10622	4.4	0.089	1	1.2	0.107	1%				
4.600	0.10099	4.6	0.084	1	1.2	0.101	0%				
4.800	0.09622	4.8	0.08	1	1.2	0.097	1%				
5.000	0.09182	5	0.077	1	1.2	0.092	0%				
95											

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	560
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.11
$Z_{1.0}$ (m) =	74
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.33	1	1	0.33
0.02	0.4	1	1	0.4
0.022	0.41	1	1	0.41
0.025	0.425	1	1	0.425
0.029	0.443	1	1	0.443
0.03	0.447	1	1	0.447
0.032	0.455	1	1	0.455
0.035	0.466	1	1	0.466
0.036	0.47	1	1	0.47
0.04	0.484	1	1	0.484
0.042	0.491	1	1	0.491
0.044	0.497	1	1	0.497
0.045	0.5	1	1	0.5
0.046	0.503	1	1	0.503
0.048	0.509	1	1	0.509
0.05	0.515	1	1	0.515
0.055	0.529	1	1	0.529
0.06	0.541	1	1	0.541
0.065	0.553	1	1	0.553
0.067	0.558	1	1	0.558
0.07	0.565	1	1	0.565
0.075	0.576	1	1	0.576
0.08	0.586	1	1	0.586
0.085	0.596	1	1	0.596
0.09	0.606	1	1	0.606
0.095	0.615	1	1	0.615
0.1	0.623	1	1	0.623
0.11	0.64	1	1	0.64
0.12	0.655	1	1	0.655
0.13	0.67	1	1	0.67
0.133	0.674	1	1	0.674
0.14	0.683	1	1	0.683
0.15	0.696	1	1	0.696
0.16	0.708	1	1	0.708
0.17	0.72	1	1	0.72
0.18	0.731	1	1	0.731
0.19	0.742	1	1	0.742
0.2	0.753	1	1	0.753
0.22	0.733	1	1	0.733
0.24	0.716	1	1	0.716
0.25	0.708	1	1	0.708
0.26	0.7	1	1	0.7
0.28	0.686	1	1	0.686

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.073	1.000	0.329	0.33	-0.2%
0.2	0.722	1.000	1.046	1.000	0.755	0.753	0.2%
0.3	0.597	1.000	1.149	1.000	0.686	0.673	1.9%
1	0.228	1.200	1.249	1.000	0.342	0.342	0.1%

Max % Difference = 1.9%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

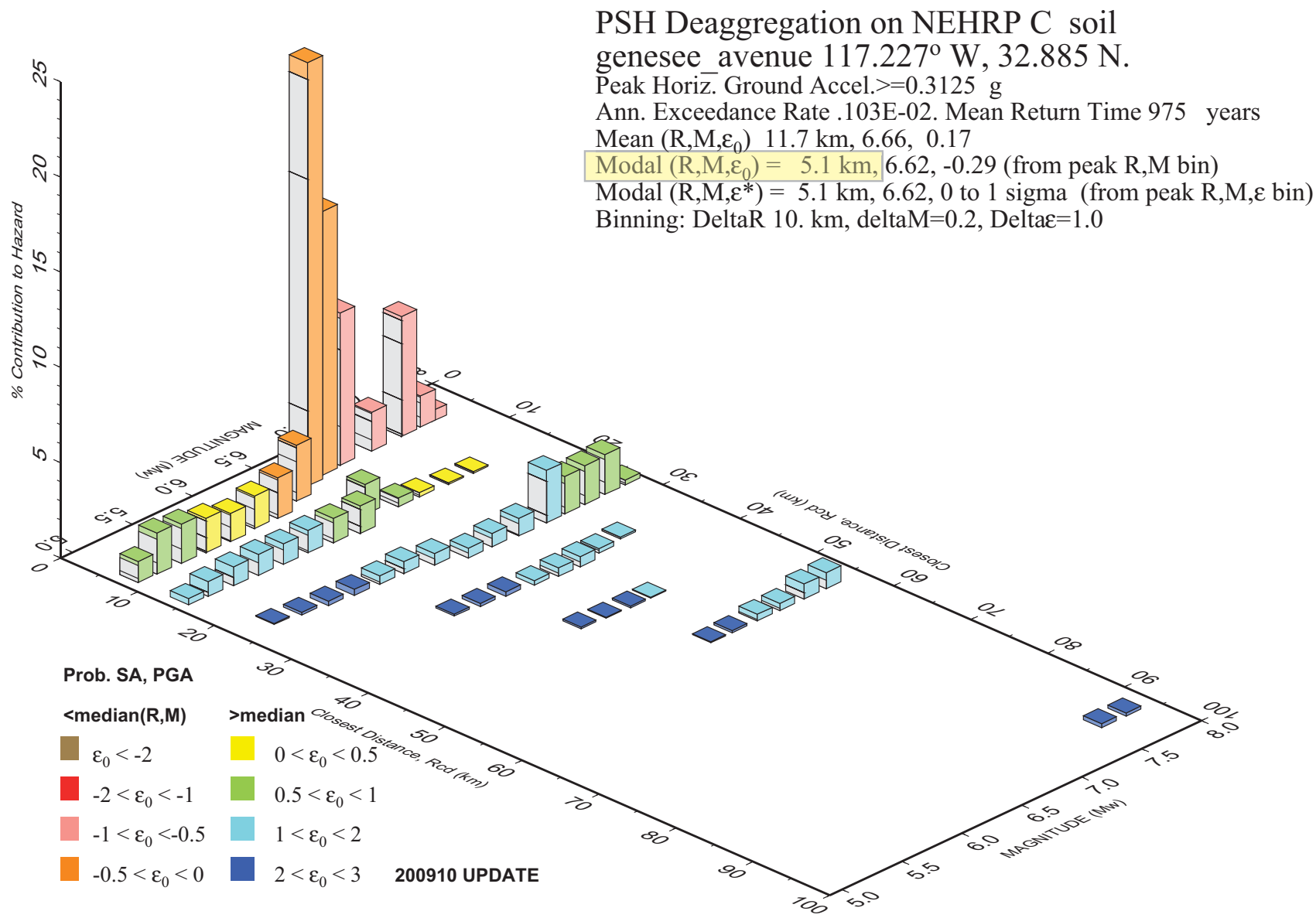
Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0		1.000	1.000		0.33	0.0%
0.1		1.000	1.000		0.623	0.0%
0.2		1.000	1.000		0.753	0.0%
0.3		1.000	1.000		0.673	0.0%
0.5		1.000	1.000		0.504	0.0%
1		1.200	1.000		0.342	0.0%
2		1.200	1.000		0.173	0.0%
3		1.200	1.000		0.109	0.0%
4		1.200	1.000		0.077	0.0%
5		1.200	1.000		0.063	0.0%

Max % Difference = 0.0%

Probabilistic_Response_Spectrum_080409 v30 560.xls 11/1/2011 10:39 AM

0.29	0.679	1	1	0.679
0.3	0.673	1	1	0.673
0.32	0.649	1	1	0.649
0.34	0.627	1	1	0.627
0.35	0.617	1	1	0.617
0.36	0.607	1	1	0.607
0.38	0.589	1	1	0.589
0.4	0.572	1	1	0.572
0.42	0.556	1	1	0.556
0.44	0.541	1	1	0.541
0.45	0.535	1	1	0.535
0.46	0.528	1	1	0.528
0.48	0.515	1	1	0.515
0.5	0.504	1	1	0.504
0.55	0.467	1	1.02	0.476
0.6	0.436	1	1.04	0.453
0.65	0.409	1	1.06	0.434
0.667	0.401	1	1.067	0.427
0.7	0.386	1	1.08	0.417
0.75	0.365	1	1.1	0.402
0.8	0.345	1	1.12	0.387
0.85	0.328	1	1.14	0.374
0.9	0.312	1	1.16	0.362
0.95	0.298	1	1.18	0.351
1	0.285	1	1.2	0.342
1.1	0.259	1	1.2	0.311
1.2	0.238	1	1.2	0.286
1.3	0.22	1	1.2	0.264
1.4	0.205	1	1.2	0.246
1.5	0.191	1	1.2	0.23
1.6	0.18	1	1.2	0.216
1.7	0.169	1	1.2	0.203
1.8	0.16	1	1.2	0.192
1.9	0.152	1	1.2	0.182
2	0.144	1	1.2	0.173
2.2	0.129	1	1.2	0.155
2.4	0.117	1	1.2	0.141
2.5	0.112	1	1.2	0.134
2.6	0.107	1	1.2	0.128
2.8	0.098	1	1.2	0.118
3	0.091	1	1.2	0.109
3.2	0.084	1	1.2	0.101
3.4	0.078	1	1.2	0.094
3.5	0.076	1	1.2	0.091
3.6	0.073	1	1.2	0.088
3.8	0.069	1	1.2	0.082
4	0.064	1	1.2	0.077
4.2	0.062	1	1.2	0.074
4.4	0.059	1	1.2	0.071
4.6	0.057	1	1.2	0.068
4.8	0.054	1	1.2	0.065
5	0.052	1	1.2	0.063

Probabilistic_Response_Spectrum_080409 v30 560.xls 11/1/2011 10:39 AM



GMT 2011 Jul 20 17:21:00 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 560. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.1

Bridge/Facility Name: RW-8 Bridge/Facility No.: RW-8

Latitude: 32.8847777 Longitude: -117.22703

Fault Information (#1)

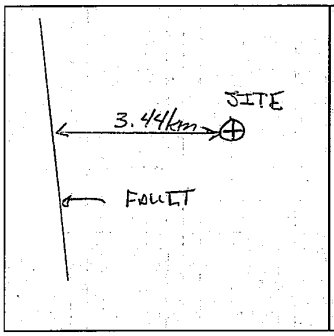
Fault Name: NEWPORT ENGLEWOOD ROSE CANYON Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

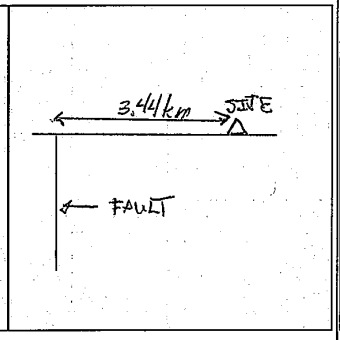
Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13 km

Plan View



Elevation View



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 580

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 7.4km

$Z_{2.5}$ (km/s): 2.0km

Notes:

Fault Information (#2)

Fault Name: _____ Fault ID#: _____

MMax: _____ Fault Type: _____

Fault Dip: _____ Dip Direction: _____

Top of Rupture: _____ Bottom of Rupture: _____

Plan View

Elevation View

Calculated or Measure Distances

R_{RUP}: _____

R_{JB}: _____

R_X: _____

Determination of V_{S30}

V_{S30} (m/s): _____

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): _____

$Z_{2.5}$ (km/s): _____

Notes:

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11- 022331 County: SD Route: 5 PM: 28.6

Bridge/Facility Name: RW-8 Bridge/Facility No.: RW-8

Latitude: 32.884777 Longitude: -117.22703

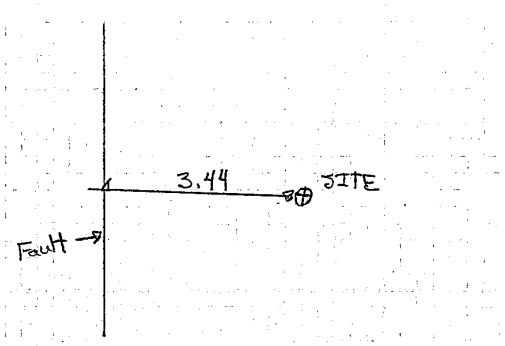
Deterministic Fault Information

Fault Name: NEWPORT INGLEWOOD ROSE CANYON FAULT ZONE Fault ID#: 224 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 km Bottom of Rupture: 13 km

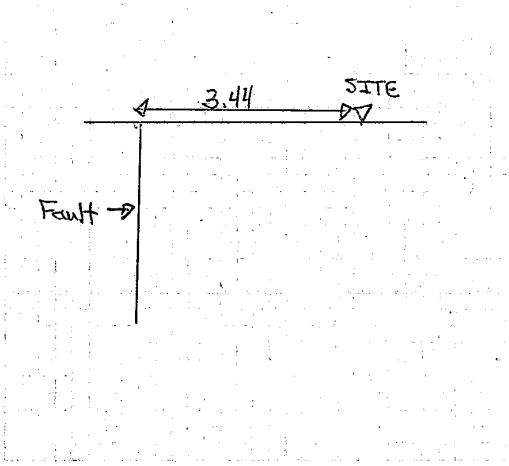
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	3.44 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	3.44 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	3.44 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 2.0 km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS Online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☑	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☑	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☐	☐	☑	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☑	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☑	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☑	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☑	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☑	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☐	☐	☑	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☑	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☑	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☑	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☑	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

RICHARD RUSNAK — TRANSPORTATION ENGINEER (CIVIL)

Checker (Print) — Title

11/7/2011

Checker (Signature) — Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

BRIAN HINMAN — SENIOR TE

Functional Supervisor (Print) — Title

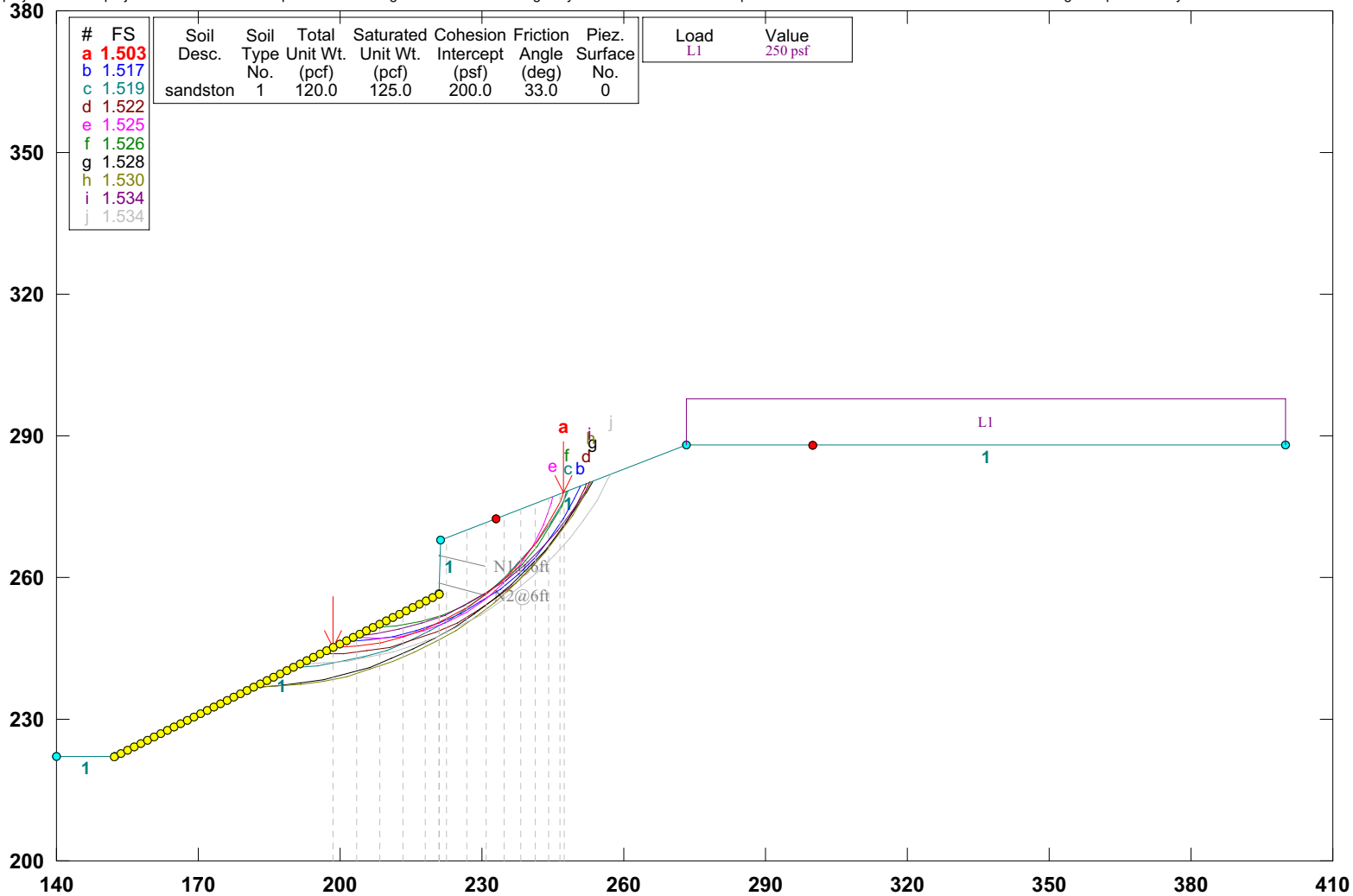
11/8/11

Functional Supervisor (Signature) — Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Bishop Modified sta 1596+50 RW8 soil nail wall rev BH global

d:\userdata\mike's projects\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw8\08172011\revised per brian oct 2011\11-022331 sta 1596+50 soil nail global.pl2 Run By: M FORDHAM CALTRANS 10/24/2011 1



GSTABL7 v.2 FSmin=1.503

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1596+50 RW8 soil nail wall rev BH

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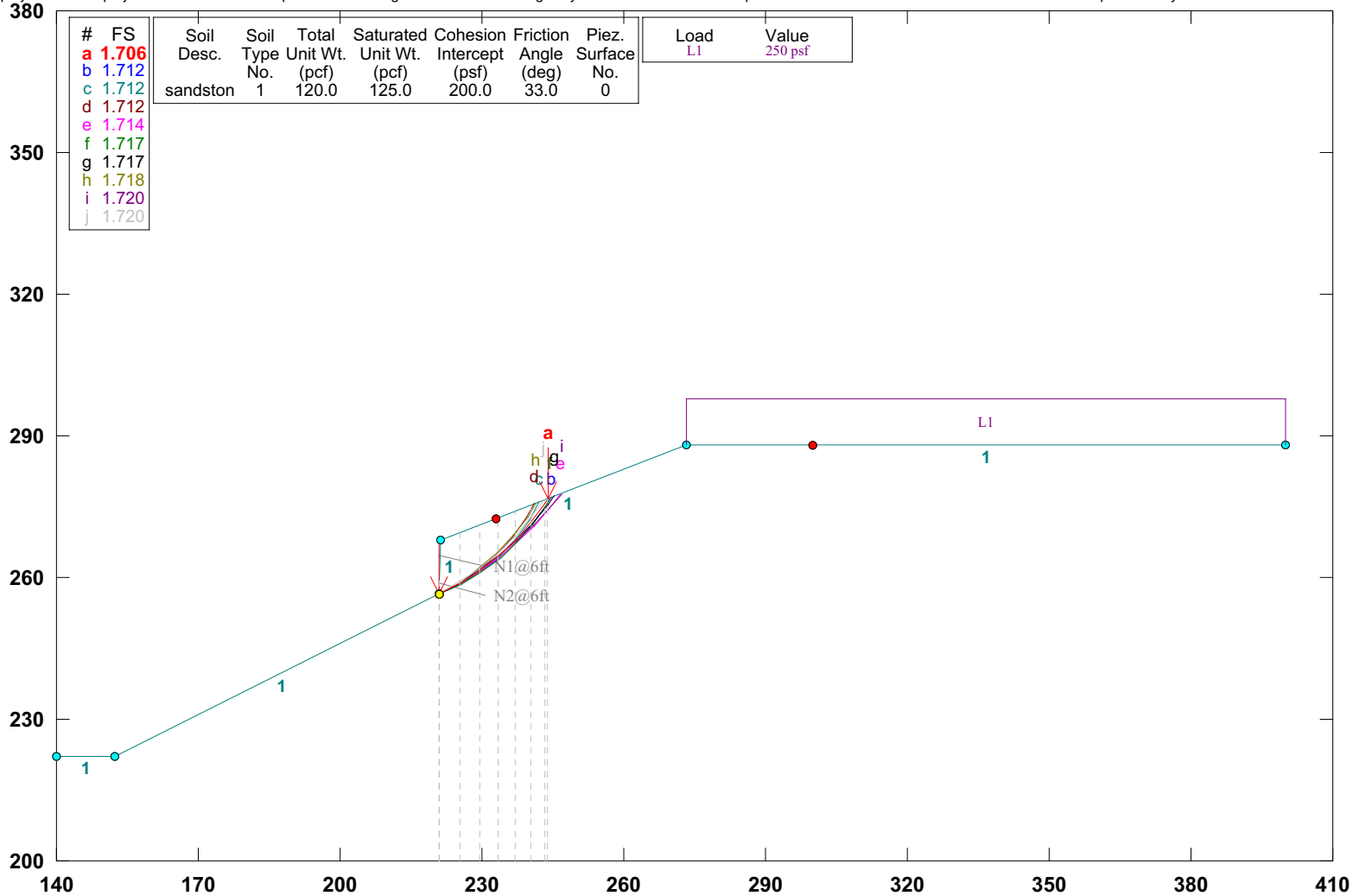

GSTABL7 v.2 FSmin=1.706

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1596+50 RW8 soil nail wall rev BH global eq

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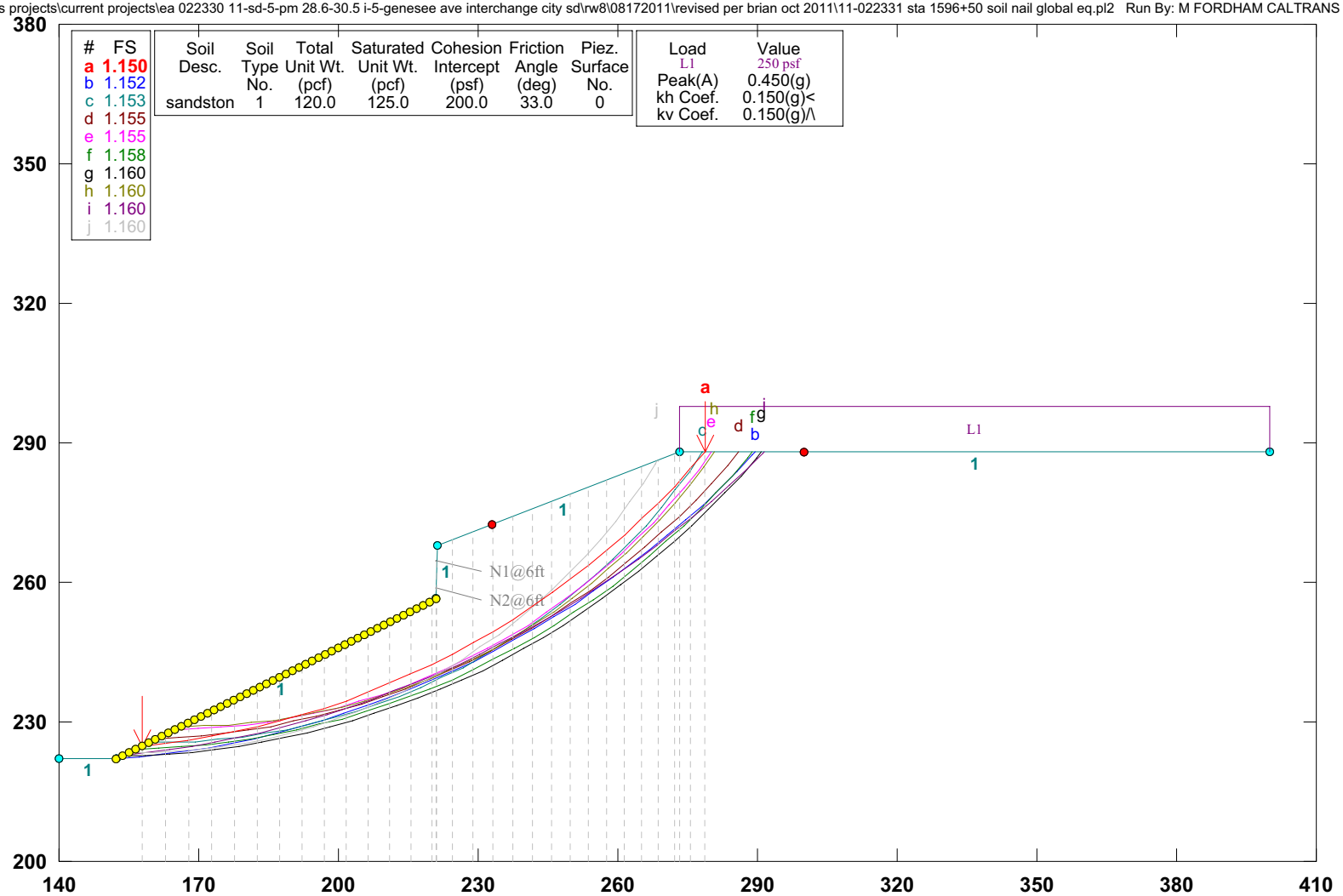

GSTABL7 v.2 FSmin=1.150

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1596+50 RW8 soil nail wall rev BH eq

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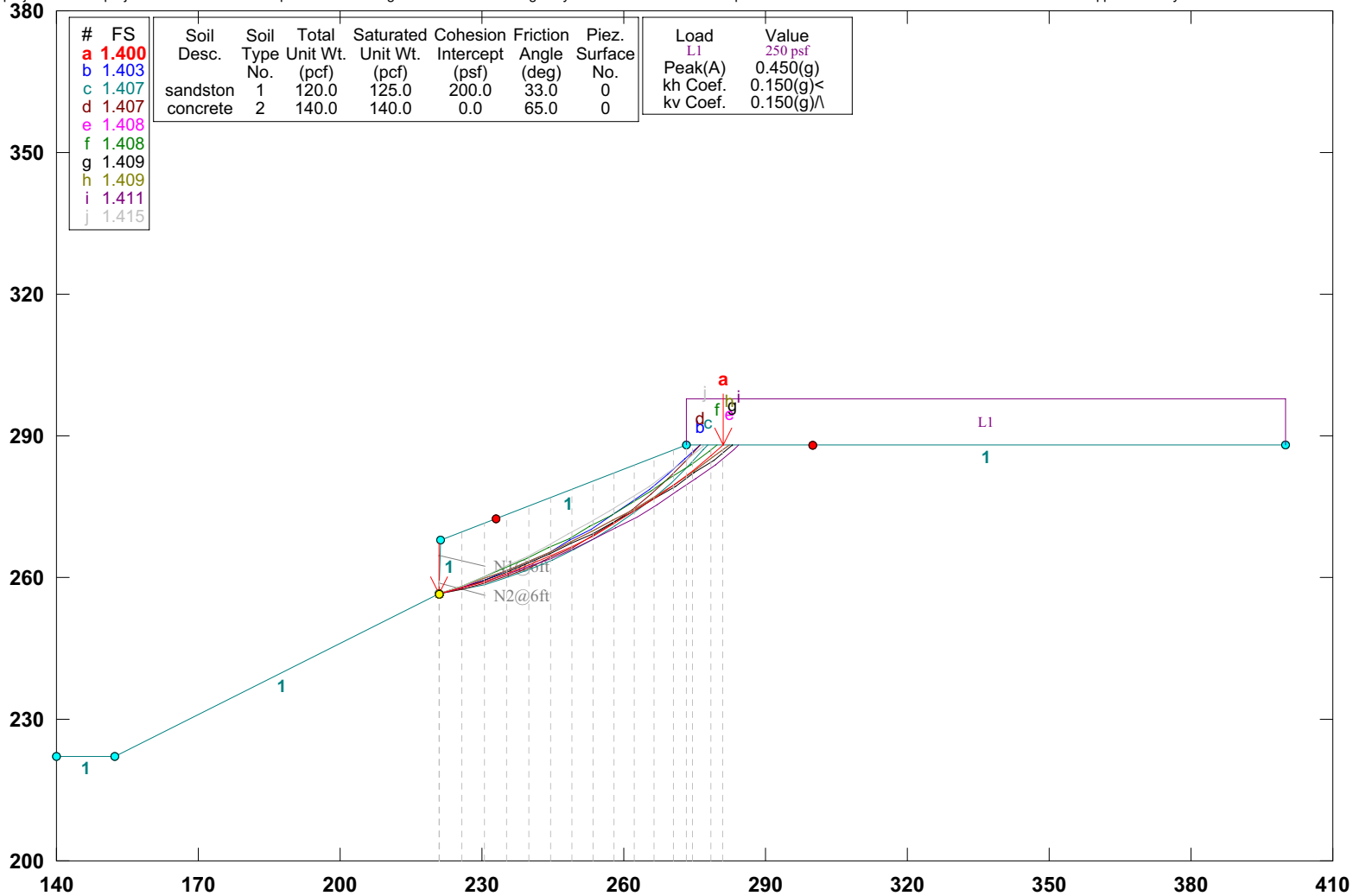

GSTABL7 v.2 FSmin=1.400

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1597+50 RW8 soil nail wall rev BH global

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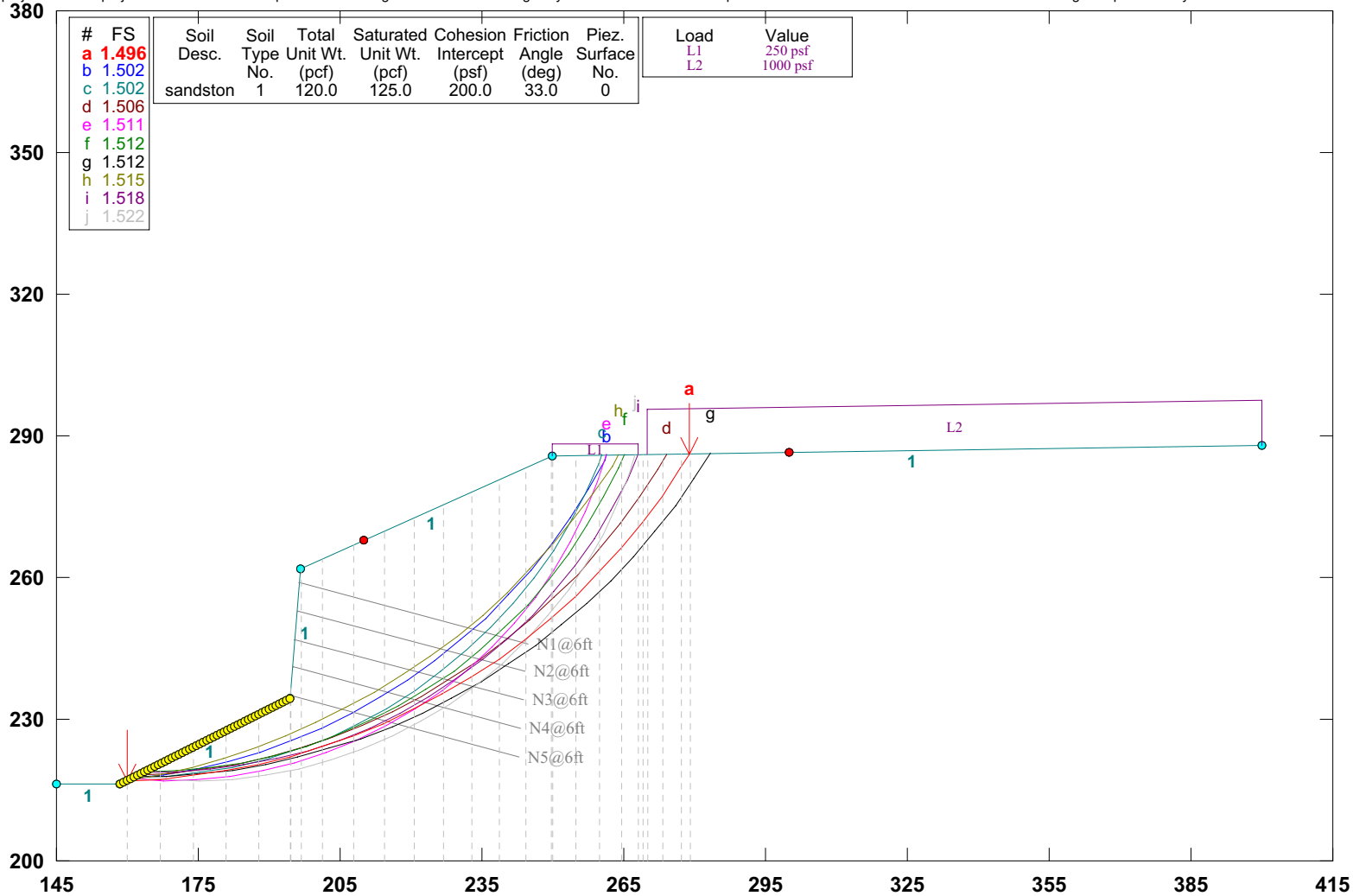

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1597+50 RW8 soil nail wall rev BH

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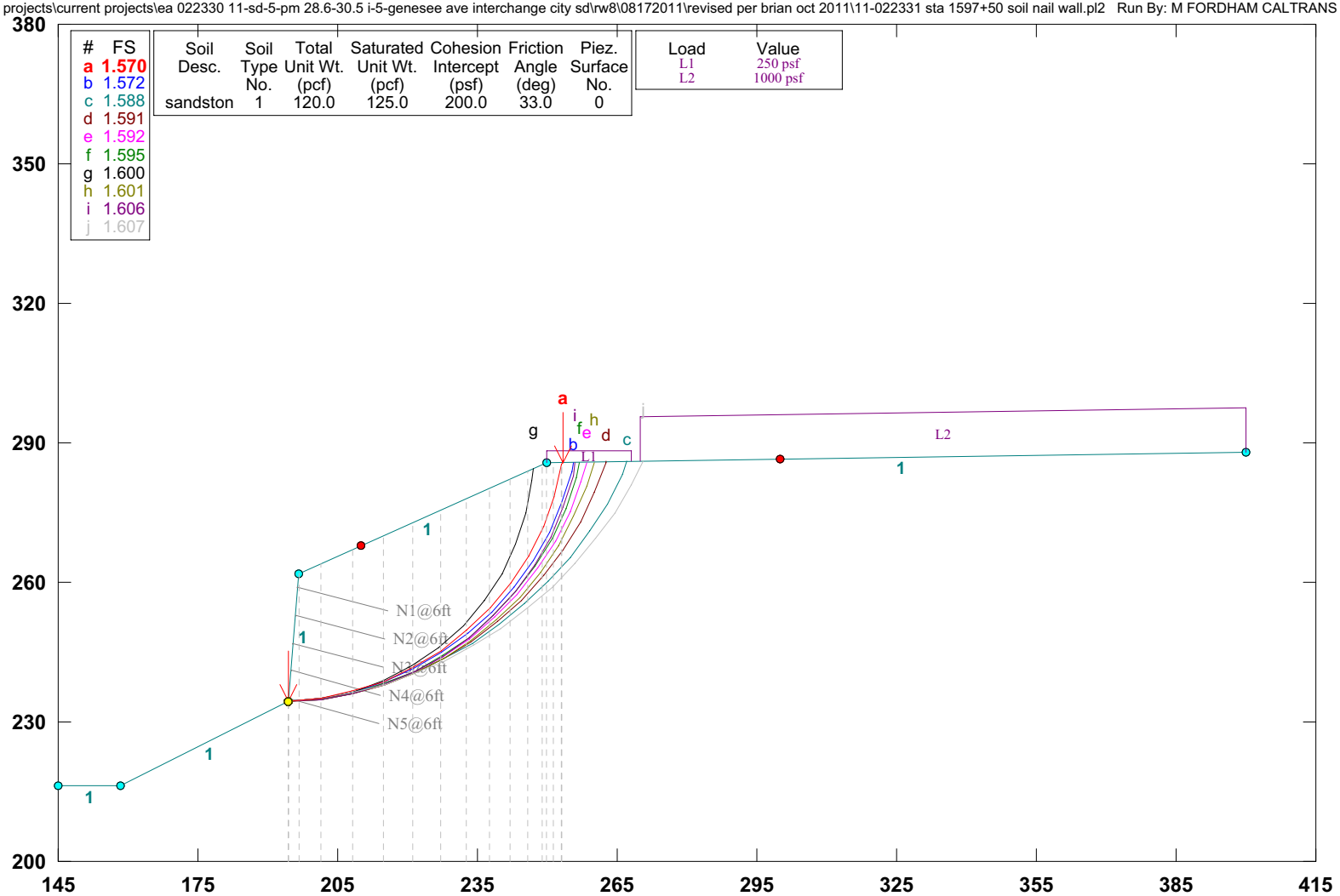

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Safety Factors Are Calculated By The Modified Bishop Method

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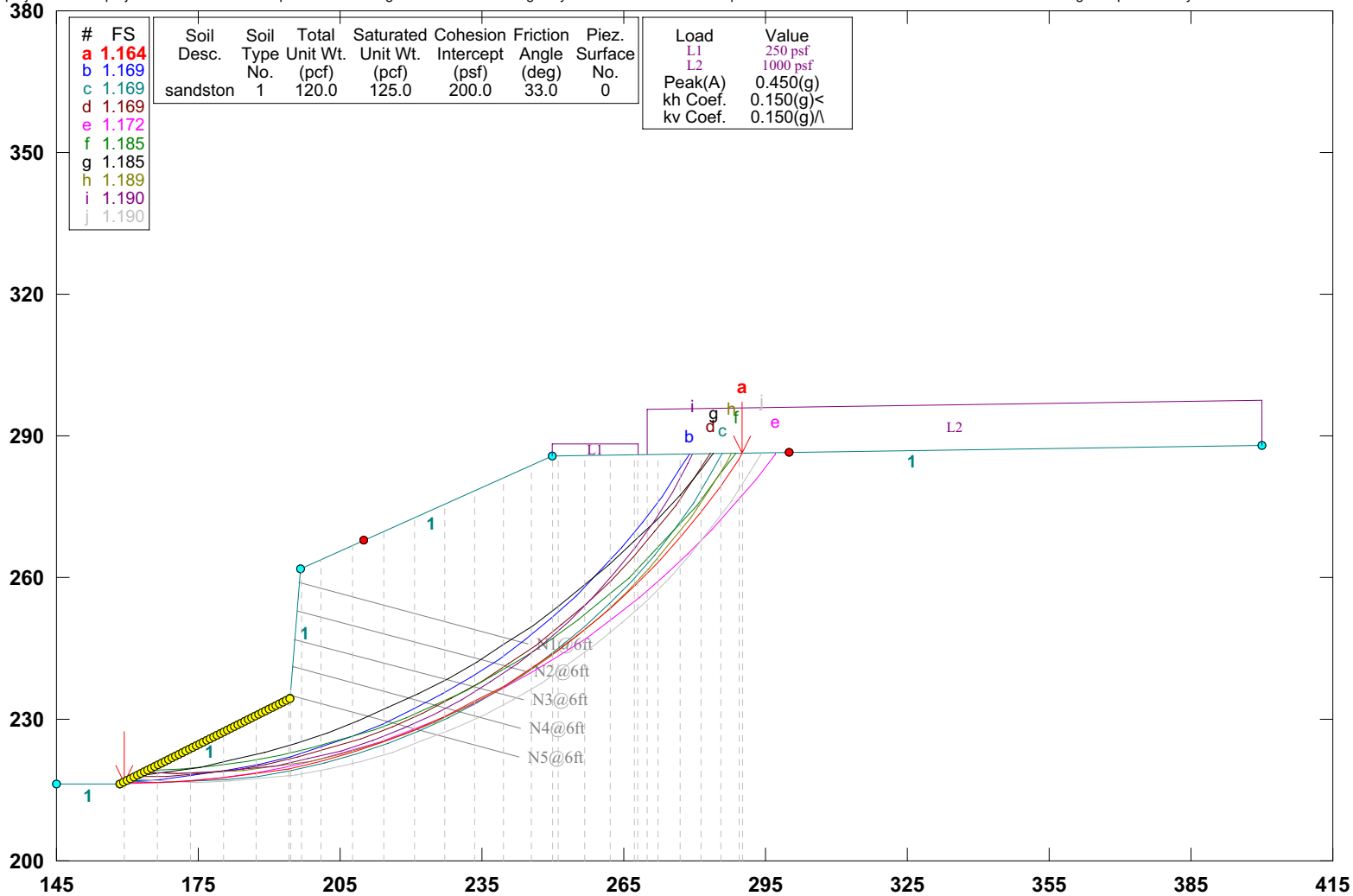

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1597+50 RW8 soil nail wall rev BH

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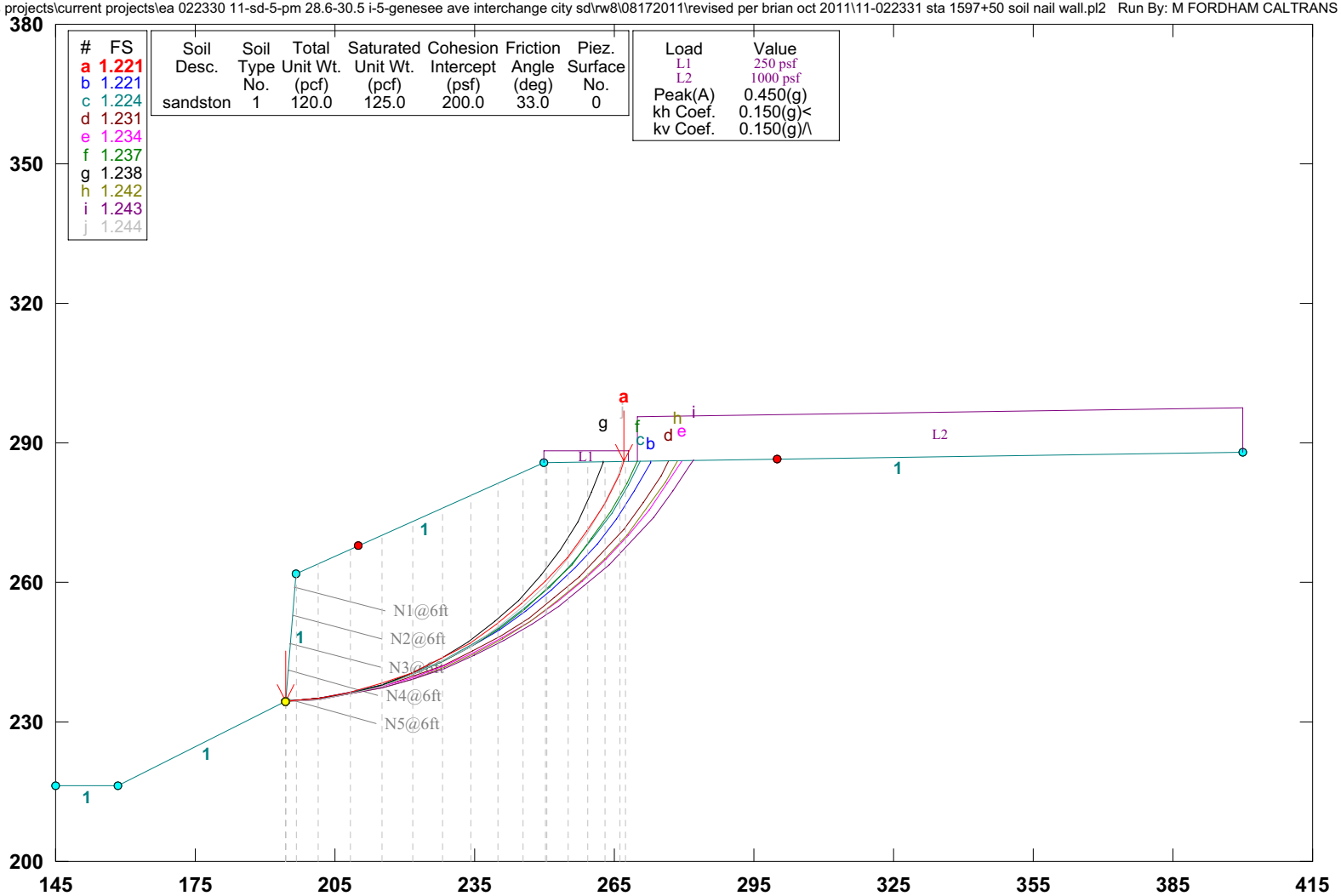

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Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 1598+50 RW8 soil nail wall rev BH

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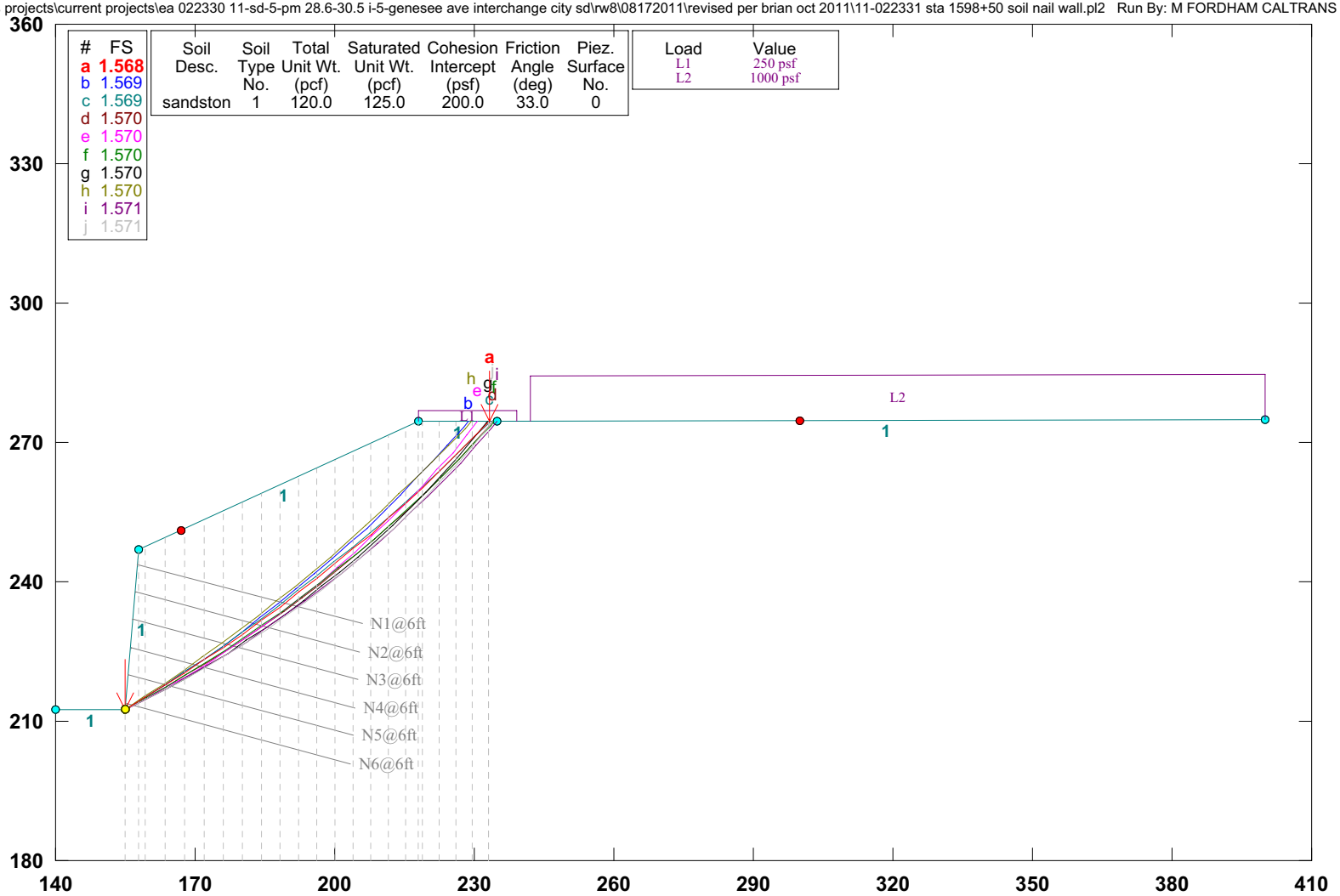

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Safety Factors Are Calculated By The Modified Bishop Method

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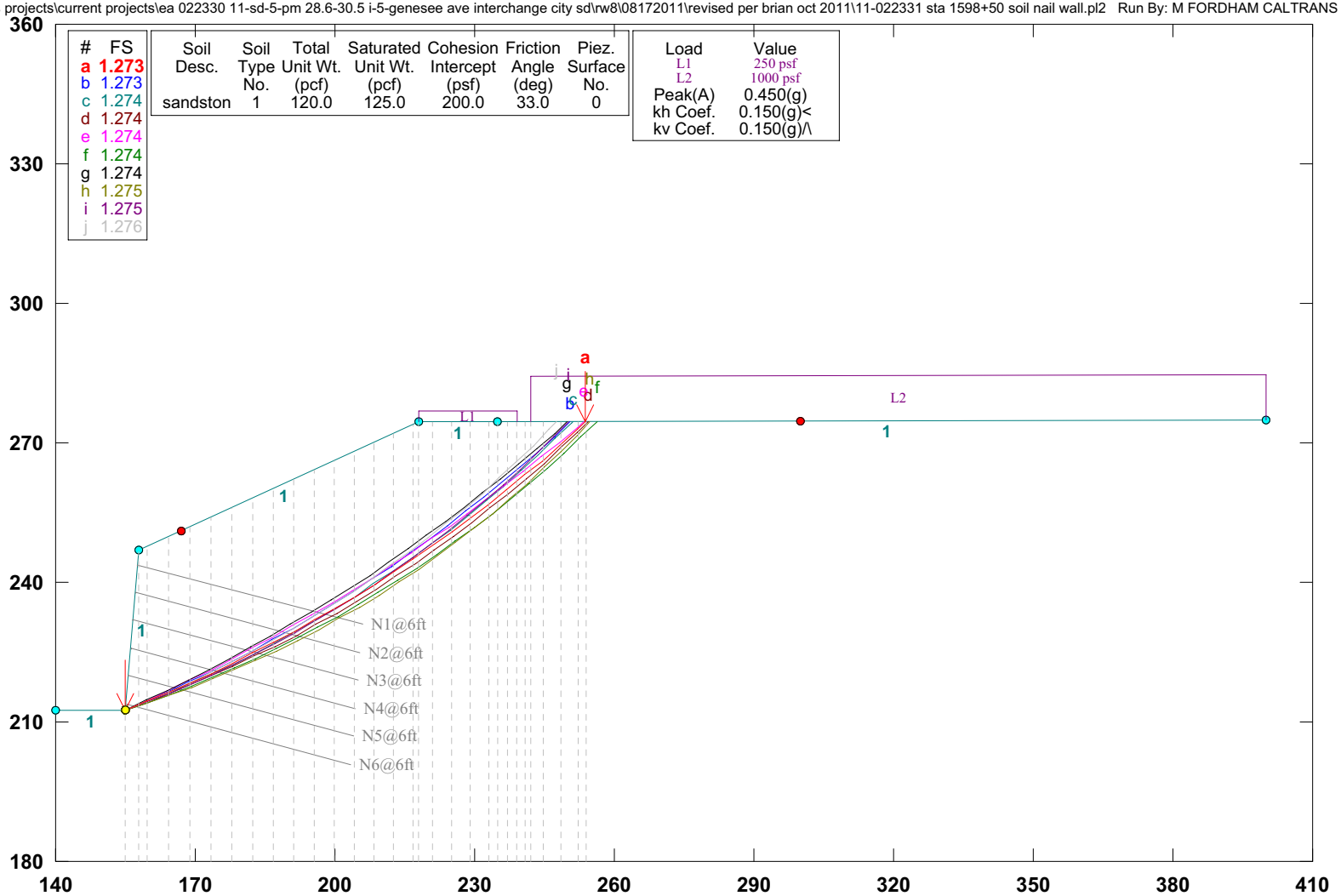

GSTABL7 v.2 FSmin=1.273

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX V
PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stolarski
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

State of California **Business, Transportation and Housing Agency**

A d d e n d u m

Flex your power!
Be energy efficient!

To: Majid Kharrati – 11
Project Design Engineer

Date: June 21, 2012

File: 11-SD-5-(PM)R28.6/R30.5
EA 287100/ EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-8.

The Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) Addendum for the I-5/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR Addendum documents changes to the design of Retaining Wall-8 (RW-8) and the associated geotechnical considerations. The information contained in this addendum supersedes any conflicting information contained in other reports.

1. A soil cohesive strength of three hundred and fifty pounds per square foot (350psf) was utilized for the design or RW-8.

2. The allowable bearing pressures for the proposed architectural treatment pilaster shallow foundations are:
   - Formation – 11,000psf
   - Artificial Fill – 4,370psf

3. Attached are revised tables to reflect revision in station limits and parameters used in retaining wall design.

Please ensure that this FR addendum is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

Prepared by:

Mike Fordham, P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman, P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

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Arturo Jacobo	District Project Manager
John Stayton	DES Office Engineer, Office of PS&E
Yong Pak	Project Engineer
Art Padilla	District Materials Engineer
Abbas Abghari	Office Chief, OGDS2
Shira Rajendra	Geotechnical Services Corporate
OGDS2 File Room	7177 Opportunity Road, San Diego, CA 92111
District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
Mike Ross	Kimley Horn and Associates
Craig Shannon	Simon Wong Engineering

TABLE 3: RETAINING WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-8	Soil Nail	1595+65.15 SD-5-Line 10+00 RW-8-Line	1596+95.42 SD-5-Line 11+35 RW-8-Line	135	14	2:1	2:1	1H:12V	Cut
		1596+95.42 SD-5-Line 11+35 RW-8-Line	1597+27.51 SD-5-Line 11+70 RW-8-Line	35	22	2:1	2:1	1H:12V	Cut
		1597+27.51 SD-5-Line 11+70 RW-8-Line	1598+18.13 SD-5-Line 12+75 RW-8-Line	105	37	Varies	2:1	1H:12V	Cut
		1598+18.13 SD-5-Line 12+75 RW-8-Line	1599+13.32 SD-5-Line 13+75 RW-8-Line	100	39	Flat	2:1	1H:12V	Cut
		1599+13.32 SD-5-Line 13+75 RW-8-Line	1600+12.73 SD-5-Line 14+90.25 RW-8-Line	115.25	39	Varies	2:1	1H:12V	Cut

Notes: L = Wall Length
H_{MAX} =Approximate Maximum Wall Height
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-8	Soil Nail	1594+65.15 SD-5-Line 10+00 RW-8-Line	1600+12.73 SD-5-Line 14+90.25 RW-8-Line	Sedimentary Formation	33	350	121

Notes:
Global slope stability calculations were performed using a Coh of 200 psf.
φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 5A: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	NS (psi)	AHS (lbs)	NHS_{MAX} (ft)	NVS_{MAX} (ft)	NIA (degrees)	$DTOP_{MAX}$ (ft)	$DBOT_{MAX}$ (ft)
RW-8	Soil Nail	1594+65.15 SD-5-Line 10+00 RW-8-Line	1600+12.73 SD-5-Line 14+90.25 RW-8-Line	3,6000	30,000	6	6	15	2.5	3

Notes: NS = Nail Strength
AHS = Assumed Head Strength
NHS_{MAX} = Maximum Nail Horizontal Spacing
NVS_{MAX} = Maximum Nail Vertical Spacing
NIA = Nail Inclination Angle from the Horizontal
$DTOP_{MAX}$ = Maximum distance from the top of the wall to the top row of nails.
$DBOT_{MAX}$ = Maximum distance from the bottom of the wall to the bottom row of nails.

TABLE 5B: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	DPR (kips/ft)	RBD (in)	MNL (ft)	MNR
RW-8	Soil Nail	1595+65.15 SD-5-Line 10+00 RW-8-Line	1596+95.42 SD-5-Line 11+35 RW-8-Line	5.4	1.128	25	3
		1596+95.42 SD-5-Line 11+35 RW-8-Line	1597+27.51 SD-5-Line 11+70 RW-8-Line	5.4	1.25	45	4
		1597+27.51 SD-5-Line 11+70 RW-8-Line	1598+18.13 SD-5-Line 12+75 RW-8-Line	5.4	1.41	60	7
		1598+18.13 SD-5-Line 12+75 RW-8-Line	1599+13.32 SD-5-Line 13+75 RW-8-Line	5.4	1.25	50	7
		1599+13.32 SD-5-Line 13+75 RW-8-Line	1600+11 SD-5-Line 14+90.25 RW-8-Line	5.4	1.128	45	7

Notes: DPR = Design Pullout Resistance
RBD = Reinforcing Bar Diameter
MNL = Minimum Nail Length
MNR = Maximum Number of Rows at Hmax

TABLE 6: WALL STABILITY TESTING ZONE(S)

Wall Zone	Beginning Station	Ending Station	Upper Elevation (ft)	Lower Elevation (ft)
1	1594+65.15 SD-5-Line 10+00 RW-8-Line	1600+12.73 SD-5-Line 14+90.25 RW-8-Line	268.63	212.87

FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-11

11-SD-5 /PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

December 14, 2012

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California **Business, Transportation and Housing Agency**

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: December 14, 2012

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-11

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the Interstate--5/Genesee Avenue Interchange Improvement Project, Retaining Wall-11 (RW-11), in the City of San Diego, in San Diego County, California.

This FR documents the revised RW-11 alignment, profile, and design parameters; the existing foundation conditions; and provides specific seismic and foundation recommendations for the revised alignment and profile. The report defines the geotechnical conditions as evaluated from field investigation data and used in the development of the geotechnical design. This report provides recommendations and specifications for project design and construction.

No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

Mike Fordham P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

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John Stayton	DES Office Engineer, Office of PS&E
Yong Pak	Project Engineer
Art Padilla	District Materials Engineer
Abbas Abghari	Office Chief, OGDS2
Shira Rajendra	Geotechnical Services Corporate
OGDS2 File Room	7177 Opportunity Road, San Diego, CA 92111
District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
Mike Ross	Kimley Horn and Associates
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1.0 SCOPE OF WORK

This Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for the new alignment and profile of Retaining Wall-11 (RW-11), to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project, in the City of San Diego, San Diego County, California, hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to evaluate the retaining wall alignment and profile, document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and to provide recommendations relevant to the design and construction of RW-11 with respect to the revised alignment and profile of the wall. The configuration of RW-11 addressed in this report was conveyed to OGDS2 on October 12, 2012. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein including Caltrans "Foundation Report Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-11," dated February 29, 2012, and "Foundation Report Addendum for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-11, dated June 21, 2012."

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, engineering analyses, and retaining wall design. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all Stations are referenced to the "RW-11" Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Foundation Report Preparation for Retaining Walls, July 2010.* No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The proposed I-5/Genesee Avenue Improvement Project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the I-5/Genesee Avenue Improvement Project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. Therefore, this Revised FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The I-5/Genesee Avenue Improvement Project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-11, are necessary to accommodate the I-5/Genesee Avenue Improvement Project and the associated features. RW-11 will accommodate the freeway widening and realignment of the onramp in the northeast quadrant of the project.

Figure 1 depicts the approximate location and alignment of RW-11. Figure 2A and Figure 2B are the layout sheets provided by Caltrans District 11 Design and utilized in the preparation of this FR. Figure 3 is the profile sheet provided by Caltrans District 11 Design and utilized in the preparation of this FR. Cross sections, perpendicular to the wall alignment, are shown in Figure 4A through Figure 4R.

RW-11 is proposed to be a soil nail wall. Refer to Section 10.0 for the discussion of wall type selection.

RW-11 will be located along the south side of Genesee Avenue east of the Genesee Avenue OC. The wall will parallel the south side of Genesee Avenue between "RW-11" LINE Station 9+85.00 and Station 18+96.50. The wall will be approximately nine hundred and twelve-feet (912ft) in length with a

maximum design height of approximately thirty five-feet (35ft).

3.0 AS-BUILT FOUNDATION DATA

RW-11 will be located approximately three hundred-feet (300ft) to the east of the Genesee Avenue OC on a fault block that is down-dropped relative to the block beneath the overcrossing. RW-11 will be constructed in sedimentary strata that is stratigraphically higher than the strata beneath the Genesee Avenue OC. The LOTB for the Genesee Avenue OC are included in Appendix I. The LOTB contain useful descriptions of the site soil characteristics but do not represent the stratigraphy at RW-11.

A parking lot and access road for Scripps Memorial Hospital-La Jolla reside along the top of slope above the proposed location of RW-11. Information conveyed to OGDS2 suggests that the access road contains utilities. The utilities of concern located within the access road are two sewer lines which are assumed to service the Scripps Memorial Hospital La Jolla. The approximate location of these utilities in relation to the revised RW-11 alignment and profile are presented in project layouts, Figure 2A to 2B, the project profile Figure 3, and the project cross sections, Figure 4A to 4R.

Scripps Memorial Hospital-La Jolla is concurrently developing or implementing plans to construct improvements including a Central Energy Plant (CEP) the Scripps XiMED II Medical Office Building (MOB), perimeter access roads, and the Burtec parking lot. A map depicting the existing features and proposed improvements developed by Scripps Memorial Hospital-La Jolla and provided to OGDS2 is included in Appendix I. The CEP is located to the west of the proposed location of RW-11. The CEP and associated perimeter access roads are currently under construction and will be completed prior to the construction of the Genesee Avenue Interchange Improvement Project. A right-of-way swap with Scripps Memorial Hospital-La Jolla was developed to accommodate the improvements proposed by all stakeholders and to simplify the properties lines in the area. A map depicting the right-of-way swap is included in Appendix I.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted in February 2009. Two (2) boring were developed for RW-11 in February 2009. The approximate locations of the borings are depicted in Figure 2B. Boring records for R-09-001 and R-09-002 are included in Appendix II. LOTB are in the process of being prepared and will be submitted separately from this report.

Exploratory borings using a hand auger were conducted in January 2011. The hand auger borings were conducted to determine the type and estimate the in place density of the subsurface soils along the alignment of RW-11. The locations of the exploratory borings using the hand auger are depicted on Figure 2B. The hand auger boring records are included in Appendix II.

The naming convention used for the hand auger boring records includes the boring method, the two digit year, and the approximate center line Station along the metric preliminary exploration plan, followed by the notation R or L indicating that the boring was to the right or left of the 11-SD-5 line Station. For example, boring HA-12-11114R is a hand auger conducted in 2012 that was developed to the right of approximate metric Station 111+14 along the “GEN” line. Metric Stationing was utilized because the subsurface investigation was performed prior to Caltrans transition back to U.S. Customary Units.

Hand driven soil probe testing was conducted in January 2011. The soil probes were conducted to determine the in place density of subsurface materials along the alignment of RW-11. The soil probe tests were performed adjacent to the hand auger borings. The locations of the hand auger borings are depicted on Figure 2B. The soil probe boring records are included in Appendix II.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to delineate the soil conditions anticipated to impact the design and construction of RW-11.

The request to the District 11 Office of Land Surveys to stake the alignments of the RW-11 through RW-15 and the subsequent survey data provided are included in Appendix II. The request for the survey of the I-5/Genesee Avenue Interchange Improvement Project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are also included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

Bulk soil samples were collected to test the corrosivity of the soil in the project area. Corrosion testing is discussed in Section 8.0. Corrosion data provided by the laboratory are presented in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

This section describes the project site geology and subsurface conditions. The project site geology was interpreted based on previous field investigations, current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map was acquired from the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975*. The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining wall. Field mapping conducted for this investigation resulted in no modifications to the geology depicted at the proposed retaining wall site. Figure 6 depicts a profile of the geology beneath the existing grade along the revised alignment of RW-11. Figure 7A through Figure 7R depict the geology of cross sections along the RW-11 revised alignment.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. RW-8 will be located on the east side of I-5 along the west facing slope of the through cut. The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

The entire length of RW-11 will be located in a cut slope composed of sedimentary formation. The cut slope is mantled by a thin veneer of young soil and ice plant. The formation beneath is comprised of moderately indurated, interbedded sandstone and siltstone with concretions. The concretions are well cemented nodules and lenses' ranging from cobble forms to lens shapes a few feet thick and greater than ten-feet (10ft) across. Concretions are anticipated to constitute up to two-percent (2%) of the total material excavated for wall construction. Concretions were encountered in the exploratory borings drilled at the wall site. Photographs of concretions exposed during construction of the CEP at Scripps Memorial Hospital-La Jolla, which is located to the west of the RW-11 alignment, are depicted in Appendix II.

The geologic units in the project area as depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fill in the project area appear to be derived from material excavated

from nearby cuts in the sandstone and siltstone.

- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.
- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and the Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voight Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the I-5/Genesee Avenue Improvement Project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego. However, the alignment of RW-11 is underlain by competent sandstone and siltstone that is not laterally truncated by faults or compromised by unfavorable or adverse structure.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the *City of San Diego, Seismic Safety Study Geologic Hazards and Faults* for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured

in the past one million six hundred thousand-years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC through the UCSD campus and into Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault system running on a north-northwest trend and located offshore approximately two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

The project site is underlain by competent sandstone and siltstone with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible, or expansive soils have not been observed along the revised alignment of RW-11.

Depth to Bedrock

Sedimentary formation is located at the ground surface along the entire revised alignment of RW-11.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-11 is not located along a stream course. A scour evaluation for the retaining wall is not applicable to this project.

8.0 CORROSION EVALUATION

Multiple bulk soil samples were collected to test the corrosivity of the soil in the project area. Corrosion data provided by the laboratory are presented in Appendix III.

Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less. None of the conditions considered to make the site soils corrosive were present in the samples collected. Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section includes the seismic study and addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set forth in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B.*

According to the *Seismic Design Criteria (SDC) Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50). The two (2) borings developed along the revised alignment of RW-11 had SPT results that were generally greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in Appendix B of the SDC, the Soil Profile Type is "C" for sedimentary formation.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the ARS online tool was five hundred and sixty-meters per second (560m/s), which correspond to Soil Profile Type C. The closest regional active fault as indicated by the Caltrans ARS Online tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site, which is the Spectral Acceleration at a period of zero-seconds (0sec), is forty five one hundredths-gravity (0.45g). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately twenty three on hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The project site is located within sedimentary formation and well above any groundwater table. There is no potential for liquefaction at the project site.

Since active faults are in the vicinity of the project site, ground motion will be produced by an earthquake. However, since no active faults transect the project site, there is no potential for surface fault rupture at the project site.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

RW-11 will be constructed within dense sedimentary formation. There is no potential for seismically induced settlement.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of RW-11 do not exist at the project site.

Pseudo static modeling and slope stability analyses were conducted to assure that RW-11 will meet stability requirements in a seismic event. Stability analyses are discussed in Section 10.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

RW-11 will be a soil nail retaining wall located along the south side of Genesee Avenue east of the Genesee Avenue OC. The wall will parallel the south side of Genesee Avenue between "RW-11" LINE Station 9+85 and Station 18+96.50. The wall will be approximately nine hundred and twelve-feet (912ft) in length with a maximum design height of approximately thirty five-feet (35ft).

A temporary back cut to facilitate the construction of any cast-in-place retaining wall of the proposed height is not feasible. A self-shoring, top-down stage construction retaining wall system is appropriate for the site constraints, slope geometry, and sedimentary formation that exist at the proposed wall location. A soil nail wall is the most economical of such retaining wall systems. The retaining wall design parameters as provided by the project development team and as determined through the evaluation of site soils are presented in Table 3.

The revised alignment of RW-11 will retain a cut that will encroach further into an existing cut slope that is inclined as steep as one and one half horizontal to one vertical (1.5H:1V). Sedimentary formation

comprised of layered siltstone and sandstone with concretions underlies the slope. A parking lot and access road for Scripps Memorial Hospital reside along the top of slope. Information conveyed to OGDS2 suggests that the access road contains utilities. The locations of utilities that facilitated the revised alignment, profile and ultimately the redesign of RW-11 were conveyed to OGDS2 by Caltrans District 11 and Kimley-Horn and Associates design teams. The possible conflict between the original RW-11 alignment and the utilities was the impetus for the revised RW-11 design and FR.

A two horizontal to one vertical (2H:1V) or flatter slope will extend from the toe of RW-11 to Genesee Avenue from"RW-11" Line from Station 9+85 to Station 11+30 and from Station 15+70 to 18+96.50. A bioretention channel will extend from the toe of RW-11 to Genesee Avenue between "RW-11" Line Station 11+30 and Station 15+70. The bioretention channel is comprised of five-foot (5.0ft) deep channel with a perforated pipe running along its length. The pipe and channel are backfilled with two layers of rock one and on-half to three-feet (1.5 to 3ft) thick separated by a layer of soil two to three-feet (2 to 3ft) thick. Additionally, one and one half horizontal to one vertical (1.5H: 1V) or flatter slope will extend from the top of wall to the parking lot and access road above. A global stability evaluation was performed to assure the stability of the combined retaining wall and slope configuration. The proposed configuration was determined to meet Caltrans criteria for both static and pseudo static (seismic) stability. Results of the stability analyses for revised RW-11 geometry are included in Appendix IV.

The soil nail wall design and global slope stability analyses for the revised RW-11 geometry were performed using SnailWin 3.10 and STEDWIN with GSTABL7 v2.0. Both internal stability and global stability were evaluated by modeling various wall heights and adjoining slopes. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of external loading such as the weight of buildings and possible transient loads above the wall was factored into the stability analyses. A water table was modeled to account for the possibility of extended periods of ponded water that may result from the bioretention channel. The criteria found to control the design length of the soil nails was the need to satisfy the global stability. The soil strength design parameters utilized in the analyses are presented in Table 4. The soil nail design parameters utilized in the analyses are presented in Table 5A and Table 5B. The graphic results of the stability analyses are presented in Appendix IV.

The earth retained by a soil nail wall must move in order to activate resisting forces along the nails. Minor deflection of the wall face and minor deformation of the earth behind the wall face should be anticipated. The wall face deflection and maximum limit of adjacent ground surface deformation may be estimated based on guidelines presented in the *Manual for Design and Construction Monitoring of Soil Nail Walls, Publication No. FHWA-SA-96-069R*. A horizontal and vertical deflection of approximately one-half-inch (0.5in) should be anticipated for the upper wall face. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height. These estimated wall movements are not expected to impact the integrity of any improvements behind the walls.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-11 be designed and constructed as a soil nail retaining wall. The parameters that may be used for the structure design are presented in Table 3 through Table 5B.

The recommended length of soil nails, the design pullout resistance values, and the strength and diameter of the reinforcing bars are provided in Table 5A and Table 5B.

Project site soils are considered non-corrosive.

12.0 NOTES TO DESIGNER

As currently planned, some soil nails will extend beyond the current Caltrans/City of San Diego right-of-way. The soil nail anchor lengths should be considered when determining the right-of-way requirements.

The designs of RW-11 should incorporate a drainage system behind the wall face such as vertical drainage strips connected to outlet pipes. Weep holes should be placed at the toe of RW-11 and at the finish grade of the backfilled bioretention channel.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining wall should be avoided. Features that promote infiltration adjacent to the retaining wall could have an adverse impact on the performance of the retaining wall.

A soil nail retaining wall may be constructed with either a sculpted shotcrete or cast-in-place facade. Sculpted shotcrete is typically more economical.

13.0 CONSTRUCTION CONSIDERATIONS

The sedimentary formation found along the revised alignment of RW-11 may generally be excavated using standard excavation equipment. Nail shafts may generally be drilled with conventional nail drilling equipment.

Rock like material (concretions) exists within the sedimentary formation. Excavation and drilling equipment capable of cutting through concretions up to ten-feet (10ft) in dimension should be utilized. It should be anticipated that one or more large concretions may be encountered during the drilling of each nail shaft.

The occurrence of groundwater is not anticipated to significantly impact retaining wall construction.

The occurrence of caving soils is anticipated to be minimal and is not anticipated to significantly impact retaining wall construction.

A horizontal and vertical deflection of about one-half-inch (0.5in) should be anticipated for the upper wall face at the tallest portion of the retaining wall. The horizontal limit of potential ground deformation behind the wall face is anticipated to be about equal to the wall height.

The construction of the soil nail wall is not anticipated to have any adverse effect on existing facilities or utilities. However, a pre-construction survey of the super adjacent access road and parking structure should be conducted to document the condition of the facility prior to construction.

Survey monuments should be placed on the ground surface a horizontal distance of thirty-five-feet (35ft) behind the wall face. The position of these monuments should be measured and recorded prior to any wall excavation and periodically measured throughout the project in order to monitor and document ground deformation behind the retaining wall.

The Contractor may elect to perform excavation stability testing to verify his proposed lift height and duration of exposure. The site exploration discovered no substantially varying zones within the sedimentary formation that will host the wall; therefore, the entire wall alignment lies within one stability testing zone.

Production nails may be used as proof and test nails. Eight percent (8%) of the total nails installed should be proof tested. The proof tested nails should be distributed throughout the wall face. Two verification test nails must be installed and tested.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and*

Rock Logging, Classification, and Presentation Manual June 2010. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is somewhat less than prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to observations of nearby excavation, information obtained from hand augers,and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and location that have been provided to OGDS2. If any conceptual changes are made during final project design, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analysis. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

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Ninyo & Moore, *Preliminary Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-235800), December 2005

Ninyo & Moore, *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-022330), December 2007

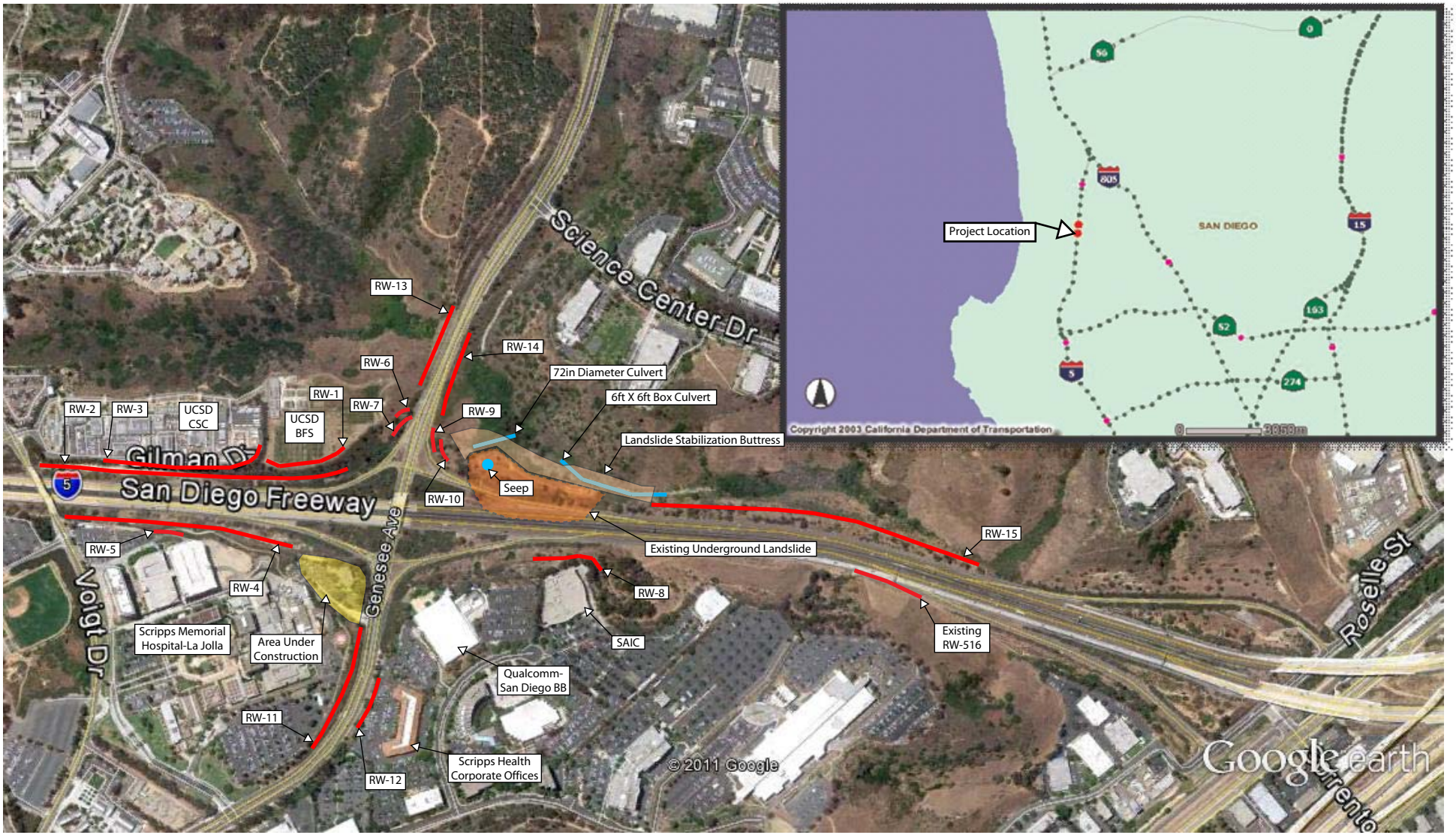
PBS&J, *University of California San Diego Long Range Development Plan, Final Environmental Impact Report*, September 2004

Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

FIGURES



Google earth

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km 1

Note: The locations, alignments, and lengths of the retaining walls; the location of the seep; the location, length, and alignment of the landslide stabilization buttress, the location and area of the landslide are approximated.

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5		..

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

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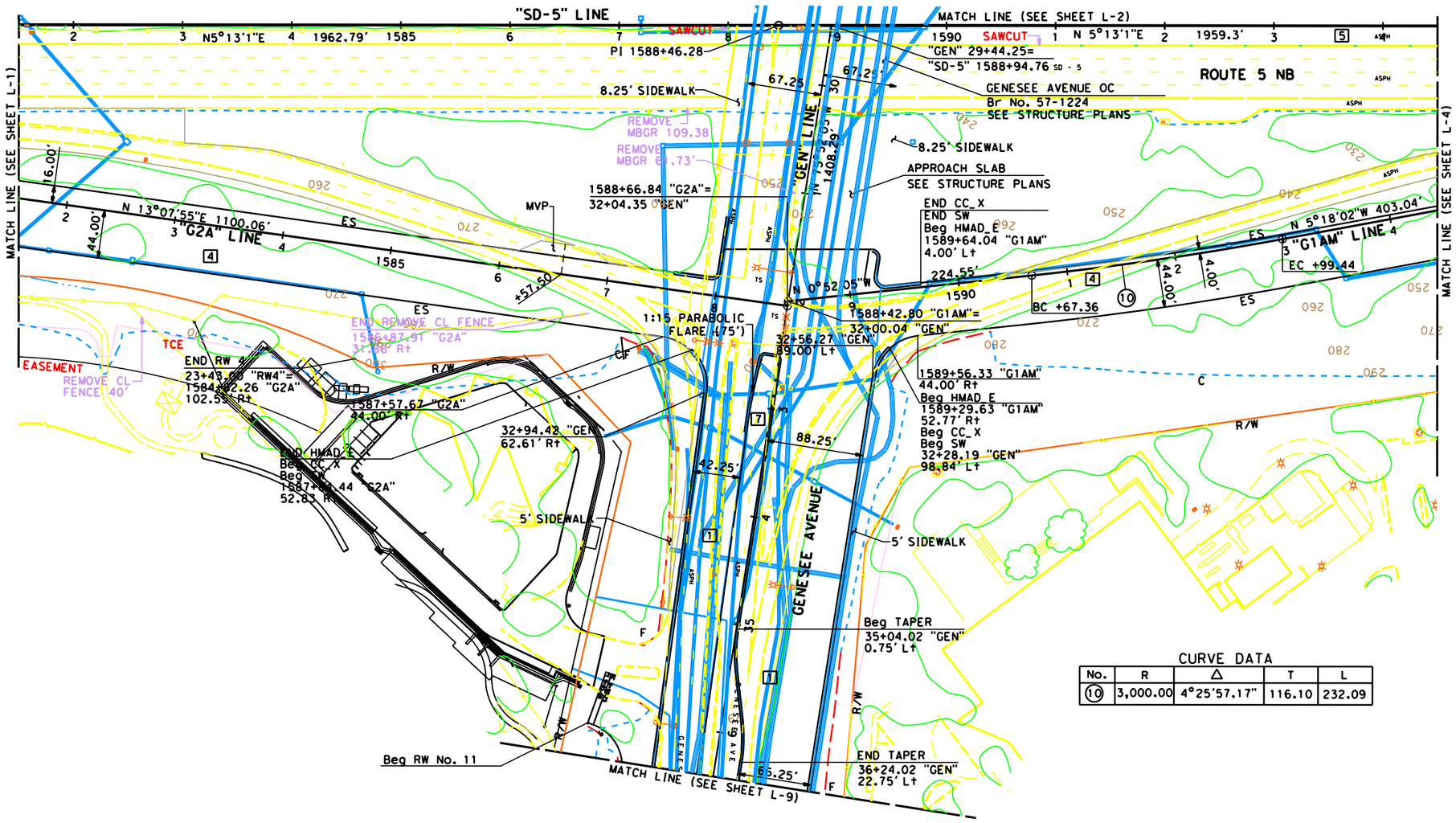
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:
FOR ACCURATE RIGHT OF WAY AND EASEMENT DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

SAN DIEGO



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L-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL ROSS
CALCULATED-DESIGNED BY: GREG ZEITOUNIAN
CHECKED BY: CASEY LEWIS
REVISED BY
DATE REVISED

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UNIT 2771
PROJECT NUMBER & PHASE 110000000121

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FIGURE 2A: PROJECT LAYOUT

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5		..

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

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401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:
FOR ACCURATE RIGHT OF WAY AND EASEMENT DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

SAN DIEGO

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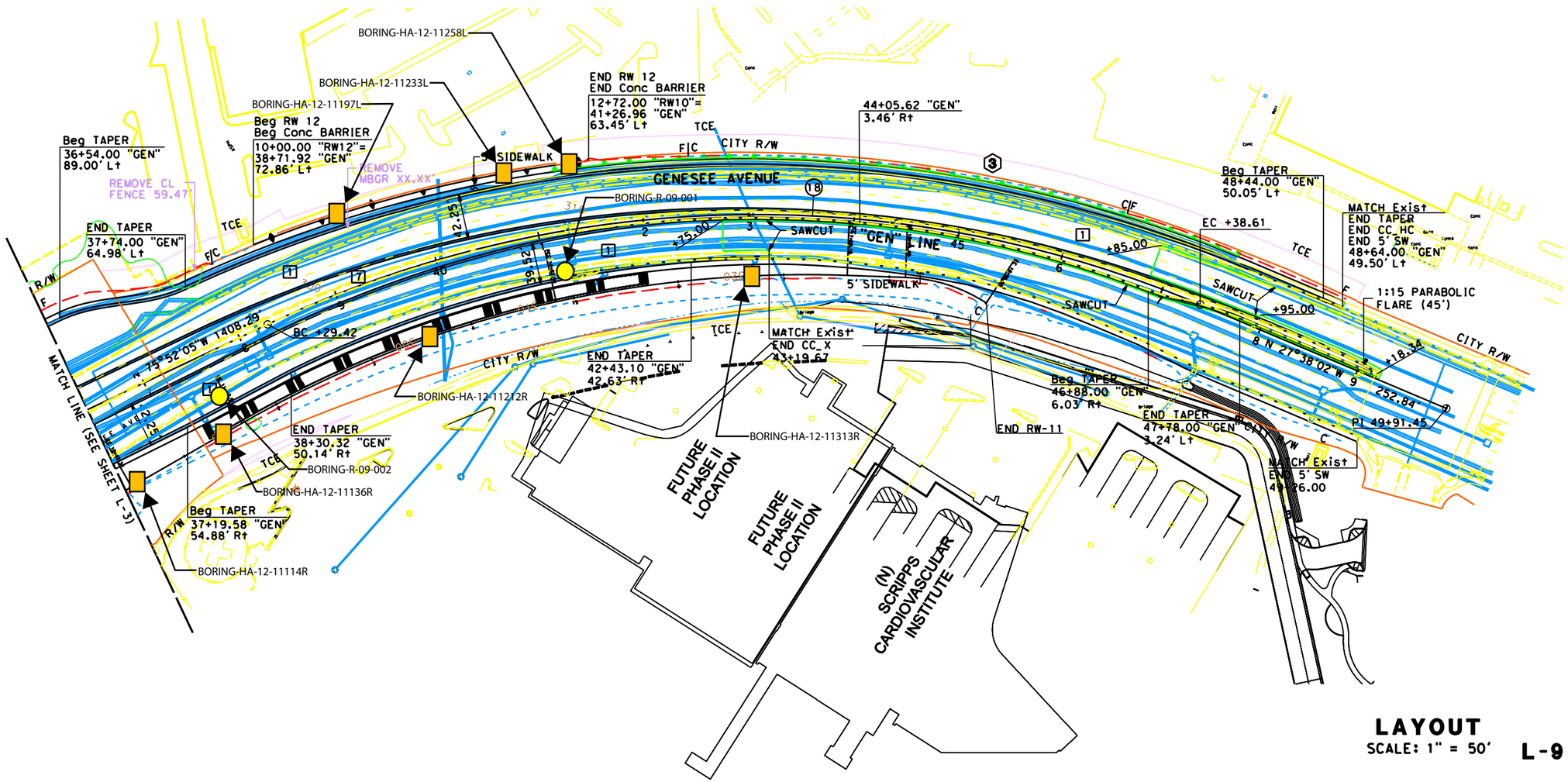

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L-9

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

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CALCULATED-DESIGNED BY: GREG ZEITOUNIAN
CHECKED BY: CASEY LEWIS
REVISED BY
DATE REVISED

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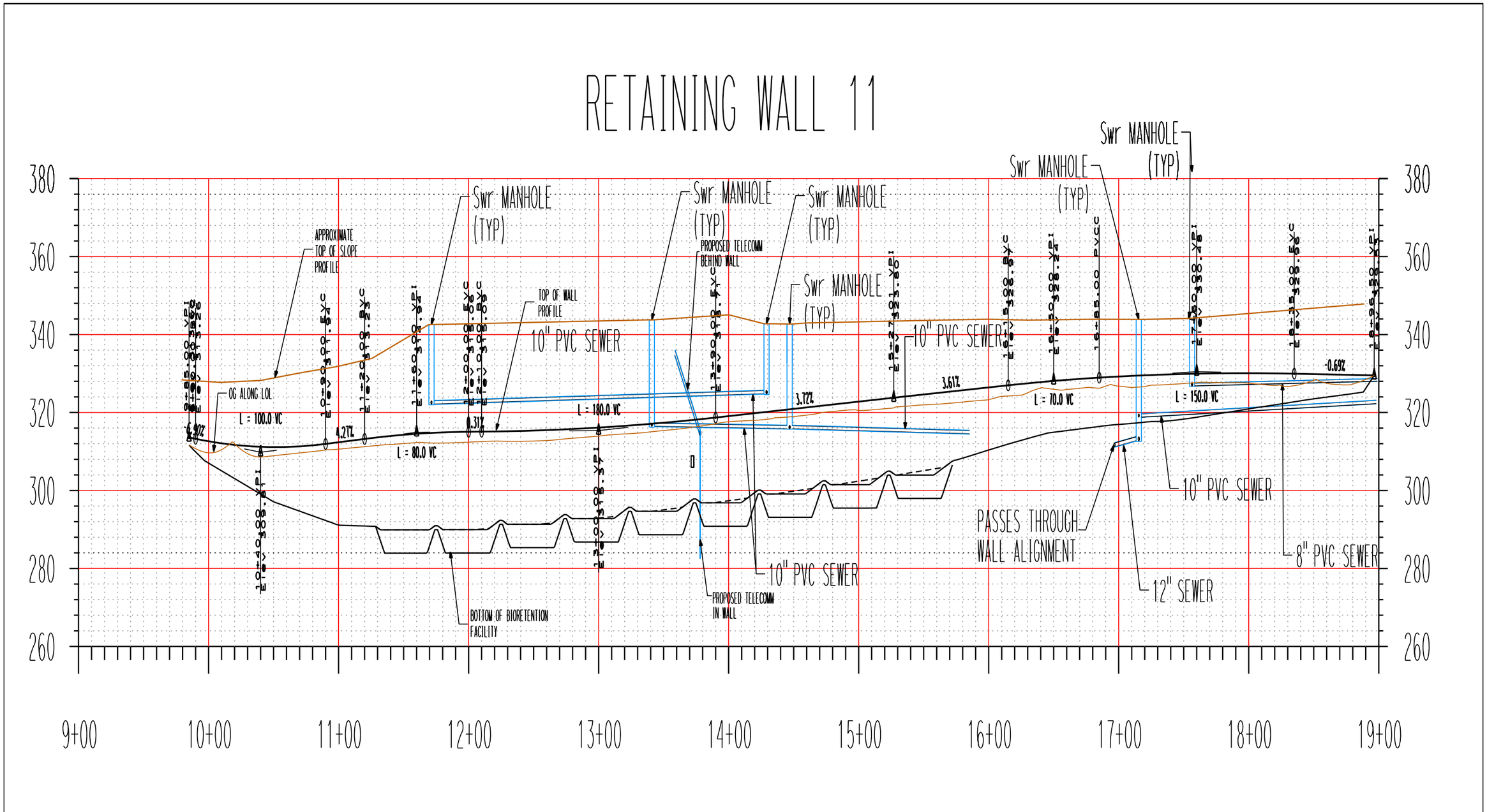
FIGURE 2B: PROJECT LAYOUT



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FOUNDATION REPORT: INTERSTATE-5/GENESEE AVENUE
INTERCHANGE IMPROVEMENT PROJECT
RETAININING WALL-11
EA 11-022331/EFIS1100000012

FIGURE 3: PROJECT PROFILE

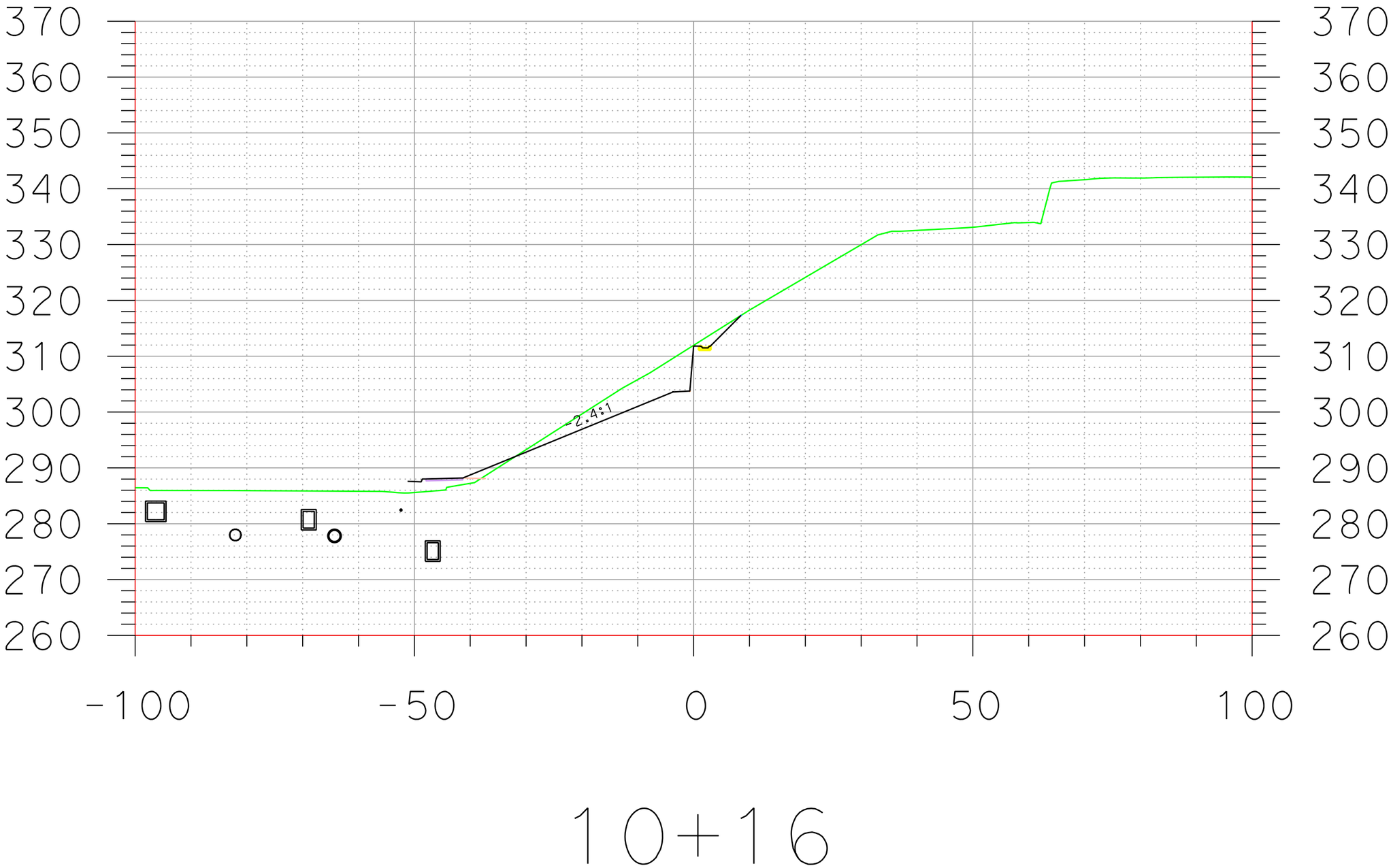

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FIGURE 4A: PROJECT CROSS SECTION

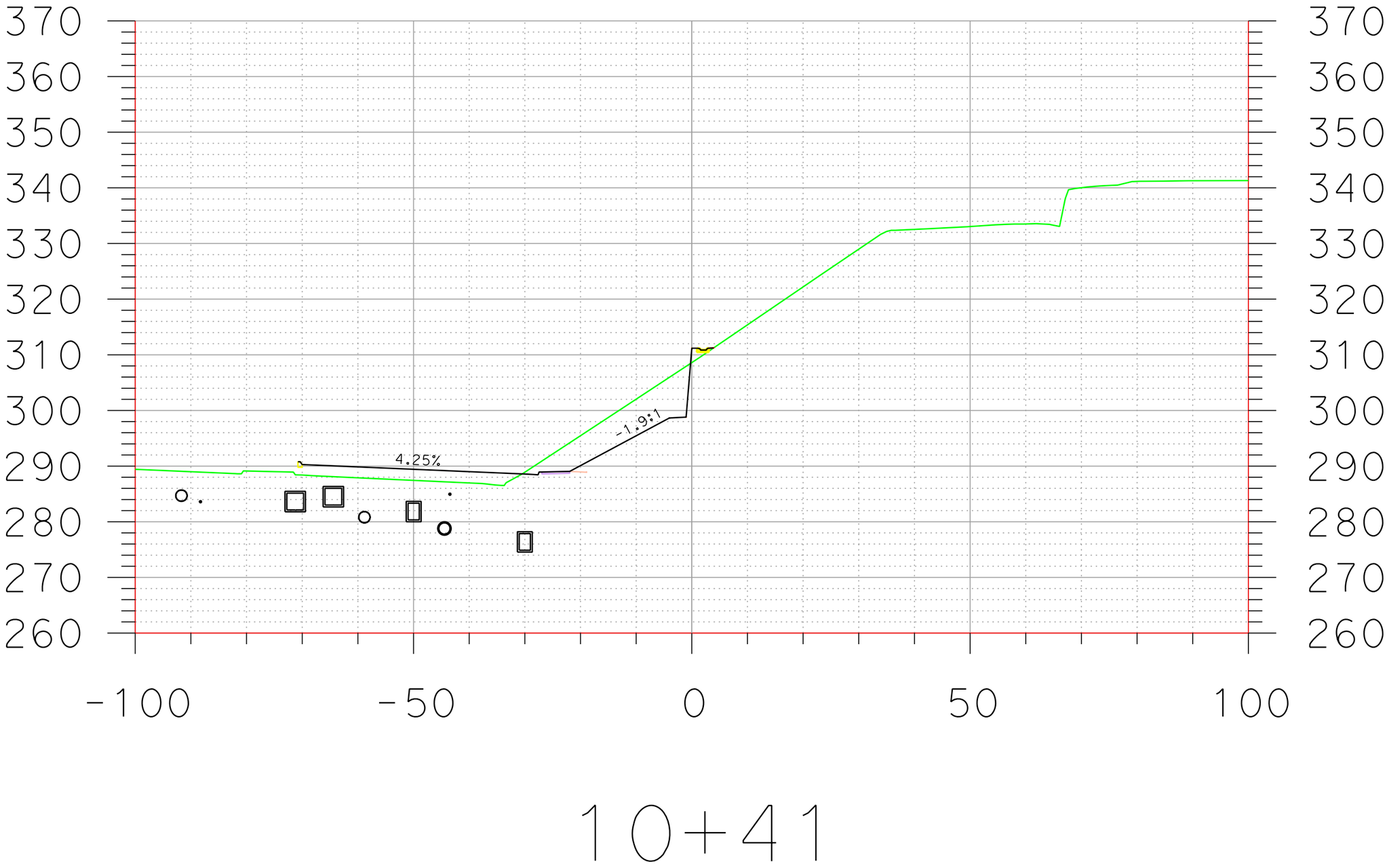

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FIGURE 4B: PROJECT CROSS SECTION

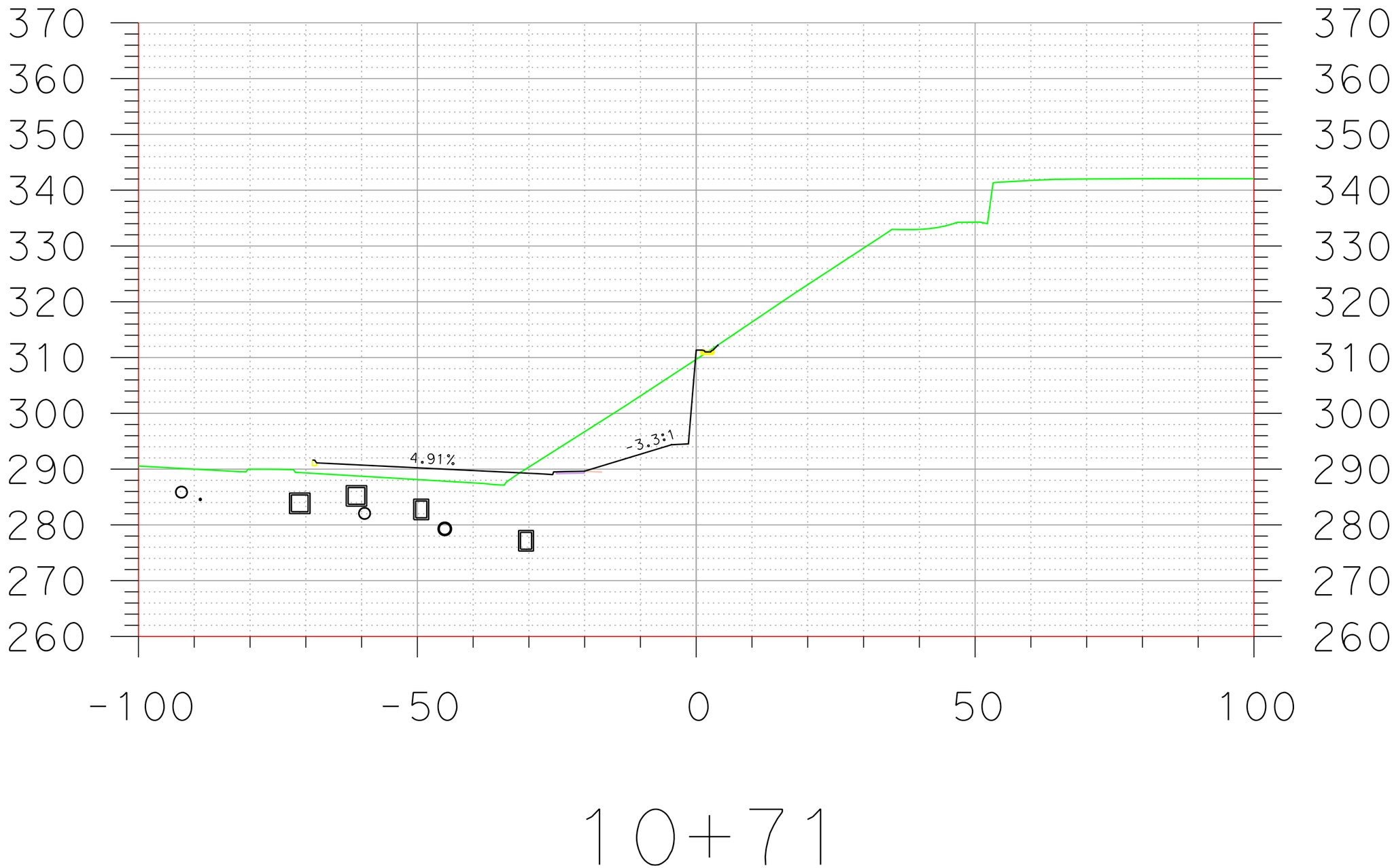

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FIGURE 4C: PROJECT CROSS SECTION

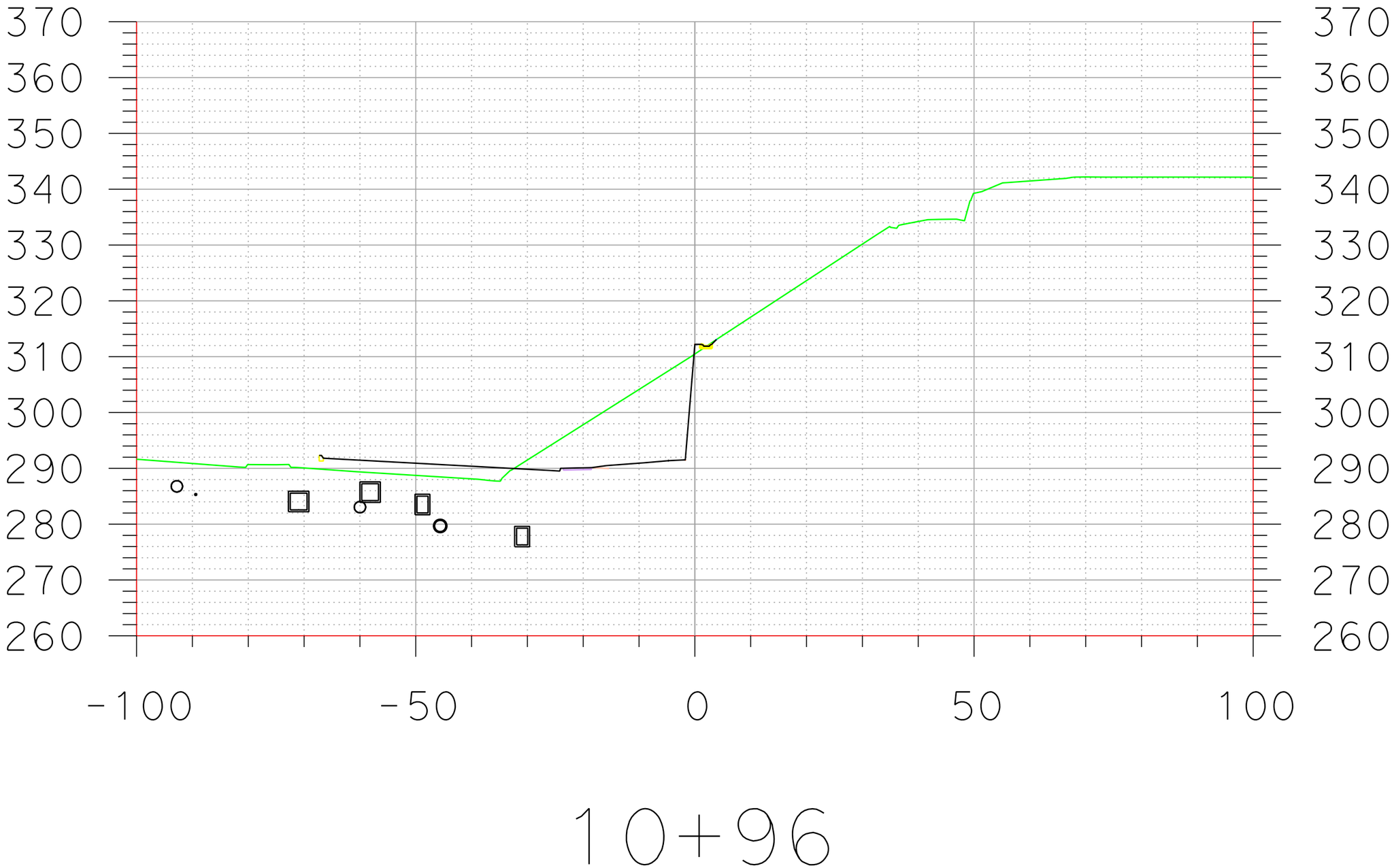

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FIGURE 4D: PROJECT CROSS SECTION

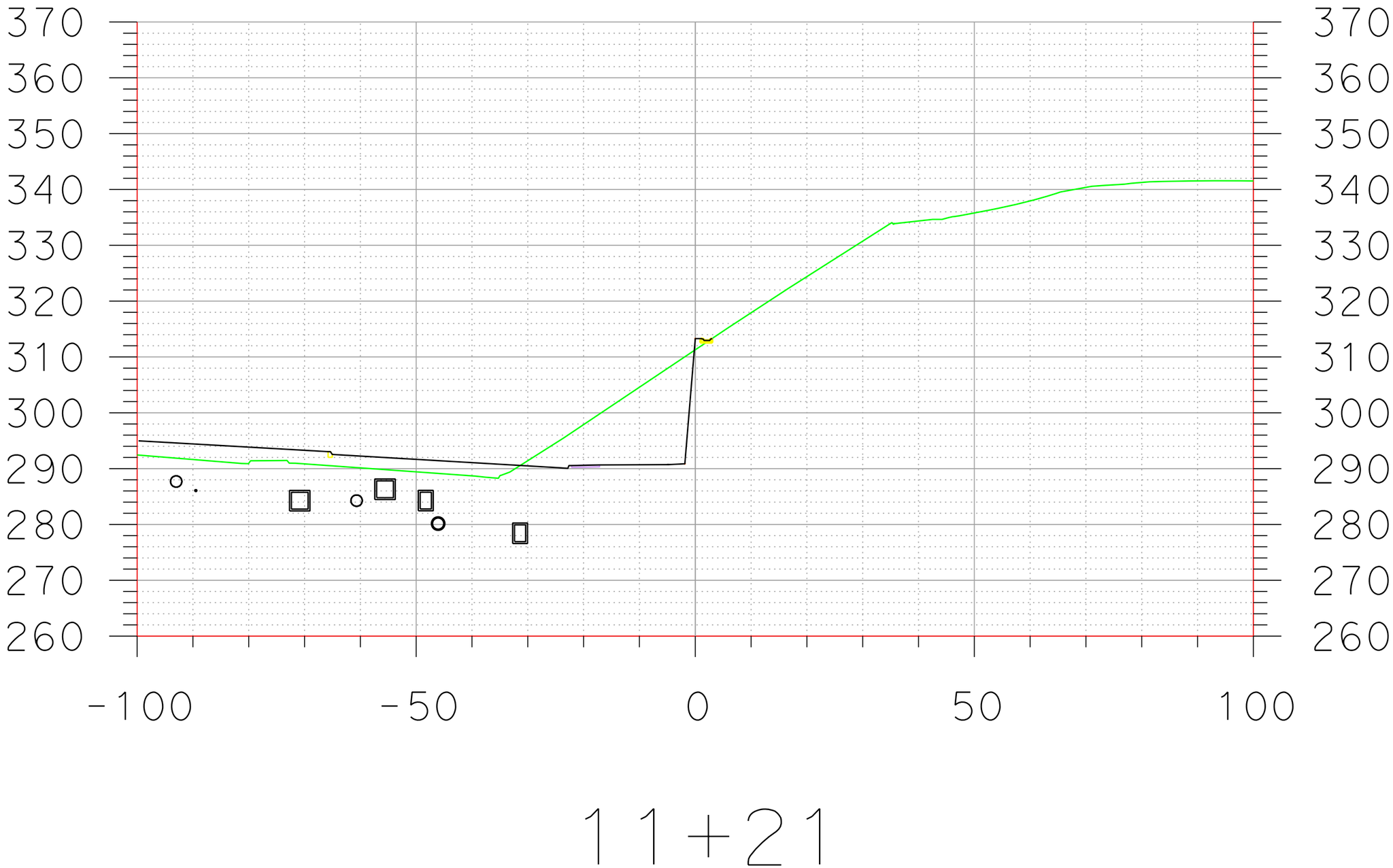

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FIGURE 4E: PROJECT CROSS SECTION

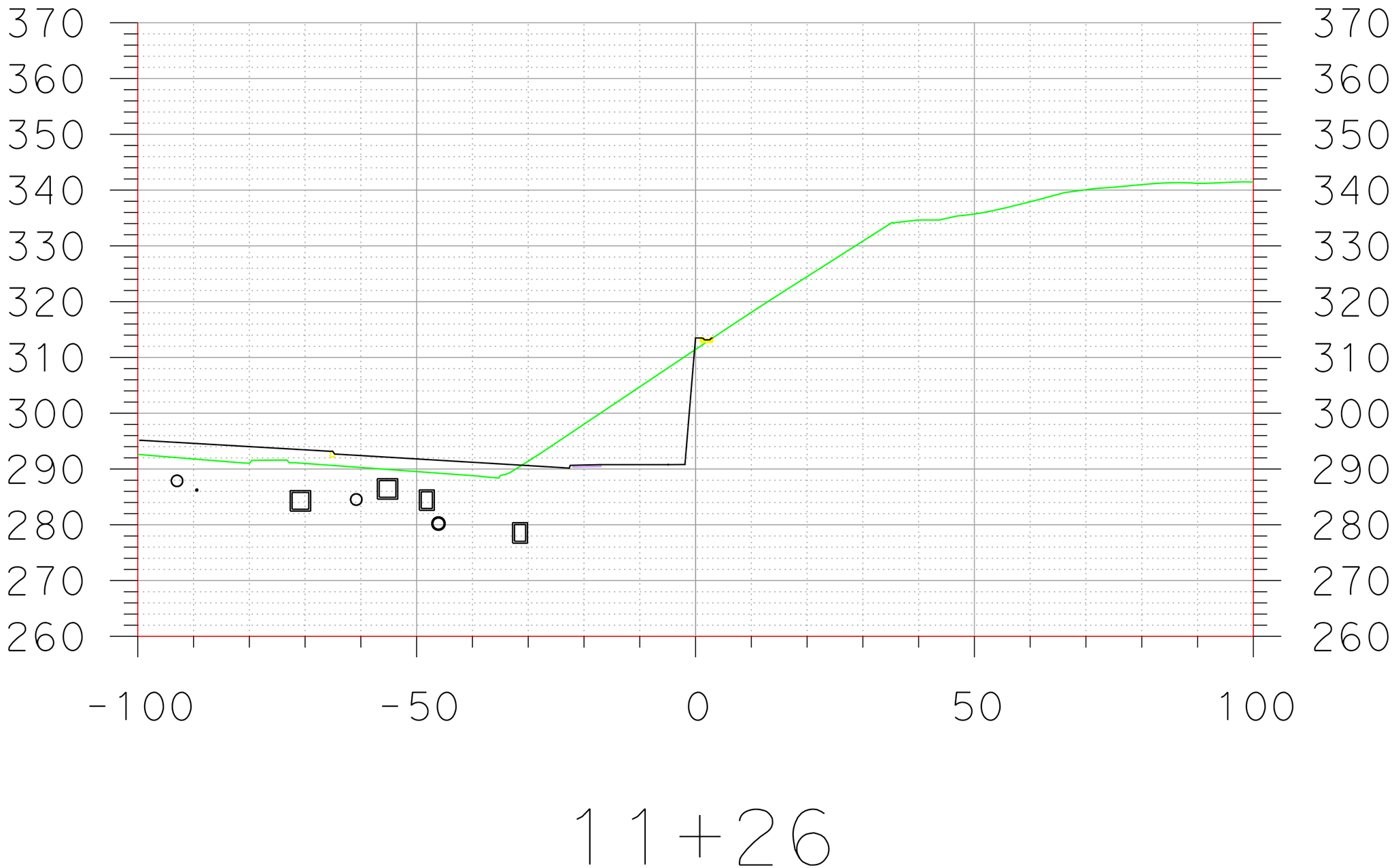

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FIGURE 4F: PROJECT CROSS SECTION

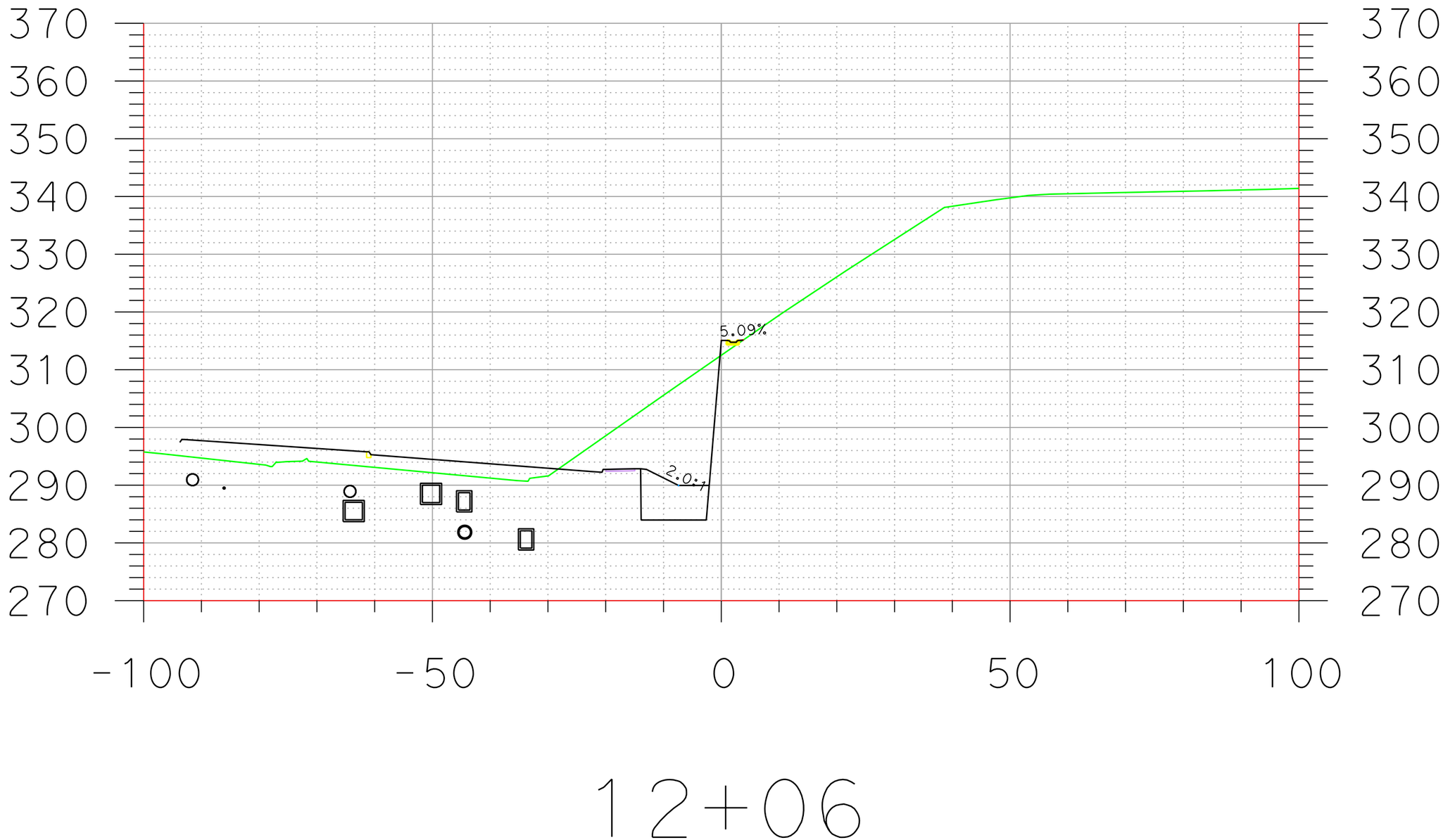

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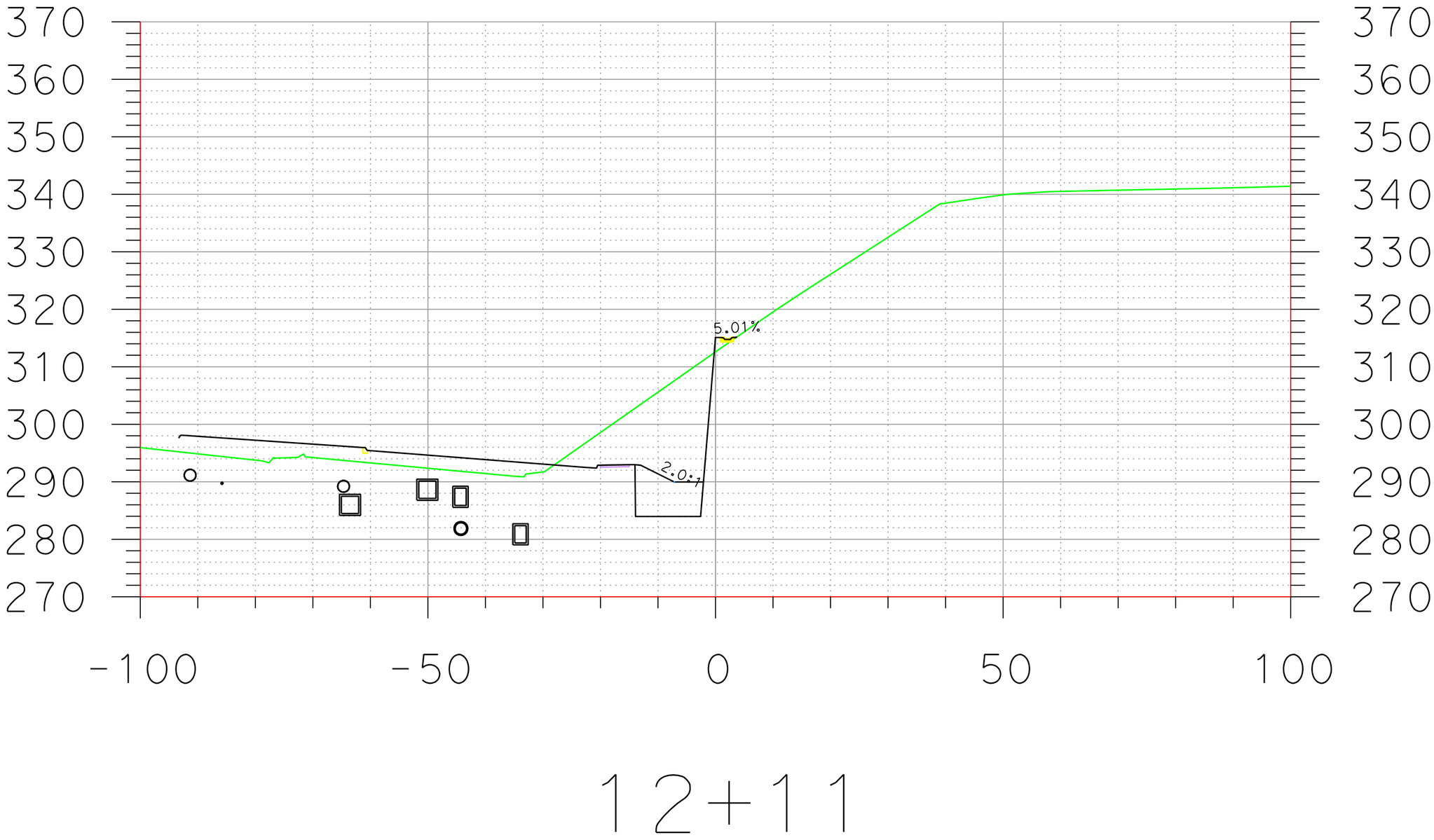
FIGURE 4G: PROJECT CROSS SECTION



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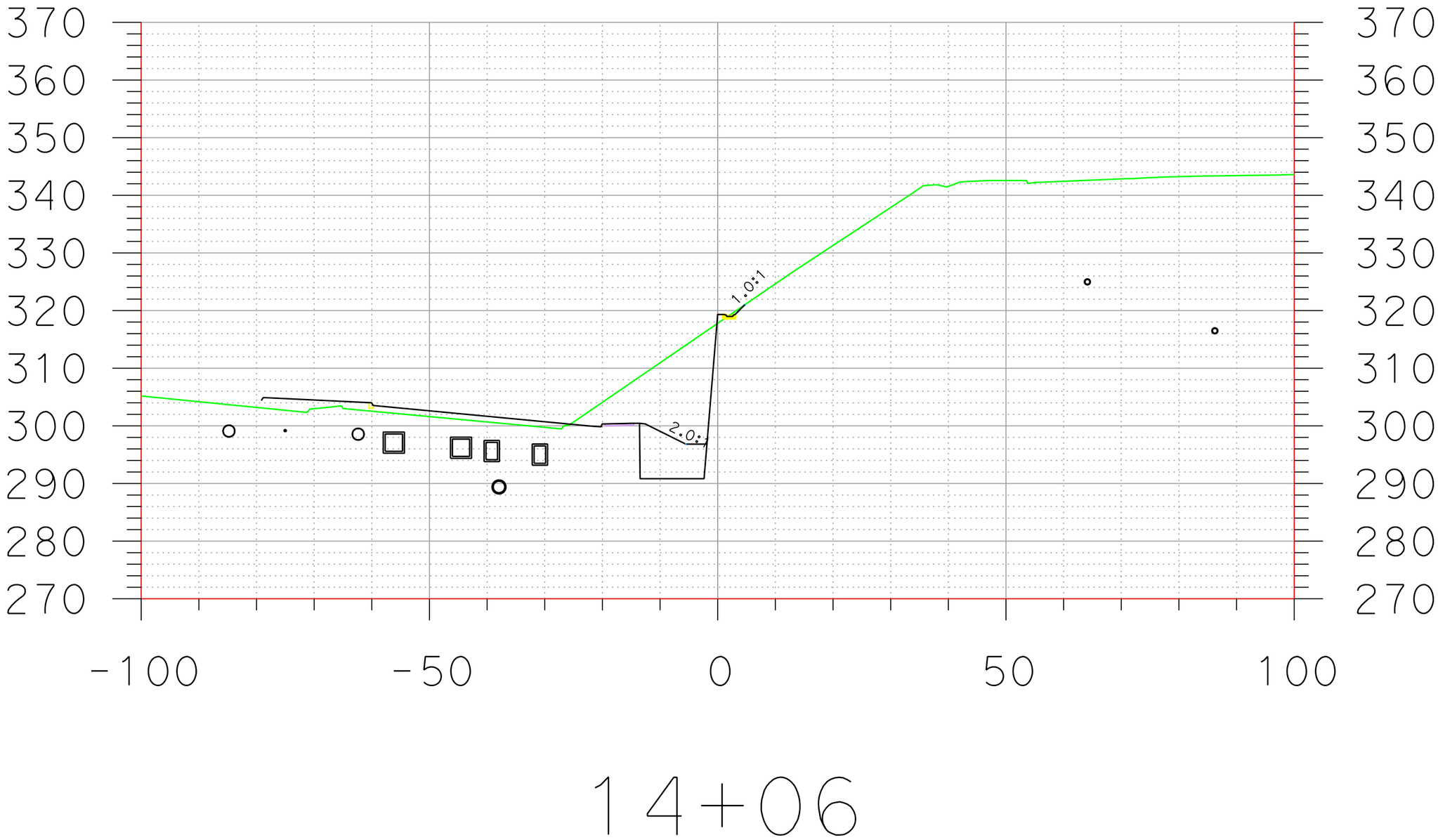
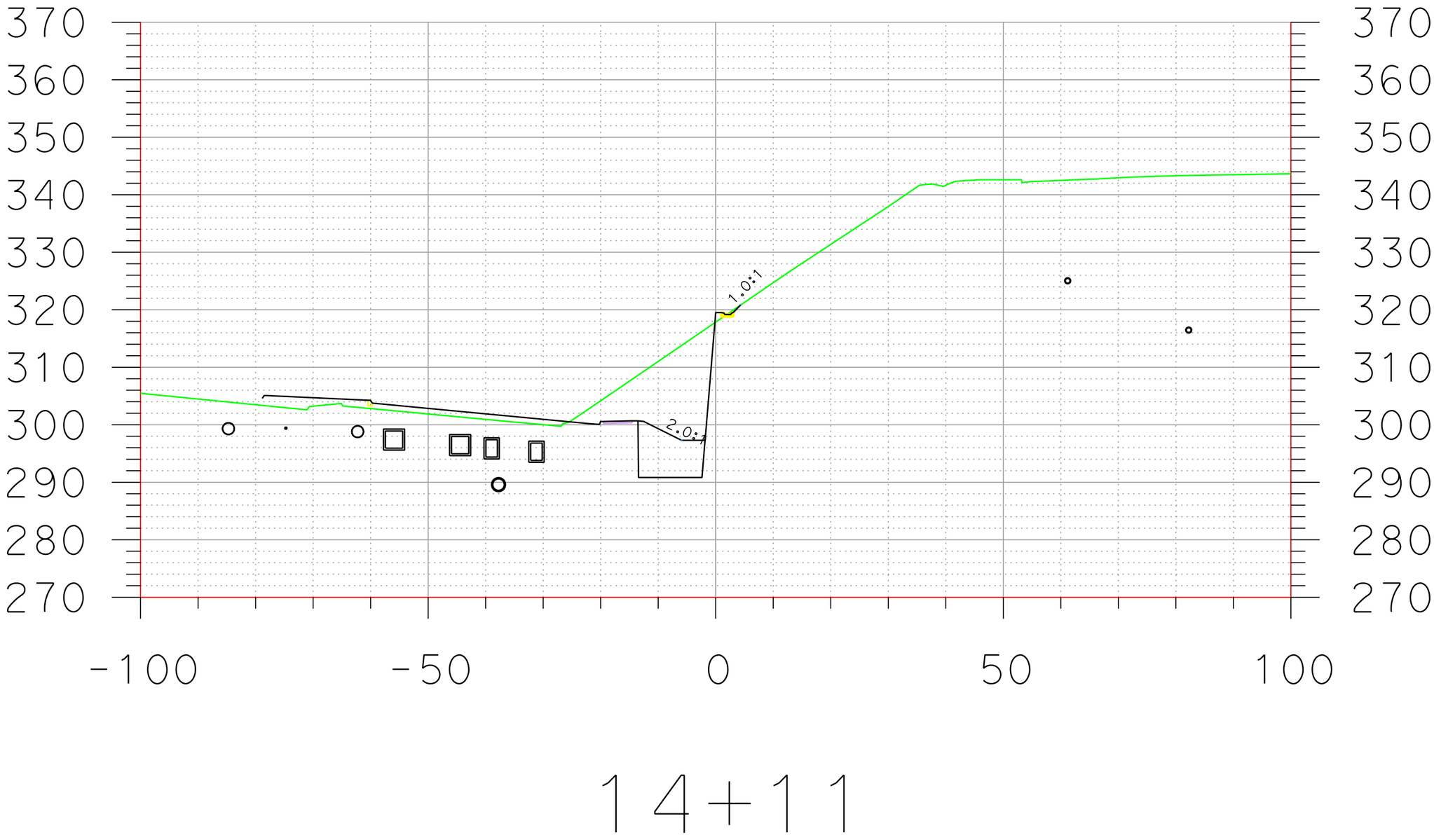
FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
RETAINING WALL-11
EA 11-022331/EFIS 1100000012

FIGURE 4H: PROJECT CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:14:24 PM

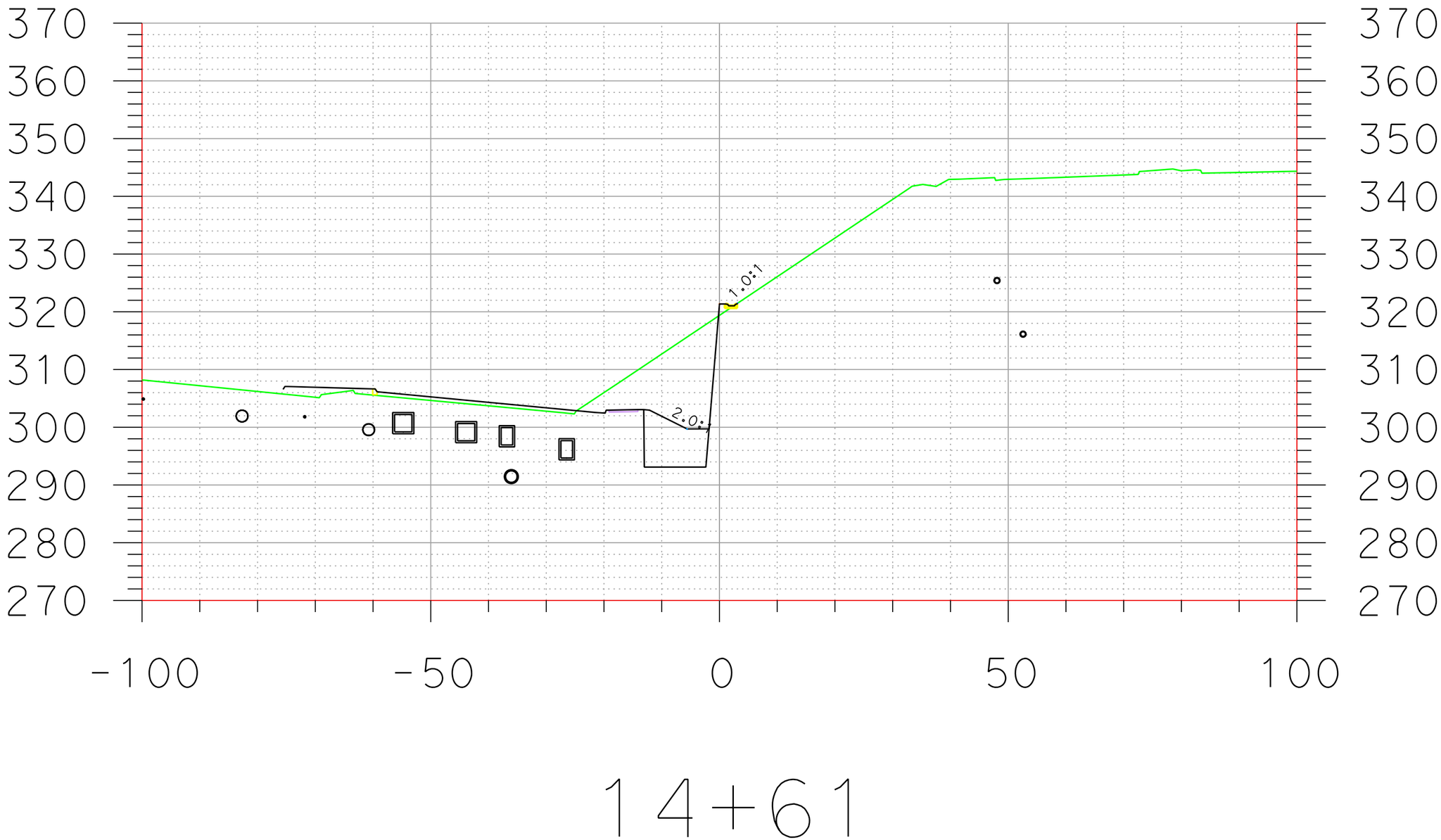
FIGURE 4I: PROJECT CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:14:44 PM

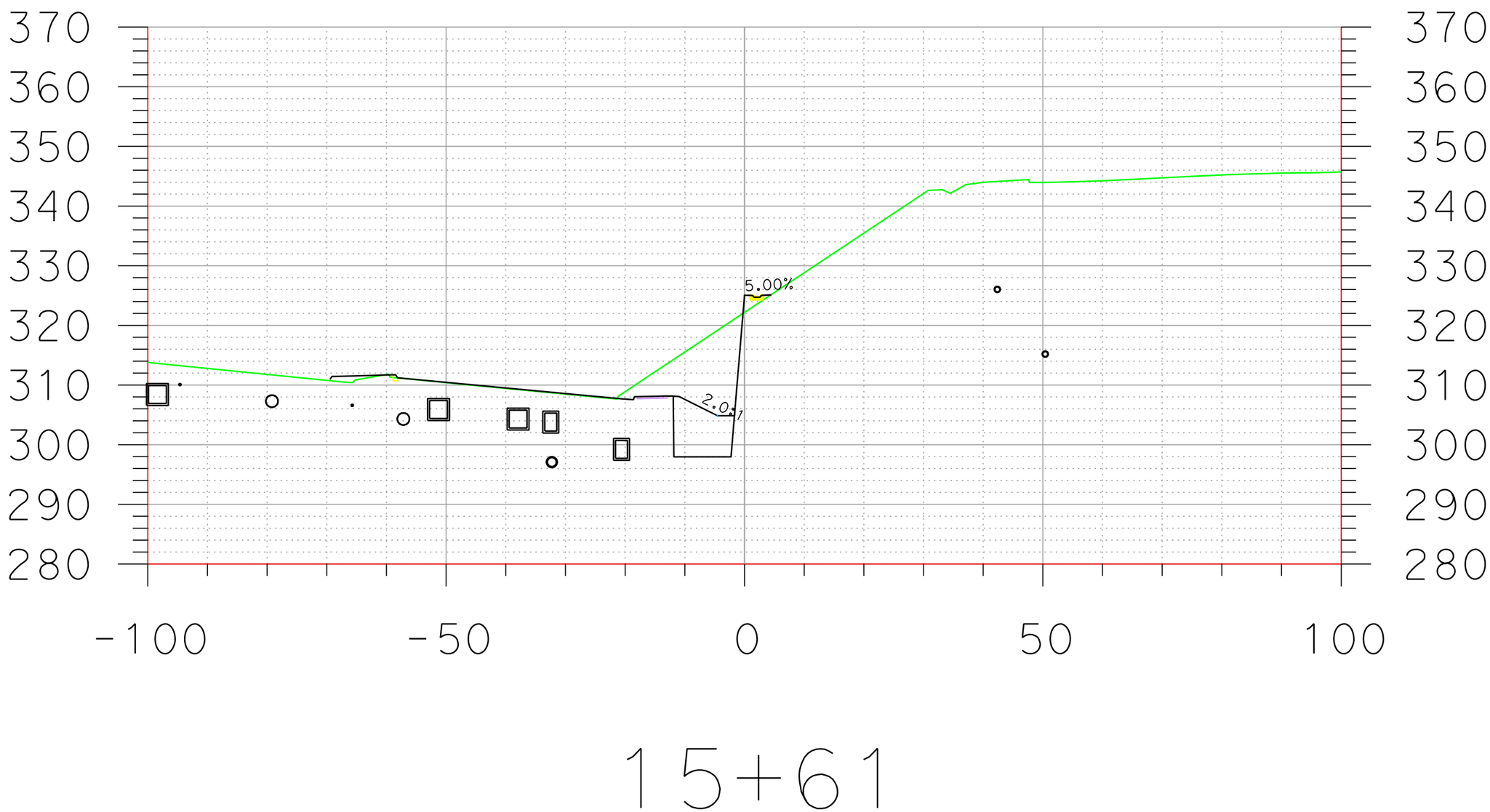
FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
RETAINING WALL-11
EA 11-022331/EFIS 1100000012

FIGURE 4J: PROJECT CROSS SECTION



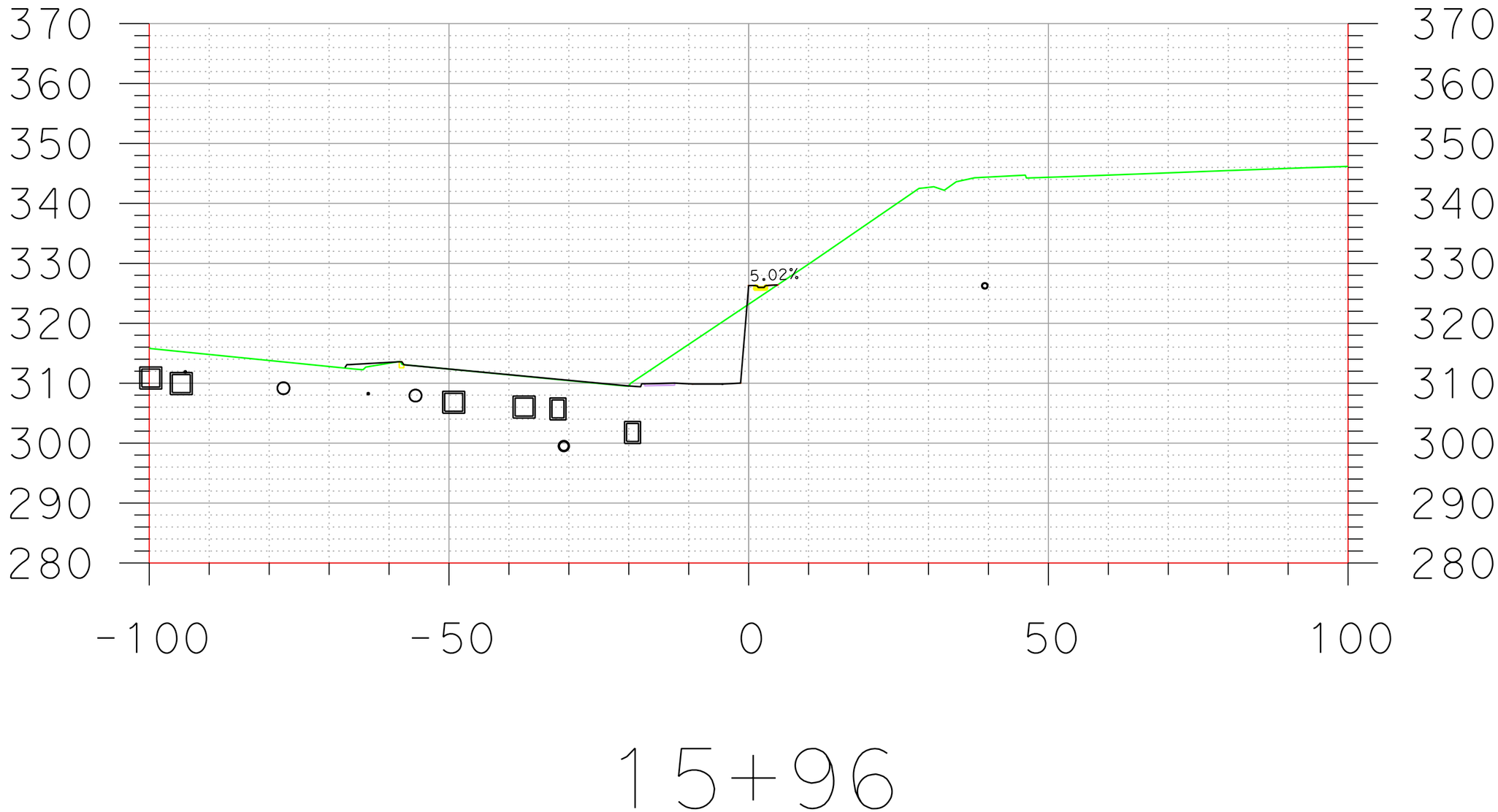
Wall 11_pf_xsc w building.dgn 10/30/2012 1:15:02 PM

FIGURE 4K: PROJECT CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:15:20 PM

FIGURE 4L: PROJECT CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:15:49 PM

FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
RETAINING WALL-11
EA 11-022331/EFIS 1100000012

FIGURE 4M: PROJECT CROSS SECTION

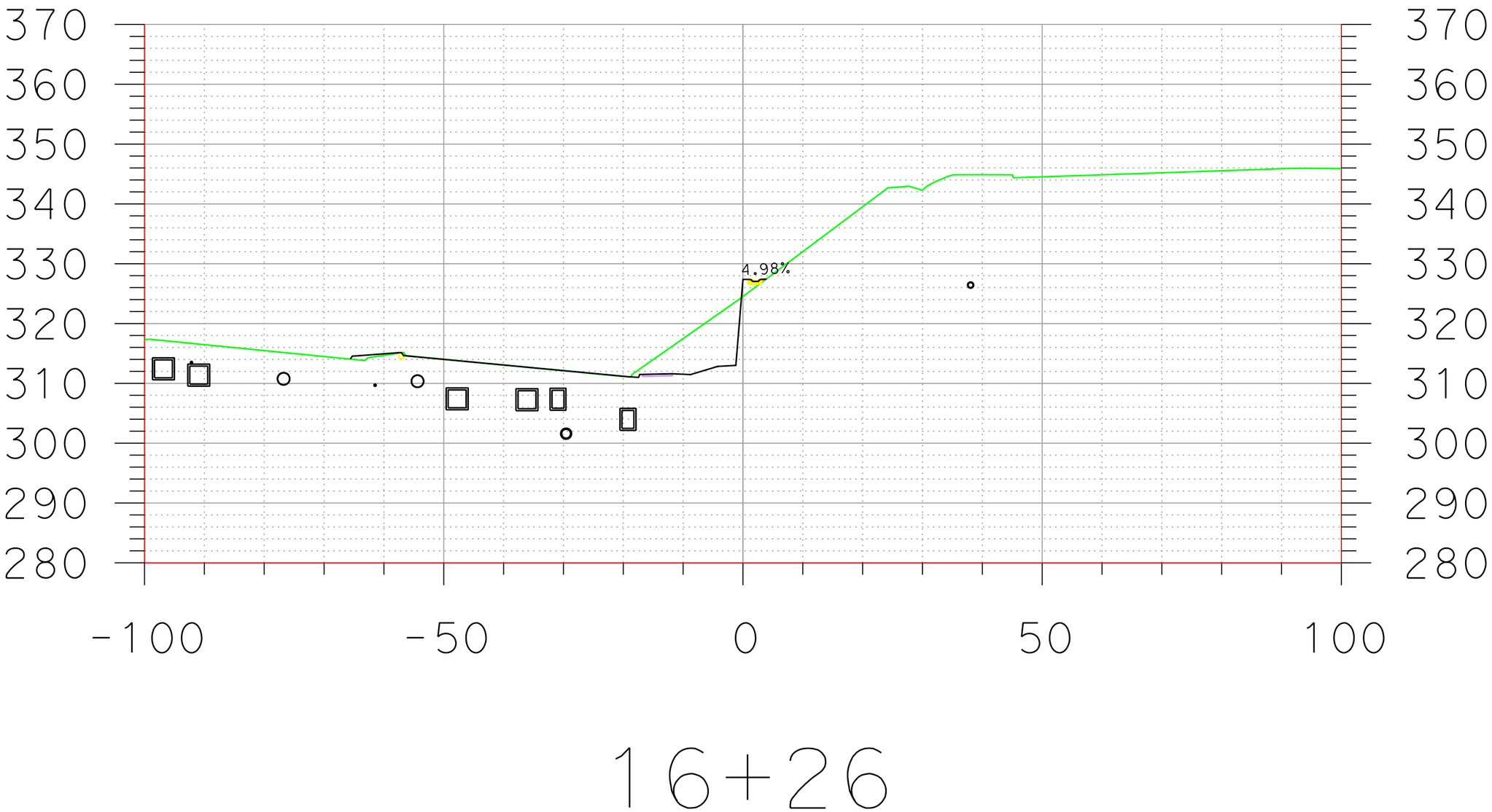


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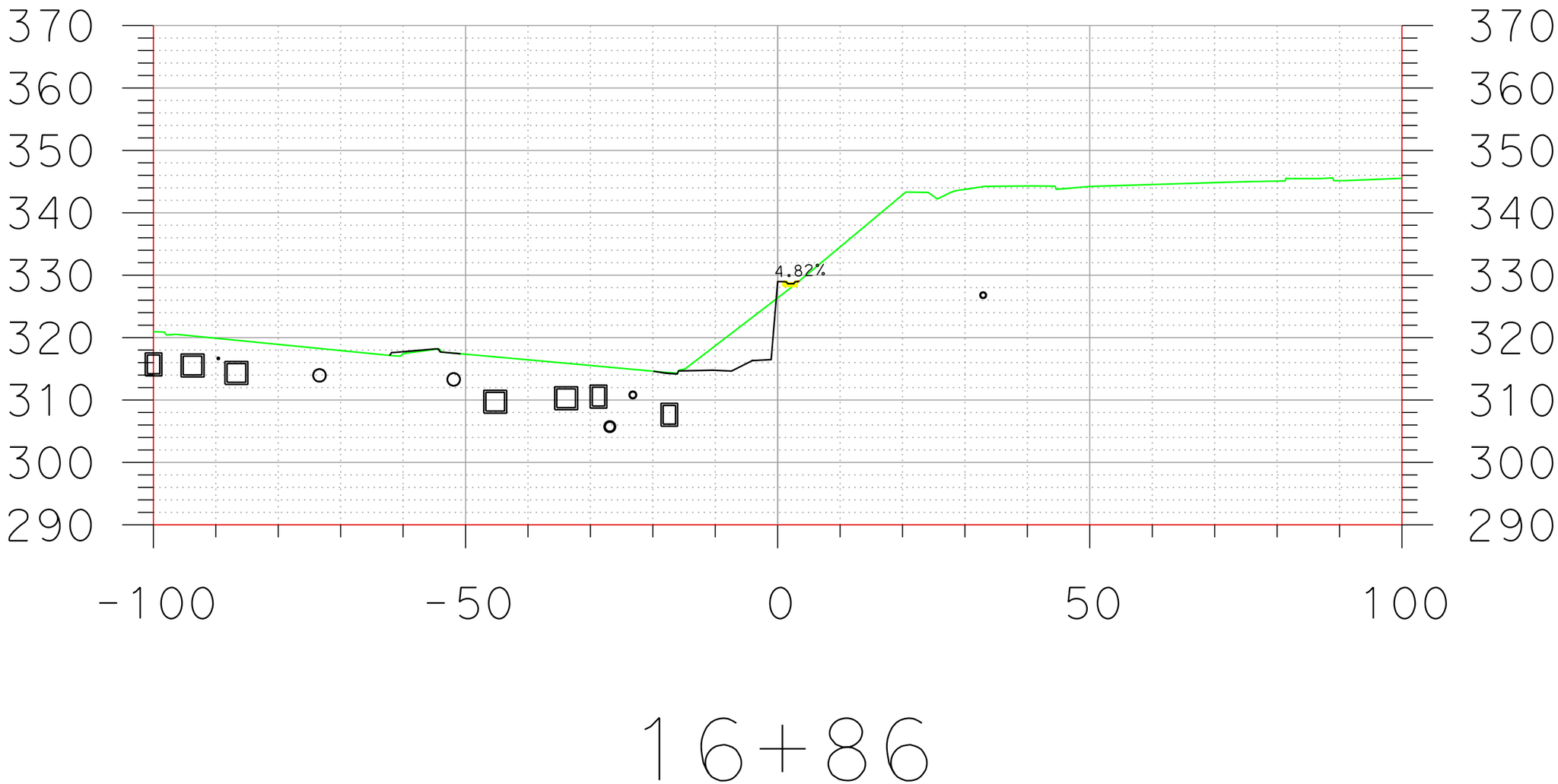
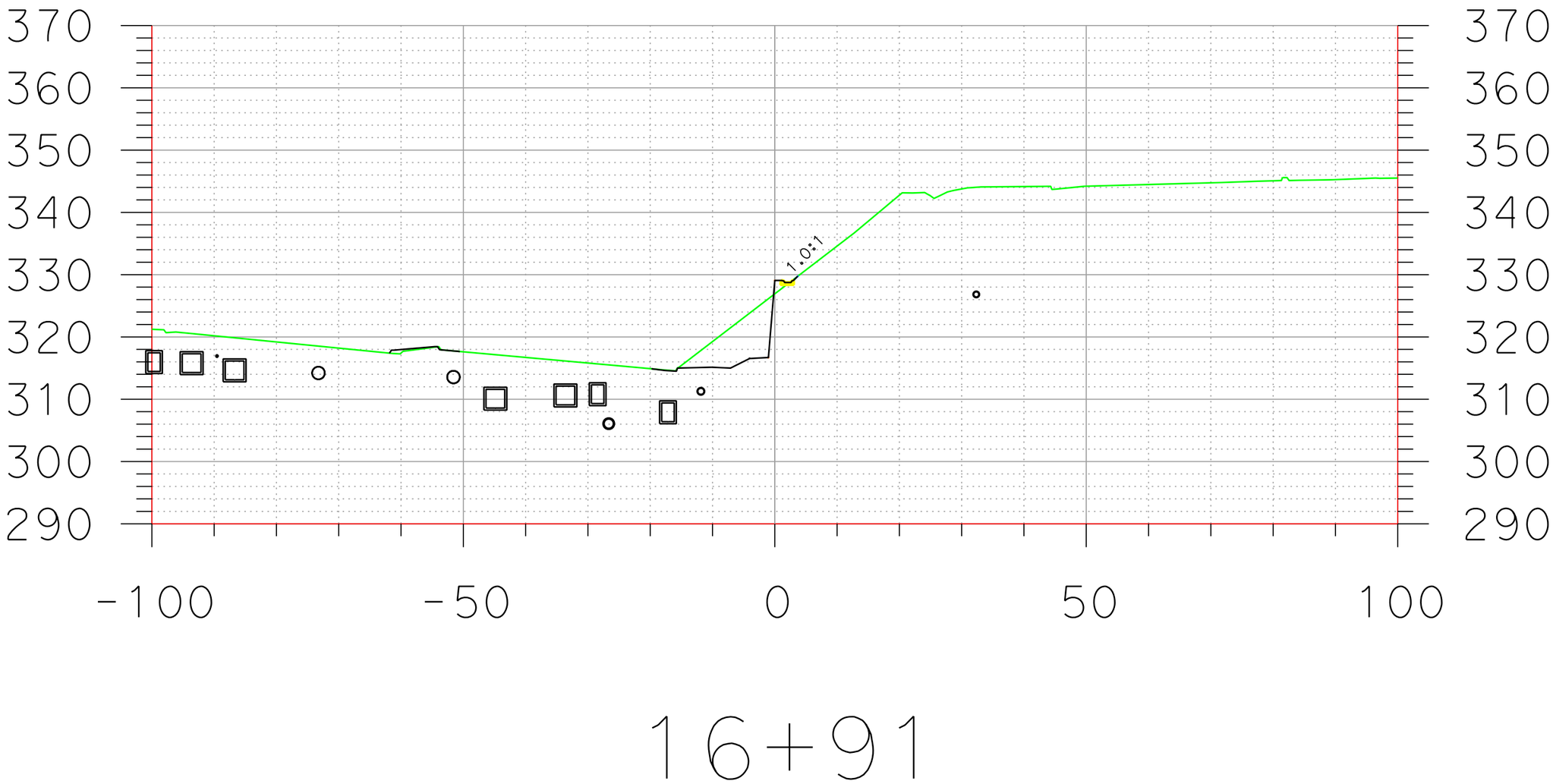
FIGURE 4N: PROJECT CROSS SECTION



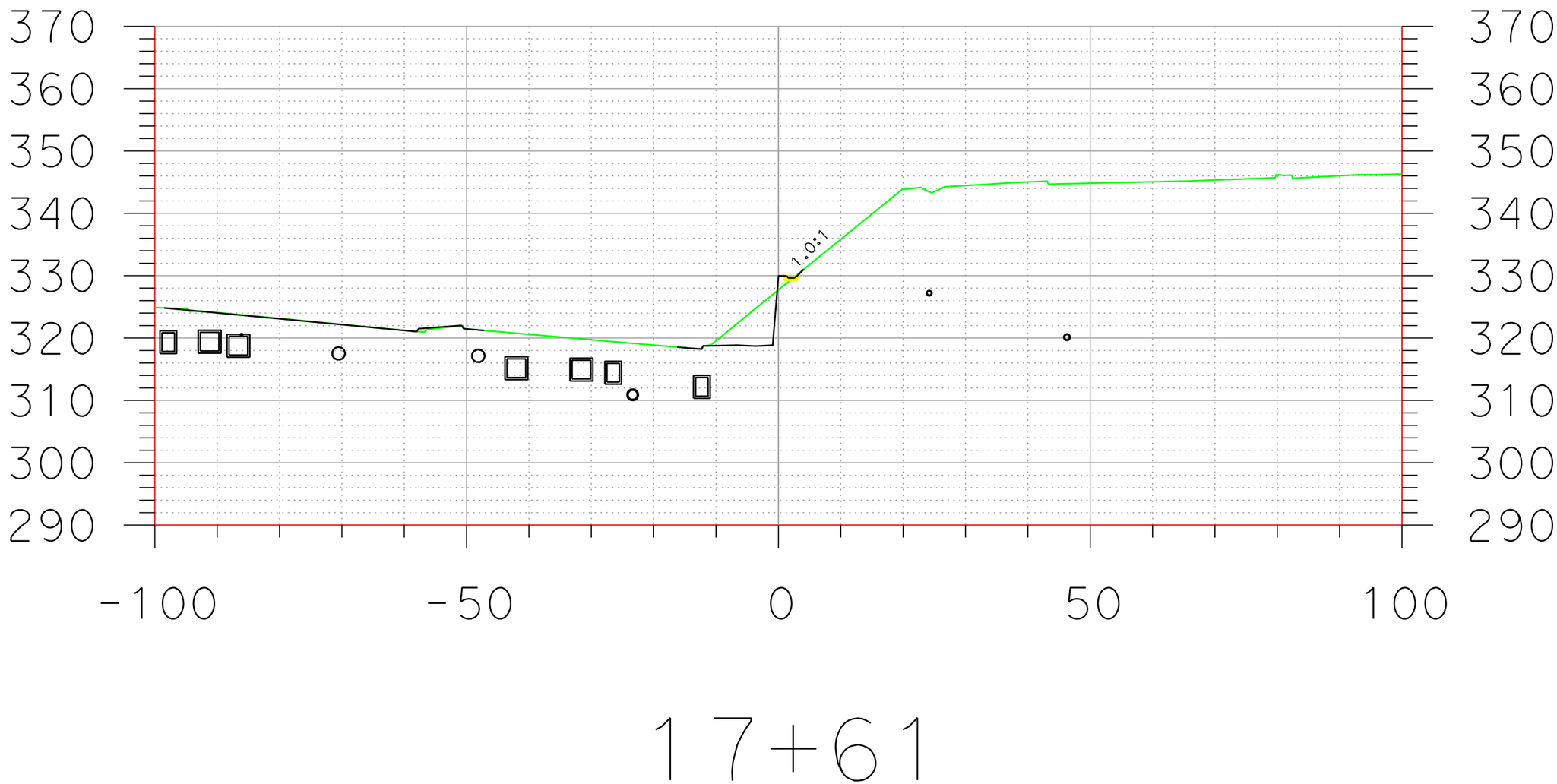
Wall 11_pf_xsc w building.dgn 10/30/2012 1:16:29 PM

FIGURE 4O: PROJECT CROSS SECTION



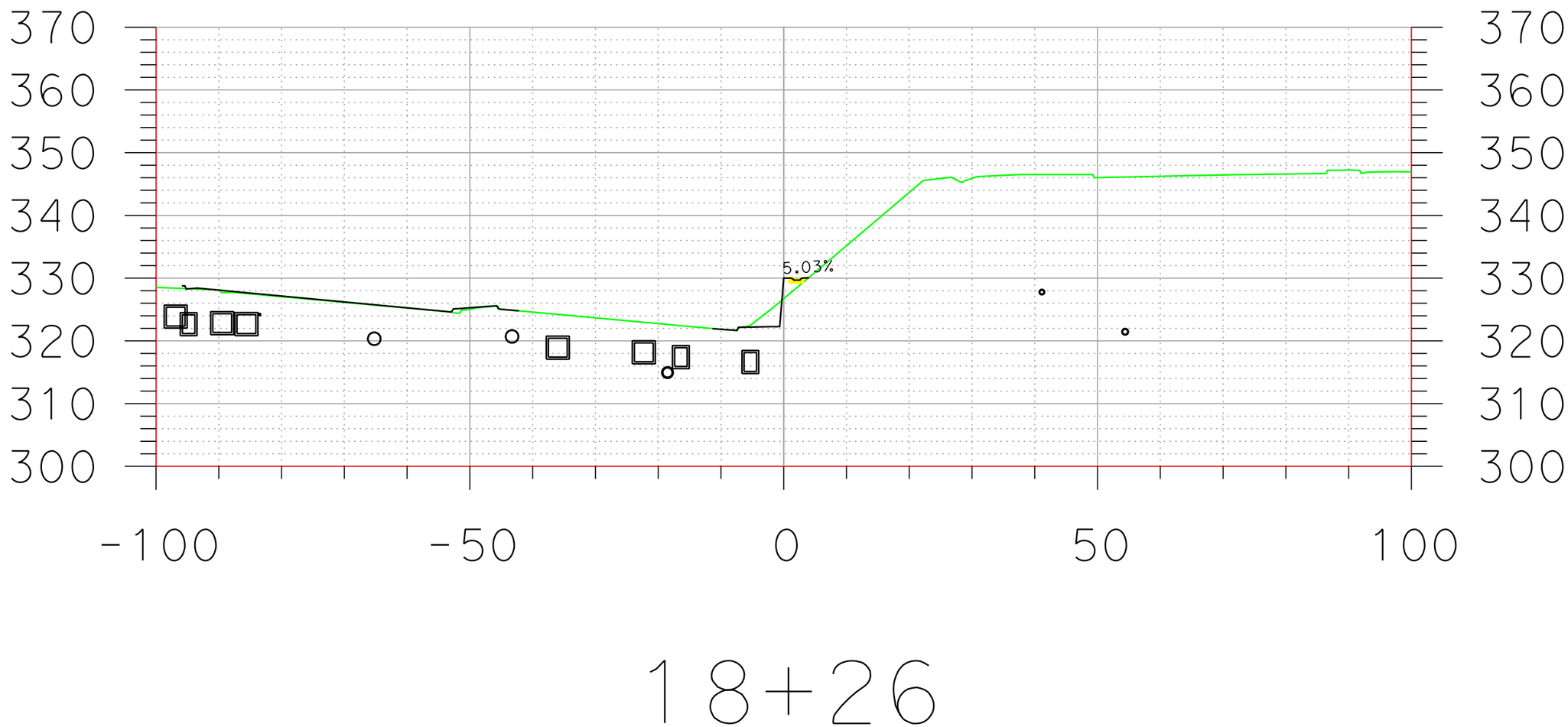
Wall 11_pf_xsc w building.dgn 10/30/2012 1:16:44 PM

FIGURE 4P: PROJECT CROSS SECTION



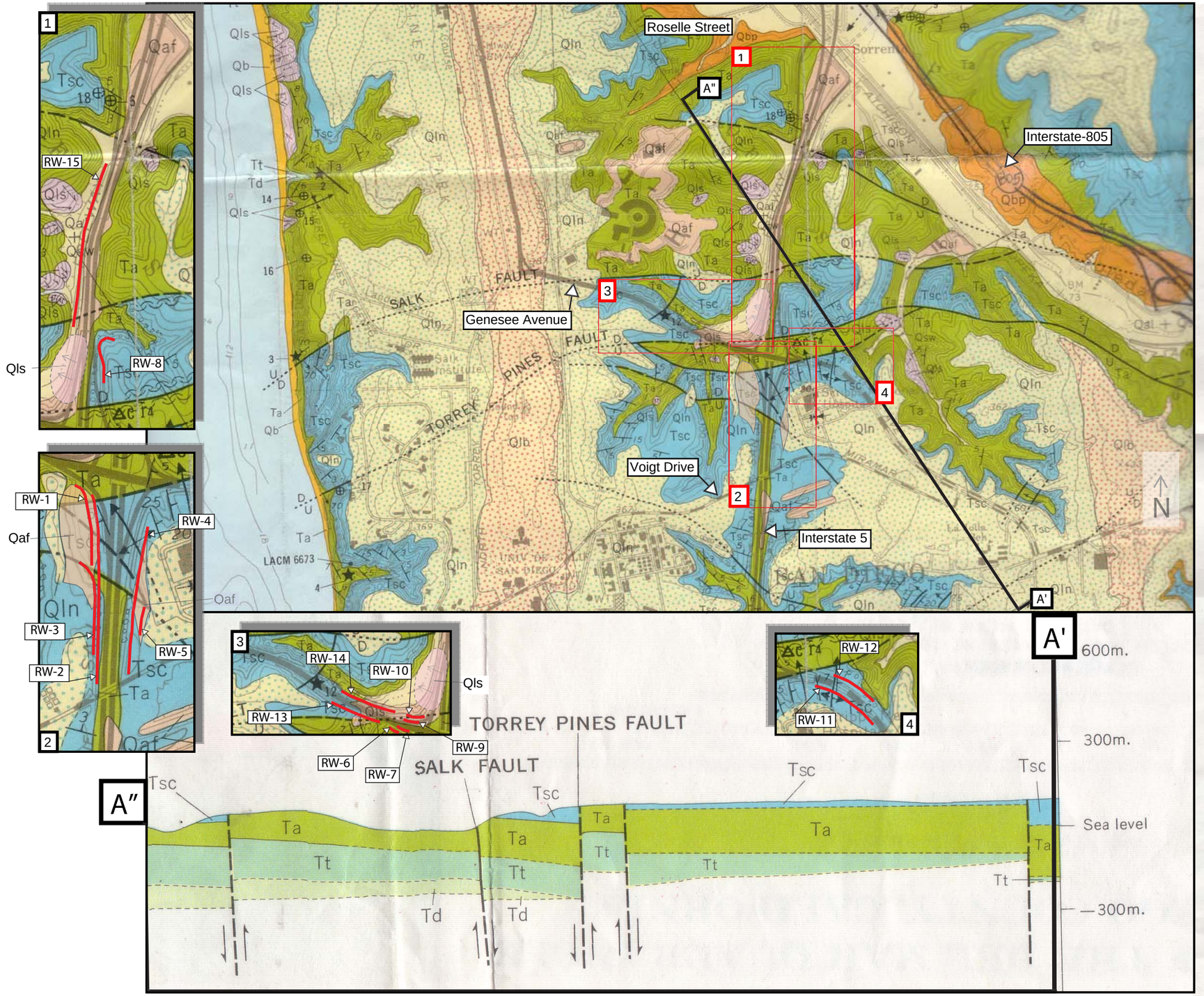
Wall 11_pf_xsc w building.dgn 10/30/2012 1:17:09 PM

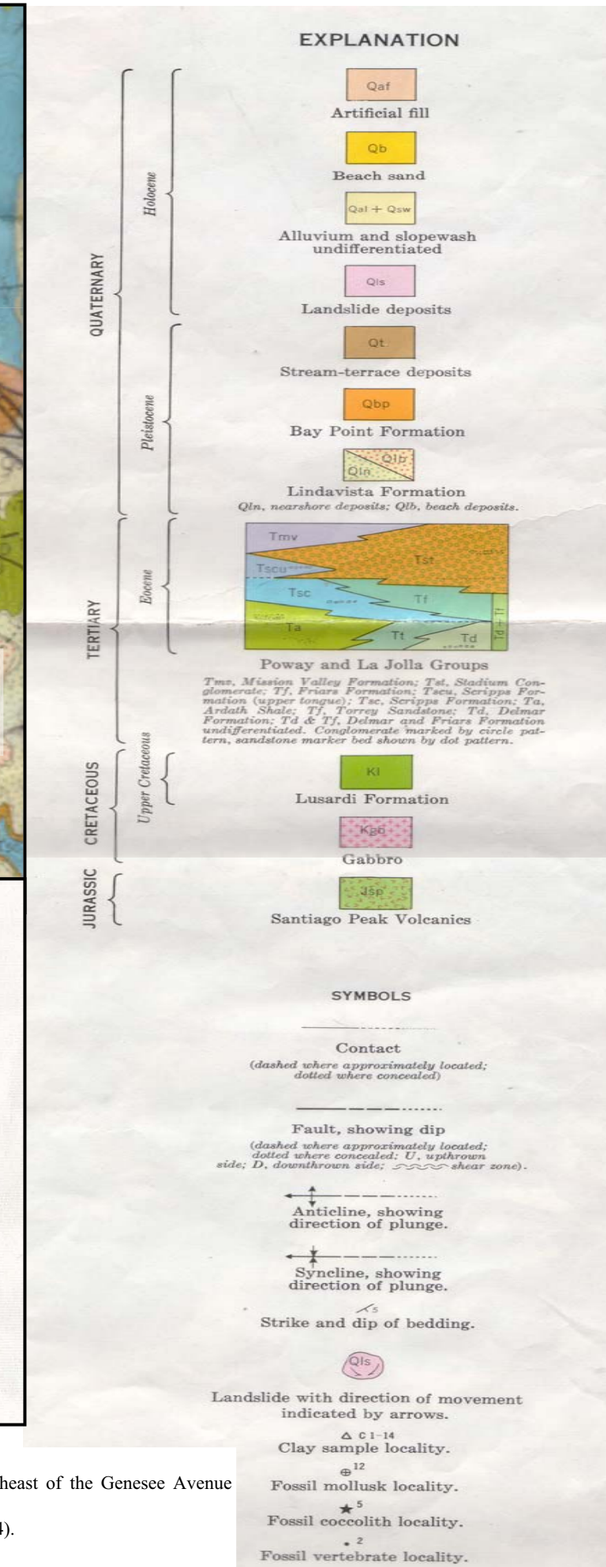
FIGURE 4Q: PROJECT CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:17:28 PM

FIGURE 4R: PROJECT CROSS SECTION

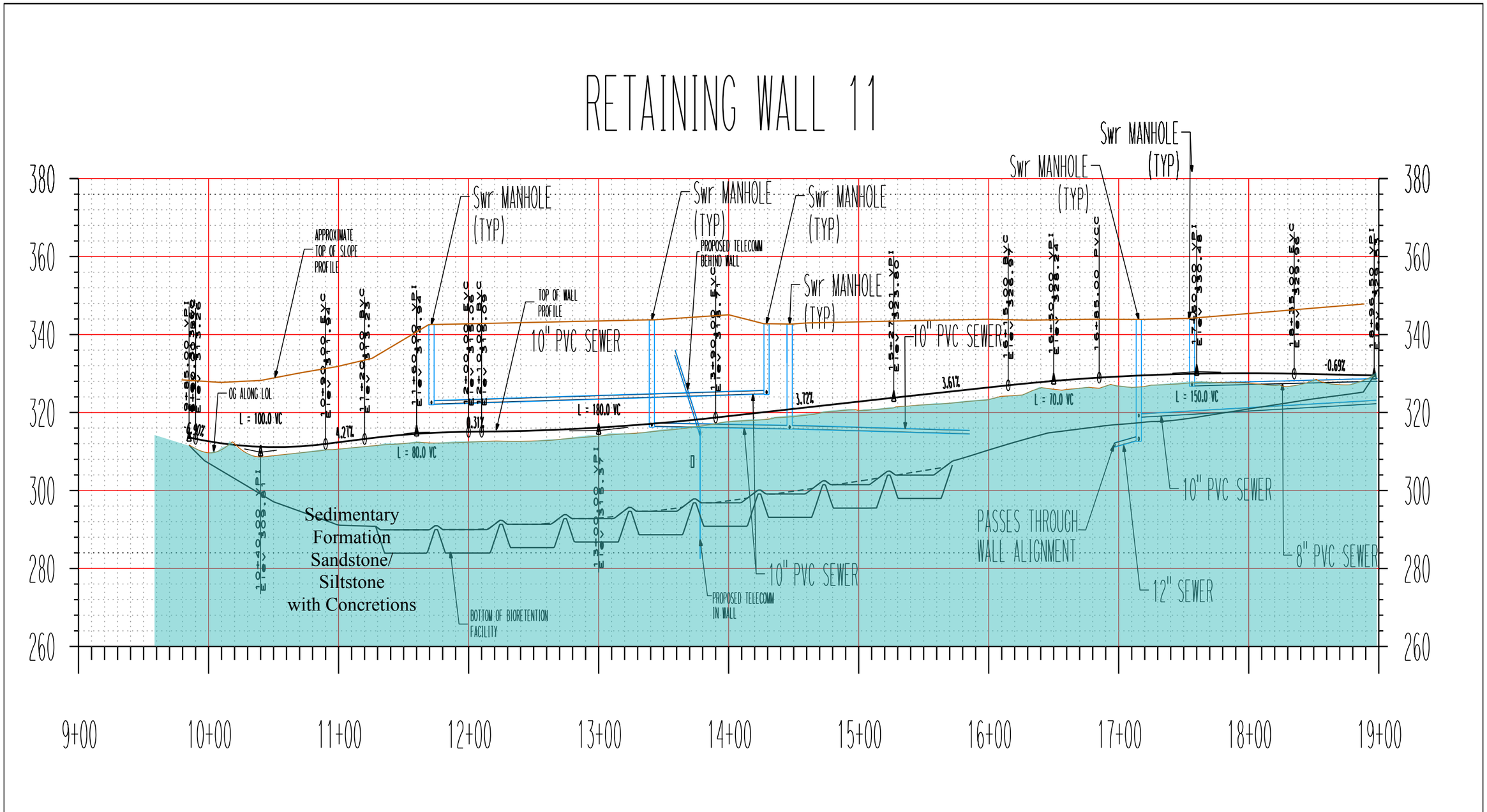




Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-11
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

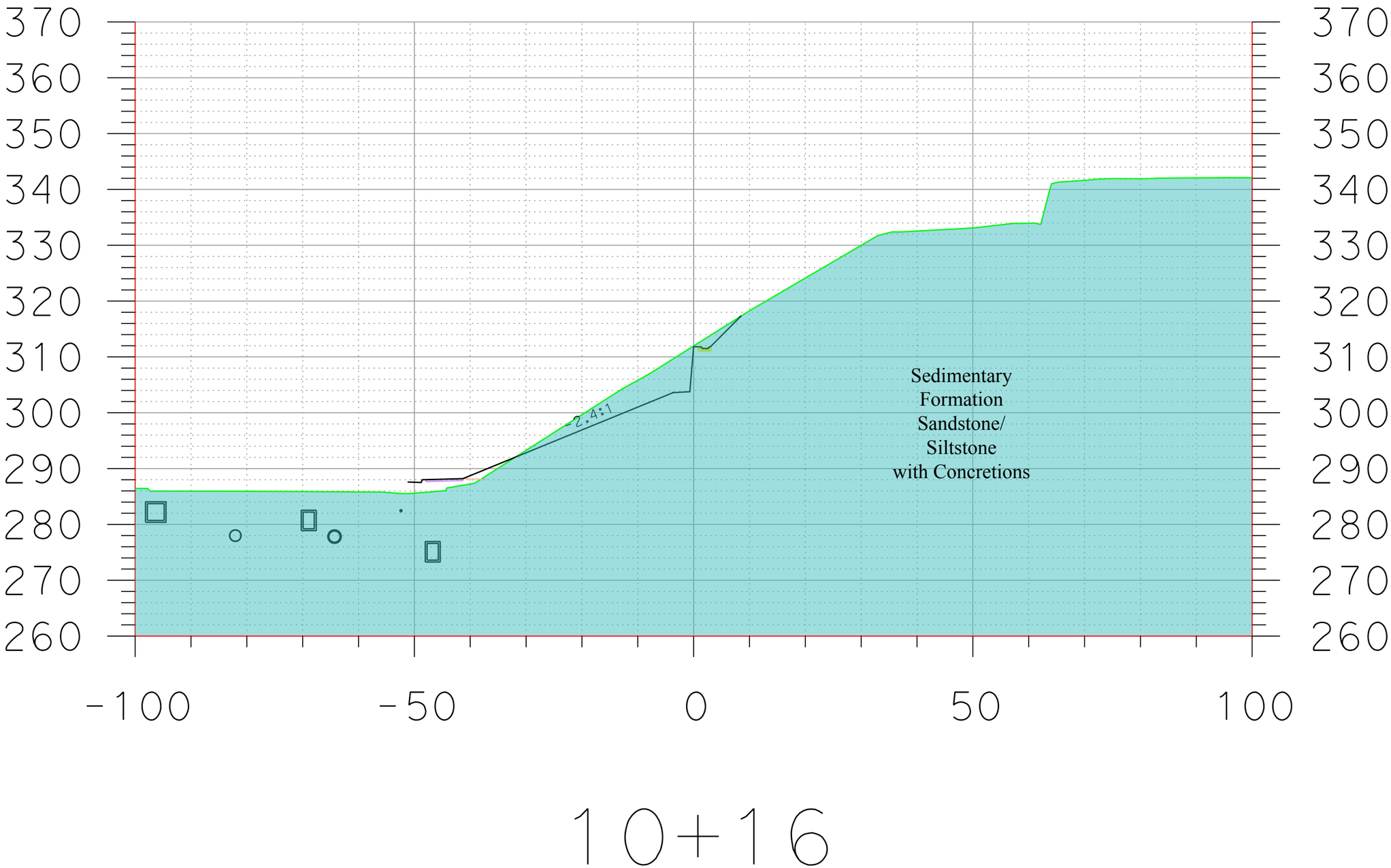
FIGURE 5: GEOLOGIC OVERVIEW MAP



Wall 11_pf_xsc w building.dgn 10/30/2012 1:10:53 PM

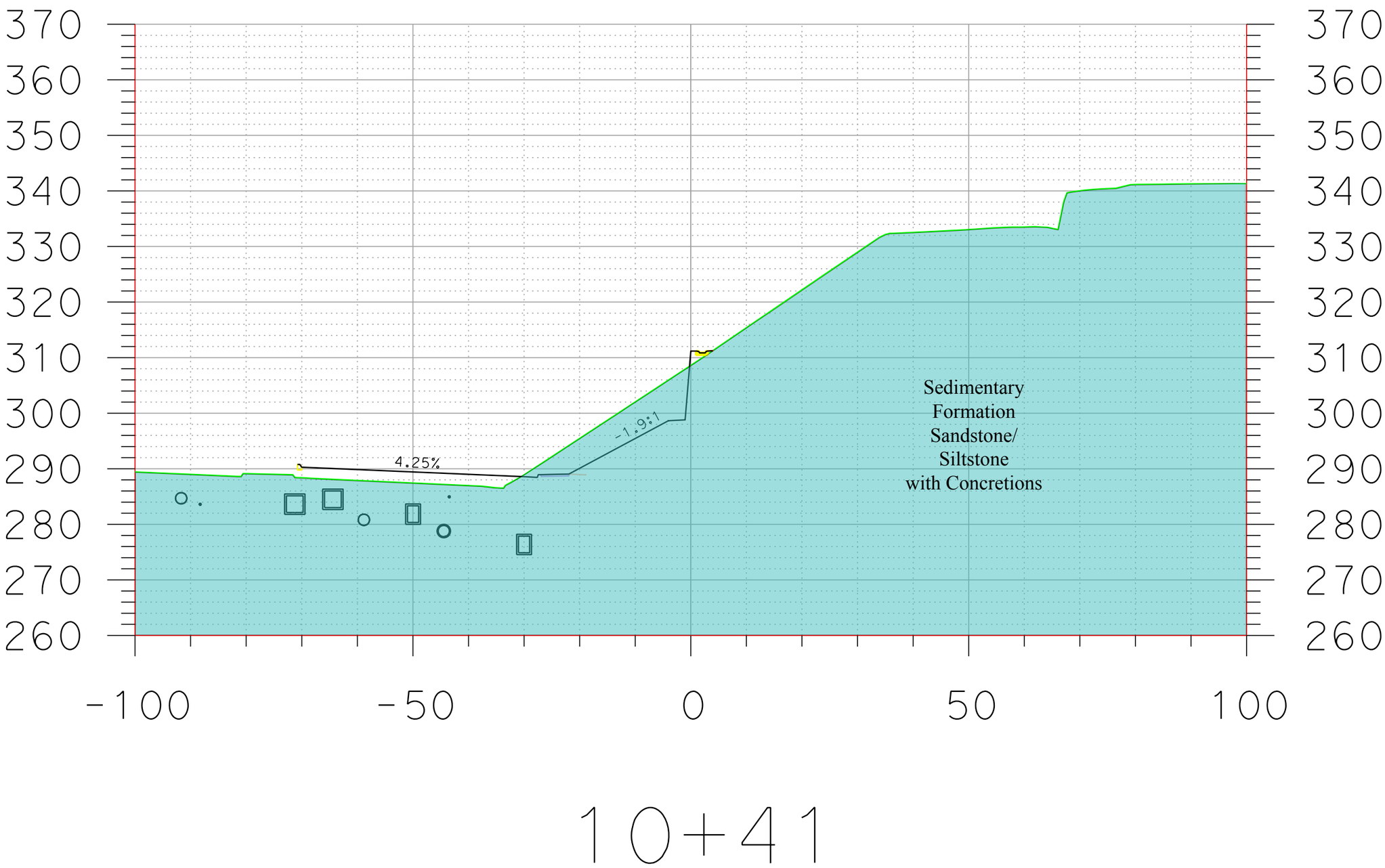
FOUNDATION REPORT: INTERSTATE-5/GENESEE AVENUE
INTERCHANGE IMPROVEMENT PROJECT
RETAININING WALL-11
EA 11-022331/EFIS1100000012

FIGURE 6: PROJECT PROFILE



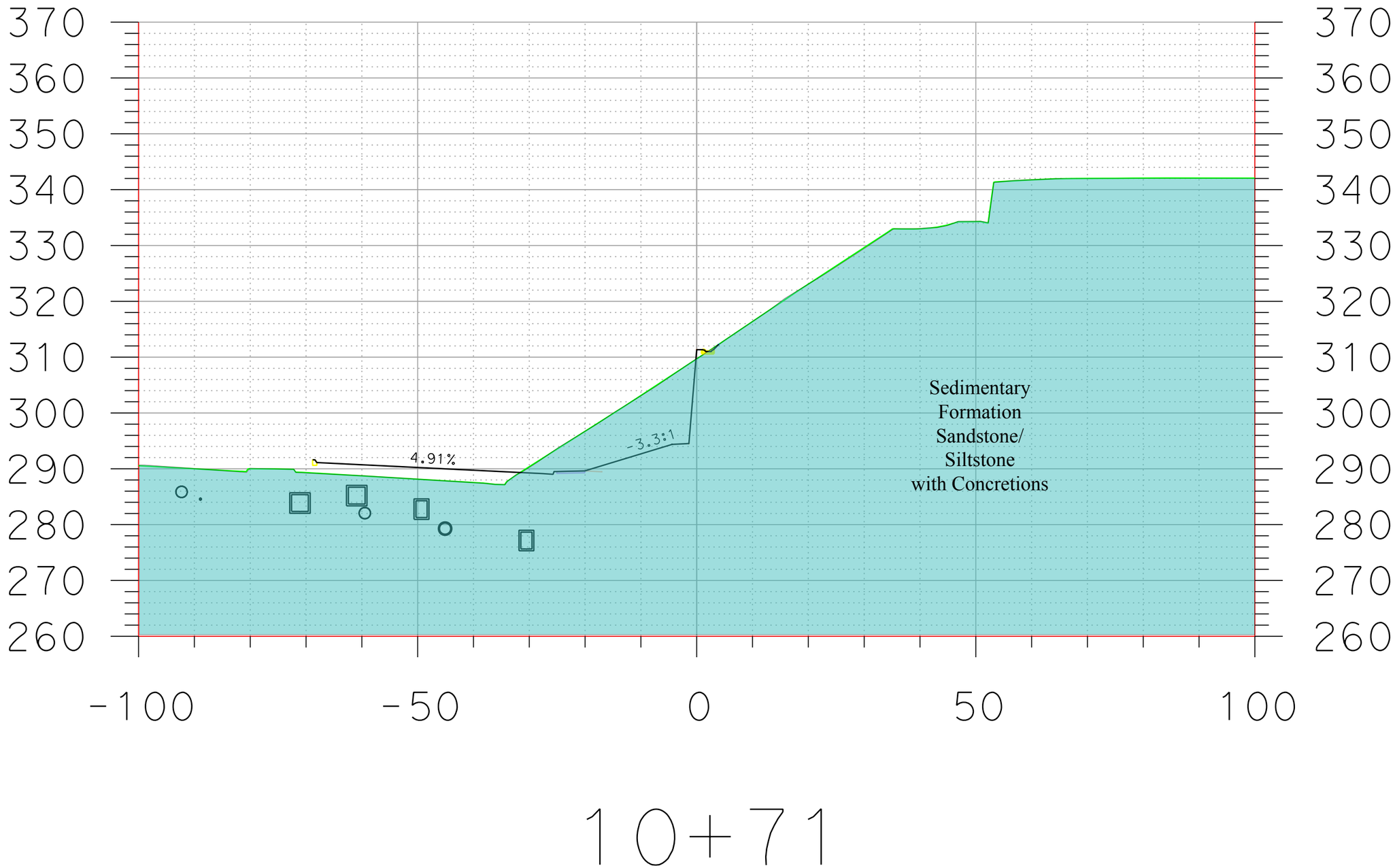
Wall 11_pf_xsc w building.dgn 10/30/2012 1:11:24 PM

FIGURE 7A: GEOLOGIC CROSS SECTION



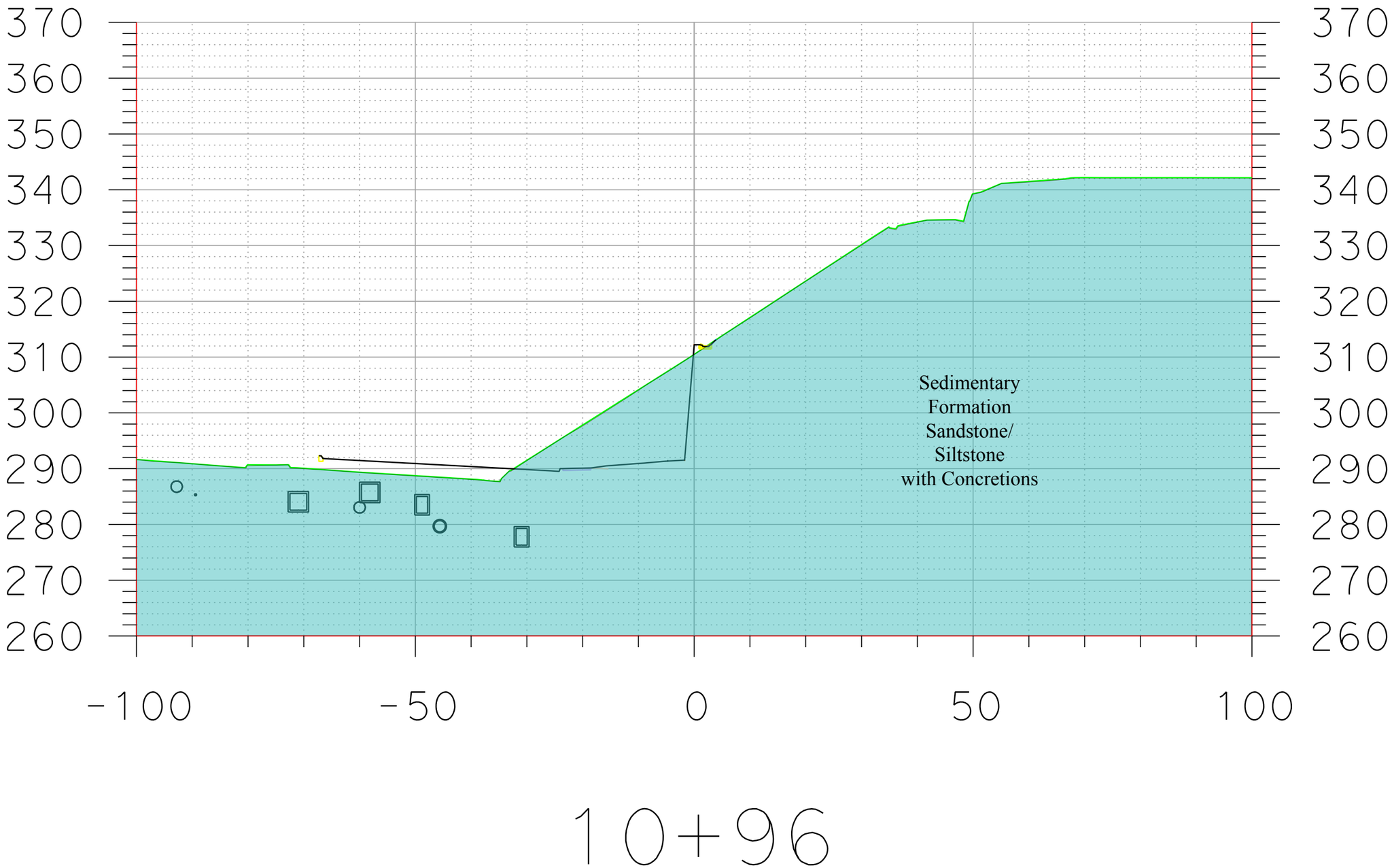
Wall 11_pf_xsc w building.dgn 10/30/2012 1:11:43 PM

FIGURE 7B: GEOLOGIC CROSS SECTION



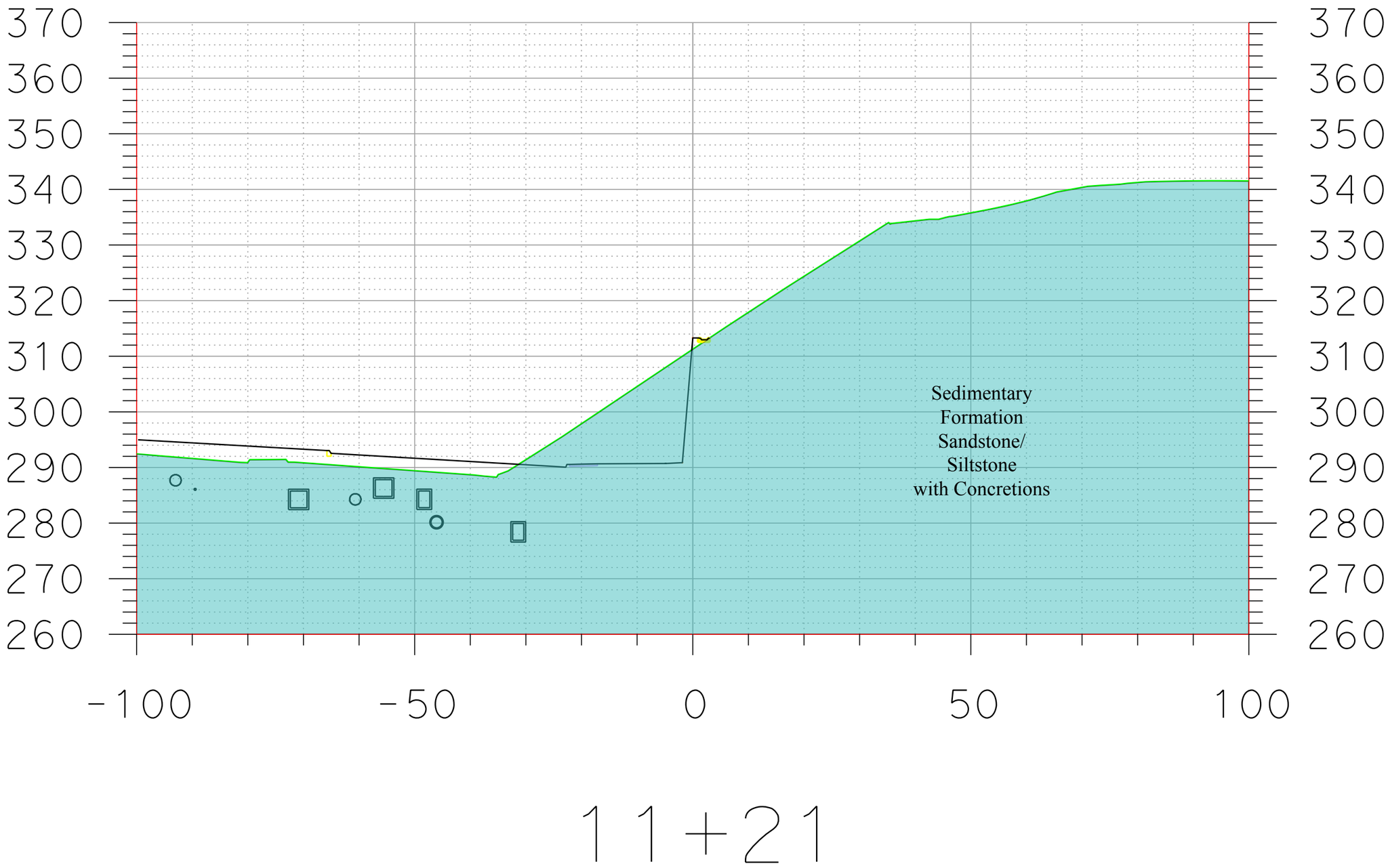
Wall 11_pf_xsc w building.dgn 10/30/2012 1:12:02 PM

FIGURE 7C: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:12:54 PM

FIGURE 7D: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:13:12 PM

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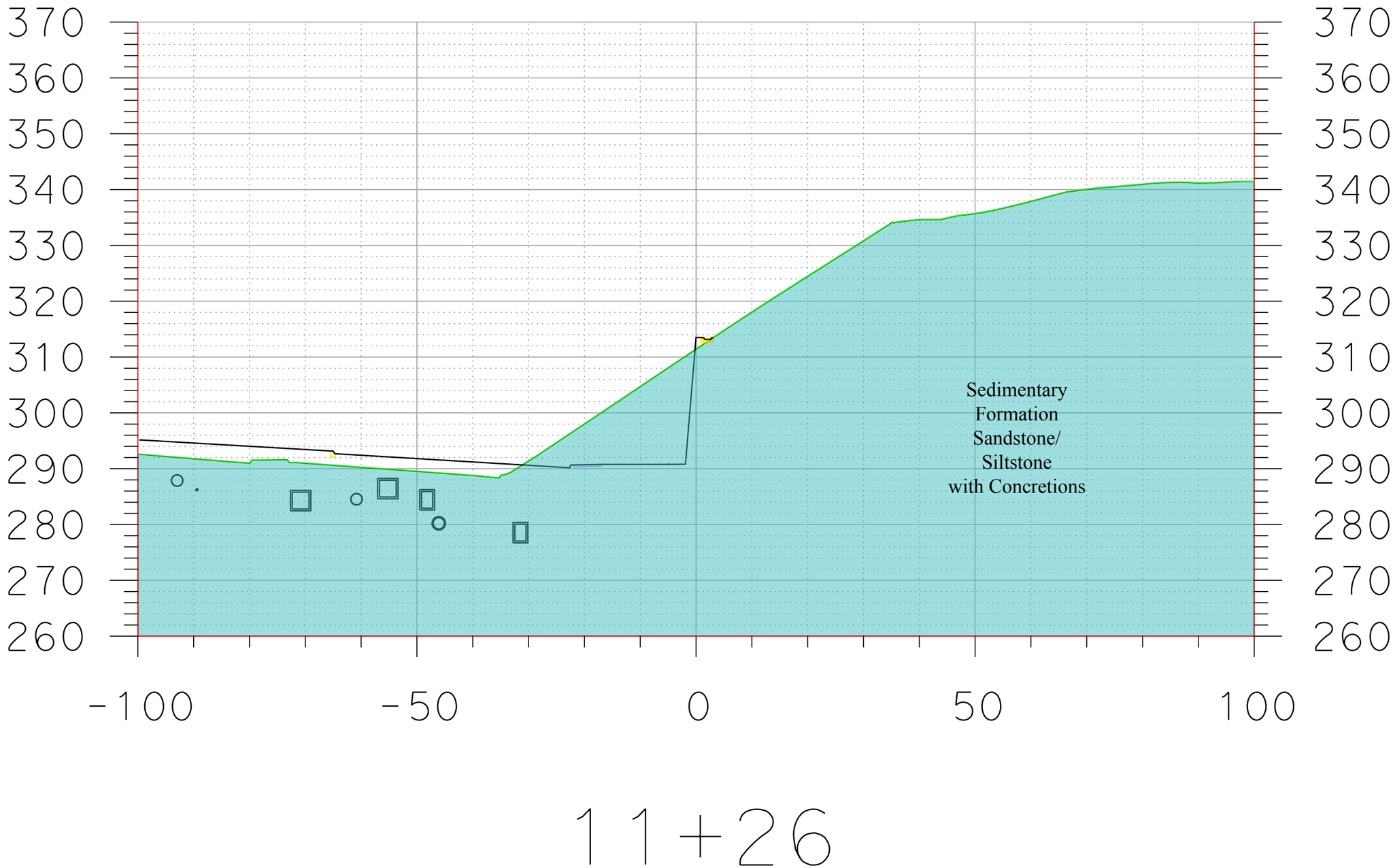
FIGURE 7E: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:13:30 PM

FIGURE 7F: GEOLOGIC CROSS SECTION

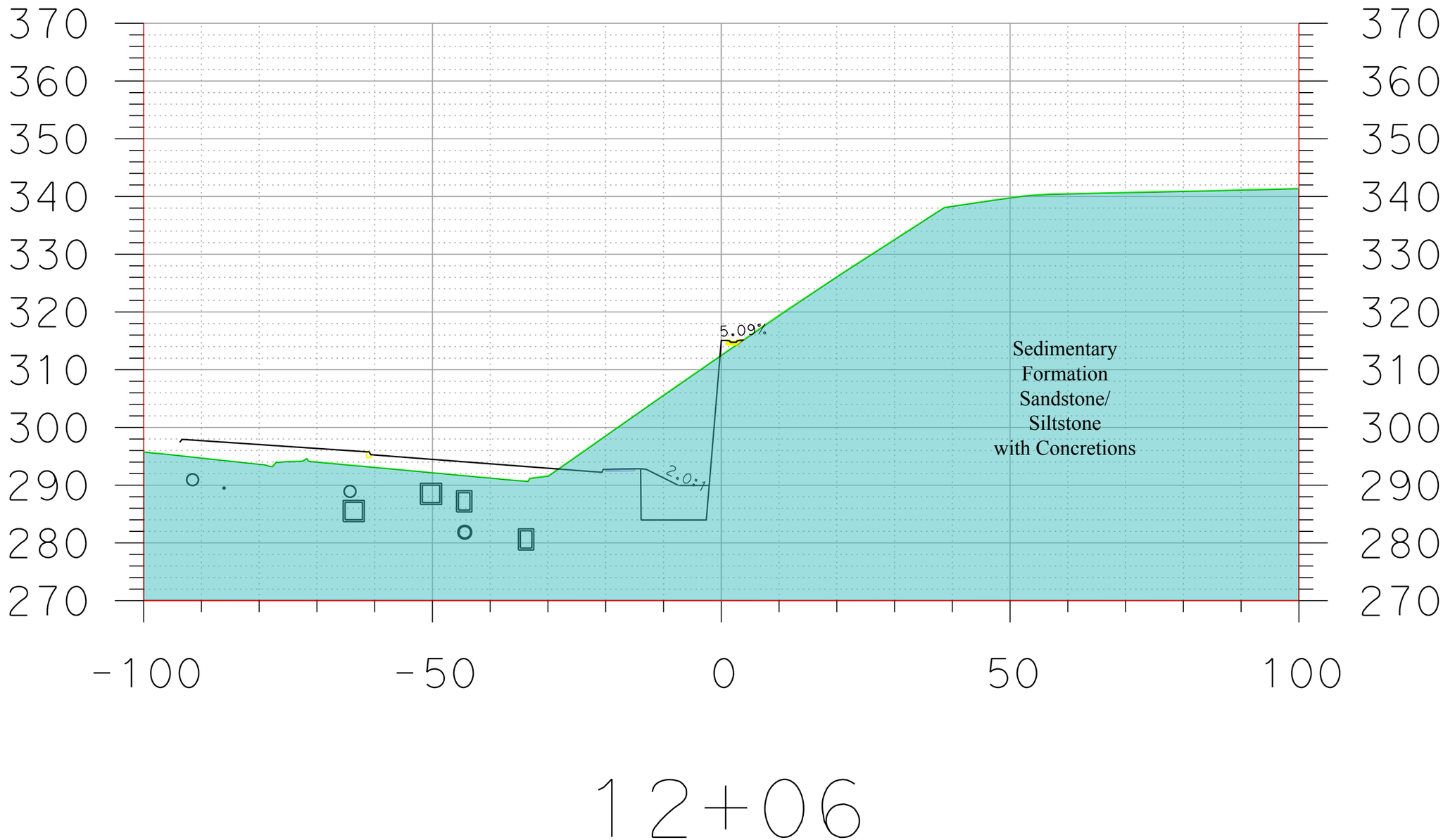


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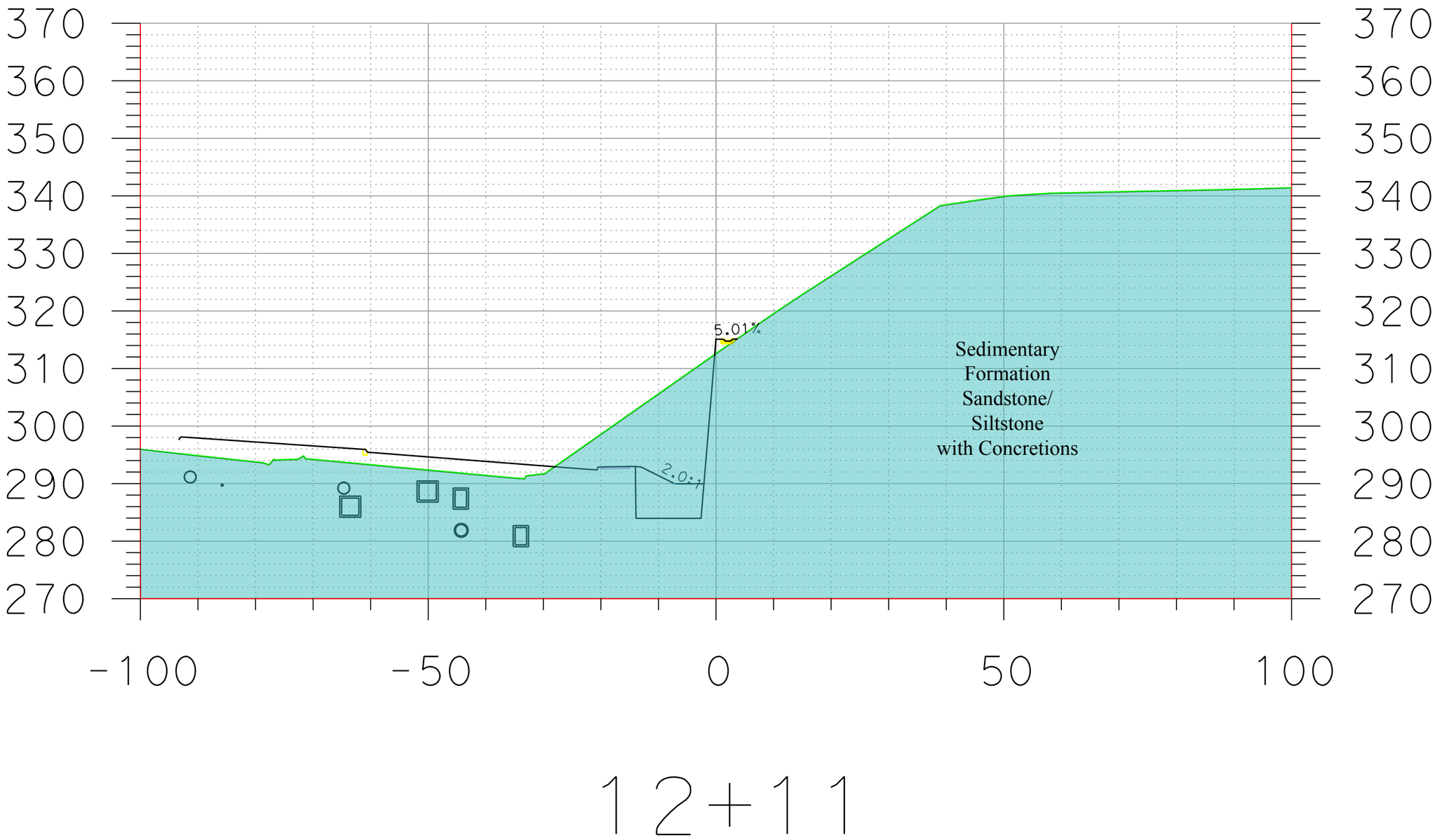
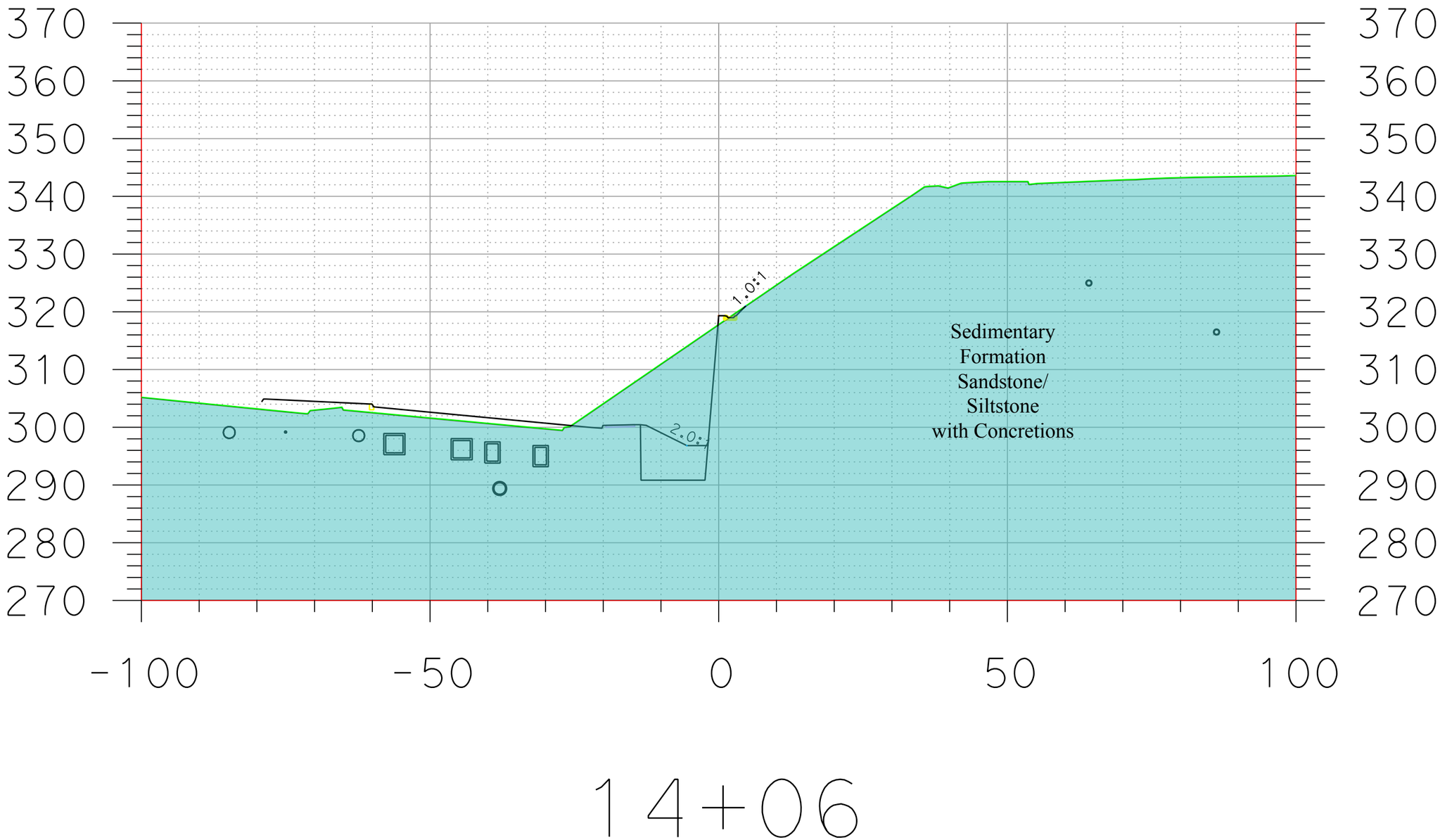
FIGURE 7G: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:14:11 PM

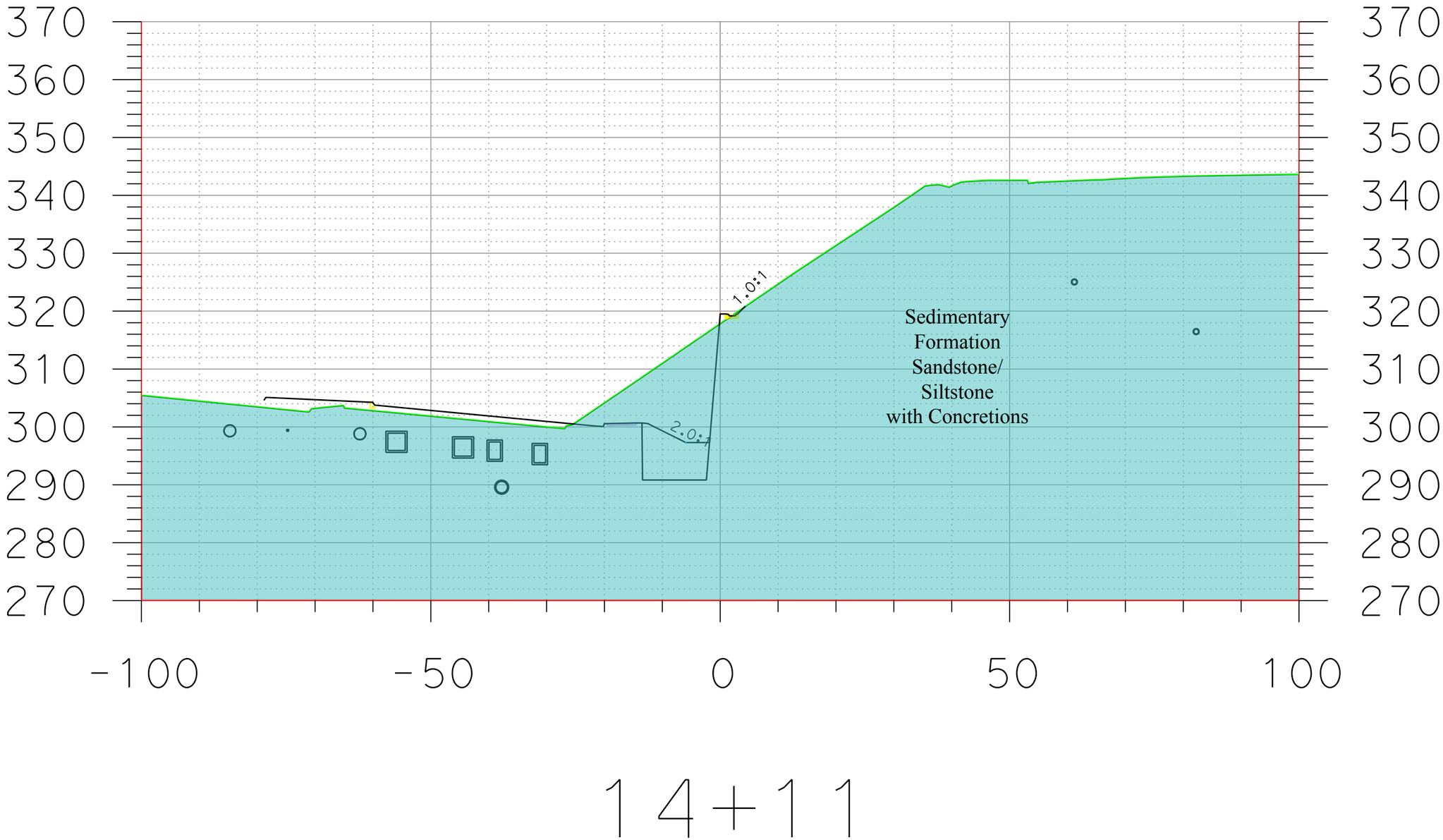
FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
RETAINING WALL-11
EA 11-022331/EFIS 1100000012

FIGURE 7H: GEOLOGIC CROSS SECTION



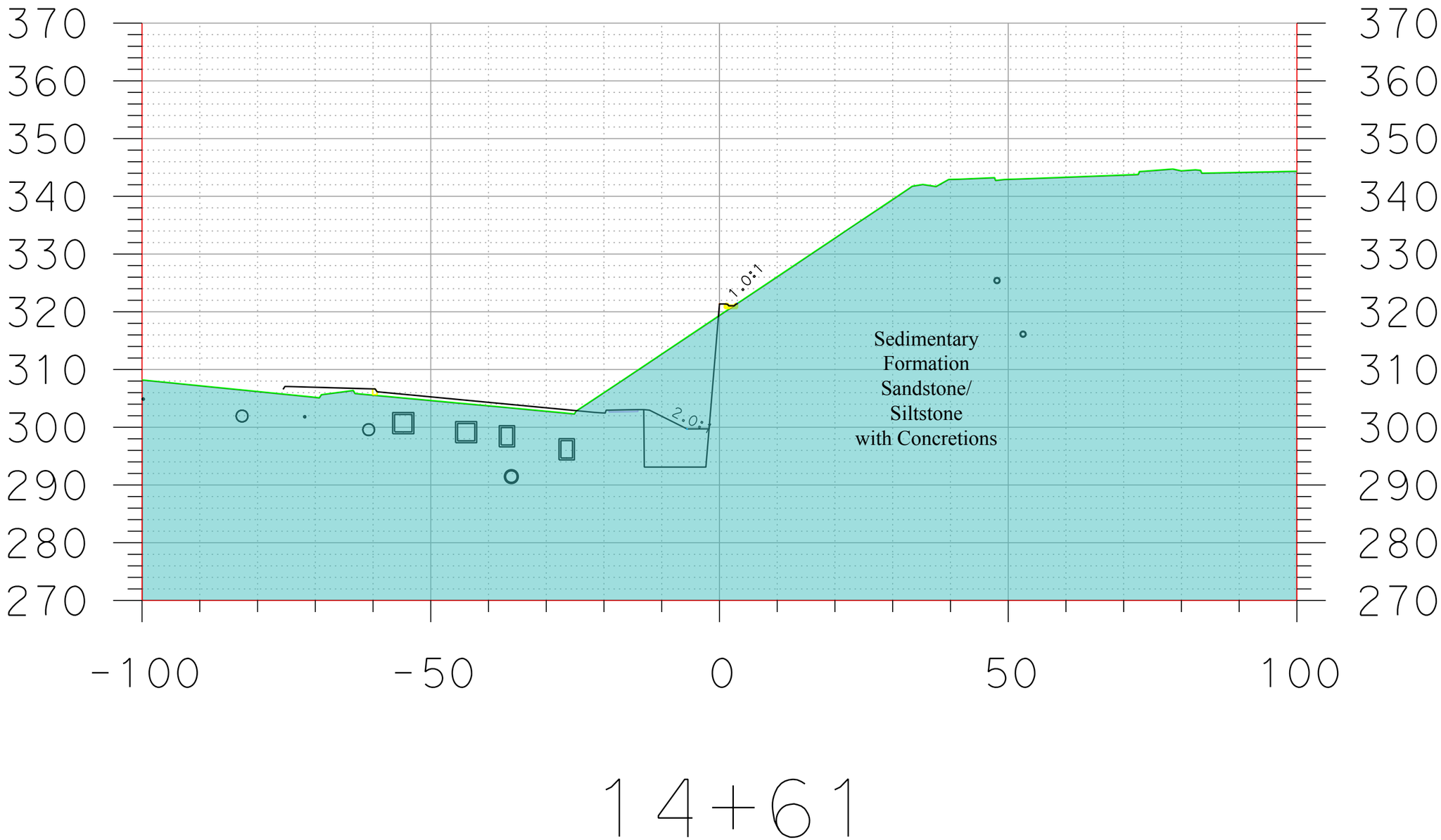
Wall 11_pf_xsc w building.dgn 10/30/2012 1:14:24 PM

FIGURE 7I: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:14:44 PM

FIGURE 7J: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:15:02 PM

FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
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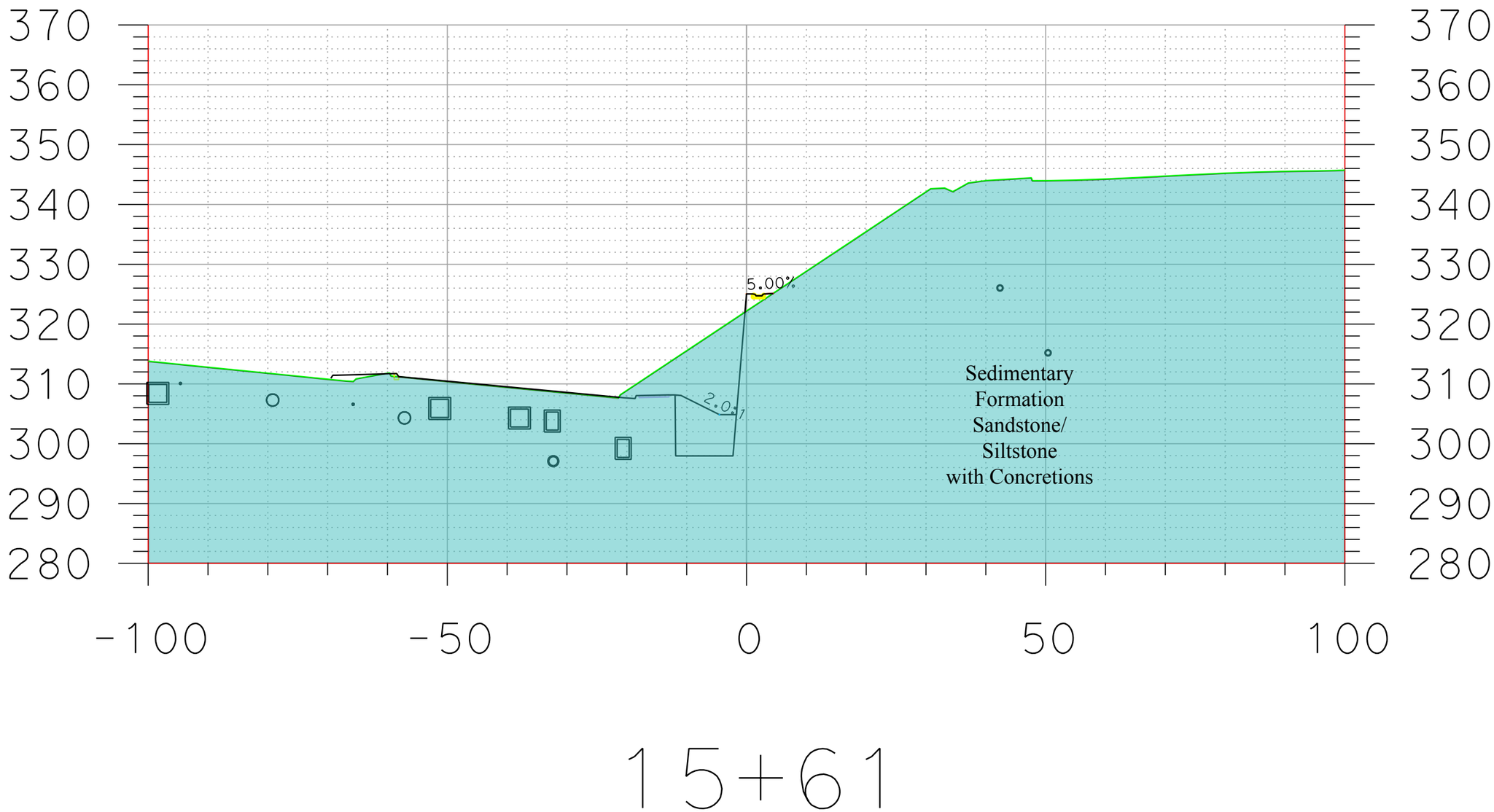
EA 11-022331/EFIS 1100000012

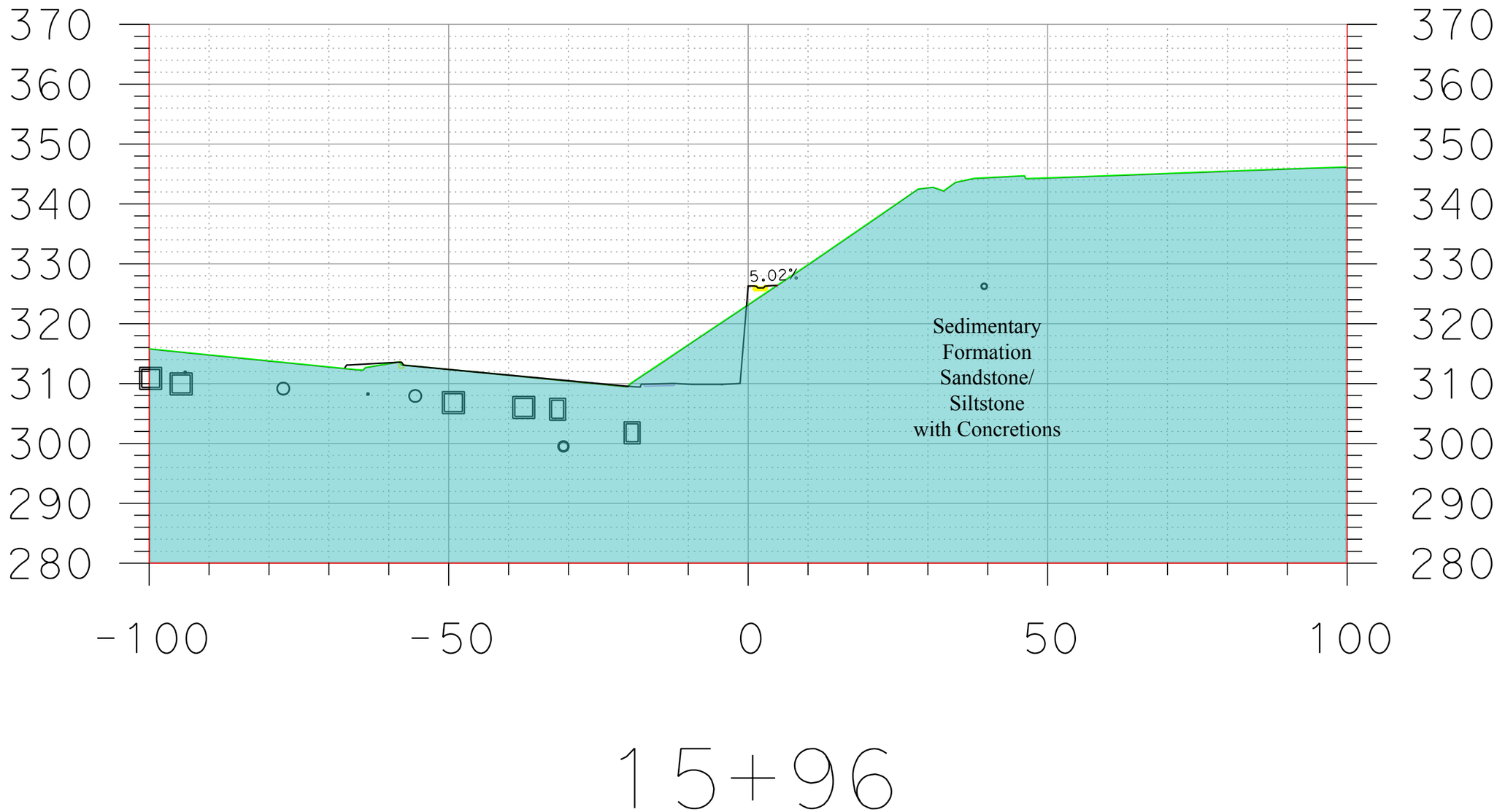
FIGURE 7K: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:15:20 PM

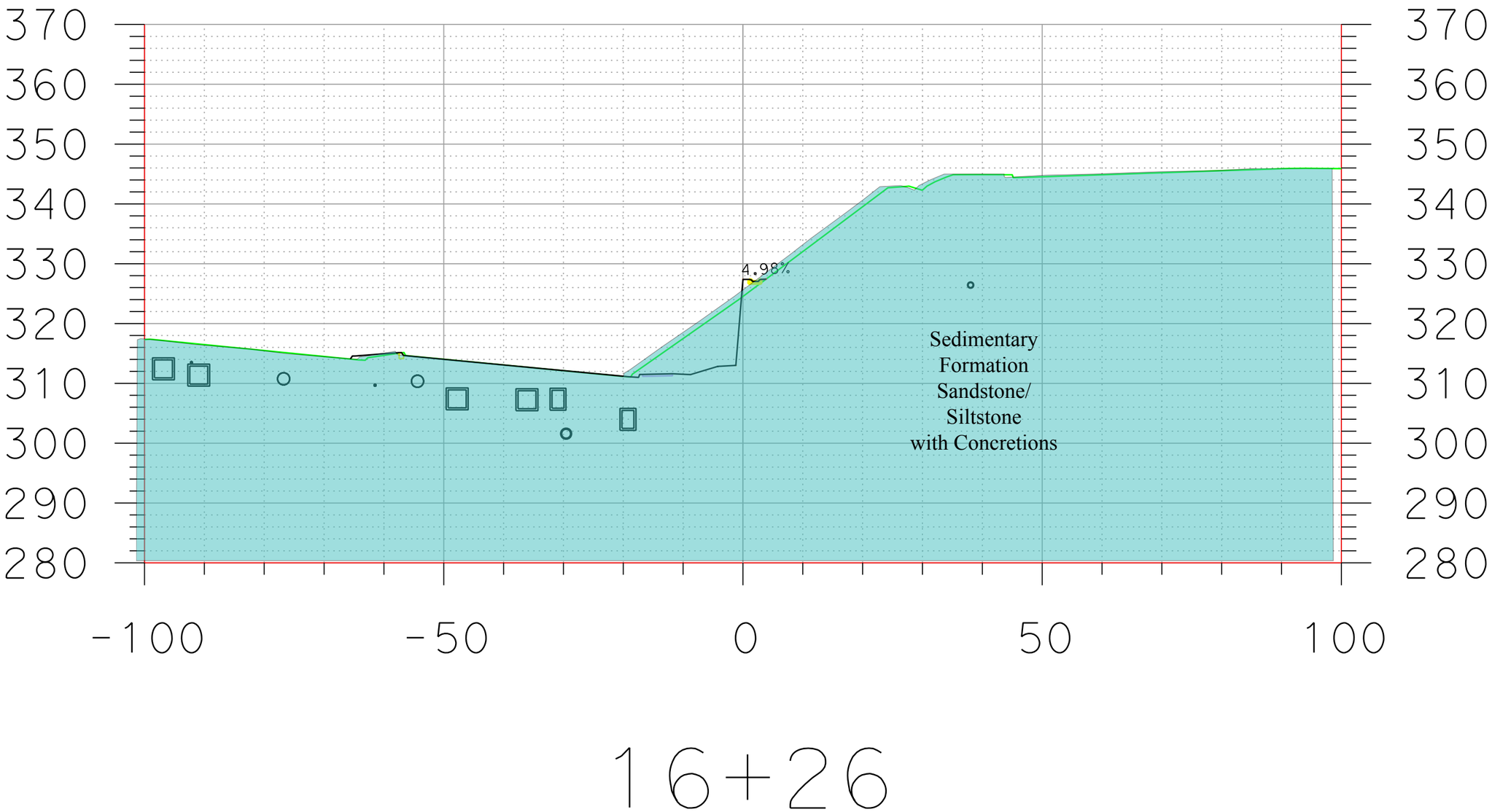
FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
RETAINING WALL-11
EA 11-022331/EFIS 1100000012

FIGURE 7L: GEOLOGIC CROSS SECTION



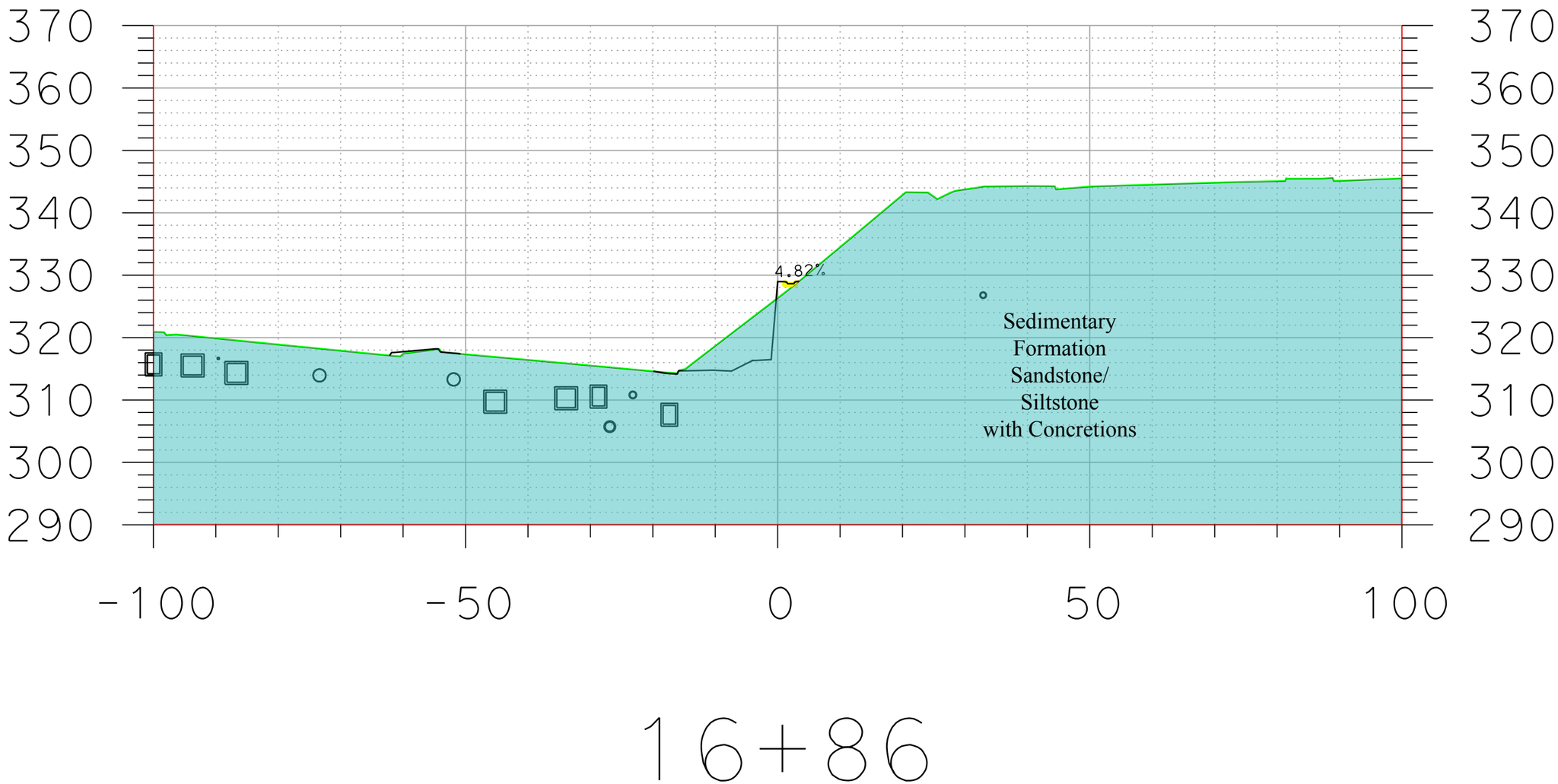
Wall 11_pf_xsc w building.dgn 10/30/2012 1:15:49 PM

FIGURE 7M: GEOLOGIC CROSS SECTION



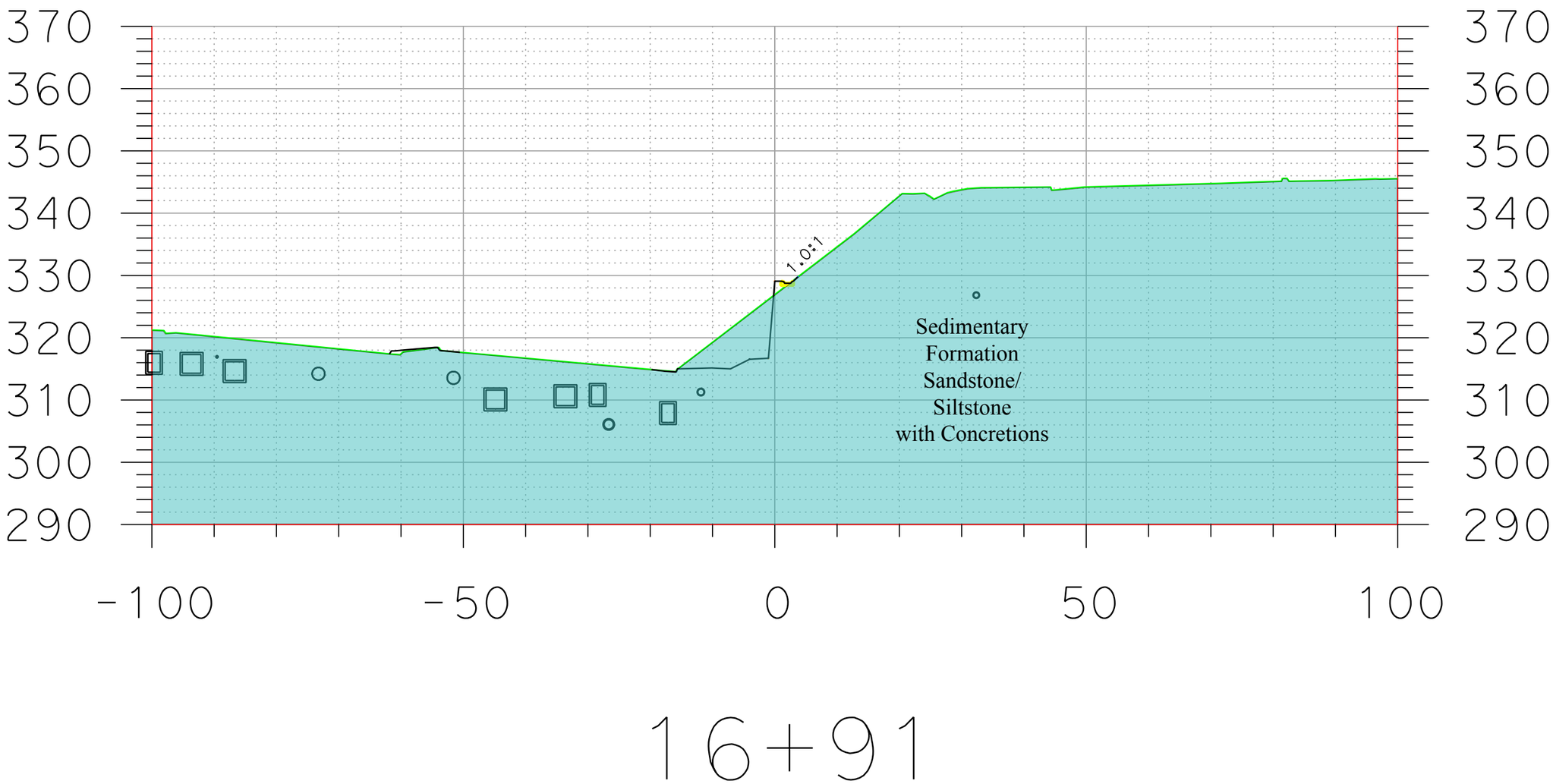
Wall 11_pf_xsc w building.dgn 10/30/2012 1:16:06 PM

FIGURE 7N: GEOLOGIC CROSS SECTION



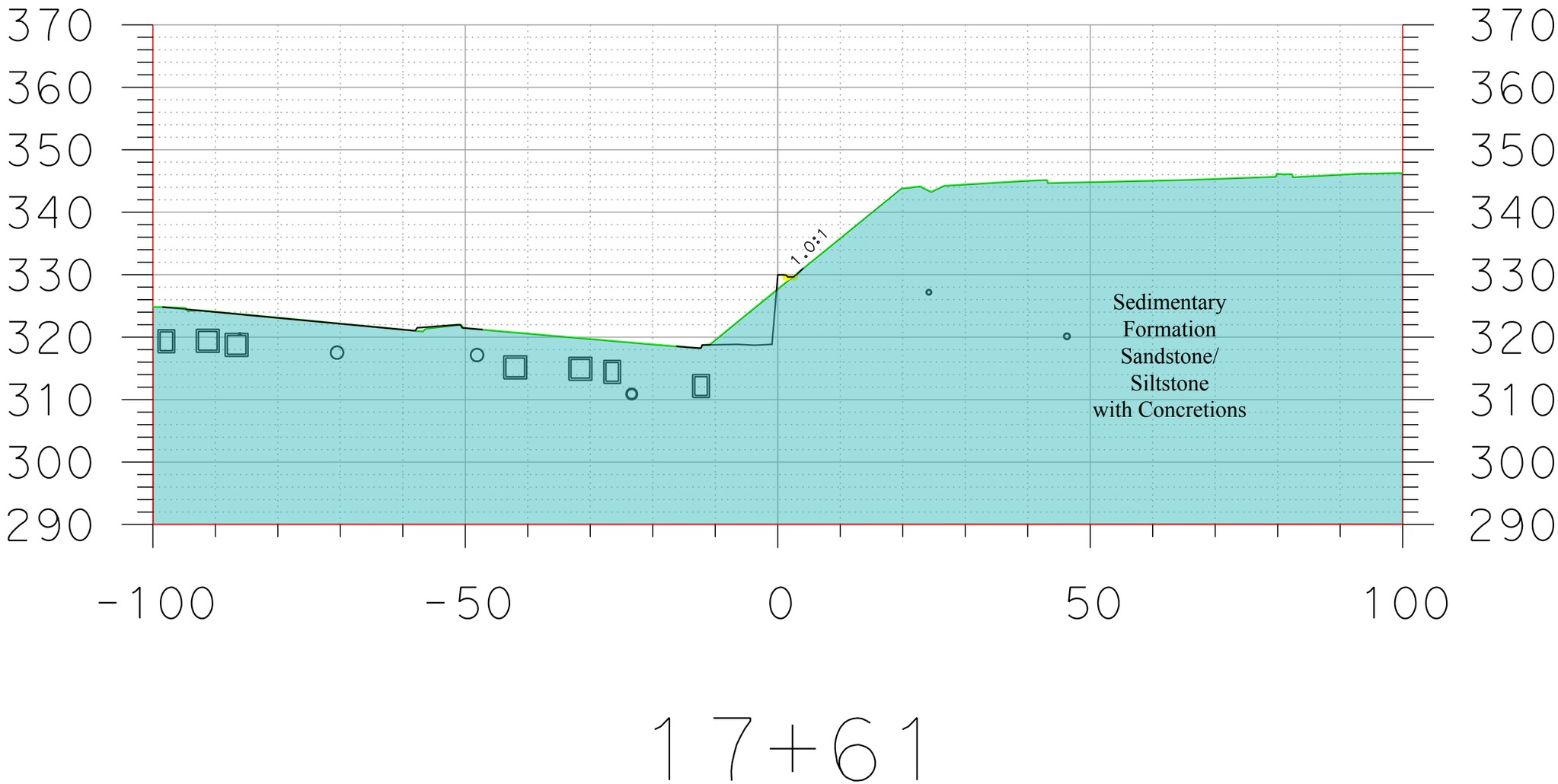
Wall 11_pf_xsc w building.dgn 10/30/2012 1:16:29 PM

FIGURE 7O: GEOLOGIC CROSS SECTION



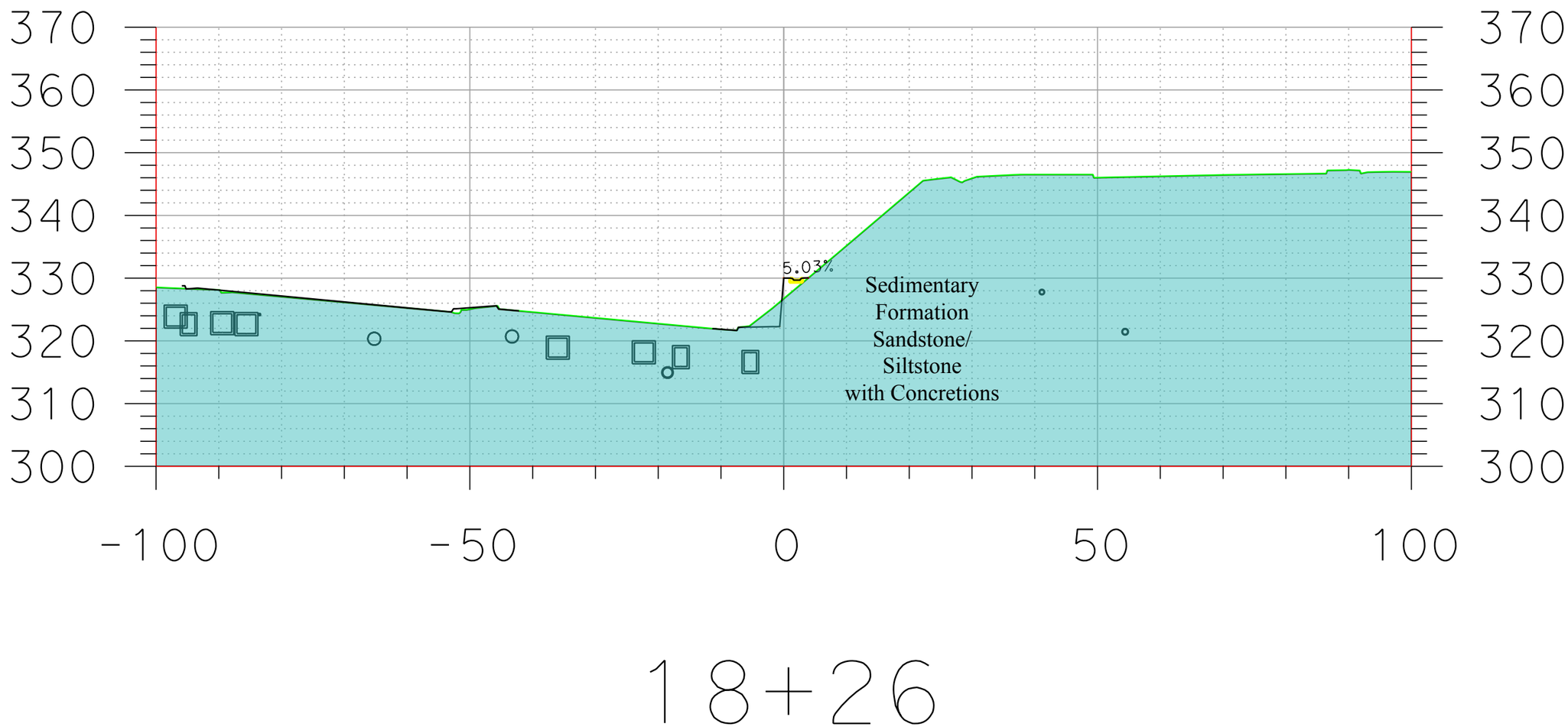
Wall 11_pf_xsc w building.dgn 10/30/2012 1:16:44 PM

FIGURE 7P: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:17:09 PM

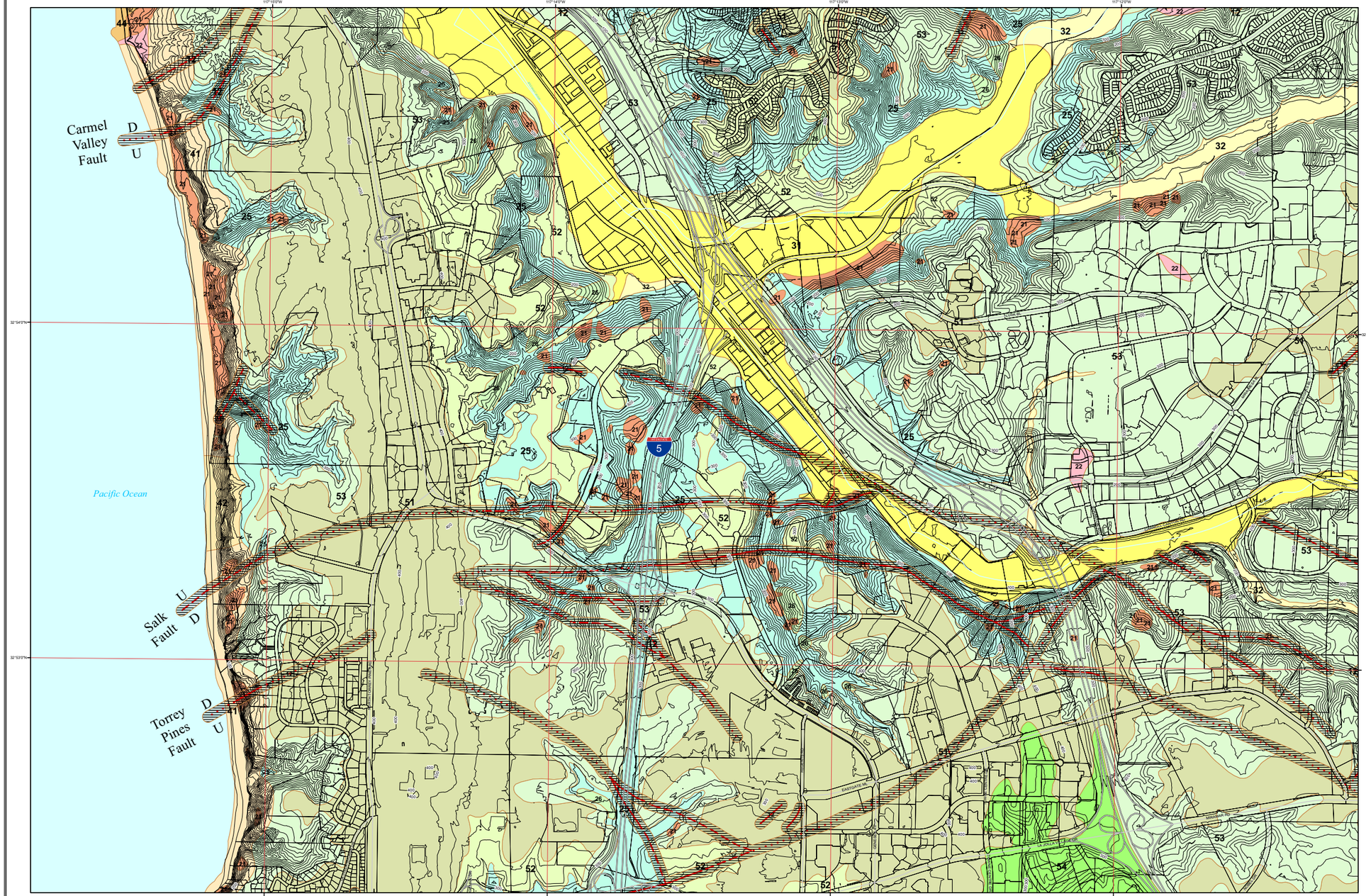
FIGURE 7Q: GEOLOGIC CROSS SECTION



Wall 11_pf_xsc w building.dgn 10/30/2012 1:17:28 PM

FOUNDATION REPORT: INTERSTATE-5/GENESEE INTERCHANGE IMPROVEMENT PROJECT
RETAINING WALL-11
EA 11-022331/EFIS 1100000012

FIGURE 7R: GEOLOGIC CROSS SECTION



LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

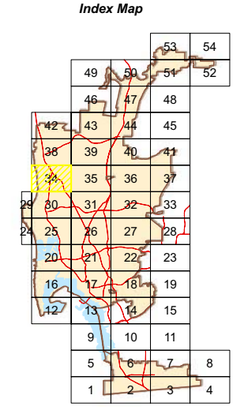
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

Every reasonable effort has been made to assure the accuracy of this map. However, neither the SanGIS participants nor San Diego Data Processing Corporation assume any liability arising from its use.

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

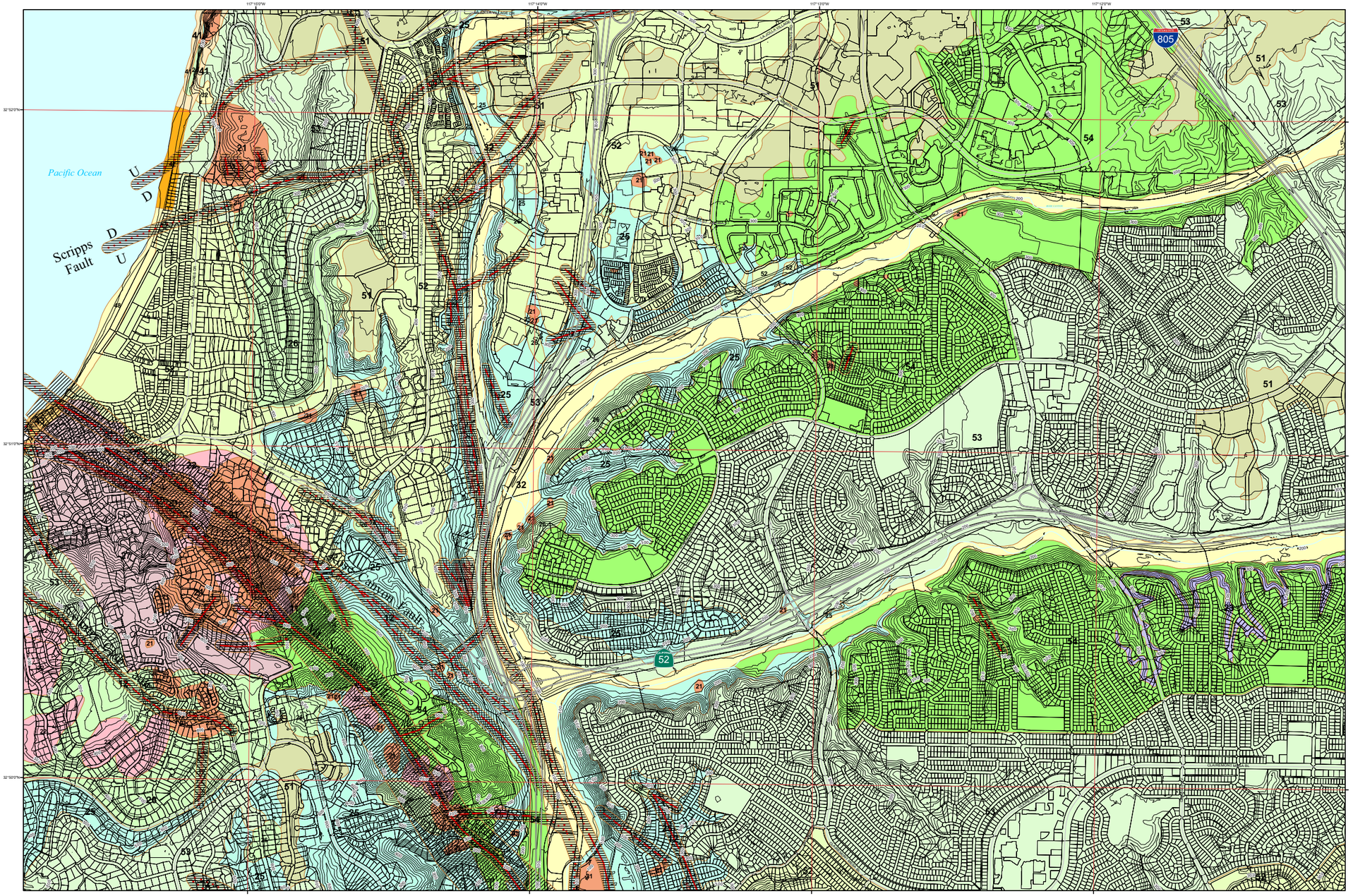
0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 34
GRID SCALE: 800
DATE: 4/3/2008

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-11
EA-11022331/EFIS 11000000012

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



LEGEND

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FAULTS

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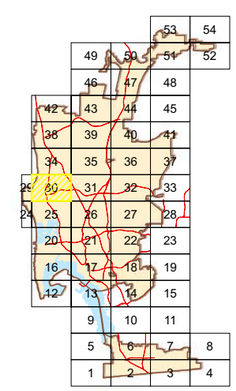
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

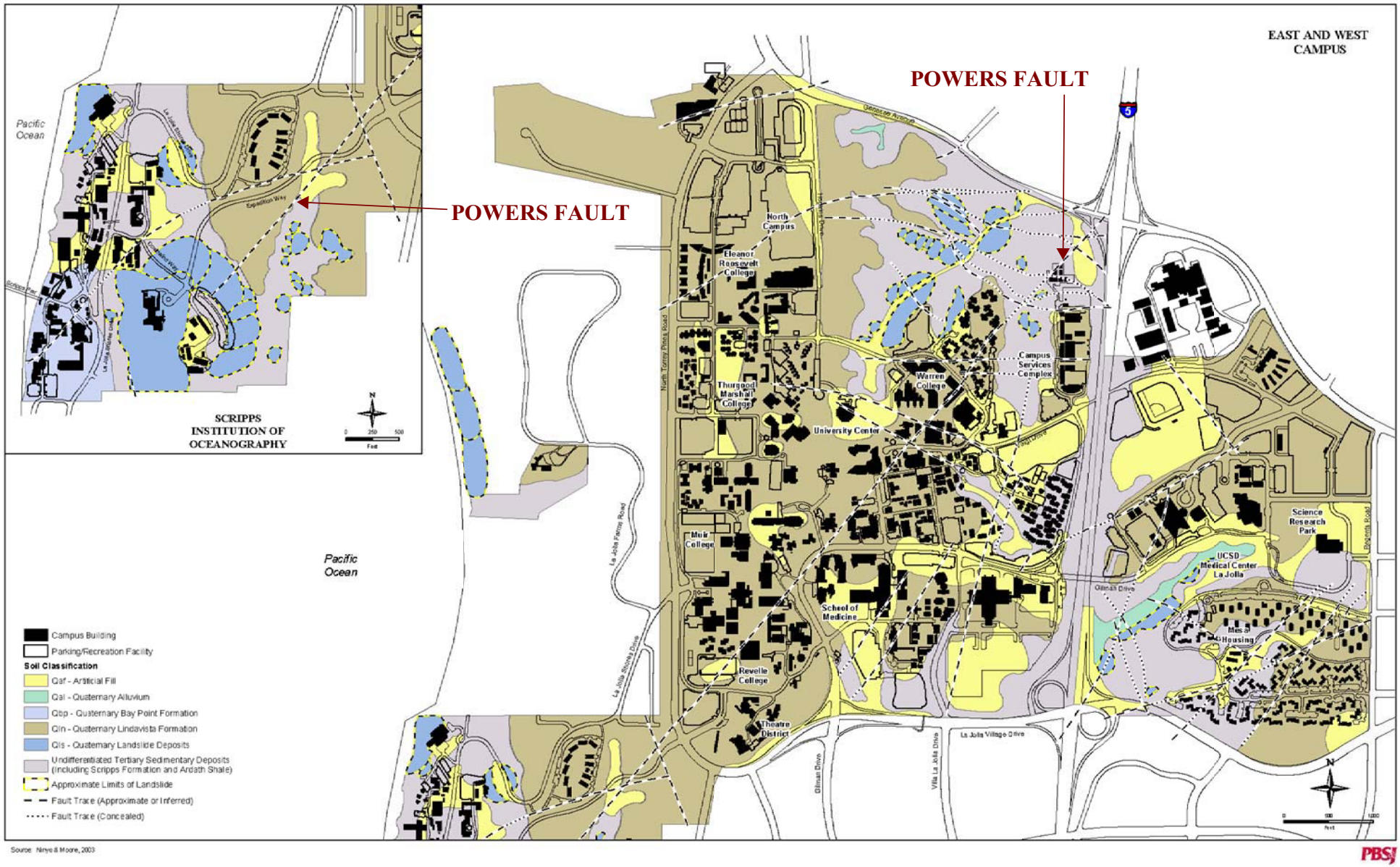
Development Services Department

Feet: 0 200 400 800 1,600 2,400

Meters: 0 120 240 480 720 960

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



Source: Ninyo & Moore, 2003

PBSJ

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Retaining Wall-11
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-479+28-23R-B01		1,300	7.50	150	298
011-481+74-40R-B02		2,600	5.43	56	191

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: RETAINING WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-11	Soil Nail	9+85.000 RW-11-Line	10+15.797 RW-11-Line	30.797	10	Varies	Varies	1H:12V	Cut
	Soil Nail	10+15.797 RW-11-Line	10+44.211 RW-11-Line	28.414	15	Varies	Varies	1H:12V	Cut
	Soil Nail	10+44.211 RW-11-Line	10+70.905 RW-11-Line	26.694	20	Varies	Varies	1H:12V	Cut
	Soil Nail	10+70.905 RW-11-Line	10+97.541 RW-11-Line	26.636	25	Varies	Varies	1H:12V	Cut
	Soil Nail	10+97.541 RW-11-Line	11+23.070 RW-11-Line	25.529	30	Varies	Varies	1H:12V	Cut
	Soil Nail	11+23.070 RW-11-Line	13+82.868 RW-11-Line	259.798	35	Varies	Varies	1H:12V	Cut
	Soil Nail	13+82.868 RW-11-Line	14+48.847 RW-11-Line	65.979	35	Varies	Varies	1H:12V	Cut
	Soil Nail	14+48.847 RW-11-Line	15+46.170 RW-11-Line	97.323	35	Varies	Varies	1H:12V	Cut
	Soil Nail	15+46.170 RW-11-Line	15+96.924 RW-11-Line	50.754	30	Varies	Varies	1H:12V	Cut
	Soil Nail	15+96.924 RW-11-Line	16+24.735 RW-11-Line	27.811	25	Flat	Varies	1H:12V	Cut
	Soil Nail	16+24.735 RW-11-Line	16+84.252 RW-11-Line	59.517	20	Flat	Varies	1H:12V	Cut
	Soil Nail	16+84.252 RW-11-Line	17+36.035 RW-11-Line	51.783	15	Flat	Varies	1H:12V	Cut
	Soil Nail	17+36.035 RW-11-Line	17+60.156 RW-11-Line	24.121	15	Flat	Varies	1H:12V	Cut
	Soil Nail	17+60.156 RW-11-Line	18+24.313 RW-11-Line	64.157	15	Flat	Varies	1H:12V	Cut
	Soil Nail	18+24.313 RW-11-Line	18+96.500 RW-11-Line	72.187	10	Flat	Varies	1H:12V	Cut

Notes: L = Wall Segment Length
H_{MAX} =Maximum Design Wall Height
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-11	Soil Nail	9+85.000 RW-11-Line	18+96.500 RW-11-Line	Sedimentary Formation	33	350	121

Notes:

φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 5A: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	NS (psi)	AHS (lbs)	NHS_{MAX} (ft)	NVS_{MAX} (ft)	NIA (degrees)	$DTOP_{MAX}$ (ft)	$DBOT_{MAX}$ (ft)
RW-11	Soil Nail	9+85.000 RW-11-Line	10+15.797 RW-11-Line	36,000	30,000	6	6	15	2.5	3
	Soil Nail	10+15.797 RW-11-Line	10+44.211 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	10+44.211 RW-11-Line	10+70.905 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	10+70.905 RW-11-Line	10+97.541 RW-11-Line	36000	30000	6	6	15	2.5	3
	Soil Nail	10+97.541 RW-11-Line	11+23.070 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	11+23.070 RW-11-Line	13+82.868 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	13+82.868 RW-11-Line	14+48.847 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	14+48.847 RW-11-Line	15+46.170 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	15+46.170 RW-11-Line	15+96.924 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	15+96.924 RW-11-Line	16+24.735 RW-11-Line	36000	30000	6	5	15	2.5	3
	Soil Nail	16+24.735 RW-11-Line	16+84.252 RW-11-Line	36000	30000	6	6	15	2.5	3
	Soil Nail	16+84.252 RW-11-Line	17+36.035 RW-11-Line	36000	30000	6	6	15	2.5	3
	Soil Nail	17+36.035 RW-11-Line	17+60.156 RW-11-Line	36000	30000	6	6	15	2.5	3
	Soil Nail	17+60.156 RW-11-Line	18+24.313 RW-11-Line	36000	30000	6	6	15	2.5	3
	Soil Nail	18+24.313 RW-11-Line	18+96.500 RW-11-Line	36000	30000	6	6	15	2.5	3

Notes: NS = Nail Strength
AHS = Assumed Head Strength
NHS_{MAX} = Maximum Nail Horizontal Spacing
NVS_{MAX} = Maximum Nail Vertical Spacing
NIA = Nail Inclination Angle from the Horizontal
$DTOP_{MAX}$ = Maximum distance from the top of the wall to the top row of nails.
$DBOT_{MAX}$ = Maximum distance from the bottom of the wall to the bottom row of nails.

TABLE 5B: SOIL NAIL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	DPR (psi)	RBD (in)	MNL (ft)	MNR
RW-11	Soil Nail	9+85.000 RW-11-Line	10+15.797 RW-11-Line	5.4	1.27	10	2
	Soil Nail	10+15.797 RW-11-Line	10+44.211 RW-11-Line	5.4	1.27	20	3
	Soil Nail	10+44.211 RW-11-Line	10+70.905 RW-11-Line	5.4	1.27	20	4
	Soil Nail	10+70.905 RW-11-Line	10+97.541 RW-11-Line	5.4	1.27	35	4
	Soil Nail	10+97.541 RW-11-Line	11+23.070 RW-11-Line	5.4	1.41	40	6
	Soil Nail	11+23.070 RW-11-Line	13+82.868 RW-11-Line	5.4	1.41	42	7
	Soil Nail	13+82.868 RW-11-Line	14+48.847 RW-11-Line	5.4	1.41	40	7
	Soil Nail	14+48.847 RW-11-Line	15+46.170 RW-11-Line	5.4	1.41	38	7
	Soil Nail	15+46.170 RW-11-Line	15+96.924 RW-11-Line	5.4	1.27	32	6
	Soil Nail	15+96.924 RW-11-Line	16+24.735 RW-11-Line	5.4	1.27	25	5
	Soil Nail	16+24.735 RW-11-Line	16+84.252 RW-11-Line	5.4	1.27	20	4
	Soil Nail	16+84.252 RW-11-Line	17+36.035 RW-11-Line	5.4	1.27	10	3
	Soil Nail	17+36.035 RW-11-Line	17+60.156 RW-11-Line	5.4	1.27	10	3
	Soil Nail	17+60.156 RW-11-Line	18+24.313 RW-11-Line	5.4	1.27	10	3
	Soil Nail	18+24.313 RW-11-Line	18+96.500 RW-11-Line	5.4	1.27	10	2

Notes: DPR = Design Pullout Resistance
RBD = Reinforcing Bar Diameter
MNL = Minimum Nail Length
MNR = Minimum Number of Rows at Hmax

APPENDICES

APPENDIX I

LOG OF TEST BORINGS AND SITE DATA

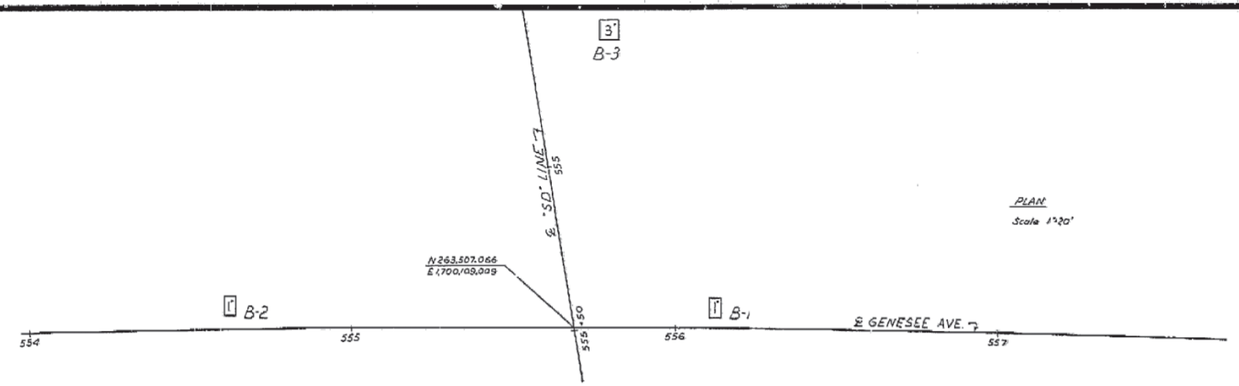
DIST.	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
XI	SD	5	28.4/R19.9	118	197

DATE APPROVED July 20, 1964

BENCH MARK

TBM #1 - ℄ Stake, sta. 554+86 "SD" top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV 278.66



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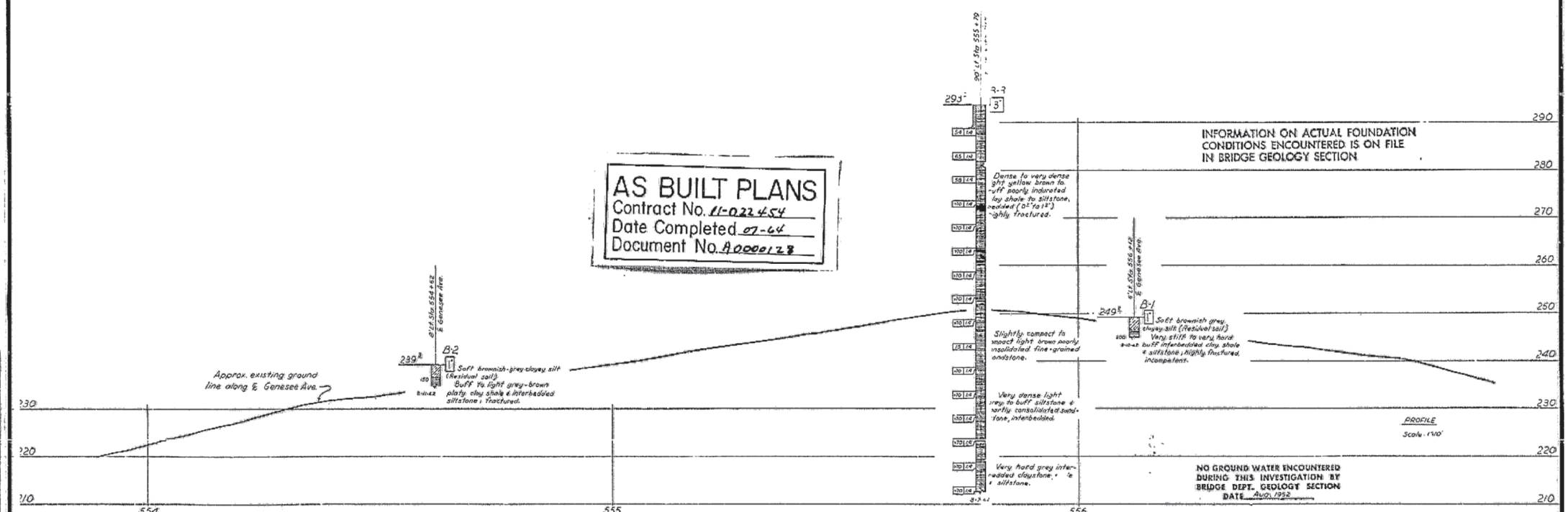


AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128

BRIDGE DEPARTMENT

Approval Recommended By — Bridge Engineer

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

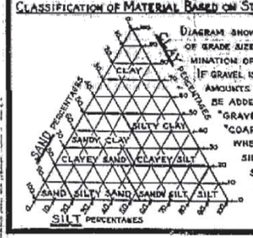


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

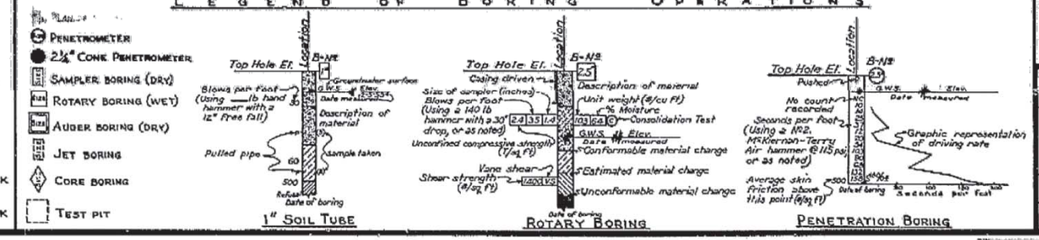
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2¼" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

GENESEE AVENUE OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-527	FILE	DRAWING 57527-9

PREL. DRAWING NO. P-

5-4

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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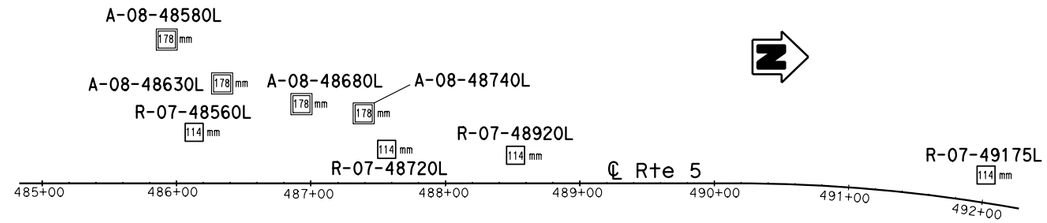
BENCH MARK

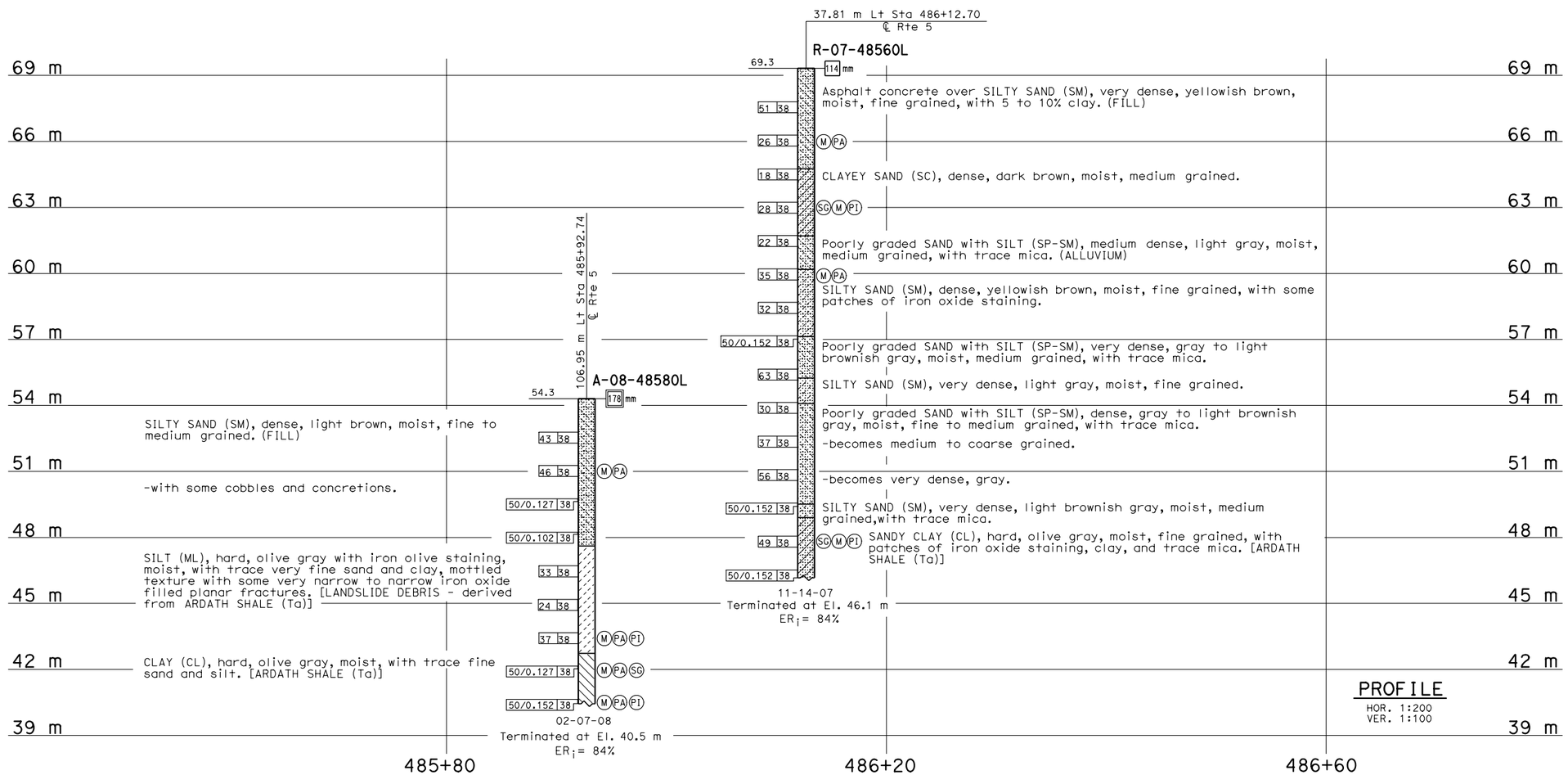
Monument 5-29.6 SD-5-PM 29.57
CHD Std Br Disk in concrete
801.9' Lt Sta 561+01.31 P.O.T "SD".
Monument is located 3.4' West of shoulder dike. Accessible from main lanes.
N 264063.10
E 1700079.16
Elev. 225.19'



PLAN

1:2000

NOTE: Ground water not encountered during field investigation.



PROFILE

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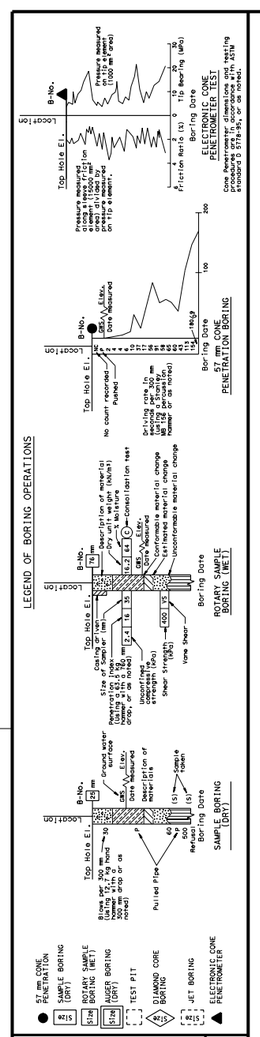
VER. 1:100



OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

Caltrans Metric

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08
CHECKED BY	M. Fordham

FIELD INVESTIGATION BY: M. Fordham

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

BRIDGE NO.

KILOMETER POST R29.20/R30.06

INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE

LOG OF TEST BORINGS 1 OF 4

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

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DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 12-03-08 12-04-08

SHEET OF

USERNAME => s116982 DATE PLOTTED => 04-DEC-2008 TIME PLOTTED => 15:39

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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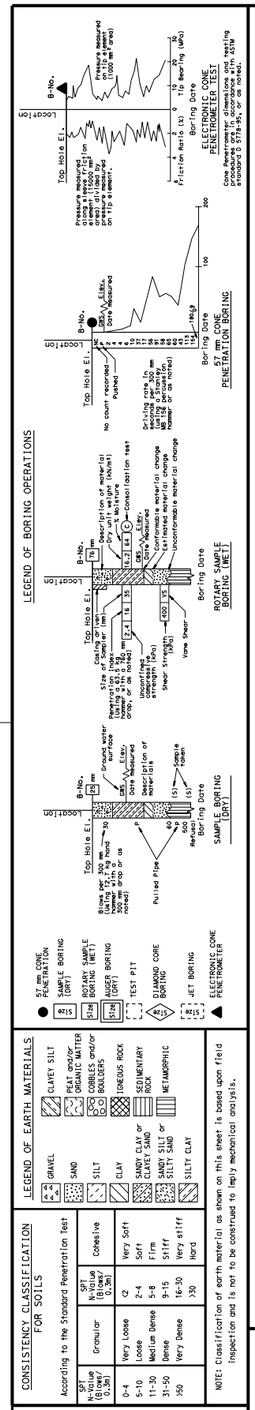
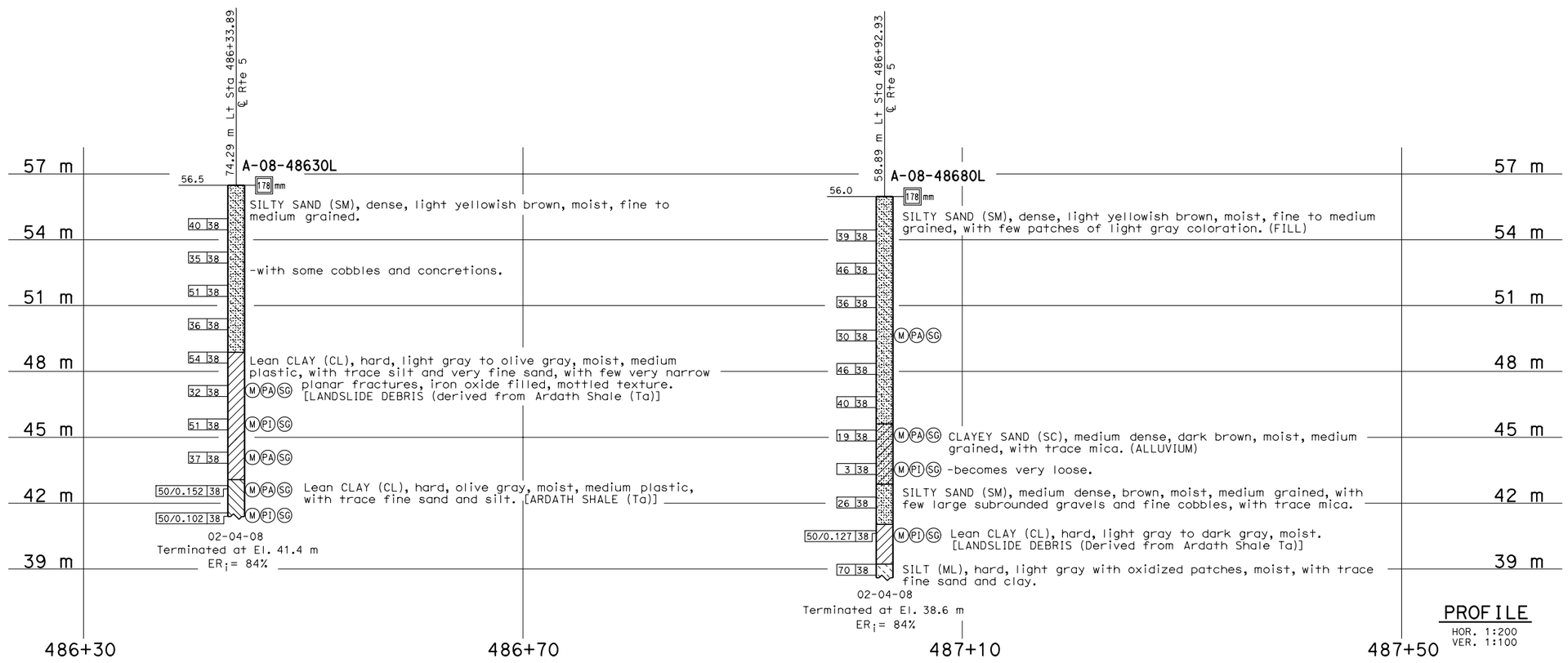


FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4



Caltrans Metric	ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE
	DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08	M. Fordham		DESIGN BRANCH	KILOMETER POST R29.20/R30.06	LOG OF TEST BORINGS 2 OF 4
	CHECKED BY	M. Fordham					

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

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11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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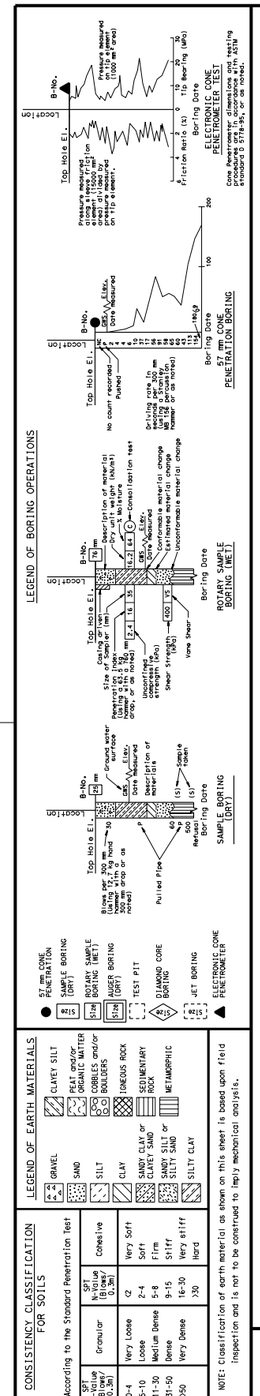
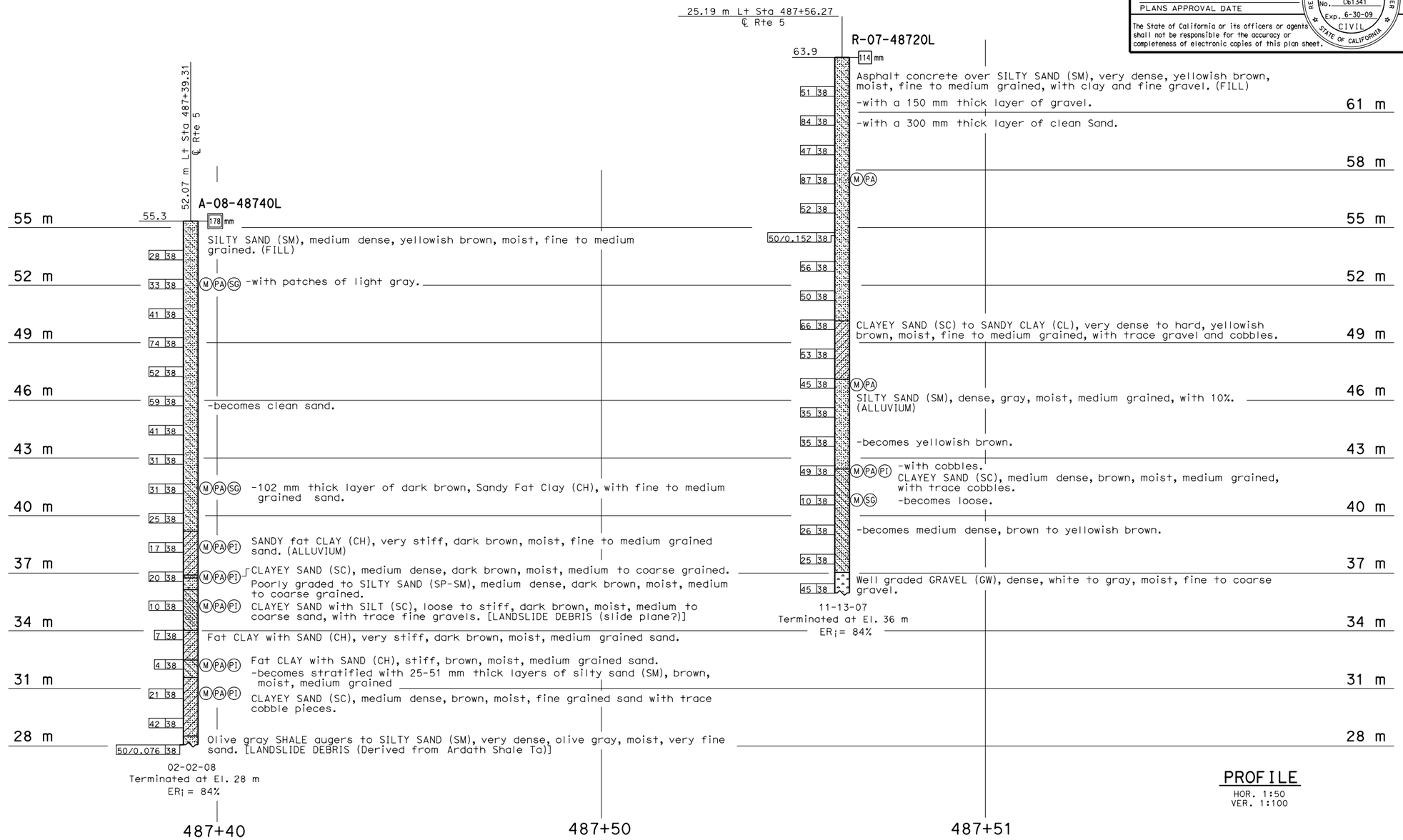


OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4



PROFILE
HOR. 1:50
VER. 1:100

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08
CHECKED BY	M. Fordham

FIELD INVESTIGATION BY: M. Fordham

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

BRIDGE NO.

KILOMETER POST R29.20/R30.06

INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE

LOG OF TEST BORINGS 3 OF 4

Caltrans Metric

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

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REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

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11	SD	5			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael M. Fordham No. C61341 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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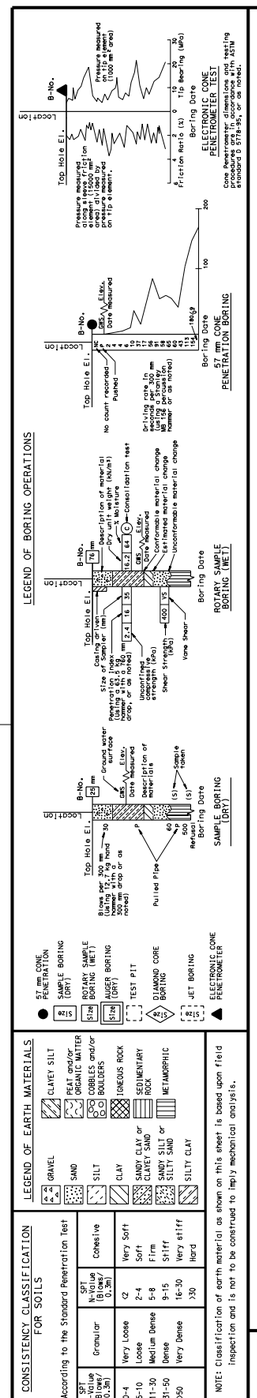
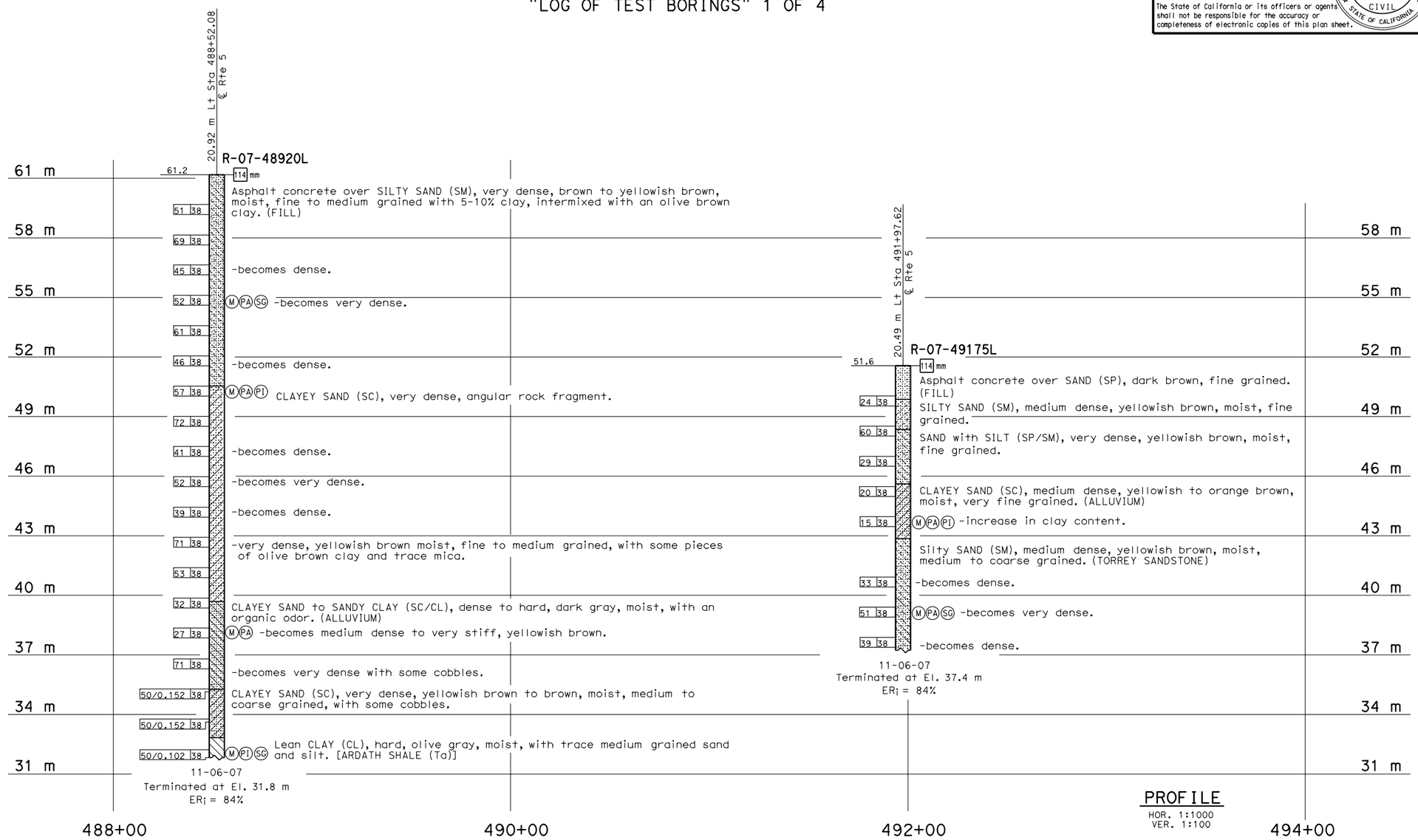


FOR PLAN VIEW, SEE
"LOG OF TEST BORINGS" 1 OF 4



ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 11/08, I.G-Remmen 12/08
CHECKED BY	M. Fordham

FIELD INVESTIGATION BY: M. Fordham

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH

BRIDGE NO.

KILOMETER POST R29.20/R30.06

INTERSTATE 5 SAFETY IMPROVEMENT PROJECT, GENESEE AVENUE

LOG OF TEST BORINGS 4 OF 4

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

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

CU 11
EA 065000

DISREGARD PRINTS BEARING EARLIER REVISION DATES 12-03-08 12-04-08

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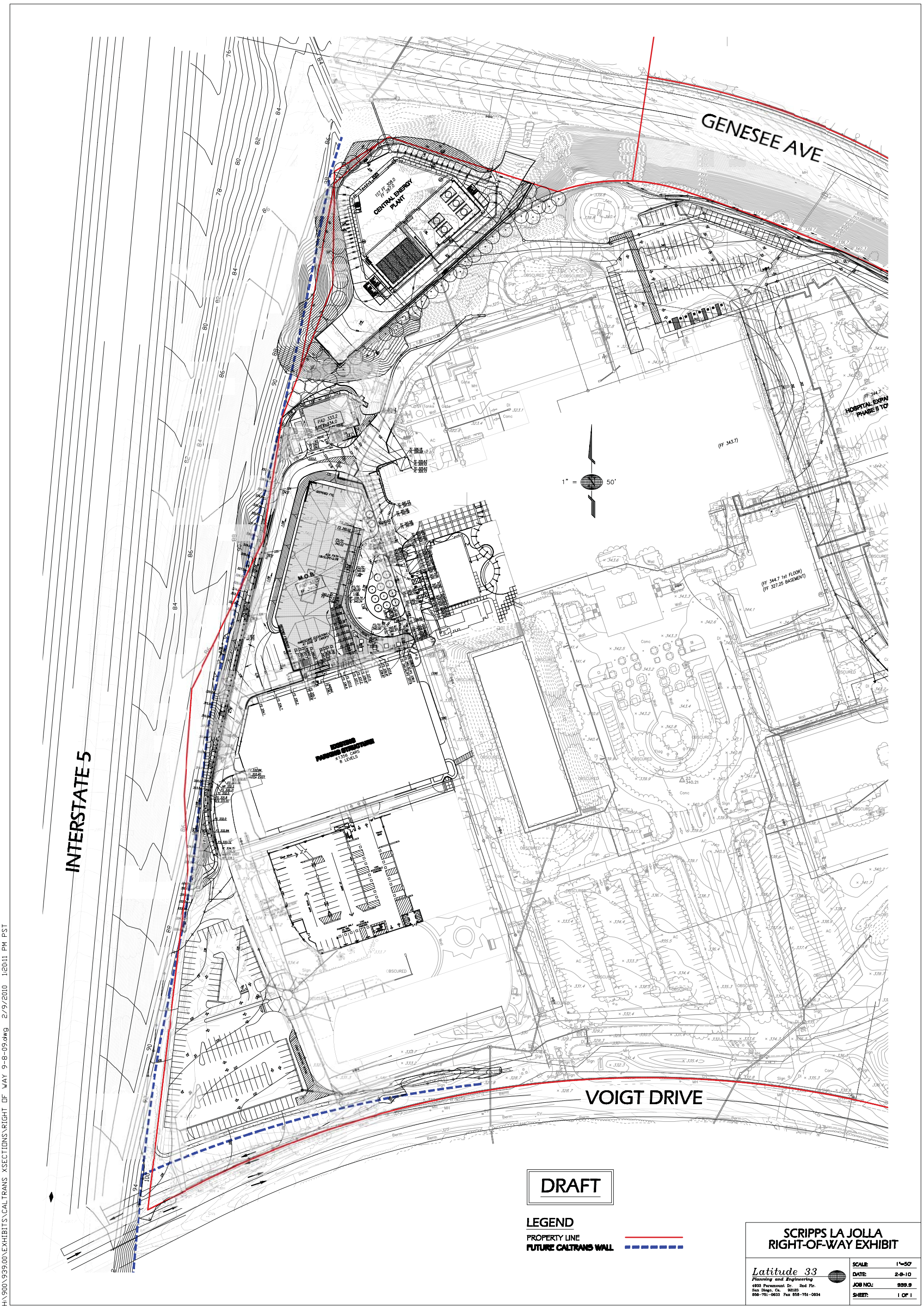
GENESEE AVE
INTERSTATE 5
VOIGT DRIVE
CENTRAL ENERGY PLANT
1" = 50'
DRAFT
LEGEND
PROPERTY LINE
FUTURE CALTRANS WALL
SCRIPPS LA JOLLA
RIGHT-OF-WAY EXHIBIT
Latitude 33
Planning and Engineering
4933 Paramount Dr. 2nd Flr.
San Diego, Ca. 92123
858-751-0633 Fax 858-751-0634
SCALE: 1"=50'
DATE: 2-9-10
JOB NO.: 939.9
SHEET: 1 OF 1
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GENESEE AVE
VOIGT DRIVE
INTERSTATE 5
A5
AREA=600sf±
A4
AREA=3,800sf±
A3
AREA=2,000sf±
A2
AREA=9,900sf±
A1
AREA=4,700sf±
CENTRAL ENERGY PLANT
EXISTING PARKING STRUCTURE
±356 CARS
8 LEVELS
HOSPITAL EXPAN
PHASE II TO
(FF 343.7)
(FF 344.7 1st FLOOR)
(FF 327.25 BASEMENT)
1" = 50'
LEGEND
PROPERTY LINE
FUTURE CALTRANS WALL
CALTRAN'S LAND ACQUISITION
AREA RELINQUISHED TO SCRIPPS
NOTE: FUTURE WORK WITHIN CALTRAN'S RIGHT-OF-WAY IS APPROXIMATE IN NATURE AND SHOWN FOR REFERENCE ONLY. ELEVATIONS ARE IN METRIC AND ON DIFFERENT DATUM THAN AERIAL TOPOGRAPHY. CONVERSION FACTOR = -2.13'
LAND "SWAP" SUMMARY
CALTRAN'S LAND ACQUISITION
NO. | AREA(sf) | TOTAL AREA(sf)
A2 | 9,900 | 10,500±
A5 | 660
SCRIPP'S LAND ACQUISITION
A1 | 4,700 | 10,500±
A3 | 2,000
A4 | 3,800
DRAFT
SCRIPPS LA JOLLA
RIGHT-OF-WAY EXHIBIT
Latitude 33
Planning and Engineering
4933 Paramount Dr. 2nd Flr.
San Diego, Ca. 92123
858-751-0633 Fax 858-751-0634
SCALE: 1"=50'
DATE: 9-08-09
JOB NO.: 939.9
SHEET: 1 OF 1
H:\900\939.00\EXHIBITS\CALTRANS XSECTIONS\RIGHT OF WAY 8-10-09.dwg 9/8/2009 5:37:34 PM PDT

APPENDIX II

FIELD EXPLORATION DATA

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-09-001
J. KERMODE / E. GALLETA	02/11/09	02/11/09	N: 580276.1483363 E: 1908736.1788164	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
CALTRANS			226.2 m Rt. Station 483+87 "11SD5A2" LINE	88.0 m
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
94 mm Punch Core			Mobile B-47 c#3174785	108 mm
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
35.6 mm I.D. Split Spoon; 94 mm Continuous double wall Punch Core barrel			Wire Line Safety hammer	94 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: N/A; AFTER DRILLING (DATE): N/A	**TOTAL DEPTH OF BORING**
Enviroplug and AC cold patch				6.5 m

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth (meters)	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m³)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
88.0				Asphalt Concrete (AC).												Diamond Single walled core barrel.
87.9			0.15	At 0.15: Silt with Sand (ML), estimated medium dense, pale yellow, dry, mostly silt with little fine sand, trace fine to coarse gravels. FILL												0.15 to 1.83 m hand auger; 100 mm diameter bucket auger.
		1														
87.4		2	0.61	At 0.61 m Sedimentary Rock (Siltstone), thinly bedded, yellow, olive gray, and reddish yellow, mottled, intensely to moderately weathered, soft to moderately soft, intensely to moderately fractured on bedding plane breaks. (Silt with Sand [ML], estimated very dense, dry, mostly silt, little fine sand).												
		3														
	1					1										
		4														
		5														
86.2		6	1.83		1.83		35									
				change to 94 mm punch core.				>50								1.83 m to 8.01 m 108 mm CRIS Bit; 94 mm Punch Core.
	2						22*									
		7														*22 Blows for 75 mm advance; Refusal.
85.6			2.41													
		8		At 2.41 m Sedimentary Rock (Claystone), thickly bedded, light olive brown, mottled, intensely to moderately weathered, soft. (Lean Clay [CL], hard, dry, mostly clay, little fine sand, medium plasticity).												PP ≥ 4.4 kg/cm
						2			100%	*1						*1 Does not meet RQD soundness criterion.
		9														
	3															
		10														
84.7		11	3.35		3.35		30*									
								>50								*30 Blows for 100 mm advance; Refusal.
		12														
	4	13														
83.9			4.10	At 4.10 m Sedimentary Rock (Siltstone), Moderately bedded to laminated, dark gray, light gray, and light yellowish brown, intensely to moderately weathered, soft to moderately hard. (Silt with Sand [ML], very dense, dry, mostly silt some fine sand trace cobble, medium plasticity).		3			78%	*1						*1 Does not meet RQD soundness criterion.
		14														
		15														
83.2		16	4.88		4.88		50*									
	5							>50								*50 Blows for 25 mm advance; Refusal.
82.9		17	5.12													at 4.88 m 254 mm length of well cemented, indurated siltstone. True rock. Remainder of sample does not meet RQD soundness criterion.
82.7			5.38	At 5.38 m: Sedimentary Rock (Sandstone and Siltstone) moderately and thinly bedded, pale yellow, intensely to moderately weathered, soft to very soft, intensely to moderately fractured on bedding plane breaks. (Silty Sand [SM], and Silt with Sand [ML], estimated very dense, dry, mostly fine sand with some silt and mostly silt with some fine sand).												Subhorizontal dips to ~ 3 degrees
		18				4			78%	17%						
		19														
	6	20														

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Reconstruction Interchange, Signal Intersection, Add Aux Lanes & Bra			HOLE ID: R-09-001
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: SD	ROUTE: 5	POSTMILE(KP): PM @9.4 / EA: 11-022330
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Genesee Retaining Wall			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: Retaining Wall Genesee E	PREPARED BY: J. Kermode	DATE: 06/22/09	SHEET: 1 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-001

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth (meters)	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m3)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
81.9			6.17	See Previous page.		4										
81.6		21	6.40	At: 6.17 m: Sedimentary Rock (Claystone), moderately bedded, light olive brown, moderately to intensely weathered, soft to moderately soft, moderately fractured on bedding plane breaks, (Lean Clay [CL]), hard, dry mostly clay, little fine sand, high plasticity).	6.4		50*	>50								* 50 Blows for 100 mm advance; refusal.
81.3		22	6.77	At 6.77 m Sedimentary Rock (Sandstone), moderately bedded, pale yellow, intensely weathered, soft. (Silty Sand [SM], estimated very dense, mostly sand, some silt, weak ferrous cementation).												
	7	23														
81.0			7.09	At 7.09 m: Sedimentary Rock (Siltstone and Claystone), very thinly to thinly bedded, olive, very pale brown and reddish yellow, intensely to moderately weathered, soft. (Silt with Sand [ML] and Clay with sand [CL], estimated very dense, dry, mostly silt with some fine sand and mostly clay with some fine sand).		5			92%	*1						*1 Does not meet RQD soundness criterion.
		24														
		25														
80.1	8	26	7.93		7.93		50*	>50								* 50 blows for 100 mm advance.
80.0			8.01	Total Depth Drilled 8.01 m Hole terminated in formational soft rock. No groundwater observed 02/11/2009 Back filled with bentonite chip Enviroplug and AC cold patch.	8.01											Lane Closure, night work under artificial lighting.
		27														
		28														
		29														
	9															
		30														
		31														
		32														
	10															
		33														
		34														
		35														
	11	36														
		37														
		38														
	12	39														
		40														

DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

GEOTECHNICAL SERVICES

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Reconstruction Interchange, Signal Intersection, Add Aux Lanes & Bra

HOLE ID: R-09-001

DISTRICT	COUNTY	ROUTE	POSTMILE(KP)	EA
11	SD	5	PM @9.4	11-022330

PROJECT OR BRIDGE NAME
Genesee Retaining Wall

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
Retaining Wall Genesee Ea	J. Kermode	06/22/09	2 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-001

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: R-09-002
J. KERMODE / E. GALLETA	02/11/09	02/11/09	N: 580241.0840742 E: 1908844.4958090	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
CALTRANS			337.2 m Rt. Station 483+62 "11SD5A2" LINE	92.6 m
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
94 mm Punch Core			Mobile B-47 c#3174785	108 mm
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
35.6 mm I.D. Split Spoon; 94 mm Continuous double wall Punch Core barrel			Wire Line Safety hammer	94 %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING N/A	AFTER DRILLING (DATE) N/A	**TOTAL DEPTH OF BORING**
Enviroplug and AC cold patch					7.7 m

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth Meters	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m³)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
92.6			0.00	Asphalt Concrete: (AC)												Diamond Single Wall Core barrel
92.5			0.15													
92.3		1	0.30	Silt with Sand (ML): estimated medium dense, pale yellow, variegated, dry, silt with trace fine to medium angular gravels. Sub-base												0.15 to 1.60 m Hand Auger, Bucket Auger;100 mm Diameter
				Silt with Sand (ML): estimated medium dense, pale yellow, dry, mostly silt with little fine sand. Fill.		1										
92.0		2	0.61													
		3		At 0.61 m: Sedimentary Rock (Sandstone and Siltstone), laminated to very thinly bedded, light yellowish brown , olive gray, and reddish yellow, mottled, moderately weathered, very soft to soft, slightly fractured on bedding breaks. (Silty Sand [SM] and Silt with Sand [ML], very dense, dry, Mostly fine Sand with some silt, trace clay, and mostly silt with some fine sand; medium plasticity).												Subhorizontal dips to ~ 3 degrees
	1															
		4														
91.0		5	1.60													
					1.6 m		26	>50								1.6 to 7.7 m Change to 108 mm CRIS Bit; 94 mm punch core
		6				2	30*		80	*1						STP 30 blows 51 mm advance; refusal.
	2															
		7														*1: Does not meet RQD soundness criterion.
90.2		8	2.41													
		9														
	3															
89.5		10	3.12	At 3.12 m Sedimentary Rock (Claystone) thickly bedded, dark gray to olive gray, intensely to moderately weathered, soft, very slightly fractured on bedding breaks. (Lean Clay [CL] hard, dry, high plasticity).	3.12		25*	>50								* 25 Blows 25 mm advance. Refusal
		11														Gradationally coarsens with depth.
																Discontinuities dip ~ 3 degrees.
89.0			3.57	At 3.57 m Sedimentary Rock (Sandstone and Siltstone) laminated and thinly bedded, light gray and yellow, mottled, intensely to moderately weathered, soft to very soft, slightly fractured on bedding breaks. (Silt with Sand [ML], and Silty Sand [SM], estimated very dense, dry, mostly silt and fine sand , little medium to coarse trace gravel, weak ferrous cementation).												
		12														Discontinuities dip ~ 3 degrees.
						3			83	*1						*1 Does not meet RQD soundness criterion.
	4	13														
		14														
		15														Shear zone at 4.57 m. Dips 55 degrees.
88.0			4.65													
				At 4.65 m Sedimentary Rock (Siltstone), moderately bedded, olive gray, moderately weathered, moderately hard, unfractured).	4.65		25*	>50	100	100%						* 25 blows no advance - refusal.
87.7		16	4.89												4.89	Block off at 4.89 m.
	5			At 4.89 m Sedimentary rock (Sandstone), moderately to thinly bedded, light gray, live gray, and reddish yellow, intensely to moderately weathered, moderately soft to very soft, intensely to moderately fractured on bedding breaks. (Silty Sand [SM], estimated very dense, dry, mostly sand, some silt, little coarse, trace clay, weakly cemented).												Discontinuities dip ~ 3 degrees.
		17														
						4										
		18							94	*1						*1 Does not meet RQD soundness criterion.
87.0			5.64													
		19		At 5.64 m Sedimentary Rock (Sandstone and Claystone) very thinly bedded, reddish yellow and olive gray, intensely to moderately weathered, very soft to soft. (Sand with Clay [SC] and Lean Clay with Sand [CL], estimated very dense, dry, mostly fine sand and clay with some fine sand, trace medium sand).												
	6															
86.4		20	6.17		6.17											

(continued)

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Reconstruct Interchange, Signal Intersection, Add Aux Lanes & Bradec			HOLE ID: R-09-002
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: SD	ROUTE: 5	POSTMILE (KP): PM @9.4	EA: 11-022330
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Genesee Retaining Wall			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: Retaining Wall Genesee E	PREPARED BY: J. Kermode	DATE: 06/22/09	SHEET: 1 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-002

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Depth Meters	DESCRIPTION	Sample Location	Sample Number	Blows Per 0.15m	Blows Per 0.3m	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (kN/m3)	Shear Strength (kPa)	Drilling Method	Casing Depth	REMARKS
86.4			6.17	At 6.17 m Sedimentary Rock (Siltstone and Sandstone), moderately to very thinly bedded, olive gray, light gray and pale yellow, intensely to moderately weathered, very soft to moderately hard, intensely to moderately fractured on bedding plane breaks. (Silt with Sand [ML] and Silty Sand [SM], very dense, dry, mostly silt and fine sand with some silt, low plasticity, weakly cemented).	6.17		50*	>50								50 blows 127 mm advance.
86.3		21	6.32		6.32					20%						304 mm long core segment of well cemented, indurated sandstone at 6.32 m.
		22														
	7	23				5			83%							
		24														
84.9		25	7.70													
	8	26		Total Depth Drilled 7.7 m. Hole terminated at design depth. No Groundwater observed; Hole backfilled with Enviroplug and AC cold patch.												ane Closure, night work under artificial lighting.
		27														
		28														
		29														
	9	30														
		31														
		32														
	10	33														
		34														
		35														
	11	36														
		37														
		38														
	12	39														
		40														

DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2

REPORT TITLE
Reconstruct Interchange, Signal Intersection, Add Aux Lanes & Bradec

HOLE ID: R-09-002

DISTRICT	COUNTY	ROUTE	POSTMILE (KP)	EA
11	SD	5	PM @9.4	11-022330

PROJECT OR BRIDGE NAME
Genesee Retaining Wall

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
Retaining Wall Genesee Ea	J. Kermode	06/22/09	2 of 2

Draft Final Boring Records Gilman genesee 090701.xls - Genesee R-09-002

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11114R
M. Fordham	01/03/12	01/03/12	N 1903748.920/E 6262170.730	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			10+50.88, 0.0ftL, RW-11 Line	308.5 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				1.5 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
308.5															Silty Sand (SM): tan to light brown, moist, medium and fine grained, roots
308.0		0.5													SEDIMENTARY FORMATION: Siltstone/ Sandstone, light brown to light gray, fine grained, soft, moderatly weathered
307.0		1.5													Terminate hand auger at 1.5 ft

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report		HOLE ID: HA-12-11114R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5 / POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project		
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12 / SHEET: 1 of 1

RW-11.xlsx - HA-12-11114R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11136R
M. Fordham	01/03/12	01/03/12	N 1903733.170/E 6262238.030	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			11+20, 0.0ftL, RW-11 Line	313.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
313.8															Silty Sand (SM): tan to light brown, moist, medium and fine grained, roots
313.3		0.5													SEDIMENTARY FORMATION: Siltstone/ Sandstone, light brown to light gray, fine grained, soft, moderatly weathered
		1													
		2													
311.8		2.0													Terminate hand auger at 2.0 ft
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11136R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-11.xlsx - HA-12-11136R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11197L
M. Fordham	01/03/12	01/03/12	N 1903821.920/E 6262495.510	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			10+60, 0.0ftL, RW-12 Line	302.5 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				4.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
302.5															Silty Sand (SM): medium brown to reddish brown, moist, fine grained, 0.25 inch to 1.0 inch sandstone and siltstone fragments, roots
		1													
		2													
		3													
298.5		4	4.0												Terminate hand auger at 4.0ft
298.0			4.5			400									Soil Probe driven 6 inches into bottom of Retrieved sample from the bottom of the boring Sedimentary Formation (sandstone/siltstone), gray, fine grained,
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11197L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-12.xlsx - HA-12-11197L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11212R
M. Fordham	01/03/12	01/03/12	N 1903733.170/E 6262238.030	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			11+20, 0.0ftL, RW-11 Line	313.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
313.8															Silty Sand (SM): light and medium brown, moist, medium and fine grained, sedimentary formation fragments
313.3		0.5													SEDIMENTARY FORMATION: Sandstone, light and medium brown, fine grained, soft, intensely weathered
		1													
		2													
311.8		2.0													Terminate hand auger at 2.0 ft
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11212R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-11.xlsx - HA-12-11212R

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11233L
M. Fordham	01/03/12	01/03/12	N 1903769.550/E 6262609.110	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			11+85, 0.0ftL, RW-12 Line	307.8 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				0.8 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
307.8															Silty Sand (SM): medium brown to reddish brown, moist, fine grained, 0.25 inch to 1.0 inch sandstone and siltstone fragments,
307.1		0.8													Terminate hand auger at 0.75 ft
		1					37								Sedimentary Formation (sandstone/siltstone), gray, fine grained, concretion
306.3		1.5				400									Soil Probe driven 6 inches into bottom of
		2													
		3													
		4													
		5													
		6													
		7													
		8													
		9													
		10													
		11													
		12													
		13													
		14													
		15													
		16													
		17													
		18													
		19													
		20													

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11233L
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-12.xlsx - HA-12-11233L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11258L
M. Fordham	01/03/12	01/03/12	N 1903727.250/E 6262683.940	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			12+71.1, 0.0ftL, RW-12 Line	311.7 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				1.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
311.7															Silty Sand (SM): light brown, moist, fine grained, sandstone and siltstone fragments, roots
310.7		1.0													Terminate hand auger at 1.0 ft

DEPARTMENT OF TRANSPORTATION	REPORT TITLE				HOLE ID: HA-12-11258L
	Geotechnical Design Report				
DIVISION OF ENGINEERING SERVICES	DISTRICT 11	COUNTY San Diego	ROUTE 5	POST MILE R28.6 - R30.5	EA_EFIS 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME Interstate-5/Genesee Avenue Interchange Improvement Project				
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER NA	PREPARED BY M. Fordham	DATE 02/01/12	SHEET 1 of 1	

RW-12.xlsx - HA-12-11258L

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID: HA-12-11313R
M. Fordham	01/03/12	01/03/12	N 1903515.680/E 6262747.800	
DRILLING CONTRACTOR			**BOREHOLE LOCATION (Station, Offset, and Line)**	**SURFACE ELEVATION**
Caltrans			16+80, 0.0ftL, RW-11 Line	340.9 ft
DRILLING METHOD			**DRILL RIG**	**BOREHOLE DIAMETER**
Hand Auger			NA	4 in
SAMPLER TYPE(S) AND SIZE(S) [ID]			**SPT HAMMER TYPE**	**HAMMER EFFICIENCY (ER_i)**
Hand Driven Soil Probe			NA	NA %
BOREHOLE BACKFILL AND COMPLETION			**GROUNDWATER READINGS** DURING DRILLING: Not Encountered; AFTER DRILLING (DATE): Not Measured	**TOTAL DEPTH OF BORING**
Backfilled with cuttings				2.0 ft

ELEVATION (ft)	MATERIAL GRAPHIC	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows Per 6 in	Blows Per 1.0 ft	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	REMARKS
340.9															Silty Sand (SM): tan to light brown, moist, medium and fine grained, roots
339.9		1.0													SEDIMENTARY FORMATION: Sandstone, light and medium brown, fine grained, soft, intensely weathered
338.9		2.0													Terminate hand auger at 2.0 ft

DEPARTMENT OF TRANSPORTATION	REPORT TITLE: Geotechnical Design Report			HOLE ID: HA-12-11313R
DIVISION OF ENGINEERING SERVICES	DISTRICT: 11	COUNTY: San Diego	ROUTE: 5	POST MILE: R28.6 - R30.5 / EA_EFIS: 11-022331_11000000012
GEOTECHNICAL SERVICES	PROJECT OR BRIDGE NAME: Interstate-5/Genesee Avenue Interchange Improvement Project			
OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2	BRIDGE NUMBER: NA	PREPARED BY: M. Fordham	DATE: 02/01/12	SHEET: 1 of 1

RW-11.xlsx - HA-12-11313R

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number: 12-135

Date:

Co. SD Rte. 005 PM 28.6 to 30.5

Pr. ID#: 1100000012 Phase: 1

EA: 022331 Reporting Code:

Request by: Mike Fordham Division: OGDS2 Ph: 858-467-3290

Project Desc: I-5/Genesee Avenue Interchange Improvement Project

Job Location: I-5 at Genesee Avenue, City of San Diego

Project. Mgr: Arturo Jacodo Ph: 6886816 Units: Feet ☒ Meters ☐

Descriptions and Limits of Work:

Stake retaining wall alignments Retaining Wall 11, 12, 13, 14, and 15

Attachments and/or References:

Caice chains for all wall and DGN of project with alignments

Brian Hinman

Desired Completion Date: 1/6/2011 Approved by (Project Engineer or above)

FOR SURVEYS USE ONLY

Date Received: Sub-Object: 185 Activity 1060

Horiz.Datum: Spec. NAD83 (HPGN) ☒ NAD83 (2007) ☐

Vert.Datum: Spec. NAVD88 +328.08' ☐ NAVD88 ☒ NAVD88 (CGPS) ☐

Rev.12/2010

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-11

10+01.13 -849.31' EL 337.580 CHAIN RWE11 N 1903369.360 E 6262898.810
FEATURE:OG PD: OG1022
CM:2012-135 dea
10+19.94 0.00' EL 304.500 CHAIN RWE11 N 1903743.110 E 6262141.230
FEATURE:OG PD: OG1008
CM:2012-135 dea
10+50.93 -0.02' EL 308.500 CHAIN RWE11 N 1903748.920 E 6262170.730
FEATURE:OG PD: OG1009
CM:2012-135 dea
11+20.04 0.03' EL 313.830 CHAIN RWE11 N 1903733.170 E 6262238.030
FEATURE:OG PD: OG1010
CM:2012-135 dea
11+74.93 -0.03' EL 317.890 CHAIN RWE11 N 1903720.760 E 6262291.490
FEATURE:OG PD: OG1011
CM:2012-135 dea
12+33.44 -0.05' EL 319.780 CHAIN RWE11 N 1903707.490 E 6262348.480
FEATURE:OG PD: OG1012
CM:2012-135 dea
13+00.02 -0.10' EL 321.120 CHAIN RWE11 N 1903690.340 E 6262412.810
FEATURE:OG PD: OG1013
CM:2012-135 dea
13+60.03 -0.02' EL 323.050 CHAIN RWE11 N 1903671.200 E 6262469.680
FEATURE:OG PD: OG1014
CM:2012-135 dea
14+20.00 0.01' EL 326.470 CHAIN RWE11 N 1903648.810 E 6262525.300
FEATURE:OG PD: OG1015
CM:2012-135 dea
14+79.99 0.00' EL 328.140 CHAIN RWE11 N 1903623.210 E 6262579.550
FEATURE:OG PD: OG1016
CM:2012-135 dea
16+20.09 -0.06' EL 334.110 CHAIN RWE11 N 1903551.400 E 6262699.720
FEATURE:OG PD: OG1017
CM:2012-135 dea
16+80.00 0.05' EL 340.870 CHAIN RWE11 N 1903515.680 E 6262747.800
FEATURE:OG PD: OG1018
CM:2012-135 dea
17+39.99 -0.05' EL 342.160 CHAIN RWE11 N 1903477.300 E 6262793.900
FEATURE:OG PD: OG1019
CM:2012-135 dea
18+00.04 -0.01' EL 344.480 CHAIN RWE11 N 1903436.130 E 6262837.610
FEATURE:OG PD: OG1020
CM:2012-135 dea
18+60.01 0.02' EL 343.030 CHAIN RWE11 N 1903392.530 E 6262878.770
FEATURE:OG PD: OG1021
CM:2012-135 dea

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-12

10+00.12 -0.09' EL 302.990 CHAIN RWW12 N 1903842.970 E 6262439.490
FEATURE:OG PD: OG1001
CM:2012-135 dea
10+59.96 0.04' EL 302.500 CHAIN RWW12 N 1903821.920 E 6262495.510
FEATURE:OG PD: OG1002
CM:2012-135 dea
11+04.93 0.16' EL 303.070 CHAIN RWW12 N 1903804.340 E 6262536.890
FEATURE:OG PD: OG1003
CM:2012-135 dea
11+85.12 0.15' EL 307.830 CHAIN RWW12 N 1903769.550 E 6262609.110
FEATURE:OG PD: OG1004
CM:2012-135 dea
12+34.99 0.12' EL 310.160 CHAIN RWW12 N 1903745.630 E 6262652.860
FEATURE:OG PD: OG1005
CM:2012-135 dea
12+71.10 0.08' EL 311.700 CHAIN RWW12 N 1903727.250 E 6262683.940
FEATURE:OG PD: OG1006
CM:2012-135 dea

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-13

10+50.08 -0.00' EL 213.580 CHAIN RWE 13 N 1904274.860 E 6260413.250
FEATURE:OG PD: OG1063
CM:2012-135 dea
10+99.96 0.01' EL 208.950 CHAIN RWE 13 N 1904248.940 E 6260455.870
FEATURE:OG PD: OG1064
CM:2012-135 dea
11+50.03 -0.02' EL 205.060 CHAIN RWE 13 N 1904223.660 E 6260499.090
FEATURE:OG PD: OG1065
CM:2012-135 dea
11+99.94 0.02' EL 203.200 CHAIN RWE 13 N 1904199.110 E 6260542.540
FEATURE:OG PD: OG1066
CM:2012-135 dea
12+50.04 0.05' EL 201.600 CHAIN RWE 13 N 1904175.180 E 6260586.560
FEATURE:OG PD: OG1067
CM:2012-135 dea
12+99.99 -0.01' EL 200.940 CHAIN RWE 13 N 1904152.120 E 6260630.870
FEATURE:OG PD: OG1068
CM:2012-135 dea
13+49.94 -0.03' EL 211.620 CHAIN RWE 13 N 1904129.750 E 6260675.520
FEATURE:OG PD: OG1069
CM:2012-135 dea
14+00.00 0.00' EL 229.890 CHAIN RWE 13 N 1904108.010 E 6260720.620
FEATURE:OG PD: OG1070
CM:2012-135 dea

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-14

10+00.01 -0.02' EL 222.280 CHAIN RWW14 N 1904425.370 E 6260400.130
FEATURE:OG PD: OG1061
CM:2012-135 dea
10+34.90 -0.03' EL 221.420 CHAIN RWW14 N 1904410.180 E 6260431.540
FEATURE:OG PD: OG1060
CM:2012-135 dea
10+90.03 0.03' EL 219.330 CHAIN RWW14 N 1904386.860 E 6260481.490
FEATURE:OG PD: OG1059
CM:2012-135 dea
11+35.03 0.05' EL 212.680 CHAIN RWW14 N 1904368.560 E 6260522.600
FEATURE:OG PD: OG1058
CM:2012-135 dea
11+80.02 0.01' EL 212.950 CHAIN RWW14 N 1904350.940 E 6260564.000
FEATURE:OG PD: OG1057
CM:2012-135 dea
12+29.94 0.02' EL 212.840 CHAIN RWW14 N 1904332.100 E 6260610.220
FEATURE:OG PD: OG1056
CM:2012-135 dea
12+80.00 -0.03' EL 213.500 CHAIN RWW14 N 1904314.050 E 6260656.920
FEATURE:OG PD: OG1055
CM:2012-135 dea
13+30.05 0.05' EL 215.010 CHAIN RWW14 N 1904296.680 E 6260703.860
FEATURE:OG PD: OG1054
CM:2012-135 dea
13+79.94 -0.03' EL 216.200 CHAIN RWW14 N 1904280.310 E 6260750.980
FEATURE:OG PD: OG1053
CM:2012-135 dea
14+29.98 -0.09' EL 217.690 CHAIN RWW14 N 1904264.690 E 6260798.520
FEATURE:OG PD: OG1052
CM:2012-135 dea

CAiCE
STATION & OFFSET REPORT FROM CHAIN RW-15

10+00.05 -0.03' EL 168.660 CHAIN RWS15 N 1905580.860 E 6261535.320
FEATURE:OG PD: OG1023
CM:2012-135 dea
11+01.00 16.92' EL 174.530 CHAIN RWS15 N 1905679.720 E 6261560.320
FEATURE:OG PD:Offset to LOL OG1025
CM:2012-135 dea
11+60.03 0.04' EL 166.060 CHAIN RWS15 N 1905740.130 E 6261549.650
FEATURE:OG PD: OG1026
CM:2012-135 dea
12+33.14 -0.01' EL 165.840 CHAIN RWS15 N 1905812.800 E 6261557.670
FEATURE:OG PD: OG1027
CM:2012-135 dea
13+00.00 0.08' EL 165.840 CHAIN RWS15 N 1905879.230 E 6261565.250
FEATURE:OG PD: OG1028
CM:2012-135 dea
13+60.03 -0.08' EL 165.200 CHAIN RWS15 N 1905938.920 E 6261571.680
FEATURE:OG PD: OG1029
CM:2012-135 dea
14+49.98 -0.02' EL 161.500 CHAIN RWS15 N 1906028.350 E 6261581.340
FEATURE:OG PD: OG1030
CM:2012-135 dea
14+50.02 0.01' EL 161.390 CHAIN RWS15 N 1906028.380 E 6261581.370
FEATURE:OG PD: OG1031
CM:2012-135 dea
15+00.00 -0.08' EL 159.120 CHAIN RWS15 N 1906078.100 E 6261586.480
FEATURE:OG PD: OG1032
CM:2012-135 dea
15+70.04 0.04' EL 156.070 CHAIN RWS15 N 1906147.770 E 6261593.720
FEATURE:OG PD: OG1033
CM:2012-135 dea
16+29.99 0.04' EL 153.130 CHAIN RWS15 N 1906207.420 E 6261599.660
FEATURE:OG PD: OG1034
CM:2012-135 dea
16+89.90 0.04' EL 149.740 CHAIN RWS15 N 1906267.050 E 6261605.450
FEATURE:OG PD: OG1035
CM:2012-135 dea
17+85.02 -0.02' EL 143.730 CHAIN RWS15 N 1906361.440 E 6261617.140
FEATURE:OG PD: OG1036
CM:2012-135 dea
18+50.04 -0.02' EL 140.220 CHAIN RWS15 N 1906425.500 E 6261628.230
FEATURE:OG PD: OG1037
CM:2012-135 dea
19+30.04 -0.01' EL 136.120 CHAIN RWS15 N 1906503.660 E 6261645.250
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CM:2012-135 dea
20+10.04 0.03' EL 134.600 CHAIN RWS15 N 1906580.920 E 6261665.980
FEATURE:OG PD: OG1039
CM:2012-135 dea

20+70.05 -0.06' EL 134.000 CHAIN RWS15 N 1906638.220 E 6261683.810
FEATURE:OG PD: OG1040
CM:2012-135 dea
21+55.02 -0.02' EL 133.210 CHAIN RWS15 N 1906718.130 E 6261712.680
FEATURE:OG PD: OG1041
CM:2012-135 dea
21+91.45 0.04' EL 134.170 CHAIN RWS15 N 1906751.910 E 6261726.320
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CM:2012-135 dea
22+45.00 -0.02' EL 135.670 CHAIN RWS15 N 1906801.510 E 6261746.500
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CM:2012-135 dea
23+25.00 -0.03' EL 135.900 CHAIN RWS15 N 1906875.980 E 6261775.710
FEATURE:OG PD: OG1044
CM:2012-135 dea
24+00.07 -0.00' EL 134.180 CHAIN RWS15 N 1906946.280 E 6261802.040
FEATURE:OG PD: OG1045
CM:2012-135 dea
24+49.99 -0.04' EL 132.500 CHAIN RWS15 N 1906993.270 E 6261818.900
FEATURE:OG PD: OG1046
CM:2012-135 dea
25+09.35 -0.03' EL 130.040 CHAIN RWS15 N 1907049.350 E 6261838.370
FEATURE:OG PD: OG1047
CM:2012-135 dea
25+70.03 -0.02' EL 127.760 CHAIN RWS15 N 1907107.420 E 6261855.910
FEATURE:OG PD: OG1048
CM:2012-135 dea
26+09.98 0.03' EL 126.480 CHAIN RWS15 N 1907146.250 E 6261865.300
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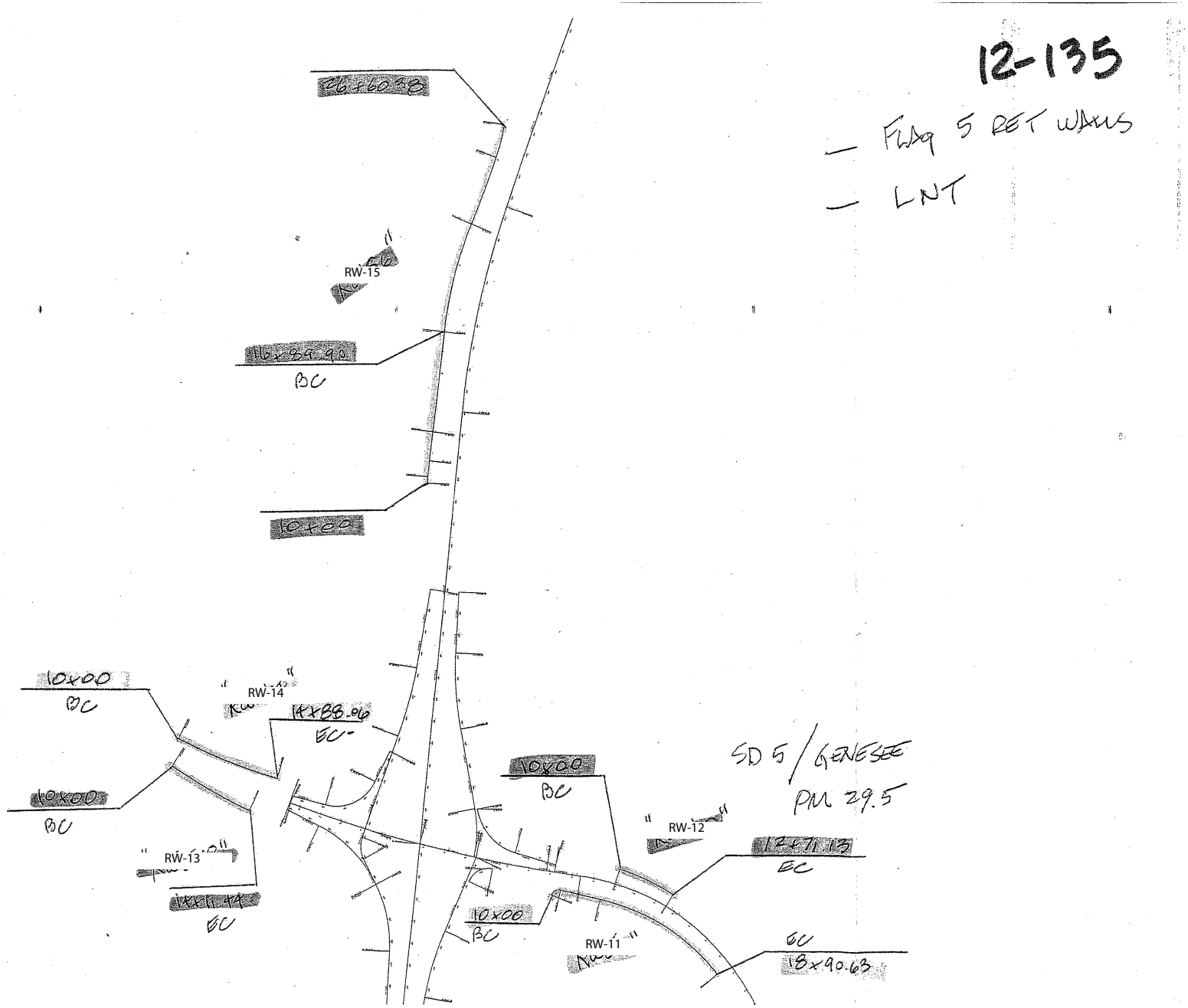
CM:2012-135 dea
26+60.36 -0.03' EL 123.850 CHAIN RWS15 N 1907195.770 E 6261874.510
FEATURE:OG PD: OG1050
CM:2012-135 dea


12-135
FLAG 5 RET WALLS
LNT
RW-15
16x89.90
BC
10+00
10x00
BC
RW-14
14x88.06
EC
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BC
RW-13
14x11.44
EC
10x00
BC
RW-12
12+71.13
EC
10x00
BC
RW-11
BC
18x90.63
SD 5 / GENESEE
PM 29.5

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

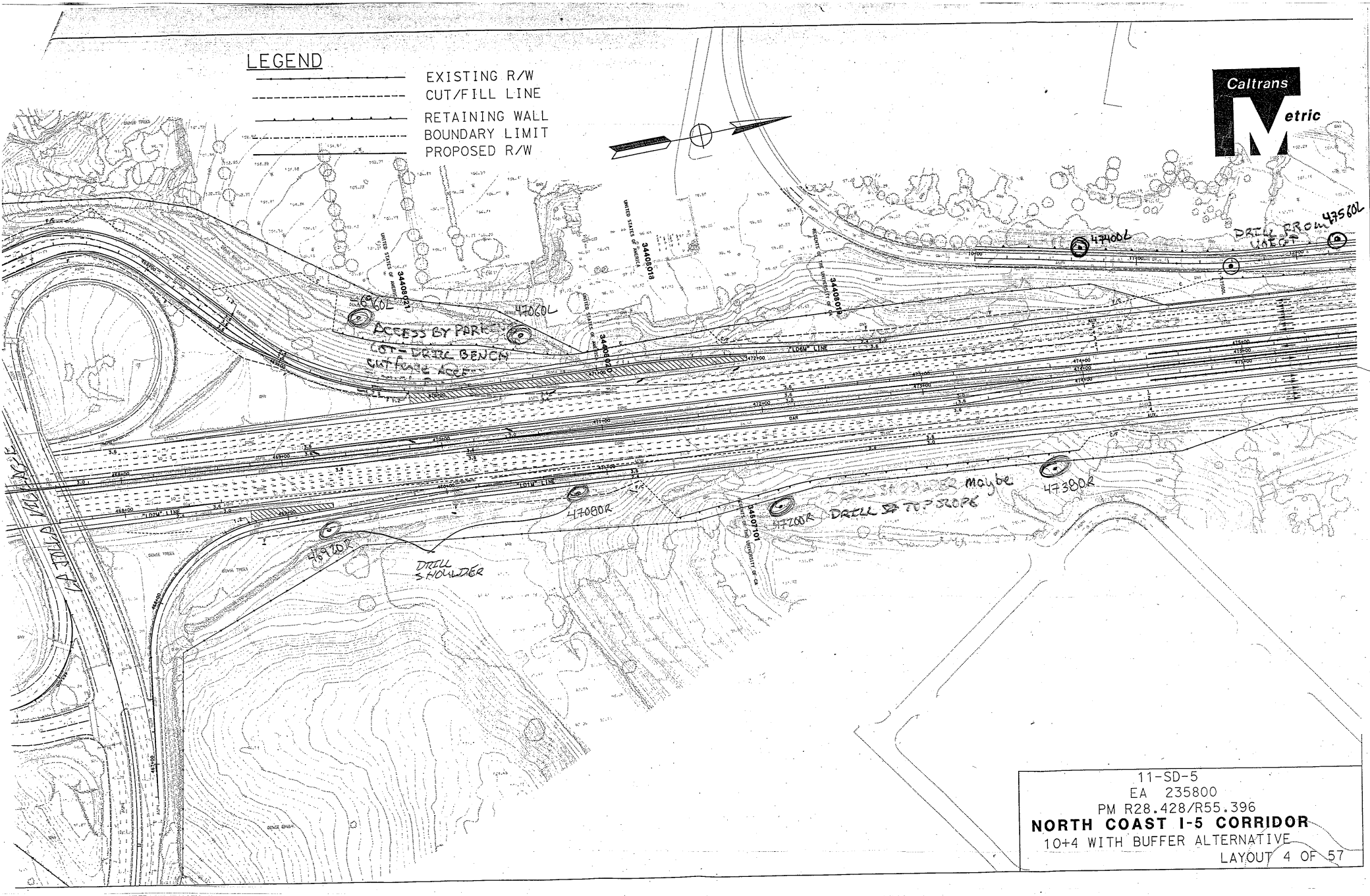
Approved by (Project Engineer or above)

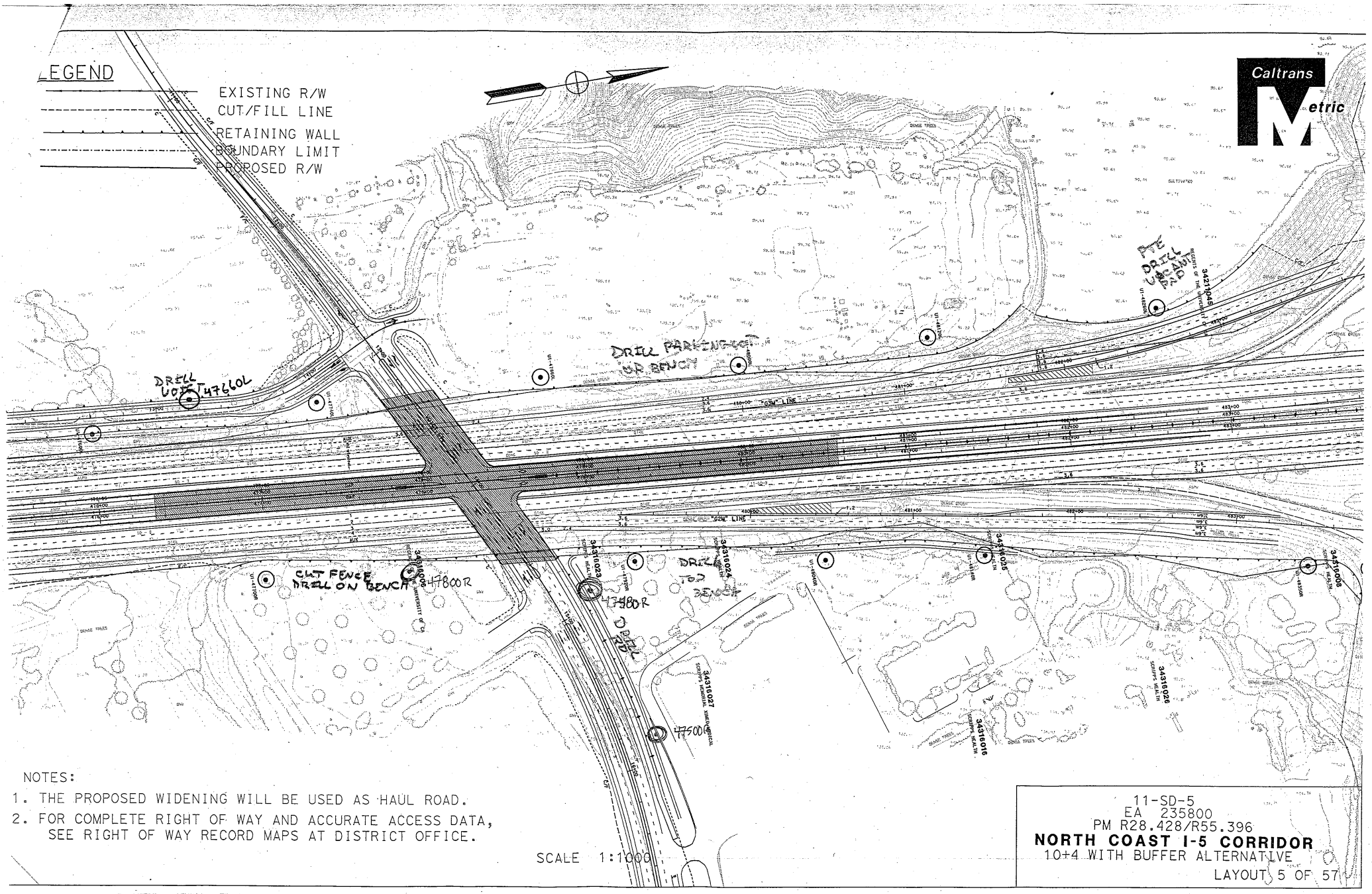
FOR SURVEYS USE ONLY

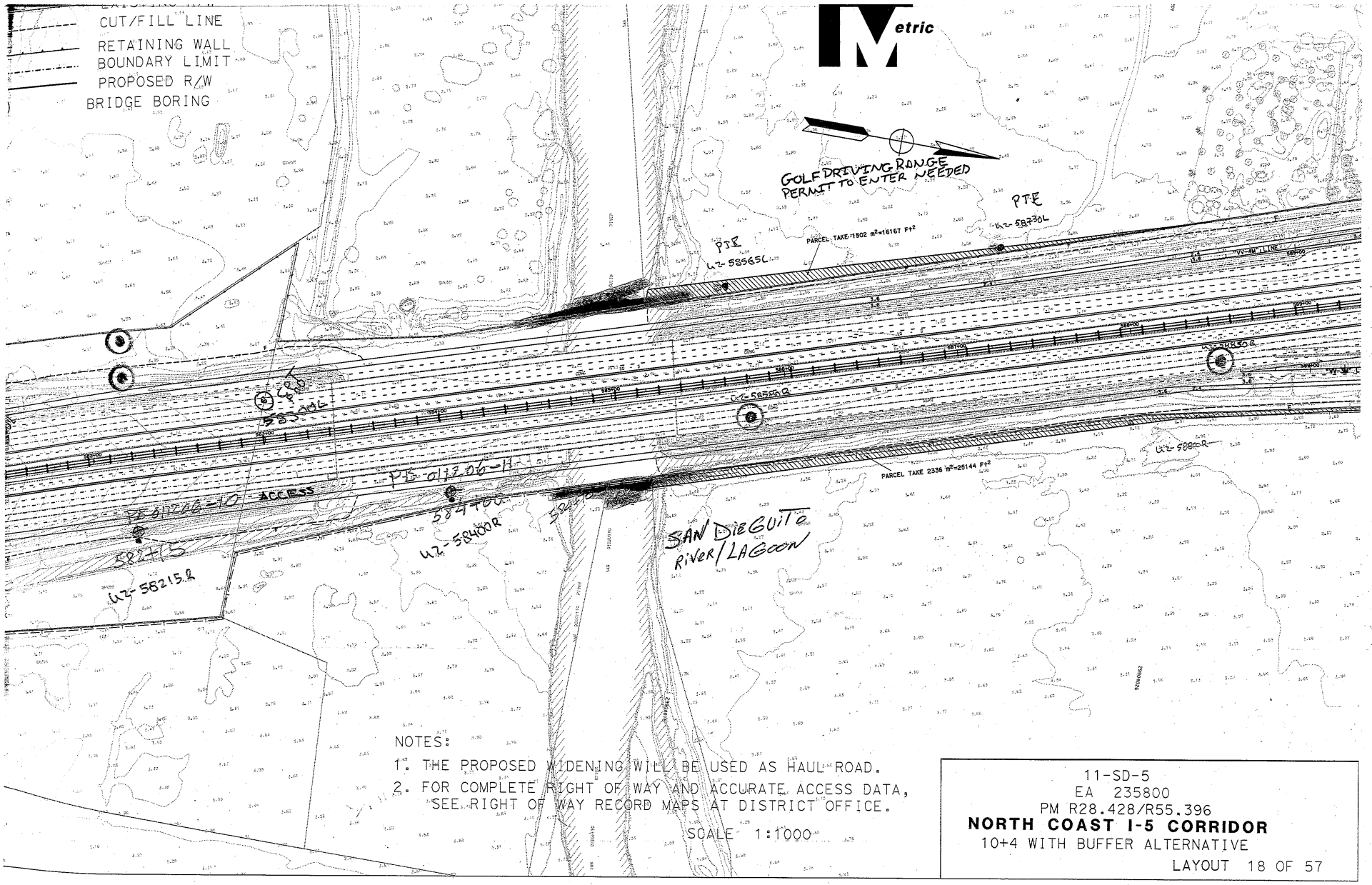
Date Received: WBS Codes:

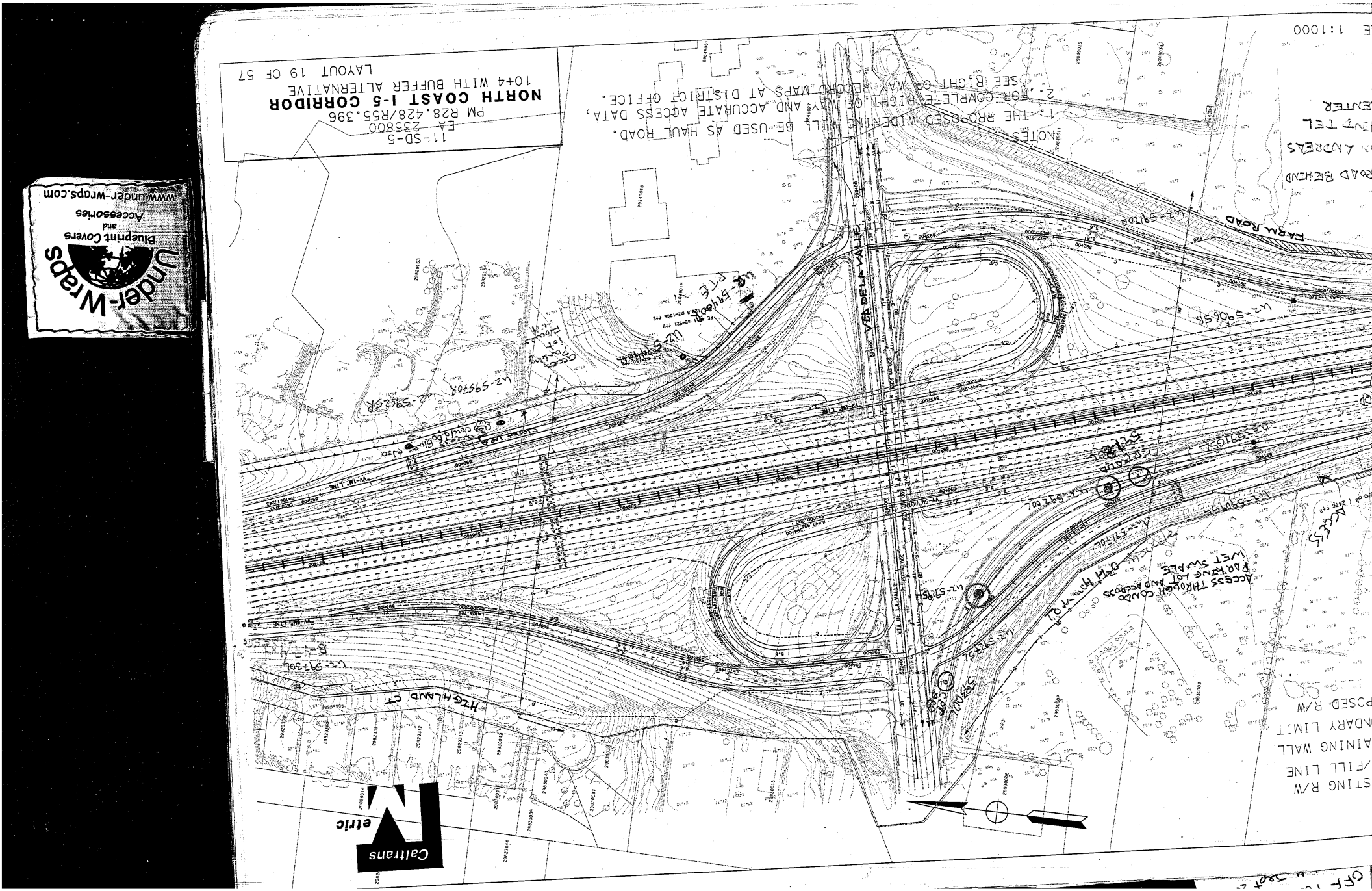
Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

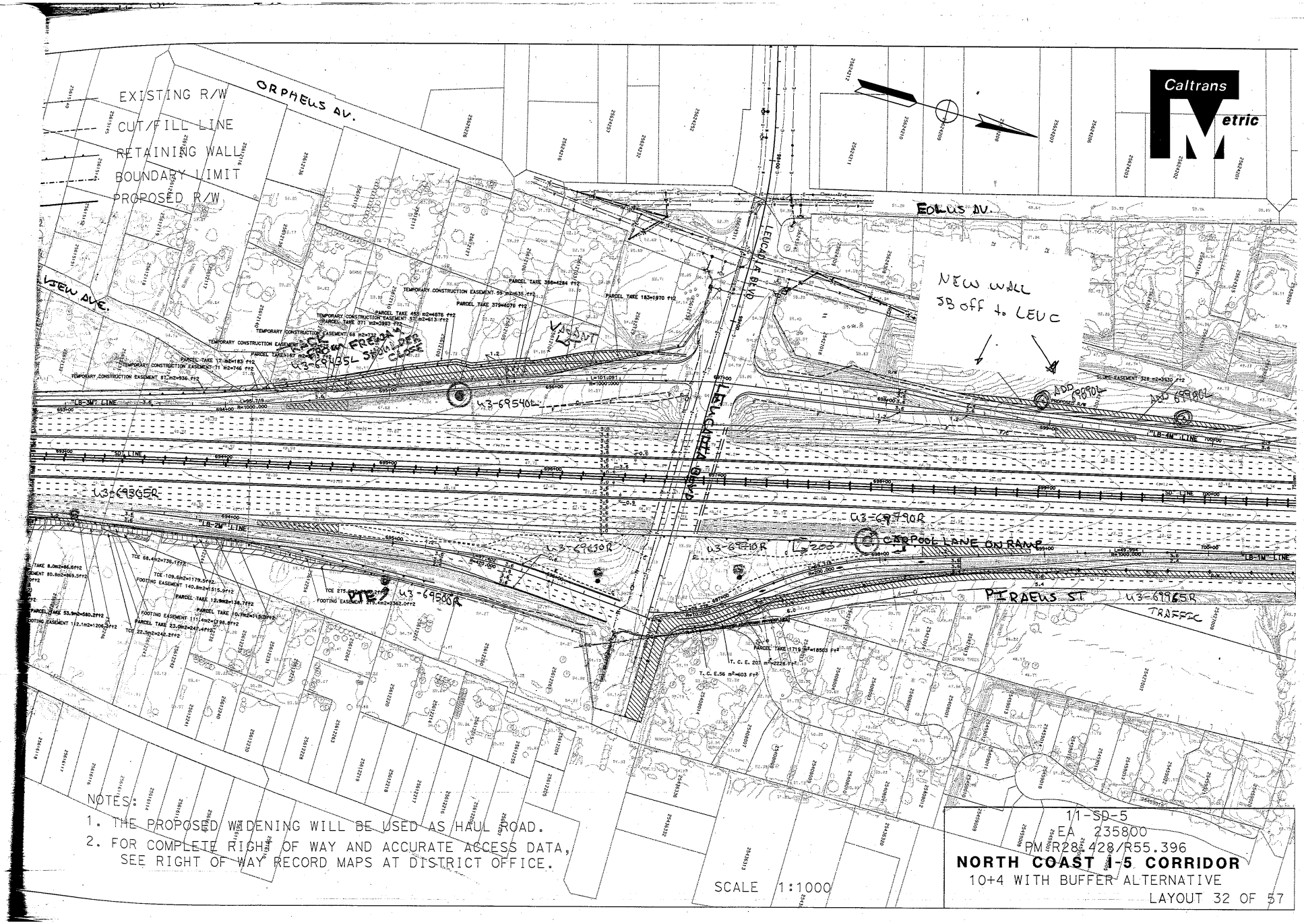
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
"LOW" LINE
47380R
47080R
47200R
DRILL SHOULDER
DRILL SHOULDER maybe
DRILL TOP SLOPE
47080R
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
DRILL PARKING LOT ON BENCH
DRILL LOT 47660L
CUT FENCE DRILL ON BENCH 47800R
47800R
DRILL ROAD
DRILL TOP BENCH
47500
34211049
34316023
34316024
34316025
34316026
34316027
34316016
34316008
SCRIPPS HEALTH
SCRIPPS MEMORIAL HOSPITAL
UNIVERSITY OF CA
REGENTS OF THE UNIVERSITY
SONG TREES
CUTTIVATED
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 5 OF 57


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57


Caltrans
NORTH COAST I-5 CORRIDOR
PM R28.428/R55.396
EA 235800
11-SD-5
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 19 OF 57
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
VIA DE LA VALLE
FARM ROAD
HIGHLAND CT
Under-Wraps
Blueprint Covers and Accessories
www.under-wraps.com


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEGACY BLVD
NEW WALL
SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69780R
U3-69965R
ADD 69890L
ADD 69980L
"LB-2W" LINE
"LB-4W" LINE
"LB-1W" LINE
SD LINE
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

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CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

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CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

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CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

WERNER

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS, BUCKETS, PLASTIC BAGS, SHELBY TUBES, BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	JO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11-479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+60 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER 0.11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	5.3	5300
20	1K	2.1	2100
20	1K	1.6	1600
20	1K	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN [illegible]

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 7/18/2008

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-022330
GL 08-070

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 1/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 2/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 12/19/2008

To: Mike Fordham / GDS-2

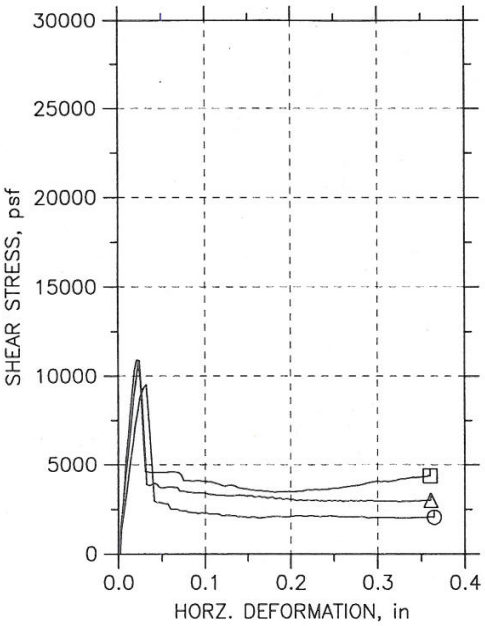
From: Lilibeth C. Purta / (916) 227-5434

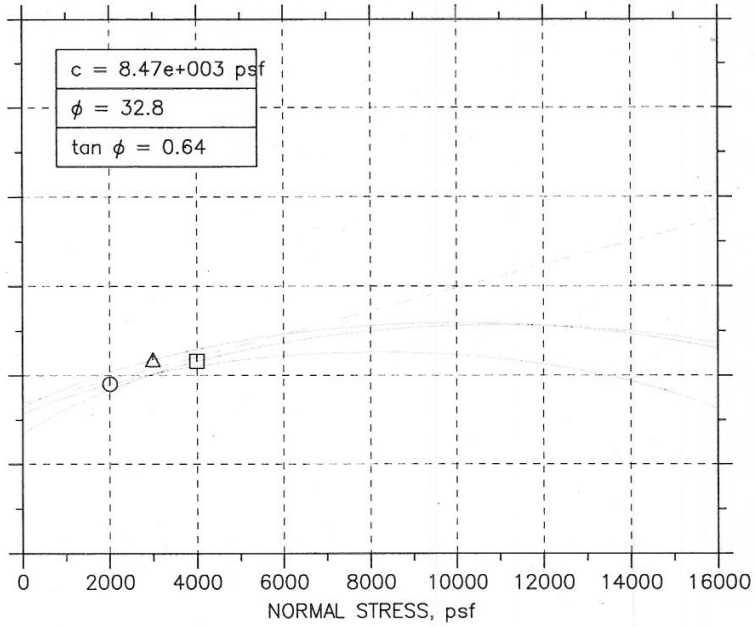
RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

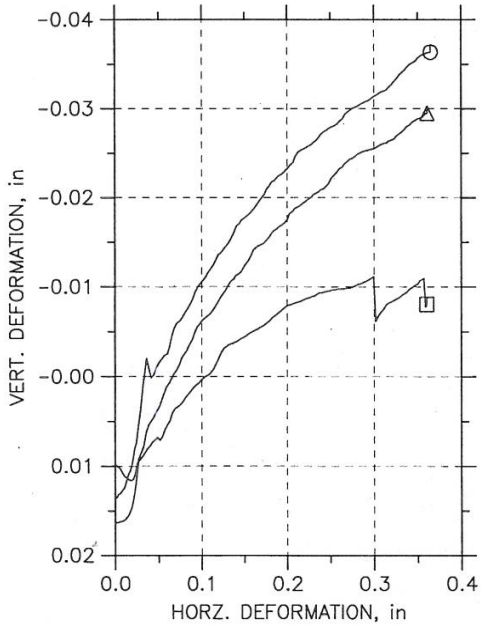
Partial test results.

AASHTO R18

DIRECT SHEAR TEST REPORT





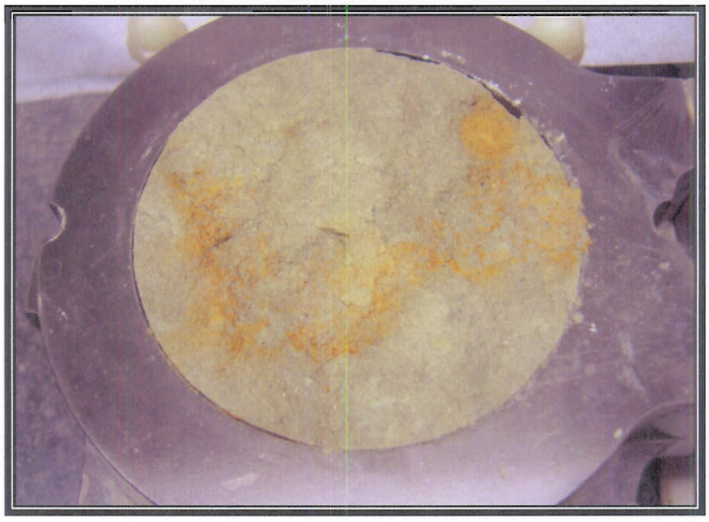


	Symbol	⊙	△	⊡
	Test No.	DS08082A	DS08082B	DS08082C
	Sample No.	4	4	4
	Shape	Circular	Circular	Circular
Initial	Dimension, in	2.37	2.37	2.37
Initial	Area, in^2	4.4115	4.4115	4.4115
Initial	Height, in	1	1	1
Initial	Water Content, %	16.05	17.70	20.80
Initial	Dry Density, pcf	107.08	109.76	105.44
Initial	Saturation, %	73.16	86.29	91.07
Initial	Void Ratio	0.60324	0.56414	0.62819
	Consol. Height, in	0.98676	0.9837	0.99073
	Consol. Void Ratio	0.58201	0.53863	0.6131
Final	Water Content, %	21.61	20.14	22.11
Final	Dry Density, pcf	103.33	106.62	104.6
Final	Saturation, %	89.85	90.77	94.83
Final	Void Ratio	0.66149	0.61022	0.64126
	Normal Stress, psf	2016.4	3000.8	4003.7
	Max. Shear Stress, psf	9518.7	10902	10804
	Ult. Shear Stress, psf	2036.2	2996.2	4359.8
	Time to Failure, min	14.001	11.002	11.002
	Disp. Rate, in/min	0.003	0.003	0.003
	Implied Specific Gravity	2.75	2.75	2.75
	Liquid Limit	0	0	0
	Plastic Limit	0	0	0
	Plasticity Index	0	0	0

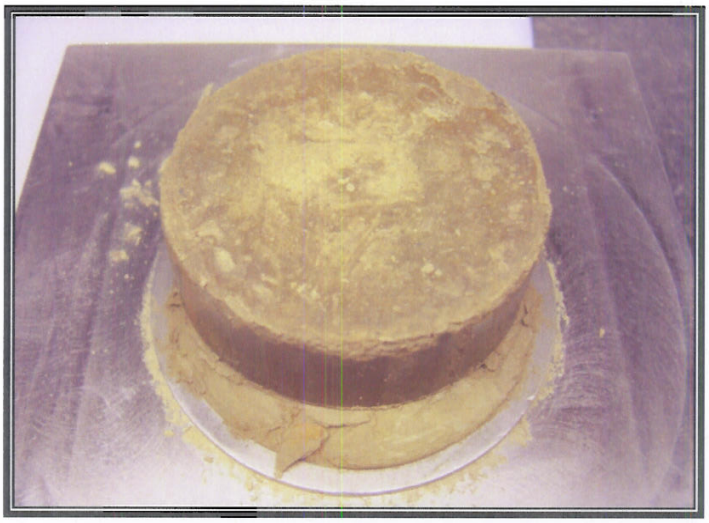
Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.	
Remarks: ASTM D3080	WP 12/12

Thu, 04-DEC-2008 16:56:12

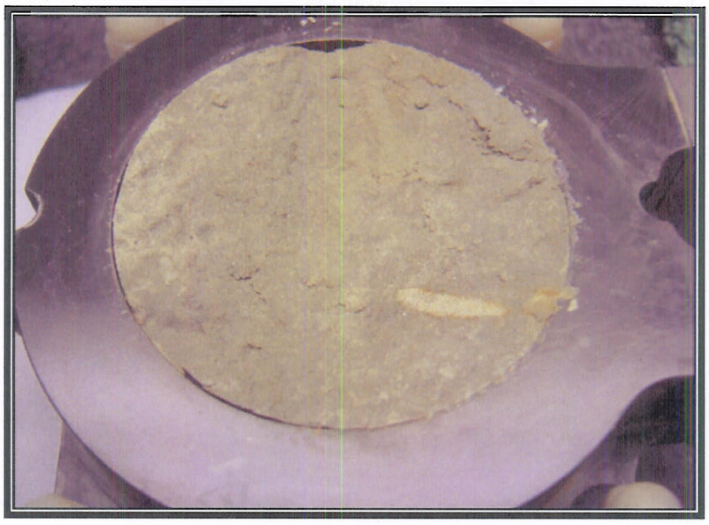
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B



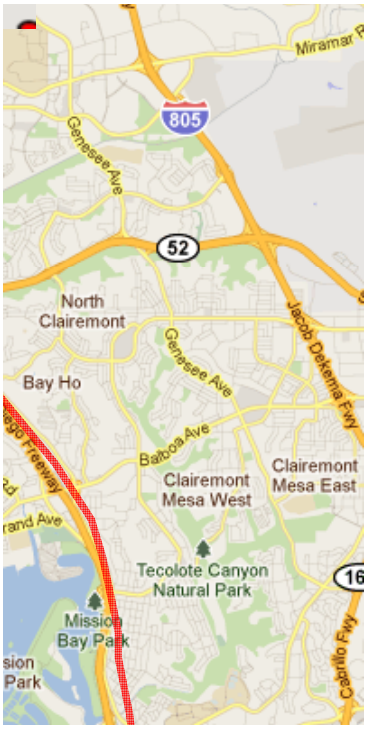
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



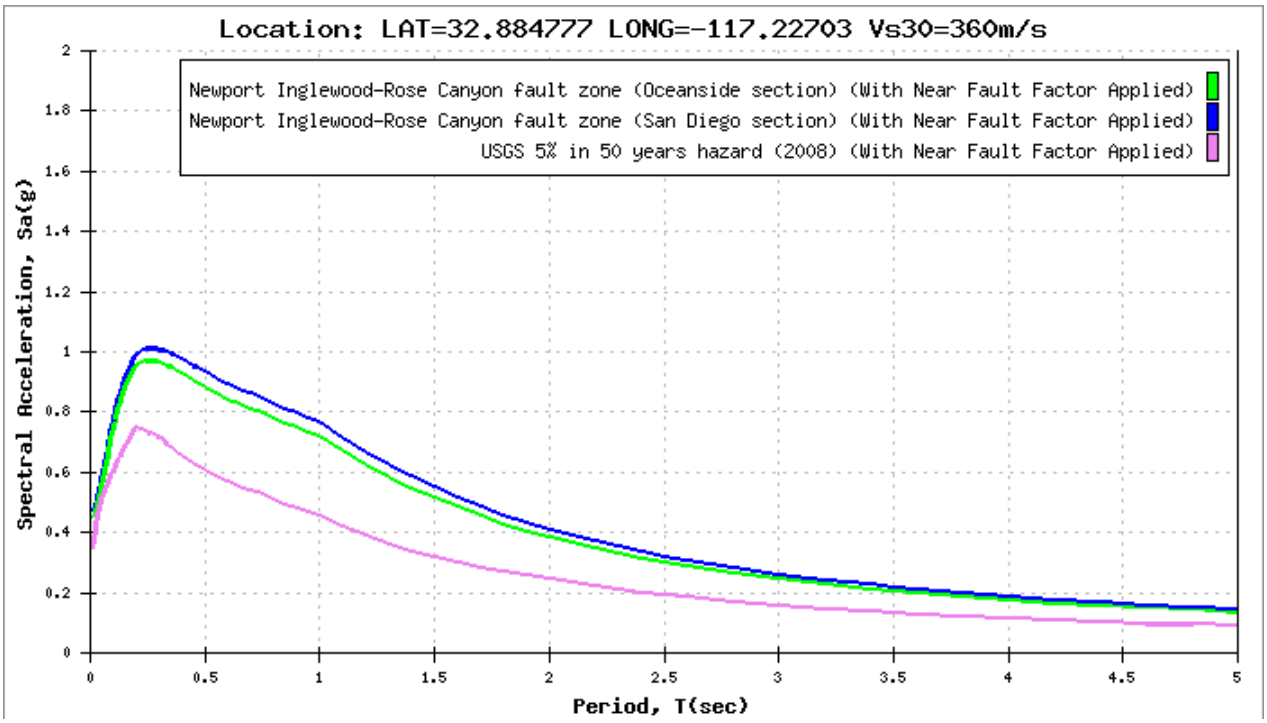
APPENDIX IV

ANALYSES AND CALCULATIONS

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	360 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	264 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.460	1.000	1.000	0.460
0.022	0.465	1.000	1.000	0.465
0.025	0.473	1.000	1.000	0.473
0.029	0.483	1.000	1.000	0.483
0.03	0.486	1.000	1.000	0.486
0.032	0.493	1.000	1.000	0.493
0.035	0.503	1.000	1.000	0.503
0.036	0.507	1.000	1.000	0.507
0.04	0.521	1.000	1.000	0.521
0.042	0.528	1.000	1.000	0.528
0.044	0.535	1.000	1.000	0.535
0.045	0.539	1.000	1.000	0.539
0.046	0.543	1.000	1.000	0.543
0.048	0.550	1.000	1.000	0.550
0.05	0.557	1.000	1.000	0.557
0.055	0.577	1.000	1.000	0.577
0.06	0.596	1.000	1.000	0.596

0.065	0.615	1.000	1.000	0.615
0.067	0.623	1.000	1.000	0.623
0.07	0.634	1.000	1.000	0.634
0.075	0.653	1.000	1.000	0.653
0.08	0.672	1.000	1.000	0.672
0.085	0.692	1.000	1.000	0.692
0.09	0.711	1.000	1.000	0.711
0.095	0.730	1.000	1.000	0.730
0.1	0.748	1.000	1.000	0.748
0.11	0.780	1.000	1.000	0.780
0.12	0.810	1.000	1.000	0.810
0.13	0.837	1.000	1.000	0.837
0.133	0.844	1.000	1.000	0.844
0.14	0.859	1.000	1.000	0.859
0.15	0.879	1.000	1.000	0.879
0.16	0.898	1.000	1.000	0.898
0.17	0.915	1.000	1.000	0.915
0.18	0.930	1.000	1.000	0.930
0.19	0.943	1.000	1.000	0.943
0.2	0.955	1.000	1.000	0.955
0.22	0.964	1.000	1.000	0.964
0.24	0.971	1.000	1.000	0.971
0.25	0.973	1.000	1.000	0.973
0.26	0.972	1.000	1.000	0.972
0.28	0.971	1.000	1.000	0.971
0.29	0.968	1.000	1.000	0.968
0.3	0.966	1.000	1.000	0.966
0.32	0.960	1.000	1.000	0.960
0.34	0.953	1.000	1.000	0.953
0.35	0.949	1.000	1.000	0.949
0.36	0.945	1.000	1.000	0.945
0.38	0.936	1.000	1.000	0.936
0.4	0.926	1.000	1.000	0.926
0.42	0.918	1.000	1.000	0.918
0.44	0.909	1.000	1.000	0.909
0.45	0.904	1.000	1.000	0.904
0.46	0.900	1.000	1.000	0.900
0.48	0.891	1.000	1.000	0.891
0.5	0.882	1.000	1.000	0.882
0.55	0.843	1.000	1.020	0.860
0.6	0.808	1.000	1.040	0.841
0.65	0.777	1.000	1.060	0.823
0.667	0.767	1.000	1.067	0.818
0.7	0.748	1.000	1.080	0.808
0.75	0.722	1.000	1.100	0.794
0.8	0.693	1.000	1.120	0.777

0.85	0.667	1.000	1.140	0.761
0.9	0.643	1.000	1.160	0.746
0.95	0.620	1.000	1.180	0.732
1	0.599	1.000	1.200	0.719
1.1	0.557	1.000	1.200	0.668
1.2	0.520	1.000	1.200	0.624
1.3	0.486	1.000	1.200	0.583
1.4	0.456	1.000	1.200	0.547
1.5	0.429	1.000	1.200	0.514
1.6	0.402	1.000	1.200	0.482
1.7	0.378	1.000	1.200	0.453
1.8	0.356	1.000	1.200	0.427
1.9	0.337	1.000	1.200	0.404
2	0.319	1.000	1.200	0.383
2.2	0.287	1.000	1.200	0.344
2.4	0.260	1.000	1.200	0.312
2.5	0.249	1.000	1.200	0.298
2.6	0.238	1.000	1.200	0.286
2.8	0.219	1.000	1.200	0.263
3	0.202	1.000	1.200	0.243
3.2	0.188	1.000	1.200	0.225
3.4	0.175	1.000	1.200	0.210
3.5	0.169	1.000	1.200	0.203
3.6	0.164	1.000	1.200	0.197
3.8	0.154	1.000	1.200	0.184
4	0.145	1.000	1.200	0.174
4.2	0.137	1.000	1.200	0.164
4.4	0.130	1.000	1.200	0.156
4.6	0.123	1.000	1.200	0.148
4.8	0.118	1.000	1.200	0.141
5	0.112	1.000	1.200	0.135

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.473	1.000	1.000	0.473
0.02	0.481	1.000	1.000	0.481
0.022	0.487	1.000	1.000	0.487
0.025	0.495	1.000	1.000	0.495
0.029	0.506	1.000	1.000	0.506
0.03	0.508	1.000	1.000	0.508
0.032	0.516	1.000	1.000	0.516
0.035	0.527	1.000	1.000	0.527
0.036	0.530	1.000	1.000	0.530
0.04	0.545	1.000	1.000	0.545
0.042	0.552	1.000	1.000	0.552
0.044	0.560	1.000	1.000	0.560
0.045	0.563	1.000	1.000	0.563
0.046	0.567	1.000	1.000	0.567
0.048	0.575	1.000	1.000	0.575
0.05	0.582	1.000	1.000	0.582
0.055	0.601	1.000	1.000	0.601
0.06	0.621	1.000	1.000	0.621
0.065	0.640	1.000	1.000	0.640
0.067	0.648	1.000	1.000	0.648
0.07	0.659	1.000	1.000	0.659
0.075	0.678	1.000	1.000	0.678
0.08	0.697	1.000	1.000	0.697
0.085	0.717	1.000	1.000	0.717
0.09	0.736	1.000	1.000	0.736
0.095	0.755	1.000	1.000	0.755
0.1	0.773	1.000	1.000	0.773
0.11	0.806	1.000	1.000	0.806
0.12	0.837	1.000	1.000	0.837
0.13	0.864	1.000	1.000	0.864
0.133	0.871	1.000	1.000	0.871
0.14	0.887	1.000	1.000	0.887
0.15	0.907	1.000	1.000	0.907
0.16	0.928	1.000	1.000	0.928
0.17	0.945	1.000	1.000	0.945
0.18	0.962	1.000	1.000	0.962
0.19	0.976	1.000	1.000	0.976
0.2	0.989	1.000	1.000	0.989
0.22	1.001	1.000	1.000	1.001
0.24	1.010	1.000	1.000	1.010
0.25	1.013	1.000	1.000	1.013
0.26	1.012	1.000	1.000	1.012
0.28	1.012	1.000	1.000	1.012

0.29	1.011	1.000	1.000	1.011
0.3	1.009	1.000	1.000	1.009
0.32	1.005	1.000	1.000	1.005
0.34	0.999	1.000	1.000	0.999
0.35	0.995	1.000	1.000	0.995
0.36	0.991	1.000	1.000	0.991
0.38	0.983	1.000	1.000	0.983
0.4	0.974	1.000	1.000	0.974
0.42	0.966	1.000	1.000	0.966
0.44	0.957	1.000	1.000	0.957
0.45	0.953	1.000	1.000	0.953
0.46	0.949	1.000	1.000	0.949
0.48	0.940	1.000	1.000	0.940
0.5	0.932	1.000	1.000	0.932
0.55	0.893	1.000	1.020	0.911
0.6	0.857	1.000	1.040	0.892
0.65	0.825	1.000	1.060	0.875
0.667	0.815	1.000	1.067	0.870
0.7	0.796	1.000	1.080	0.860
0.75	0.769	1.000	1.100	0.846
0.8	0.739	1.000	1.120	0.828
0.85	0.712	1.000	1.140	0.811
0.9	0.686	1.000	1.160	0.795
0.95	0.662	1.000	1.180	0.781
1	0.639	1.000	1.200	0.767
1.1	0.594	1.000	1.200	0.713
1.2	0.555	1.000	1.200	0.666
1.3	0.519	1.000	1.200	0.623
1.4	0.487	1.000	1.200	0.585
1.5	0.458	1.000	1.200	0.550
1.6	0.430	1.000	1.200	0.516
1.7	0.404	1.000	1.200	0.485
1.8	0.381	1.000	1.200	0.457
1.9	0.360	1.000	1.200	0.432
2	0.341	1.000	1.200	0.410
2.2	0.307	1.000	1.200	0.368
2.4	0.279	1.000	1.200	0.334
2.5	0.266	1.000	1.200	0.319
2.6	0.255	1.000	1.200	0.306
2.8	0.234	1.000	1.200	0.281
3	0.216	1.000	1.200	0.260
3.2	0.201	1.000	1.200	0.241
3.4	0.187	1.000	1.200	0.225
3.5	0.181	1.000	1.200	0.217
3.6	0.175	1.000	1.200	0.210
3.8	0.164	1.000	1.200	0.197

4	0.155	1.000	1.200	0.186
4.2	0.147	1.000	1.200	0.176
4.4	0.139	1.000	1.200	0.167
4.6	0.132	1.000	1.200	0.159
4.8	0.126	1.000	1.200	0.151
5	0.120	1.000	1.200	0.144

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.347	1.000	1.000	0.347
0.02	0.410	1.000	1.000	0.410
0.022	0.419	1.000	1.000	0.419
0.025	0.433	1.000	1.000	0.433
0.029	0.448	1.000	1.000	0.448
0.03	0.452	1.000	1.000	0.452
0.032	0.459	1.000	1.000	0.459
0.035	0.469	1.000	1.000	0.469
0.036	0.472	1.000	1.000	0.472
0.04	0.485	1.000	1.000	0.485
0.042	0.490	1.000	1.000	0.490
0.044	0.496	1.000	1.000	0.496
0.045	0.499	1.000	1.000	0.499
0.046	0.501	1.000	1.000	0.501
0.048	0.507	1.000	1.000	0.507
0.05	0.512	1.000	1.000	0.512
0.055	0.524	1.000	1.000	0.524
0.06	0.535	1.000	1.000	0.535
0.065	0.545	1.000	1.000	0.545
0.067	0.549	1.000	1.000	0.549
0.07	0.555	1.000	1.000	0.555
0.075	0.564	1.000	1.000	0.564
0.08	0.573	1.000	1.000	0.573
0.085	0.582	1.000	1.000	0.582
0.09	0.590	1.000	1.000	0.590
0.095	0.598	1.000	1.000	0.598
0.1	0.605	1.000	1.000	0.605
0.11	0.623	1.000	1.000	0.623
0.12	0.639	1.000	1.000	0.639
0.13	0.655	1.000	1.000	0.655
0.133	0.659	1.000	1.000	0.659

0.14	0.670	1.000	1.000	0.670
0.15	0.684	1.000	1.000	0.684
0.16	0.697	1.000	1.000	0.697
0.17	0.710	1.000	1.000	0.710
0.18	0.723	1.000	1.000	0.723
0.19	0.735	1.000	1.000	0.735
0.2	0.746	1.000	1.000	0.746
0.22	0.740	1.000	1.000	0.740
0.24	0.734	1.000	1.000	0.734
0.25	0.731	1.000	1.000	0.731
0.26	0.728	1.000	1.000	0.728
0.28	0.724	1.000	1.000	0.724
0.29	0.721	1.000	1.000	0.721
0.3	0.719	1.000	1.000	0.719
0.32	0.704	1.000	1.000	0.704
0.34	0.690	1.000	1.000	0.690
0.35	0.683	1.000	1.000	0.683
0.36	0.677	1.000	1.000	0.677
0.38	0.664	1.000	1.000	0.664
0.4	0.653	1.000	1.000	0.653
0.42	0.643	1.000	1.000	0.643
0.44	0.633	1.000	1.000	0.633
0.45	0.628	1.000	1.000	0.628
0.46	0.623	1.000	1.000	0.623
0.48	0.615	1.000	1.000	0.615
0.5	0.606	1.000	1.000	0.606
0.55	0.573	1.000	1.020	0.584
0.6	0.544	1.000	1.040	0.566
0.65	0.519	1.000	1.060	0.550
0.667	0.511	1.000	1.067	0.545
0.7	0.497	1.000	1.080	0.536
0.75	0.477	1.000	1.100	0.524
0.8	0.454	1.000	1.120	0.508
0.85	0.433	1.000	1.140	0.493
0.9	0.414	1.000	1.160	0.480
0.95	0.397	1.000	1.180	0.469
1	0.382	1.000	1.200	0.458
1.1	0.350	1.000	1.200	0.420
1.2	0.323	1.000	1.200	0.388
1.3	0.301	1.000	1.200	0.361
1.4	0.281	1.000	1.200	0.337
1.5	0.264	1.000	1.200	0.317
1.6	0.249	1.000	1.200	0.299
1.7	0.236	1.000	1.200	0.283
1.8	0.224	1.000	1.200	0.268
1.9	0.213	1.000	1.200	0.255

2	0.203	1.000	1.200	0.244
2.2	0.183	1.000	1.200	0.220
2.4	0.167	1.000	1.200	0.200
2.5	0.159	1.000	1.200	0.191
2.6	0.153	1.000	1.200	0.183
2.8	0.141	1.000	1.200	0.169
3	0.130	1.000	1.200	0.157
3.2	0.121	1.000	1.200	0.145
3.4	0.113	1.000	1.200	0.135
3.5	0.109	1.000	1.200	0.131
3.6	0.105	1.000	1.200	0.126
3.8	0.099	1.000	1.200	0.119
4	0.093	1.000	1.200	0.112
4.2	0.089	1.000	1.200	0.107
4.4	0.085	1.000	1.200	0.102
4.6	0.082	1.000	1.200	0.098
4.8	0.079	1.000	1.200	0.094
5	0.076	1.000	1.200	0.091

Envelope Data

Period	SA
0.01	0.451
0.02	0.460
0.022	0.465
0.025	0.473
0.029	0.483
0.03	0.486
0.032	0.493
0.035	0.503
0.036	0.507
0.04	0.521
0.042	0.528
0.044	0.535
0.045	0.539
0.046	0.543
0.048	0.550
0.05	0.557
0.055	0.577
0.06	0.596
0.065	0.615
0.067	0.623
0.07	0.634
0.075	0.653

0.08	0.672
0.085	0.692
0.09	0.711
0.095	0.730
0.1	0.748
0.11	0.780
0.12	0.810
0.13	0.837
0.133	0.844
0.14	0.859
0.15	0.879
0.16	0.898
0.17	0.915
0.18	0.930
0.19	0.943
0.2	0.955
0.22	0.964
0.24	0.971
0.25	0.973
0.26	0.972
0.28	0.971
0.29	0.968
0.3	0.966
0.32	0.960
0.34	0.953
0.35	0.949
0.36	0.945
0.38	0.936
0.4	0.926
0.42	0.918
0.44	0.909
0.45	0.904
0.46	0.900
0.48	0.891
0.5	0.882
0.55	0.860
0.6	0.841
0.65	0.823
0.667	0.818
0.7	0.808
0.75	0.794
0.8	0.777
0.85	0.761
0.9	0.746
0.95	0.732
1	0.719

1.1	0.668
1.2	0.624
1.3	0.583
1.4	0.547
1.5	0.514
1.6	0.482
1.7	0.453
1.8	0.427
1.9	0.404
2	0.383
2.2	0.344
2.4	0.312
2.5	0.298
2.6	0.286
2.8	0.263
3	0.243
3.2	0.225
3.4	0.210
3.5	0.203
3.6	0.197
3.8	0.184
4	0.174
4.2	0.164
4.4	0.156
4.6	0.148
4.8	0.141
5	0.135

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} *(km)*	0	

Distance

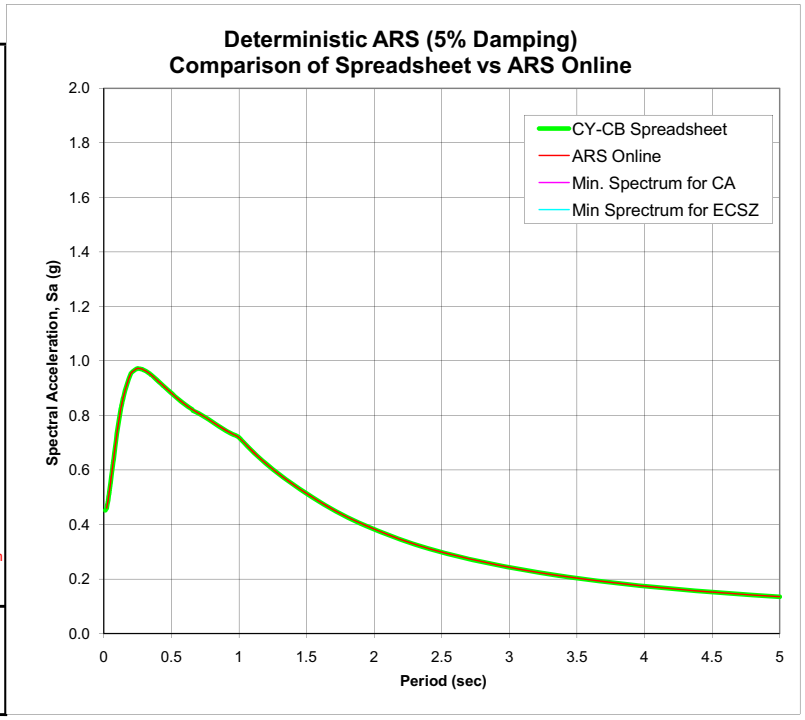
R_{RUP} *(km)*	4.2	
R_{JB} *(km)*	4.2	
R_x *(km)*	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} *(m/sec)*	360	(270 to 1500 m/s)
$Z_{1.0}$ *(m)*	264	(0 - No Basin)
$Z_{2.5}$ *(km)*	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45139
0.020	0.45947
0.022	0.46490
0.025	0.47294
0.029	0.48278
0.030	0.48562
0.032	0.49264
0.035	0.50314
0.036	0.50673
0.040	0.52058
0.042	0.52790
0.044	0.53500
0.045	0.53880
0.046	0.54250
0.048	0.54974
0.050	0.55711
0.055	0.57641
0.060	0.59603
0.065	0.61508
0.067	0.62288
0.070	0.63405
0.075	0.65285
0.080	0.67234
0.085	0.69186
0.090	0.71071
0.095	0.72940
0.100	0.74759
0.110	0.78037
0.120	0.81031
0.130	0.83671
0.133	0.84361
0.140	0.85907
0.150	0.87910
0.160	0.89809
0.170	0.91439

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.46	1	1	0.46	0%
0.022	0.465	1	1	0.465	0%
0.025	0.473	1	1	0.473	0%
0.029	0.483	1	1	0.483	0%
0.03	0.486	1	1	0.486	0%
0.032	0.493	1	1	0.493	0%
0.035	0.503	1	1	0.503	0%
0.036	0.507	1	1	0.507	0%
0.04	0.521	1	1	0.521	0%
0.042	0.528	1	1	0.528	0%
0.044	0.535	1	1	0.535	0%
0.045	0.539	1	1	0.539	0%
0.046	0.543	1	1	0.543	0%
0.048	0.55	1	1	0.55	0%
0.05	0.557	1	1	0.557	0%
0.055	0.577	1	1	0.577	0%
0.06	0.596	1	1	0.596	0%
0.065	0.615	1	1	0.615	0%
0.067	0.623	1	1	0.623	0%
0.07	0.634	1	1	0.634	0%
0.075	0.653	1	1	0.653	0%
0.08	0.672	1	1	0.672	0%
0.085	0.692	1	1	0.692	0%
0.09	0.711	1	1	0.711	0%
0.095	0.73	1	1	0.73	0%
0.1	0.748	1	1	0.748	0%
0.11	0.78	1	1	0.78	0%
0.12	0.81	1	1	0.81	0%
0.13	0.837	1	1	0.837	0%
0.133	0.844	1	1	0.844	0%
0.14	0.859	1	1	0.859	0%
0.15	0.879	1	1	0.879	0%
0.16	0.898	1	1	0.898	0%
0.17	0.915	1	1	0.915	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

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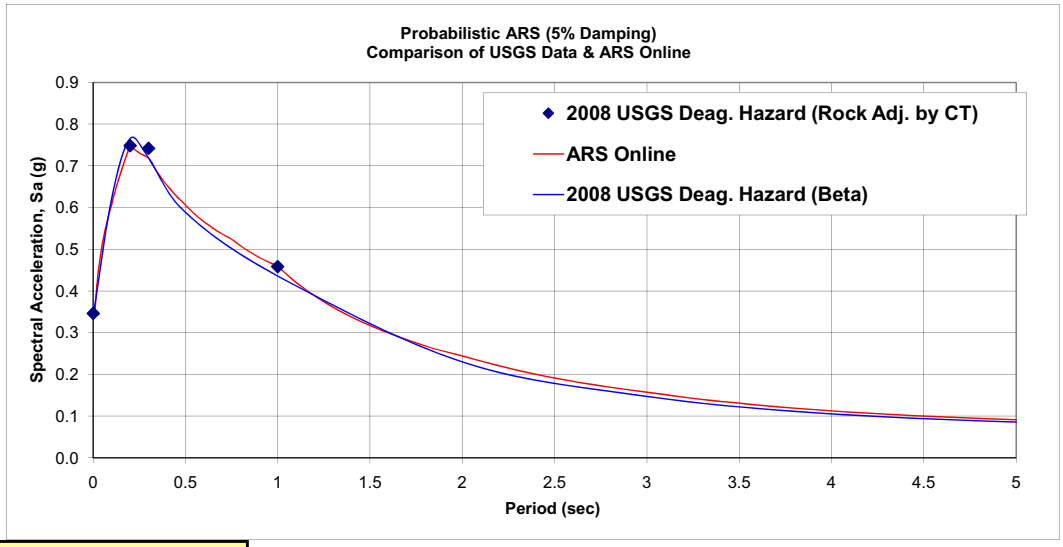
0.180	0.92942	0.18	0.93	1	1	0.93	0%				
0.190	0.94265	0.19	0.943	1	1	0.943	0%				
0.200	0.95443	0.2	0.955	1	1	0.955	0%				
0.220	0.96409	0.22	0.964	1	1	0.964	0%				
0.240	0.97074	0.24	0.971	1	1	0.971	0%				
0.250	0.97261	0.25	0.973	1	1	0.973	0%				
0.260	0.97171	0.26	0.972	1	1	0.972	0%				
0.280	0.97033	0.28	0.971	1	1	0.971	0%				
0.290	0.96791	0.29	0.968	1	1	0.968	0%				
0.300	0.96562	0.3	0.966	1	1	0.966	0%				
0.320	0.96013	0.32	0.96	1	1	0.96	0%				
0.340	0.95309	0.34	0.953	1	1	0.953	0%				
0.350	0.94896	0.35	0.949	1	1	0.949	0%				
0.360	0.94494	0.36	0.945	1	1	0.945	0%				
0.380	0.93573	0.38	0.936	1	1	0.936	0%				
0.400	0.92617	0.4	0.926	1	1	0.926	0%				
0.420	0.91759	0.42	0.918	1	1	0.918	0%				
0.440	0.90828	0.44	0.909	1	1	0.909	0%				
0.450	0.90398	0.45	0.904	1	1	0.904	0%				
0.460	0.89951	0.46	0.9	1	1	0.9	0%				
0.480	0.89025	0.48	0.891	1	1	0.891	0%				
0.500	0.88172	0.5	0.882	1	1	0.882	0%				
0.550	0.85945	0.55	0.843	1	1.02	0.86	0%				
0.600	0.84028	0.6	0.808	1	1.04	0.841	0%				
0.650	0.82311	0.65	0.777	1	1.06	0.823	0%				
0.660	0.81721	0.667	0.767	1	1.067	0.818	0%				
0.700	0.80777	0.7	0.748	1	1.08	0.808	0%				
0.750	0.79391	0.75	0.722	1	1.1	0.794	0%				
0.800	0.77635	0.8	0.693	1	1.12	0.777	0%				
0.850	0.76043	0.85	0.667	1	1.14	0.761	0%				
0.900	0.74535	0.9	0.643	1	1.16	0.746	0%				
0.950	0.73161	0.95	0.62	1	1.18	0.732	0%				
1.000	0.71844	1	0.599	1	1.2	0.719	0%				
1.100	0.66744	1.1	0.557	1	1.2	0.668	0%				
1.200	0.62274	1.2	0.52	1	1.2	0.624	0%				
1.300	0.58253	1.3	0.486	1	1.2	0.583	0%				
1.400	0.54648	1.4	0.456	1	1.2	0.547	0%				
1.500	0.51357	1.5	0.429	1	1.2	0.514	0%				
1.600	0.48149	1.6	0.402	1	1.2	0.482	0%				
1.700	0.45257	1.7	0.378	1	1.2	0.453	0%				
1.800	0.42652	1.8	0.356	1	1.2	0.427	0%				
1.900	0.40307	1.9	0.337	1	1.2	0.404	0%				
2.000	0.38213	2	0.319	1	1.2	0.383	0%				
2.200	0.34354	2.2	0.287	1	1.2	0.344	0%				
2.400	0.31177	2.4	0.26	1	1.2	0.312	0%				
2.500	0.29779	2.5	0.249	1	1.2	0.298	0%				
2.600	0.28492	2.6	0.238	1	1.2	0.286	0%				
2.800	0.26192	2.8	0.219	1	1.2	0.263	0%				
3.000	0.24206	3	0.202	1	1.2	0.243	0%				
3.200	0.22481	3.2	0.188	1	1.2	0.225	0%				
3.400	0.20959	3.4	0.175	1	1.2	0.21	0%				
3.500	0.20264	3.5	0.169	1	1.2	0.203	0%				
3.600	0.19608	3.6	0.164	1	1.2	0.197	0%				
3.800	0.18399	3.8	0.154	1	1.2	0.184	0%				
4.000	0.17319	4	0.145	1	1.2	0.174	0%				
4.200	0.16400	4.2	0.137	1	1.2	0.164	0%				
4.400	0.15555	4.4	0.13	1	1.2	0.156	0%				
4.600	0.14783	4.6	0.123	1	1.2	0.148	0%				
4.800	0.14078	4.8	0.118	1	1.2	0.141	0%				
5.000	0.13425	5	0.112	1	1.2	0.135	1%				

Deterministic_Response_Spectrum_072809.xls 9/19/2011 10:51 AM

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	360
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.1
$Z_{1.0}$ (m) =	264
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.347	1	1	0.347
0.02	0.41	1	1	0.41
0.022	0.419	1	1	0.419
0.025	0.433	1	1	0.433
0.029	0.448	1	1	0.448
0.03	0.452	1	1	0.452
0.032	0.459	1	1	0.459
0.035	0.469	1	1	0.469
0.036	0.472	1	1	0.472
0.04	0.485	1	1	0.485
0.042	0.49	1	1	0.49
0.044	0.496	1	1	0.496
0.045	0.499	1	1	0.499
0.046	0.501	1	1	0.501
0.048	0.507	1	1	0.507
0.05	0.512	1	1	0.512
0.055	0.524	1	1	0.524
0.06	0.535	1	1	0.535
0.065	0.545	1	1	0.545
0.067	0.549	1	1	0.549
0.07	0.555	1	1	0.555
0.075	0.564	1	1	0.564
0.08	0.573	1	1	0.573
0.085	0.582	1	1	0.582
0.09	0.59	1	1	0.59
0.095	0.598	1	1	0.598
0.1	0.605	1	1	0.605
0.11	0.623	1	1	0.623
0.12	0.639	1	1	0.639
0.13	0.655	1	1	0.655
0.133	0.659	1	1	0.659
0.14	0.67	1	1	0.67
0.15	0.684	1	1	0.684
0.16	0.697	1	1	0.697
0.17	0.71	1	1	0.71
0.18	0.723	1	1	0.723
0.19	0.735	1	1	0.735
0.2	0.746	1	1	0.746
0.22	0.74	1	1	0.74
0.24	0.734	1	1	0.734
0.25	0.731	1	1	0.731
0.26	0.728	1	1	0.728
0.28	0.724	1	1	0.724

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.128	1.000	0.346	0.347	-0.3%
0.2	0.722	1.000	1.037	1.000	0.748	0.746	0.3%
0.3	0.597	1.000	1.242	1.000	0.742	0.719	3.1%
1	0.228	1.200	1.673	1.000	0.458	0.458	0.1%

Max % Difference = 3.1%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.3398	1.000	1.000	0.340	0.347	2.1%
0.1	0.6208	1.000	1.000	0.621	0.605	2.5%
0.2	0.7651	1.000	1.000	0.765	0.746	2.5%
0.3	0.7188	1.000	1.000	0.719	0.719	0.0%
0.5	0.5881	1.000	1.000	0.588	0.606	3.0%
1	0.3631	1.200	1.000	0.436	0.458	5.1%
2	0.1914	1.200	1.000	0.230	0.244	6.2%
3	0.12256	1.200	1.000	0.147	0.157	6.8%
4	0.08762	1.200	1.000	0.105	0.112	6.5%
5	0.07141	1.200	1.000	0.086	0.091	6.2%

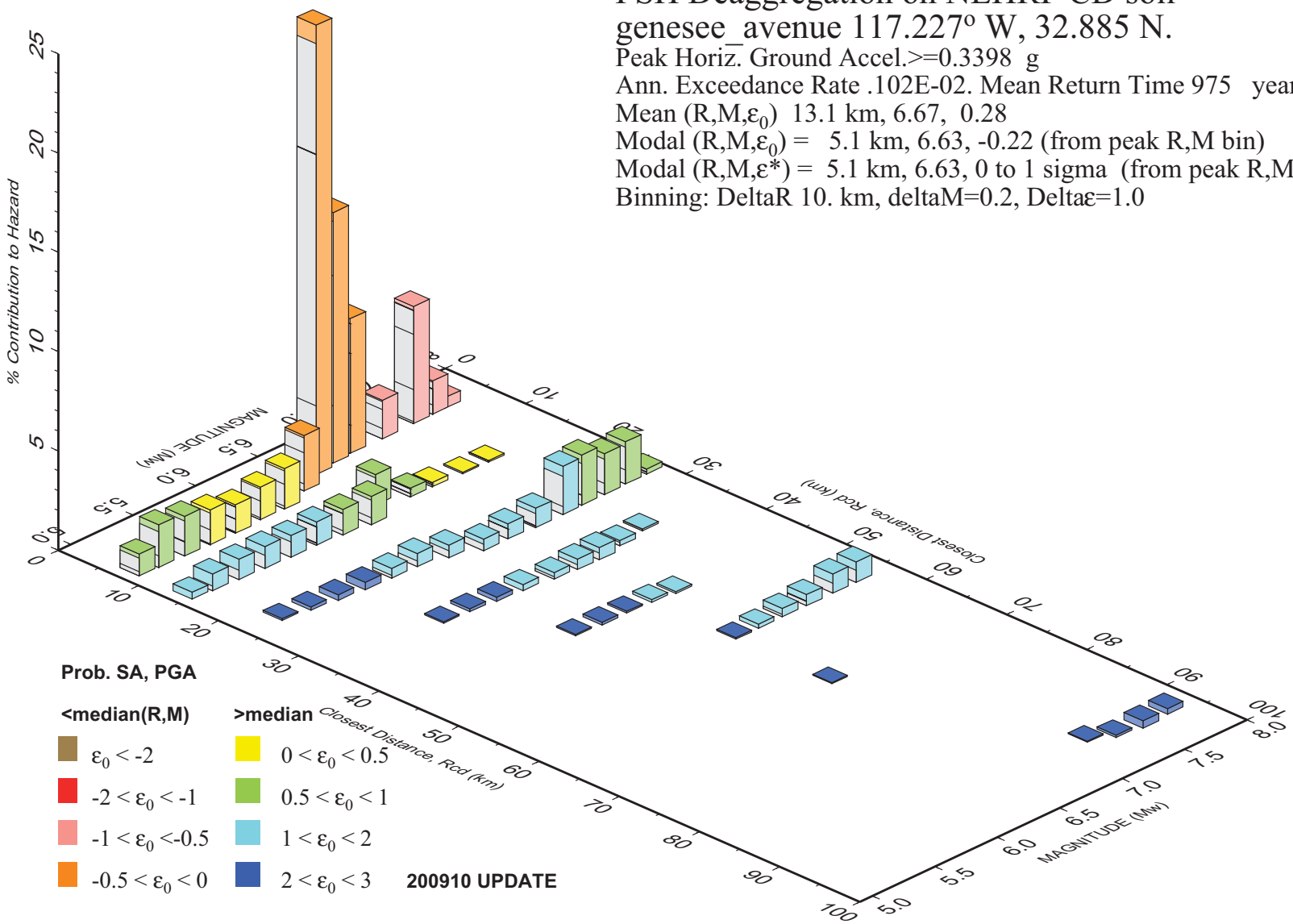
Max % Difference = 6.8%

Probabilistic_Response_Spectrum_080409.xls 9/19/2011 10:55 AM

0.29	0.721	1	1	0.721
0.3	0.719	1	1	0.719
0.32	0.704	1	1	0.704
0.34	0.69	1	1	0.69
0.35	0.683	1	1	0.683
0.36	0.677	1	1	0.677
0.38	0.664	1	1	0.664
0.4	0.653	1	1	0.653
0.42	0.643	1	1	0.643
0.44	0.633	1	1	0.633
0.45	0.628	1	1	0.628
0.46	0.623	1	1	0.623
0.48	0.615	1	1	0.615
0.5	0.606	1	1	0.606
0.55	0.573	1	1.02	0.584
0.6	0.544	1	1.04	0.566
0.65	0.519	1	1.06	0.55
0.667	0.511	1	1.067	0.545
0.7	0.497	1	1.08	0.536
0.75	0.477	1	1.1	0.524
0.8	0.454	1	1.12	0.508
0.85	0.433	1	1.14	0.493
0.9	0.414	1	1.16	0.48
0.95	0.397	1	1.18	0.469
1	0.382	1	1.2	0.458
1.1	0.35	1	1.2	0.42
1.2	0.323	1	1.2	0.388
1.3	0.301	1	1.2	0.361
1.4	0.281	1	1.2	0.337
1.5	0.264	1	1.2	0.317
1.6	0.249	1	1.2	0.299
1.7	0.236	1	1.2	0.283
1.8	0.224	1	1.2	0.268
1.9	0.213	1	1.2	0.255
2	0.203	1	1.2	0.244
2.2	0.183	1	1.2	0.22
2.4	0.167	1	1.2	0.2
2.5	0.159	1	1.2	0.191
2.6	0.153	1	1.2	0.183
2.8	0.141	1	1.2	0.169
3	0.13	1	1.2	0.157
3.2	0.121	1	1.2	0.145
3.4	0.113	1	1.2	0.135
3.5	0.109	1	1.2	0.131
3.6	0.105	1	1.2	0.126
3.8	0.099	1	1.2	0.119
4	0.093	1	1.2	0.112
4.2	0.089	1	1.2	0.107
4.4	0.085	1	1.2	0.102
4.6	0.082	1	1.2	0.098
4.8	0.079	1	1.2	0.094
5	0.076	1	1.2	0.091

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

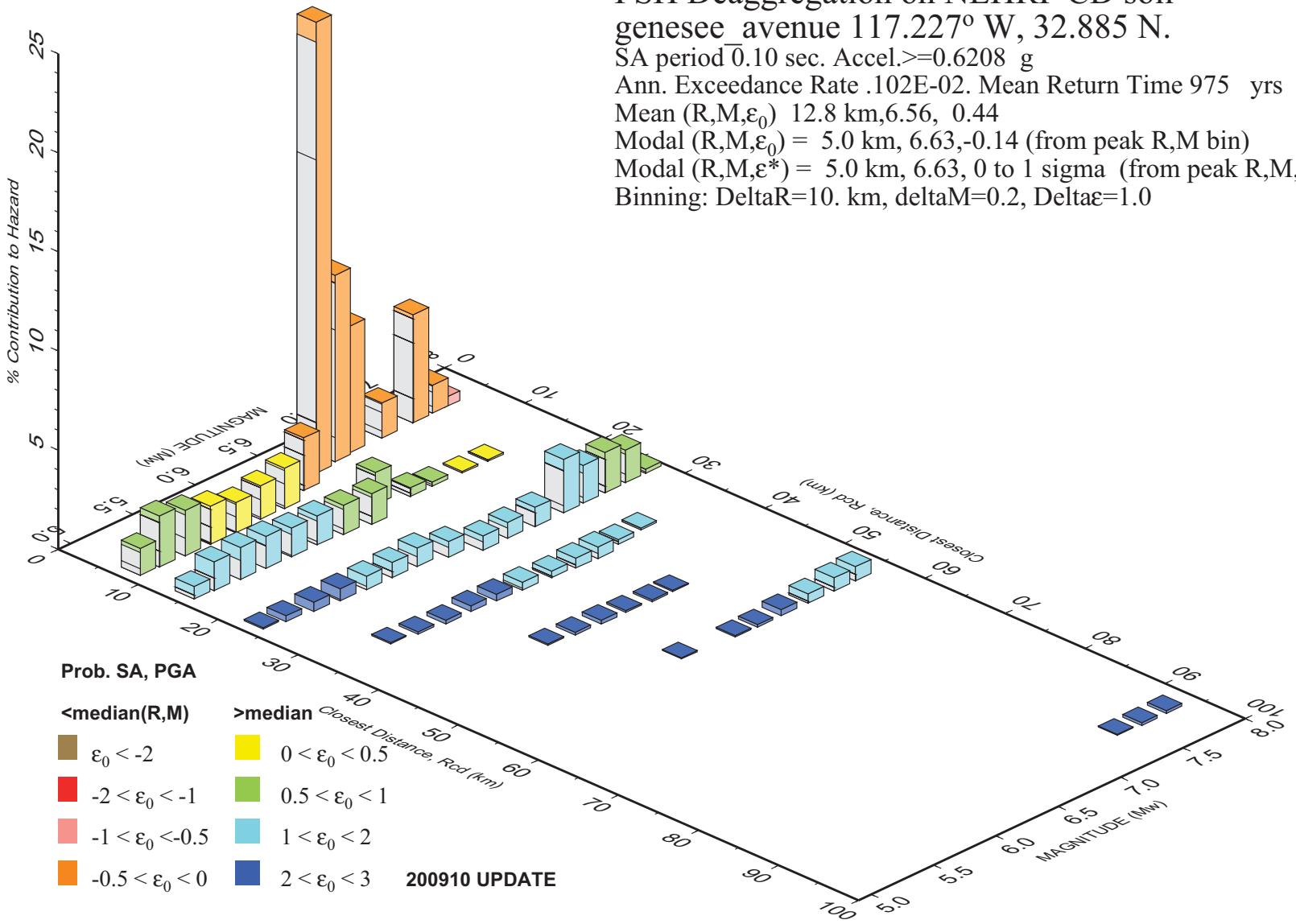
Peak Horiz. Ground Accel.>=0.3398 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 years
Mean (R,M,ε_0) 13.1 km, 6.67, 0.28
Modal (R,M,ε_0) = 5.1 km, 6.63, -0.22 (from peak R,M bin)
Modal (R,M,ε*) = 5.1 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:39:21 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

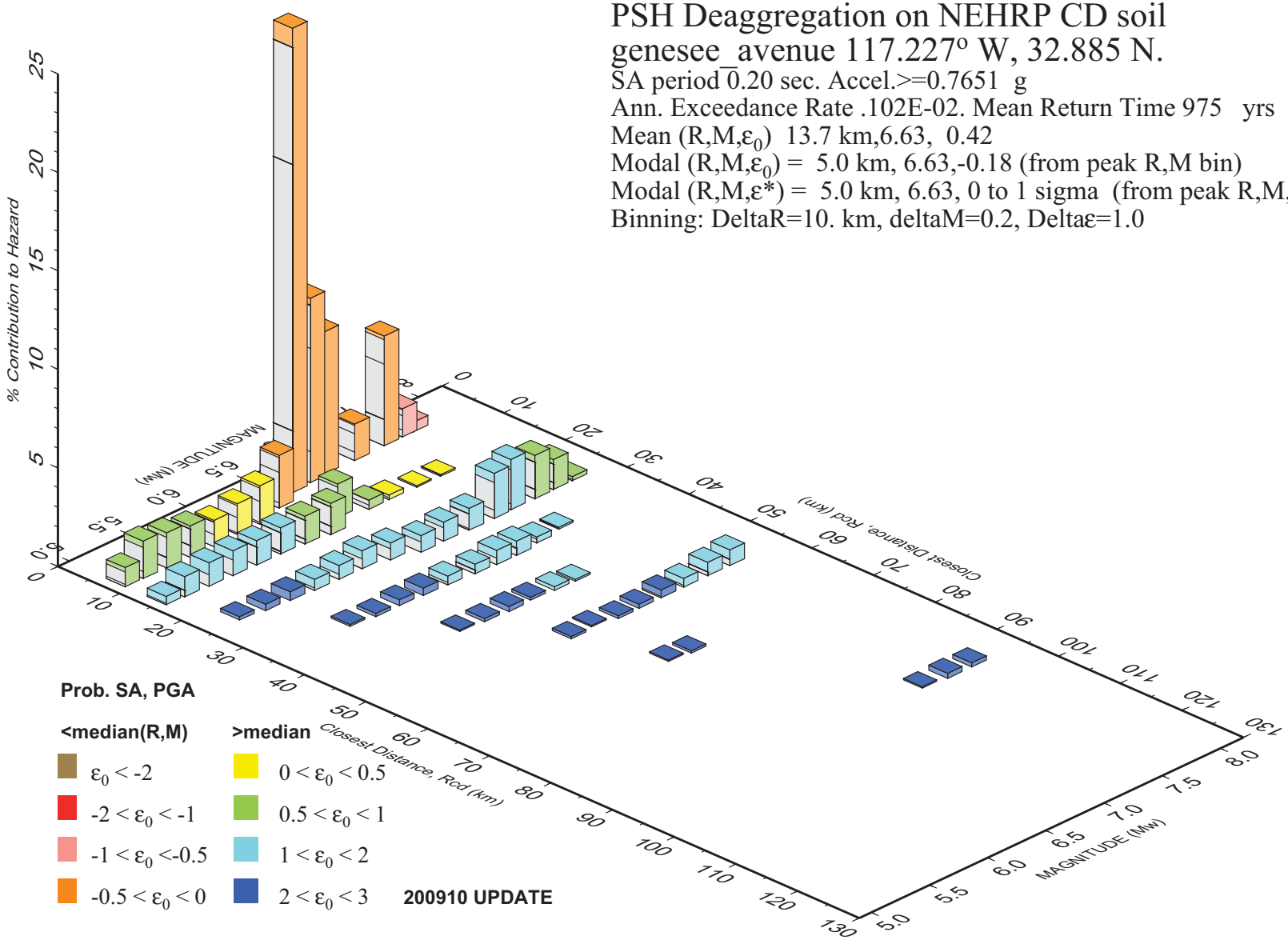
SA period 0.10 sec. Accel.>=0.6208 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 12.8 km,6.56, 0.44
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.14 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:47:02 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

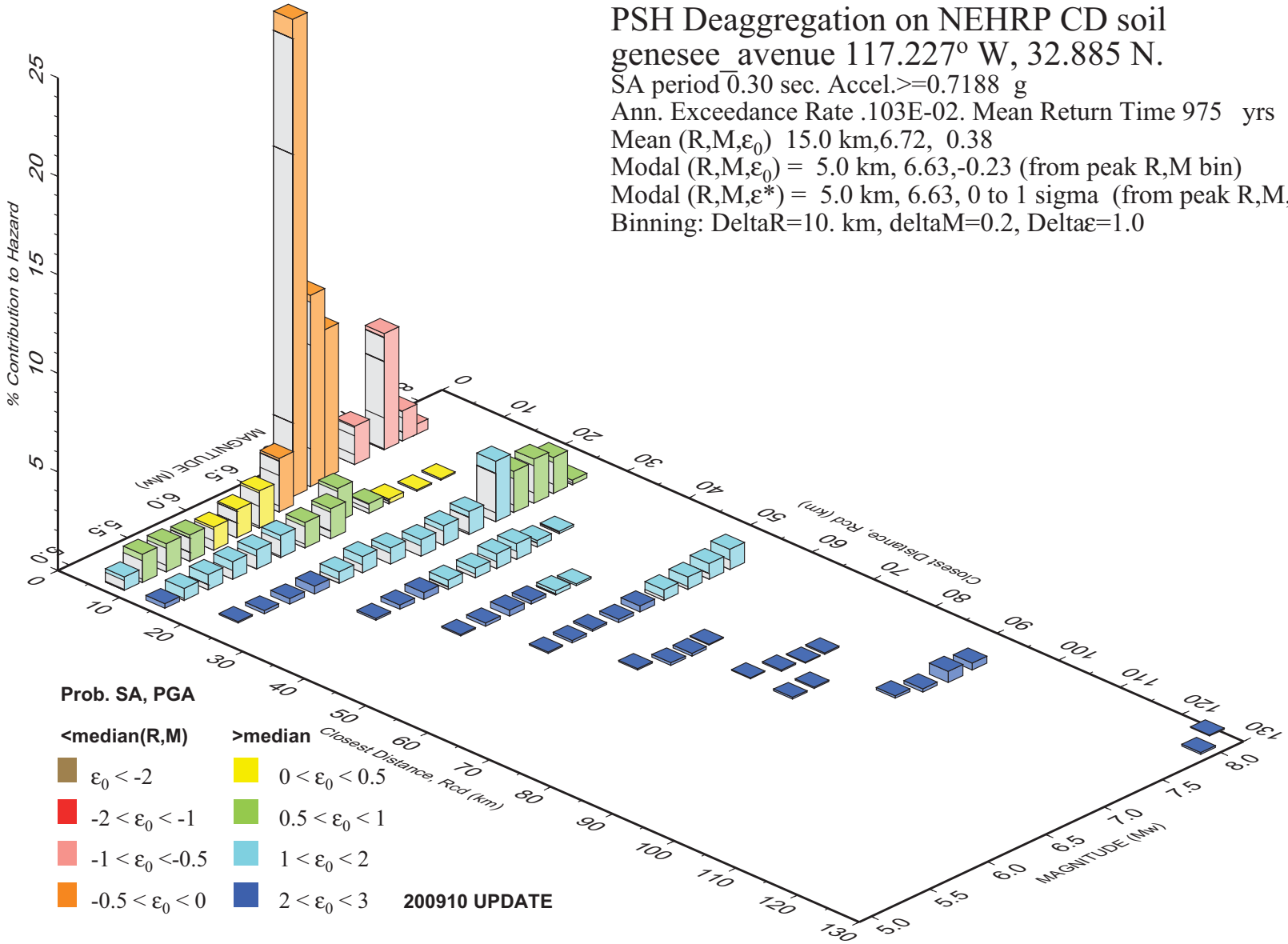
SA period 0.20 sec. Accel.>=0.7651 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 13.7 km,6.63, 0.42
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.18 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:48:40 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

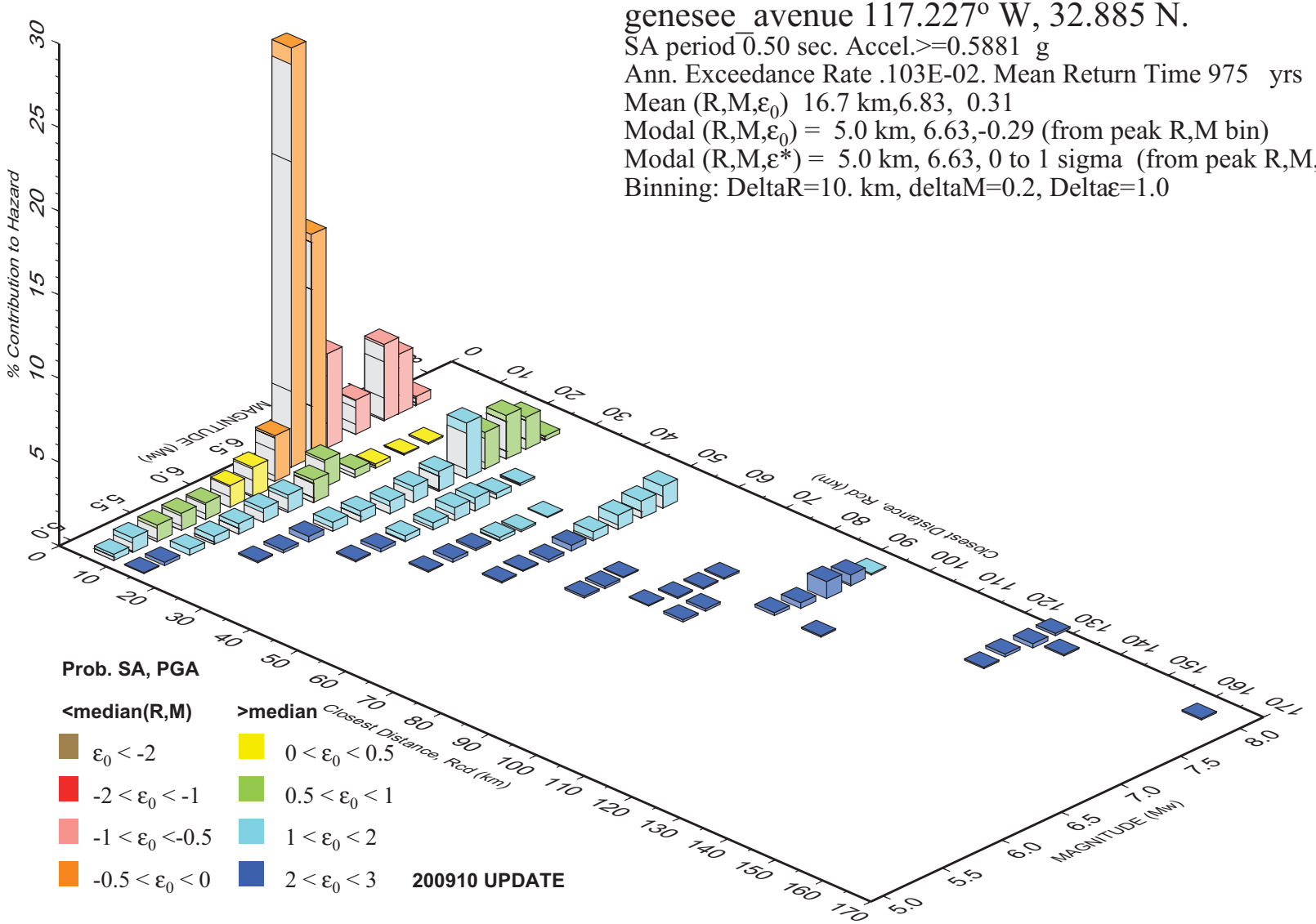
SA period 0.30 sec. Accel.>=0.7188 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 15.0 km,6.72, 0.38
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.23 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:49:49 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

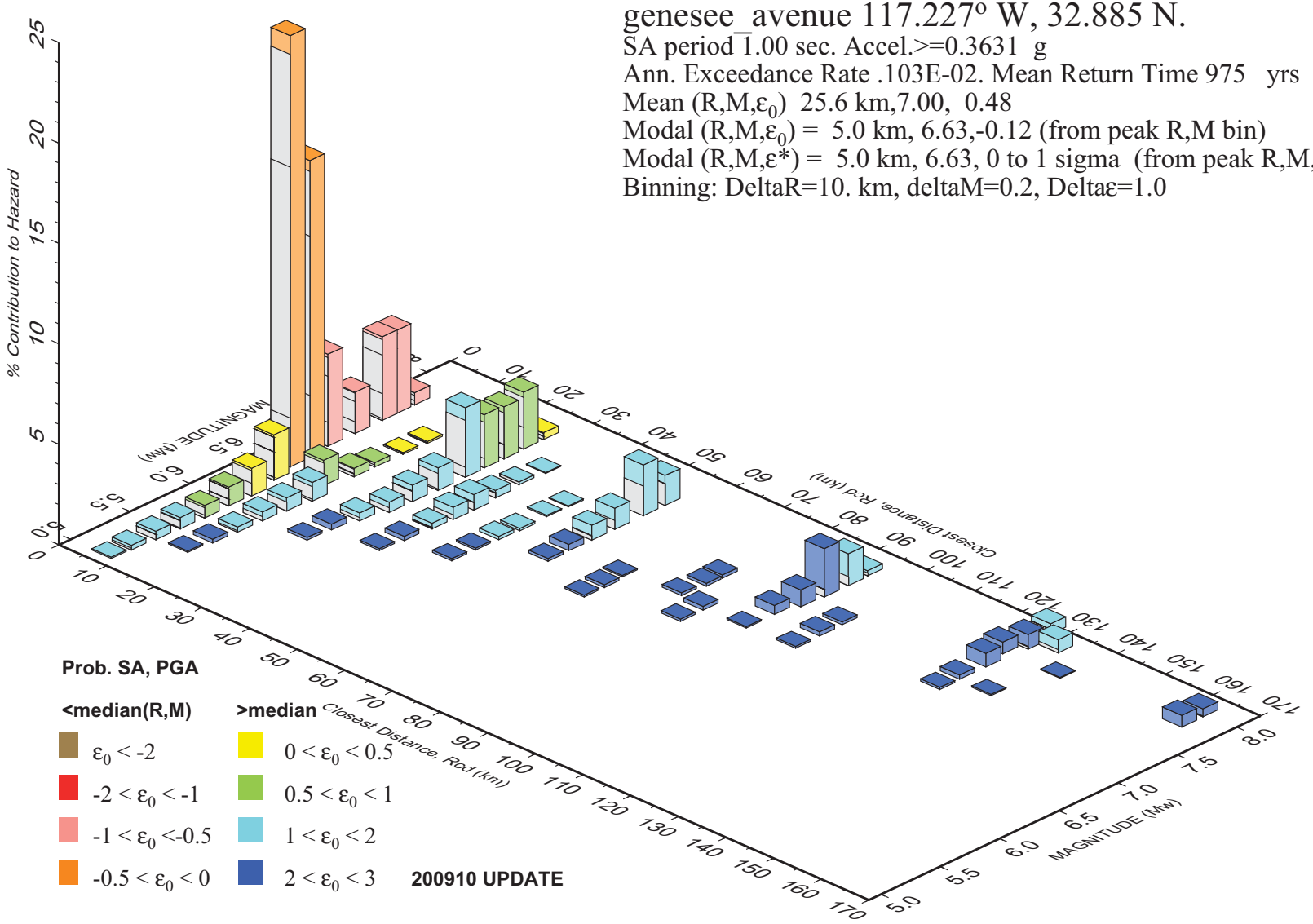
SA period 0.50 sec. Accel.>=0.5881 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 16.7 km,6.83, 0.31
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:50:55 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

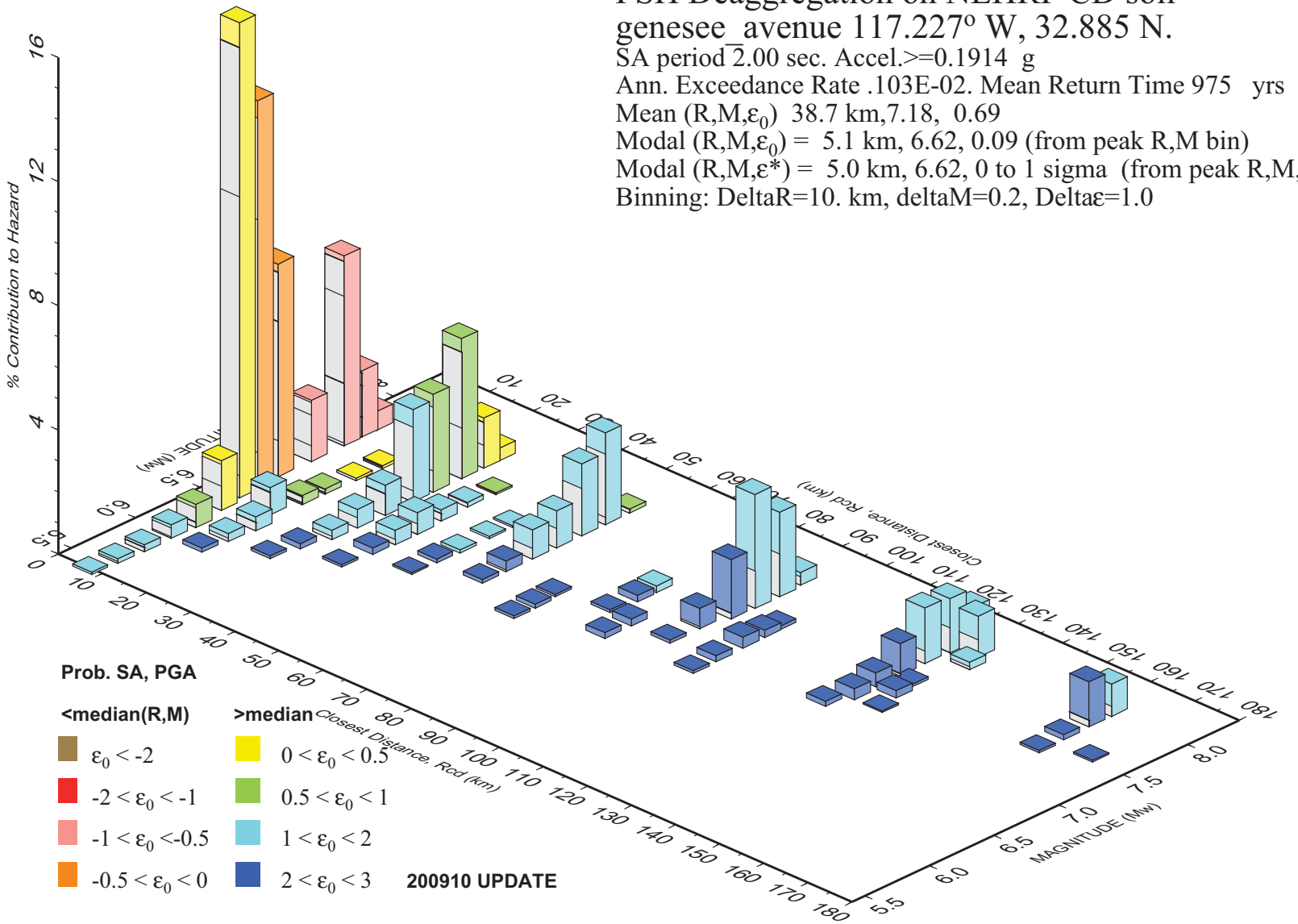
SA period 1.00 sec. Accel.>=0.3631 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 25.6 km,7.00, 0.48
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.12 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:52:12 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

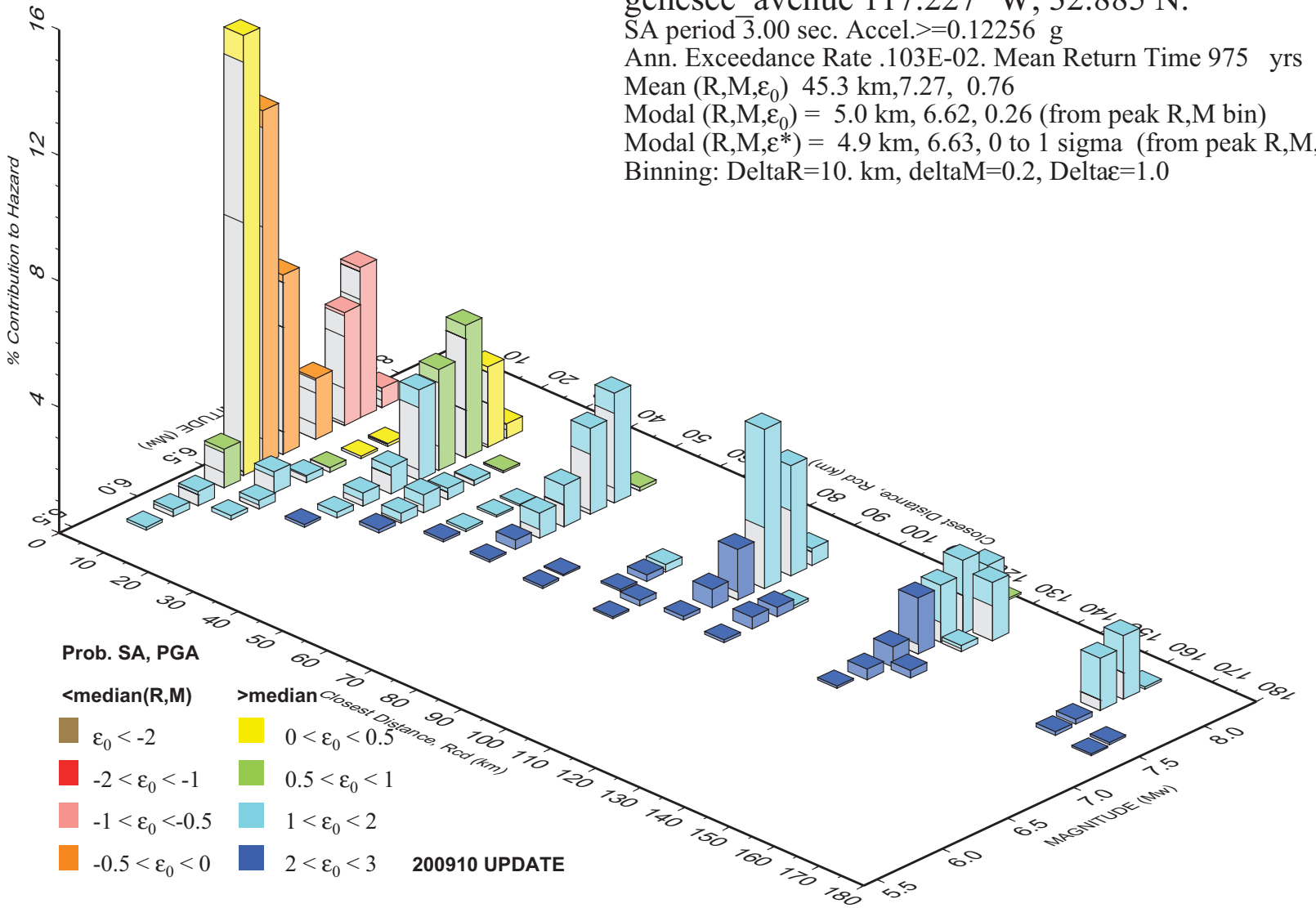
SA period 2.00 sec. Accel.>=0.1914 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 38.7 km,7.18, 0.69
Modal (R,M,ε_0) = 5.1 km, 6.62, 0.09 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.62, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:53:10 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

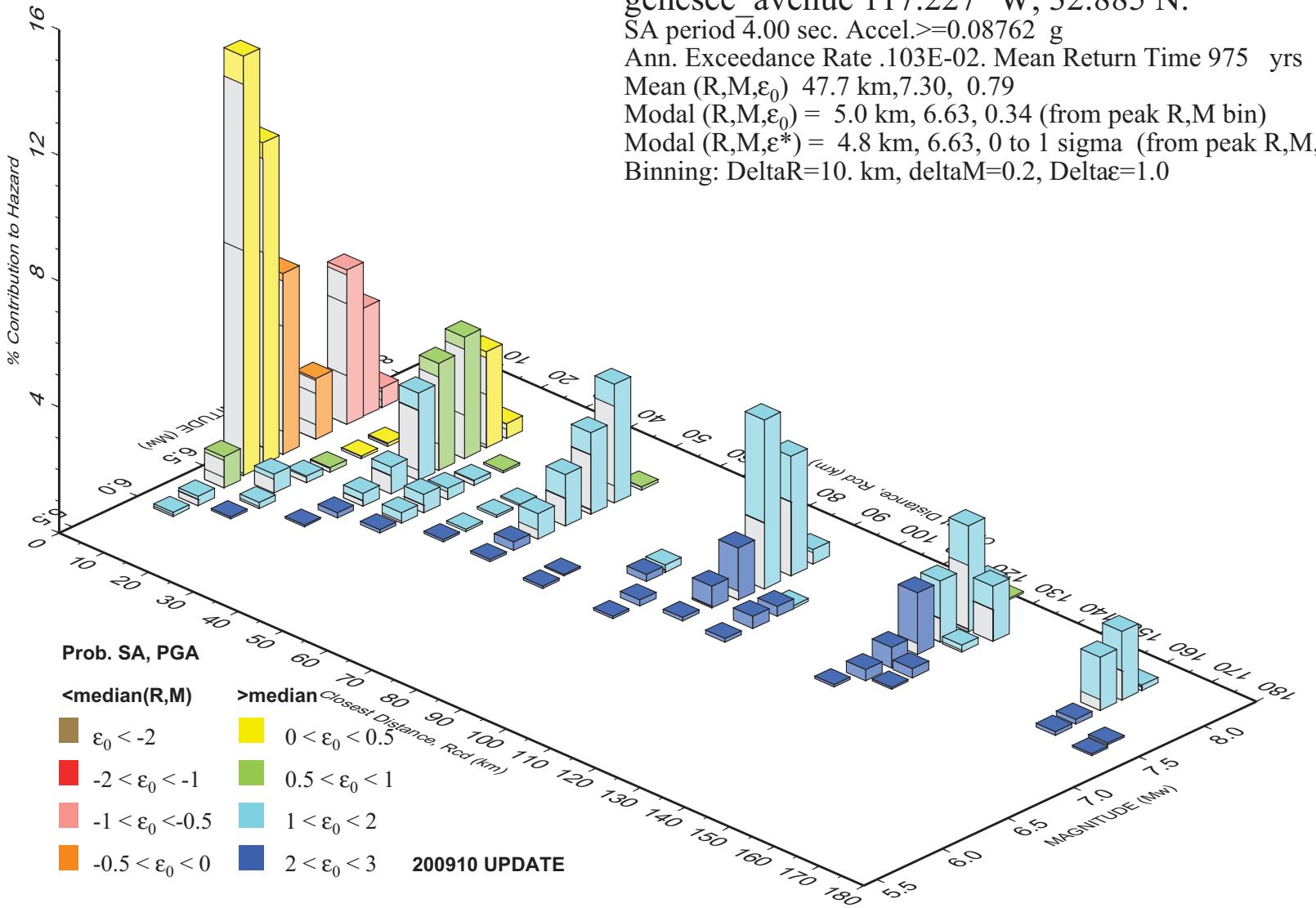
SA period 3.00 sec. Accel.>=0.12256 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 45.3 km,7.27, 0.76
Modal (R,M,ε_0) = 5.0 km, 6.62, 0.26 (from peak R,M bin)
Modal (R,M,ε*) = 4.9 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



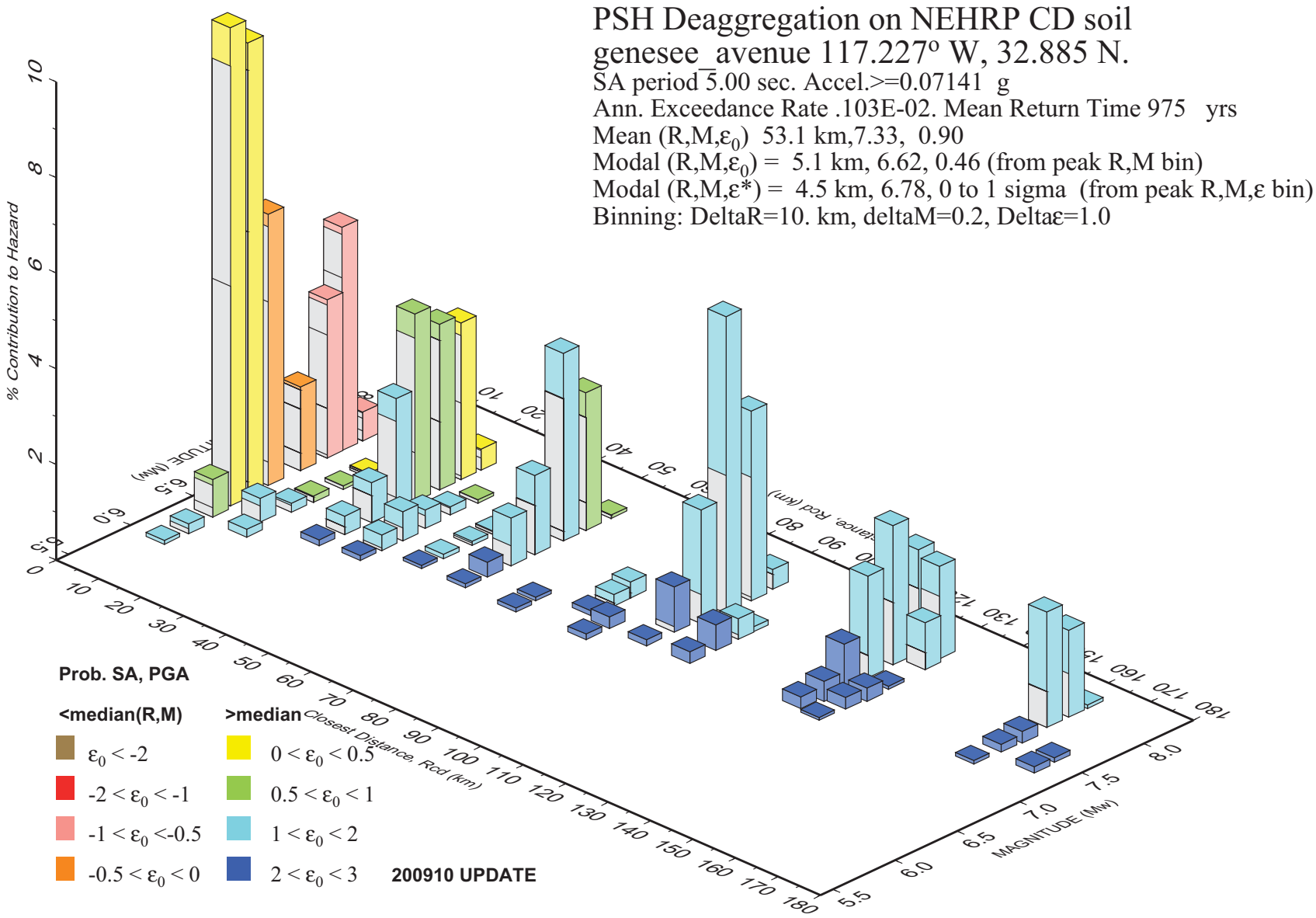
GMT 2011 Jul 20 16:54:05 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

SA period 4.00 sec. Accel.>=0.08762 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 47.7 km,7.30, 0.79
Modal (R,M,ε_0) = 5.0 km, 6.63, 0.34 (from peak R,M bin)
Modal (R,M,ε*) = 4.8 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:54:57 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:55:47 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: R-1,2,and3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

Fault Information (#1)

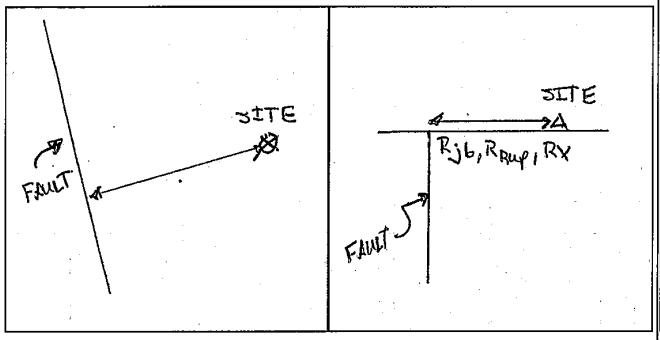
Fault Name: Newport Inglewood (Oceanside) Fault ID#: 223

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.00

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 4.21

R_{JB}: 4.21

R_X: 4.21

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

Fault Information (#2)

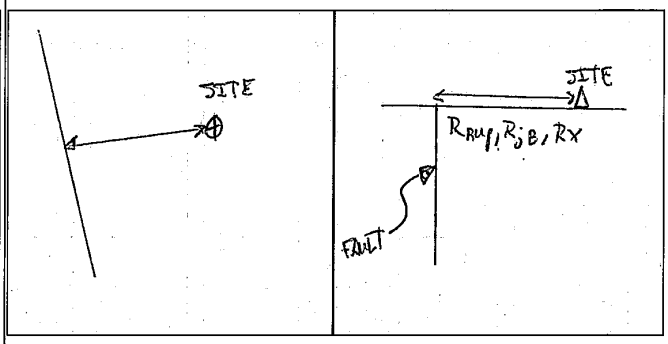
Fault Name: Newport Inglewood (San Diego) Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.0

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: RW-1, 2 and 3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

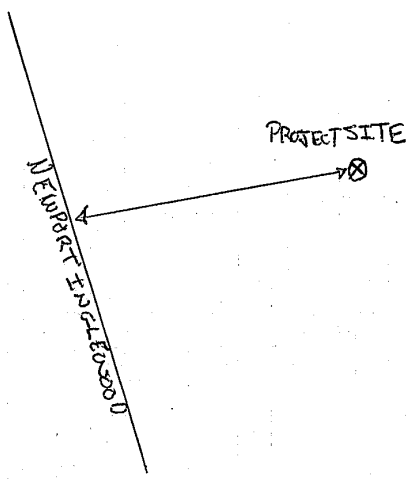
Deterministic Fault Information

Fault Name: New Port Inglewood Rose Canyon Fault ID#: 223 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13.00 km

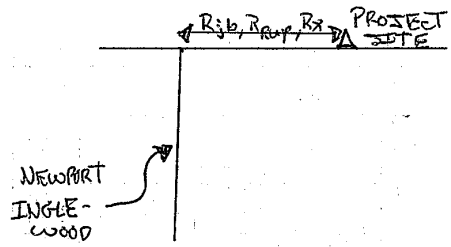
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	4.21 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT Correlation (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 20km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☒	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

ZIA YAZDANI — 11-7-11
Checker (Print) — Title

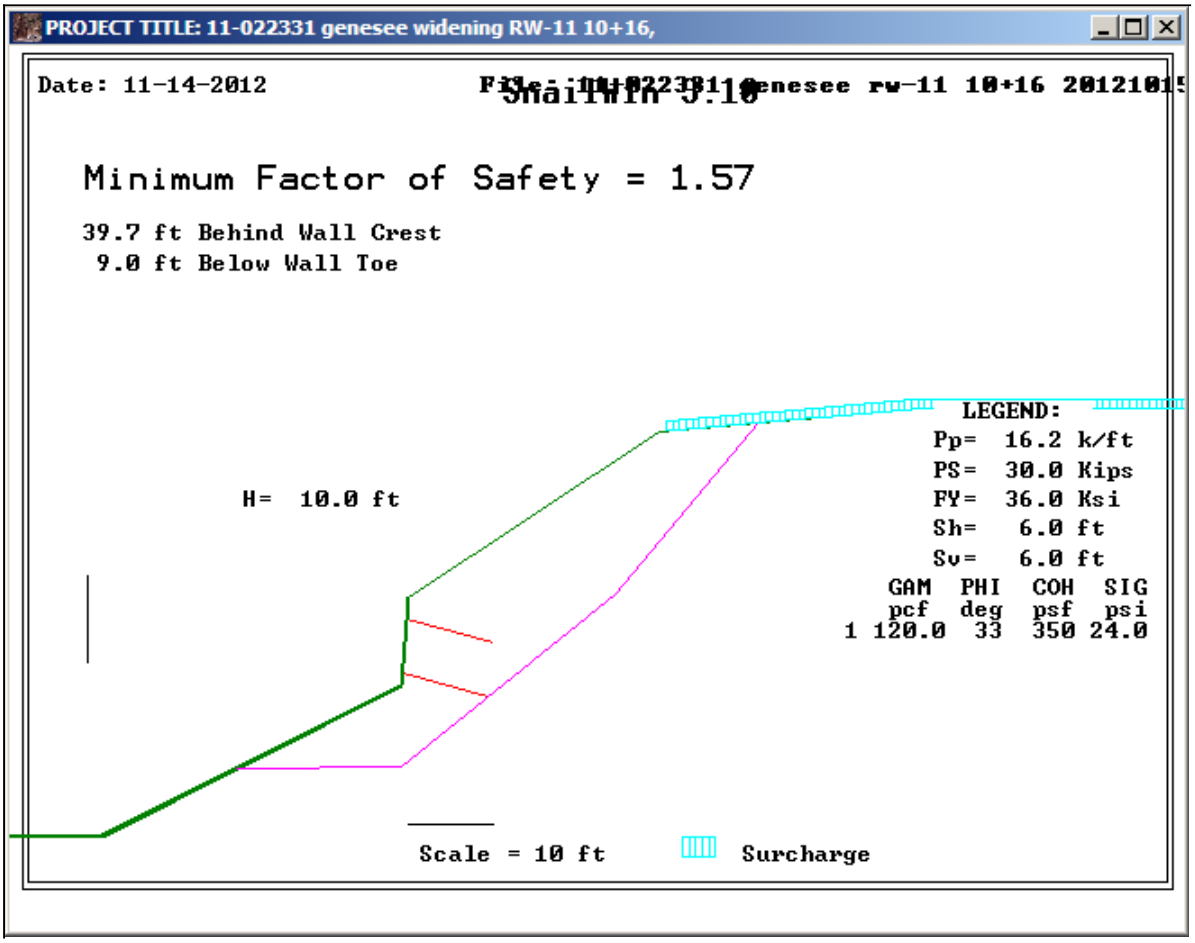
Yazdani — 11-7-11
Checker (Signature) — Date

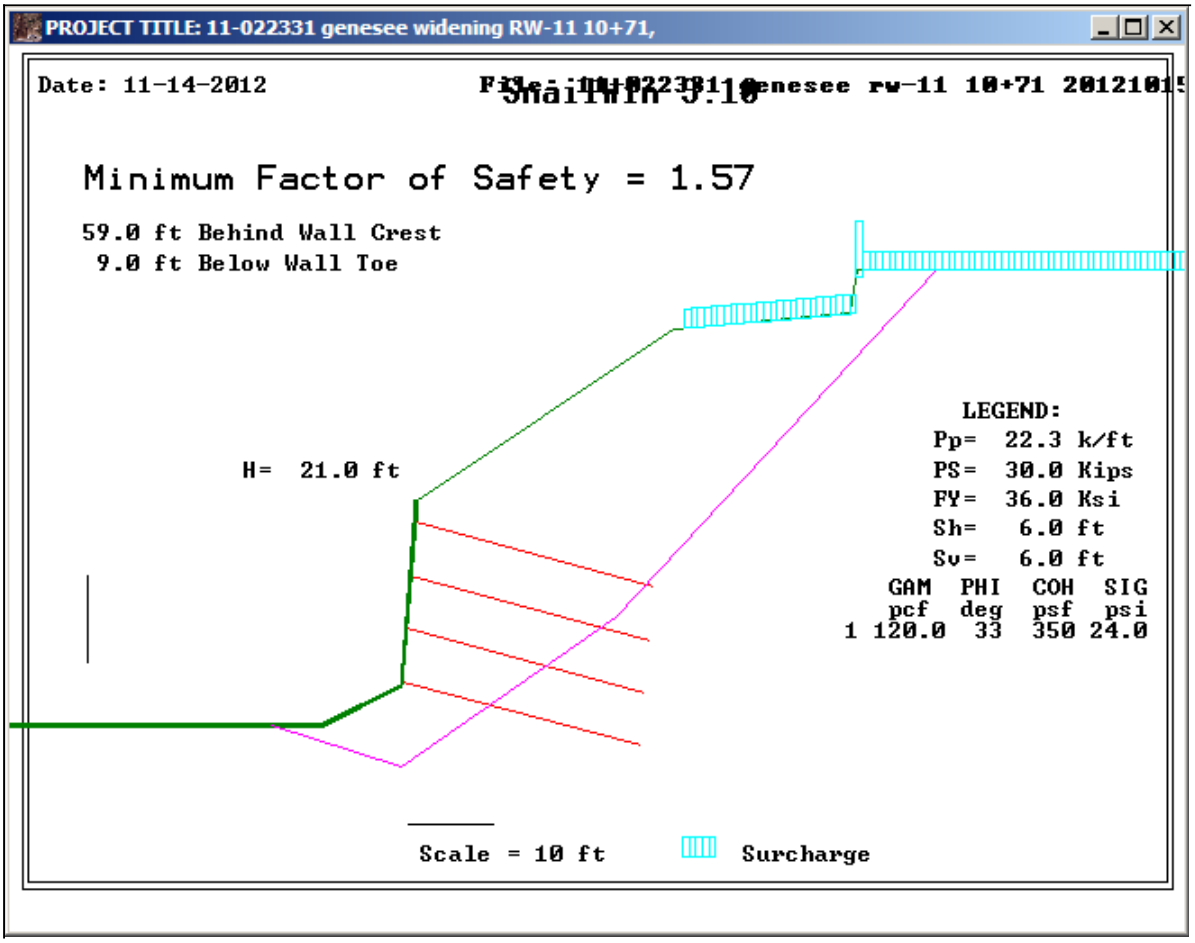
I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

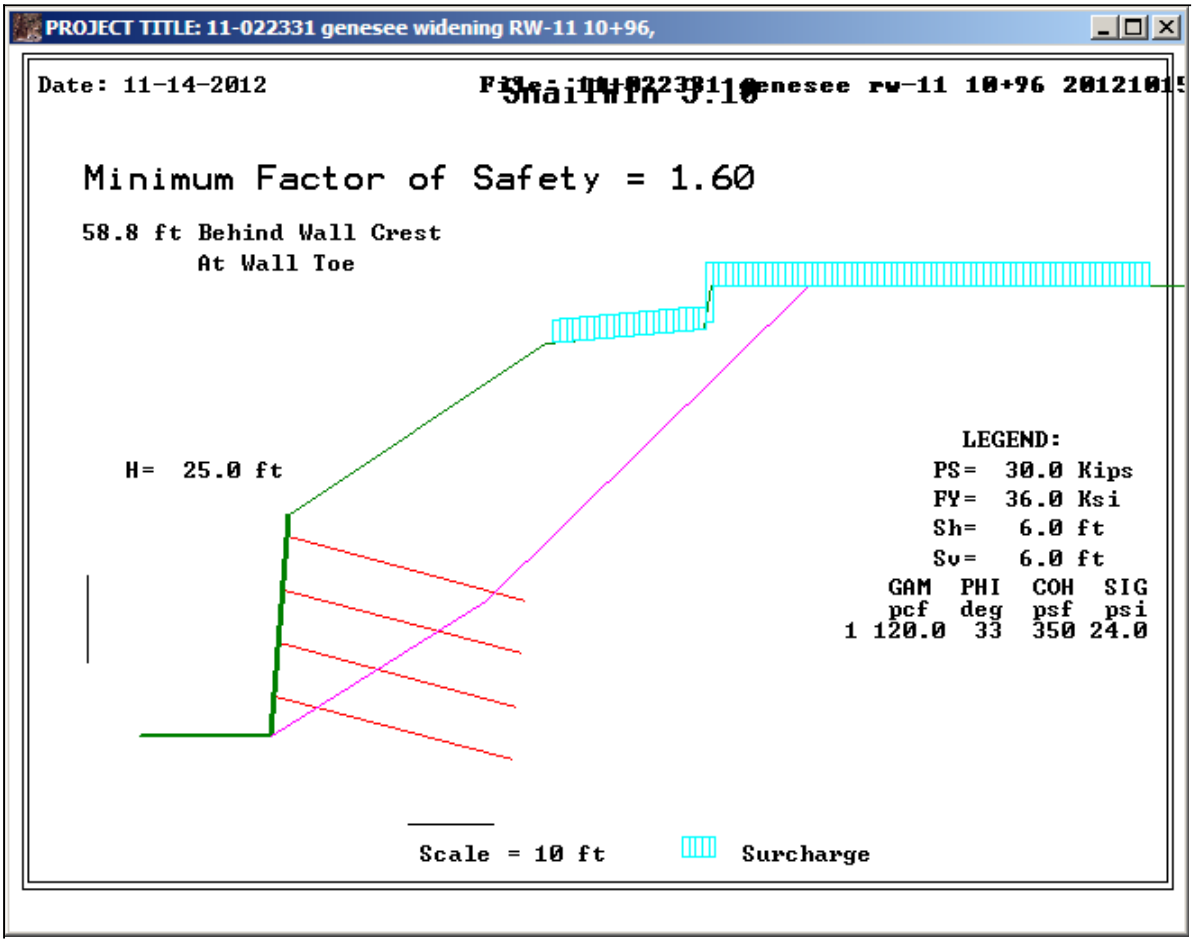
BRIAN HINMAN — SENIOR TE
Functional Supervisor (Print) — Title

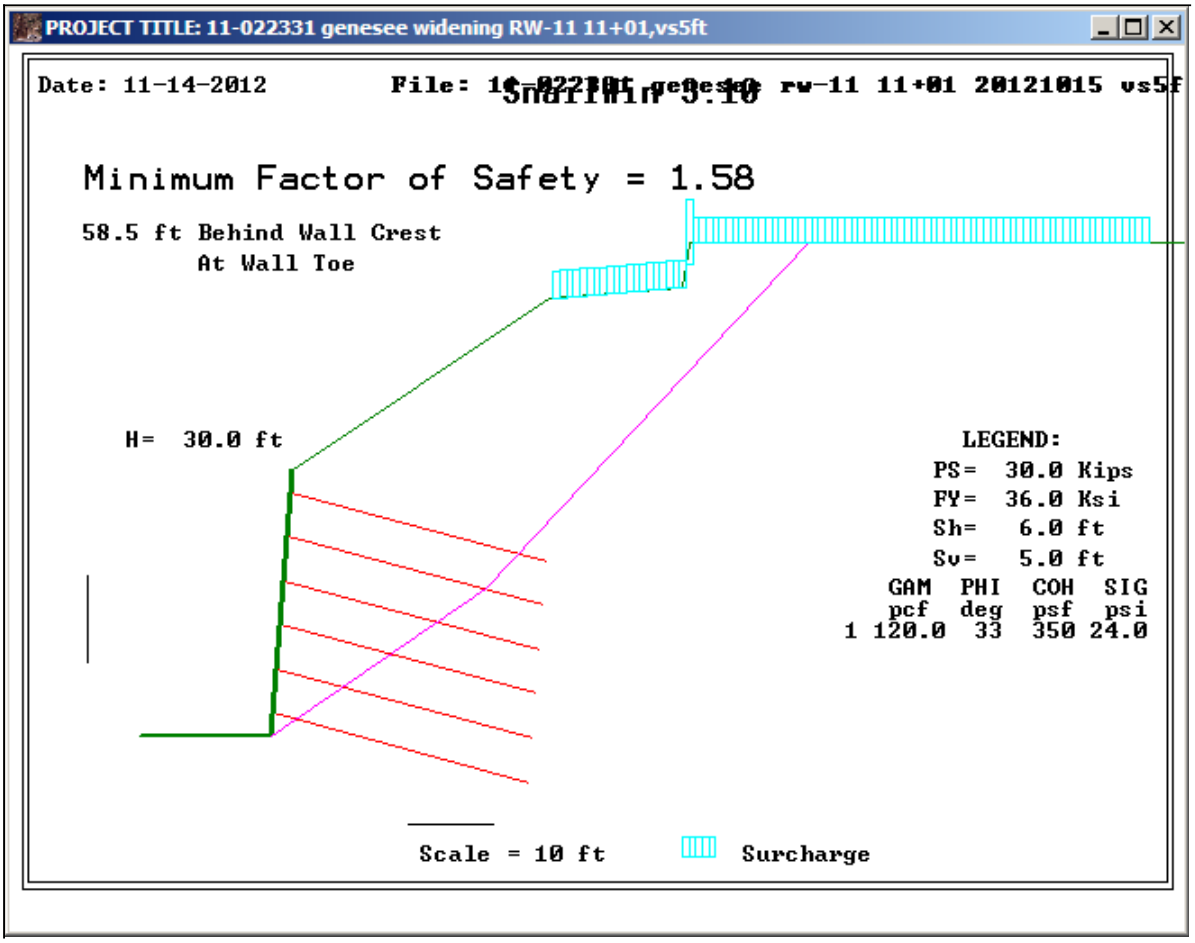
Brian Hinman — 11/8/11
Functional Supervisor (Signature) — Date

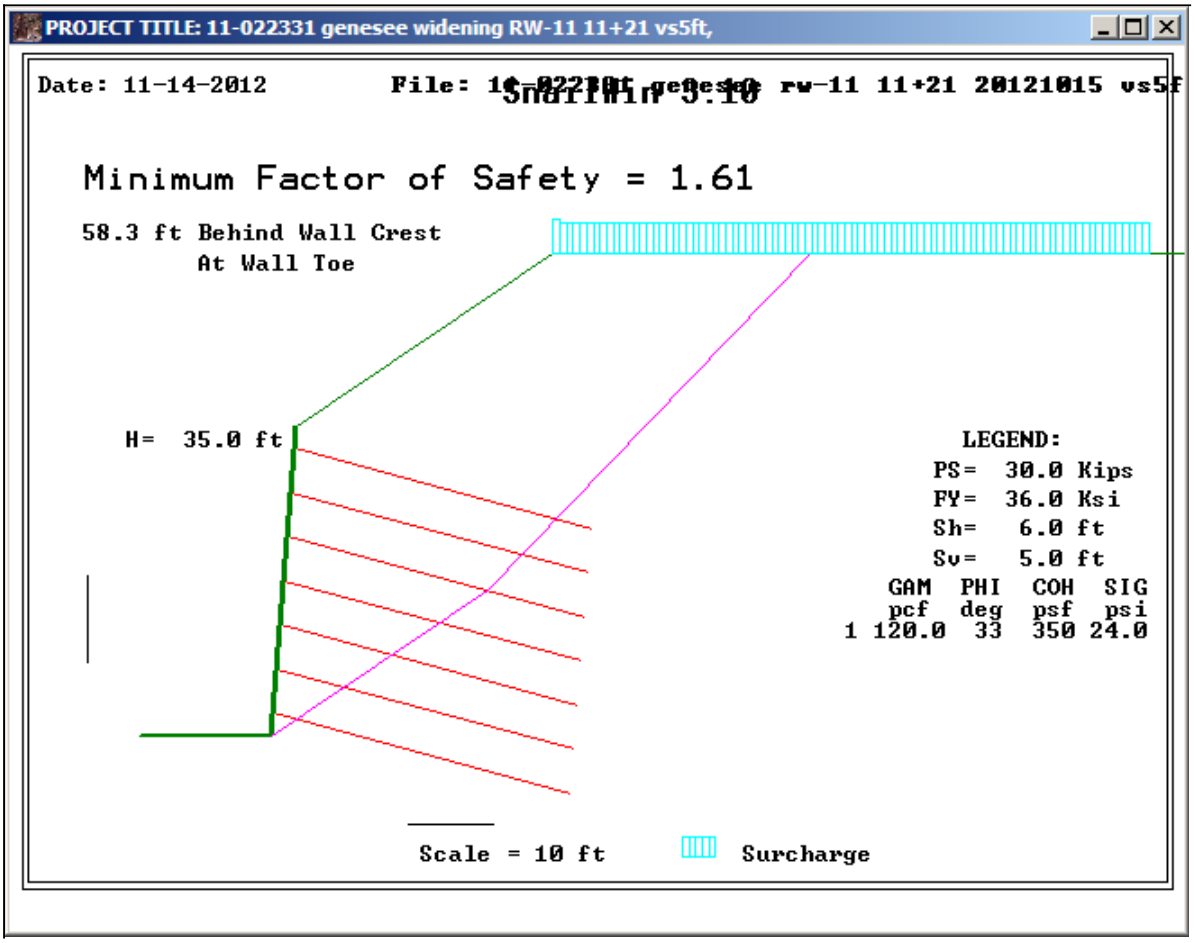
(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

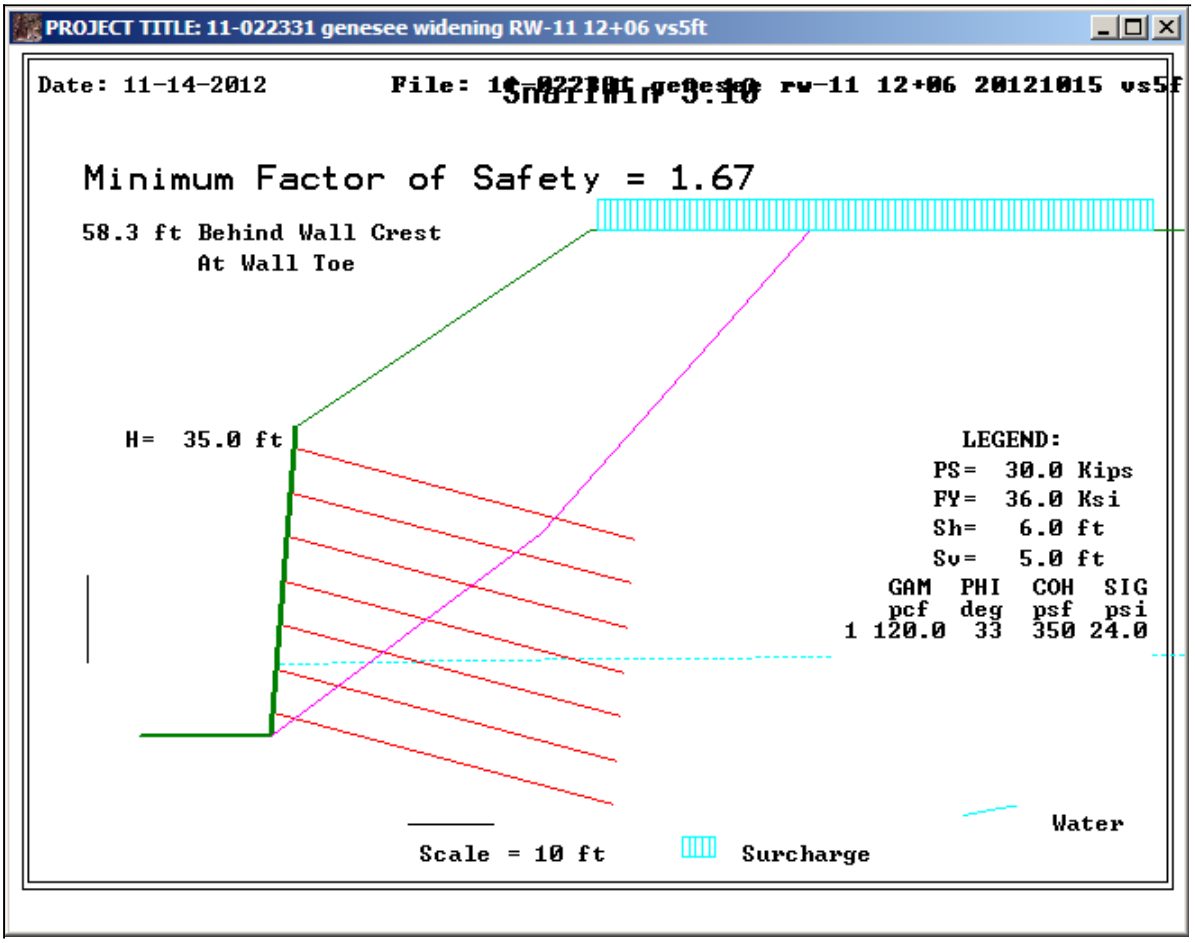

PROJECT TITLE: 11-022331 genesee widening RW-11 10+16,
Date: 11-14-2012
SnailPlus 9.10
Minimum Factor of Safety = 1.57
39.7 ft Behind Wall Crest
9.0 ft Below Wall Toe
H= 10.0 ft
LEGEND:
Pp= 16.2 k/ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

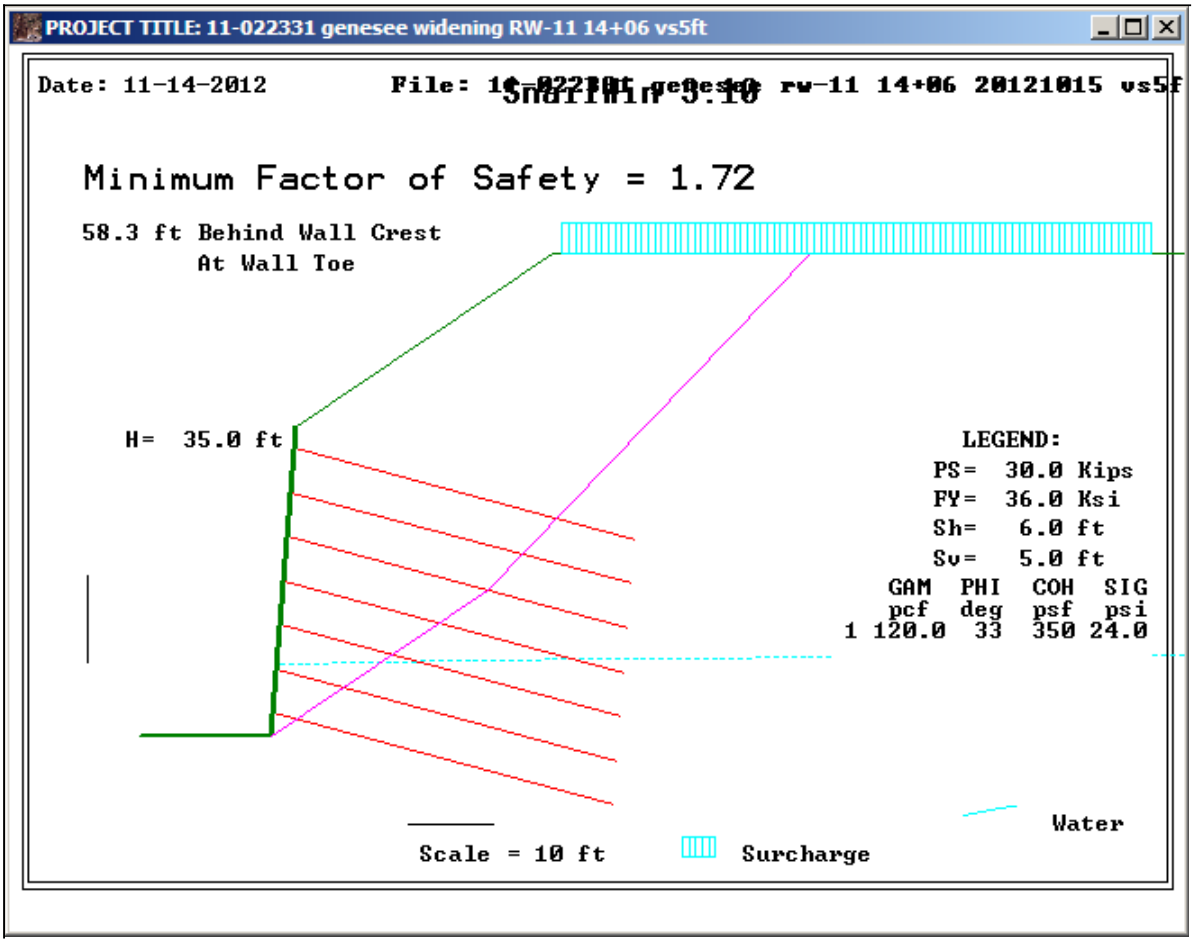

PROJECT TITLE: 11-022331 genesee widening RW-11 10+71,
Date: 11-14-2012
SnailPlus 9.10
Minimum Factor of Safety = 1.57
59.0 ft Behind Wall Crest
9.0 ft Below Wall Toe
H= 21.0 ft
LEGEND:
Pp= 22.3 k/ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

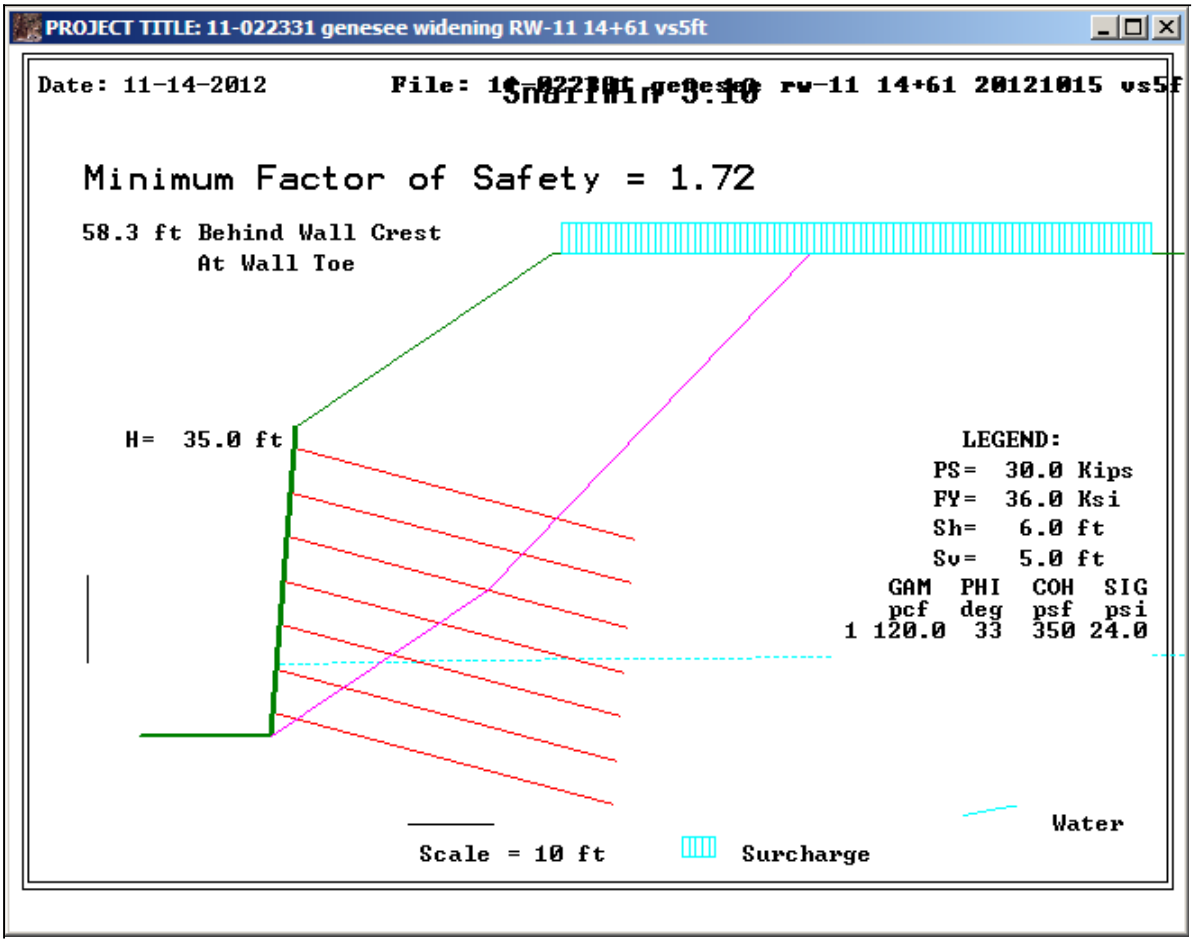

PROJECT TITLE: 11-022331 genesee widening RW-11 10+96,
Date: 11-14-2012
SnailPlus 3.10
Minimum Factor of Safety = 1.60
58.8 ft Behind Wall Crest
At Wall Toe
H= 25.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

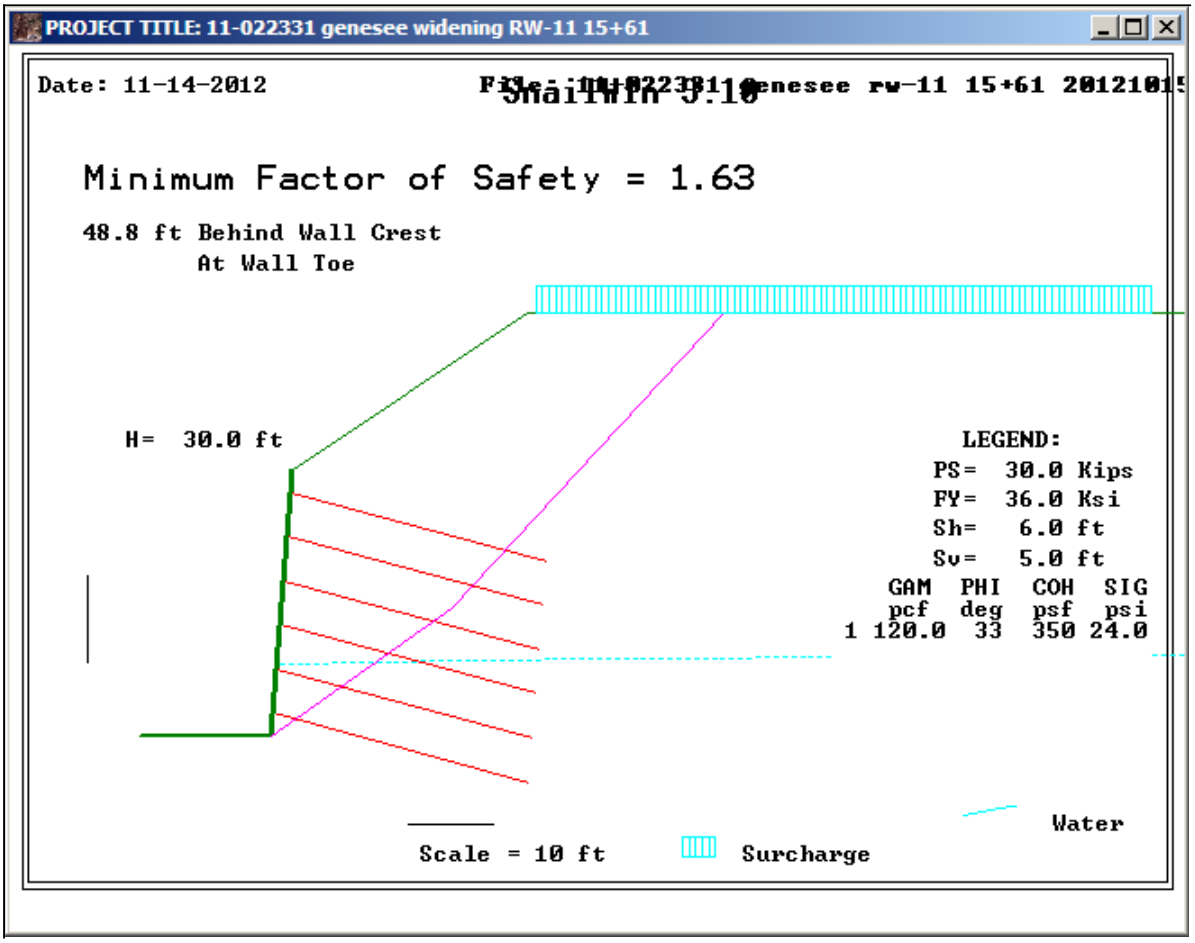

PROJECT TITLE: 11-022331 genesee widening RW-11 11+01,vs5ft
Date: 11-14-2012
File: 1
rw-11 11+01 20121015 vs5f
Minimum Factor of Safety = 1.58
58.5 ft Behind Wall Crest
At Wall Toe
H= 30.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

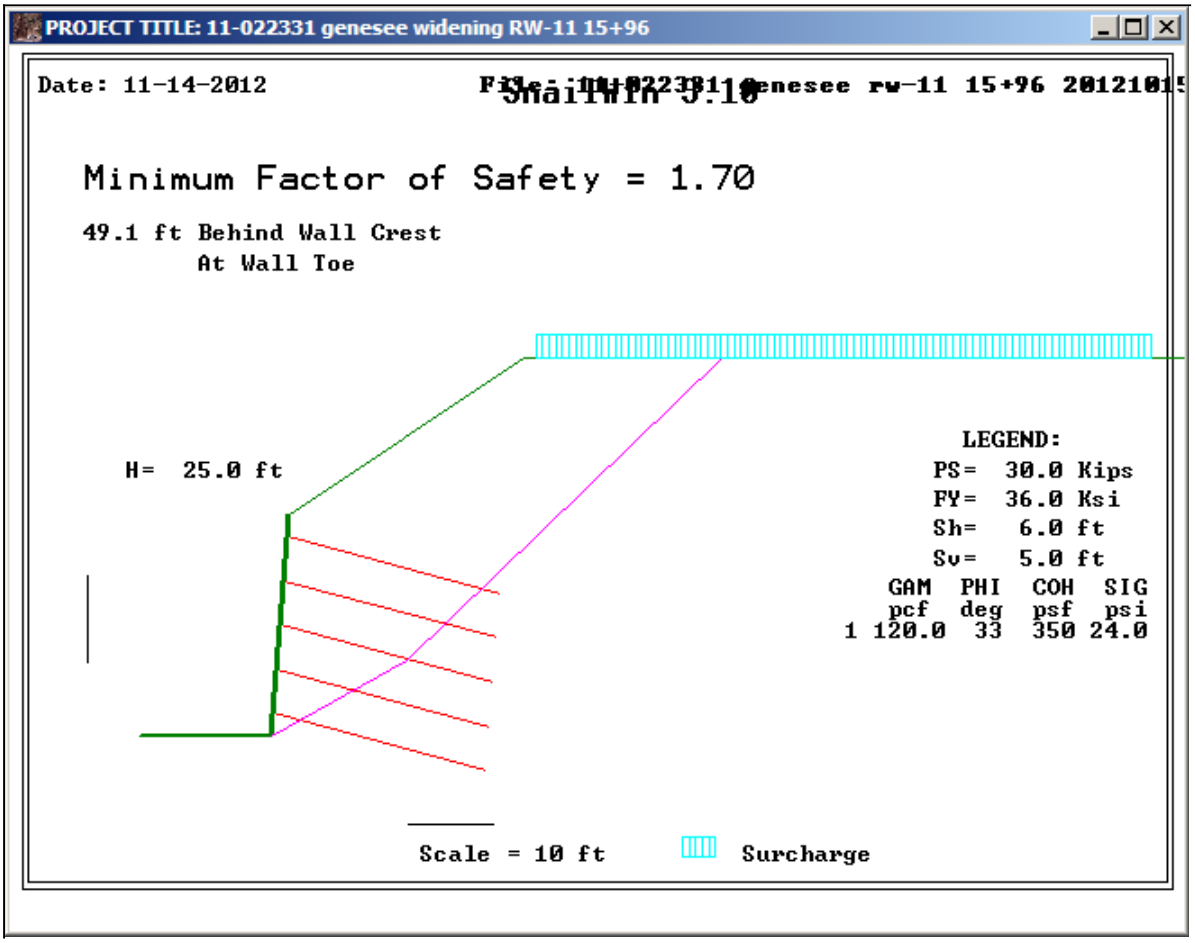

PROJECT TITLE: 11-022331 genesee widening RW-11 11+21 vs5ft,
Date: 11-14-2012
File: 1
rw-11 11+21 20121015 vs5f
Minimum Factor of Safety = 1.61
58.3 ft Behind Wall Crest
At Wall Toe
H= 35.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

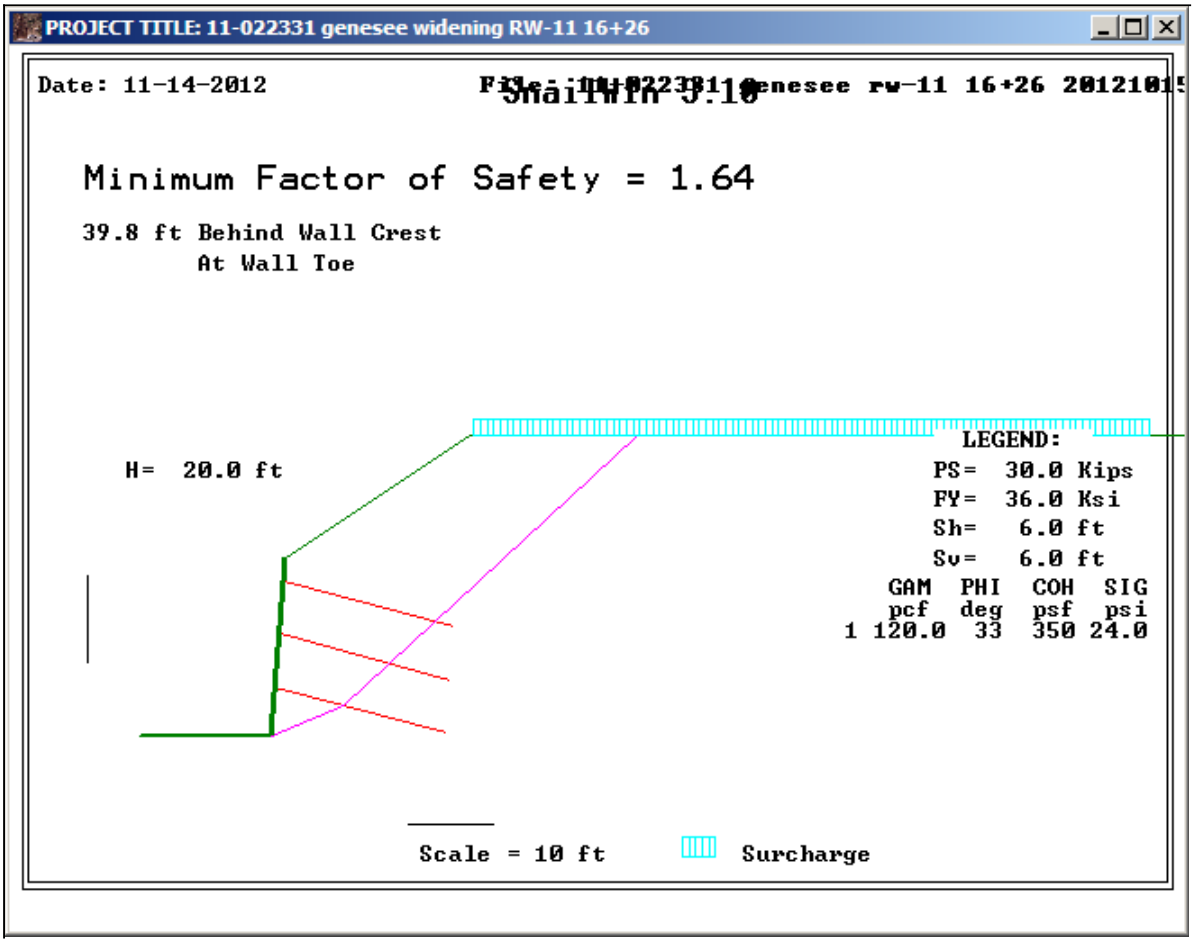

PROJECT TITLE: 11-022331 genesee widening RW-11 12+06 vs5ft
Date: 11-14-2012
File: 1
rw-11 12+06 20121015 vs5f
Minimum Factor of Safety = 1.67
58.3 ft Behind Wall Crest
At Wall Toe
H= 35.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

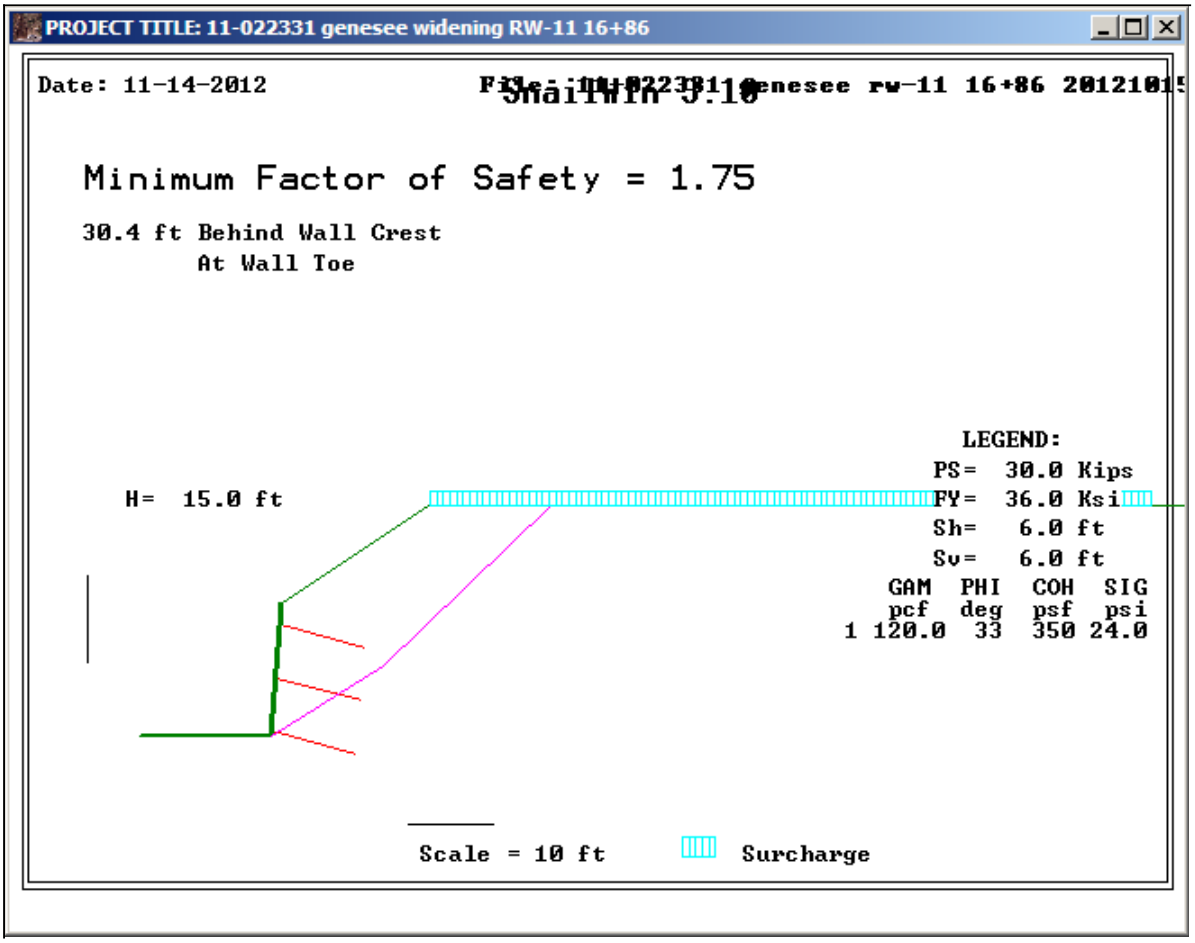

PROJECT TITLE: 11-022331 genesee widening RW-11 14+06 vs5ft
Date: 11-14-2012
File: 1
rw-11 14+06 20121015 vs5f
Minimum Factor of Safety = 1.72
58.3 ft Behind Wall Crest
At Wall Toe
H= 35.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

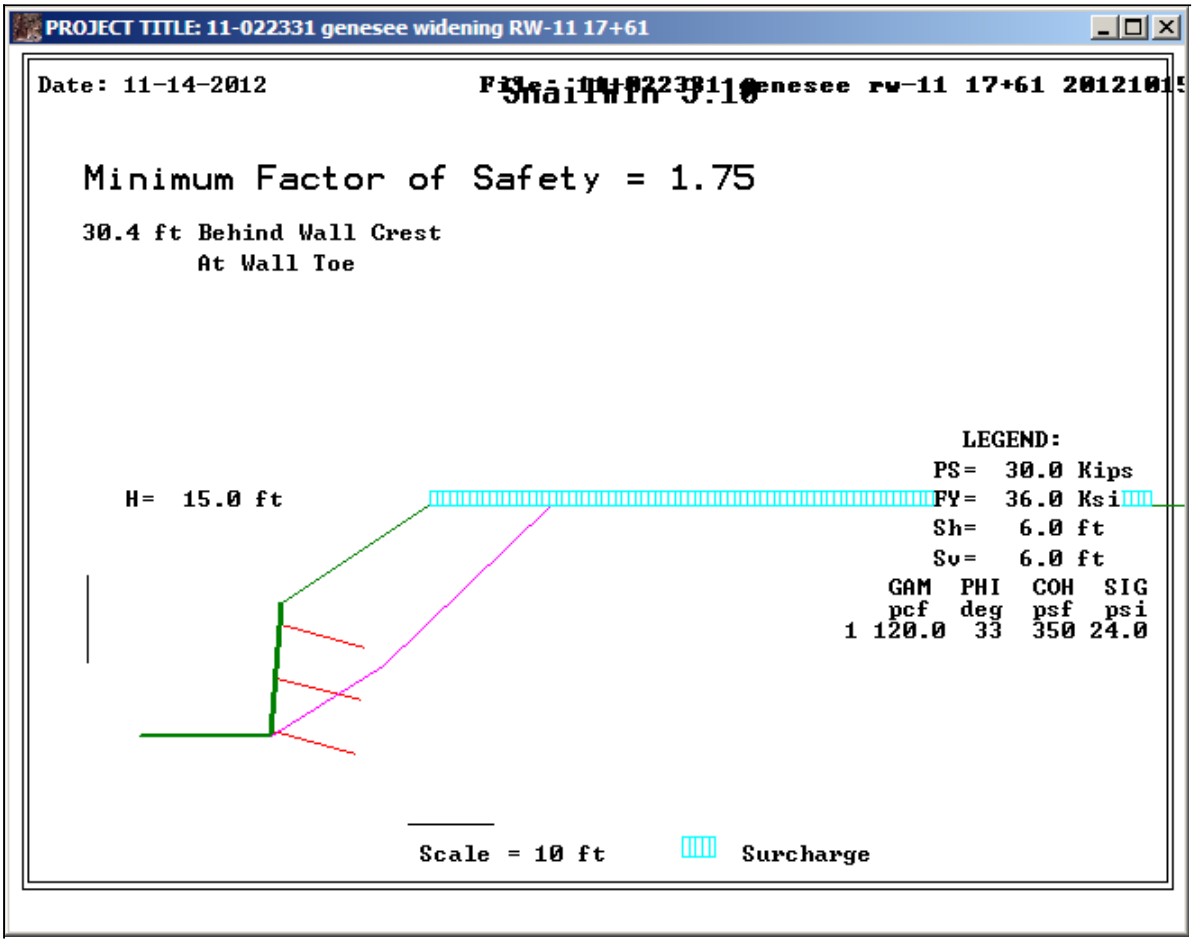

PROJECT TITLE: 11-022331 genesee widening RW-11 14+61 vs5ft
Date: 11-14-2012
File: 1
rw-11 14+61 20121015 vs5f
Minimum Factor of Safety = 1.72
58.3 ft Behind Wall Crest
At Wall Toe
H= 35.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

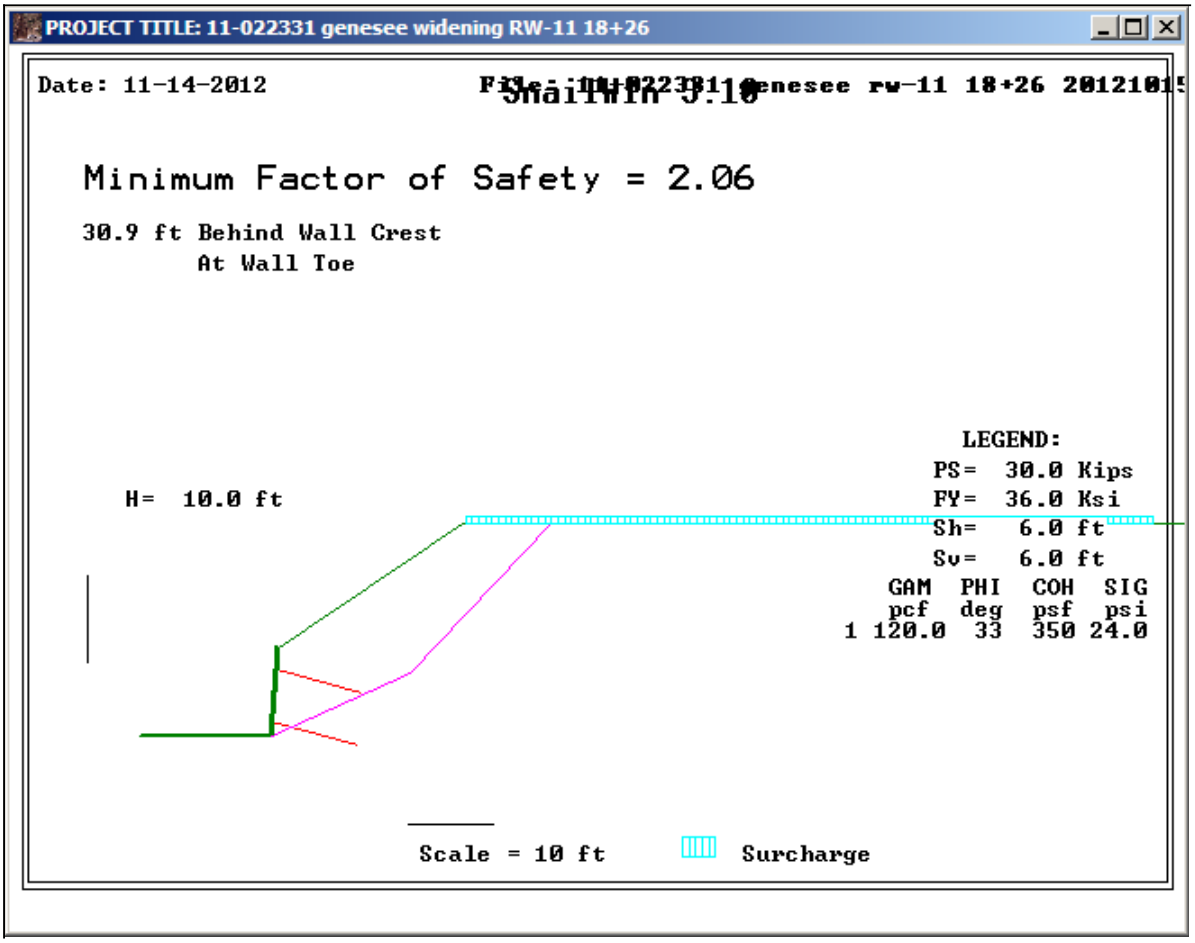

PROJECT TITLE: 11-022331 genesee widening RW-11 15+61
Date: 11-14-2012
SnailPlus 3.10
Minimum Factor of Safety = 1.63
48.8 ft Behind Wall Crest
At Wall Toe
H= 30.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

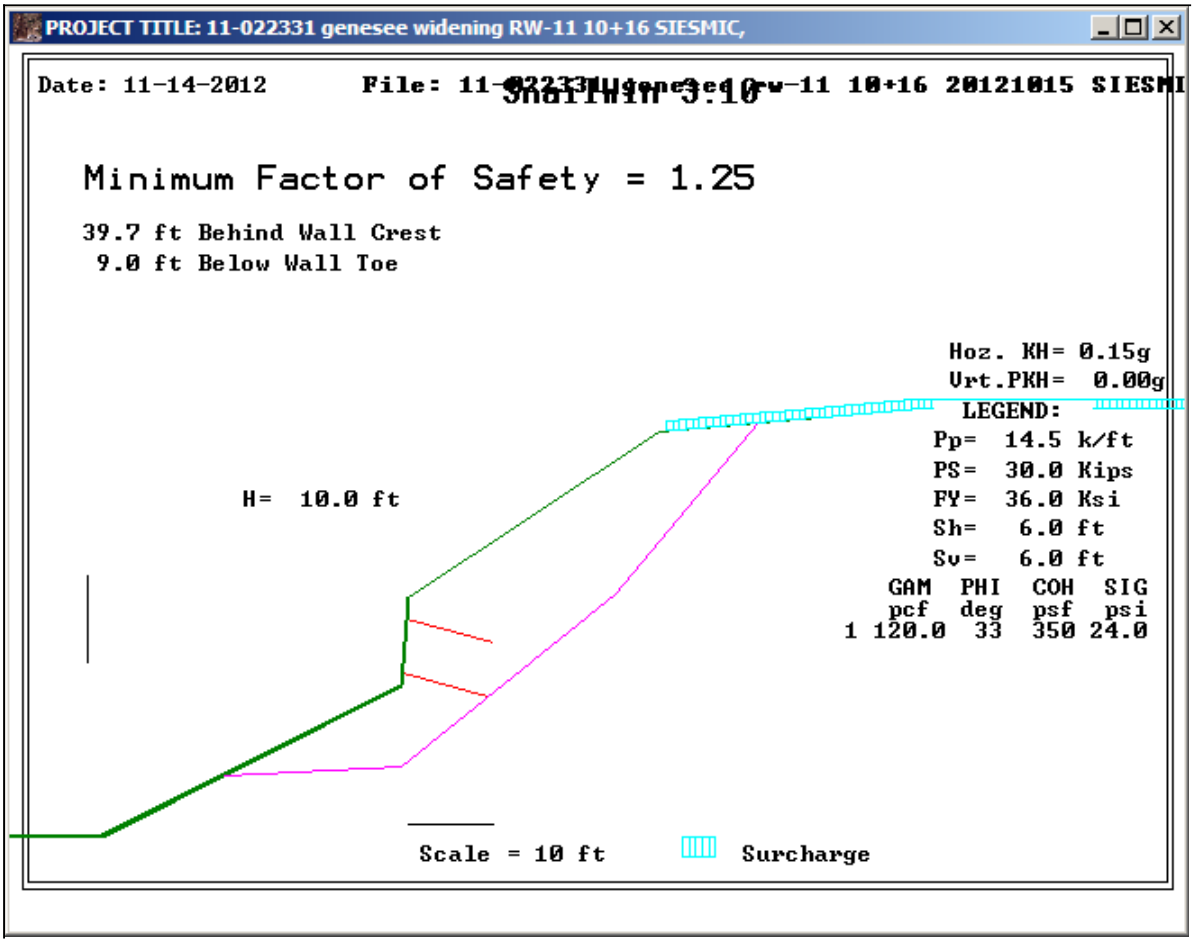

PROJECT TITLE: 11-022331 genesee widening RW-11 15+96
Date: 11-14-2012
SnailPlus 3.10
Minimum Factor of Safety = 1.70
49.1 ft Behind Wall Crest
At Wall Toe
H= 25.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

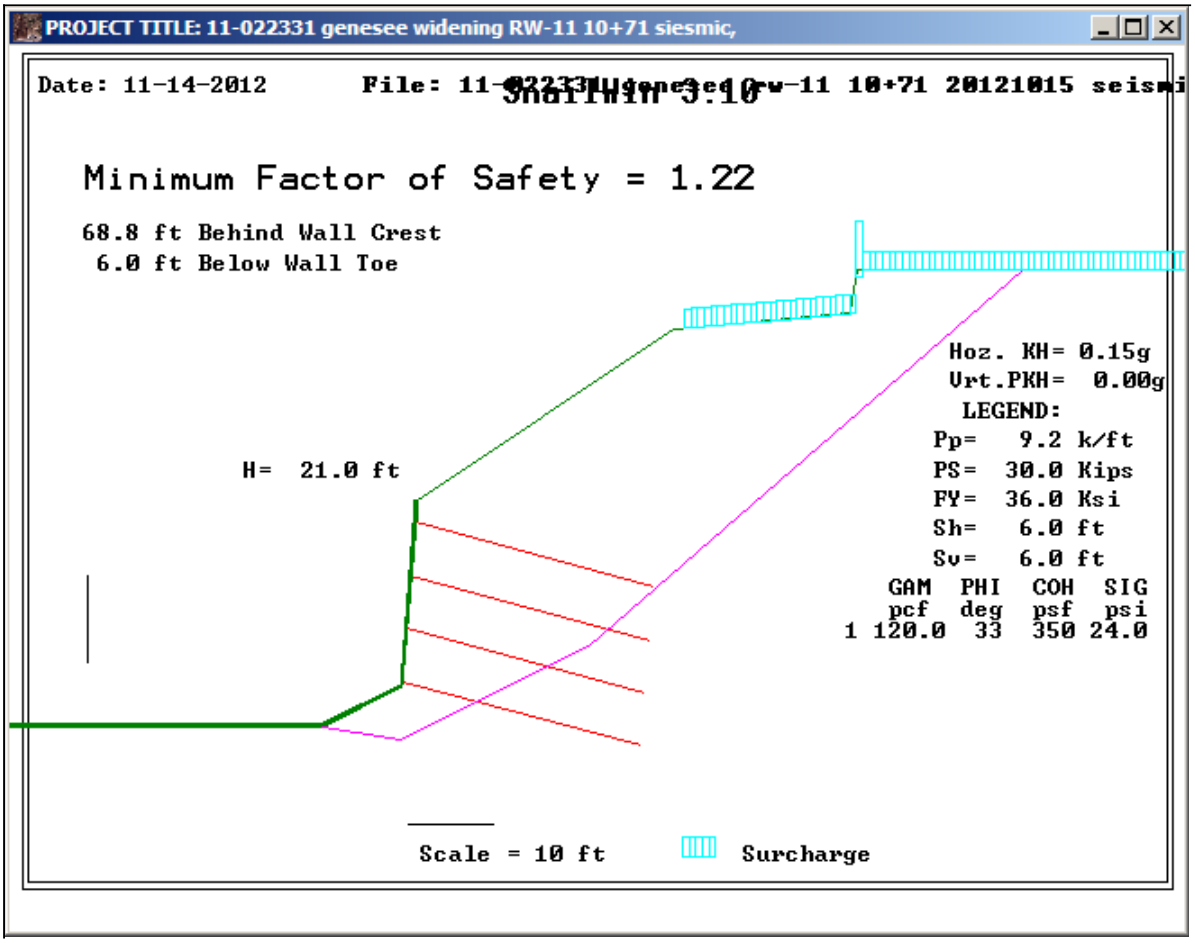

PROJECT TITLE: 11-022331 genesee widening RW-11 16+26
Date: 11-14-2012
SnailPlus 9.10
Minimum Factor of Safety = 1.64
39.8 ft Behind Wall Crest
At Wall Toe
H= 20.0 ft
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

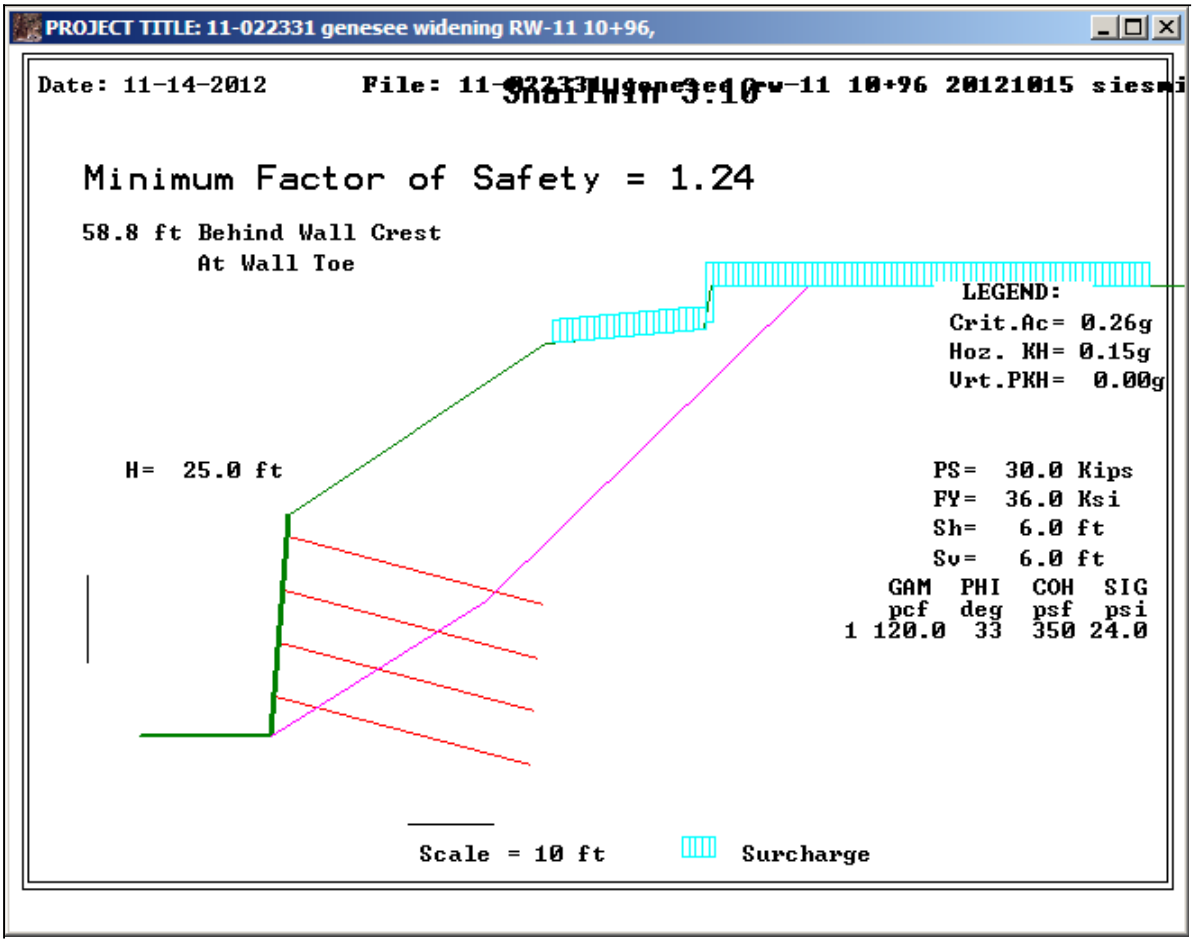

PROJECT TITLE: 11-022331 genesee widening RW-11 16+86
Date: 11-14-2012
SnailPlus 9.10
Minimum Factor of Safety = 1.75
30.4 ft Behind Wall Crest
At Wall Toe
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
H= 15.0 ft
Scale = 10 ft
Surcharge

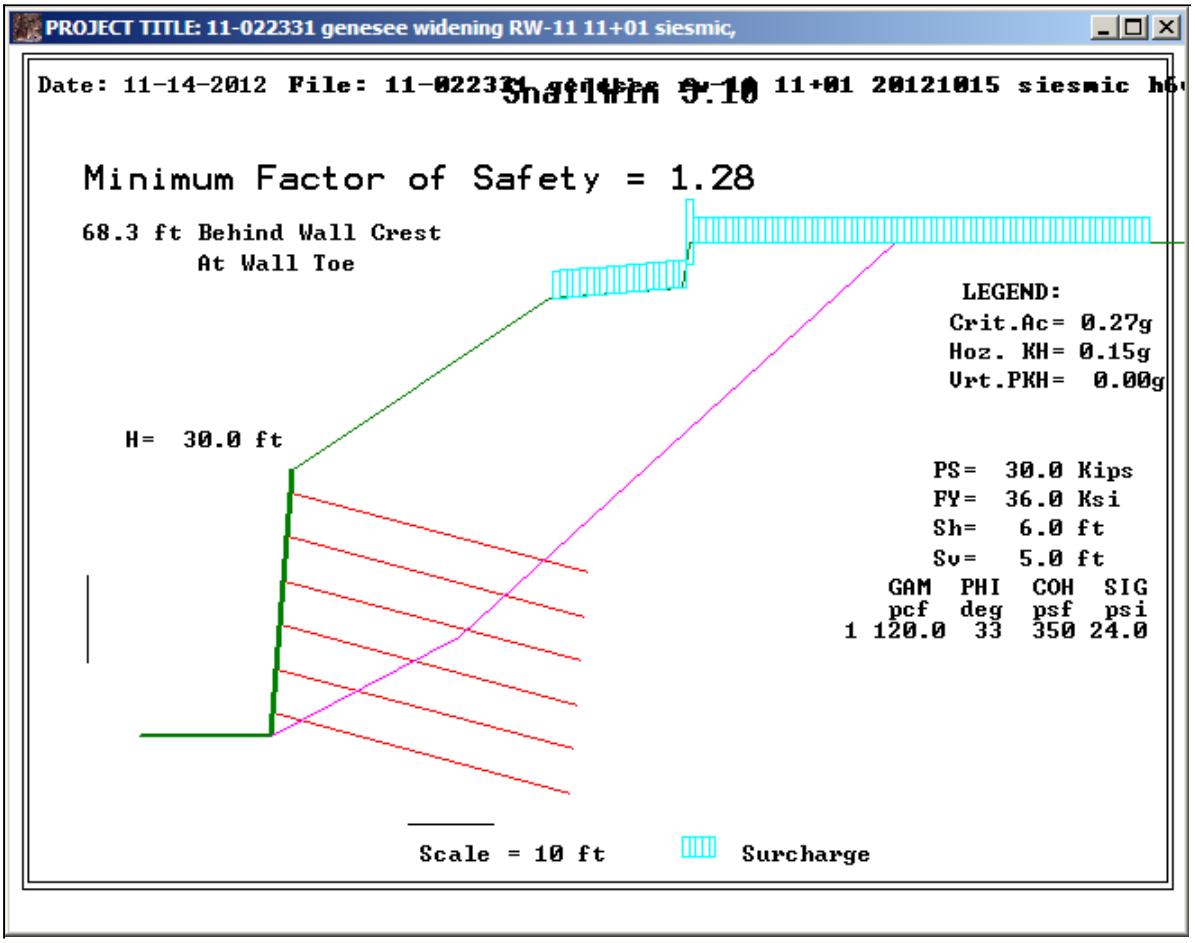

PROJECT TITLE: 11-022331 genesee widening RW-11 17+61
Date: 11-14-2012
SnailPlus 9.10
Minimum Factor of Safety = 1.75
30.4 ft Behind Wall Crest
At Wall Toe
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
H= 15.0 ft
Scale = 10 ft
Surcharge

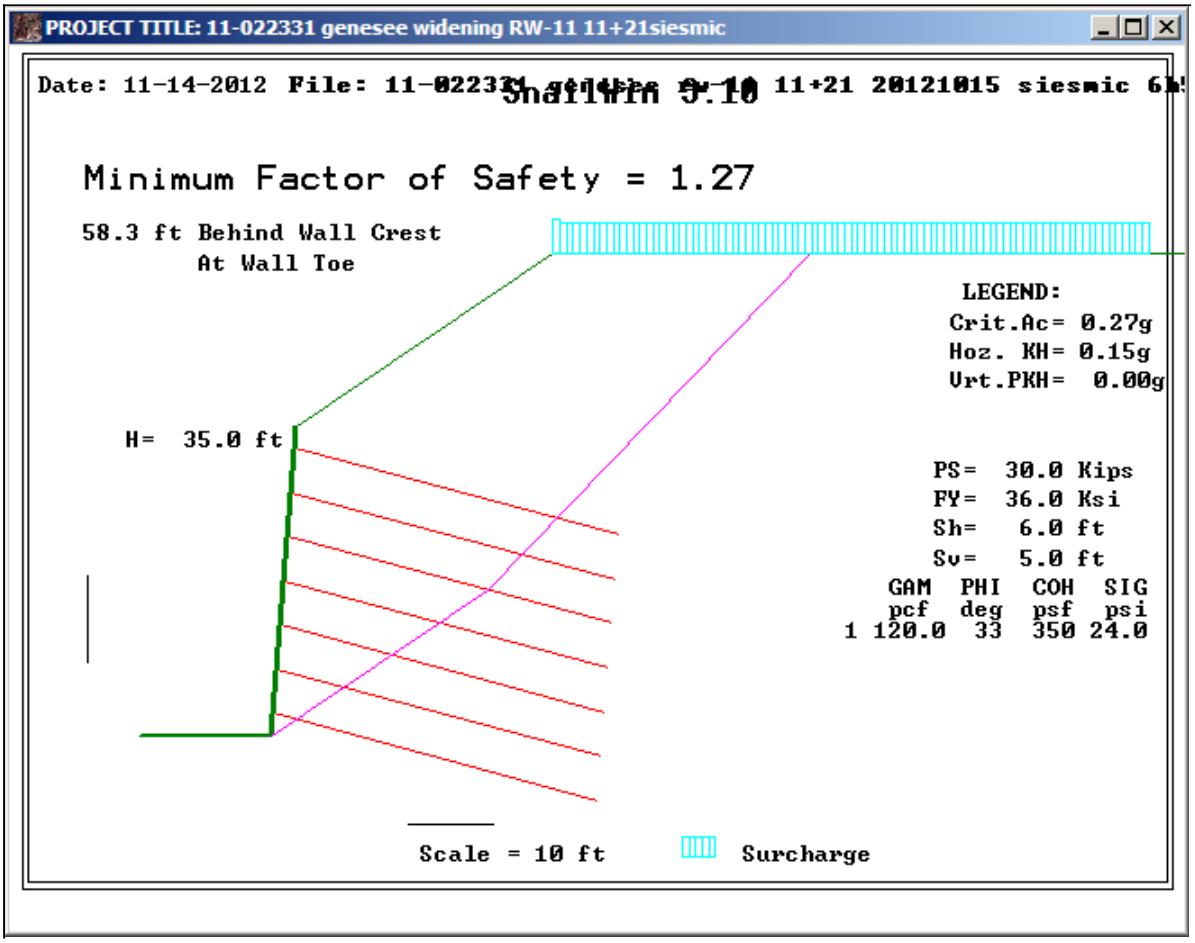

PROJECT TITLE: 11-022331 genesee widening RW-11 18+26
Date: 11-14-2012
SnailPlus 3.10
Minimum Factor of Safety = 2.06
30.9 ft Behind Wall Crest
At Wall Toe
LEGEND:
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
H= 10.0 ft
Scale = 10 ft
Surcharge

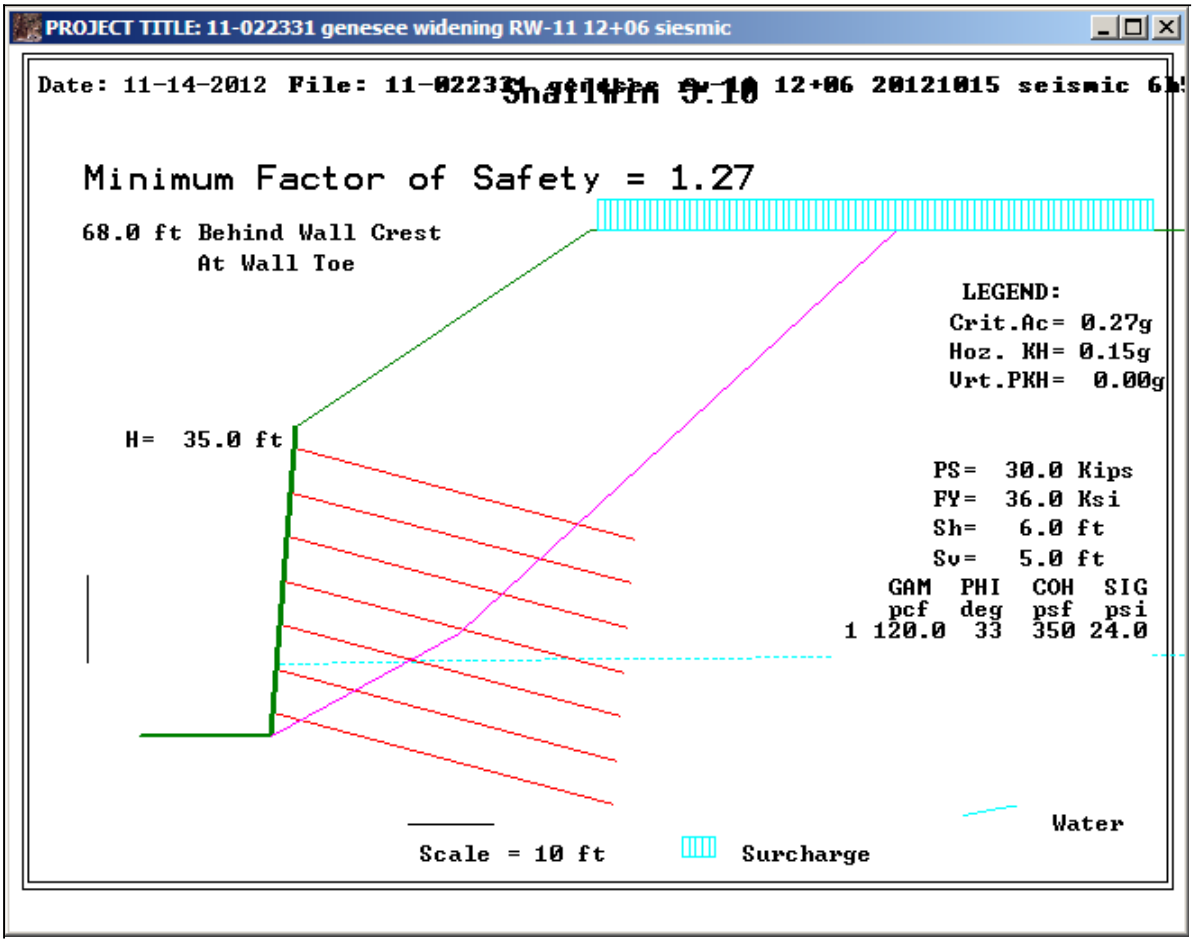

PROJECT TITLE: 11-022331 genesee widening RW-11 10+16 SIESMIC,
Date: 11-14-2012
File: 11-022331genesee rw-11 10+16 20121015 SIESMI
Minimum Factor of Safety = 1.25
39.7 ft Behind Wall Crest
9.0 ft Below Wall Toe
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
LEGEND:
Pp= 14.5 k/ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
H= 10.0 ft
Scale = 10 ft
Surcharge

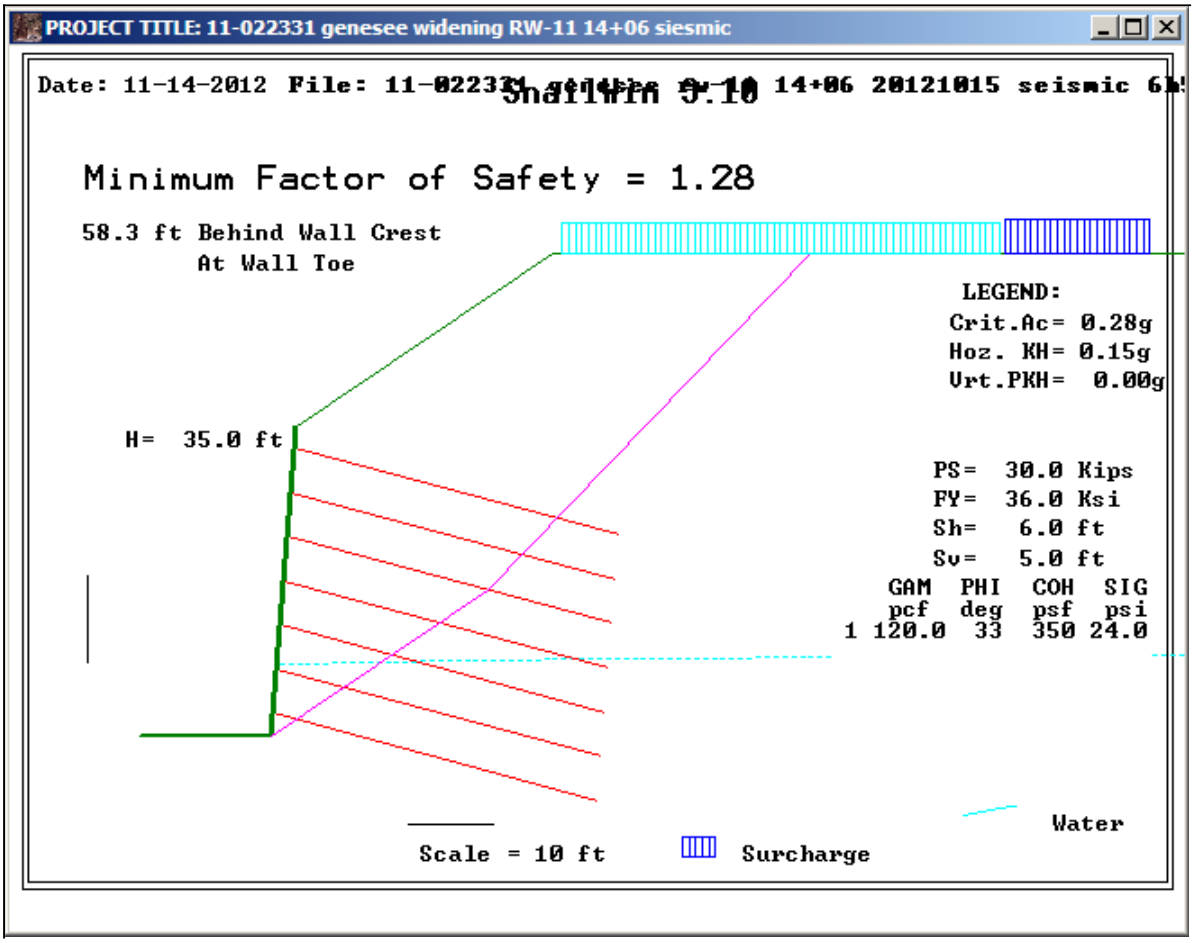

PROJECT TITLE: 11-022331 genesee widening RW-11 10+71 siesmic,
Date: 11-14-2012
Minimum Factor of Safety = 1.22
68.8 ft Behind Wall Crest
6.0 ft Below Wall Toe
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
LEGEND:
Pp= 9.2 k/ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
H= 21.0 ft
Scale = 10 ft
Surcharge

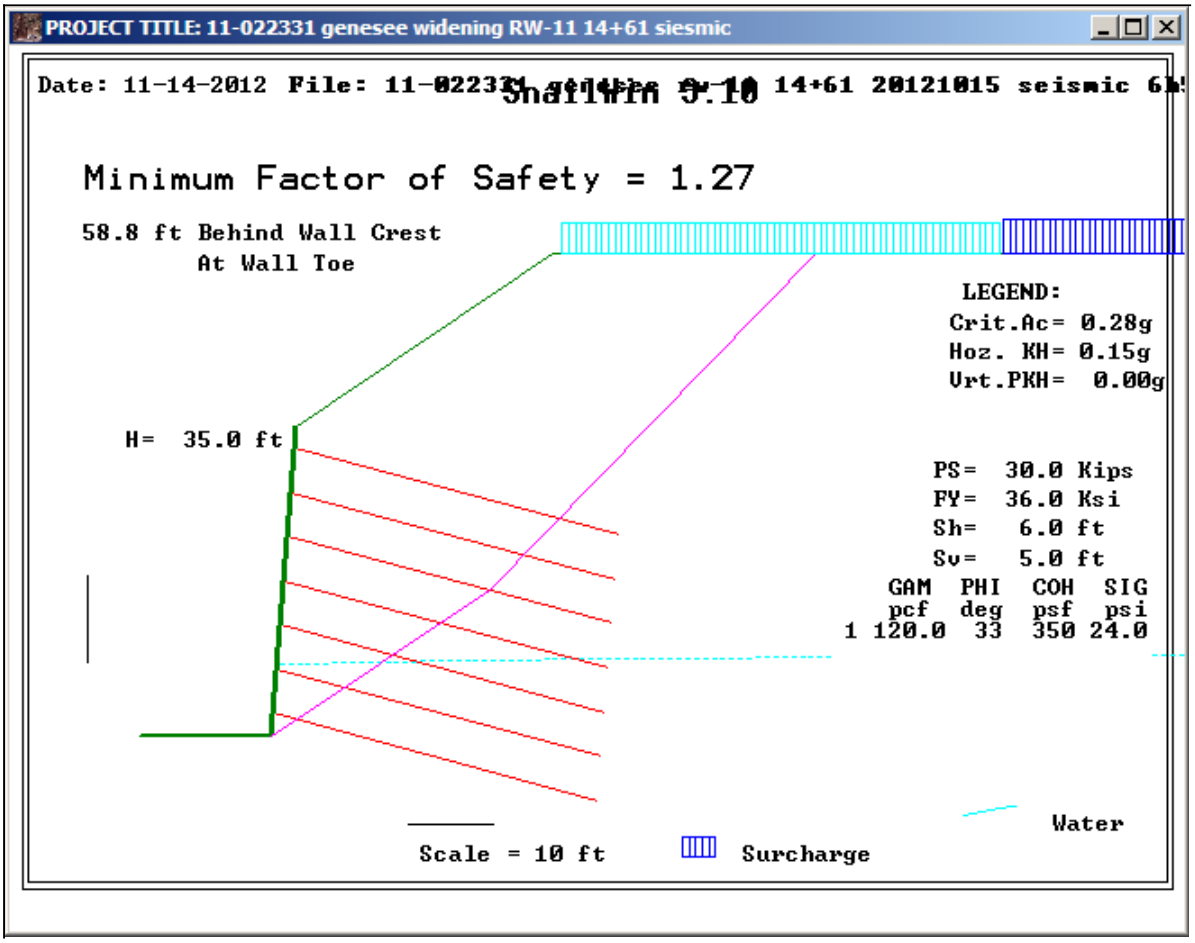

PROJECT TITLE: 11-022331 genesee widening RW-11 10+96,
Date: 11-14-2012
File: 11-022331genesee0rw-11 10+96 20121015 siesmi
Shallwin 3.10
Minimum Factor of Safety = 1.24
58.8 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.26g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 25.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

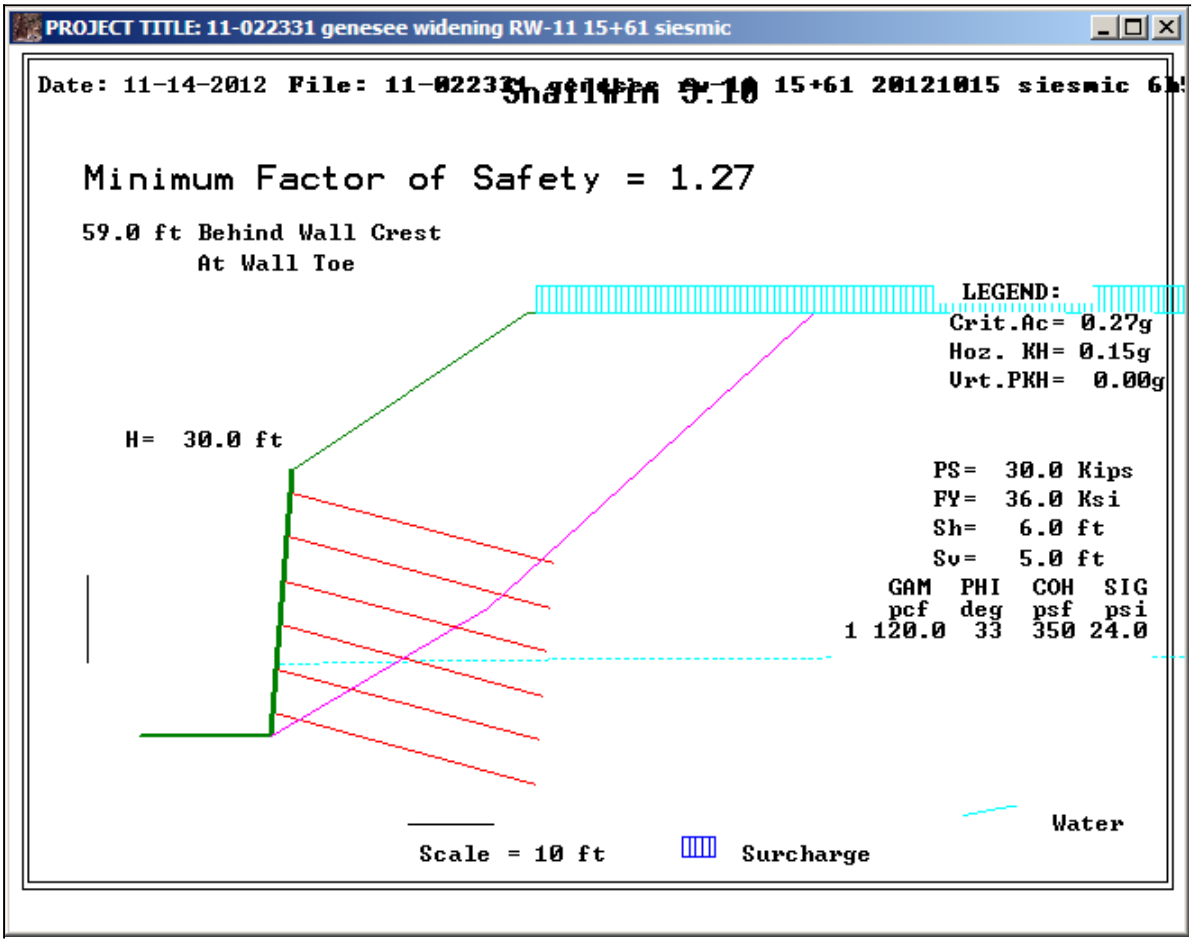

PROJECT TITLE: 11-022331 genesee widening RW-11 11+01 siesmic,
Date: 11-14-2012 File: 11-022331 genesee rw-10 11+01 20121015 siesmic h6
Shaflwin 5.10
Minimum Factor of Safety = 1.28
68.3 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.27g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 30.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

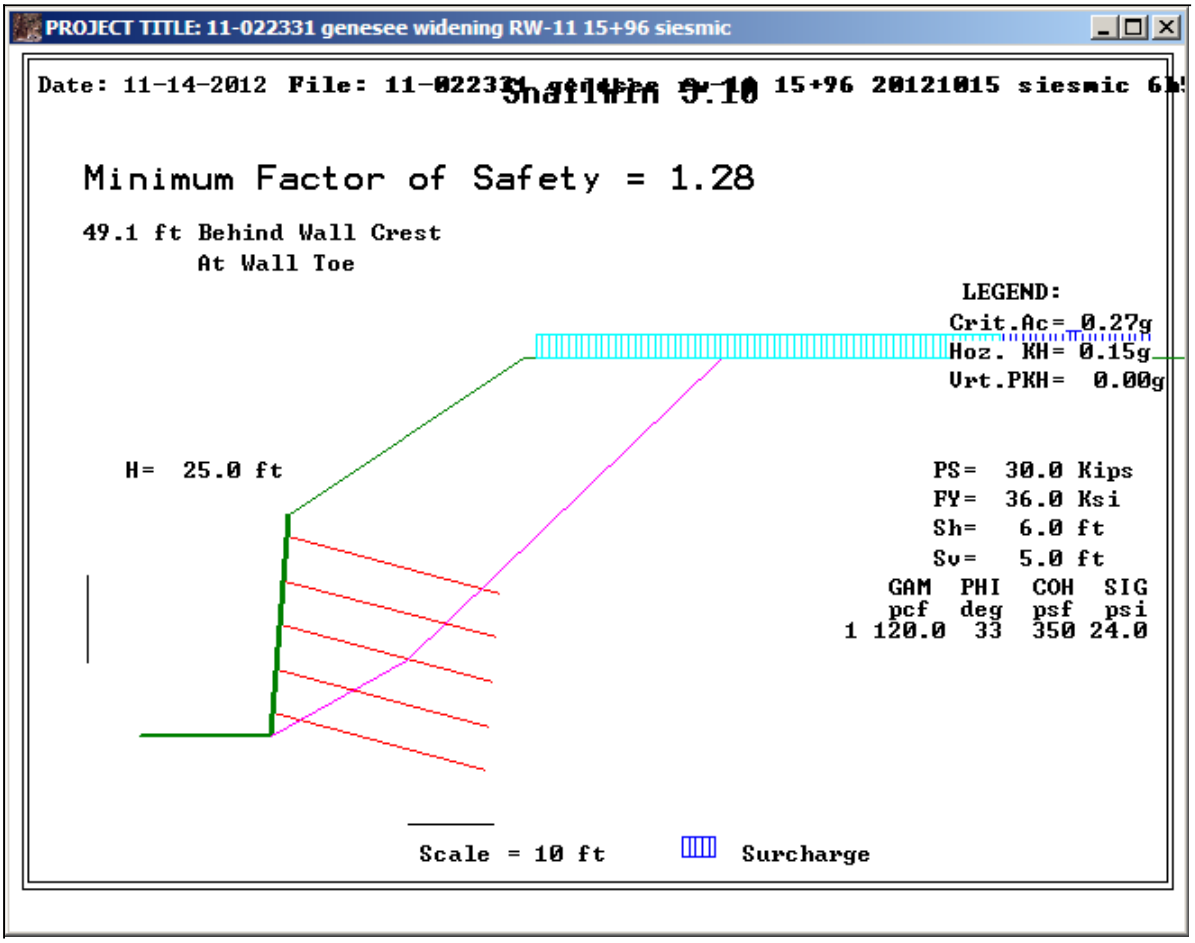

PROJECT TITLE: 11-022331 genesee widening RW-11 11+21siesmic
Date: 11-14-2012 File: 11-022331 genesee rw-10 11+21 20121015 siesmic 6h
Shaflwin 5.10
Minimum Factor of Safety = 1.27
58.3 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.27g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 35.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

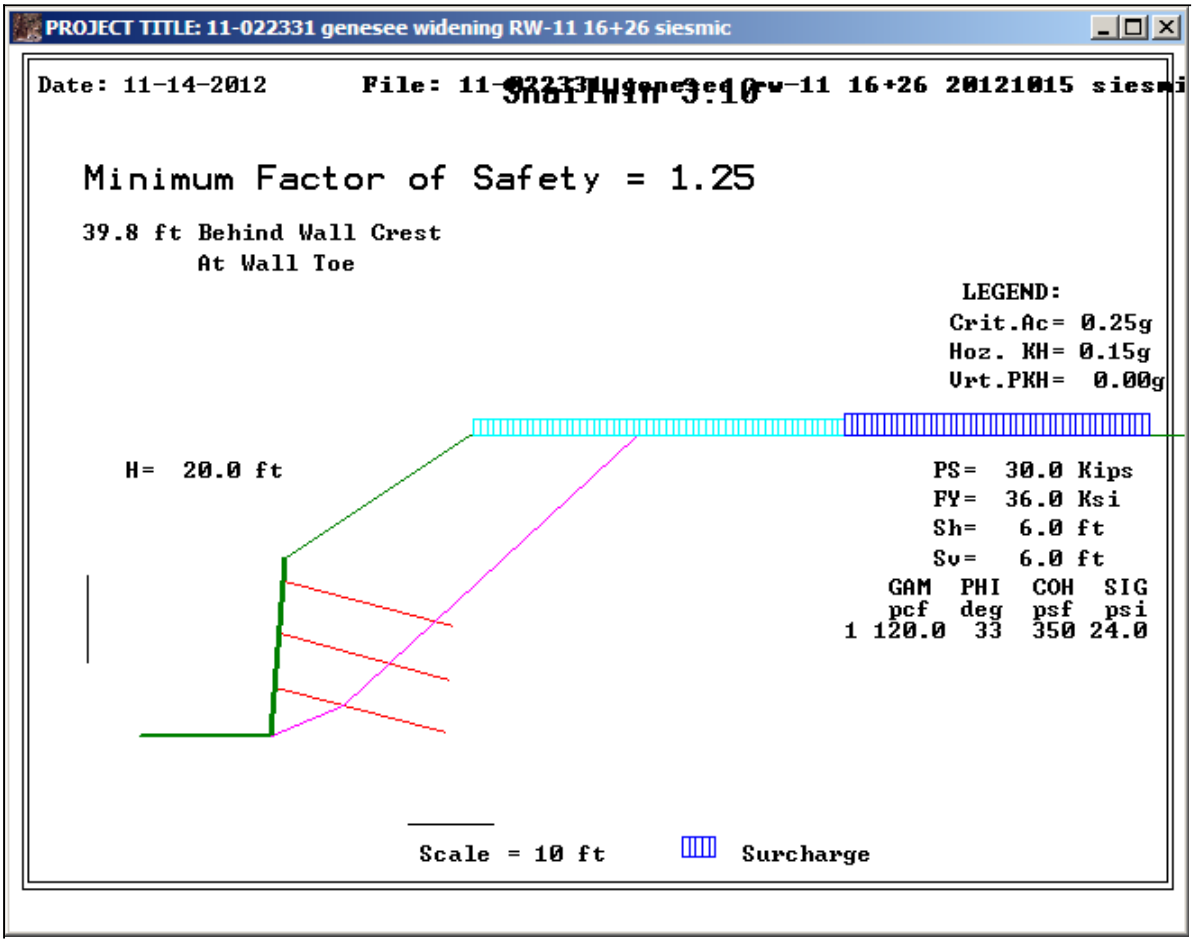

PROJECT TITLE: 11-022331 genesee widening RW-11 12+06 siesmic
Date: 11-14-2012 File: 11-022331 genesee rw-10 12+06 20121015 seismic 6h
Shallwin 5.10
Minimum Factor of Safety = 1.27
68.0 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.27g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 35.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

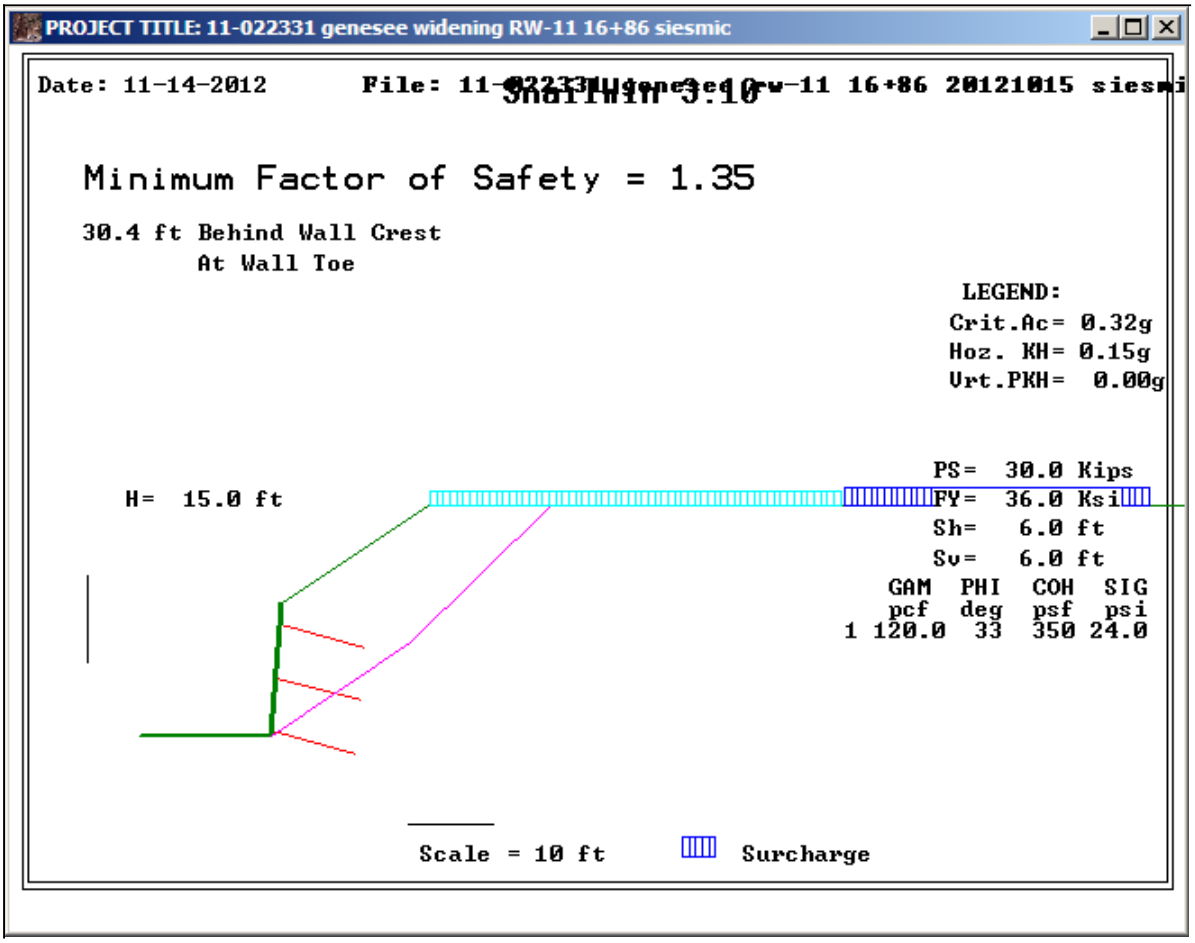

PROJECT TITLE: 11-022331 genesee widening RW-11 14+06 siesmic
Date: 11-14-2012 File: 11-022331 genesee rw-10 14+06 20121015 seismic 6h
Shaflwin 5.10
Minimum Factor of Safety = 1.28
58.3 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.28g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 35.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

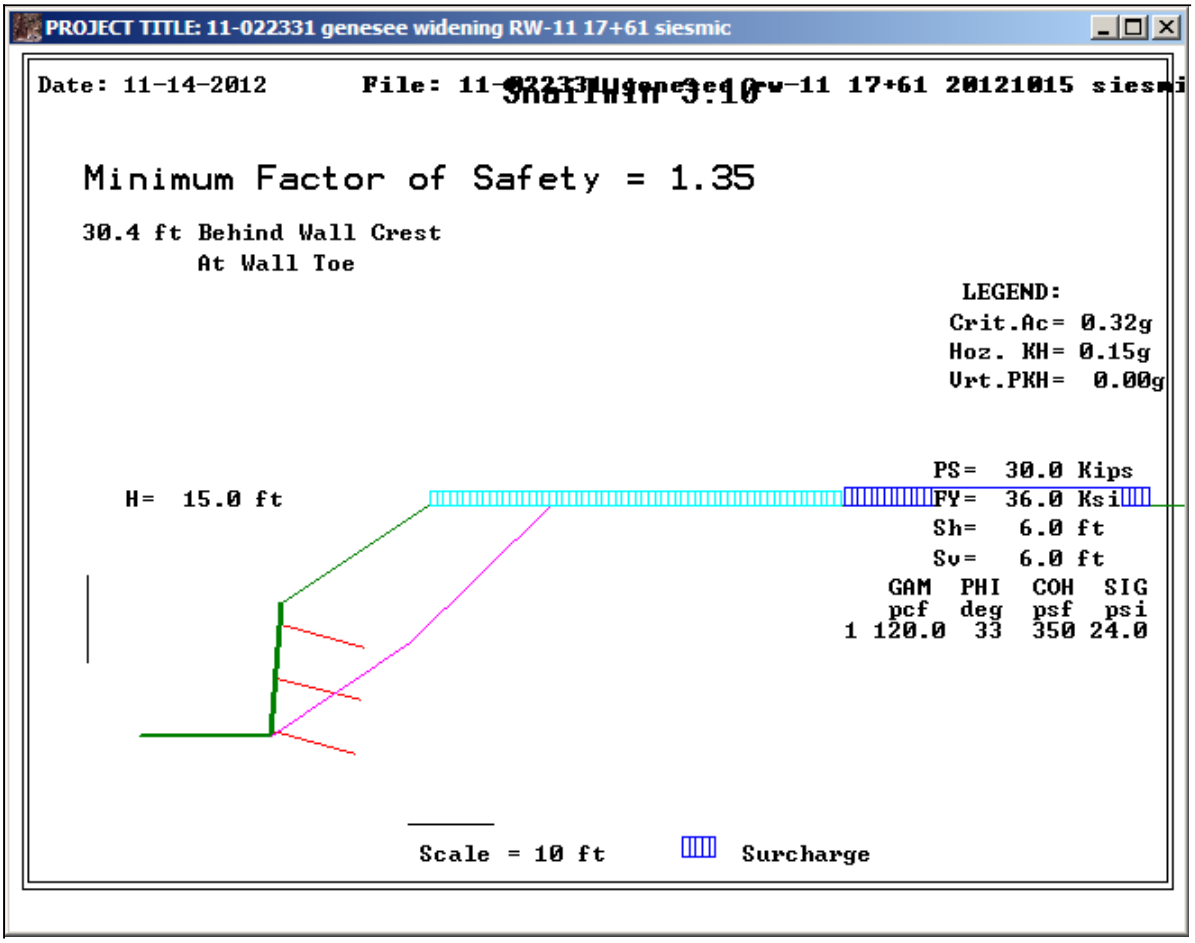

PROJECT TITLE: 11-022331 genesee widening RW-11 14+61 siesmic
Date: 11-14-2012 File: 11-022331 genesee rw-10 14+61 20121015 seismic 6k
Shallwin 5.10
Minimum Factor of Safety = 1.27
58.8 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.28g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 35.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge

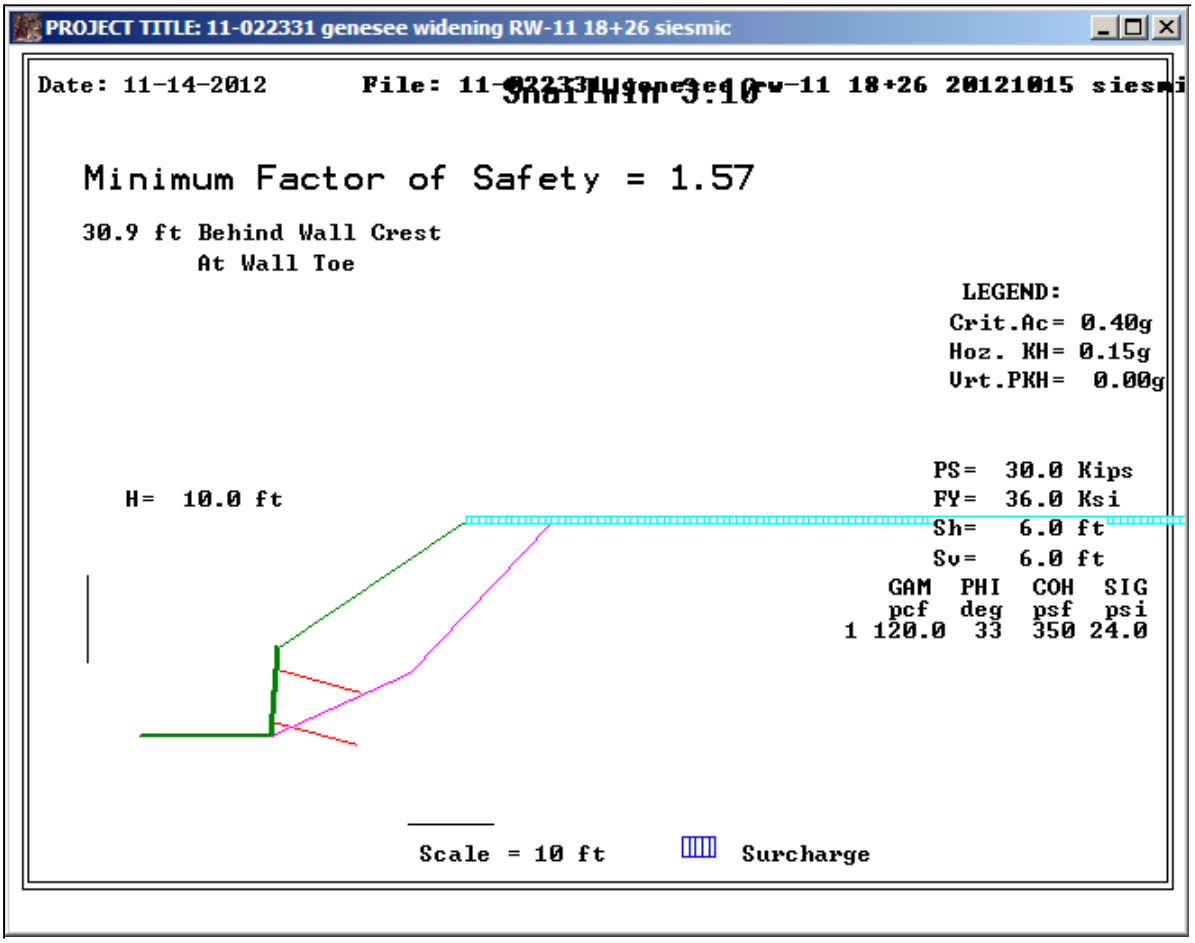

PROJECT TITLE: 11-022331 genesee widening RW-11 15+61 siesmic
Date: 11-14-2012 File: 11-022331 genesee rw-10 15+61 20121015 siesmic 6h
Shaflwin 5.10
Minimum Factor of Safety = 1.27
59.0 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.27g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 30.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Water
Scale = 10 ft
Surcharge


PROJECT TITLE: 11-022331 genesee widening RW-11 15+96 siesmic
Date: 11-14-2012 File: 11-022331 genesee widening RW-11 15+96 20121015 siesmic 6h
Shaflwin 5.10
Minimum Factor of Safety = 1.28
49.1 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.27g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 25.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 5.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge


PROJECT TITLE: 11-022331 genesee widening RW-11 16+26 siesmic
Date: 11-14-2012
Minimum Factor of Safety = 1.25
39.8 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.25g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
H= 20.0 ft
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

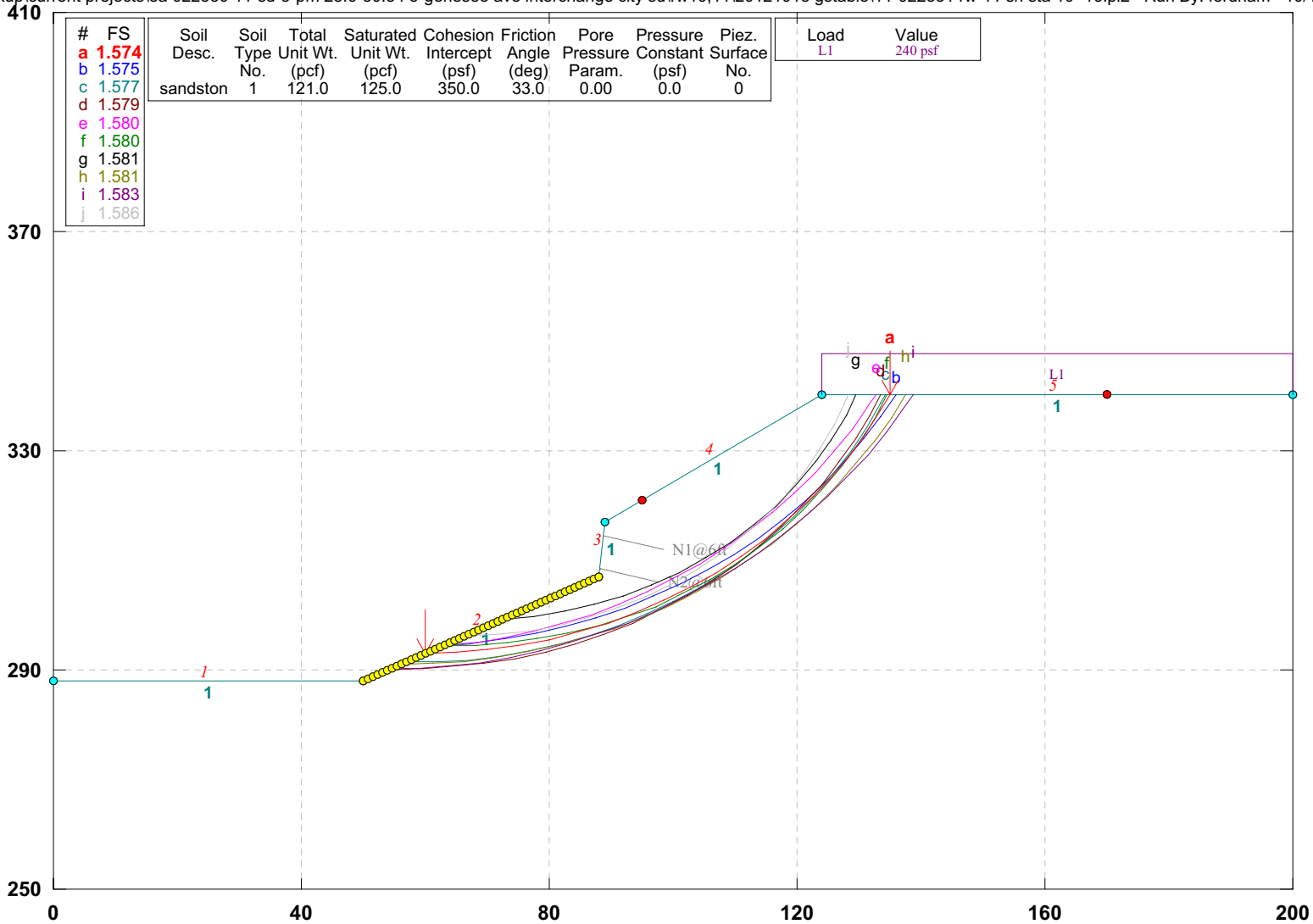

PROJECT TITLE: 11-022331 genesee widening RW-11 16+86 siesmic
Date: 11-14-2012
File: 11-022331genesee rw-11 16+86 20121015 siesmi
Shallwin 3.10
Minimum Factor of Safety = 1.35
30.4 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.32g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
H= 15.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge


PROJECT TITLE: 11-022331 genesee widening RW-11 17+61 siesmic
Date: 11-14-2012
File: 11-022331genesee rw-11 17+61 20121015 siesmi
Shallwin 3.10
Minimum Factor of Safety = 1.35
30.4 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.32g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
H= 15.0 ft
Scale = 10 ft
Surcharge


PROJECT TITLE: 11-022331 genesee widening RW-11 18+26 siesmic
Date: 11-14-2012
File: 11-022331genesee rw-11 18+26 20121015 siesmi
Shallwin 3.10
Minimum Factor of Safety = 1.57
30.9 ft Behind Wall Crest
At Wall Toe
LEGEND:
Crit.Ac= 0.40g
Hoz. KH= 0.15g
Vrt.PKH= 0.00g
PS= 30.0 Kips
FY= 36.0 Ksi
Sh= 6.0 ft
Sv= 6.0 ft
H= 10.0 ft
GAM PHI COH SIG
pcf deg psf psi
1 120.0 33 350 24.0
Scale = 10 ft
Surcharge

Bishop Modified sta 10+16 RW-11 SN global

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 10+16.pl2 Run By: fordham 10/16/2012 08:5



GSTABL7 v.2 FSmin=1.574

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 10+71 RW-11 SN global

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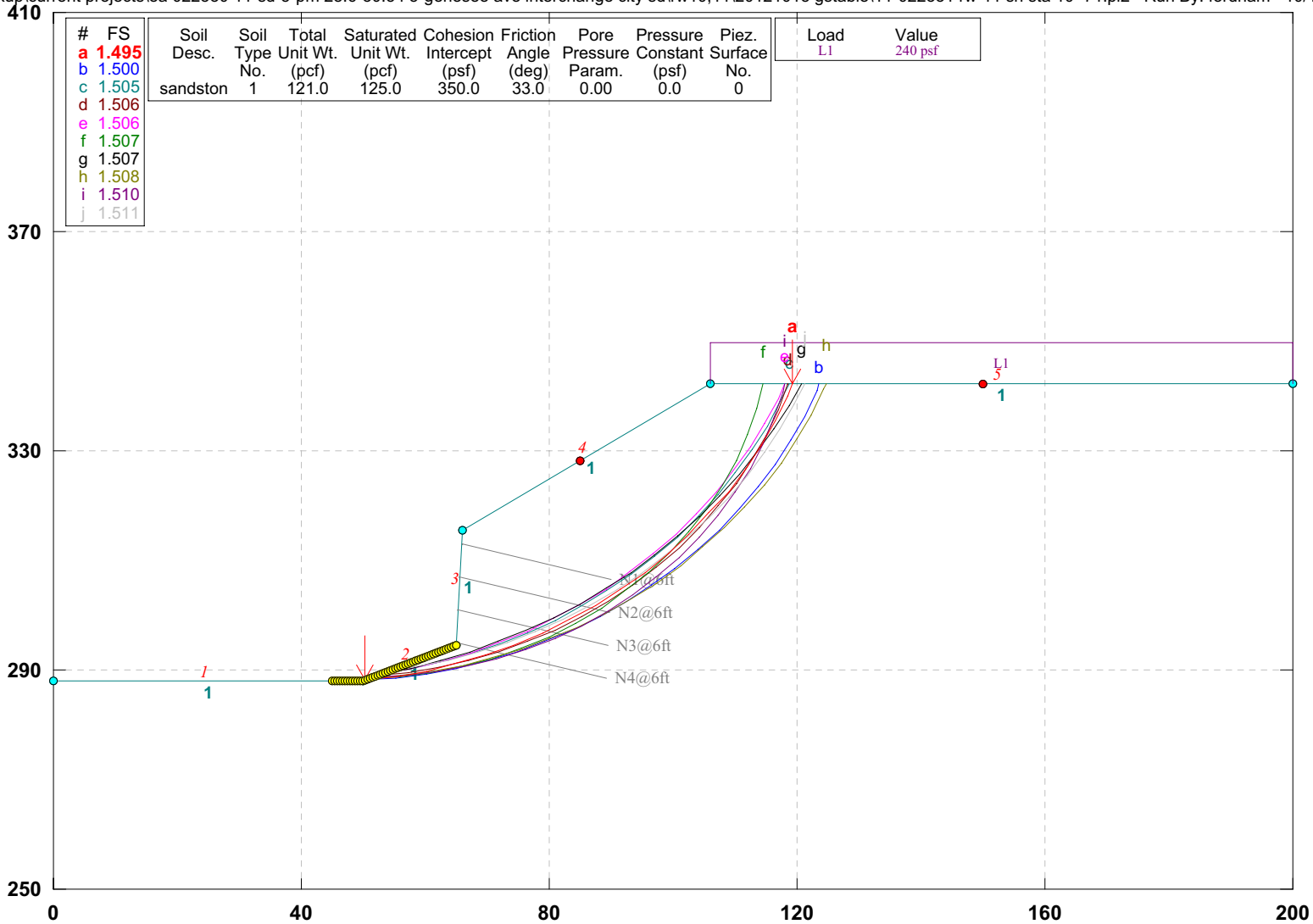

GSTABL7 v.2 FSmin=1.495

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 10+96 RW-11 SN global

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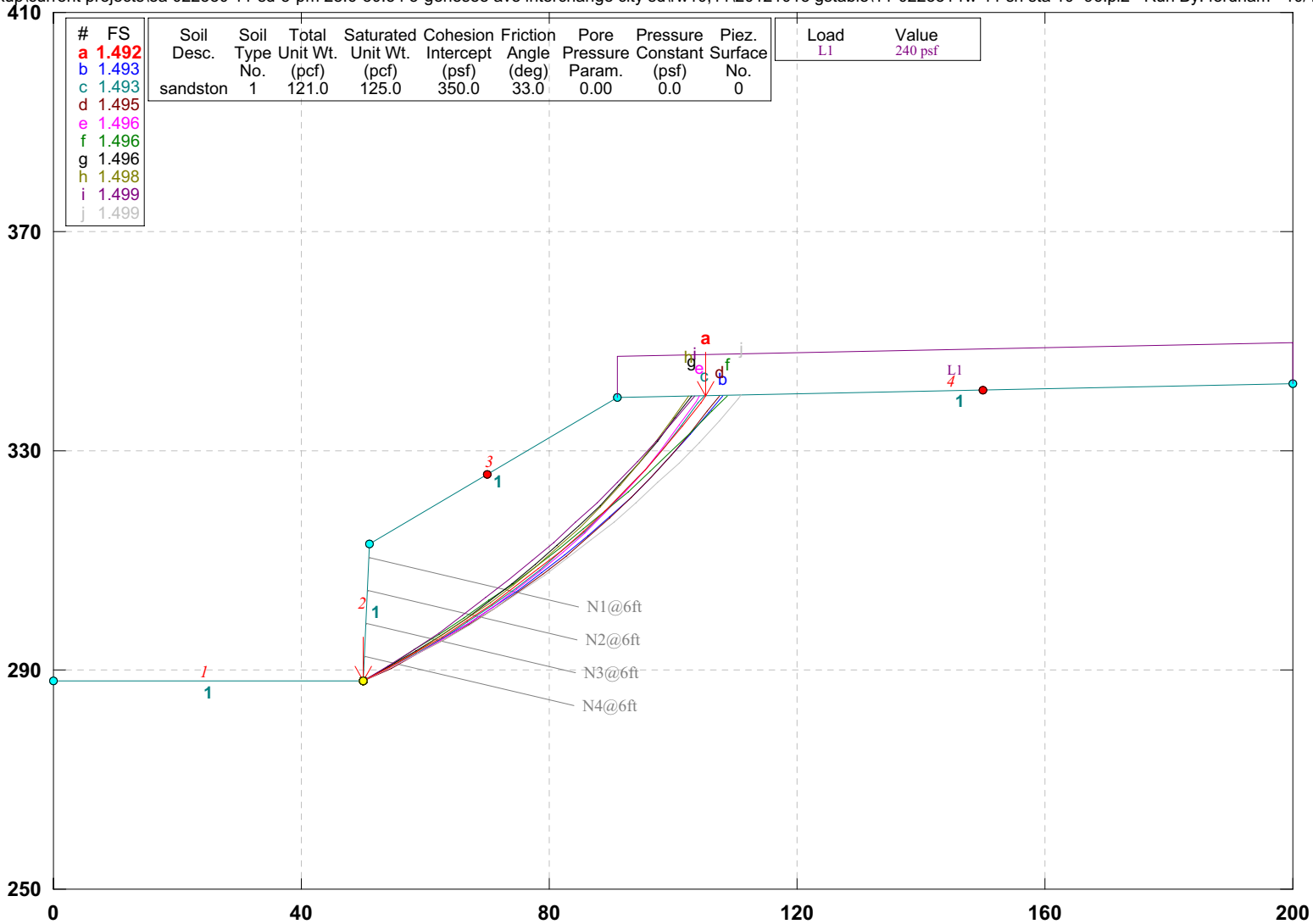

GSTABL7 v.2 FSmin=1.492

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 11+01 RW-11 SN global

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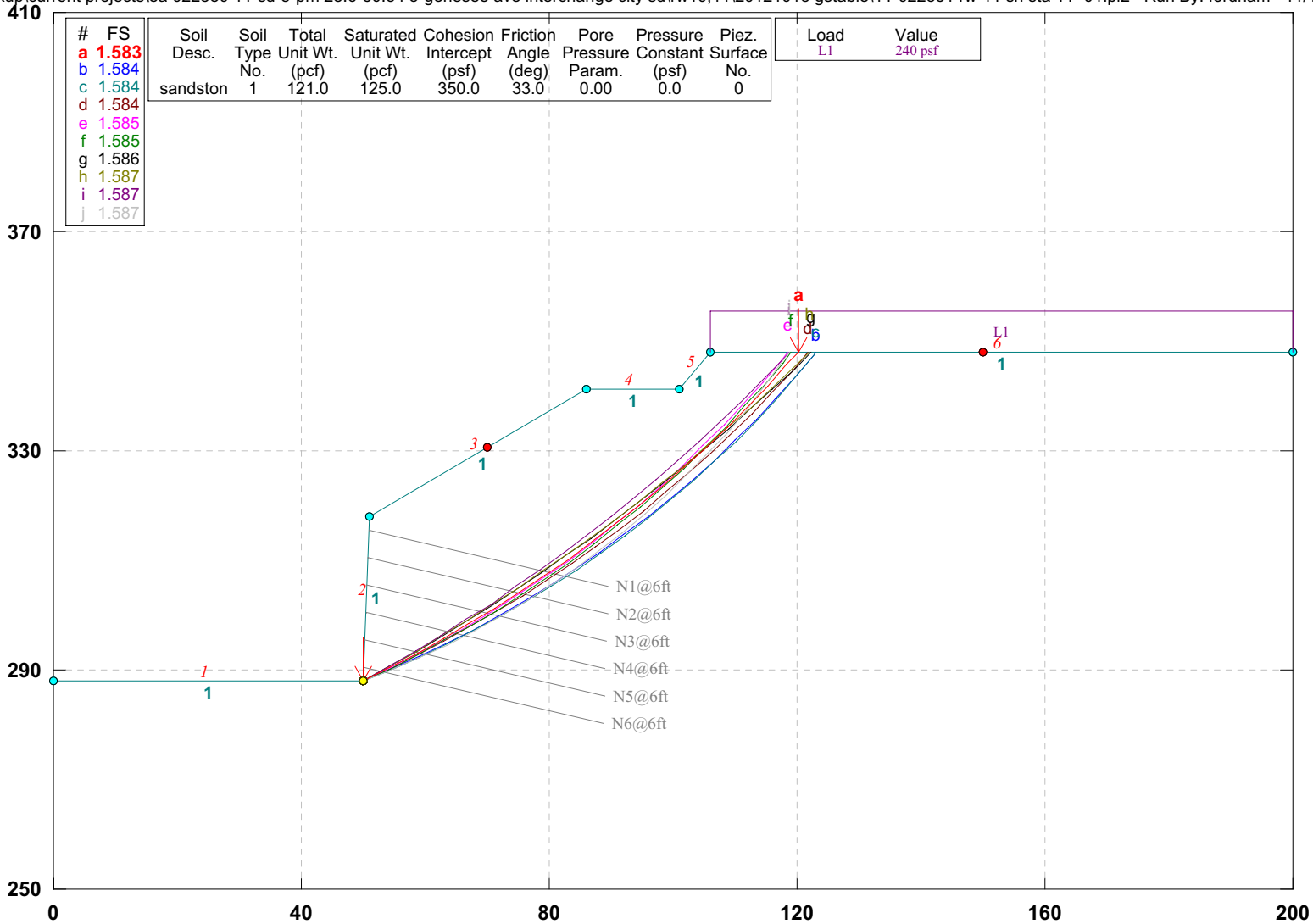

GSTABL7 v.2 FSmin=1.583

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 11+21 RW-11 SN global

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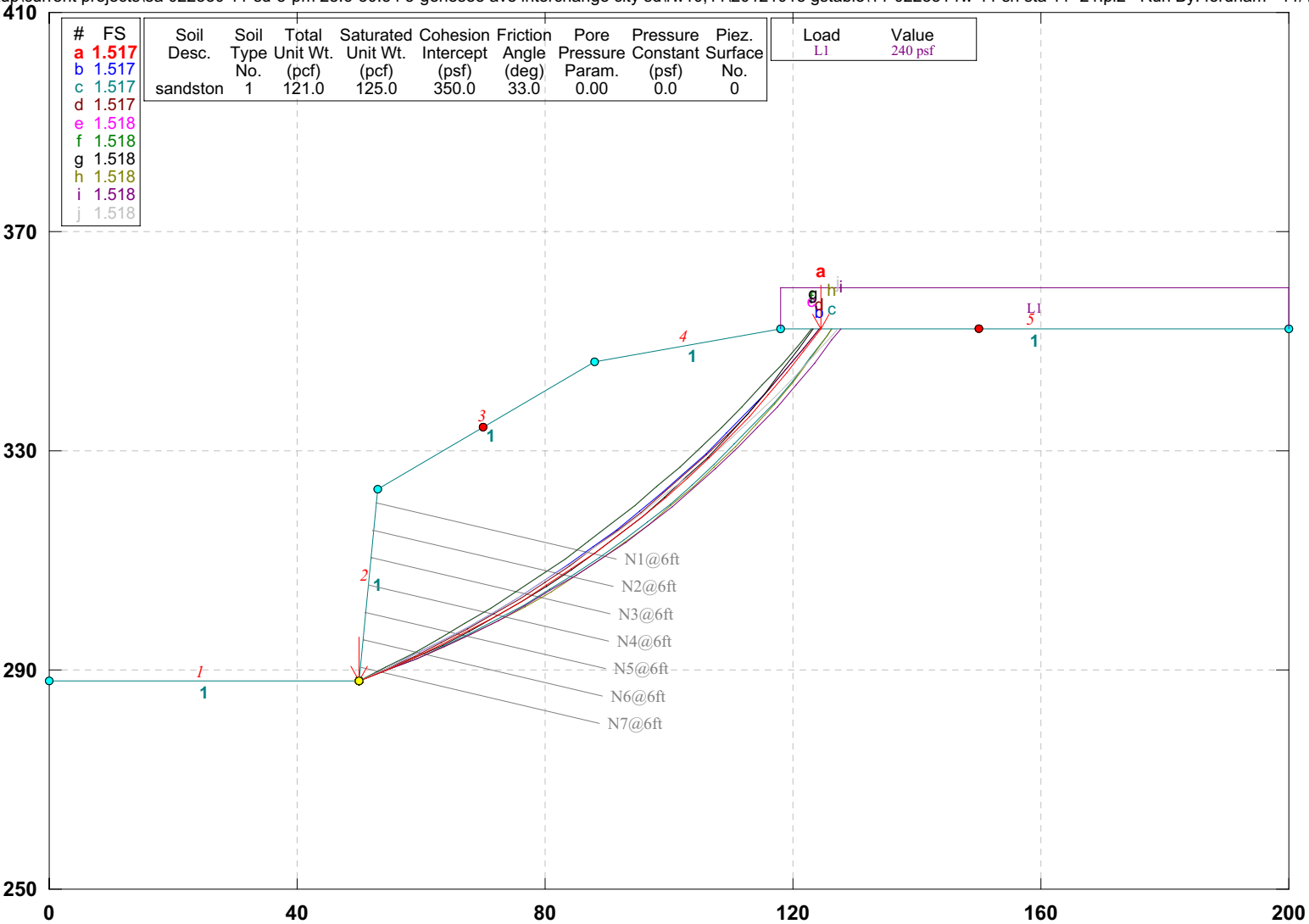

GSTABL7 v.2 FSmin=1.517

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 12+06 RW-11 SN global

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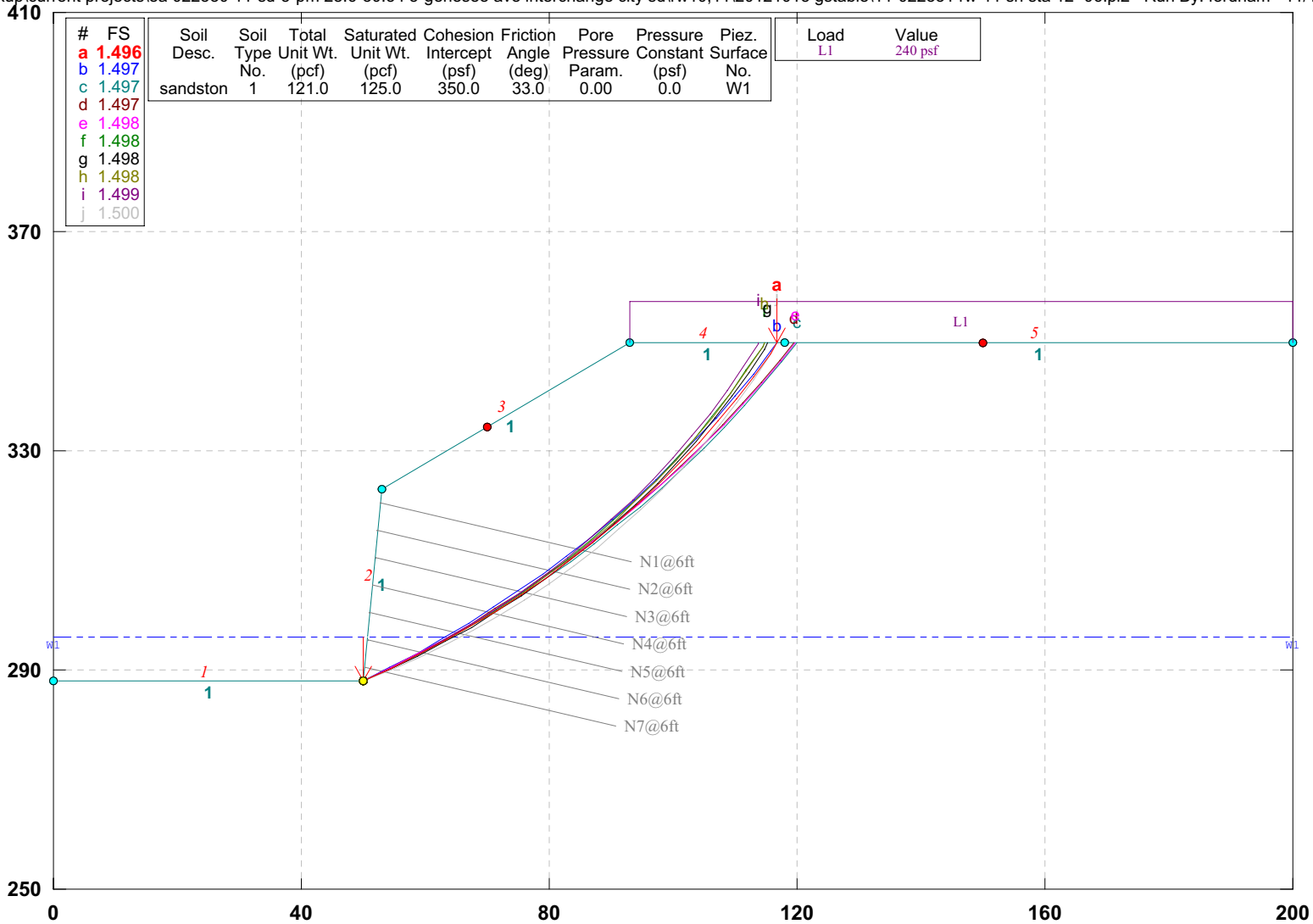

GSTABL7 v.2 FSmin=1.496

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 14+06 RW-11 SN global

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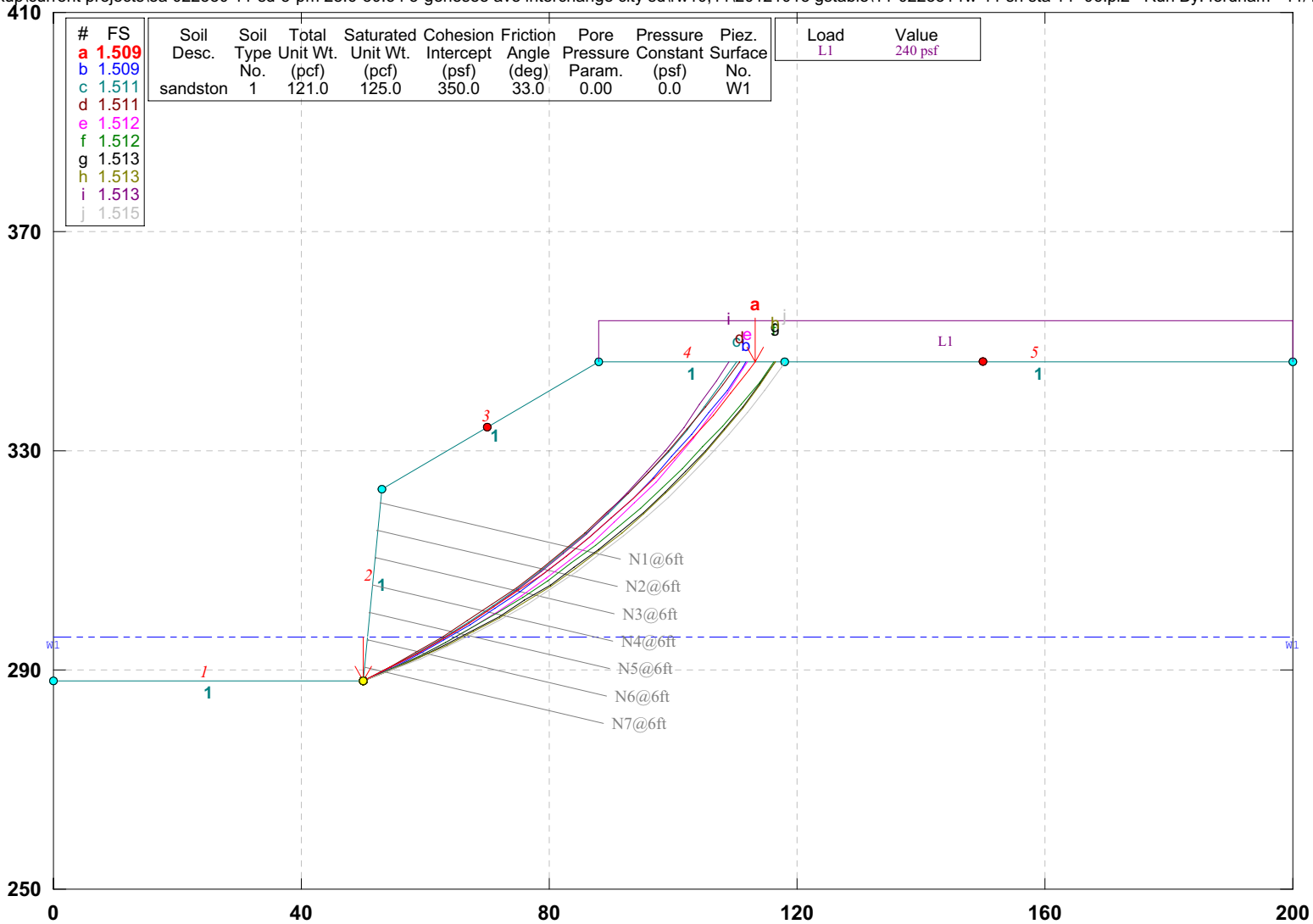

GSTABL7 v.2 FSmin=1.509

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 14+61 RW-11 SN global

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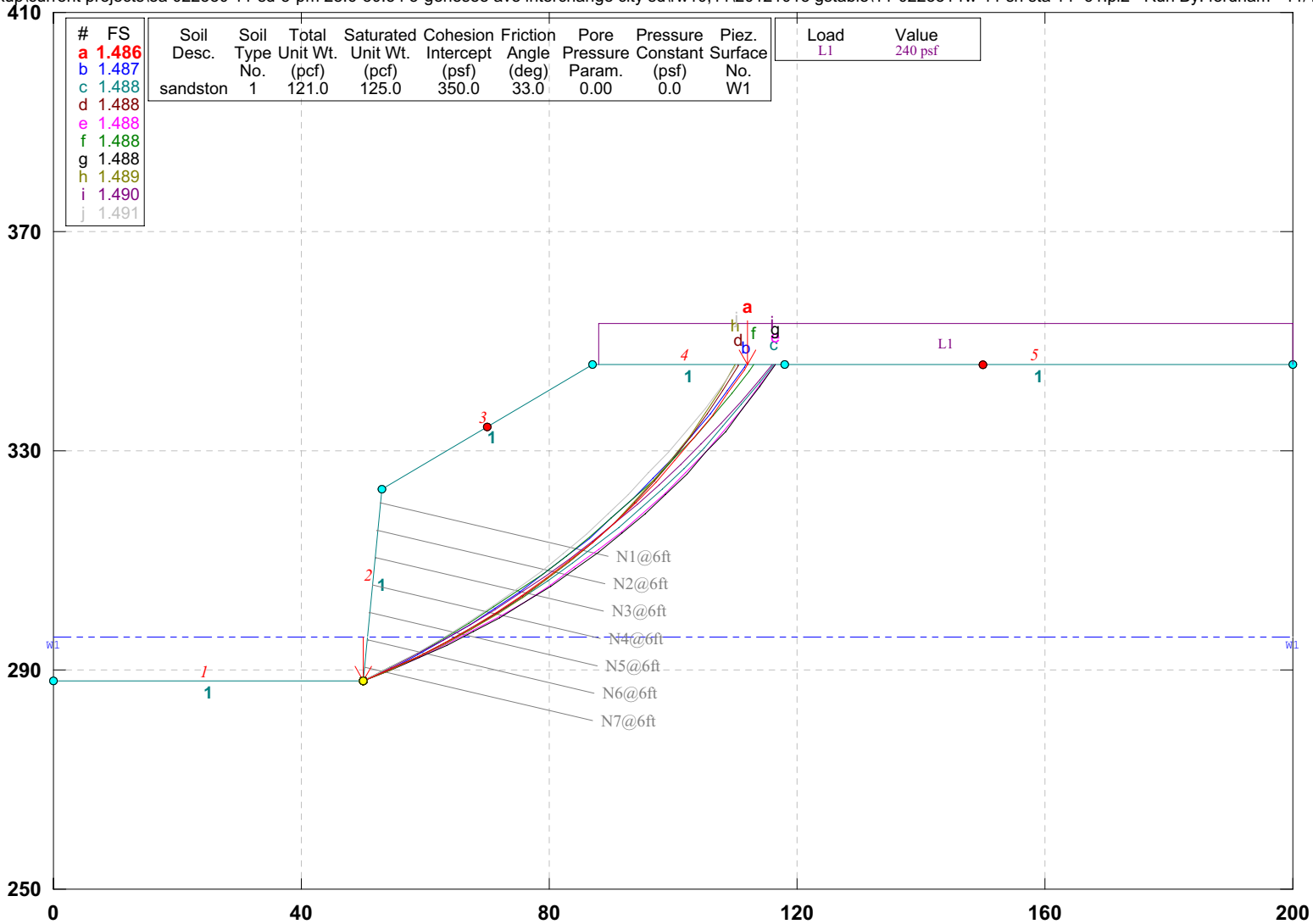
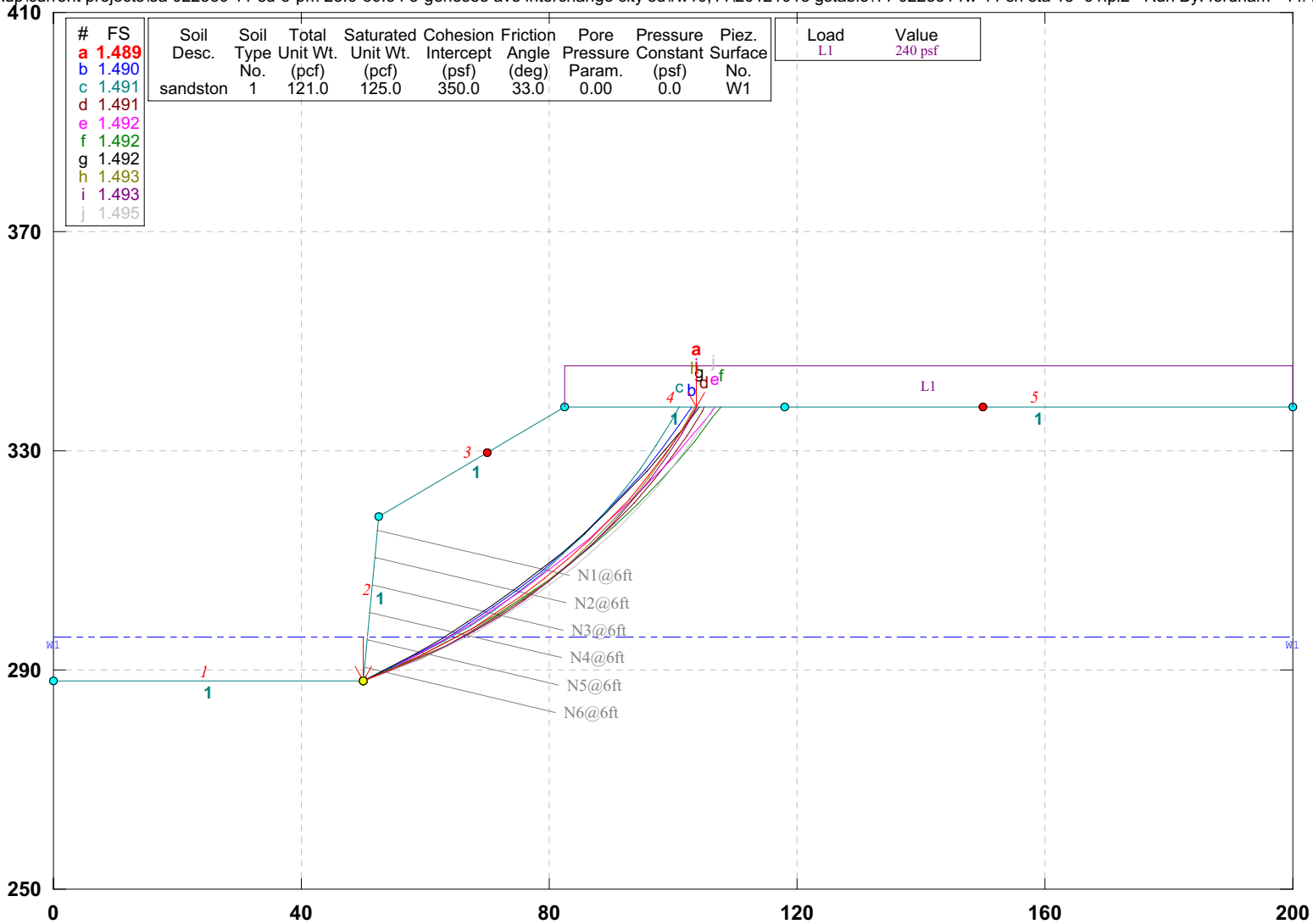


GSTABL7 v.2 FSmin=1.486

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 15+61 RW-11 SN global

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 15+61.pl2 Run By: fordham 11/14/2012 12:4



GSTABL7 v.2 FSmin=1.489

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 15+96 RW-11 SN global

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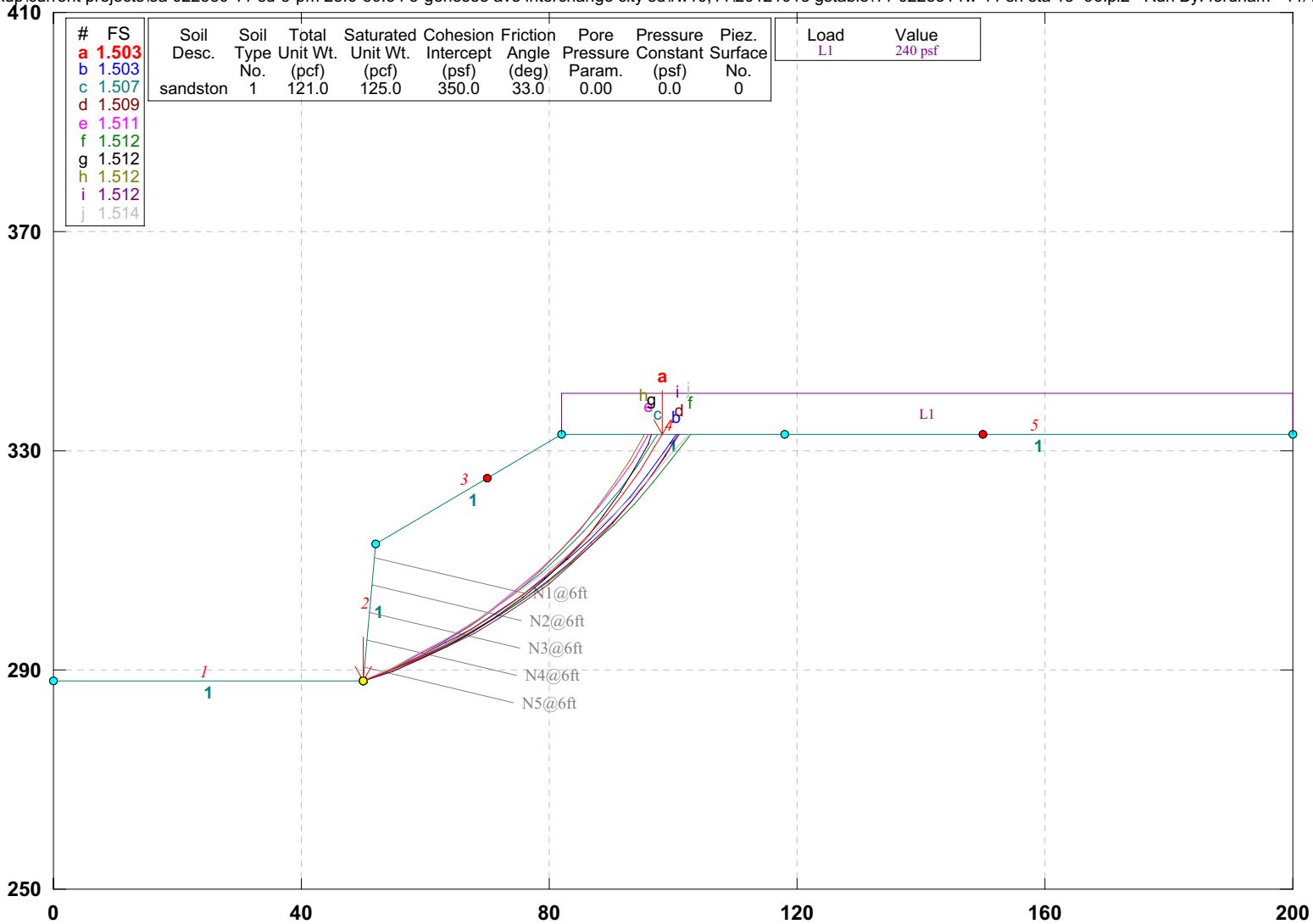

GSTABL7 v.2 FSmin=1.503

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 16+26 RW-11 SN global

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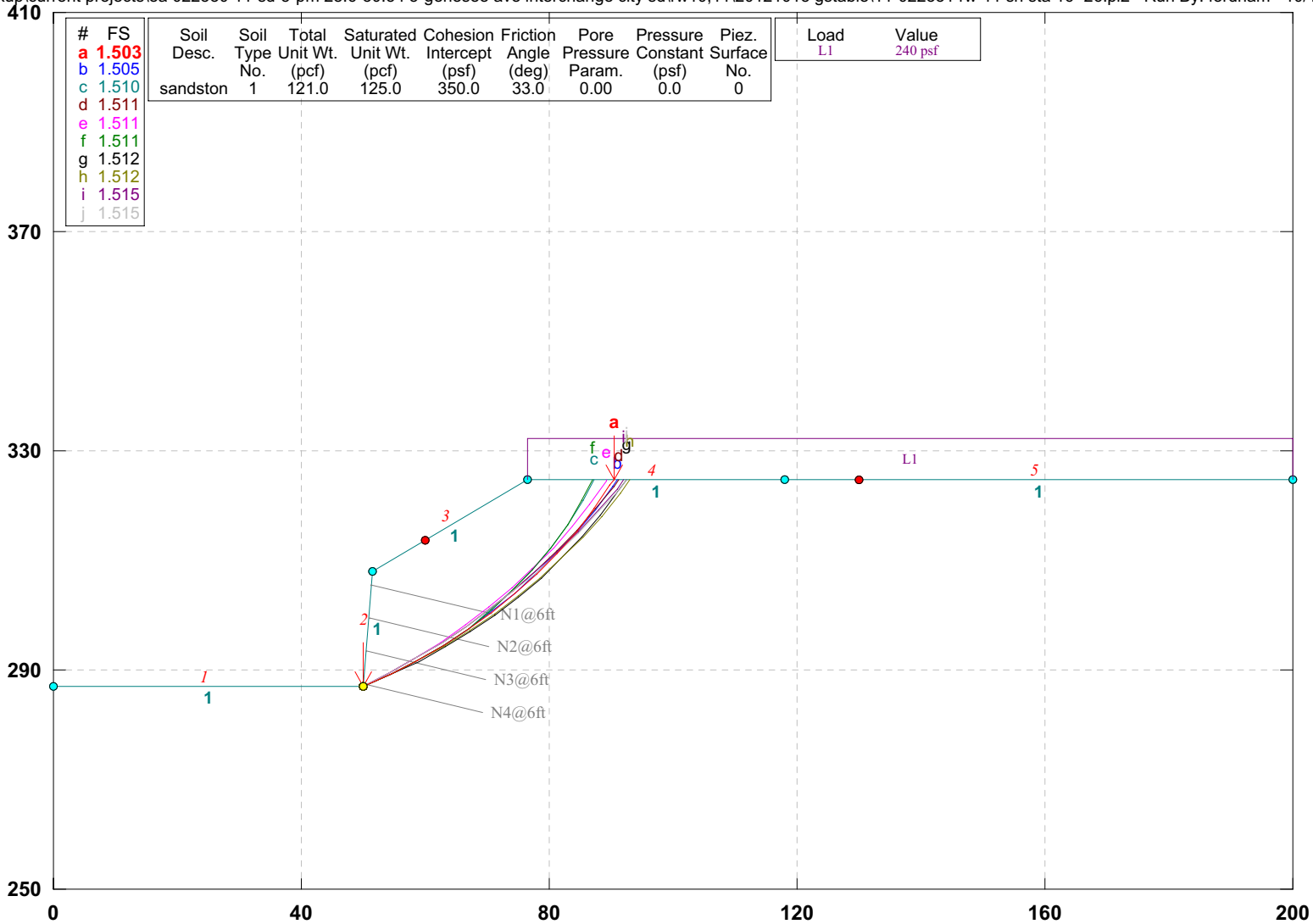

GSTABL7 v.2 FSmin=1.503

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 16+86 RW-11 SN global

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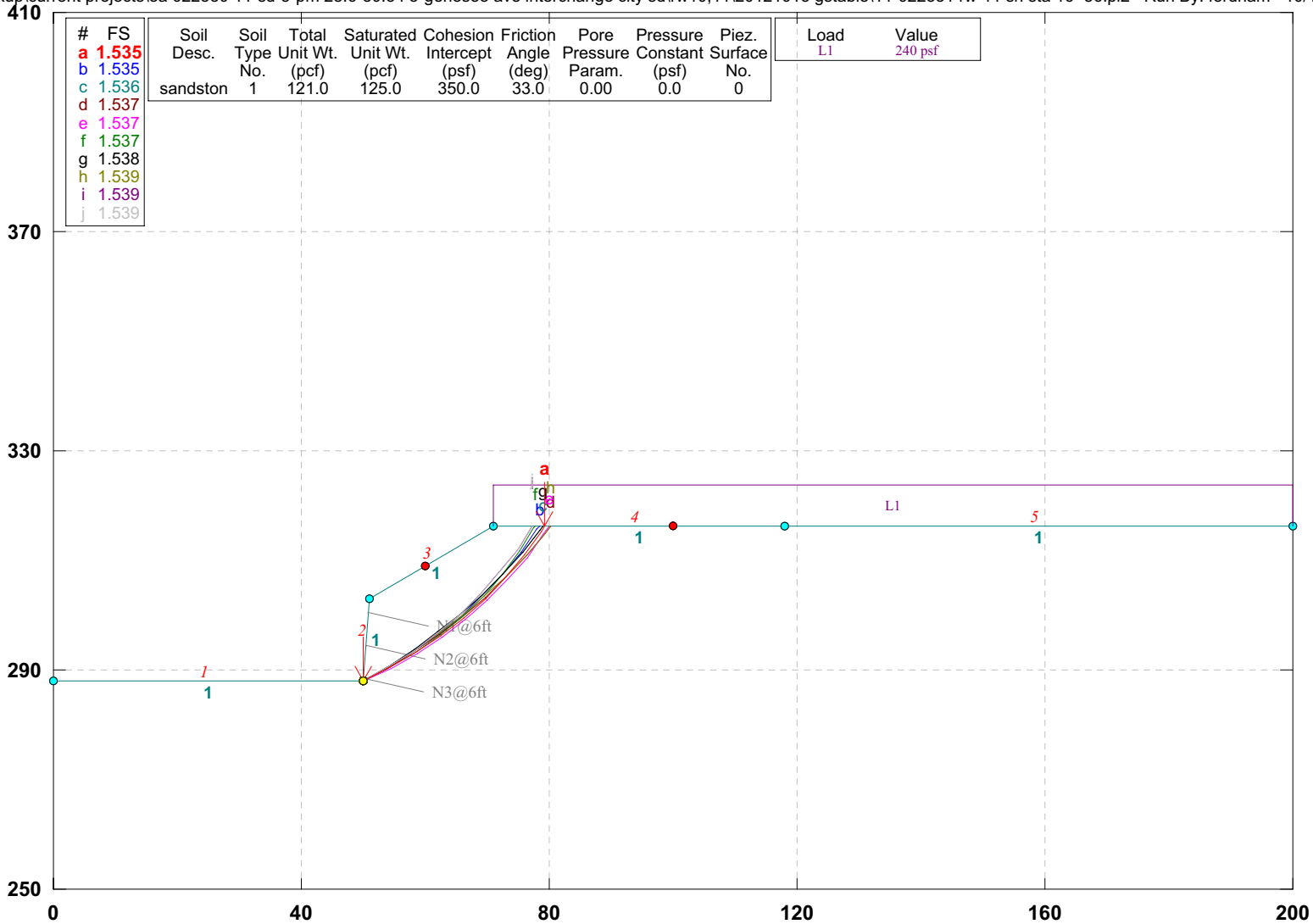
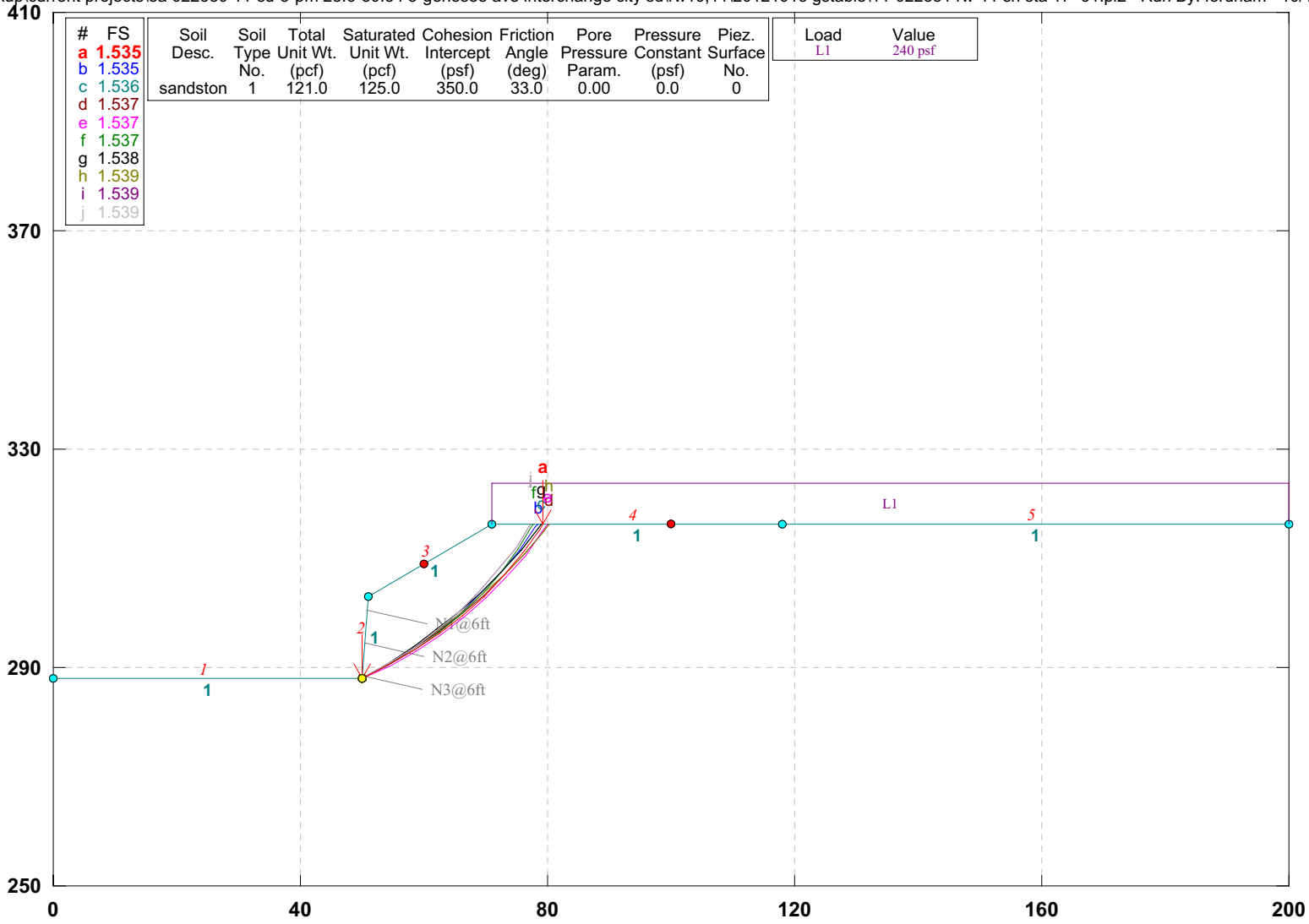


GSTABL7 v.2 FSmin=1.535

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 17+61 RW-11 SN global

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 17+61.pl2 Run By: fordham 10/16/2012 11:2

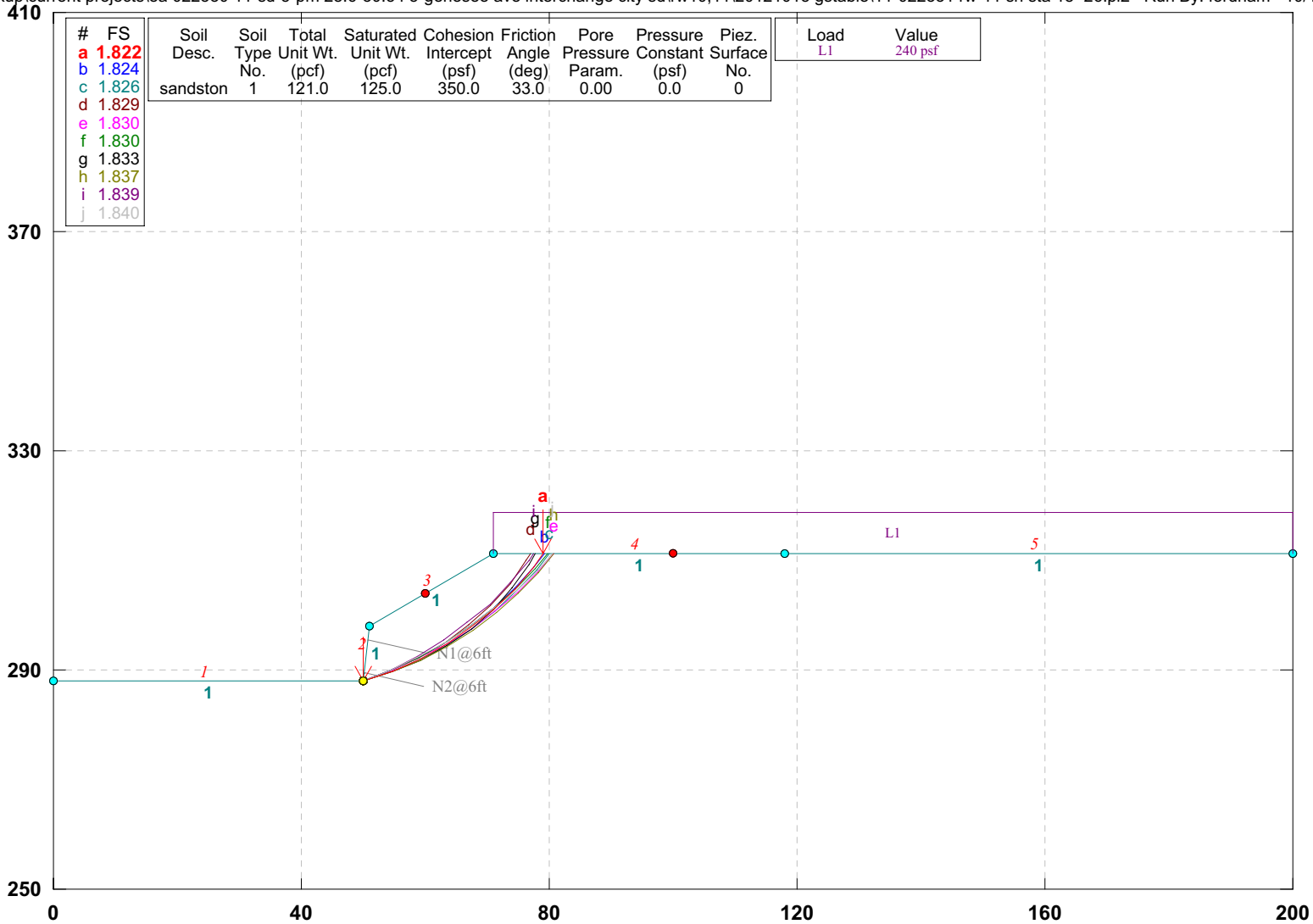


GSTABL7 v.2 FSmin=1.535

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 18+26 RW-11 SN global

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 18+26.pl2 Run By: fordham 10/16/2012 11:2

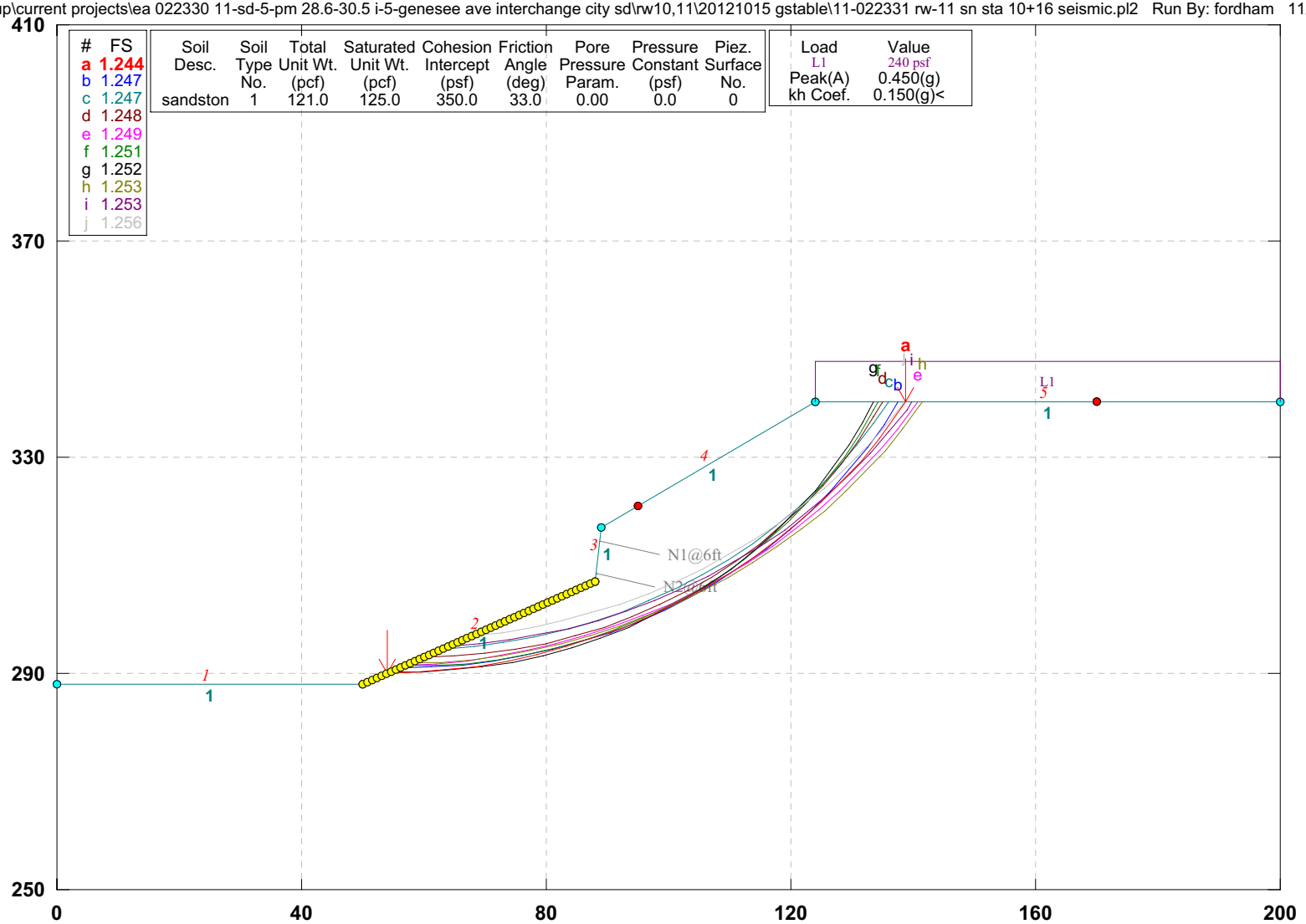


GSTABL7 v.2 FSmin=1.822

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 10+16 RW-11 SN global seismic

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 10+16 seismic.pl2 Run By: fordham 11/14/2012 09:



GSTABL7 v.2 FSmin=1.244

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 10+71 RW-11 SN global siesmic

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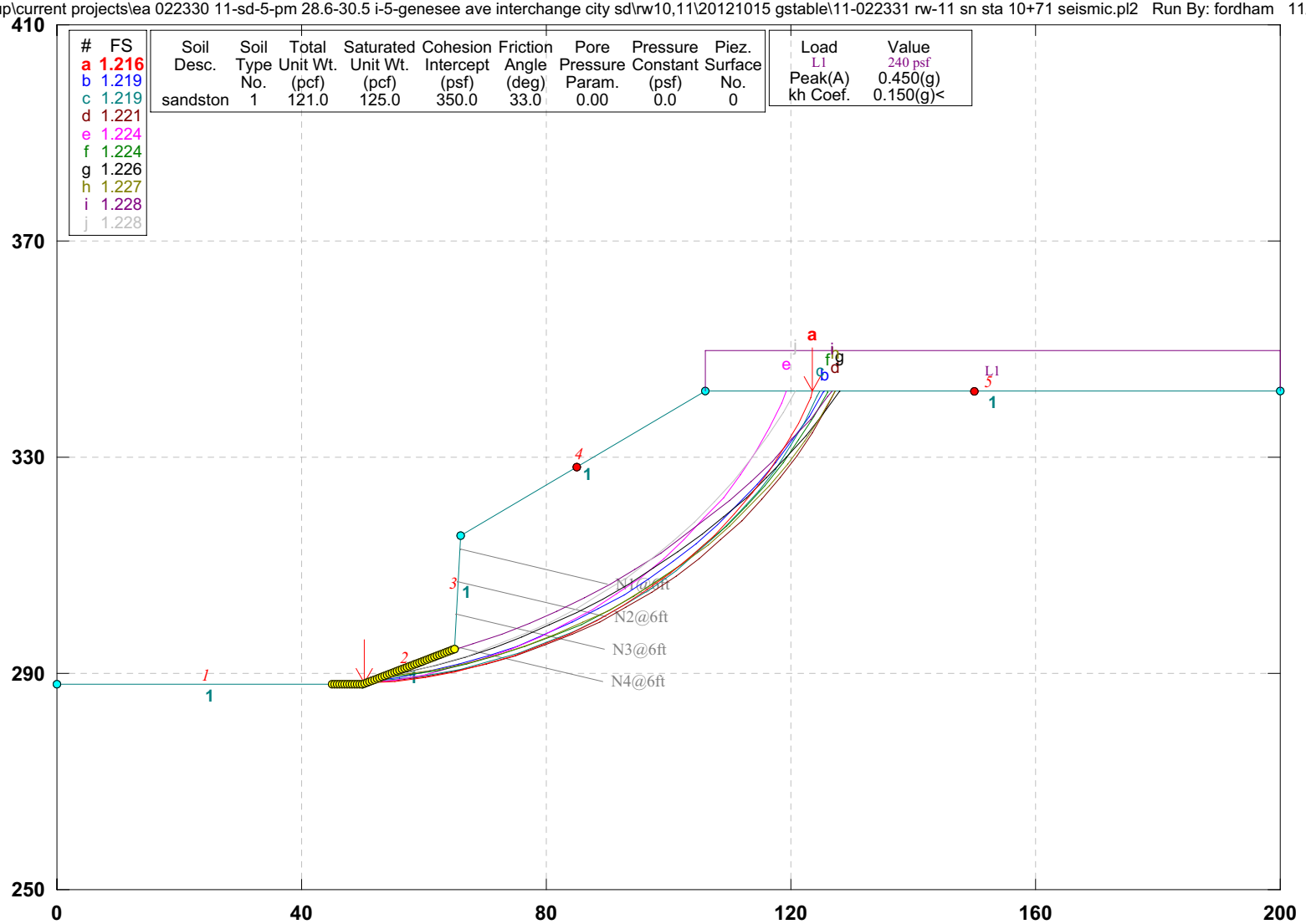

GSTABL7 v.2 FSmin=1.216

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 10+96 RW-11 SN global siesmic

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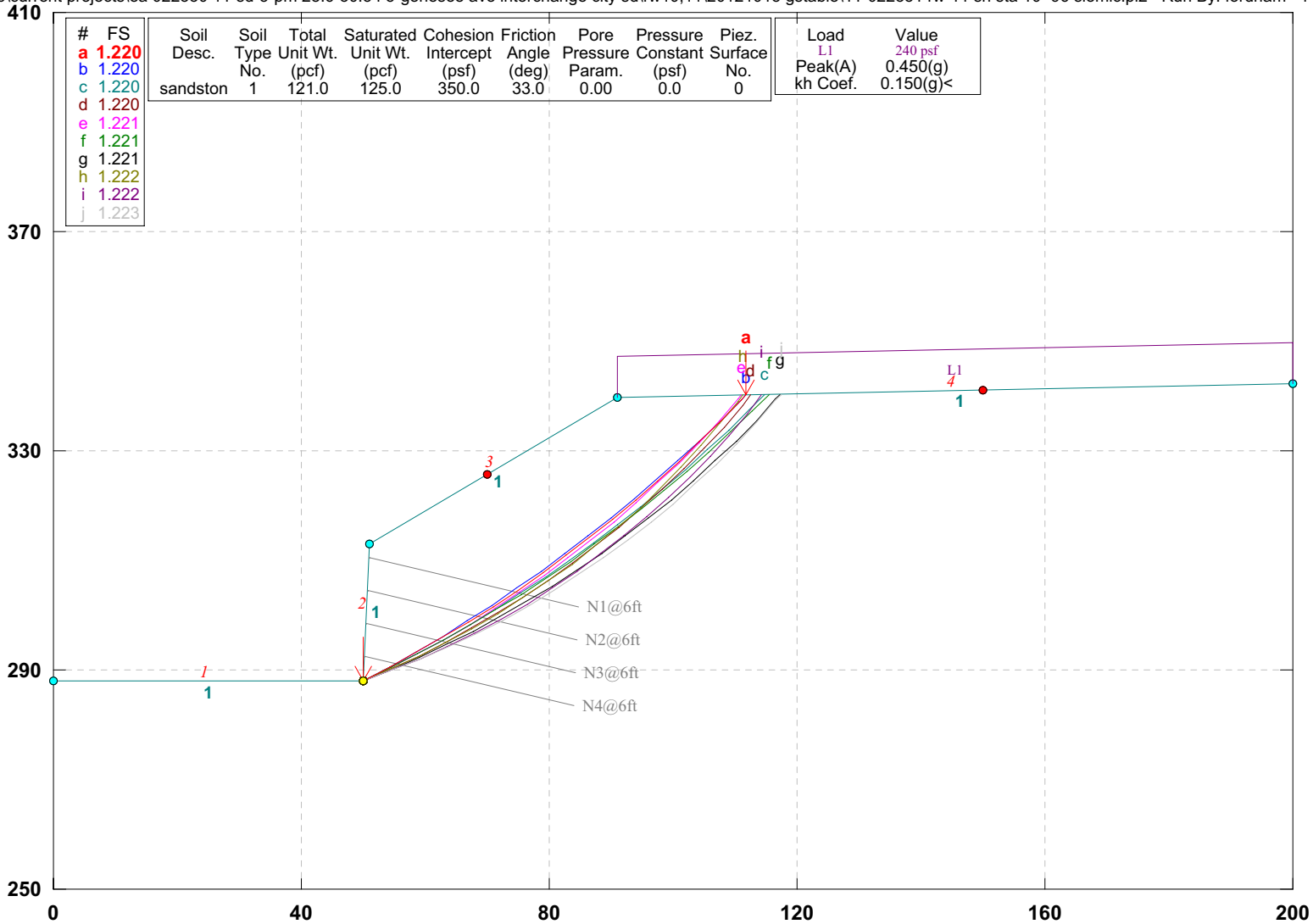

GSTABL7 v.2 FSmin=1.220

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 11+01 RW-11 SN global siesmic 6h5v

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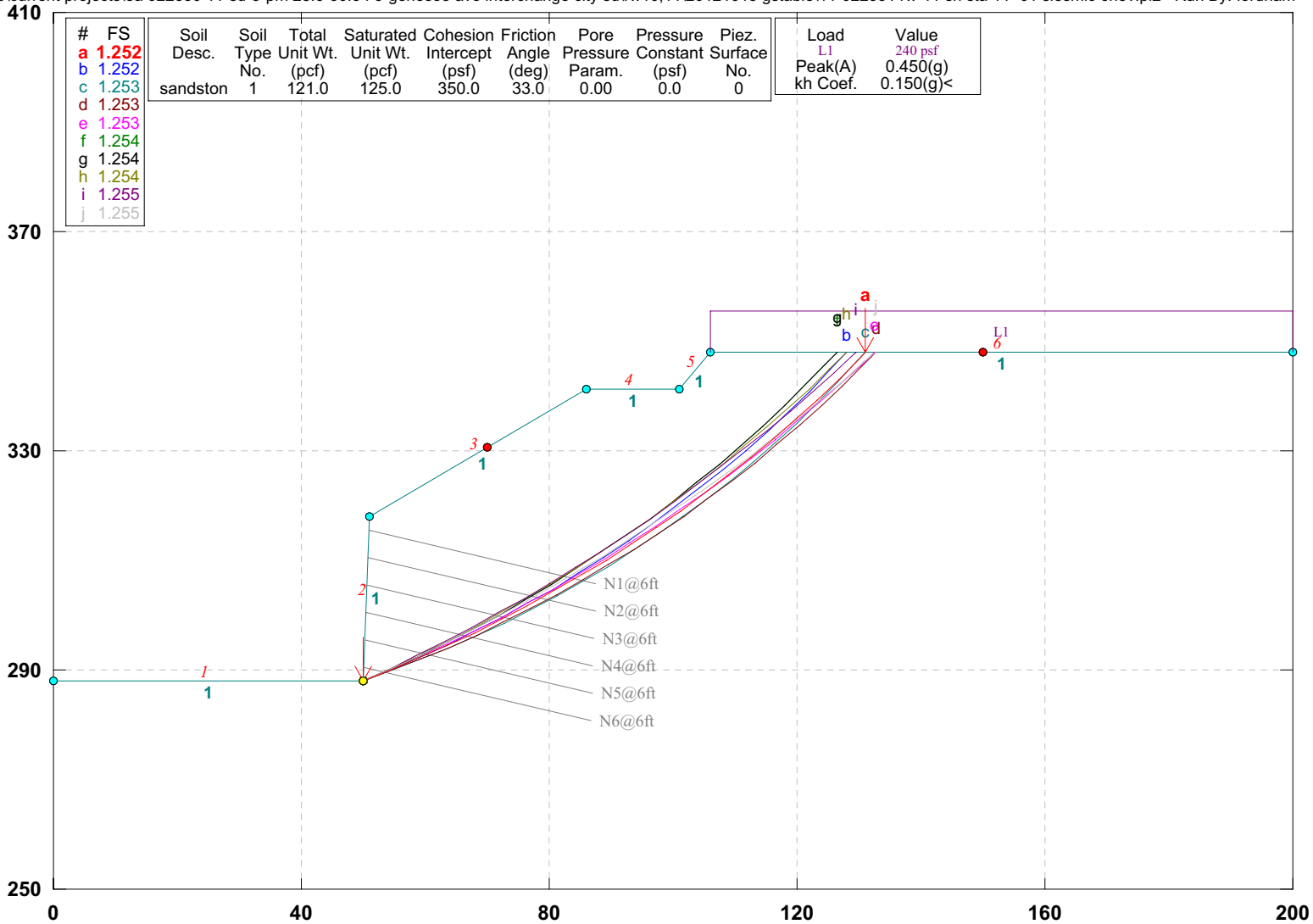

GSTABL7 v.2 FSmin=1.252

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 11+21 RW-11 SN global siesmic 6h5v

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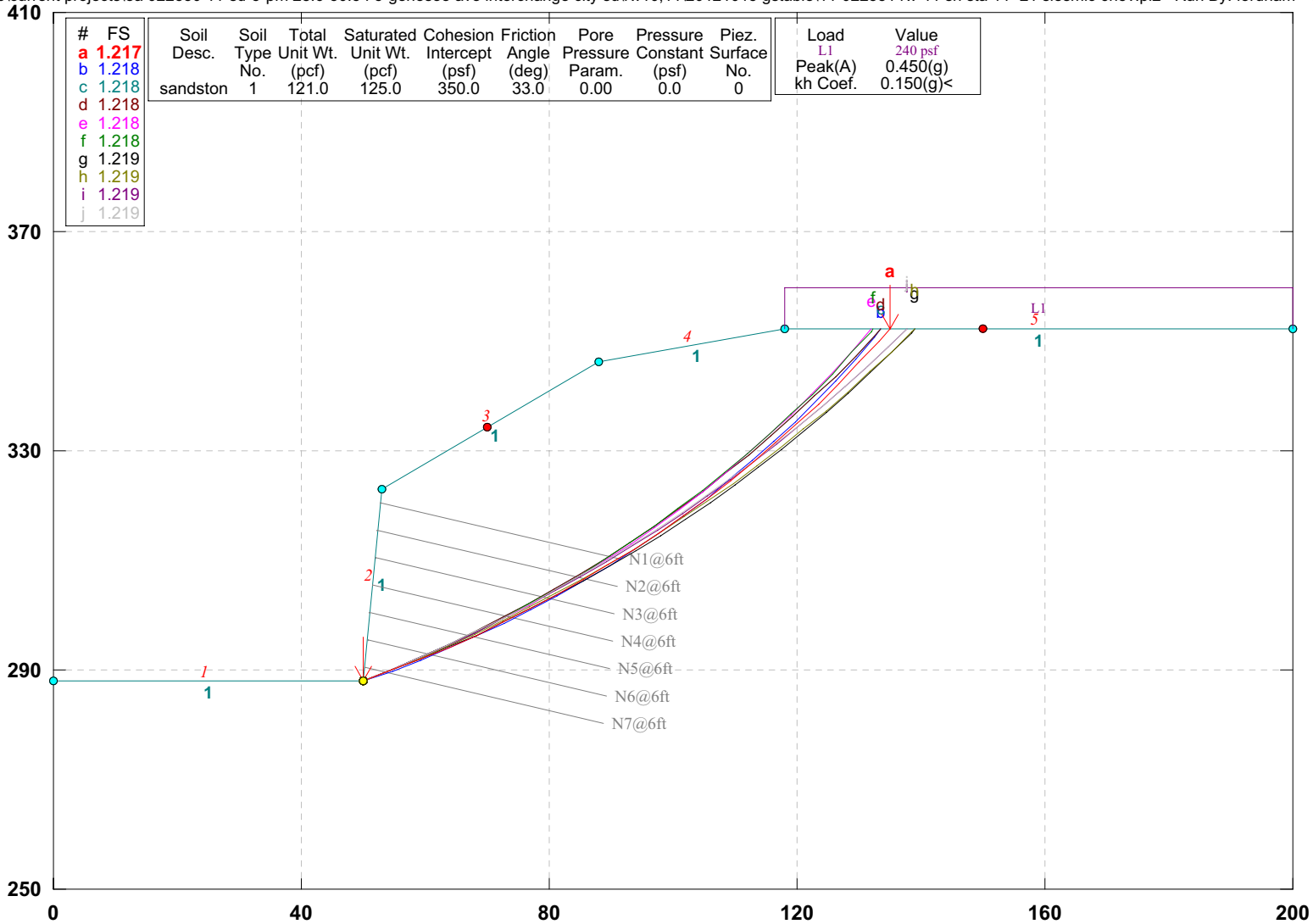

GSTABL7 v.2 FSmin=1.217

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 12+06 RW-11 SN global siesmic 6h5v

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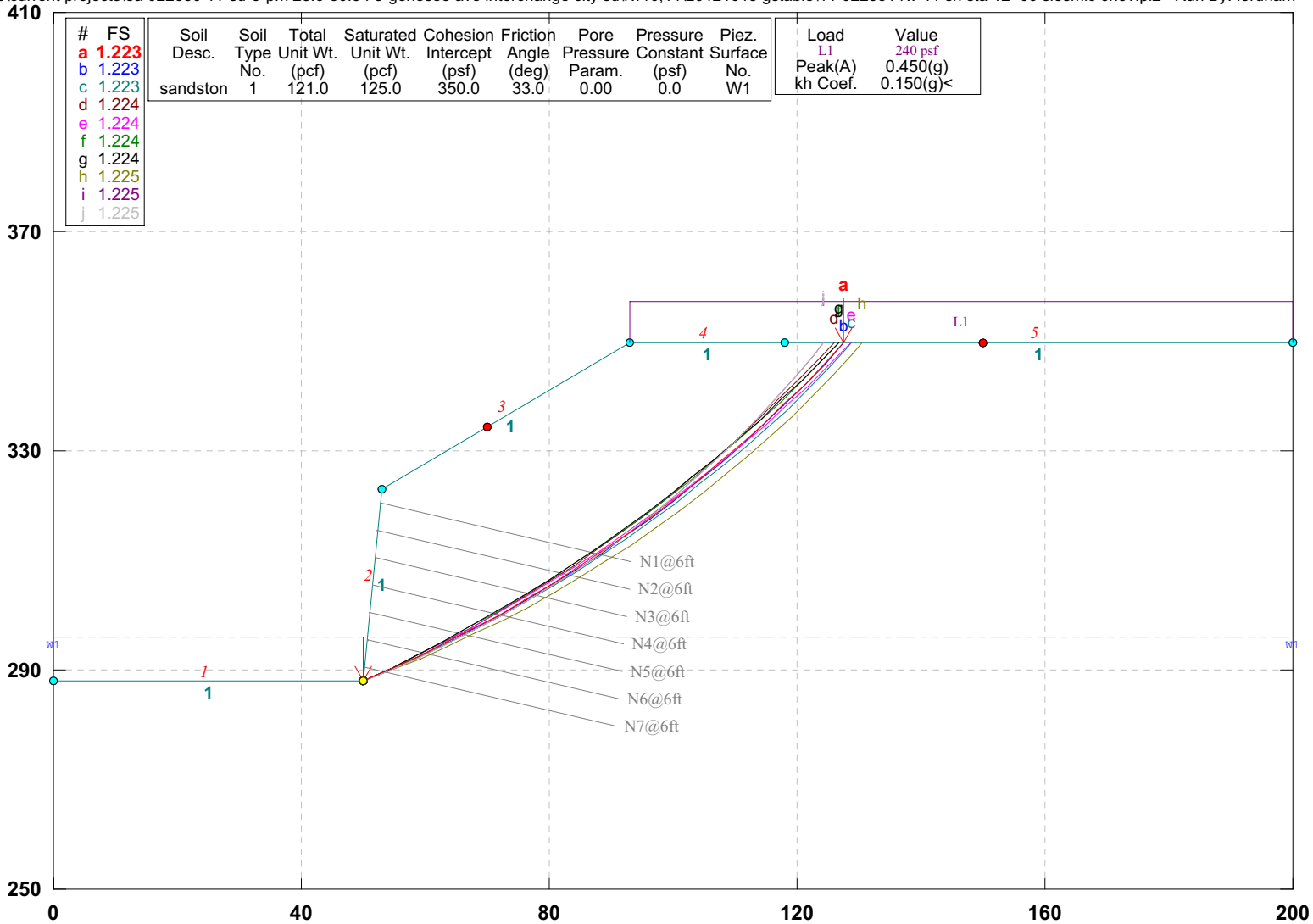

GSTABL7 v.2 FSmin=1.223

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 14+06 RW-11 SN global siesmic 6h5v

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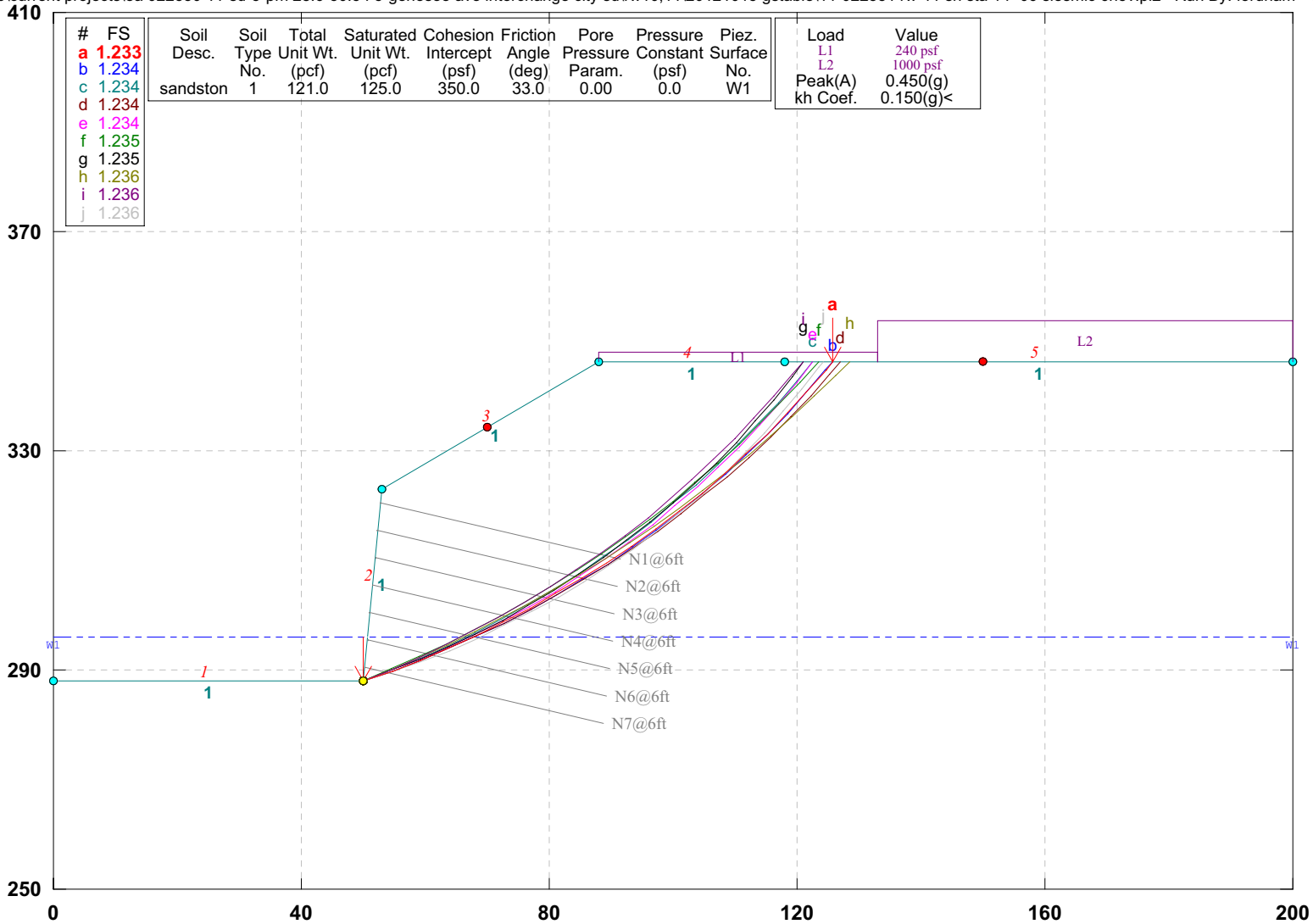

GSTABL7 v.2 FSmin=1.233

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 14+61 RW-11 SN global siesmic 6h5v

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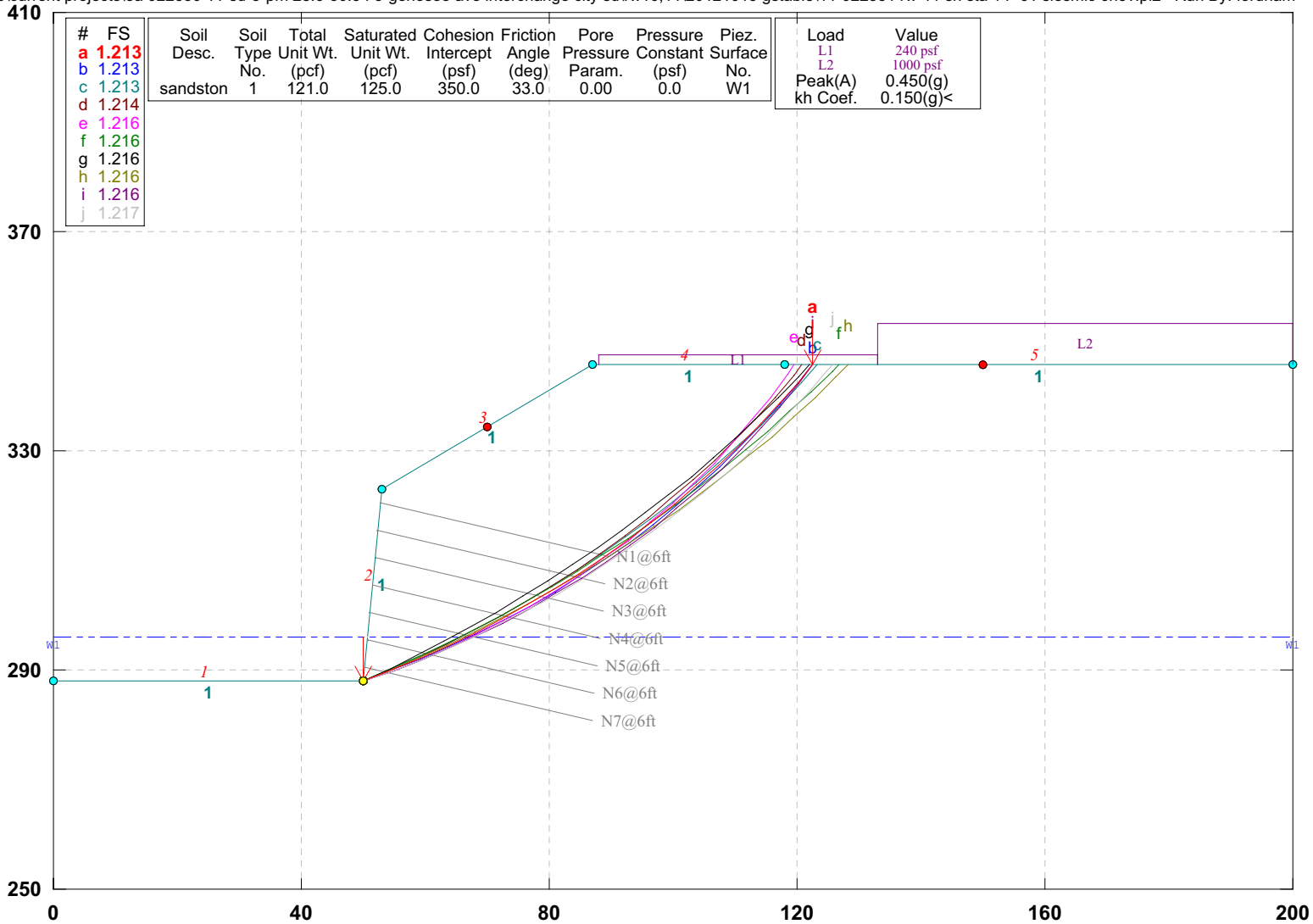

GSTABL7 v.2 FSmin=1.213

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 15+61 RW-11 SN global siesmic 6h5v

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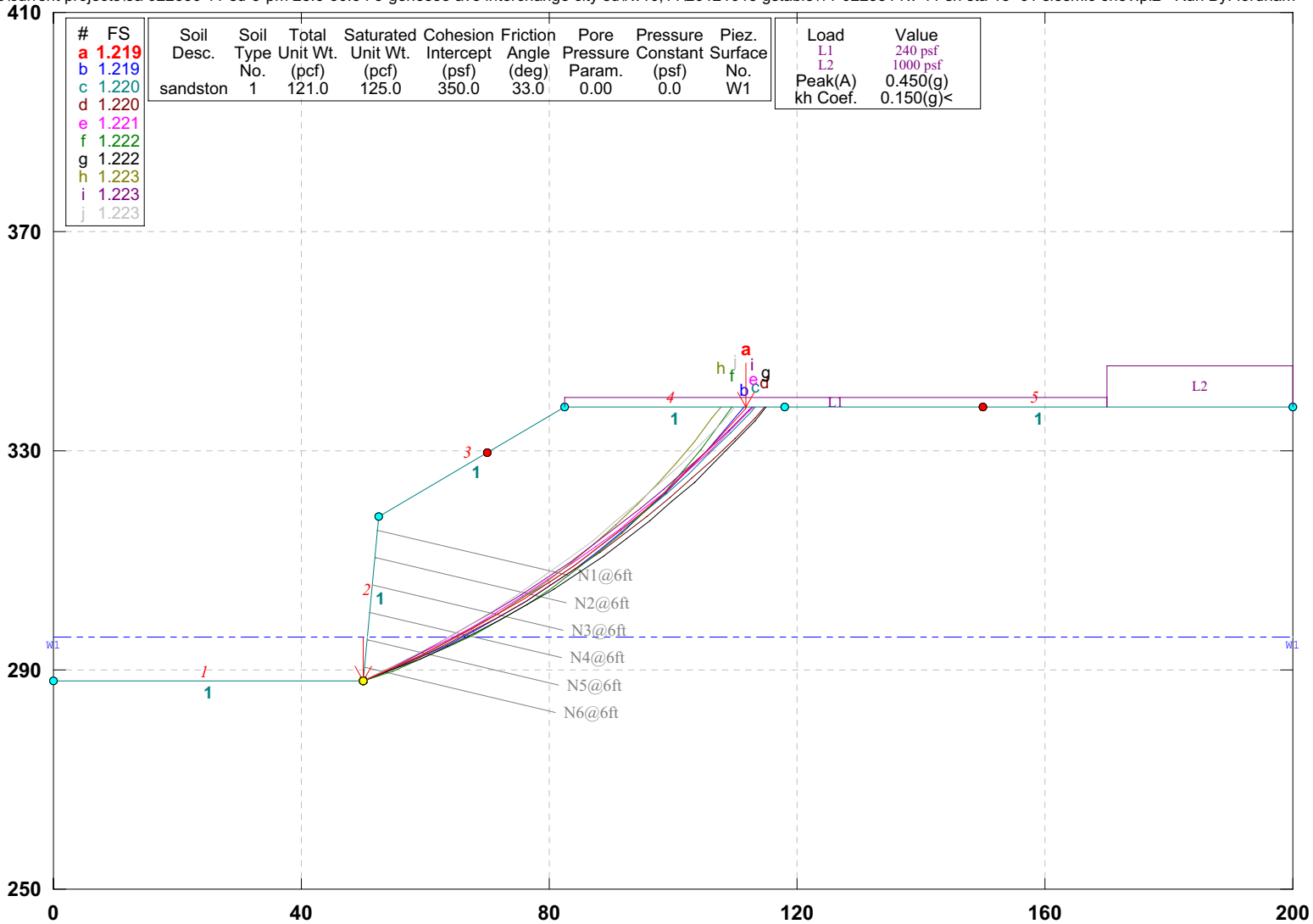

GSTABL7 v.2 FSmin=1.219

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 15+96 RW-11 SN global siesmic 6h5v

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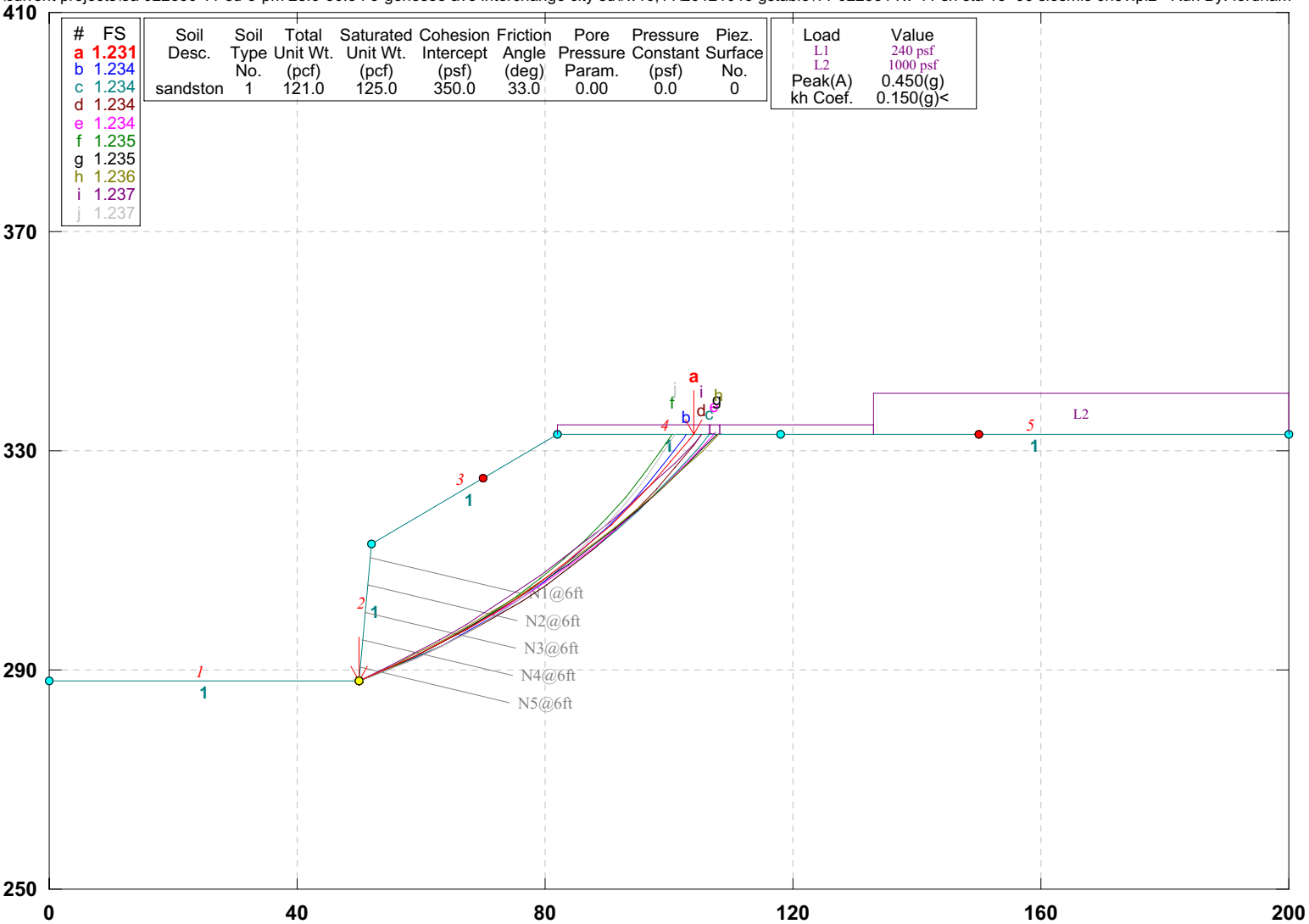

GSTABL7 v.2 FSmin=1.231

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 16+26 RW-11 SN global siesmic

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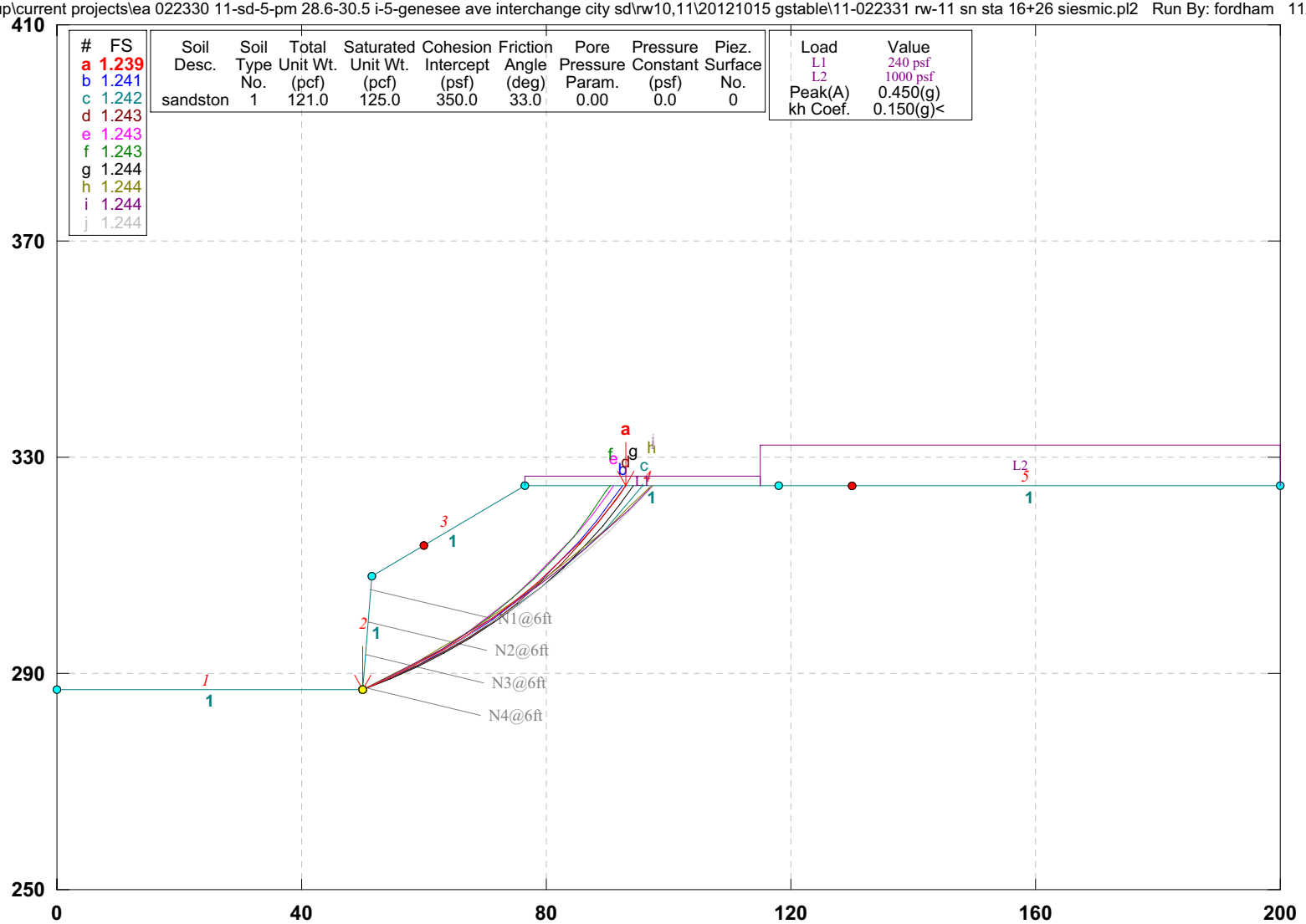

GSTABL7 v.2 FSmin=1.239

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 16+86 RW-11 SN global siesmic

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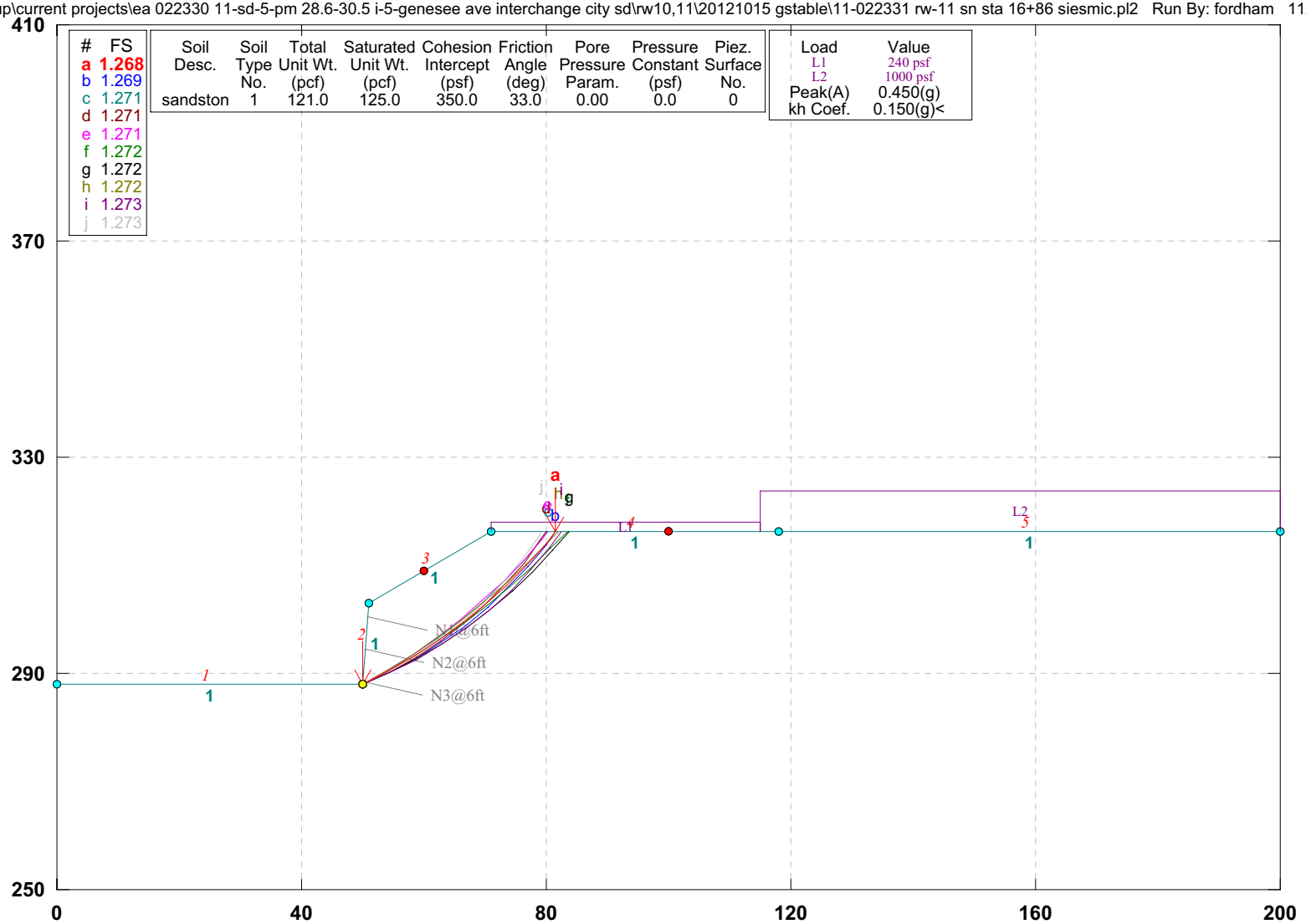
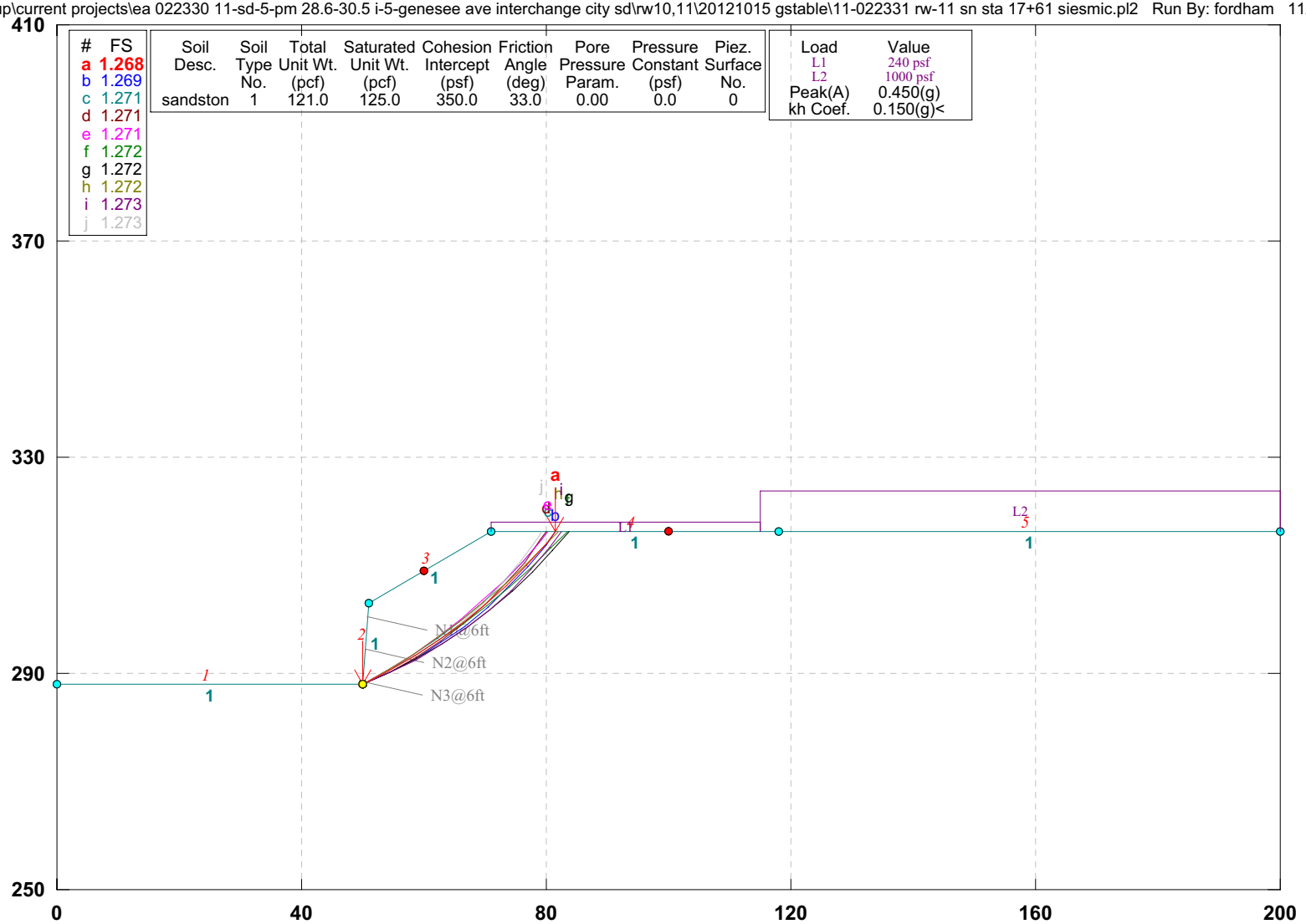


GSTABL7 v.2 FSmin=1.268

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 17+61 RW-11 SN global siesmic

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 17+61 siesmic.pl2 Run By: fordham 11/14/2012 10:

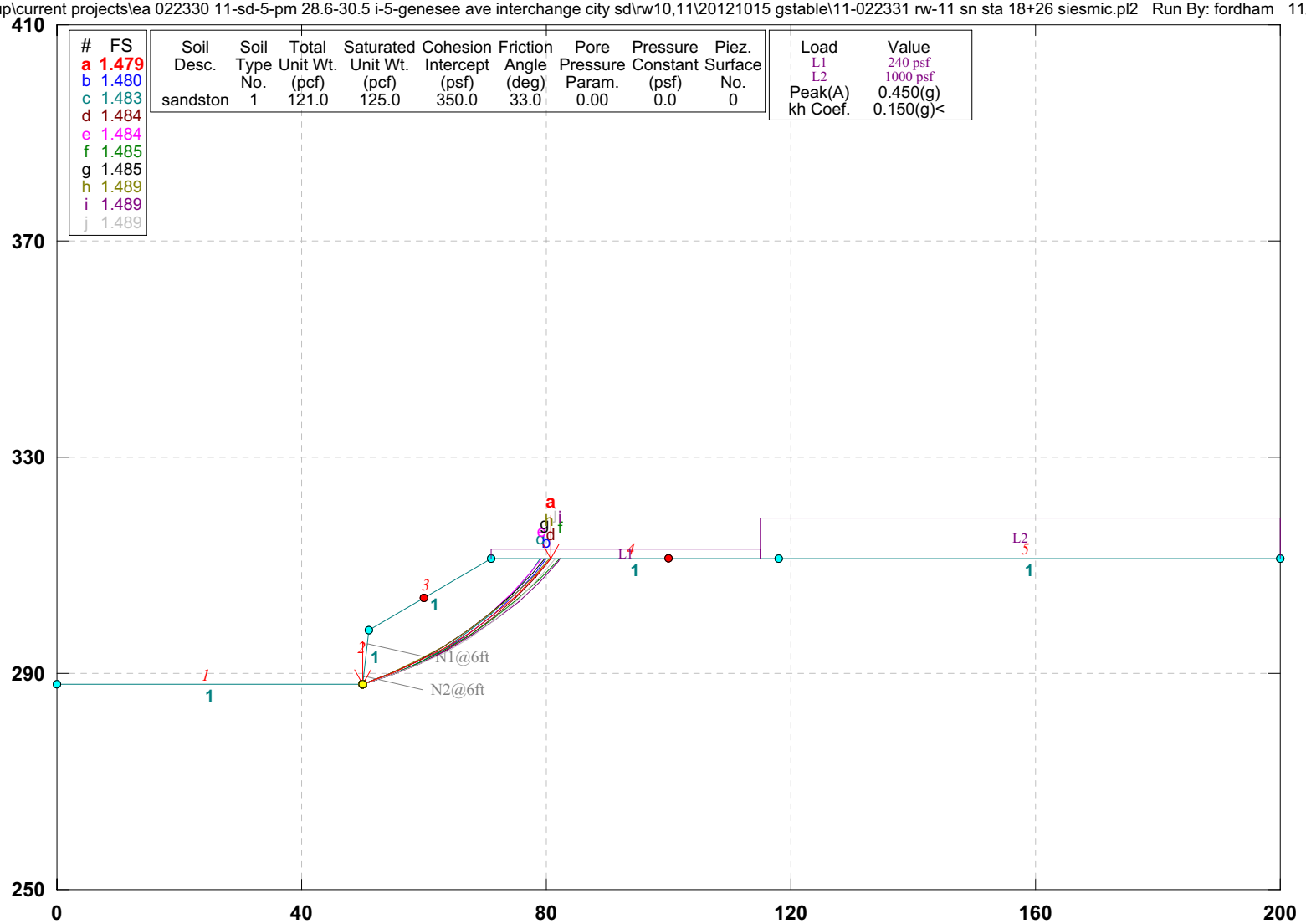


GSTABL7 v.2 FSmin=1.268

Safety Factors Are Calculated By The Modified Bishop Method

Bishop Modified sta 18+26 RW-11 SN global siesmic

h:\project backup\current projects\ea 022330 11-sd-5-pm 28.6-30.5 i-5-genesee ave interchange city sd\rw10,11\20121015 gstable\11-022331 rw-11 sn sta 18+26 siesmic.pl2 Run By: fordham 11/14/2012 10:



GSTABL7 v.2 FSmin=1.479

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX V

PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stokoski
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-13

11-SD-5/PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

MARCH 28, 2014

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California | Business, Transportation and Housing Agency

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 28, 2014

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-13

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the I-5/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR documents the prevailing site conditions and provides specific foundation recommendations for Retaining Wall-13. The report defines the geotechnical conditions as evaluated from field investigation data and used in the geotechnical analyses and design. This report provides recommendations and specifications for project design and construction. This FR supersedes information regarding RW-13 presented in the *Caltrans Geotechnical Design Report for the Interstate-5/Genesee Avenue Interchange Improvement Project, EA 11-022331/EFIS 1100000012, dated February 29, 2012.*

No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared for the retaining wall prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

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1.0 SCOPE OF WORK

This Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for Retaining Wall-13 (RW-13) to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project, in the City of San Diego, San Diego County, California hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and to provide recommendations relevant to the design and construction of RW-13. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein.

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, engineering analyses, and retaining wall design. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all stations are referenced to the SD-5 Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Foundation Report Preparation for Retaining Walls, July 2010*. No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) for RW-13 were prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. This FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-13, are necessary to accommodate the project and the associated features. RW-13 is proposed to be a Geosynthetically Reinforced Earth (GRE) Retaining Wall. RW-13 is located south of and parallel to Genesee Avenue. A discussion of the wall type selection is provided in Section10.0

RW-13 will be located between Station 17+00 “GEN-Line” and Station 22+00 “GEN-Line”. The retaining wall will be approximately four hundred thirty five-feet (435ft) in length, with a maximum height of approximately thirty-feet (30ft). Figure 1 depicts the approximate locations and alignment of RW-13 in plan view. Figure 2A and Figure 2B are the layout sheets utilized in the preparation of this FR as provided by the project design staff that includes Caltrans District 11 Design and Kimley Horne and Associates (KHA). Figure 3 is the profile sheet provided by the project design staff and utilized in the preparation of this FR. Illustrative cross sections perpendicular to the wall alignments are shown in Figure 4A through Figure 4G. These cross sections represent the most severe cases of wall and slope geometry.

3.0 AS-BUILT FOUNDATION DATA

The east end of RW-13 will be located approximately seven hundred forty four-feet (744ft) to the west of I-5. The LOTB for the overcrossings include information relevant to the soil conditions near the project

site. LOTB for the Genesee Avenue OC are included in the Appendix I. The construction of RW-13 will not affect the Genesee Avenue OC bridge foundations.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted in December 2008. Three (3) boring were developed for RW-13. The naming convention used for the boring records includes the boring method, the two digit year, and the approximate center line Station along the metric preliminary exploration plan, followed by the notation R or L indicating that the boring was to the right or left of the GEN-line Station. For example, boring R-08-10580R is a rotary boring conducted in 2008 that was developed to the right of approximate metric Station 105+80 along the GEN-line. Metric Stationing was utilized because the subsurface investigation was performed prior to Caltrans transition back to U.S. Customary Units. The approximate locations of the borings are depicted in Figure 2A and Figure 2B. The metric plans referenced for the development of the boring records are not included in this report. LOTB for R-08-10580R, R-08-10700L, and R-08-10740L are included in Appendix II.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to determine the extent of previously unmapped fill thereby delineating the soil conditions anticipated to impact the design and construction of the retaining walls.

The request for the survey of the project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

Corrosion data provided by the laboratory for the project are presented in Appendix III.

Laboratory test data for the project are included in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site geology was interpreted based on previous field investigations, current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map is a modified version of the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975.* The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining walls and the extent of fill mapped by OGDS2. Figure 6 depicts a profile of the geology beneath the existing grade along the retaining wall alignment. Figure 7A through Figure 7G depicts geologic cross sections along the RW-13 alignment.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine-hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. The

approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

Fill slopes currently exist along the proposed retaining wall alignments. RW-13 will be constructed within artificial fill over a thin layer alluvium and sedimentary formation.

The geologic units in the project area and depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fills in the project area appear to be medium dense engineered fills derived from material excavated from nearby cuts in the sandstone and siltstone.
- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.
- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voigt Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the City of San Diego, Seismic Safety Study Geologic Hazards and Faults for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC. Additionally, one or more un-named short inactive faults cross the RW-3 and the I-5 north coast corridor widening project retaining wall alignments.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC under the UCSD campus and under the Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault System running on a north-northwest trend and located offshore roughly two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

Theretaining wall alignment is underlain by competent engineered fill, sandstone, and siltstone with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible soils, or expansive soils have not been observed along the proposed alignment of RW-13.

Landslides are commonly associated with the Ardath Shale where expansive claystone locally comprises as much as twenty-five-percent (25%) of the geologic unit. Expansive claystone was not observed along the alignments of RW13. Landslides are not anticipated to be a geologic hazard at the wall locations.

Zones of loosely compacted embankment beneath the wall alignment were revealed during the exploration program. The foundation soils may settle up to four-inches (4in) during wall construction.

Depth to Bedrock

Based on observations made during the subsurface investigation, artificial fill up to seventy-feet (70ft) in depth is located along the alignment of RW-13. The artificial fill currently traverses a small canyon that bisects Genesee Avenue west of I-5. The depth of artificial fill varies along the length of the retaining wall. Based on topographic maps and the subsurface investigation, the depth of the fill is located near the midpoint of RW-13 alignment.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-13 is not located along a stream course. A scour evaluation for the retaining walls is not applicable to this project.

8.0 CORROSION EVALUATION

Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

None of the conditions considered to make the site soils corrosive were present in the onsite samples collected and analyzed for the project. Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section includes the seismic study and addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B*.

According to the *Seismic Design Criteria (SDC)Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50). Soil Profile Type D has SPT results with the number of blows per twelve-inches (12in) greater than/or equal to fifteen and less than fifty ($15 \leq N < 50$).

The three (3) borings developed along the alignment of the proposed future retaining wall and RW-3 consistently had SPT results that ranged from as low as eight (8) to as high as forty-one (41) blows per twelve-inches (12in) in artificial fill and greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in the Appendix B of the SDC, the appropriate Soil Profile Type is C for sedimentary formation and D for artificial fill.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the Caltrans ARS Online Tool was three hundred and sixty-meters per second (360m/s), which correspond to Soil Profile Type D. The shear wave velocity for soil profile Type D was used to obtain the most conservative results. The closest regional active fault as indicated by the Caltrans ARS Online Tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately fifteen one hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The retaining walls are located within sedimentary formation and compact artificial fill well above any groundwater table. There is no potential for liquefaction at the project site.

Earthquakes caused by movement along nearby active faults are likely to result in ground motion impacting project features. However, since no active faults transect the project site, there is no potential for surface fault rupture.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

The retaining walls will be constructed within dense sedimentary formation and compact fill. There is little potential for seismically induced settlement.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of the retaining walls do not exist at the project site.

Pseudo-static modeling and slope stability analyses were conducted to assure that the retaining walls will meet stability requirements in a seismic event. Stability analyses are discussed in Section 10.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

RW-13 will be developed along an existing fill slope. The retaining wall will allow for the widening of Genesee Avenue. Retaining walls suitable for fill situations such as Caltrans Standard retaining walls, Mechanically Stabilized Earth (MSE) retaining walls, and GRE retaining walls are considered feasible. Self-shoring, top-down stage construction retaining wall system such as a soil nail and ground anchor walls are not applicable to placement of additional embankment fill. A temporary back cut to facilitate the construction of a retaining wall is feasible, though shoring may be needed to lessen the impact on Genesee Avenue.

Caltrans Standard retaining walls and MSE retaining walls require the use of select backfill that is not available on-site. The proposed GRE wall will utilize on site material as backfill and is therefore the most economical retaining wall system available. The GRE retaining wall system will also accommodate anticipated ground settlement without the need for remedial grading of foundation soils. The retaining wall design parameters as provided by the project development team and in the project plans are included in Table 4A and Table 4B.

The GRE wall design and global slope stability analyses for RW-15 were performed using STEDWIN with GSTABL7 v2.0 and MSEW v3.0. Internal, global, and mixed stability were evaluated by modeling various wall heights and adjoining slopes. The bearing capacity, overturning, sliding and reinforcement pullout were evaluated for various wall height. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of transient loads was modeled as a distributed vertical load of two hundred forty-pounds per square foot (240psf). The GRE backfill soil strength design parameters utilized in the analyses are presented in Table 3. The basis for the selection of the soil strength parameters was archived data, field test results, and engineering experience and judgment. It is anticipated that soil generated from project cuts will meet or exceed design soil strength parameters. GRE design parameters utilized in the analyses are presented in Table 4A and Table 4B. The graphic results of the stability analyses are presented in Appendix IV. The need to satisfy global slope stability criteria was found to control the design of the geosynthetic reinforcement.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-13 be designed and constructed as a GRE retaining wall.

The parameters that may be used for GRE retaining wall design are presented in Tables 3 through Table 4B.

The recommended length of geosynthetic reinforcement, the design strength of the geosynthetic reinforcement, and the vertical spacing of the geosynthetic reinforcement are provided in Table 4A and Table 4B.

12.0 NOTES TO DESIGNER

The project site soils are considered non-corrosive.

The design of the retaining walls should incorporate a gravel drainage system similar to those found in on MSE walls. An example drainage system is presented in Figure 10.

Surface runoff should be controlled so as to not erode or otherwise adversely affect soil above or below

the retaining wall.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining wall should be avoided. Features that promote infiltration could have an adverse impact on the performance of the retaining wall.

The temporary GRE retaining wall facing will consist of ten-foot (10ft) long by one and one-half foot (1.5ft) high by one and one-half foot (1.5ft) deep galvanized L-shaped wire basket. The basket will have a maximum opening size of four-inches (4in) by four-inches (4in). L-shaped baskets will have supporting cross struts placed every 1.5 feet along there length. L-shaped baskets should overlap one another by four-inches (4in) and a cross strut should be placed at the overlap and around the top and bottom wire of both baskets. L-shape basket will be positively connected to geogrid. The lengths of the geogrid and the vertical spacing of the geogrid are presented in Table 4B. The L-shaped basket will be lined with filter fabric and backfilled with free draining, non-corrosive sand or gravel. If the free draining material is gravel then filter fabric will be placed between the free draining material and the backfill.

The design of RW-13 assumes the use of onsite borrow material generated form project cut slopes can be utilized as backfill.

Wall facing anchors and facing may be designed to be similar to soil nails and soil nail wall facing. The wall facing may be cantilevered up to two and one-half-feet (2.5ft) at the top of wall to accommodate the sloping wall profile.

Permanent GRE retaining wall facing may consist of either sculpted shotcrete or cast-in-place concrete. Sculpted shotcrete is typically the more economical method. Parameters for the design of the permanent facing and anchors are presented in Table 5. (FHWA-HRT-11-027, 2011)

13.0 CONSTRUCTION CONSIDERATIONS

The artificial fill found along the alignment of RW-15 may be excavated using standard excavation equipment.

The occurrence of groundwater is not anticipated to impact retaining wall construction.

Temporary cut slopes proposed by the Contractor should follow the guidelines set forth in the Caltrans Trenching and Shoring Manual and the project Geotechnical Design Report. The estimated soil strength parameters presented in Table 3 should be utilized by the contractor to perform any required engineering analyses of proposed temporary slope configurations. The acceptable minimum factor of safety criteria for the stability analyses of a temporary cut slope is 1.2.

The temporary face of RW-13 should be constructed at a batter of thirty six vertical to one horizontal (36v:1h). This batter requires that each successive one and one-half foot (1.5ft) lift be set back one-half inch (0.5 in). The batter will allow for the outward deflection of the temporary GRE retaining wall facing during construction. (No. FHWA-NHI-10-024, 2009)

All geosynthetic reinforcement fabric should be place taut and remain taut during the backfill process. Spreader bars or other mechanical means of insuring the geosynthetic reinforcement remains taut should be employed during construction.

If the facing anchor system is utilized to stabilize form work for cast-in-place facing, the forces applied to the anchor during the casting of the facing should not exceed the maximum capacity of the anchor. The maximum capacity of the facing anchor is presented in Table 5.

The contractor will need to develop a large enough working bench along the top of the wall to facilitate the installation of the final wall facing. Most of the embankment fill slope above the GRE retaining wall should be placed and a settlement waiting period of sixty-days (60days) should be observed before

applying the permanent facing. It will be necessary to allow a portion of the fill slope to be placed later in order to provide a working bench for construction equipment.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2010*. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is less than what is prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to abundant geologic exposures available by inspection of the existing cut slope and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and locations that have been provided to OGDS2. If any changes are made to the project features addressed herein, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analyses. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

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U.S. Department of Transportation, Federal Highway Administration, *Geosynthetic Reinforced Soil Integrated Bridge System Synthesis Report,* Publication No. FHWA-HRT-11-027, January 2011

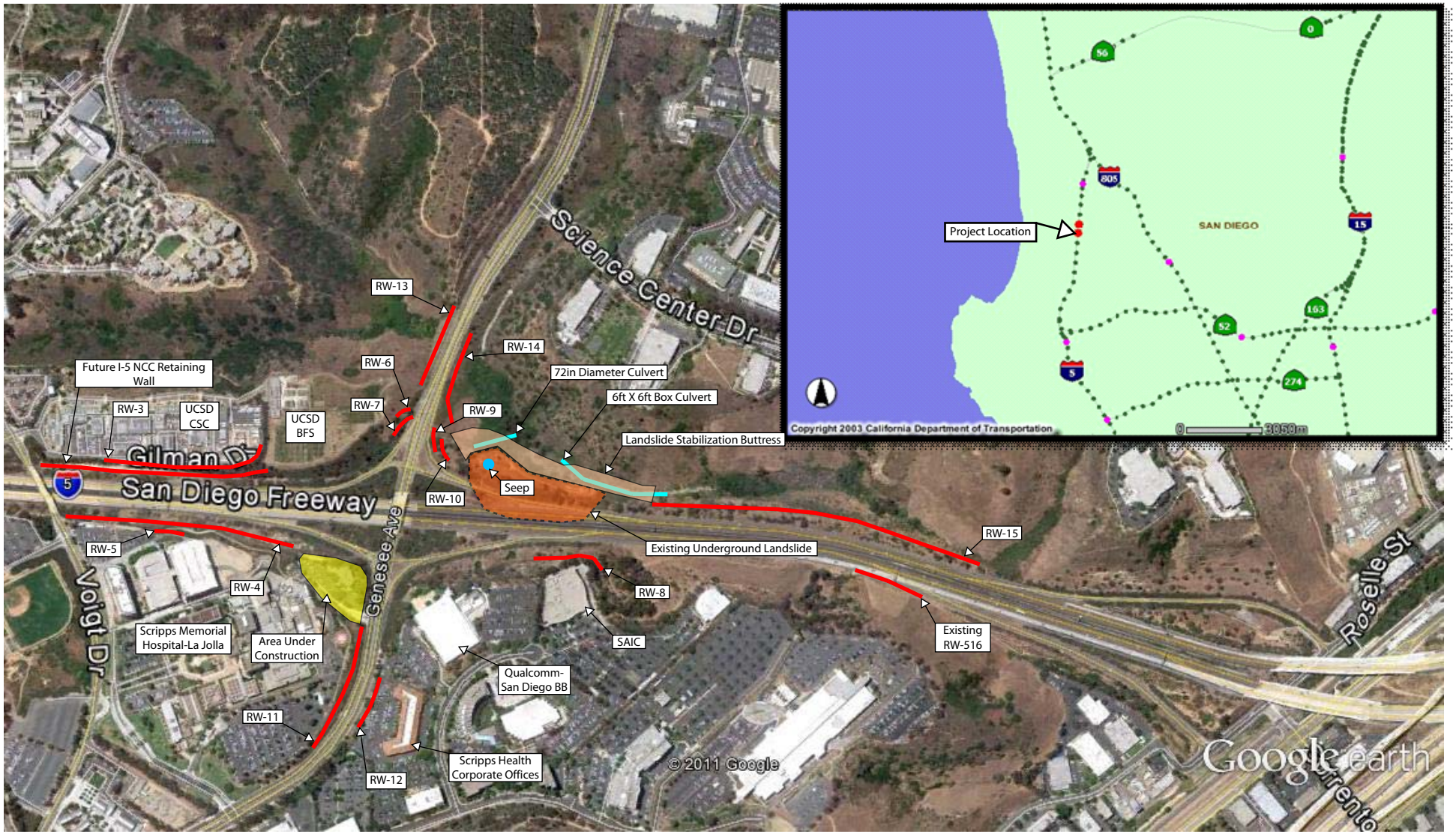
National Highway Institute, *Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I,* NHI Courses No. 132042 and 132043, Publication No. FHWA-NHI-10-024 FHWA GEC 011 – Volume I, November 2009

Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

FIGURES



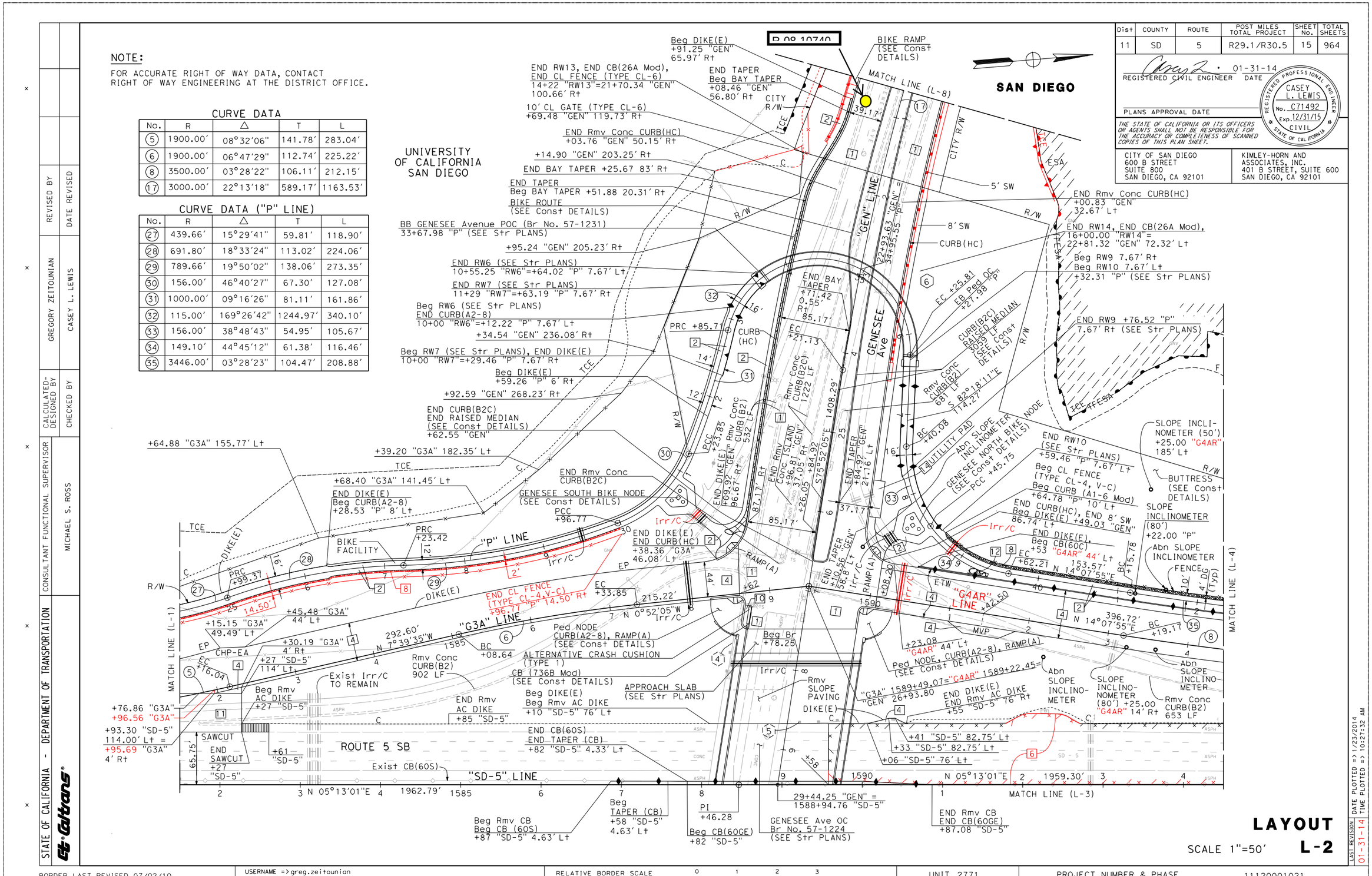
Google earth

feet 5000

km 1

Note: The locations, alignments, and lengths of the retaining walls; the location of the seep; the location, length, and alignment of the landslide stabilization buttress, the location and area of the landslide are approximated.

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 2A: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	21	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

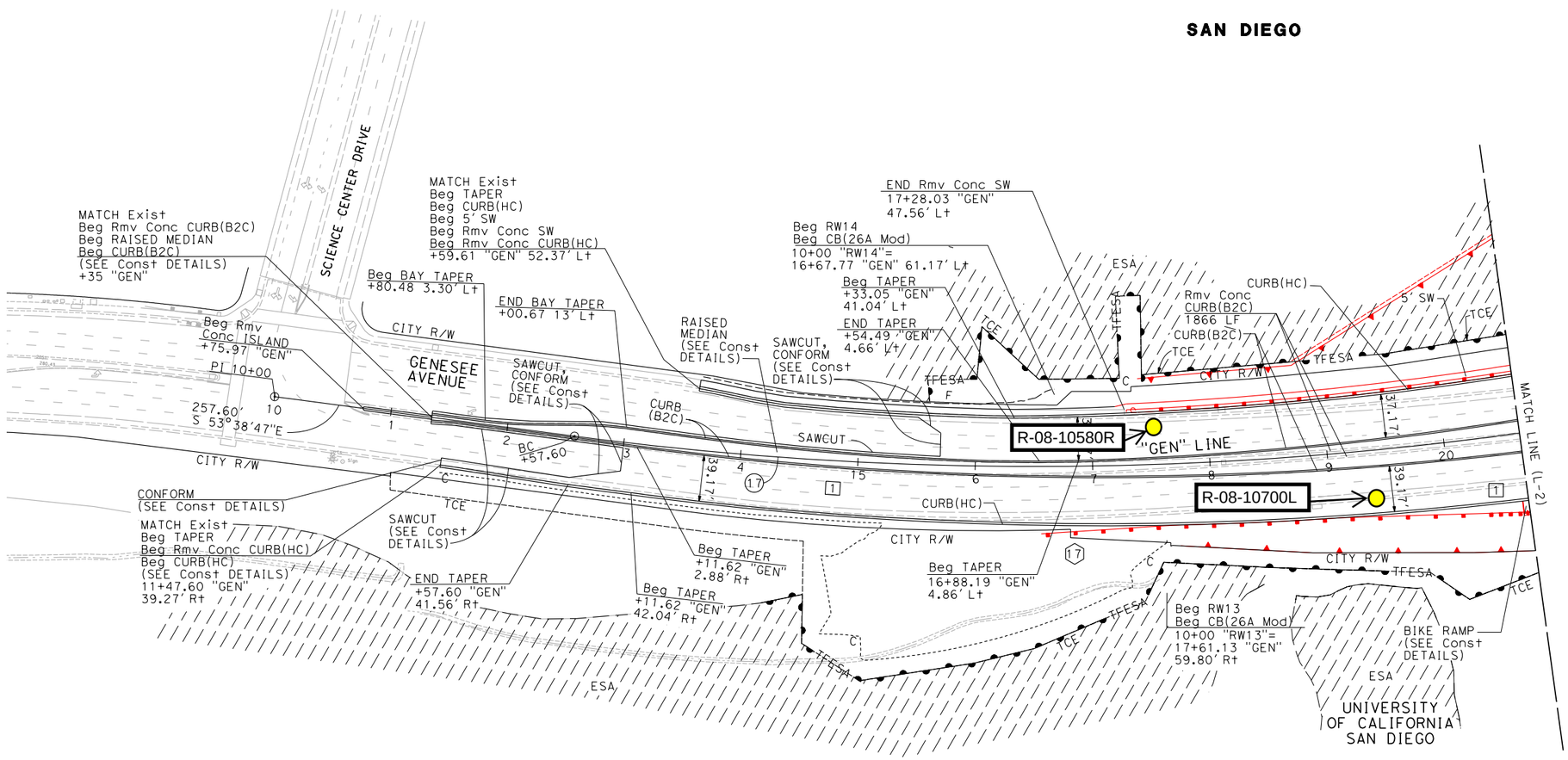
KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
17	3,000′	22°13′18"	589.17′	1,163.53′



LAYOUT

SCALE 1"=50′ **L-8**

CALCULATED-DESIGNED BY	GREGORY ZEITOUNIAN	REVISED BY	
CHECKED BY	CASEY L. LEWIS	DATE REVISED	
CONSULTANT FUNCTIONAL SUPERVISOR	MICHAEL S. ROSS		

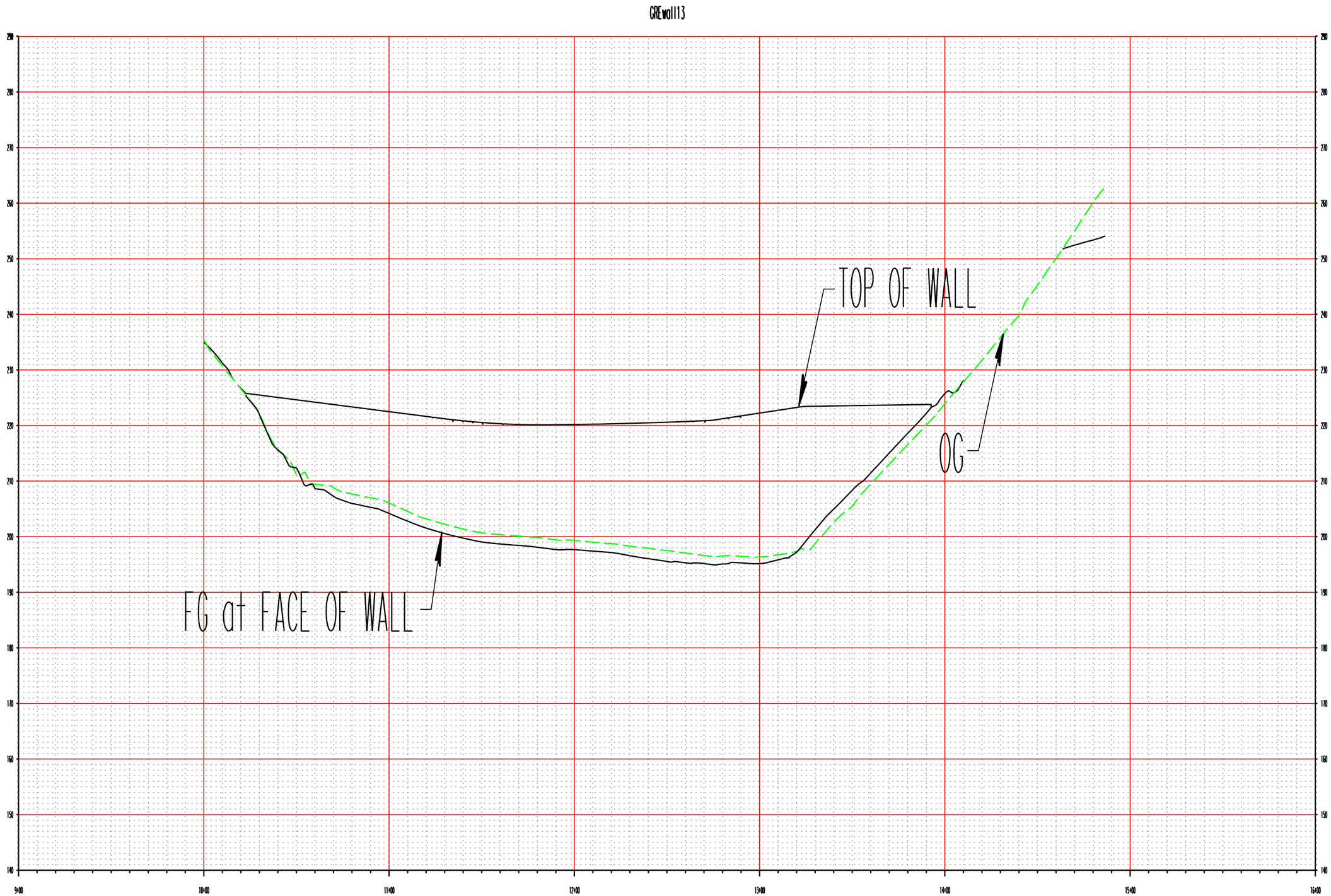
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

LAST REVISION 01-31-14 DATE PLOTTED => 1/23/2014 TIME PLOTTED => 10:27:48 AM

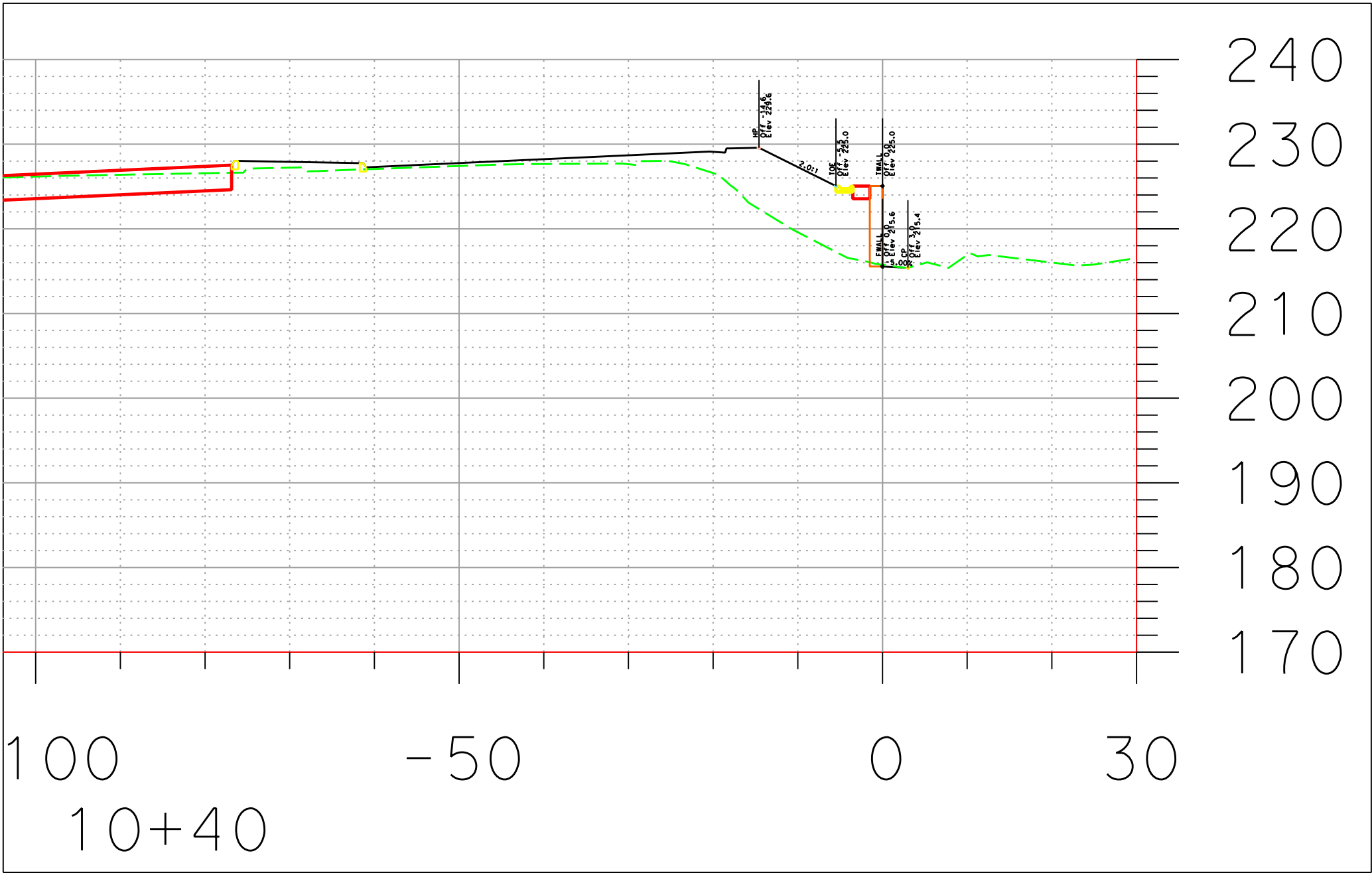
BORDER LAST REVISED 07/02/10 | USERNAME => greg.zeitounian DGN FILE => 1112000102ea008.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 2771 | PROJECT NUMBER & PHASE 11120001021

FIGURE 2B: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH



Foundation Report
Interstate-5/GeneseeAvenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 3: PROJECT PROFILE



Wall13.dgn 1/16/2014 9:09:14 AM

Foundation Report
Interstate-5/GeneseeAvenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 4A: PROJECT CROSS SECTION

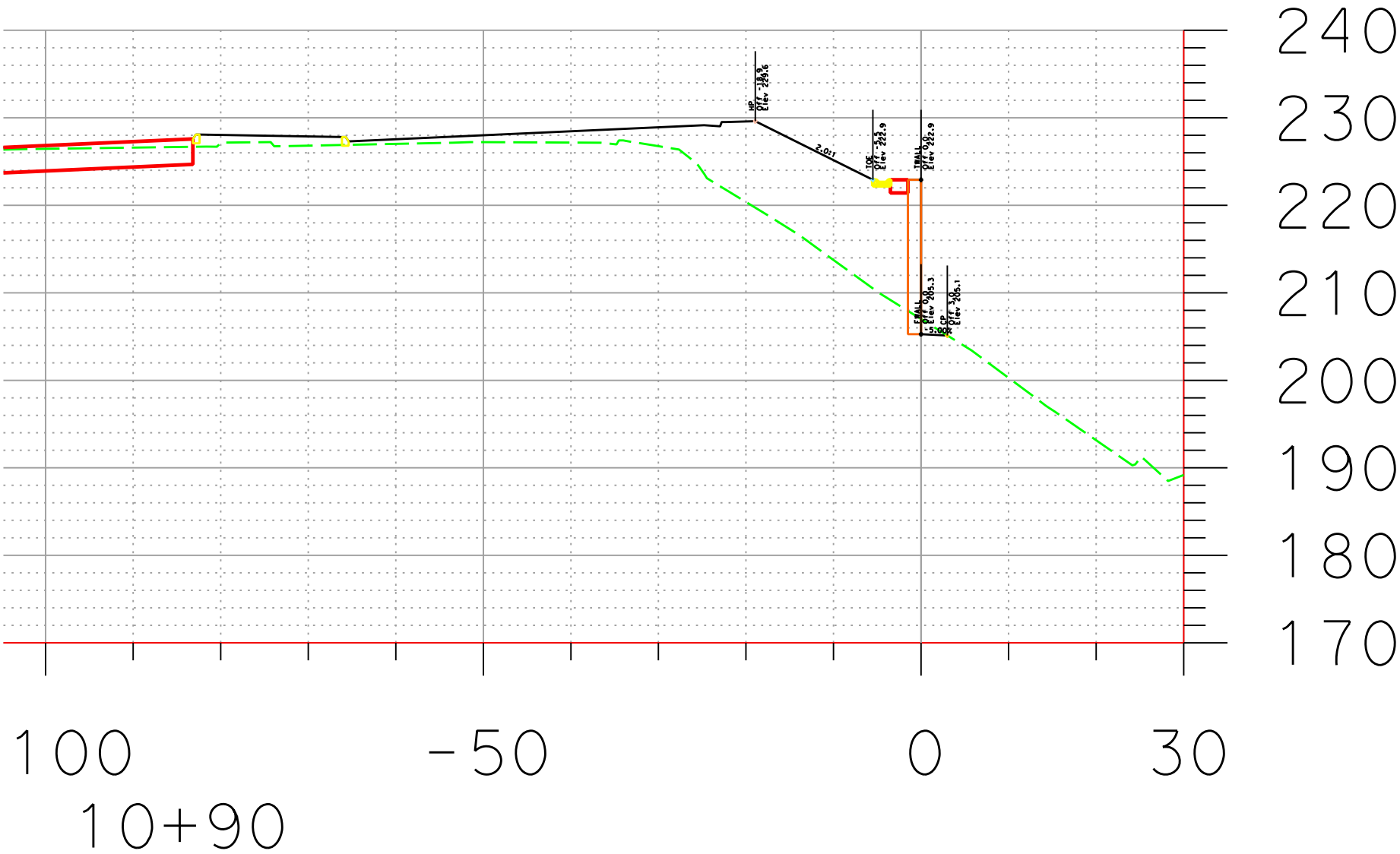


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FIGURE 4B: PROJECT CROSS SECTION

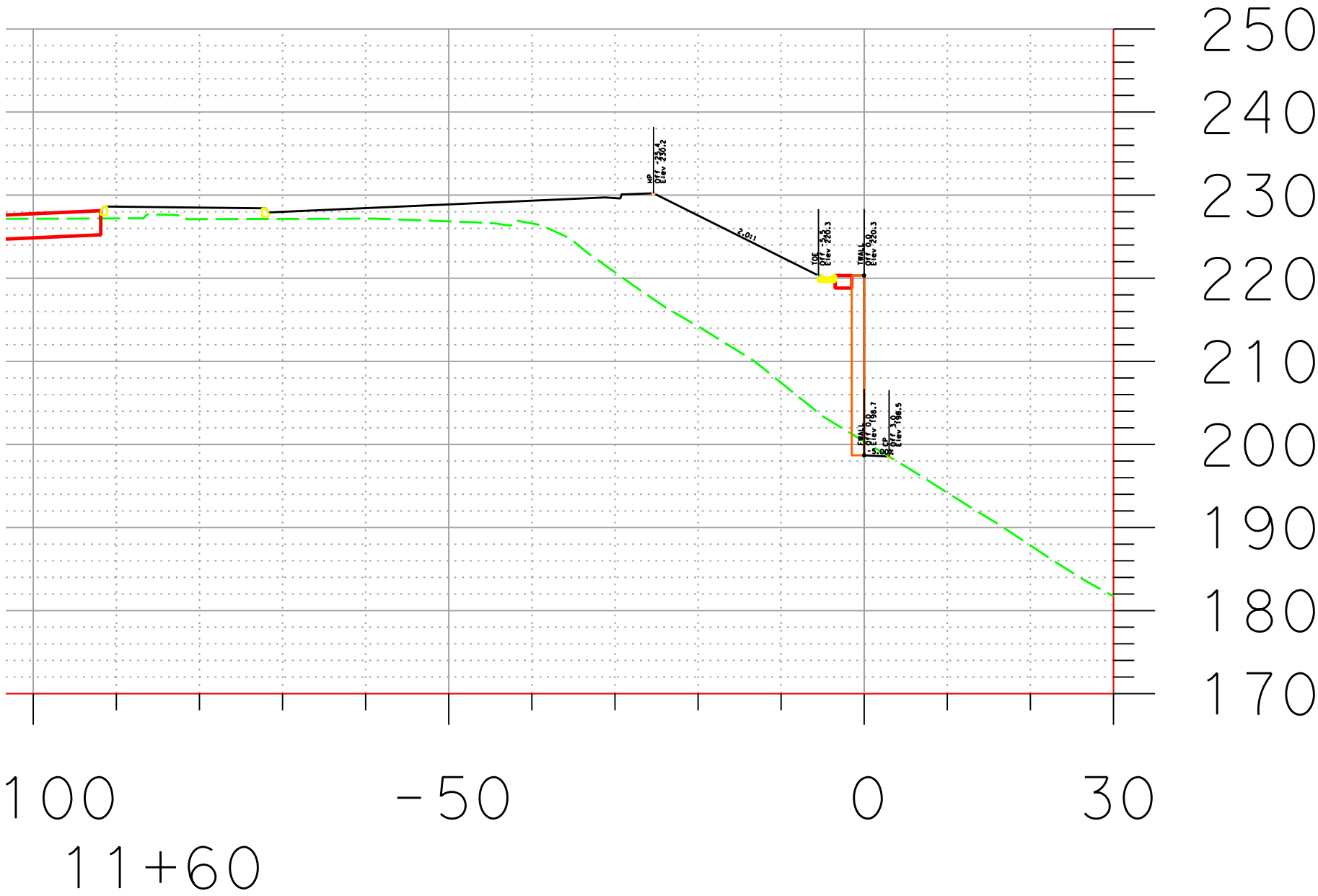

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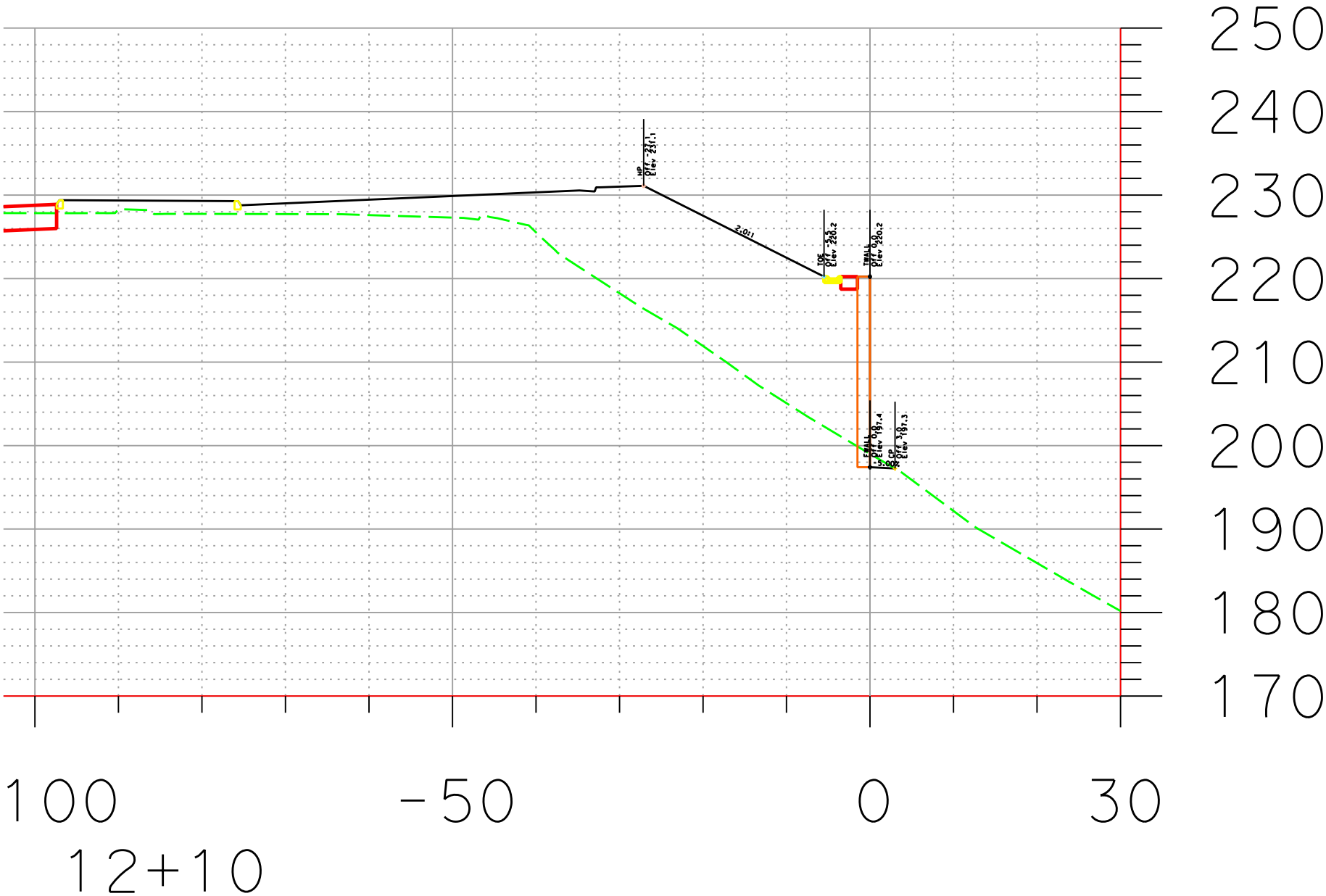
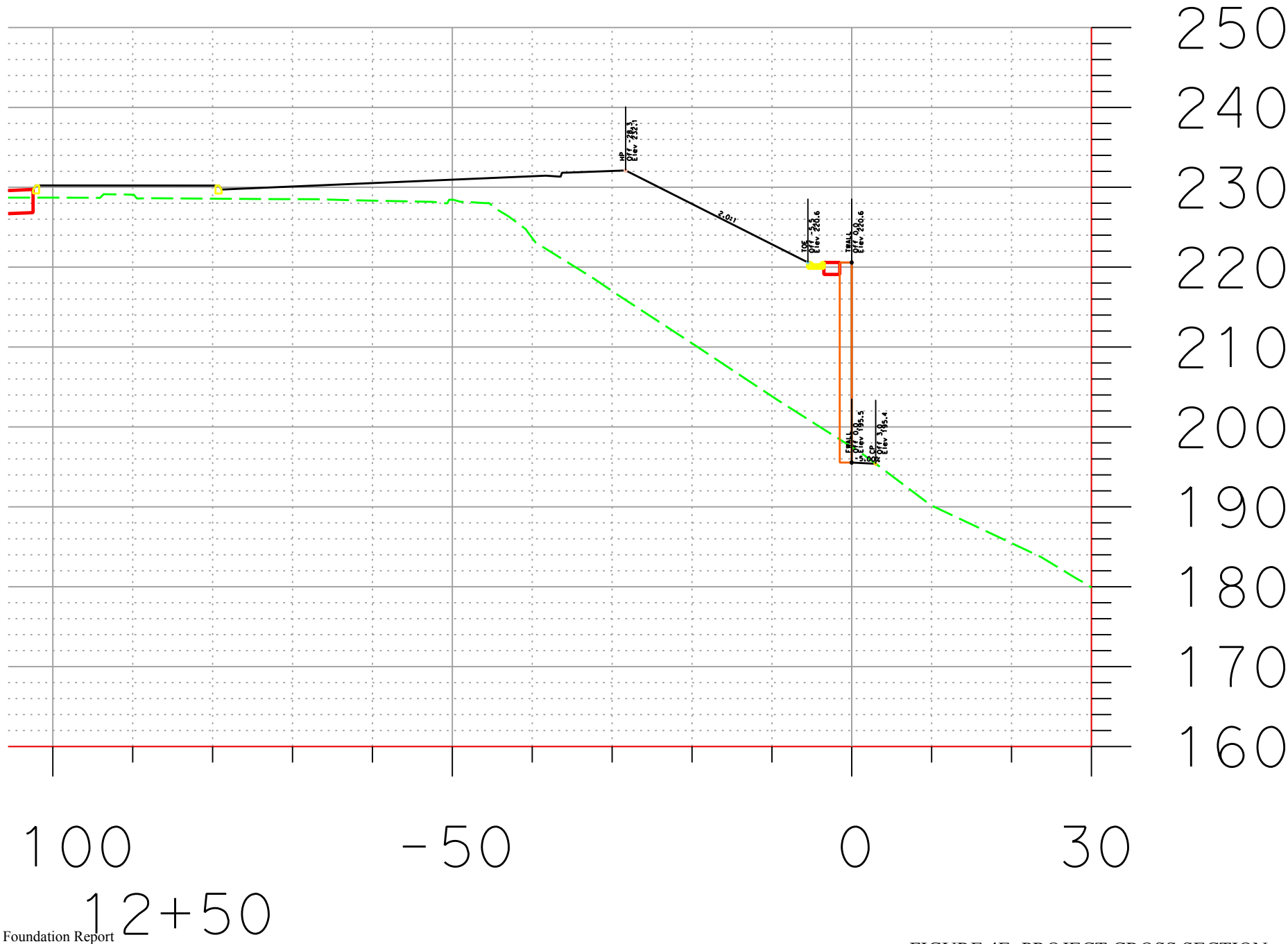
FIGURE 4C: PROJECT CROSS SECTION



Wall13.dgn 1/16/2014 9:16:21 AM

Foundation Report
Interstate-5/GeneseeAvenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 4D: PROJECT CROSS SECTION



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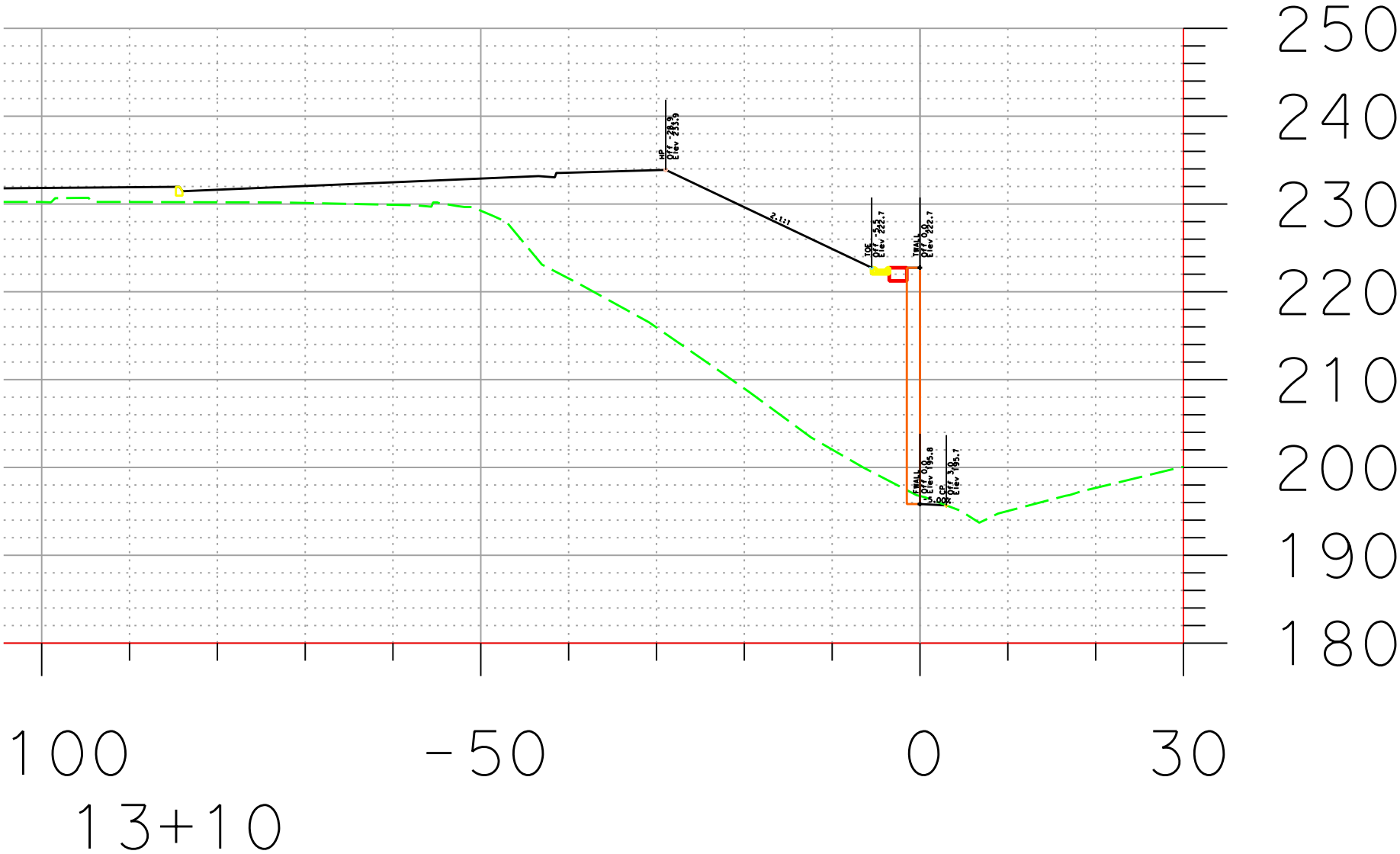
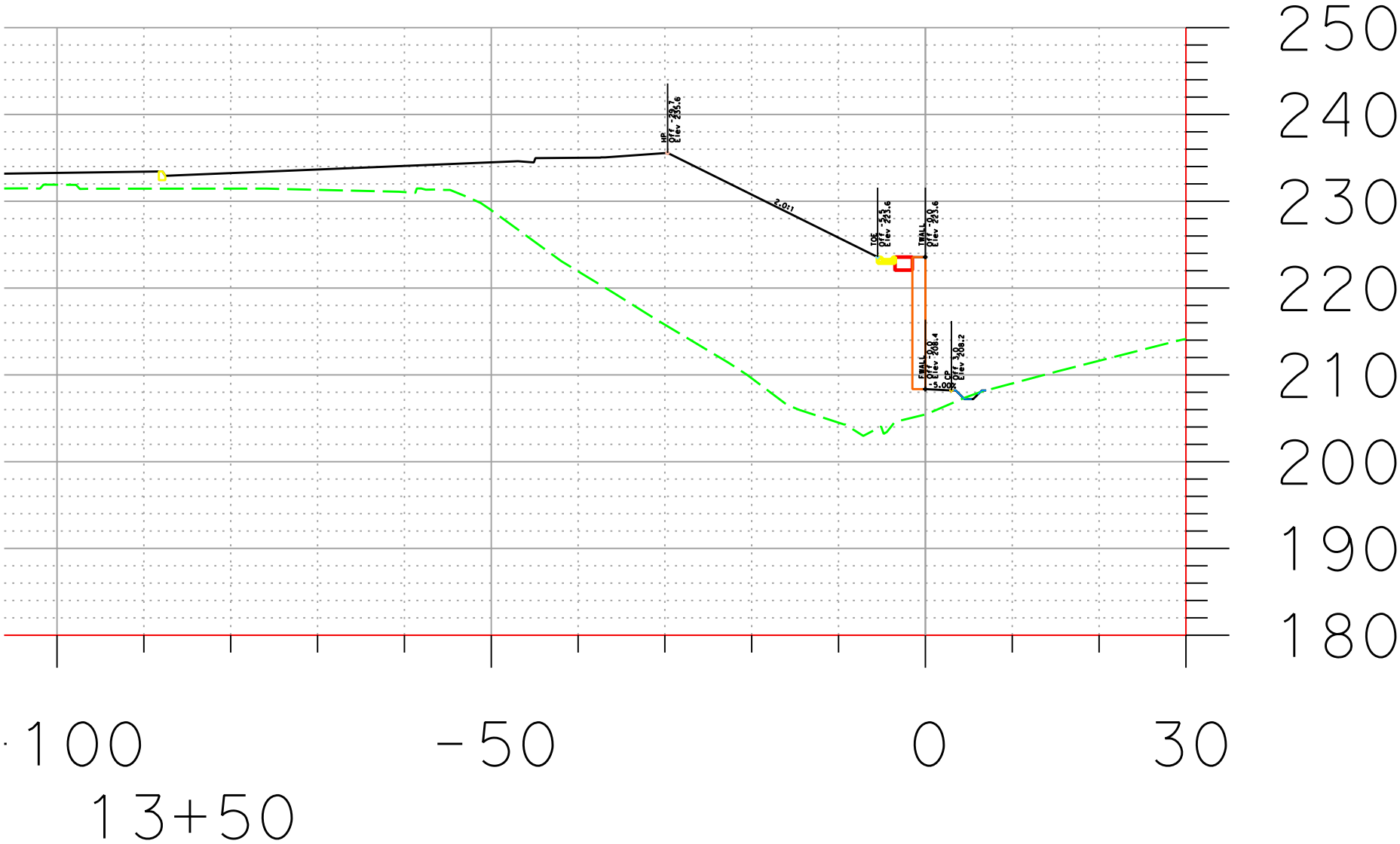
Foundation Report
Interstate 35/Genesee Avenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 4E: PROJECT CROSS SECTION



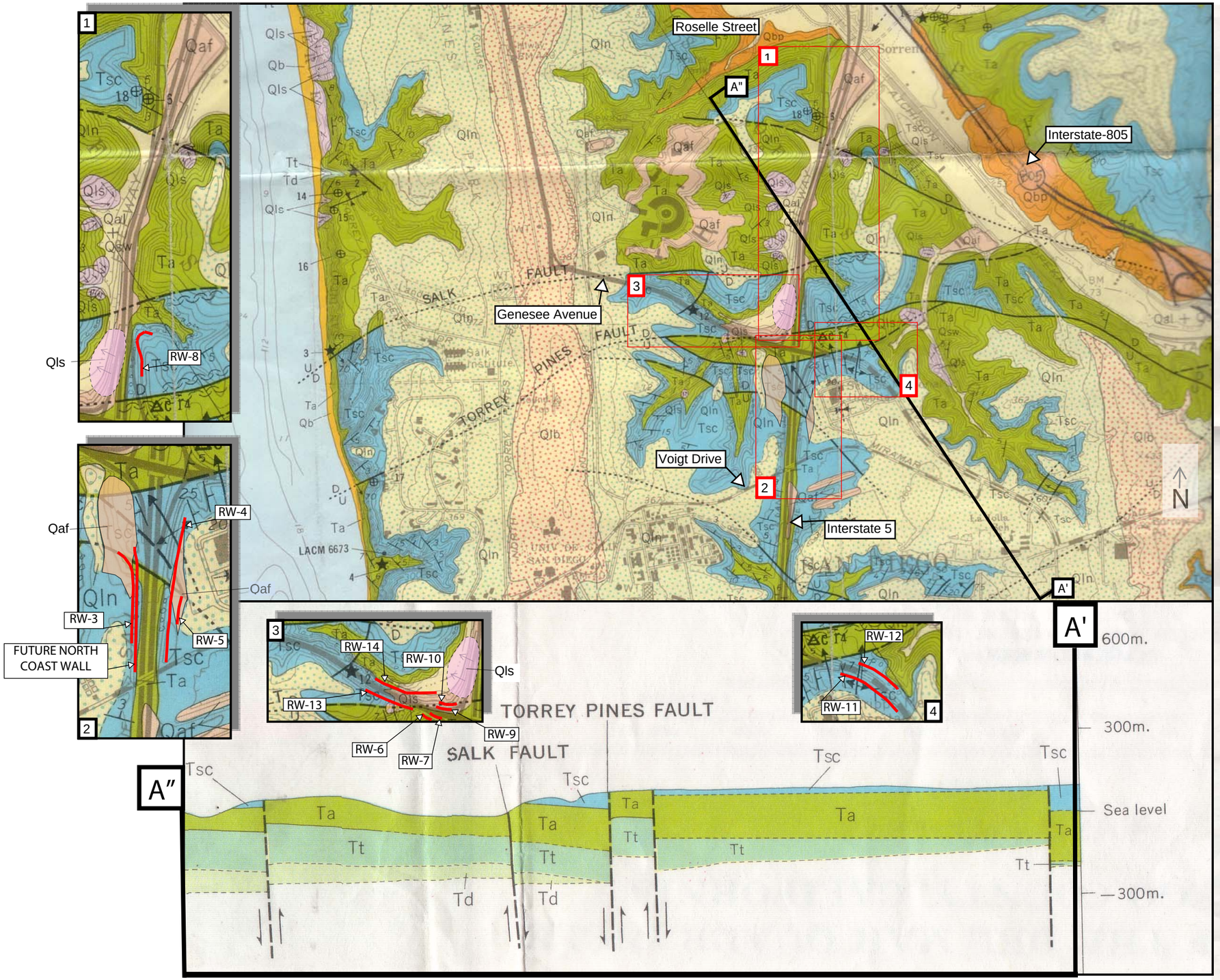
Wall13.dgn 1/16/2014 9:21:17 AM

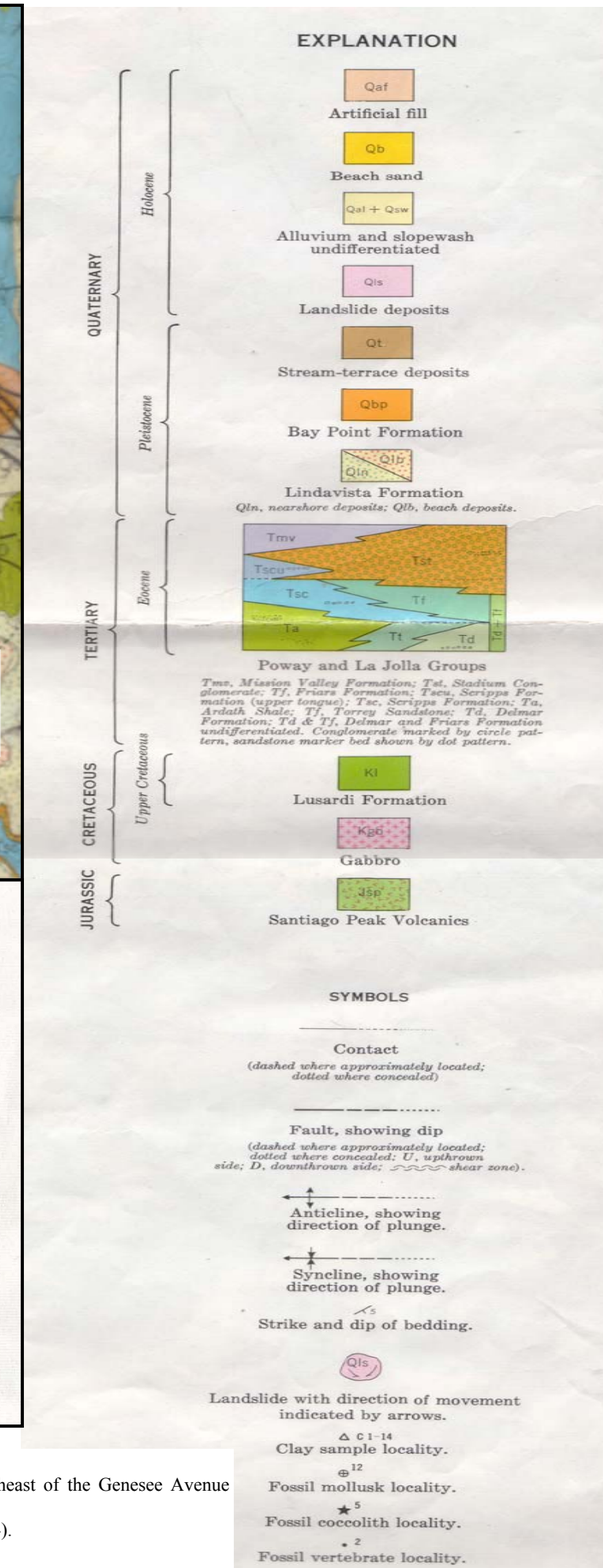
FIGURE 4F: PROJECT CROSS SECTION



Wall13.dgn 1/16/2014 9:22:27 AM

FIGURE 4G: PROJECT CROSS SECTION





Foundation Report
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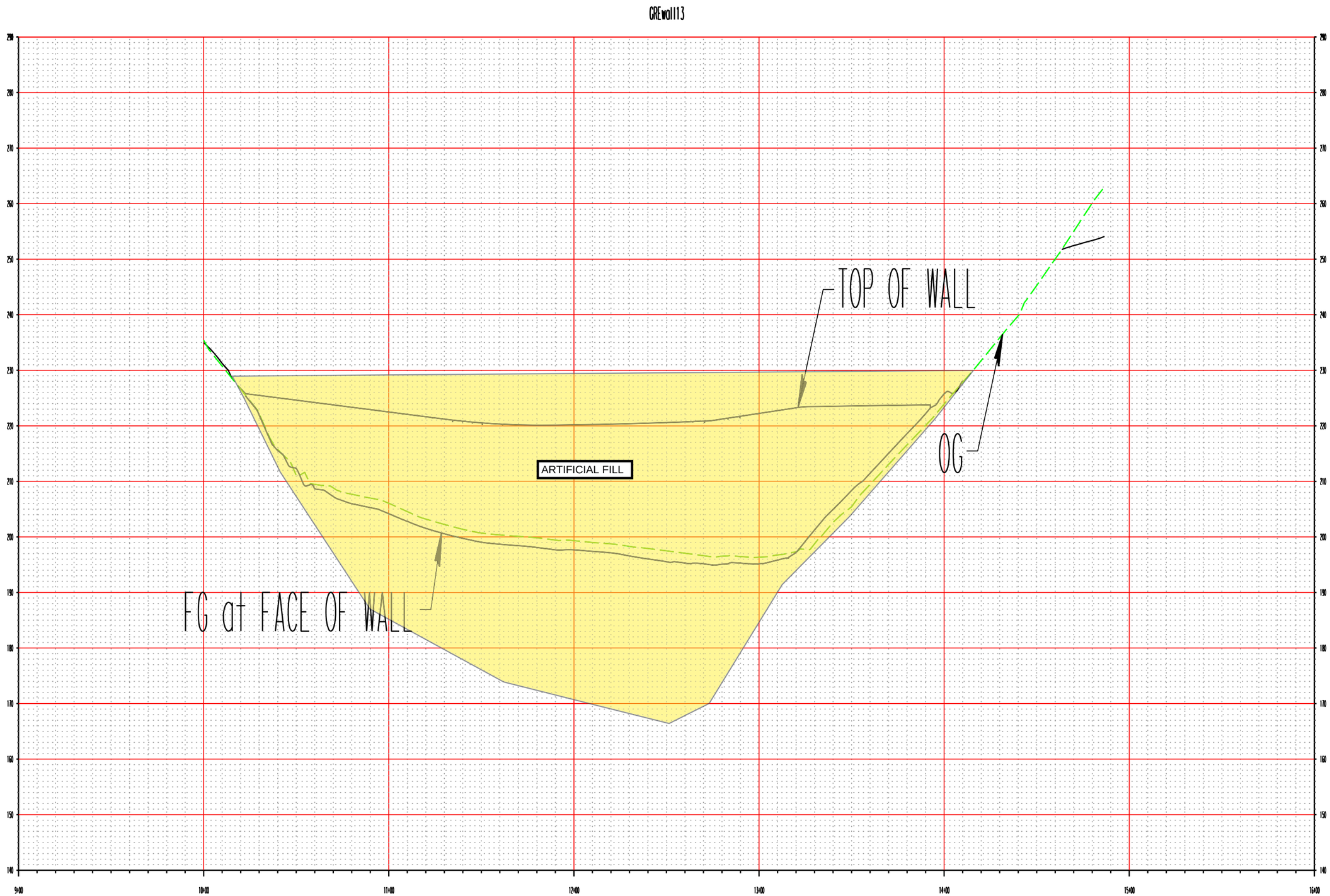
Retaining Wall-13
EA 11-022331/EFIS 1100000012

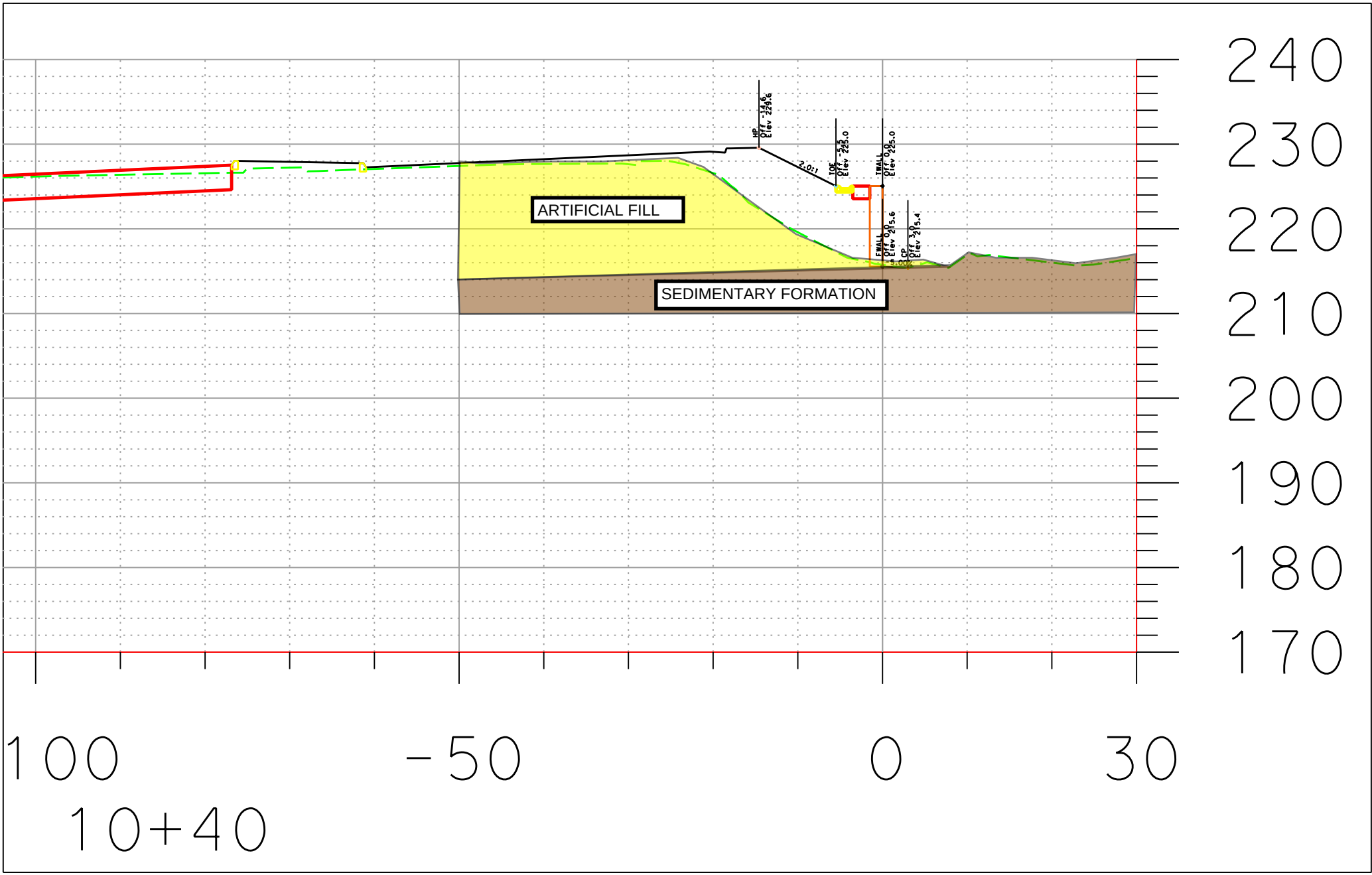
Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 6: GEOLOGIC PROFILE



Wall13.dgn 1/16/2014 9:09:14 AM

Foundation Report
Interstate-5/GeneseeAvenue Interchange Improvement Project
Retaining Wall-13
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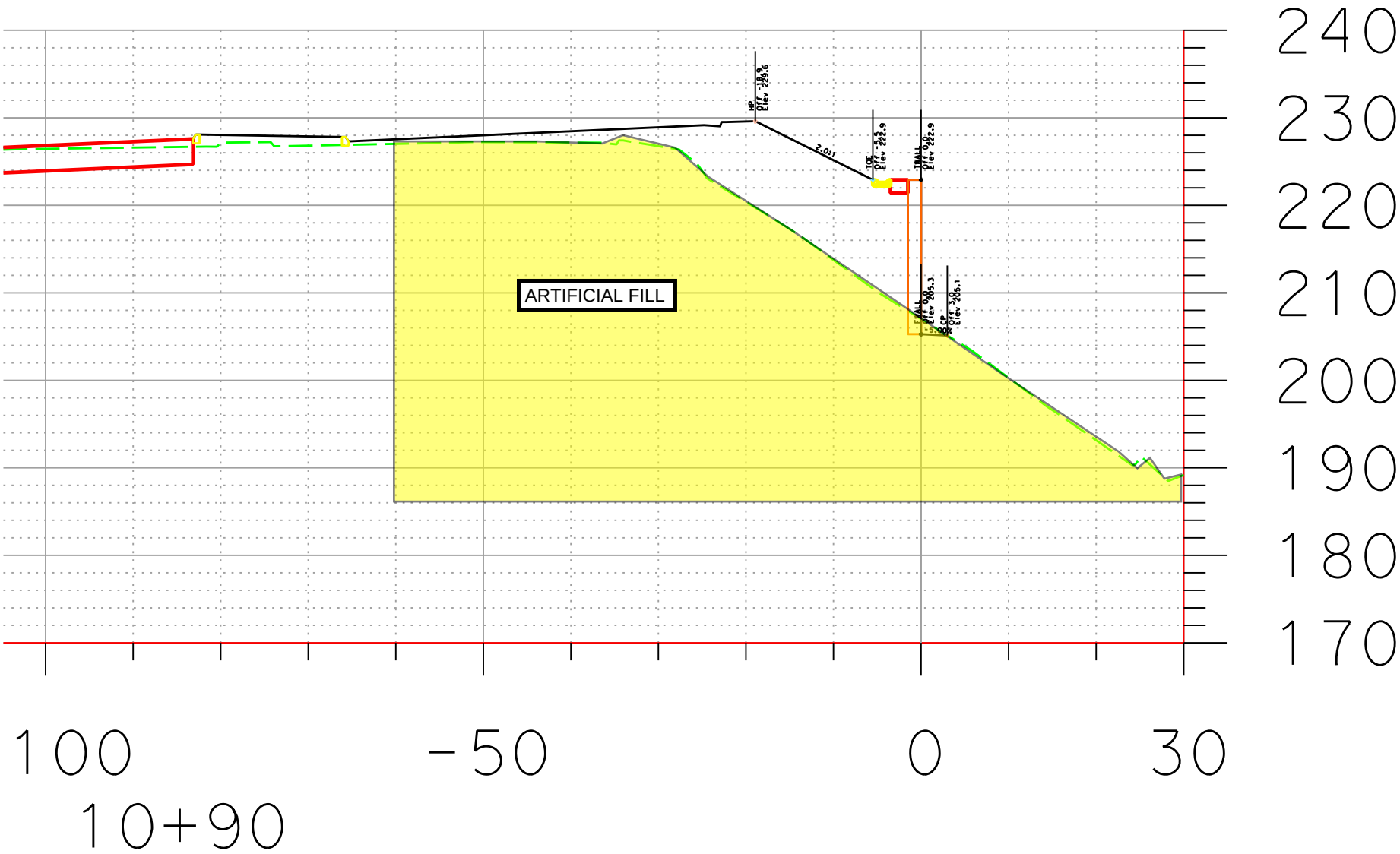
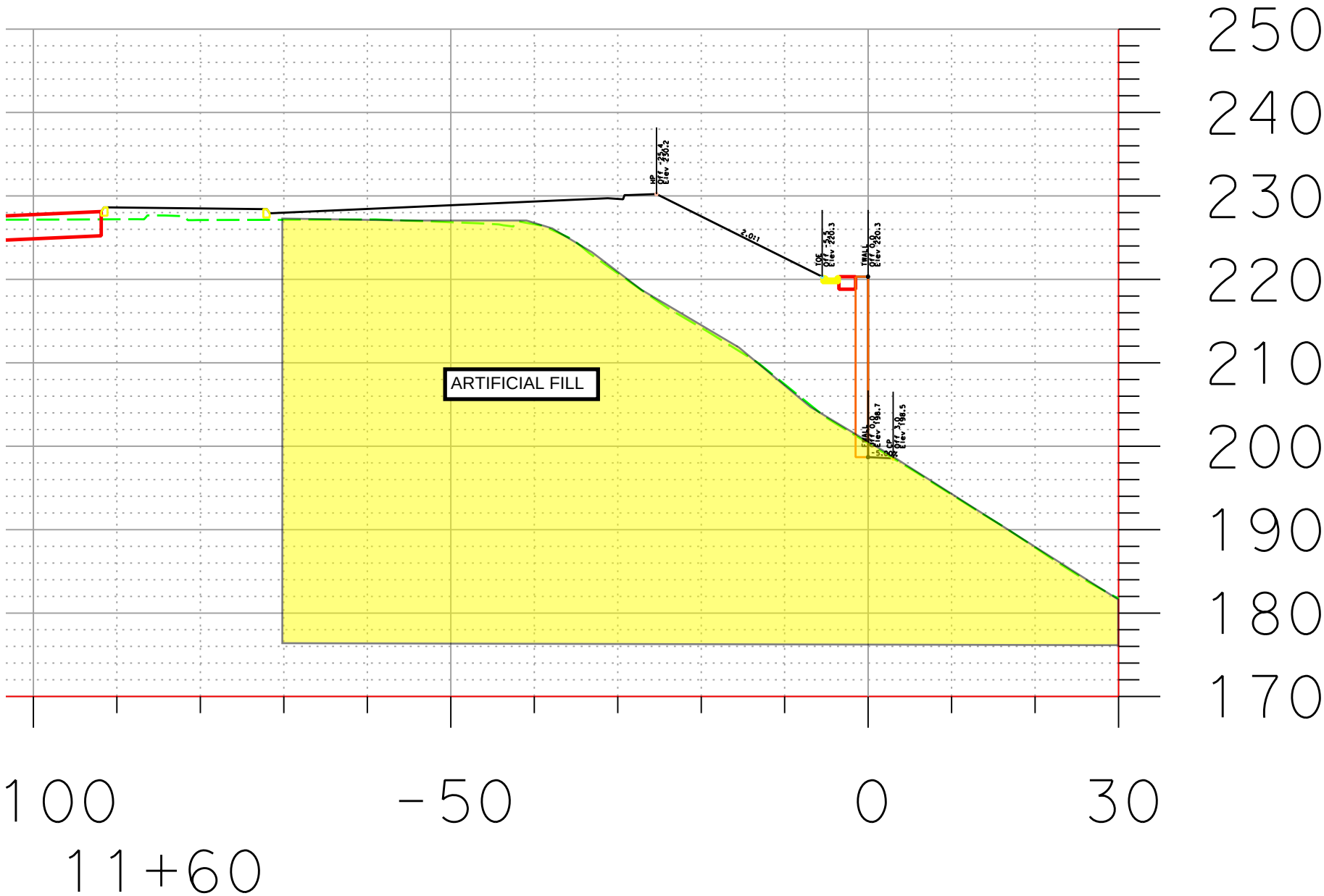
FIGURE 7A: GEOLOGIC CROSS SECTION



Wall13.dgn 1/16/2014 9:11:15 AM

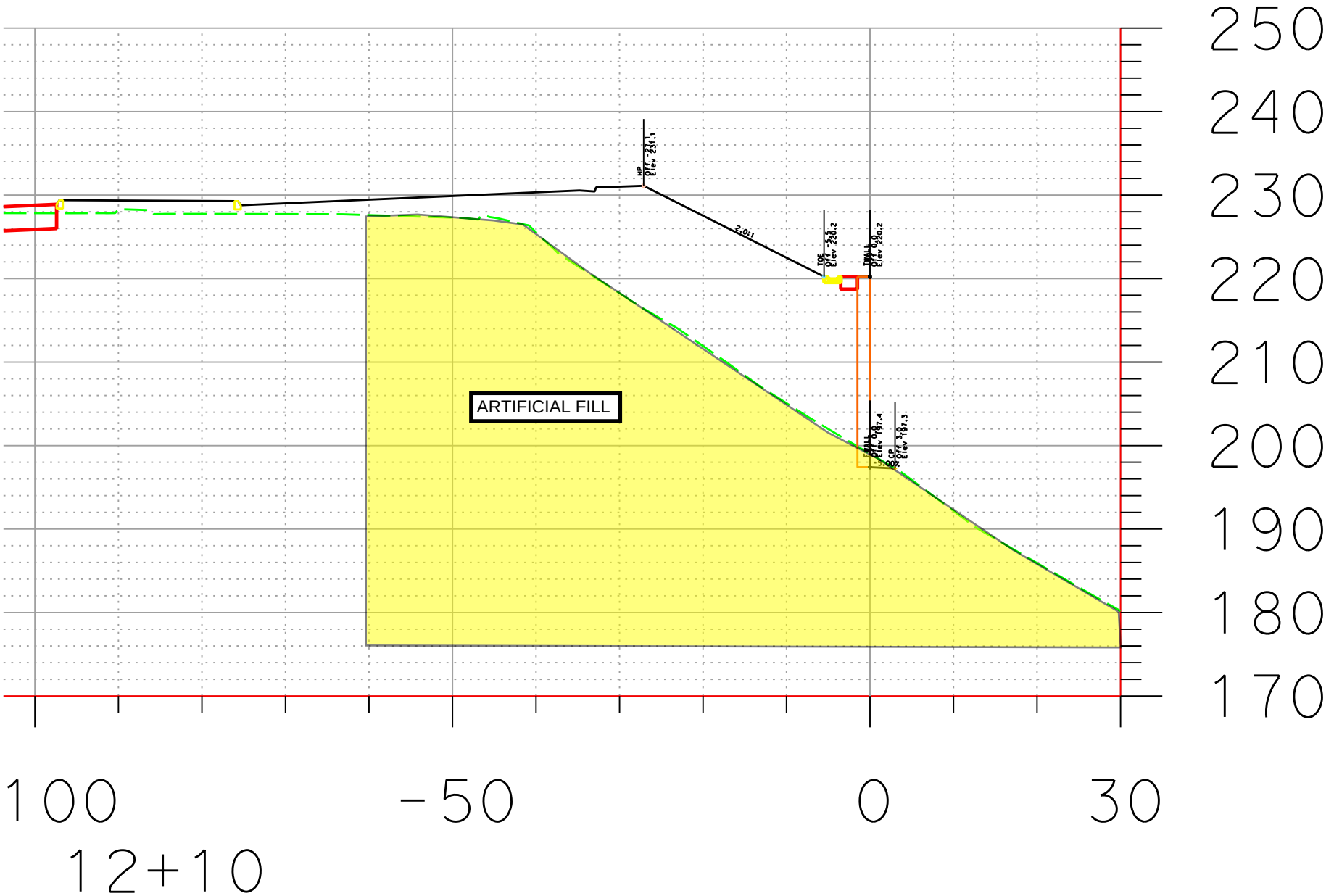
FIGURE 7B: GEOLOGIC CROSS SECTION



Wall13.dgn 1/16/2014 9:14:10 AM

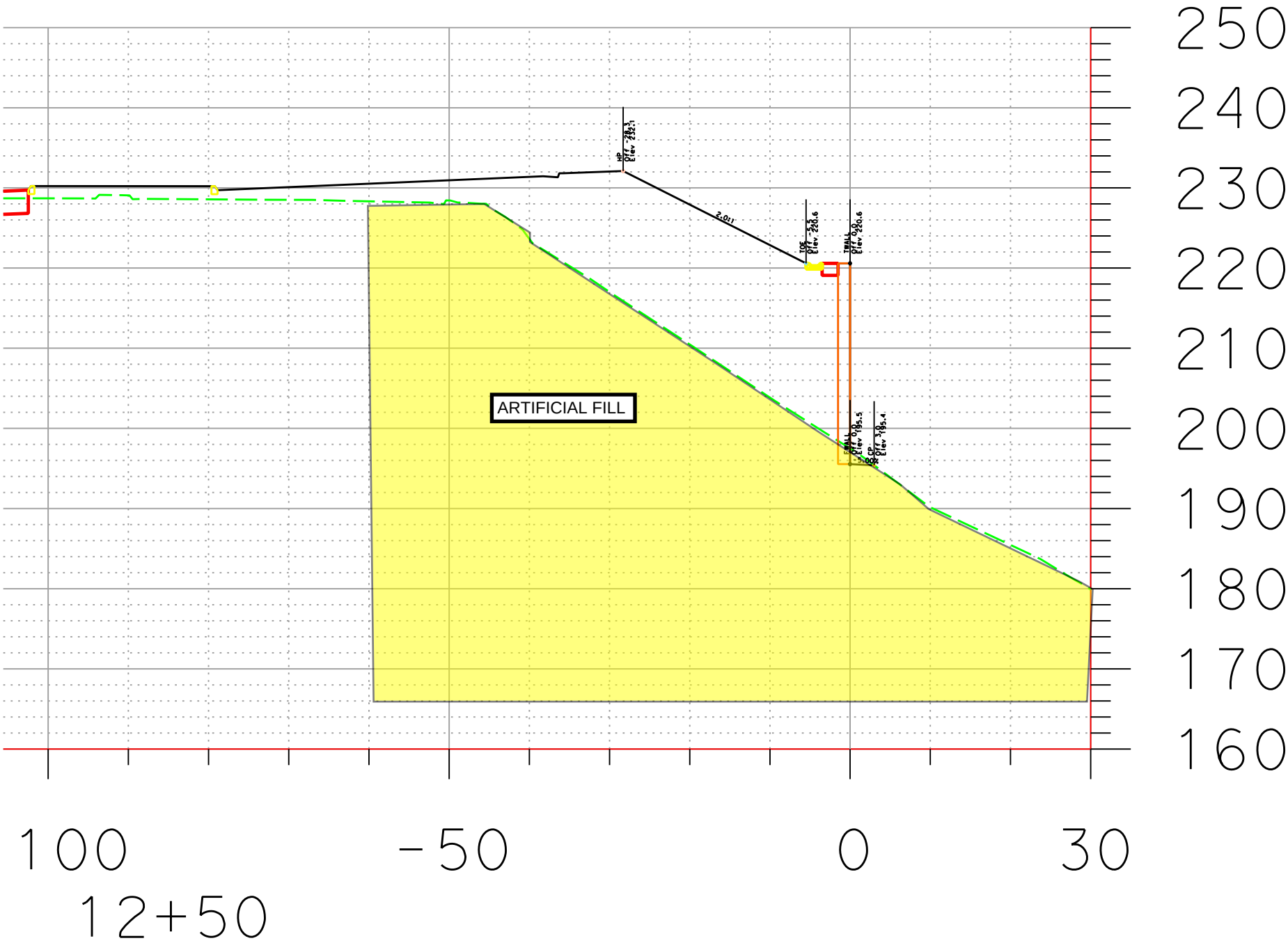
Foundation Report
Interstate-5/GeneseeAvenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 7C: GEOLOGIC CROSS SECTION



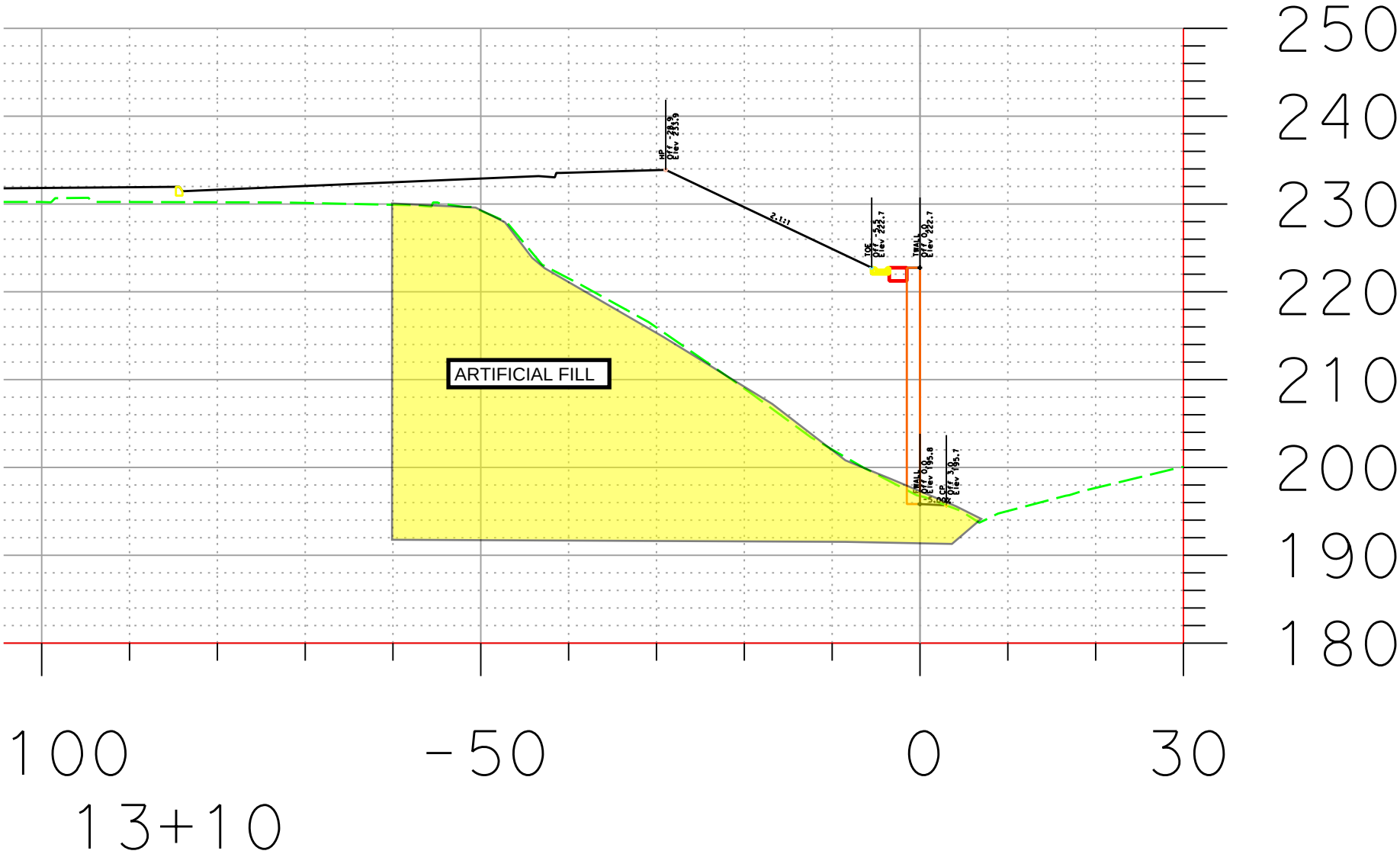
Wall13.dgn 1/16/2014 9:16:21 AM

FIGURE 7D: GEOLOGIC CROSS SECTION



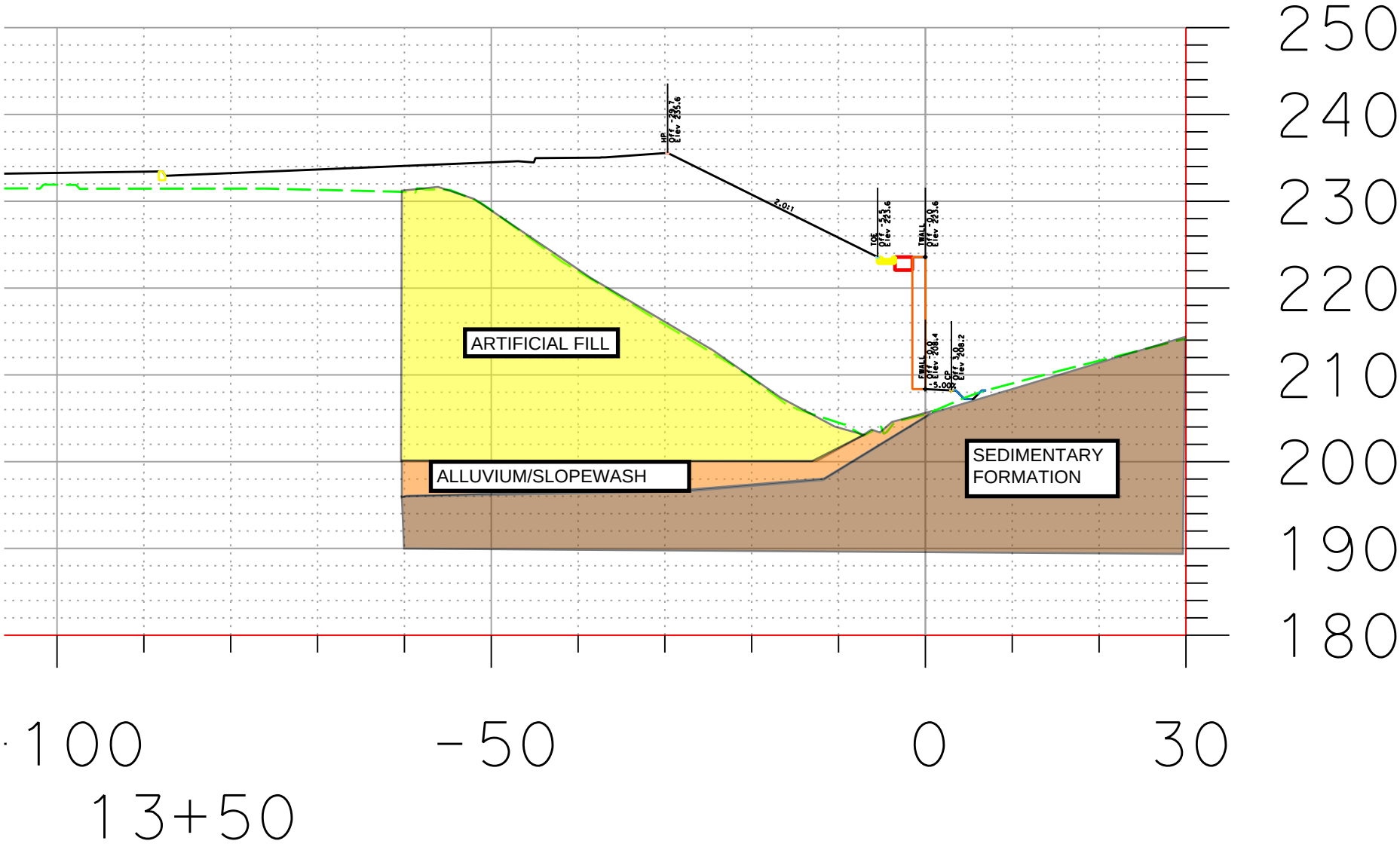
Wall13.dgn 1/16/2014 9:17:41 AM

FIGURE 7E: GEOLOGIC CROSS SECTION



Wall13.dgn 1/16/2014 9:21:17 AM

FIGURE 7F: GEOLOGIC CROSS SECTION



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Foundation Report
Interstate-5/GeneseeAvenue Interchange Improvement Project
Retaining Wall-13
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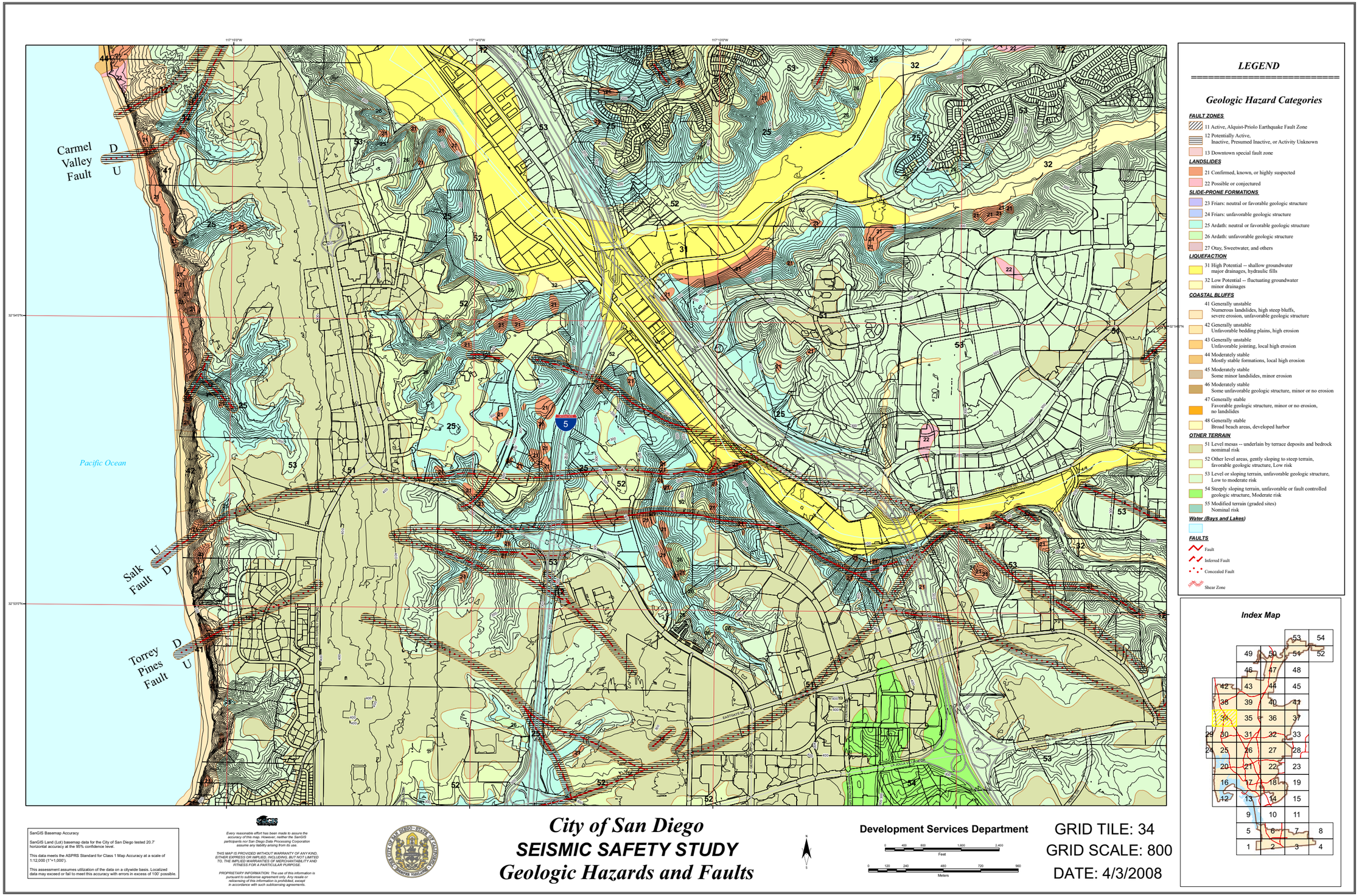
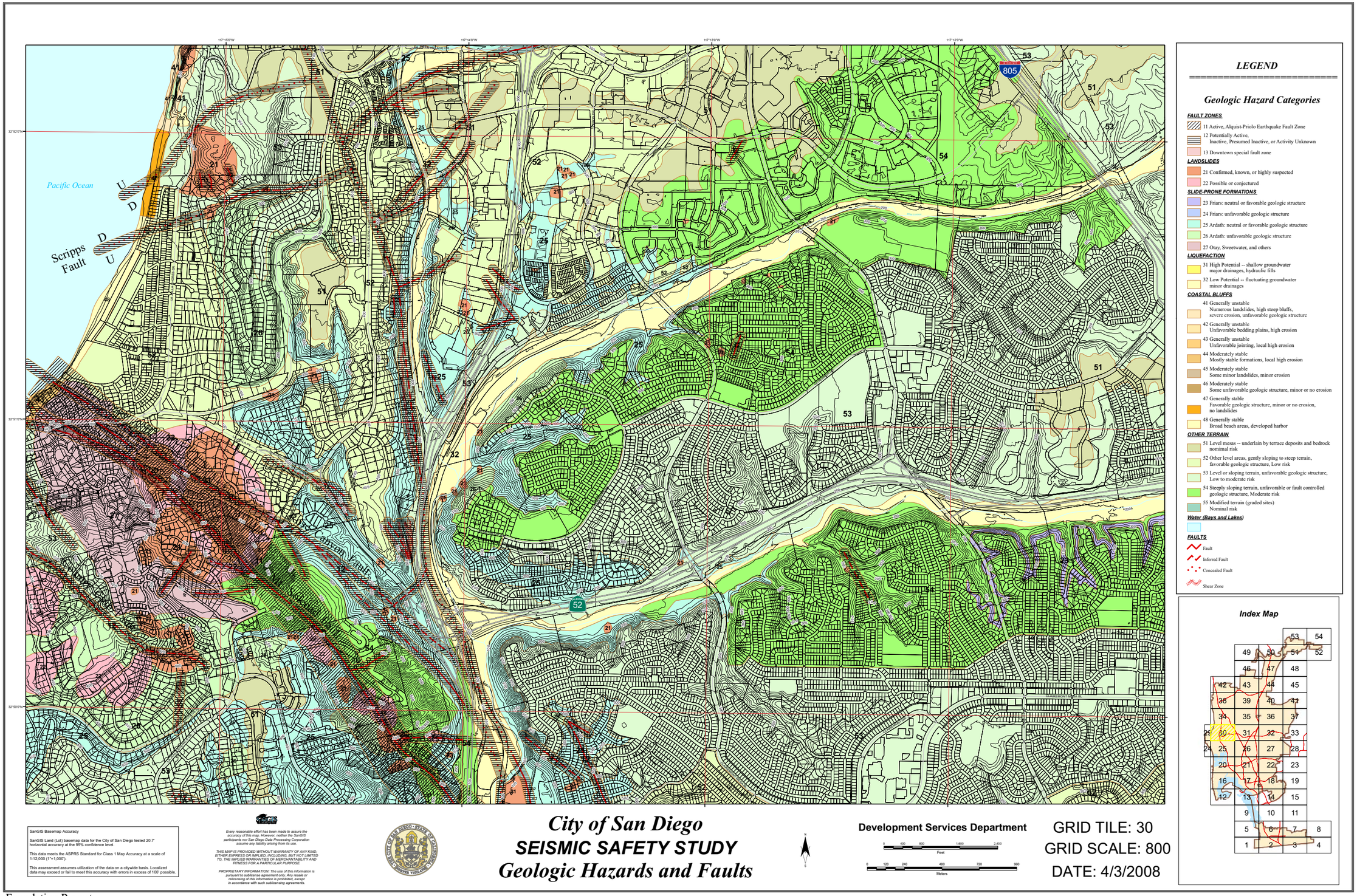
FIGURE 7G: GEOLOGIC CROSS SECTION



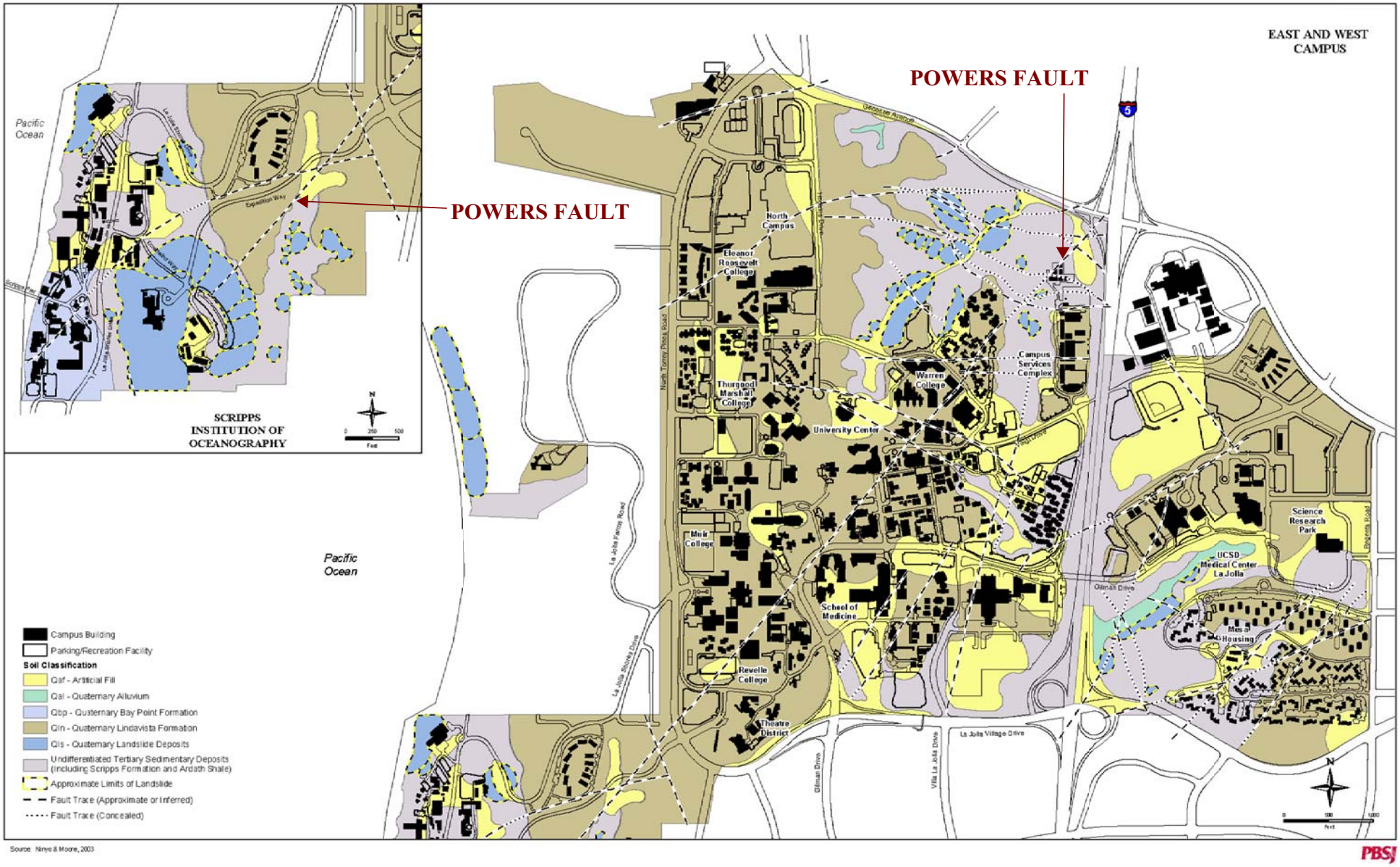
Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



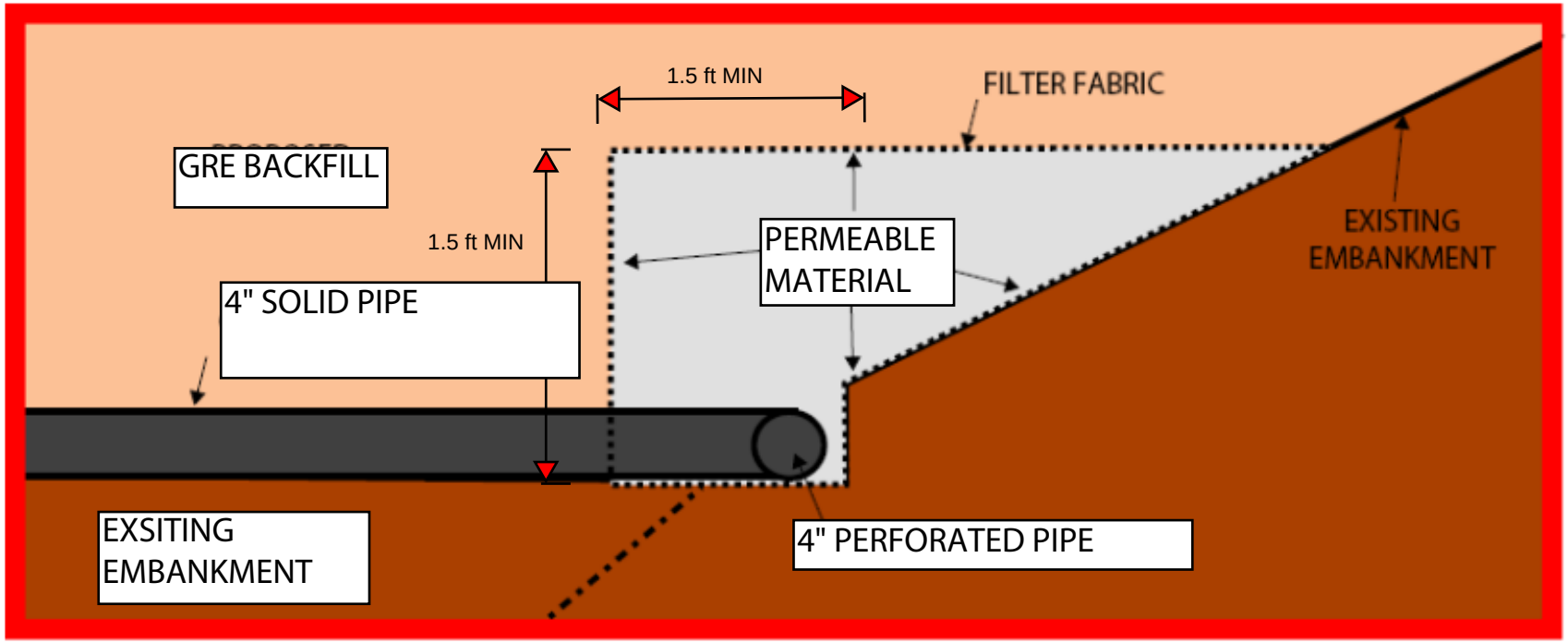
Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-13
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP



NOTE: DRAWINGS NOT TO SCALE

FIGURE 10: GRAVEL DRAIN DETAIL

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-479+28-23R-B01	1,300	7.50	150	298
011-481+74-40R-B02	2,600	5.43	56	191

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-13	Geosynthetically Reinforce Earth Wall	10+23 RW-13-Line	13+93 RW-13-Line	Artificial Fill	33	120	121
				GRE Backfill	33	120	121

Notes: φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 4A: GEOSYTHETICALLY REINFORCED EARTH WALL PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-13	Geosynthetically Reinforce Earth Wall	10+22.58 RW-13-Line	10+62.58 RW-13-Line	40	19.5	Flat	2:1	Vertical	Fill
		10+62.58 RW-13-Line	10+82.58 RW-13-Line	20	22.5	Varies	2:1	Vertical	Fill
		10+82.58 RW-13-Line	11+02.58 RW-13-Line	20	22.5	Varies	2:1	Vertical	Fill
		11+02.58 RW-13-Line	11+52.58 RW-13-Line	50	27	Varies	2:1	Vertical	Fill
		11+52.58 RW-13-Line	12+12.58 RW-13-Line	60	27	Varies	2:1	Vertical	Fill
		12+12.58 RW-13-Line	12+72.58 RW-13-Line	60	30	Varies	2:1	Vertical	Fill
		12+72.58 RW-13-Line	13+22.58 RW-13-Lne	50	33	Varies	2:1	Vertical	Fill
		13+22.58 RW-13-Line	13+52.58 RW-13-Line	30	30	Flat	2:1	Vertical	Fill
		13+52.58 RW-13-Line	13+72.58 RW-13-Line	20	19.5	Flat	2:1	Vertical	Fill
		13+72.58 RW-13-Line	13+92.50 RW-13-Line	23	12	Flat	2:1	Vertical	Fill

Notes: L = Wall Length
H_{MAX} =Approximate Maximum Wall Height including embedment
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4B: GEOSYTHETICALLY REINFORCED EARTH WALL PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Vertical Spacing Reinforcement Layers (Feet)	Reinforcement Embedment Length (Feet)	Long Term Design Strength (lbs/ft)
RW-13	Geosynthetically Reinforce Earth Wall	10+22.58 RW-13-Line	10+62.58 RW-13-Line	1.5	10	3400
		10+62.58 RW-13-Line	10+82.58 RW-13-Line	1.5	20	3400
		10+82.58 RW-13-Line	11+02.58 RW-13-Line	1.5	30	3400
		11+02.58 RW-13-Line	11+52.58 RW-13-Line	1.5	34	3400
		11+52.58 RW-13-Line	12+12.58 RW-13-Line	1.5	36	3400
		12+12.58 RW-13-Line	12+72.58 RW-13-Line	1.5	36	4400
		12+72.58 RW-13-Line	13+22.58 RW-13-Lne	1.5	28	3400
		13+22.58 RW-13-Line	13+52.58 RW-13-Line	1.5	24	3400
		13+52.58 RW-13-Line	13+72.58 RW-13-Line	1.5	15	3400
		13+72.58 RW-13-Line	13+92.50 RW-13-Line	1.5	10	3400

TABLE 5: DESIGN PARAMETERS FOR GEOSYNTHETICALLY REINFORCED EARTH WALL FACING

Retaining Wall	Wall Type	Beginning Station	Ending Station	Design Pressure (lbs/ft^2)	Vertical Anchor Spacing (ft)	Horizontal Anchor Spacing (ft)	Minimum Anchor Length (ft)	Minimum Design Pullout Resistance (lbs)	Minimum Reinforcing Bar Diameter (in)
RW-13	Geosynthetically Reinforce Earth Wall	10+22.58 RW-13-Line	13+92.50 RW-13-Line	80	6	6	10	3000	1.0

Notes: Applied Pressure = Horizontal pressure generated along a one square foot section of the façade multiplied by a factor of safety of 2.0.

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA

DIST.	COUNTY	ROUTE	PREFIX	PROJECT NO.	TOTAL SHEETS
XI	SD	5	15-1/15	118	197

BRIDGE ENGINEER — CIVIL ENGINEER — LICENSE NO.

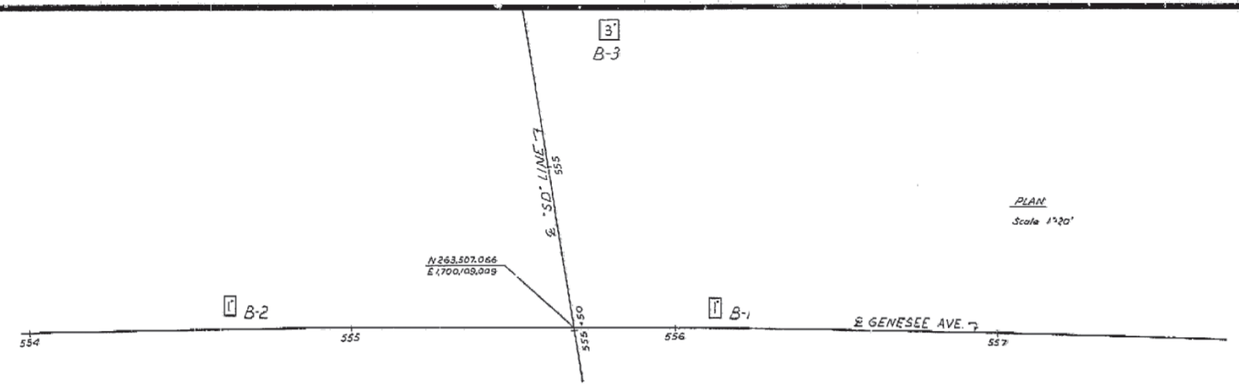
DATE APPROVED July 20, 1964

BRIDGE DEPARTMENT

BENCH MARK

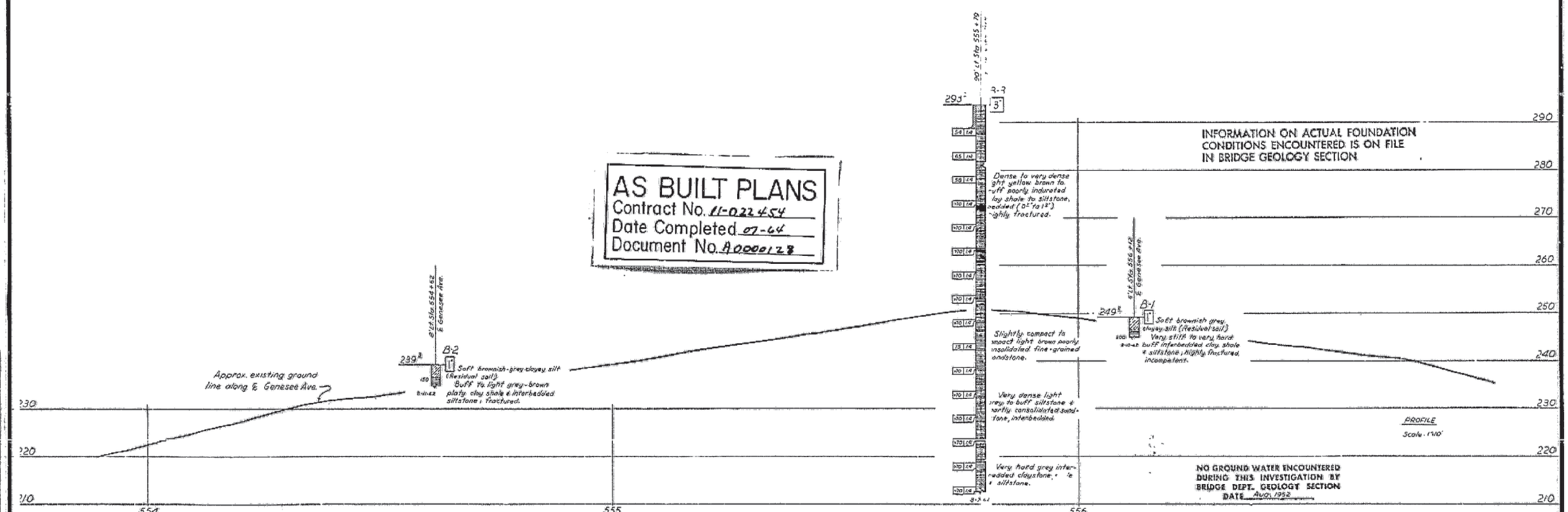
TBM #1 - ℄ Stake, sta. 554+86 "SD" top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV 278.66



PLAN
Scale 1"=20'

AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128



CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

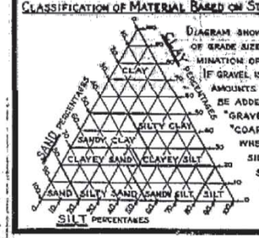


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

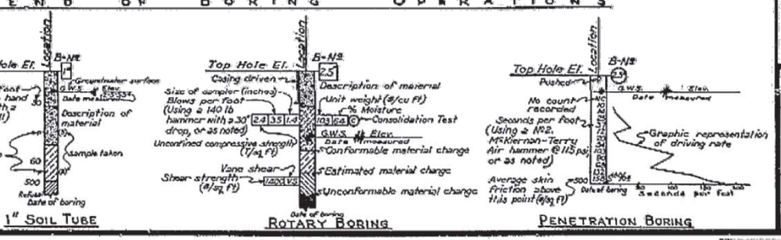
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2¼" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

GENESEE AVENUE OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted | BRIDGE 57-527 | FILE | DRAWING 57527-9

PREL. DRAWING NO. P-

5-4

APPENDIX II

FIELD EXPLORATION DATA

DIST	COUNTY	ROUTE	POST MILES (KP) TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	5	R28.8/R55.3		

CERTIFIED ENGINEERING GEOLOGIST — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Michael M. Fordham — NO. C61341 — EXP. 6-30-13 — CIVIL — STATE OF CALIFORNIA

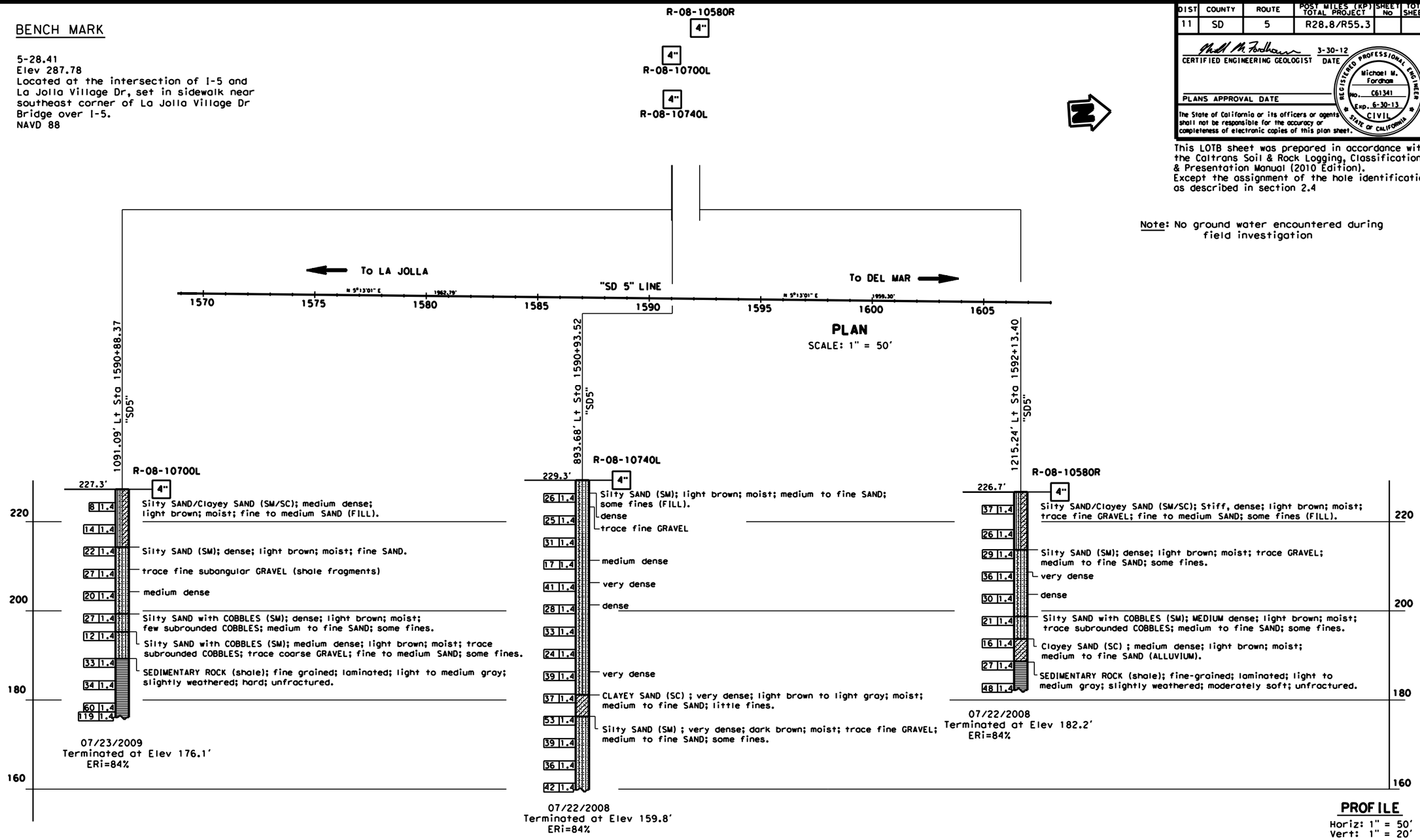
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition). Except the assignment of the hole identification as described in section 2.4

Note: No ground water encountered during field investigation

BENCH MARK

5-28.41
Elev 287.78
Located at the intersection of I-5 and La Jolla Village Dr, set in sidewalk near southeast corner of La Jolla Village Dr Bridge over I-5.
NAVD 88



ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	RETAINING WALL NO. 13 AND 14
FUNCTIONAL SUPERVISOR NAME: B. Hinman	DRAWN BY: K. Le; CHECKED BY: Z. Yazdani	FIELD INVESTIGATION BY: M. Fordham	DESIGN BRANCH	POST MILES (KP) R28.8/R55.3	LOG OF TEST BORINGS 1 of 4

OOS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — CU 3643 EA 1100000012 — FILE => $REQUEST — DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES — SHEET OF

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

RW-13,14 1 OF 4.dgn 5/17/2012 8:56:57 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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.

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

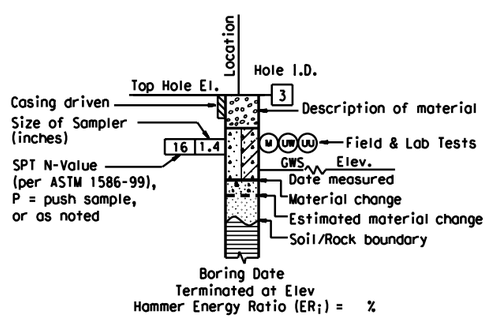
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R RW RC P	Rotary drilled boring (conventional) Rotary drilled with self-casing wire-line Rotary core with continuously-sampled, self-casing wire-line Rotary percussion boring (air)
Size	R RC	Rotary drilled diamond core Rotary drilled rock core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778)
[ ]	O	Other (note on LOTB)

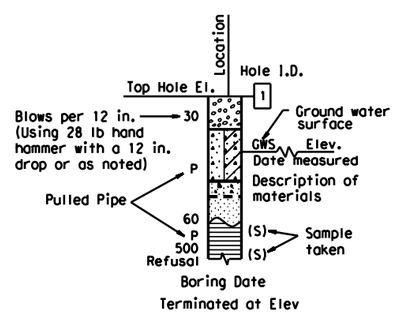
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

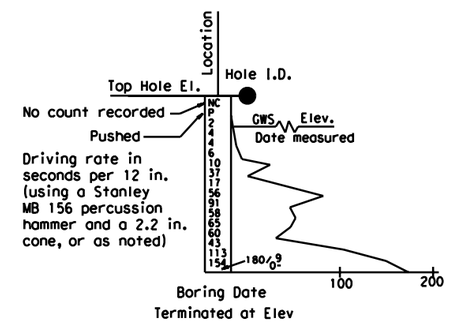
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



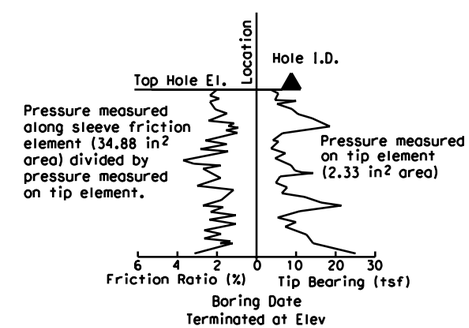
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

ENGINEERING SERVICES	MATERIALS AND GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH X	BRIDGE NO. / POST MILE 28.6/30.1	RETAINING WALL NO. 13 AND 14 LOG OF TEST BORINGS 2 OF 4
	PREPARED BY: W. Tang 02/12				

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121
CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET X | OF X

FILE => $REQUEST

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

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL		
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

ENGINEERING SERVICES

MATERIALS AND GEOTECHNICAL SERVICES

PREPARED BY: W. Tang 02/12

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH X

BRIDGE NO. — POST MILE 28.6/30.1

RETAINING WALL NO. 13 AND 14

LOG OF TEST BORINGS 3 OF 4

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121 CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

RW-13,14 3of4.dgn 5/17/2012 8:57:40 AM

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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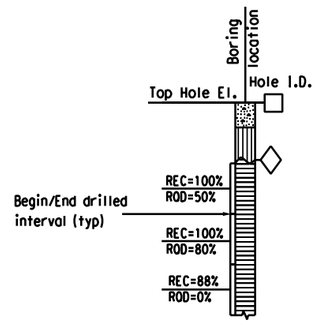
PERCENT CORE RECOVERY (REC) & ROCK QUALITY DESIGNATION (RQD)

$$REC = \frac{\sum \text{Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100\%$$

$$RQD = \frac{\sum \text{Length of intact core pieces} \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100\%$$



RQD* Indicates soundness criteria not met.

BEDDING SPACING

Description	Thickness / Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in. - 1 ft
Thinly Bedded	1 in. - 4 in.
Very Thinly Bedded	1/4 in. - 1 in.
Laminated	Less than 1/4 in.

LEGEND OF ROCK MATERIALS

- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows.
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily by a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures.
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

WEATHERING DESCRIPTORS FOR INTACT ROCK

Description	Diagnostic Features					General Characteristics
	Chemical Weathering-Discoloration and/or Oxidation		Mechanical Weathering-Grain Boundary Conditions (Disaggregation) Primarily for Granitics and Some Coarse-Grained Sediments	Texture and Leaching		
	Body of Rock	Fracture Surfaces		Texture	Leaching	
Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved	Minor leaching of some soluble minerals.	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened.
Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes."

ENGINEERING SERVICES

MATERIALS AND GEOTECHNICAL SERVICES

PREPARED BY: W. Tang 02/12

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH X

BRIDGE NO. — POST MILE 28.6/30.1

RETAINING WALL NO. 13 AND 14

LOG OF TEST BORINGS 4 OF 4

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121 CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

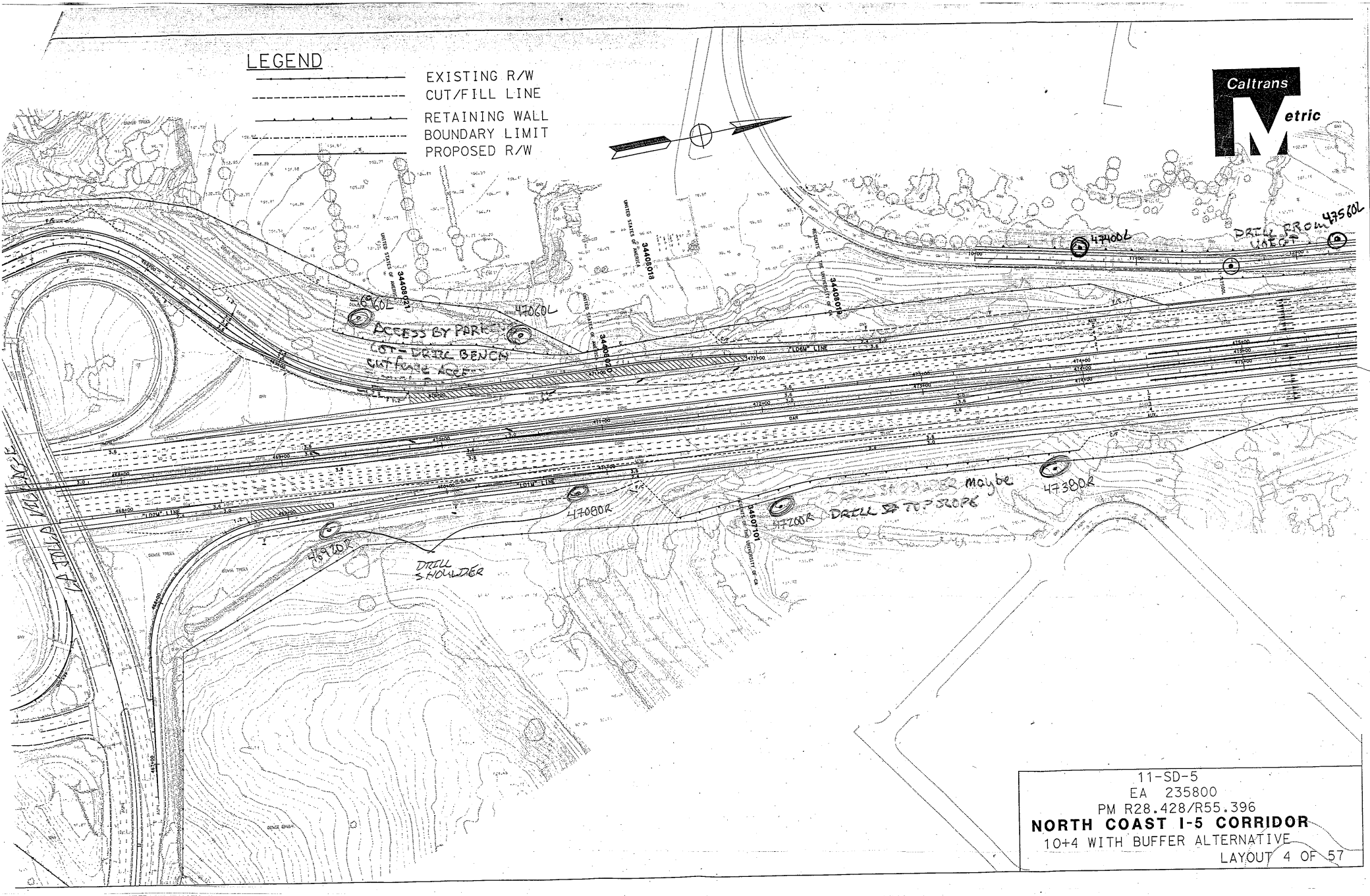
Approved by (Project Engineer or above)

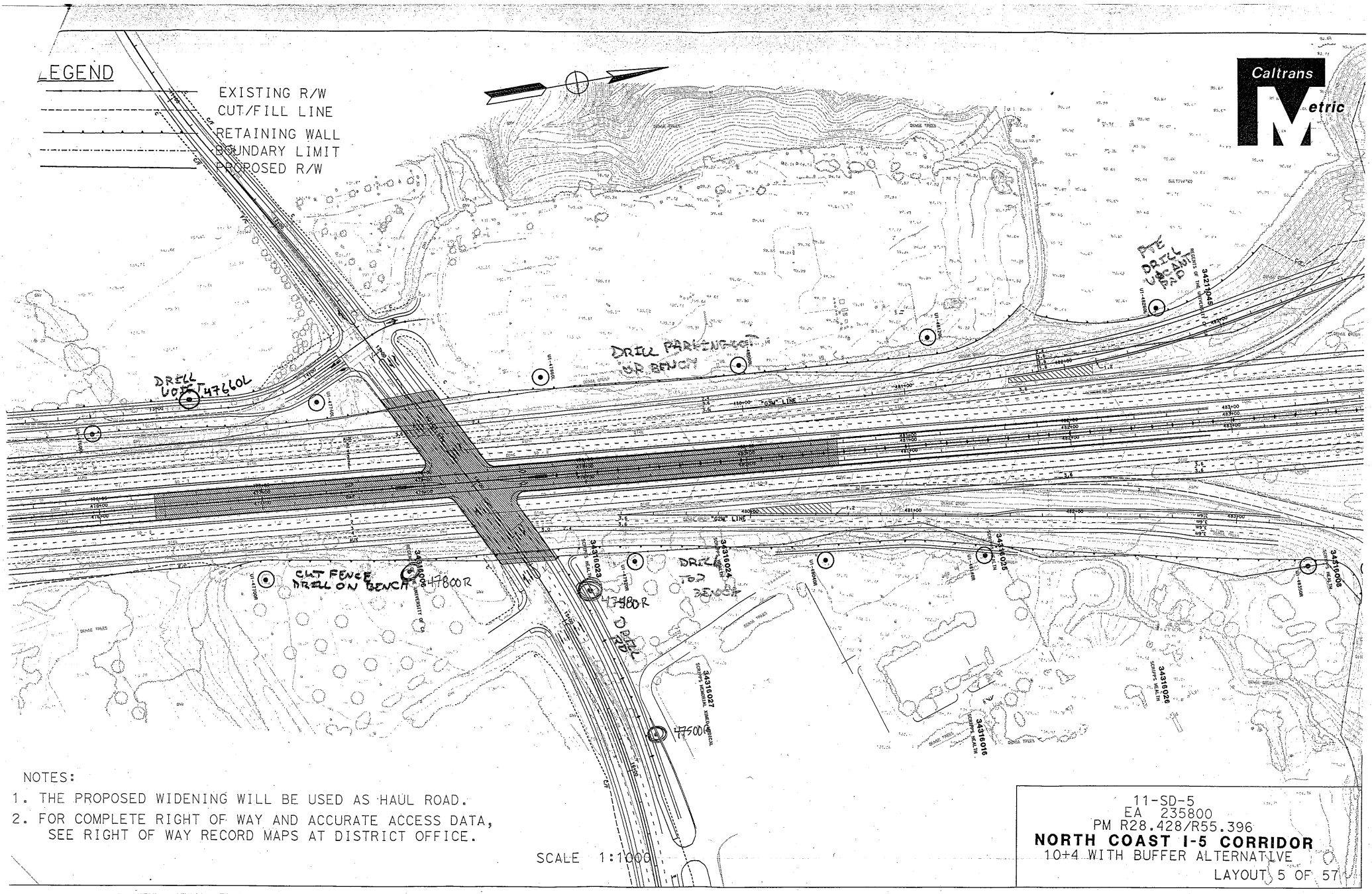
FOR SURVEYS USE ONLY

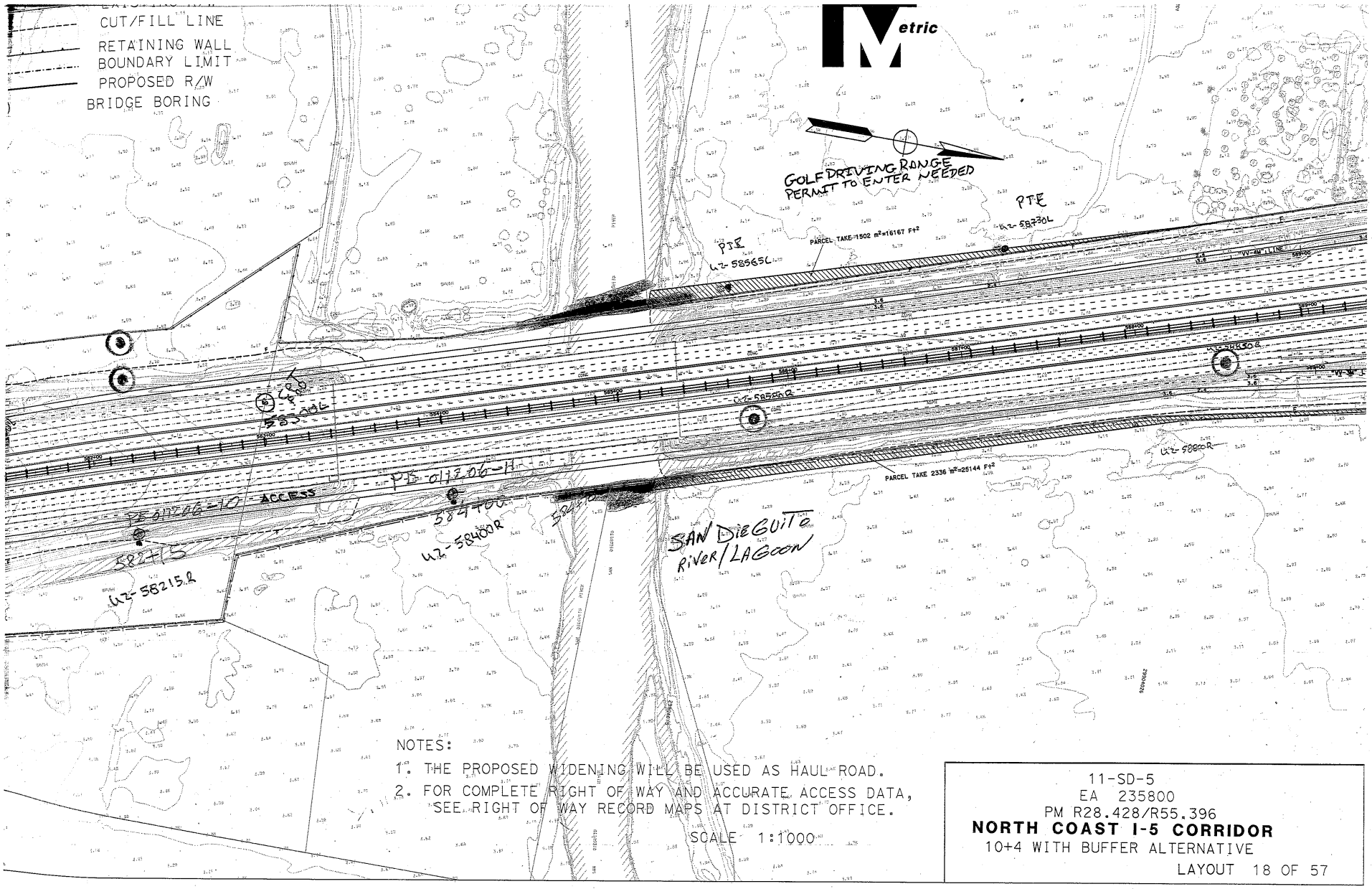
Date Received: WBS Codes:

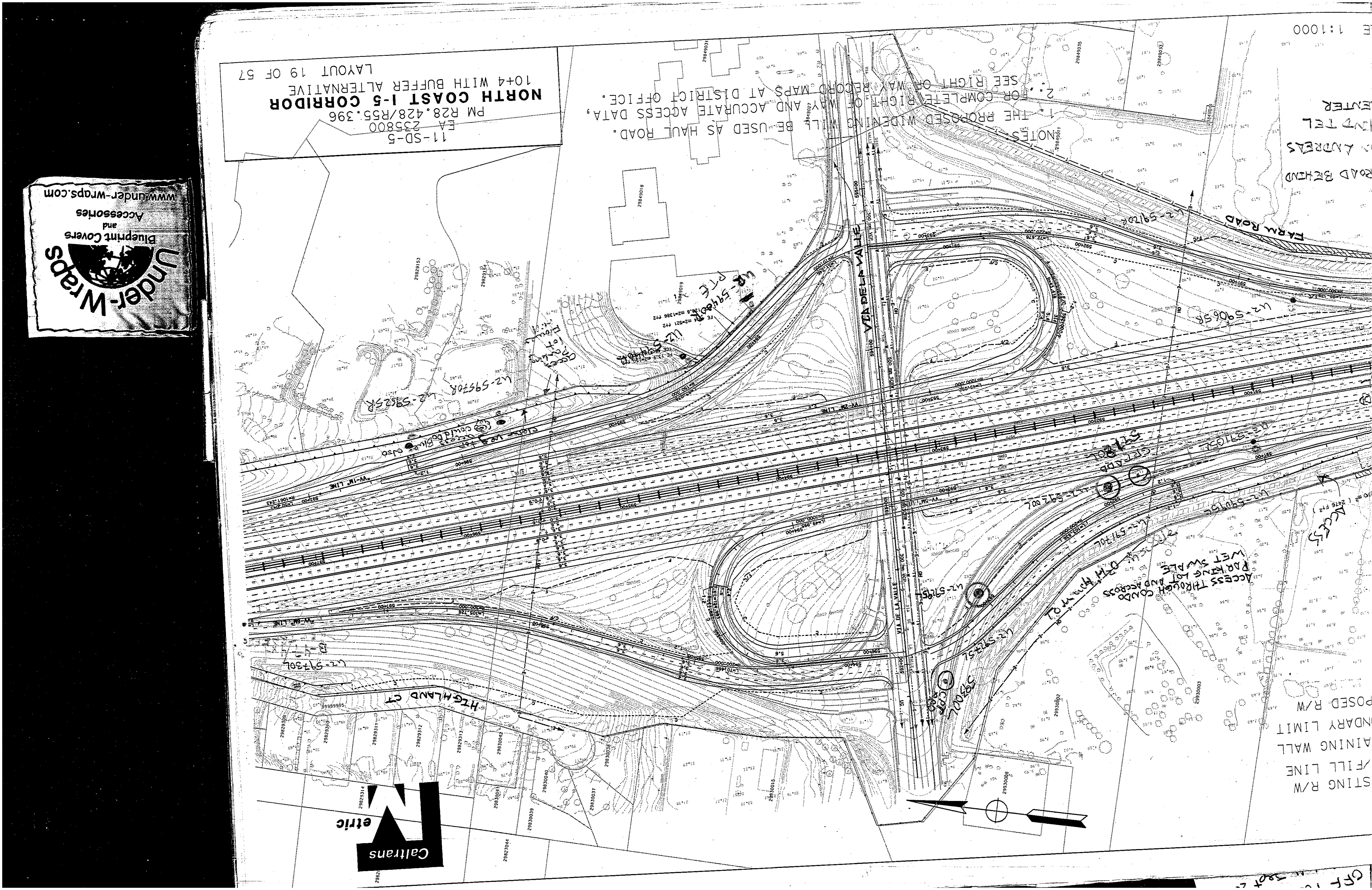
Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

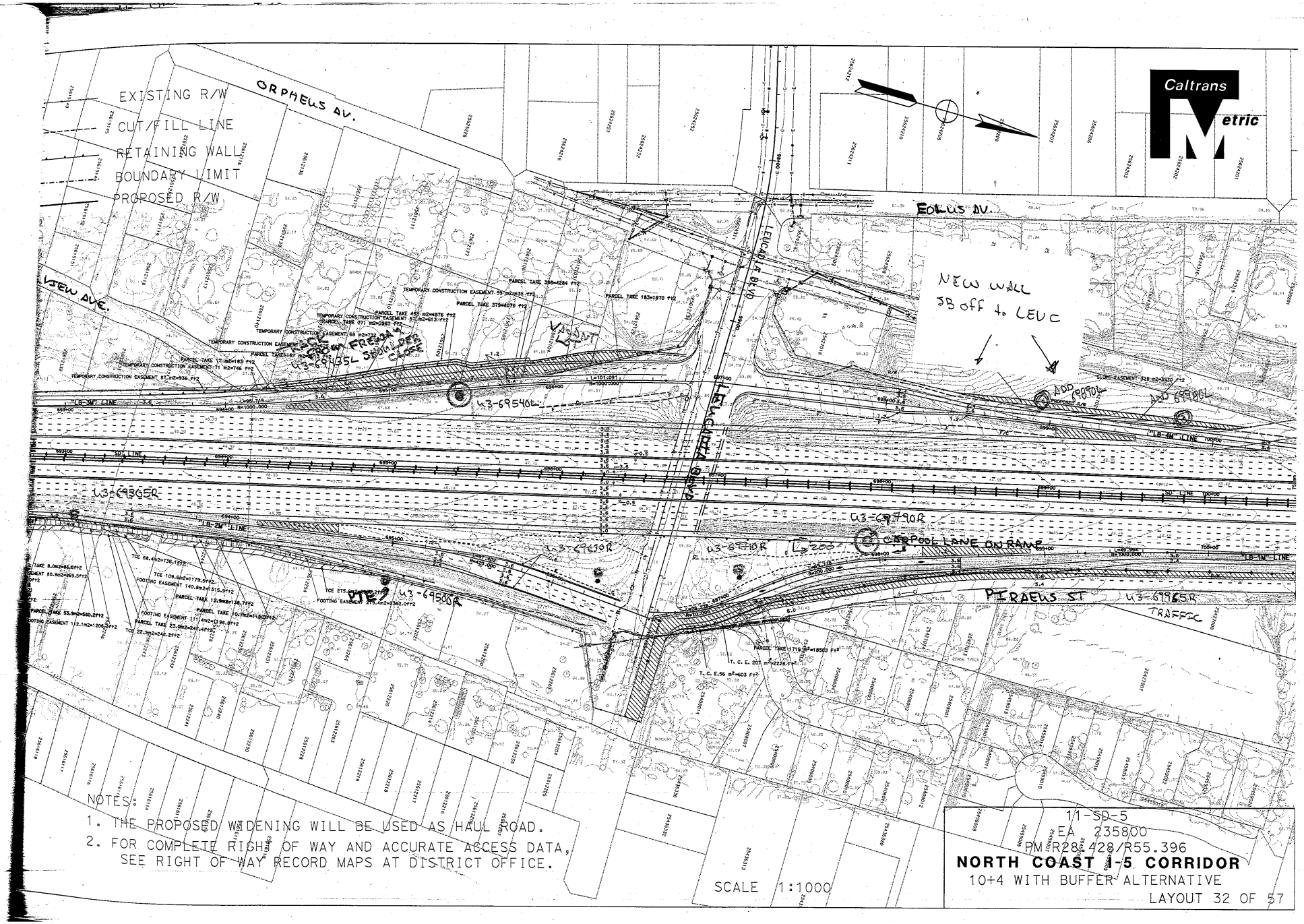
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47080R
47200R
DRILL SHOULDER
DRILL SHOULDER maybe
DRILL TOP SLOPE
47380R
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
DRILL PARKING LOT ON BENCH
DRILL LOT 47660L
CUT FENCE DRILL ON BENCH 47800R
47800R
DRILL TOP BENCH
DRILL ROAD
47500
34316023
34316024
34316025
34316026
34316027
34316016
34316008
34211049
SCHIPPS HEALTH
SCHIPPS MEMORIAL HOSPITAL
UNIVERSITY OF CA
REGENTS OF THE UNIVERSITY
SENSE TREES
CULTIVATED
SCALE 1:1000
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 5 OF 57


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57


11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 19 OF 57
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
VIA DE LA VALLE
HIGHLAND CT
FARM ROAD
ACCESS THROUGH CONDO PARKING LOT AND ACROSS WET SWALE
Caltrans
Metric
Under-Wraps
Blueprint Covers and Accessories
www.under-wraps.com


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEUCADIA BLVD.
NEW WALL SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69670R
U3-69965R
U3-69965R
U3-69835L
U3-69835R
ADD 69980L
ADD 69980L
"LB-2W" LINE
"LB-4W" LINE
"LB-1W" LINE
"SD" LINE
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS BUCKETS, ____ PLASTIC BAGS, ____ SHELBY TUBES, ____ BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT.) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	DO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11-479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+60 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER 0.11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	5.3	5300
20	1k	2.1	2100
20	1k	1.6	1600
20	1k	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SO

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

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OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 5/1/2009

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5434

RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

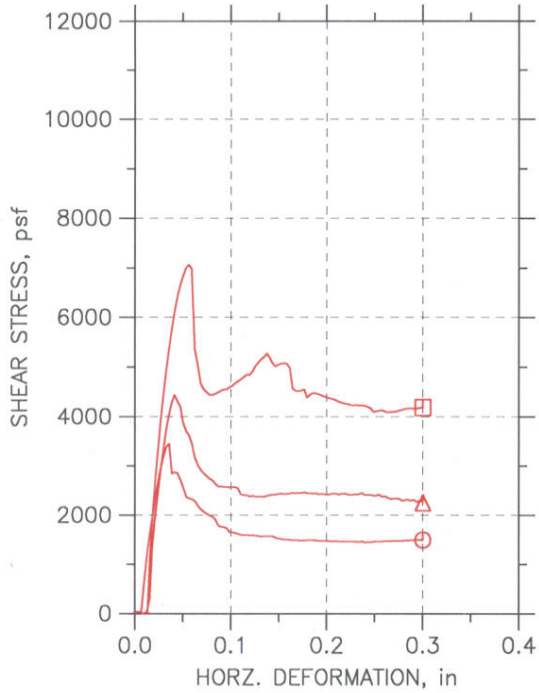
CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

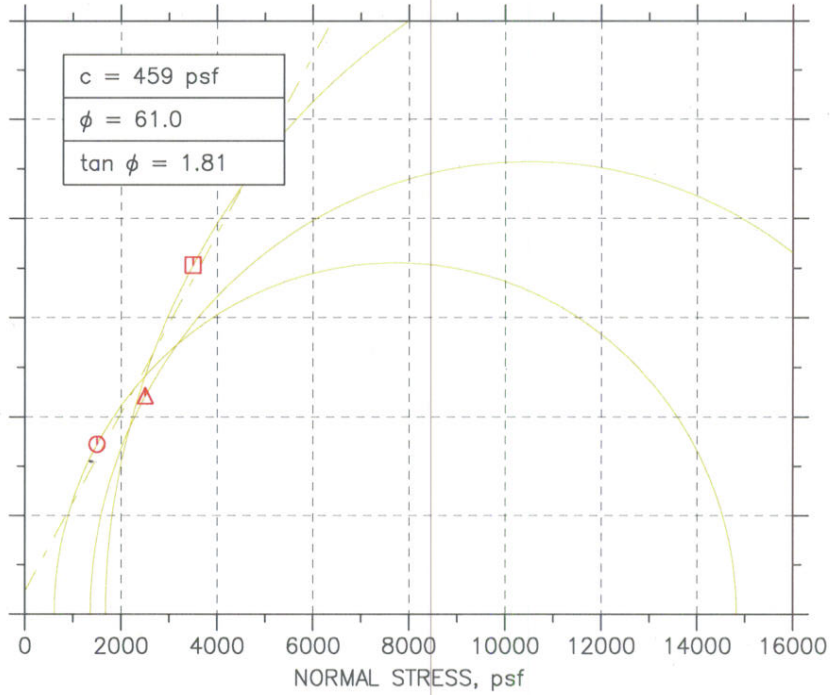
GL TRACKING NO : 08-135
Dist - EA: 11-022330
Report Date: May 1, 2009
Page: 1/1

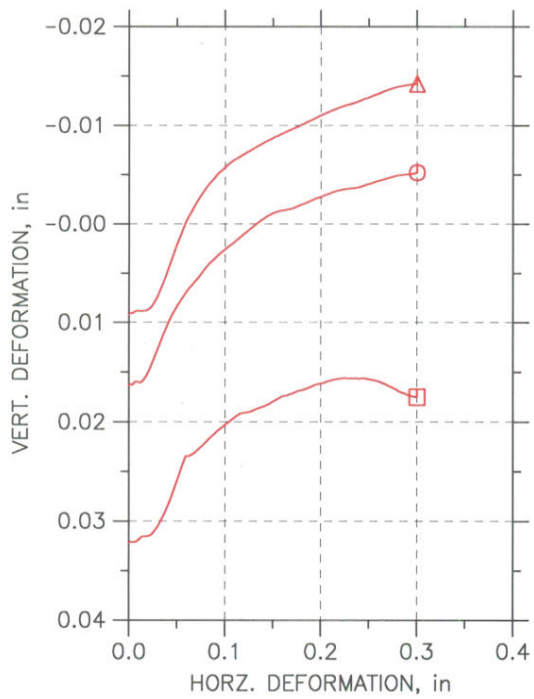
CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
10580R_1								100	91	84	82	80	78	76	71	18	7	45	21		14.1	
10700L_1																					16.7	
48040R_2												100	92	47	20	6	1		NP		11.0	
48040R_3											100	94	51	26	16	4	1		NP		7.6	
48040R_4																					18.1	

DIRECT SHEAR TEST REPORT





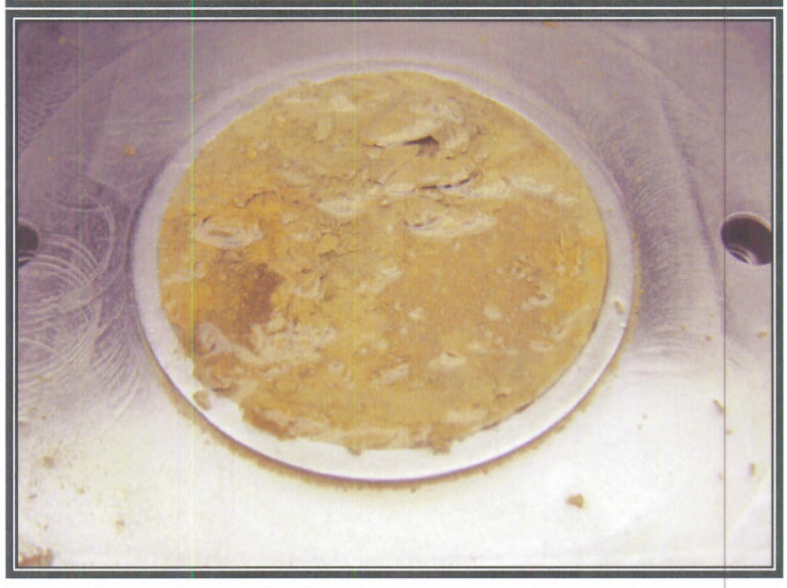


Symbol		⊙	△	⊡	
Test No.		DS08081A	DS08081B	DS08081C	
Sample No.		1	1	1	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	1.94	1.94	1.94	
	Area, in^2	2.9559	2.9559	2.9559	
	Height, in	1	1	1	
	Water Content, %	17.85	18.36	17.42	
	Dry Density, pcf	110.45	113.03	114.7	
	Saturation, %	88.57	97.29	96.42	
	Void Ratio	0.55434	0.51889	0.49671	
Consol. Height, in		0.9838	0.99092	0.96807	
Consol. Void Ratio		0.52916	0.5051	0.44892	
Final	Water Content, %	20.42	19.61	17.08	
	Dry Density, pcf	109.88	111.44	116.75	
	Saturation, %	99.85	99.79	99.82	
	Void Ratio	0.56241	0.54048	0.47049	
Normal Stress, psf		1500.4	2506.9	3503	
Max. Shear Stress, psf		3443.3	4430.8	7061.7	
Ult. Shear Stress, psf		1491.4	2253.4	4185	
Time to Failure, min		13.003	15.001	20.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

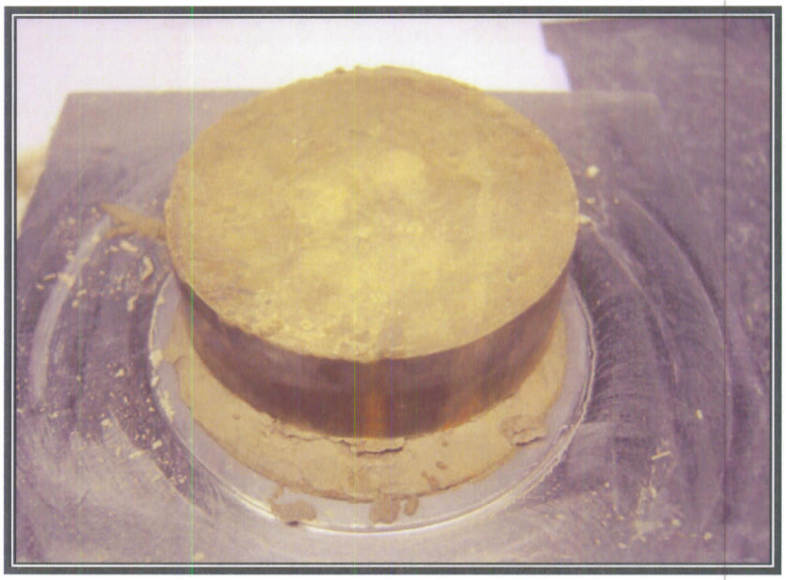
Project: Genesee Widening
Location: 11-SD-8-R22.4-R55.8
Project No.: 11-022330 ELEVATION 177.3FT
Boring No.: 10700L
Sample Type: 2" BRASS
Description: Moist, Very Stiff, Tan, Clayey Silt. Sheared before sample could swell.
Remarks: ASTM D3080

WP 12/12

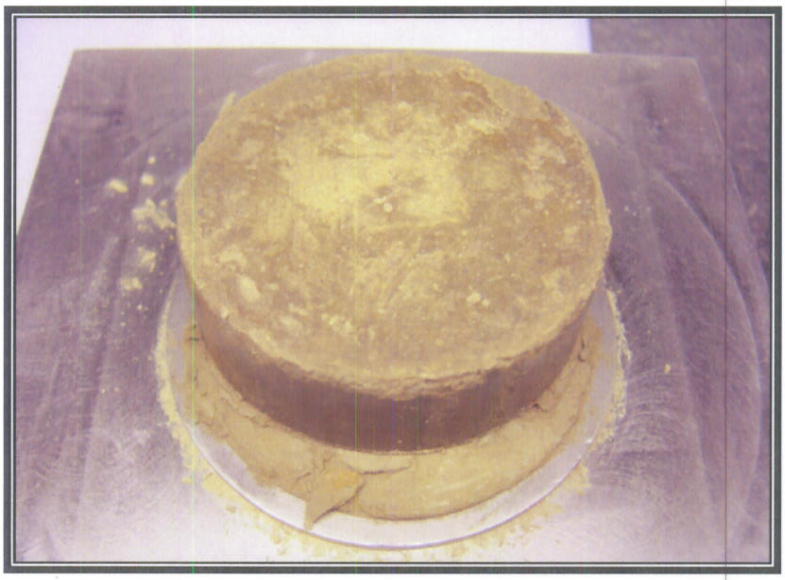
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen A



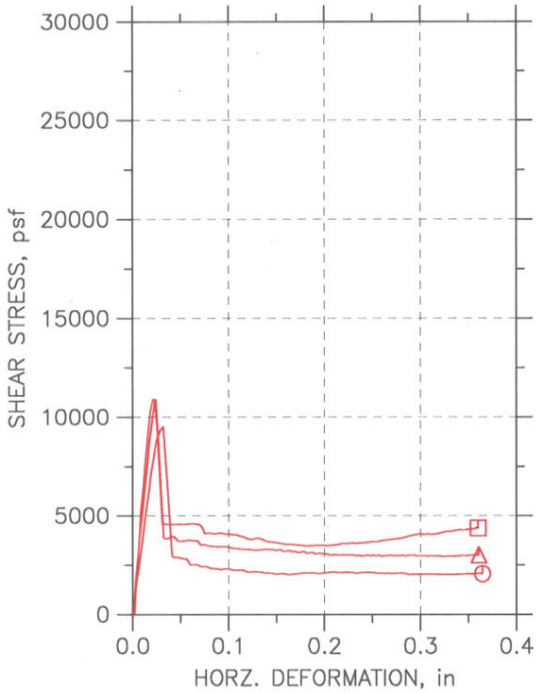
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen B

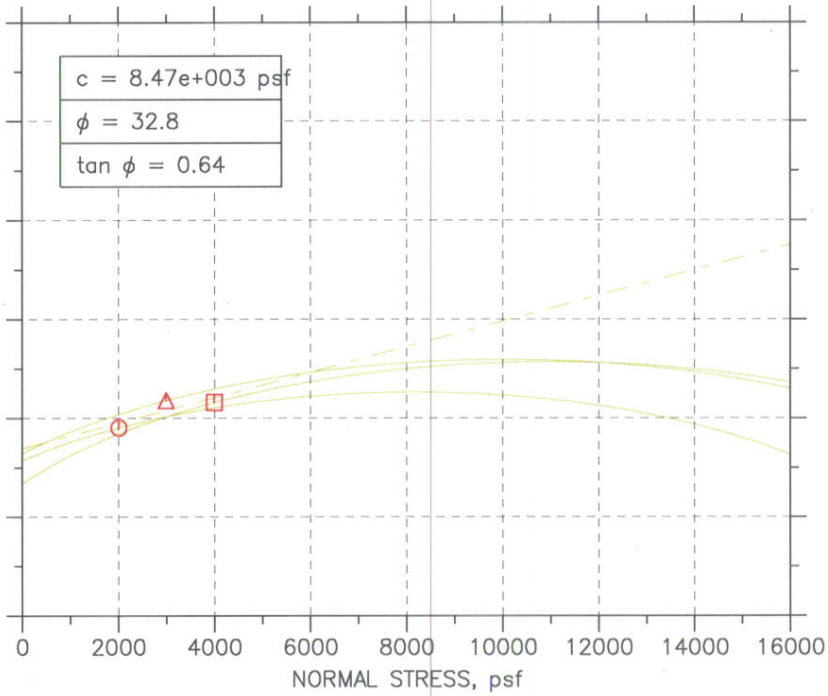


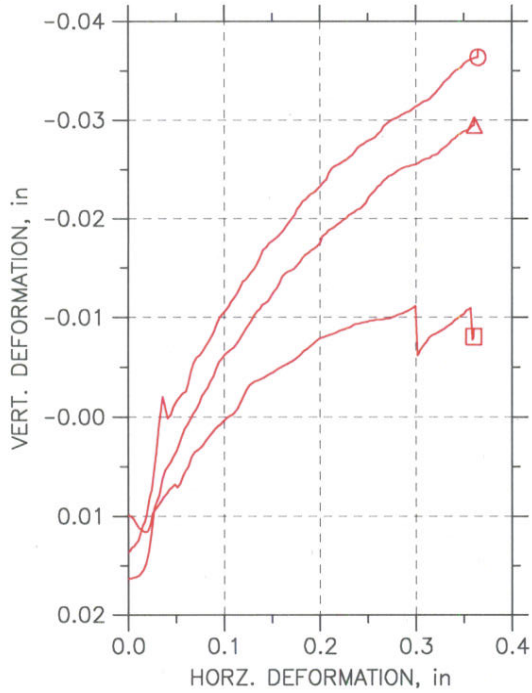
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen C



DIRECT SHEAR TEST REPORT







Symbol		⏲	△	⊡	
Test No.		DS08082A	DS08082B	DS08082C	
Sample No.		4	4	4	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.37	2.37	2.37	
	Area, in^2	4.4115	4.4115	4.4115	
	Height, in	1	1	1	
	Water Content, %	16.05	17.70	20.80	
	Dry Density, pcf	107.08	109.76	105.44	
	Saturation, %	73.16	86.29	91.07	
	Void Ratio	0.60324	0.56414	0.62819	
Consol. Height, in		0.98676	0.9837	0.99073	
Consol. Void Ratio		0.58201	0.53863	0.6131	
Final	Water Content, %	21.61	20.14	22.11	
	Dry Density, pcf	103.33	106.62	104.6	
	Saturation, %	89.85	90.77	94.83	
	Void Ratio	0.66149	0.61022	0.64126	
Normal Stress, psf		2016.4	3000.8	4003.7	
Max. Shear Stress, psf		9518.7	10902	10804	
Ult. Shear Stress, psf		2036.2	2996.2	4359.8	
Time to Failure, min		14.001	11.002	11.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

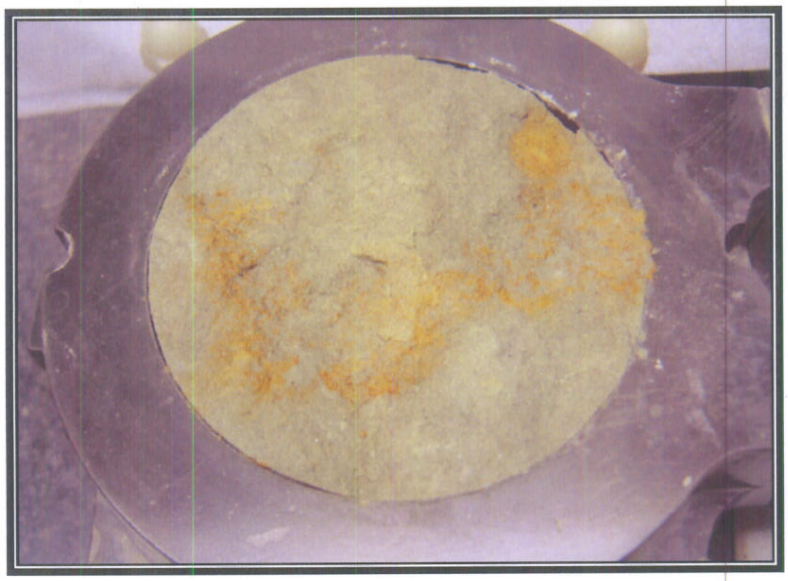
Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	

Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.

Remarks: ASTM D3080

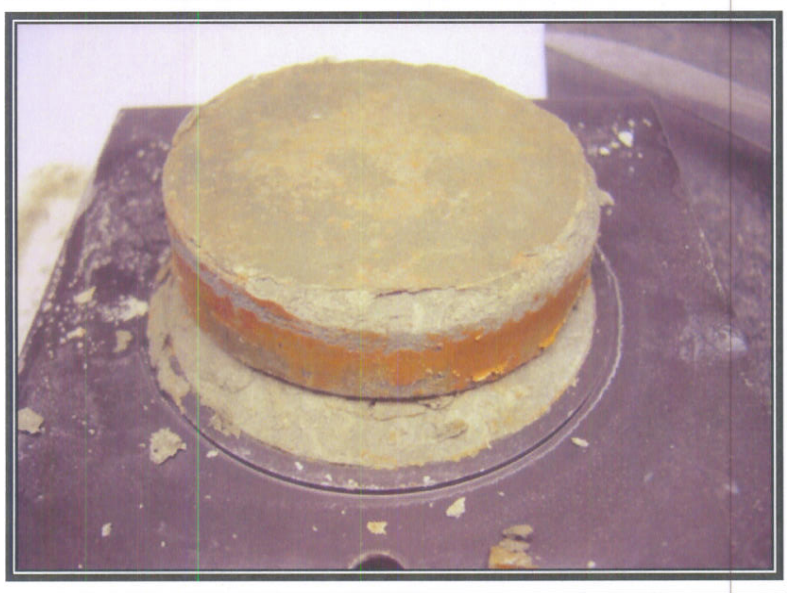
WP 12/12

DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B

DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
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CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

Note: Boring location shown on Geotechnical Design Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Figure 2

CALIFORNIA DEPARTMENT OF TRANSPORTATION
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GL TRACKING NO : 08-070
Dist - EA: 11-022330
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CLASSIFICATION TEST SUMMARY

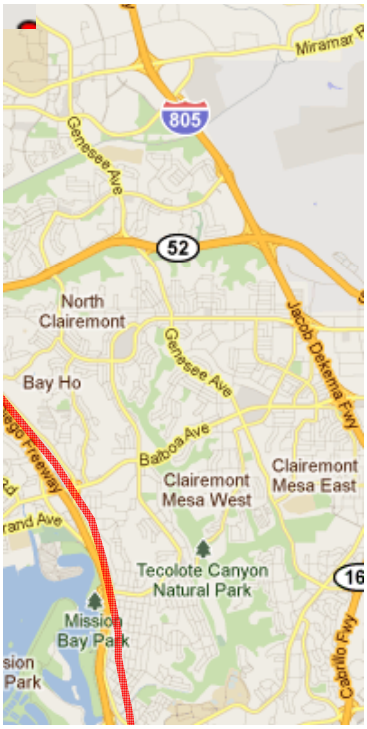
SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

Note: Boring location shown on Geotechnical Design Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Figure 2

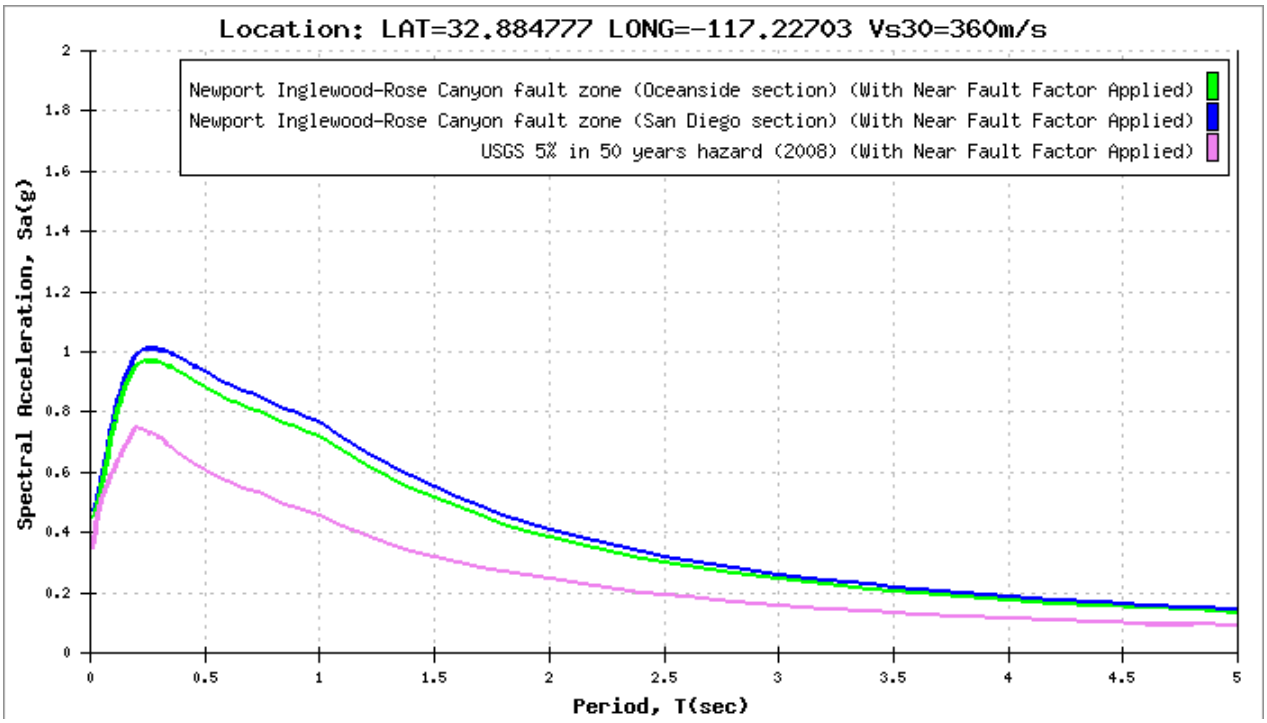
APPENDIX IV

ANALYSES & CALCULATIONS

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	360 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	264 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.460	1.000	1.000	0.460
0.022	0.465	1.000	1.000	0.465
0.025	0.473	1.000	1.000	0.473
0.029	0.483	1.000	1.000	0.483
0.03	0.486	1.000	1.000	0.486
0.032	0.493	1.000	1.000	0.493
0.035	0.503	1.000	1.000	0.503
0.036	0.507	1.000	1.000	0.507
0.04	0.521	1.000	1.000	0.521
0.042	0.528	1.000	1.000	0.528
0.044	0.535	1.000	1.000	0.535
0.045	0.539	1.000	1.000	0.539
0.046	0.543	1.000	1.000	0.543
0.048	0.550	1.000	1.000	0.550
0.05	0.557	1.000	1.000	0.557
0.055	0.577	1.000	1.000	0.577
0.06	0.596	1.000	1.000	0.596

0.065	0.615	1.000	1.000	0.615
0.067	0.623	1.000	1.000	0.623
0.07	0.634	1.000	1.000	0.634
0.075	0.653	1.000	1.000	0.653
0.08	0.672	1.000	1.000	0.672
0.085	0.692	1.000	1.000	0.692
0.09	0.711	1.000	1.000	0.711
0.095	0.730	1.000	1.000	0.730
0.1	0.748	1.000	1.000	0.748
0.11	0.780	1.000	1.000	0.780
0.12	0.810	1.000	1.000	0.810
0.13	0.837	1.000	1.000	0.837
0.133	0.844	1.000	1.000	0.844
0.14	0.859	1.000	1.000	0.859
0.15	0.879	1.000	1.000	0.879
0.16	0.898	1.000	1.000	0.898
0.17	0.915	1.000	1.000	0.915
0.18	0.930	1.000	1.000	0.930
0.19	0.943	1.000	1.000	0.943
0.2	0.955	1.000	1.000	0.955
0.22	0.964	1.000	1.000	0.964
0.24	0.971	1.000	1.000	0.971
0.25	0.973	1.000	1.000	0.973
0.26	0.972	1.000	1.000	0.972
0.28	0.971	1.000	1.000	0.971
0.29	0.968	1.000	1.000	0.968
0.3	0.966	1.000	1.000	0.966
0.32	0.960	1.000	1.000	0.960
0.34	0.953	1.000	1.000	0.953
0.35	0.949	1.000	1.000	0.949
0.36	0.945	1.000	1.000	0.945
0.38	0.936	1.000	1.000	0.936
0.4	0.926	1.000	1.000	0.926
0.42	0.918	1.000	1.000	0.918
0.44	0.909	1.000	1.000	0.909
0.45	0.904	1.000	1.000	0.904
0.46	0.900	1.000	1.000	0.900
0.48	0.891	1.000	1.000	0.891
0.5	0.882	1.000	1.000	0.882
0.55	0.843	1.000	1.020	0.860
0.6	0.808	1.000	1.040	0.841
0.65	0.777	1.000	1.060	0.823
0.667	0.767	1.000	1.067	0.818
0.7	0.748	1.000	1.080	0.808
0.75	0.722	1.000	1.100	0.794
0.8	0.693	1.000	1.120	0.777

0.85	0.667	1.000	1.140	0.761
0.9	0.643	1.000	1.160	0.746
0.95	0.620	1.000	1.180	0.732
1	0.599	1.000	1.200	0.719
1.1	0.557	1.000	1.200	0.668
1.2	0.520	1.000	1.200	0.624
1.3	0.486	1.000	1.200	0.583
1.4	0.456	1.000	1.200	0.547
1.5	0.429	1.000	1.200	0.514
1.6	0.402	1.000	1.200	0.482
1.7	0.378	1.000	1.200	0.453
1.8	0.356	1.000	1.200	0.427
1.9	0.337	1.000	1.200	0.404
2	0.319	1.000	1.200	0.383
2.2	0.287	1.000	1.200	0.344
2.4	0.260	1.000	1.200	0.312
2.5	0.249	1.000	1.200	0.298
2.6	0.238	1.000	1.200	0.286
2.8	0.219	1.000	1.200	0.263
3	0.202	1.000	1.200	0.243
3.2	0.188	1.000	1.200	0.225
3.4	0.175	1.000	1.200	0.210
3.5	0.169	1.000	1.200	0.203
3.6	0.164	1.000	1.200	0.197
3.8	0.154	1.000	1.200	0.184
4	0.145	1.000	1.200	0.174
4.2	0.137	1.000	1.200	0.164
4.4	0.130	1.000	1.200	0.156
4.6	0.123	1.000	1.200	0.148
4.8	0.118	1.000	1.200	0.141
5	0.112	1.000	1.200	0.135

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

	SA		**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.473	1.000	1.000	0.473
0.02	0.481	1.000	1.000	0.481
0.022	0.487	1.000	1.000	0.487
0.025	0.495	1.000	1.000	0.495
0.029	0.506	1.000	1.000	0.506
0.03	0.508	1.000	1.000	0.508
0.032	0.516	1.000	1.000	0.516
0.035	0.527	1.000	1.000	0.527
0.036	0.530	1.000	1.000	0.530
0.04	0.545	1.000	1.000	0.545
0.042	0.552	1.000	1.000	0.552
0.044	0.560	1.000	1.000	0.560
0.045	0.563	1.000	1.000	0.563
0.046	0.567	1.000	1.000	0.567
0.048	0.575	1.000	1.000	0.575
0.05	0.582	1.000	1.000	0.582
0.055	0.601	1.000	1.000	0.601
0.06	0.621	1.000	1.000	0.621
0.065	0.640	1.000	1.000	0.640
0.067	0.648	1.000	1.000	0.648
0.07	0.659	1.000	1.000	0.659
0.075	0.678	1.000	1.000	0.678
0.08	0.697	1.000	1.000	0.697
0.085	0.717	1.000	1.000	0.717
0.09	0.736	1.000	1.000	0.736
0.095	0.755	1.000	1.000	0.755
0.1	0.773	1.000	1.000	0.773
0.11	0.806	1.000	1.000	0.806
0.12	0.837	1.000	1.000	0.837
0.13	0.864	1.000	1.000	0.864
0.133	0.871	1.000	1.000	0.871
0.14	0.887	1.000	1.000	0.887
0.15	0.907	1.000	1.000	0.907
0.16	0.928	1.000	1.000	0.928
0.17	0.945	1.000	1.000	0.945
0.18	0.962	1.000	1.000	0.962
0.19	0.976	1.000	1.000	0.976
0.2	0.989	1.000	1.000	0.989
0.22	1.001	1.000	1.000	1.001
0.24	1.010	1.000	1.000	1.010
0.25	1.013	1.000	1.000	1.013
0.26	1.012	1.000	1.000	1.012
0.28	1.012	1.000	1.000	1.012

0.29	1.011	1.000	1.000	1.011
0.3	1.009	1.000	1.000	1.009
0.32	1.005	1.000	1.000	1.005
0.34	0.999	1.000	1.000	0.999
0.35	0.995	1.000	1.000	0.995
0.36	0.991	1.000	1.000	0.991
0.38	0.983	1.000	1.000	0.983
0.4	0.974	1.000	1.000	0.974
0.42	0.966	1.000	1.000	0.966
0.44	0.957	1.000	1.000	0.957
0.45	0.953	1.000	1.000	0.953
0.46	0.949	1.000	1.000	0.949
0.48	0.940	1.000	1.000	0.940
0.5	0.932	1.000	1.000	0.932
0.55	0.893	1.000	1.020	0.911
0.6	0.857	1.000	1.040	0.892
0.65	0.825	1.000	1.060	0.875
0.667	0.815	1.000	1.067	0.870
0.7	0.796	1.000	1.080	0.860
0.75	0.769	1.000	1.100	0.846
0.8	0.739	1.000	1.120	0.828
0.85	0.712	1.000	1.140	0.811
0.9	0.686	1.000	1.160	0.795
0.95	0.662	1.000	1.180	0.781
1	0.639	1.000	1.200	0.767
1.1	0.594	1.000	1.200	0.713
1.2	0.555	1.000	1.200	0.666
1.3	0.519	1.000	1.200	0.623
1.4	0.487	1.000	1.200	0.585
1.5	0.458	1.000	1.200	0.550
1.6	0.430	1.000	1.200	0.516
1.7	0.404	1.000	1.200	0.485
1.8	0.381	1.000	1.200	0.457
1.9	0.360	1.000	1.200	0.432
2	0.341	1.000	1.200	0.410
2.2	0.307	1.000	1.200	0.368
2.4	0.279	1.000	1.200	0.334
2.5	0.266	1.000	1.200	0.319
2.6	0.255	1.000	1.200	0.306
2.8	0.234	1.000	1.200	0.281
3	0.216	1.000	1.200	0.260
3.2	0.201	1.000	1.200	0.241
3.4	0.187	1.000	1.200	0.225
3.5	0.181	1.000	1.200	0.217
3.6	0.175	1.000	1.200	0.210
3.8	0.164	1.000	1.200	0.197

4	0.155	1.000	1.200	0.186
4.2	0.147	1.000	1.200	0.176
4.4	0.139	1.000	1.200	0.167
4.6	0.132	1.000	1.200	0.159
4.8	0.126	1.000	1.200	0.151
5	0.120	1.000	1.200	0.144

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.347	1.000	1.000	0.347
0.02	0.410	1.000	1.000	0.410
0.022	0.419	1.000	1.000	0.419
0.025	0.433	1.000	1.000	0.433
0.029	0.448	1.000	1.000	0.448
0.03	0.452	1.000	1.000	0.452
0.032	0.459	1.000	1.000	0.459
0.035	0.469	1.000	1.000	0.469
0.036	0.472	1.000	1.000	0.472
0.04	0.485	1.000	1.000	0.485
0.042	0.490	1.000	1.000	0.490
0.044	0.496	1.000	1.000	0.496
0.045	0.499	1.000	1.000	0.499
0.046	0.501	1.000	1.000	0.501
0.048	0.507	1.000	1.000	0.507
0.05	0.512	1.000	1.000	0.512
0.055	0.524	1.000	1.000	0.524
0.06	0.535	1.000	1.000	0.535
0.065	0.545	1.000	1.000	0.545
0.067	0.549	1.000	1.000	0.549
0.07	0.555	1.000	1.000	0.555
0.075	0.564	1.000	1.000	0.564
0.08	0.573	1.000	1.000	0.573
0.085	0.582	1.000	1.000	0.582
0.09	0.590	1.000	1.000	0.590
0.095	0.598	1.000	1.000	0.598
0.1	0.605	1.000	1.000	0.605
0.11	0.623	1.000	1.000	0.623
0.12	0.639	1.000	1.000	0.639
0.13	0.655	1.000	1.000	0.655
0.133	0.659	1.000	1.000	0.659

0.14	0.670	1.000	1.000	0.670
0.15	0.684	1.000	1.000	0.684
0.16	0.697	1.000	1.000	0.697
0.17	0.710	1.000	1.000	0.710
0.18	0.723	1.000	1.000	0.723
0.19	0.735	1.000	1.000	0.735
0.2	0.746	1.000	1.000	0.746
0.22	0.740	1.000	1.000	0.740
0.24	0.734	1.000	1.000	0.734
0.25	0.731	1.000	1.000	0.731
0.26	0.728	1.000	1.000	0.728
0.28	0.724	1.000	1.000	0.724
0.29	0.721	1.000	1.000	0.721
0.3	0.719	1.000	1.000	0.719
0.32	0.704	1.000	1.000	0.704
0.34	0.690	1.000	1.000	0.690
0.35	0.683	1.000	1.000	0.683
0.36	0.677	1.000	1.000	0.677
0.38	0.664	1.000	1.000	0.664
0.4	0.653	1.000	1.000	0.653
0.42	0.643	1.000	1.000	0.643
0.44	0.633	1.000	1.000	0.633
0.45	0.628	1.000	1.000	0.628
0.46	0.623	1.000	1.000	0.623
0.48	0.615	1.000	1.000	0.615
0.5	0.606	1.000	1.000	0.606
0.55	0.573	1.000	1.020	0.584
0.6	0.544	1.000	1.040	0.566
0.65	0.519	1.000	1.060	0.550
0.667	0.511	1.000	1.067	0.545
0.7	0.497	1.000	1.080	0.536
0.75	0.477	1.000	1.100	0.524
0.8	0.454	1.000	1.120	0.508
0.85	0.433	1.000	1.140	0.493
0.9	0.414	1.000	1.160	0.480
0.95	0.397	1.000	1.180	0.469
1	0.382	1.000	1.200	0.458
1.1	0.350	1.000	1.200	0.420
1.2	0.323	1.000	1.200	0.388
1.3	0.301	1.000	1.200	0.361
1.4	0.281	1.000	1.200	0.337
1.5	0.264	1.000	1.200	0.317
1.6	0.249	1.000	1.200	0.299
1.7	0.236	1.000	1.200	0.283
1.8	0.224	1.000	1.200	0.268
1.9	0.213	1.000	1.200	0.255

2	0.203	1.000	1.200	0.244
2.2	0.183	1.000	1.200	0.220
2.4	0.167	1.000	1.200	0.200
2.5	0.159	1.000	1.200	0.191
2.6	0.153	1.000	1.200	0.183
2.8	0.141	1.000	1.200	0.169
3	0.130	1.000	1.200	0.157
3.2	0.121	1.000	1.200	0.145
3.4	0.113	1.000	1.200	0.135
3.5	0.109	1.000	1.200	0.131
3.6	0.105	1.000	1.200	0.126
3.8	0.099	1.000	1.200	0.119
4	0.093	1.000	1.200	0.112
4.2	0.089	1.000	1.200	0.107
4.4	0.085	1.000	1.200	0.102
4.6	0.082	1.000	1.200	0.098
4.8	0.079	1.000	1.200	0.094
5	0.076	1.000	1.200	0.091

Envelope Data

Period	SA
0.01	0.451
0.02	0.460
0.022	0.465
0.025	0.473
0.029	0.483
0.03	0.486
0.032	0.493
0.035	0.503
0.036	0.507
0.04	0.521
0.042	0.528
0.044	0.535
0.045	0.539
0.046	0.543
0.048	0.550
0.05	0.557
0.055	0.577
0.06	0.596
0.065	0.615
0.067	0.623
0.07	0.634
0.075	0.653

0.08	0.672
0.085	0.692
0.09	0.711
0.095	0.730
0.1	0.748
0.11	0.780
0.12	0.810
0.13	0.837
0.133	0.844
0.14	0.859
0.15	0.879
0.16	0.898
0.17	0.915
0.18	0.930
0.19	0.943
0.2	0.955
0.22	0.964
0.24	0.971
0.25	0.973
0.26	0.972
0.28	0.971
0.29	0.968
0.3	0.966
0.32	0.960
0.34	0.953
0.35	0.949
0.36	0.945
0.38	0.936
0.4	0.926
0.42	0.918
0.44	0.909
0.45	0.904
0.46	0.900
0.48	0.891
0.5	0.882
0.55	0.860
0.6	0.841
0.65	0.823
0.667	0.818
0.7	0.808
0.75	0.794
0.8	0.777
0.85	0.761
0.9	0.746
0.95	0.732
1	0.719

1.1	0.668
1.2	0.624
1.3	0.583
1.4	0.547
1.5	0.514
1.6	0.482
1.7	0.453
1.8	0.427
1.9	0.404
2	0.383
2.2	0.344
2.4	0.312
2.5	0.298
2.6	0.286
2.8	0.263
3	0.243
3.2	0.225
3.4	0.210
3.5	0.203
3.6	0.197
3.8	0.184
4	0.174
4.2	0.164
4.4	0.156
4.6	0.148
4.8	0.141
5	0.135

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} *(km)*	0	

Distance

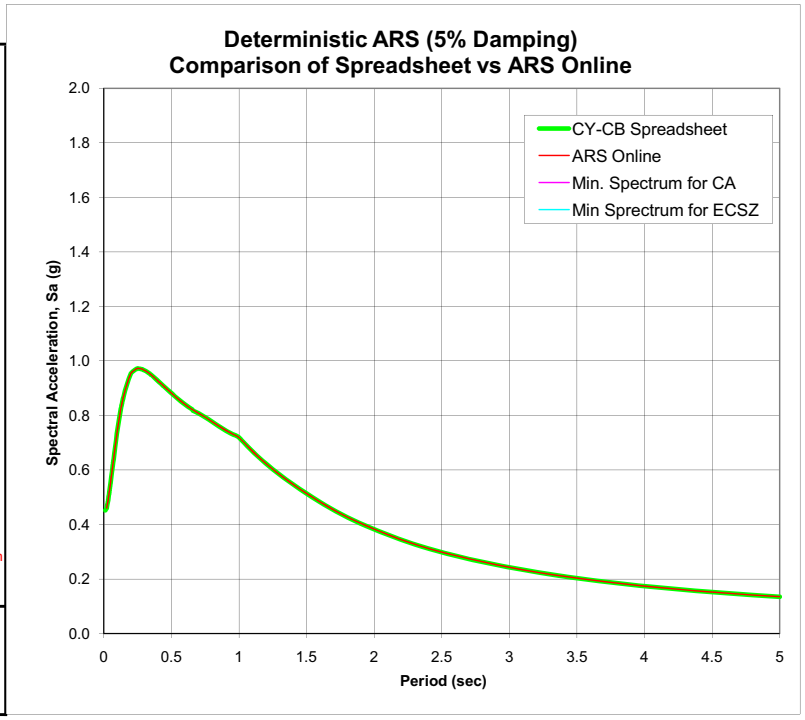
R_{RUP} *(km)*	4.2	
R_{JB} *(km)*	4.2	
R_x *(km)*	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} *(m/sec)*	360	(270 to 1500 m/s)
$Z_{1.0}$ *(m)*	264	(0 - No Basin)
$Z_{2.5}$ *(km)*	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45139
0.020	0.45947
0.022	0.46490
0.025	0.47294
0.029	0.48278
0.030	0.48562
0.032	0.49264
0.035	0.50314
0.036	0.50673
0.040	0.52058
0.042	0.52790
0.044	0.53500
0.045	0.53880
0.046	0.54250
0.048	0.54974
0.050	0.55711
0.055	0.57641
0.060	0.59603
0.065	0.61508
0.067	0.62288
0.070	0.63405
0.075	0.65285
0.080	0.67234
0.085	0.69186
0.090	0.71071
0.095	0.72940
0.100	0.74759
0.110	0.78037
0.120	0.81031
0.130	0.83671
0.133	0.84361
0.140	0.85907
0.150	0.87910
0.160	0.89809
0.170	0.91439

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.46	1	1	0.46	0%
0.022	0.465	1	1	0.465	0%
0.025	0.473	1	1	0.473	0%
0.029	0.483	1	1	0.483	0%
0.03	0.486	1	1	0.486	0%
0.032	0.493	1	1	0.493	0%
0.035	0.503	1	1	0.503	0%
0.036	0.507	1	1	0.507	0%
0.04	0.521	1	1	0.521	0%
0.042	0.528	1	1	0.528	0%
0.044	0.535	1	1	0.535	0%
0.045	0.539	1	1	0.539	0%
0.046	0.543	1	1	0.543	0%
0.048	0.55	1	1	0.55	0%
0.05	0.557	1	1	0.557	0%
0.055	0.577	1	1	0.577	0%
0.06	0.596	1	1	0.596	0%
0.065	0.615	1	1	0.615	0%
0.067	0.623	1	1	0.623	0%
0.07	0.634	1	1	0.634	0%
0.075	0.653	1	1	0.653	0%
0.08	0.672	1	1	0.672	0%
0.085	0.692	1	1	0.692	0%
0.09	0.711	1	1	0.711	0%
0.095	0.73	1	1	0.73	0%
0.1	0.748	1	1	0.748	0%
0.11	0.78	1	1	0.78	0%
0.12	0.81	1	1	0.81	0%
0.13	0.837	1	1	0.837	0%
0.133	0.844	1	1	0.844	0%
0.14	0.859	1	1	0.859	0%
0.15	0.879	1	1	0.879	0%
0.16	0.898	1	1	0.898	0%
0.17	0.915	1	1	0.915	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

Deterministic_Response_Spectrum_072809.xls 9/19/2011 10:51 AM

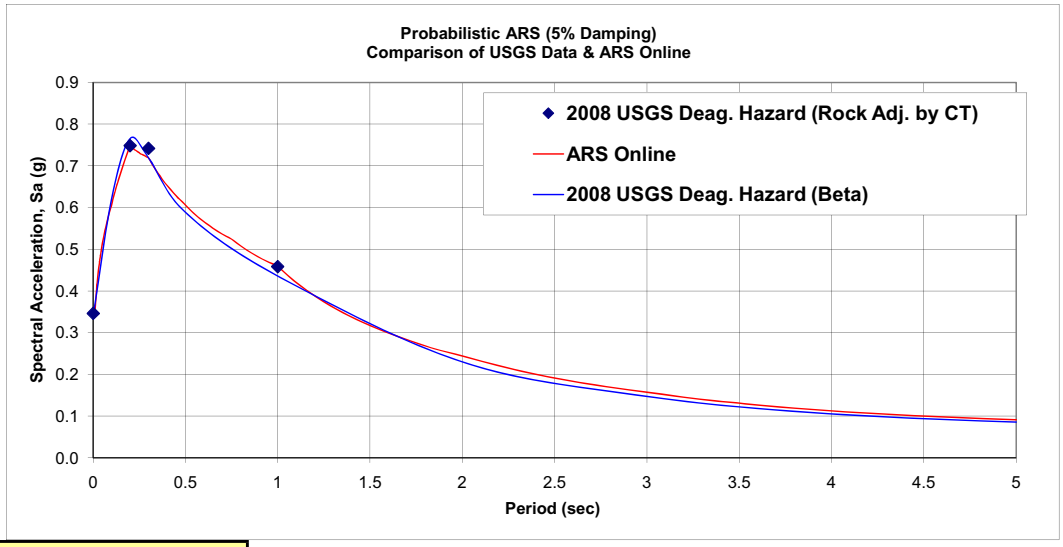
0.180	0.92942
0.190	0.94265
0.200	0.95443
0.220	0.96409
0.240	0.97074
0.250	0.97261
0.260	0.97171
0.280	0.97033
0.290	0.96791
0.300	0.96562
0.320	0.96013
0.340	0.95309
0.350	0.94896
0.360	0.94494
0.380	0.93573
0.400	0.92617
0.420	0.91759
0.440	0.90828
0.450	0.90398
0.460	0.89951
0.480	0.89025
0.500	0.88172
0.550	0.85945
0.600	0.84028
0.650	0.82311
0.660	0.81721
0.700	0.80777
0.750	0.79391
0.800	0.77635
0.850	0.76043
0.900	0.74535
0.950	0.73161
1.000	0.71844
1.100	0.66744
1.200	0.62274
1.300	0.58253
1.400	0.54648
1.500	0.51357
1.600	0.48149
1.700	0.45257
1.800	0.42652
1.900	0.40307
2.000	0.38213
2.200	0.34354
2.400	0.31177
2.500	0.29779
2.600	0.28492
2.800	0.26192
3.000	0.24206
3.200	0.22481
3.400	0.20959
3.500	0.20264
3.600	0.19608
3.800	0.18399
4.000	0.17319
4.200	0.16400
4.400	0.15555
4.600	0.14783
4.800	0.14078
5.000	0.13425

0.18	0.93	1	1	0.93	0%
0.19	0.943	1	1	0.943	0%
0.2	0.955	1	1	0.955	0%
0.22	0.964	1	1	0.964	0%
0.24	0.971	1	1	0.971	0%
0.25	0.973	1	1	0.973	0%
0.26	0.972	1	1	0.972	0%
0.28	0.971	1	1	0.971	0%
0.29	0.968	1	1	0.968	0%
0.3	0.966	1	1	0.966	0%
0.32	0.96	1	1	0.96	0%
0.34	0.953	1	1	0.953	0%
0.35	0.949	1	1	0.949	0%
0.36	0.945	1	1	0.945	0%
0.38	0.936	1	1	0.936	0%
0.4	0.926	1	1	0.926	0%
0.42	0.918	1	1	0.918	0%
0.44	0.909	1	1	0.909	0%
0.45	0.904	1	1	0.904	0%
0.46	0.9	1	1	0.9	0%
0.48	0.891	1	1	0.891	0%
0.5	0.882	1	1	0.882	0%
0.55	0.843	1	1.02	0.86	0%
0.6	0.808	1	1.04	0.841	0%
0.65	0.777	1	1.06	0.823	0%
0.667	0.767	1	1.067	0.818	0%
0.7	0.748	1	1.08	0.808	0%
0.75	0.722	1	1.1	0.794	0%
0.8	0.693	1	1.12	0.777	0%
0.85	0.667	1	1.14	0.761	0%
0.9	0.643	1	1.16	0.746	0%
0.95	0.62	1	1.18	0.732	0%
1	0.599	1	1.2	0.719	0%
1.1	0.557	1	1.2	0.668	0%
1.2	0.52	1	1.2	0.624	0%
1.3	0.486	1	1.2	0.583	0%
1.4	0.456	1	1.2	0.547	0%
1.5	0.429	1	1.2	0.514	0%
1.6	0.402	1	1.2	0.482	0%
1.7	0.378	1	1.2	0.453	0%
1.8	0.356	1	1.2	0.427	0%
1.9	0.337	1	1.2	0.404	0%
2	0.319	1	1.2	0.383	0%
2.2	0.287	1	1.2	0.344	0%
2.4	0.26	1	1.2	0.312	0%
2.5	0.249	1	1.2	0.298	0%
2.6	0.238	1	1.2	0.286	0%
2.8	0.219	1	1.2	0.263	0%
3	0.202	1	1.2	0.243	0%
3.2	0.188	1	1.2	0.225	0%
3.4	0.175	1	1.2	0.21	0%
3.5	0.169	1	1.2	0.203	0%
3.6	0.164	1	1.2	0.197	0%
3.8	0.154	1	1.2	0.184	0%
4	0.145	1	1.2	0.174	0%
4.2	0.137	1	1.2	0.164	0%
4.4	0.13	1	1.2	0.156	0%
4.6	0.123	1	1.2	0.148	0%
4.8	0.118	1	1.2	0.141	0%
5	0.112	1	1.2	0.135	1%

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	360
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.1
$Z_{1.0}$ (m) =	264
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.347	1	1	0.347
0.02	0.41	1	1	0.41
0.022	0.419	1	1	0.419
0.025	0.433	1	1	0.433
0.029	0.448	1	1	0.448
0.03	0.452	1	1	0.452
0.032	0.459	1	1	0.459
0.035	0.469	1	1	0.469
0.036	0.472	1	1	0.472
0.04	0.485	1	1	0.485
0.042	0.49	1	1	0.49
0.044	0.496	1	1	0.496
0.045	0.499	1	1	0.499
0.046	0.501	1	1	0.501
0.048	0.507	1	1	0.507
0.05	0.512	1	1	0.512
0.055	0.524	1	1	0.524
0.06	0.535	1	1	0.535
0.065	0.545	1	1	0.545
0.067	0.549	1	1	0.549
0.07	0.555	1	1	0.555
0.075	0.564	1	1	0.564
0.08	0.573	1	1	0.573
0.085	0.582	1	1	0.582
0.09	0.59	1	1	0.59
0.095	0.598	1	1	0.598
0.1	0.605	1	1	0.605
0.11	0.623	1	1	0.623
0.12	0.639	1	1	0.639
0.13	0.655	1	1	0.655
0.133	0.659	1	1	0.659
0.14	0.67	1	1	0.67
0.15	0.684	1	1	0.684
0.16	0.697	1	1	0.697
0.17	0.71	1	1	0.71
0.18	0.723	1	1	0.723
0.19	0.735	1	1	0.735
0.2	0.746	1	1	0.746
0.22	0.74	1	1	0.74
0.24	0.734	1	1	0.734
0.25	0.731	1	1	0.731
0.26	0.728	1	1	0.728
0.28	0.724	1	1	0.724

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.128	1.000	0.346	0.347	-0.3%
0.2	0.722	1.000	1.037	1.000	0.748	0.746	0.3%
0.3	0.597	1.000	1.242	1.000	0.742	0.719	3.1%
1	0.228	1.200	1.673	1.000	0.458	0.458	0.1%

Max % Difference = 3.1%

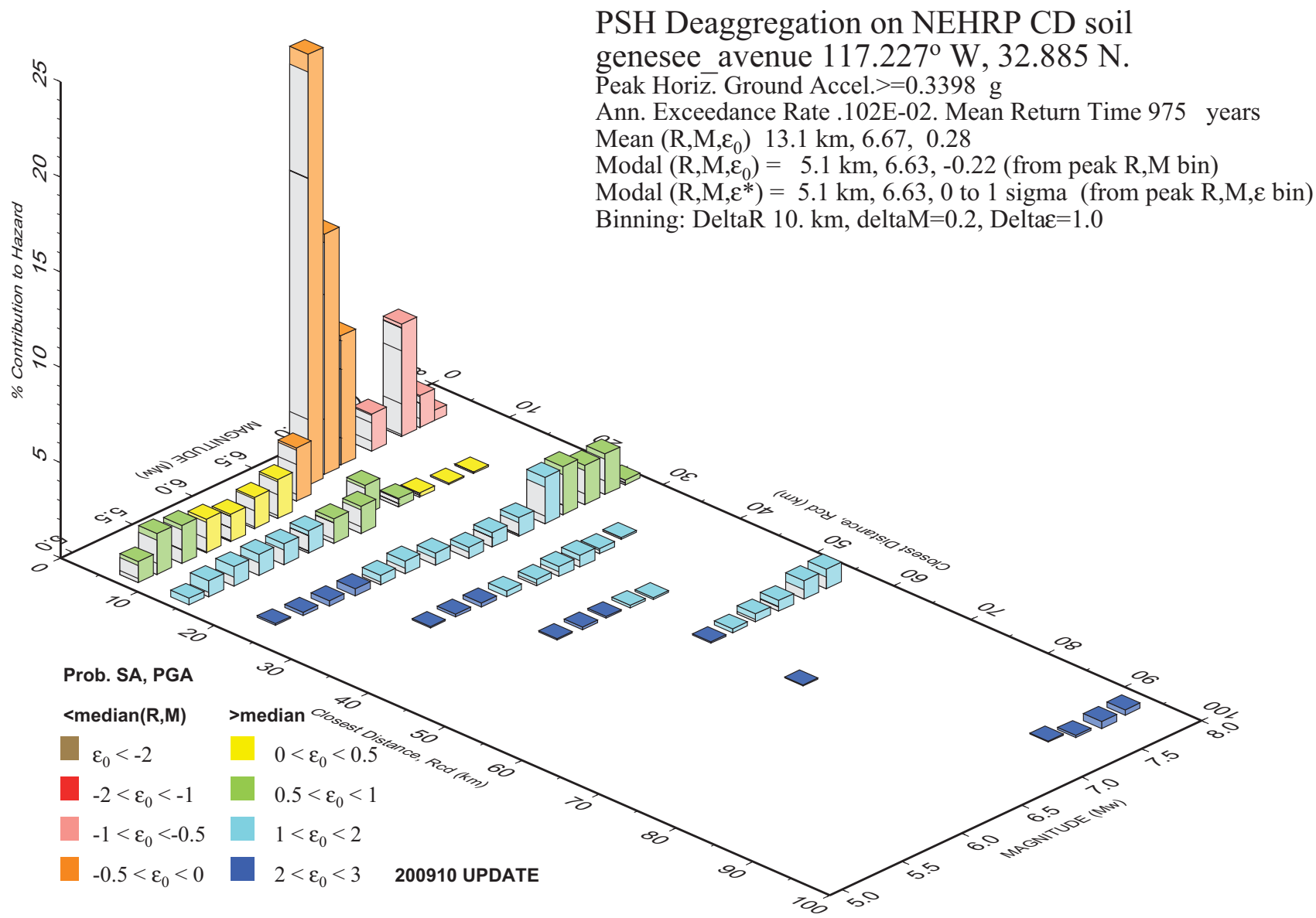
USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.3398	1.000	1.000	0.340	0.347	2.1%
0.1	0.6208	1.000	1.000	0.621	0.605	2.5%
0.2	0.7651	1.000	1.000	0.765	0.746	2.5%
0.3	0.7188	1.000	1.000	0.719	0.719	0.0%
0.5	0.5881	1.000	1.000	0.588	0.606	3.0%
1	0.3631	1.200	1.000	0.436	0.458	5.1%
2	0.1914	1.200	1.000	0.230	0.244	6.2%
3	0.12256	1.200	1.000	0.147	0.157	6.8%
4	0.08762	1.200	1.000	0.105	0.112	6.5%
5	0.07141	1.200	1.000	0.086	0.091	6.2%

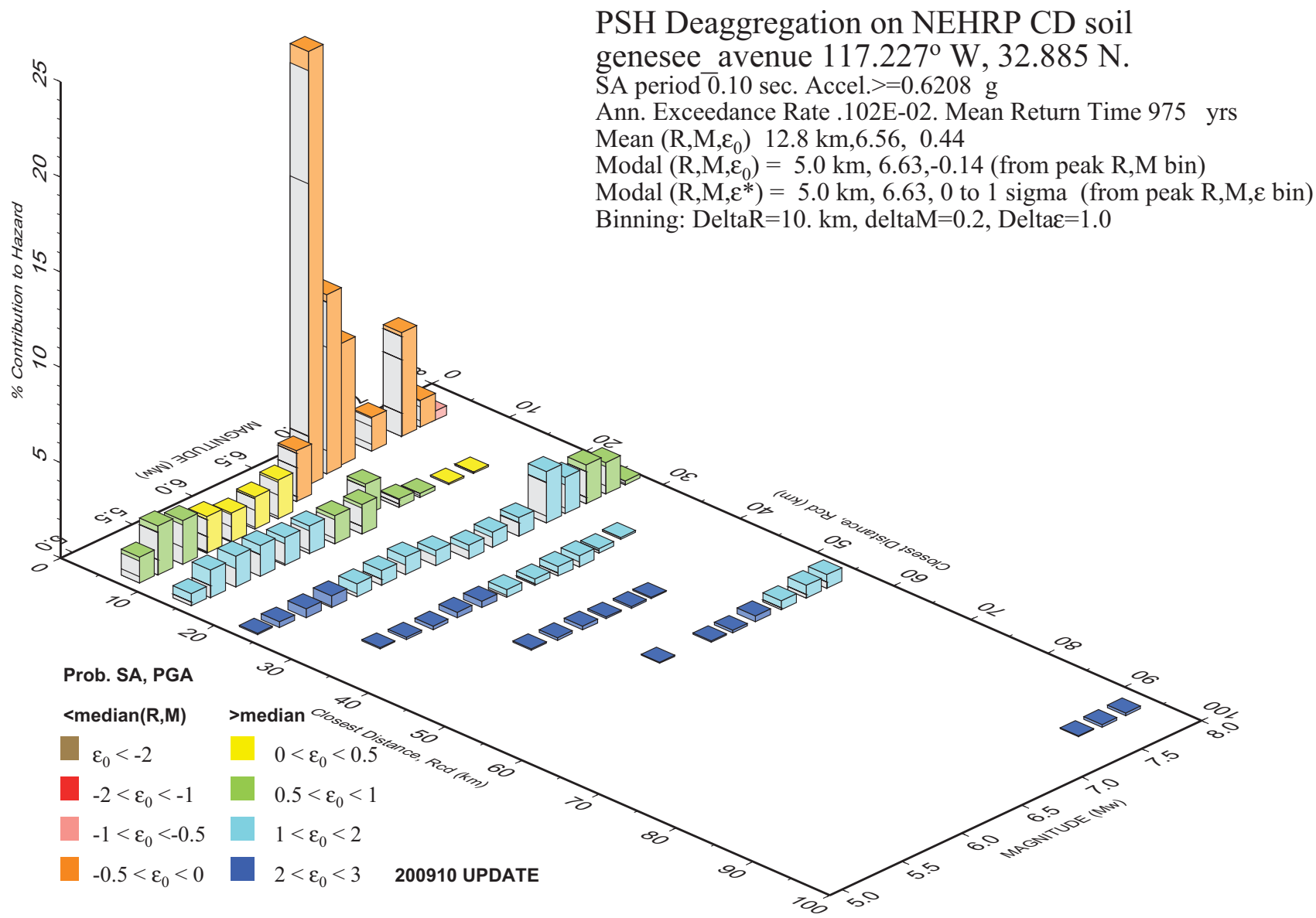
Max % Difference = 6.8%

Probabilistic_Response_Spectrum_080409.xls 9/19/2011 10:55 AM

0.29	0.721	1	1	0.721
0.3	0.719	1	1	0.719
0.32	0.704	1	1	0.704
0.34	0.69	1	1	0.69
0.35	0.683	1	1	0.683
0.36	0.677	1	1	0.677
0.38	0.664	1	1	0.664
0.4	0.653	1	1	0.653
0.42	0.643	1	1	0.643
0.44	0.633	1	1	0.633
0.45	0.628	1	1	0.628
0.46	0.623	1	1	0.623
0.48	0.615	1	1	0.615
0.5	0.606	1	1	0.606
0.55	0.573	1	1.02	0.584
0.6	0.544	1	1.04	0.566
0.65	0.519	1	1.06	0.55
0.667	0.511	1	1.067	0.545
0.7	0.497	1	1.08	0.536
0.75	0.477	1	1.1	0.524
0.8	0.454	1	1.12	0.508
0.85	0.433	1	1.14	0.493
0.9	0.414	1	1.16	0.48
0.95	0.397	1	1.18	0.469
1	0.382	1	1.2	0.458
1.1	0.35	1	1.2	0.42
1.2	0.323	1	1.2	0.388
1.3	0.301	1	1.2	0.361
1.4	0.281	1	1.2	0.337
1.5	0.264	1	1.2	0.317
1.6	0.249	1	1.2	0.299
1.7	0.236	1	1.2	0.283
1.8	0.224	1	1.2	0.268
1.9	0.213	1	1.2	0.255
2	0.203	1	1.2	0.244
2.2	0.183	1	1.2	0.22
2.4	0.167	1	1.2	0.2
2.5	0.159	1	1.2	0.191
2.6	0.153	1	1.2	0.183
2.8	0.141	1	1.2	0.169
3	0.13	1	1.2	0.157
3.2	0.121	1	1.2	0.145
3.4	0.113	1	1.2	0.135
3.5	0.109	1	1.2	0.131
3.6	0.105	1	1.2	0.126
3.8	0.099	1	1.2	0.119
4	0.093	1	1.2	0.112
4.2	0.089	1	1.2	0.107
4.4	0.085	1	1.2	0.102
4.6	0.082	1	1.2	0.098
4.8	0.079	1	1.2	0.094
5	0.076	1	1.2	0.091



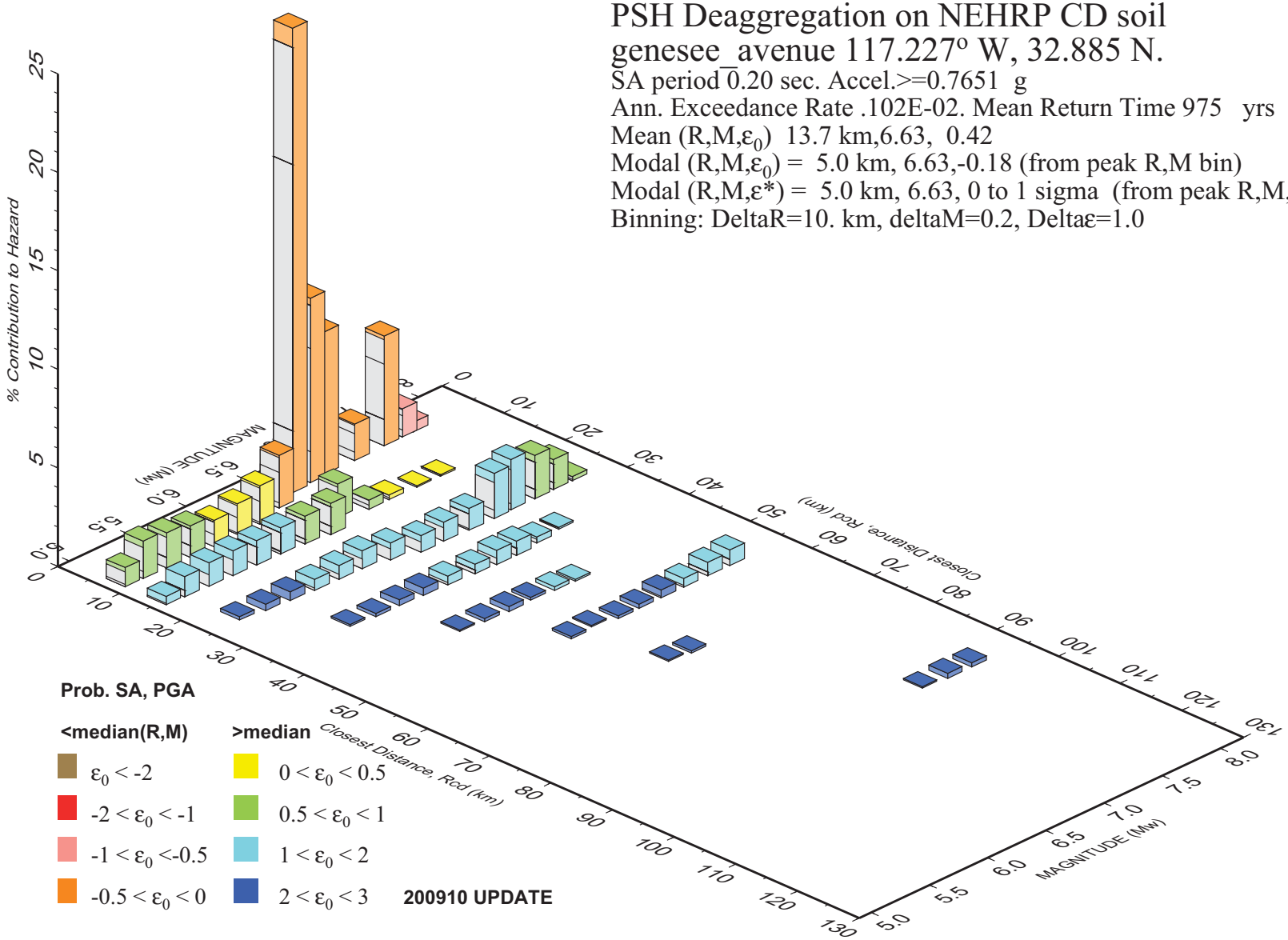
GMT 2011 Jul 20 16:39:21 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted



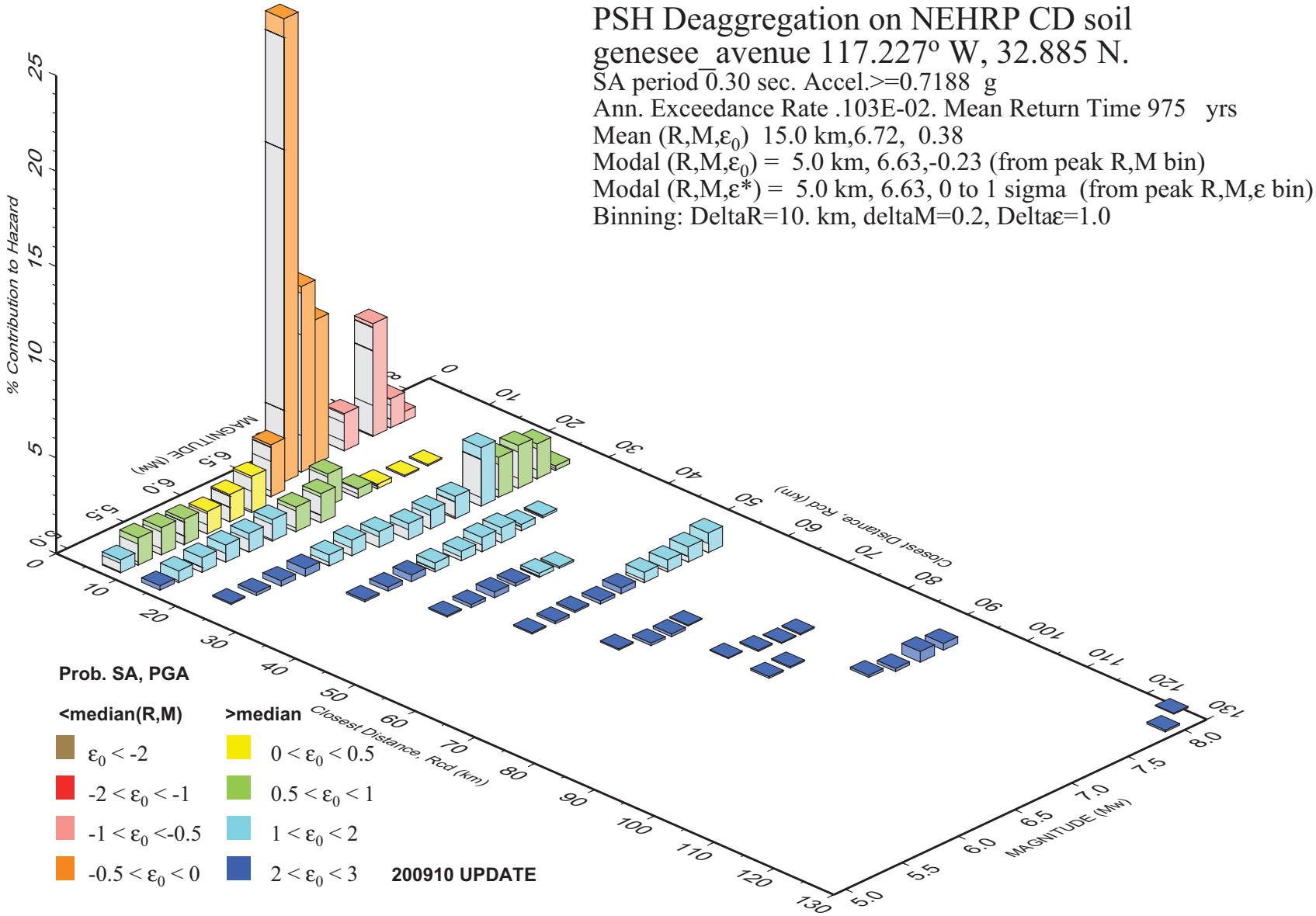
GMT 2011 Jul 20 16:47:02 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

SA period 0.20 sec. Accel.>=0.7651 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 13.7 km,6.63, 0.42
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.18 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



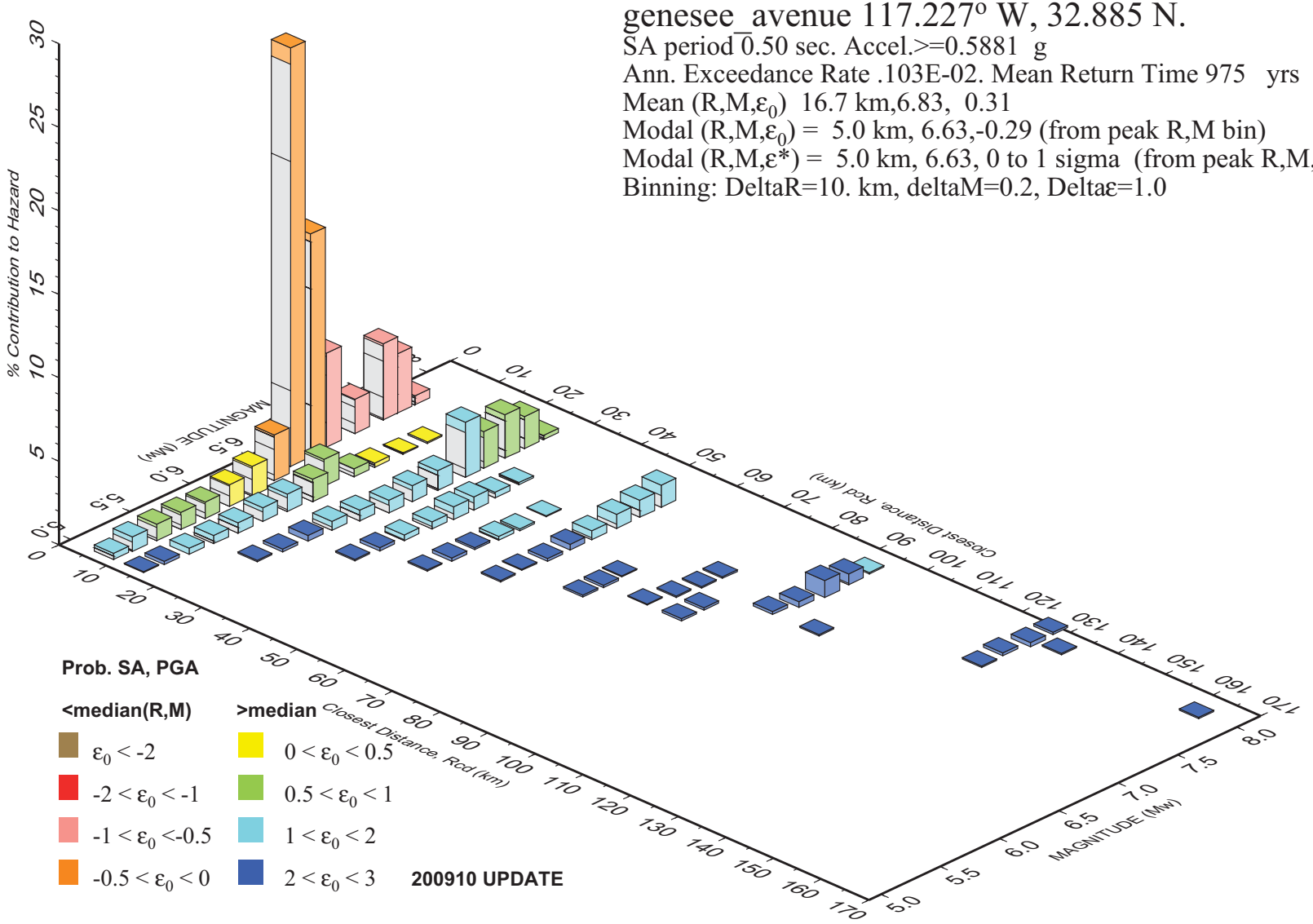
GMT 2011 Jul 20 16:48:40 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:49:49 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

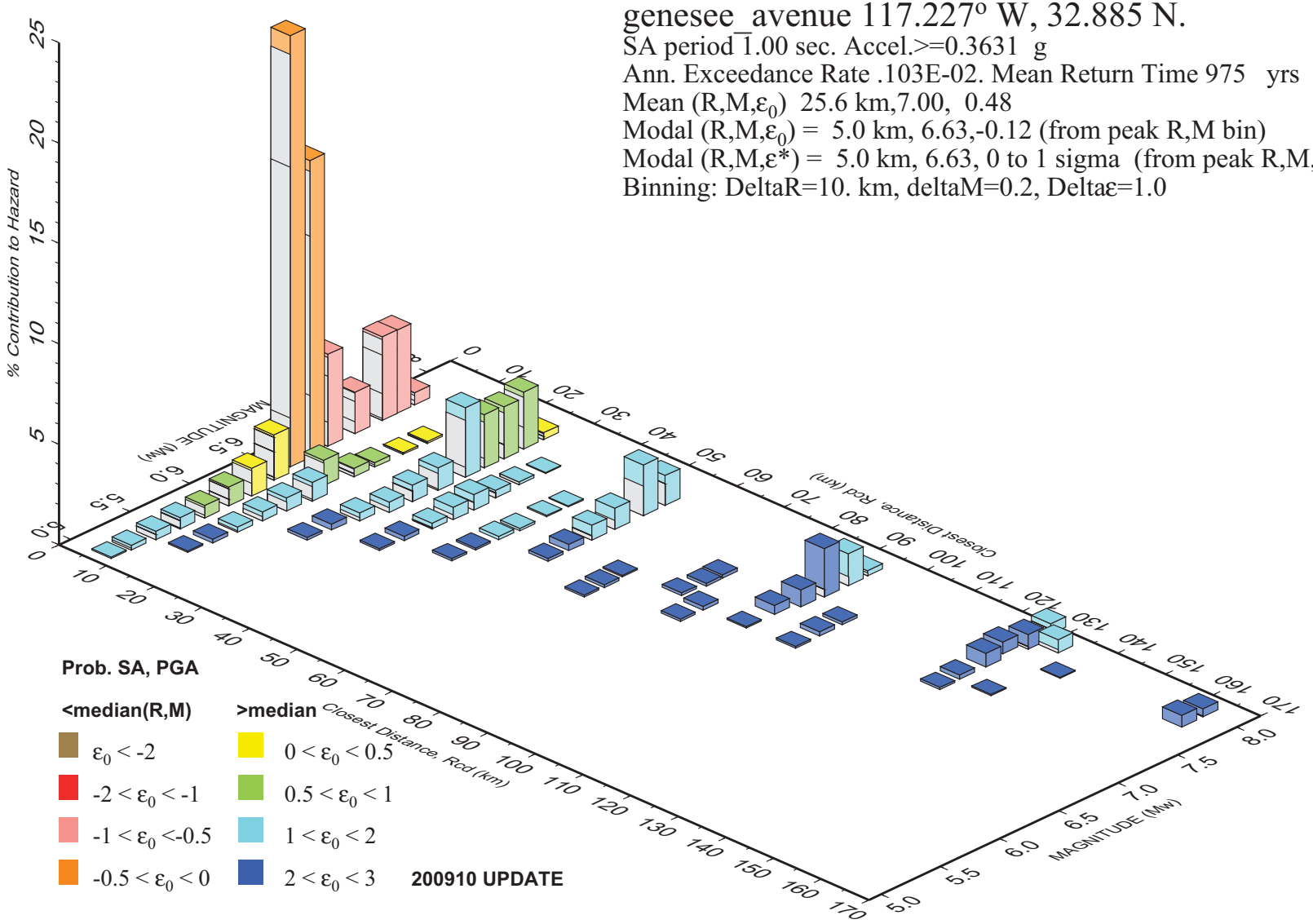
SA period 0.50 sec. Accel.>=0.5881 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 16.7 km,6.83, 0.31
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



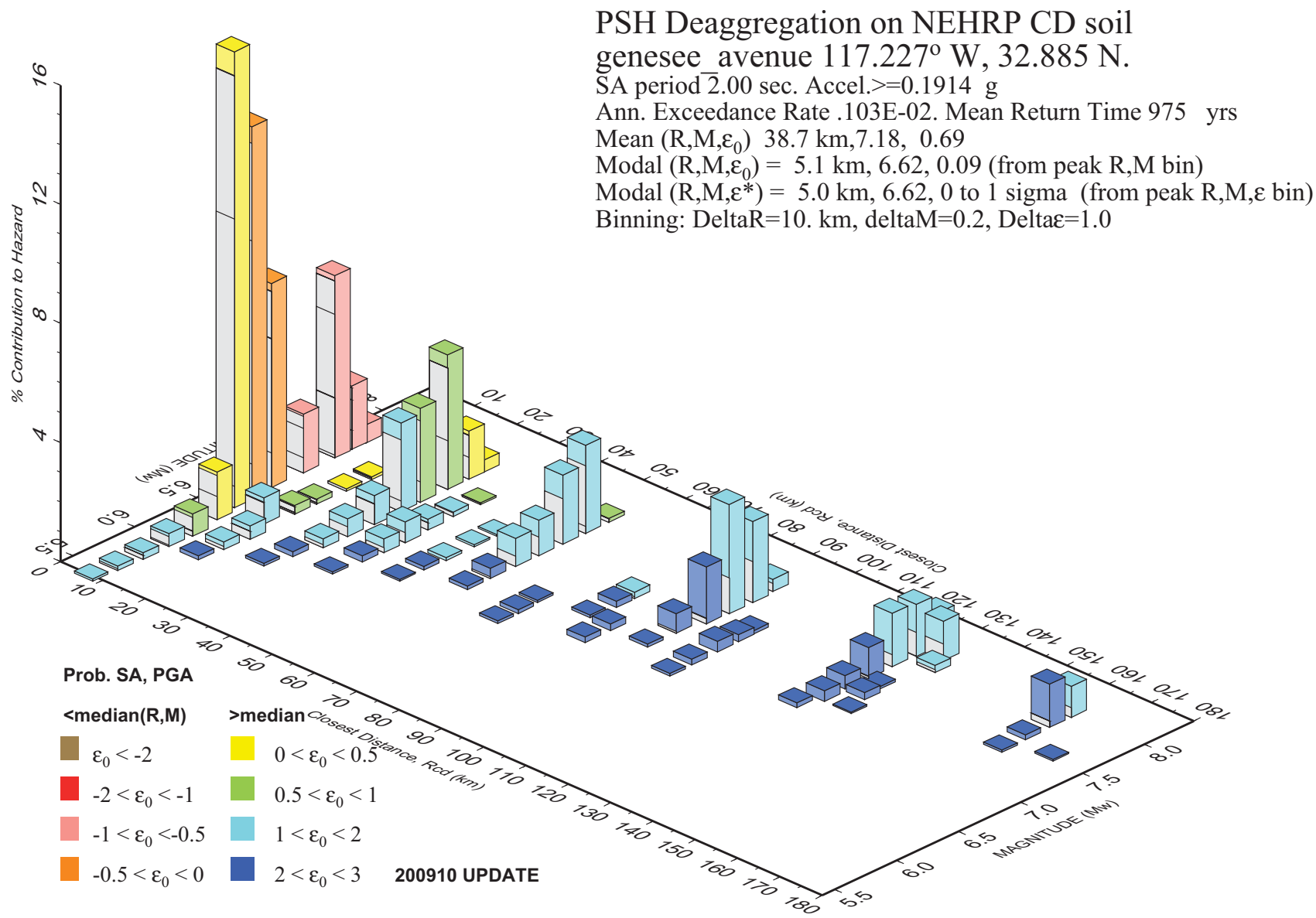
GMT 2011 Jul 20 16:50:55 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

SA period 1.00 sec. Accel.>=0.3631 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 25.6 km,7.00, 0.48
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.12 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



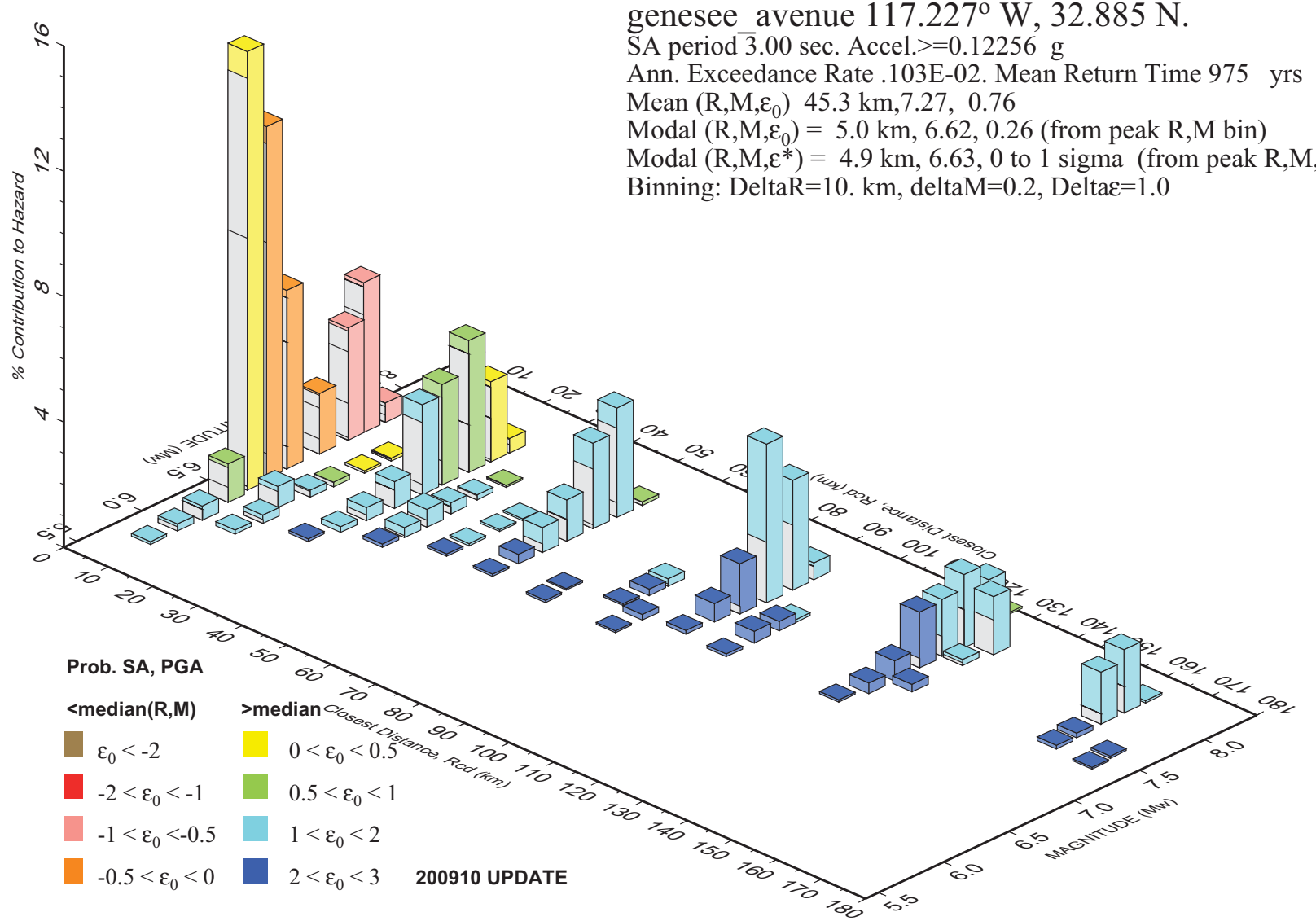
GMT 2011 Jul 20 16:52:12 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted



GMT 2011 Jul 20 16:53:10 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

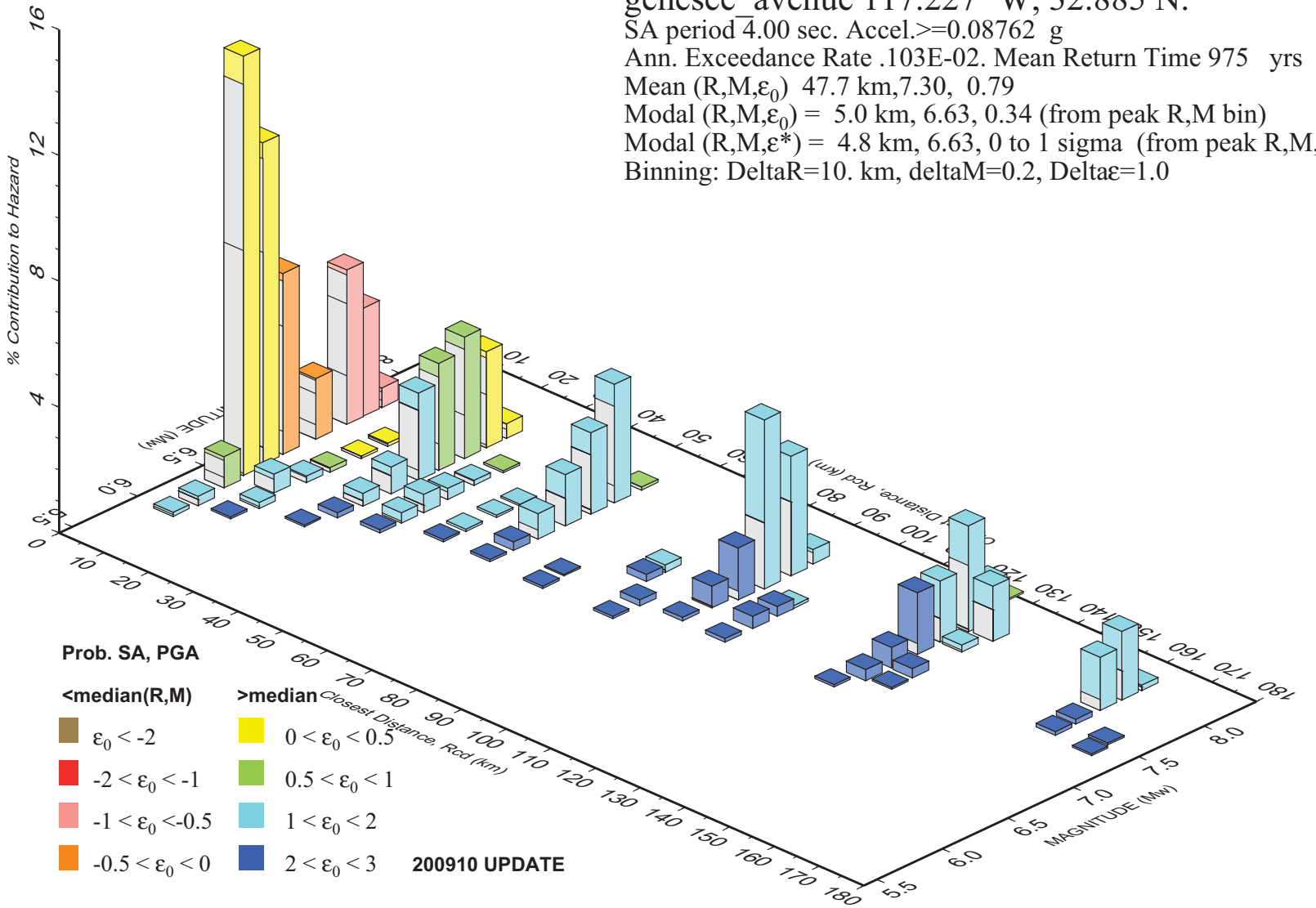
SA period 3.00 sec. Accel.>=0.12256 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 45.3 km,7.27, 0.76
Modal (R,M,ε_0) = 5.0 km, 6.62, 0.26 (from peak R,M bin)
Modal (R,M,ε*) = 4.9 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



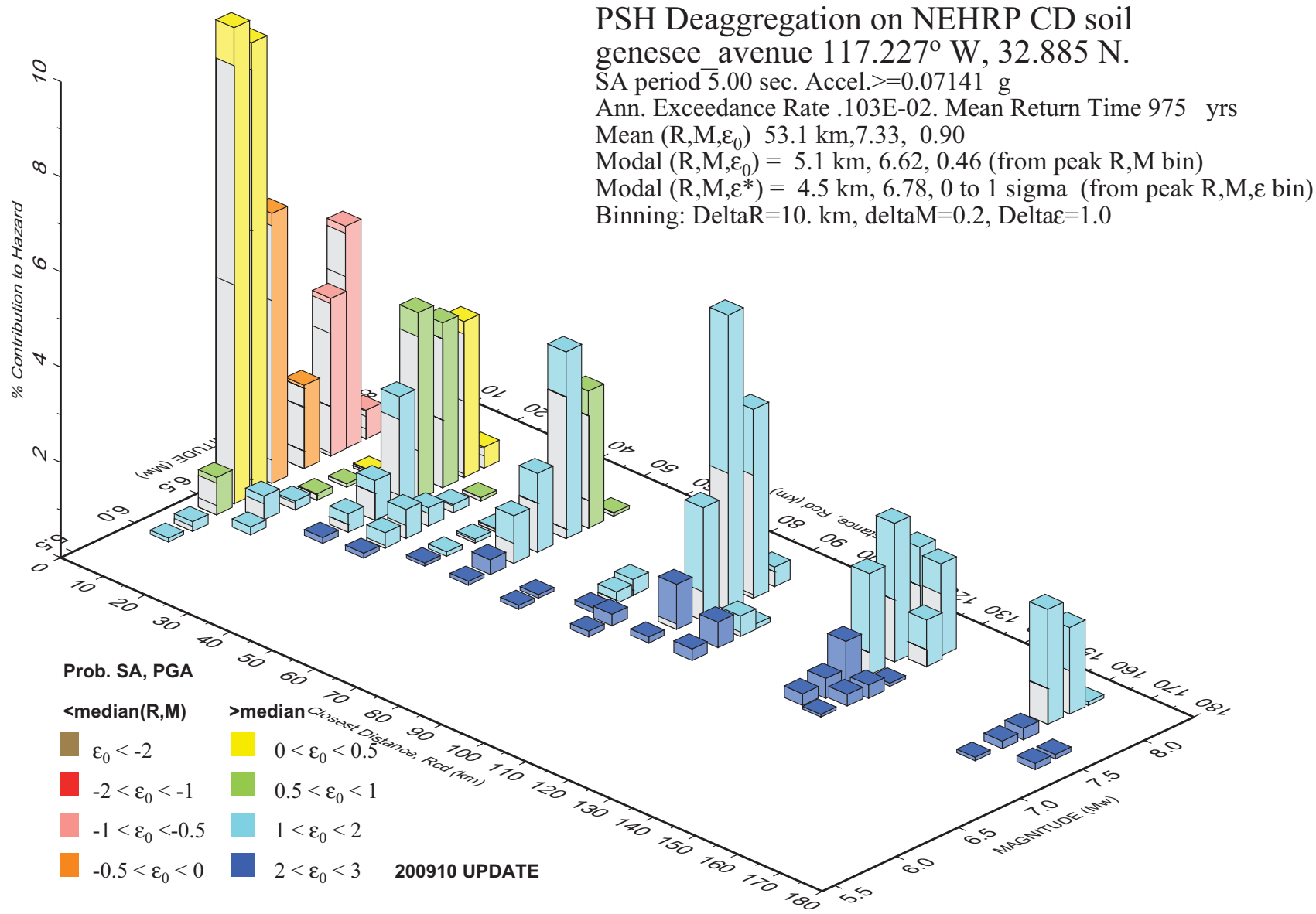
GMT 2011 Jul 20 16:54:05 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

SA period 4.00 sec. Accel.>=0.08762 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 47.7 km,7.30, 0.79
Modal (R,M,ε_0) = 5.0 km, 6.63, 0.34 (from peak R,M bin)
Modal (R,M,ε*) = 4.8 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:54:57 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:55:47 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: R-1,2,and3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

Fault Information (#1)

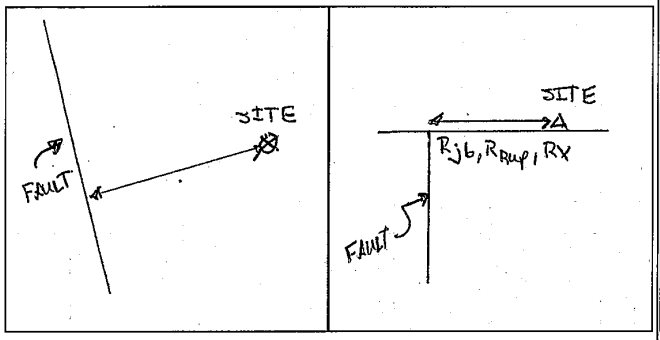
Fault Name: Newport Inglewood (Oceanside) Fault ID#: 223

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.00

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 4.21

R_{JB}: 4.21

R_X: 4.21

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

Fault Information (#2)

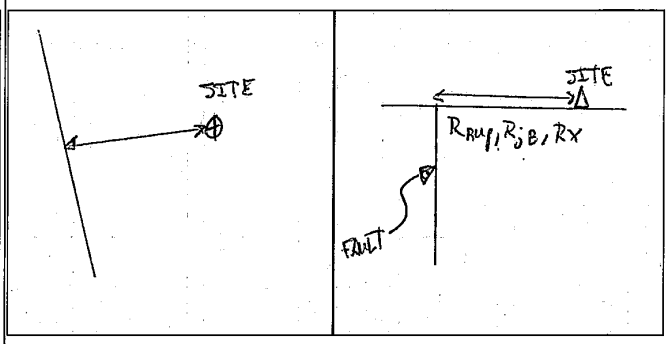
Fault Name: Newport Inglewood (San Diego) Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.0

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: RW-1, 2 and 3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: 117.22703

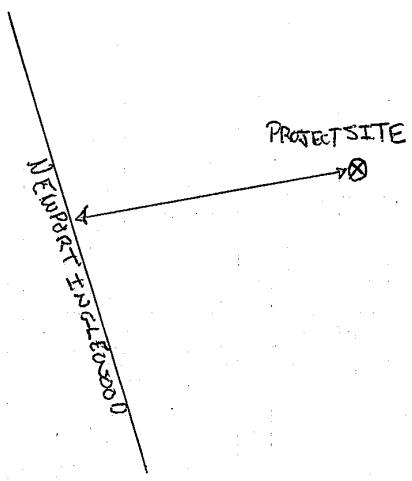
Deterministic Fault Information

Fault Name: New Port Inglewood Rose Canyon Fault ID#: 223 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13.00 km

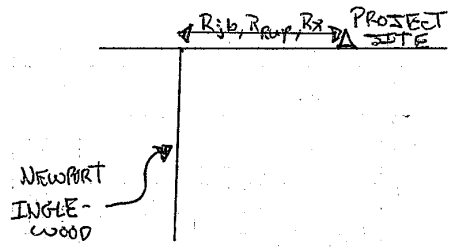
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	4.21 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT Correlation (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 20km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☒	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

ZIA YAZDANI — 11-7-11
Checker (Print) — Title

Checker (Signature) — 11-7-11
Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

BRIAN HINMAN — SENIOR TE
Functional Supervisor (Print) — Title

Functional Supervisor (Signature) — 11/8/11
Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Genesee Int Imp Proj 11-022331 RW-13 10+40.00 H=9.4 mse global

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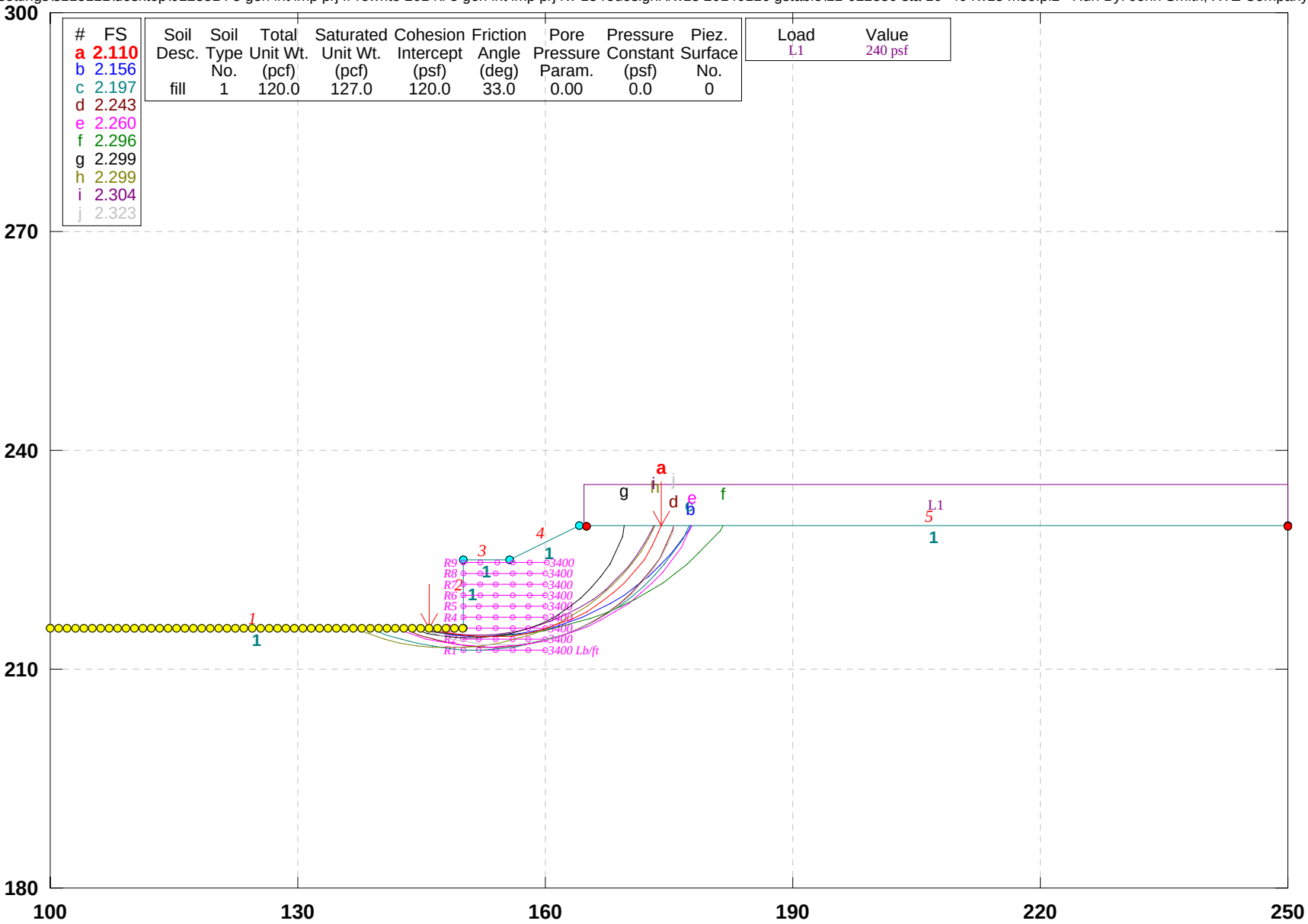

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Safety Factors Are Calculated By The Modified Bishop Method

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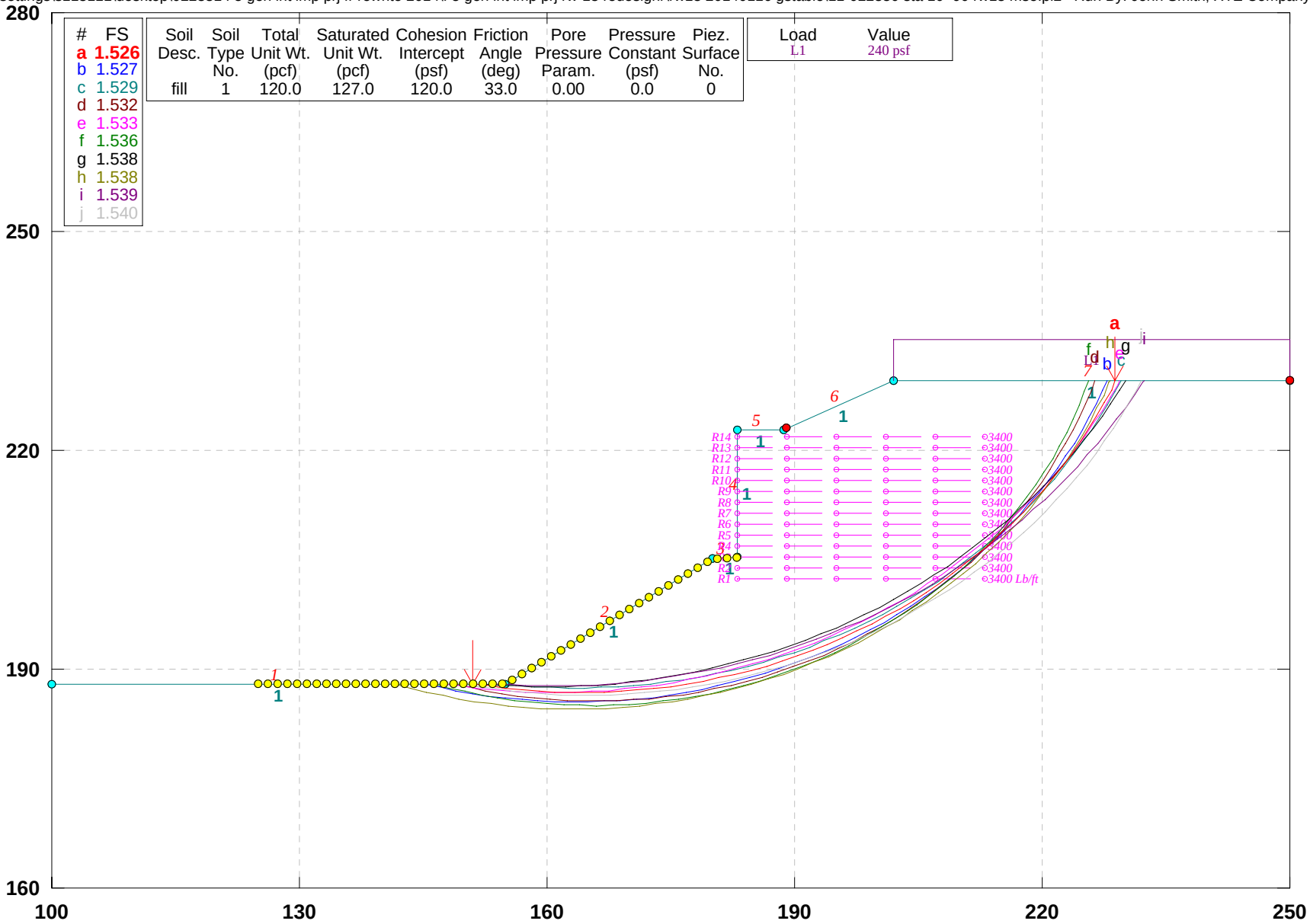

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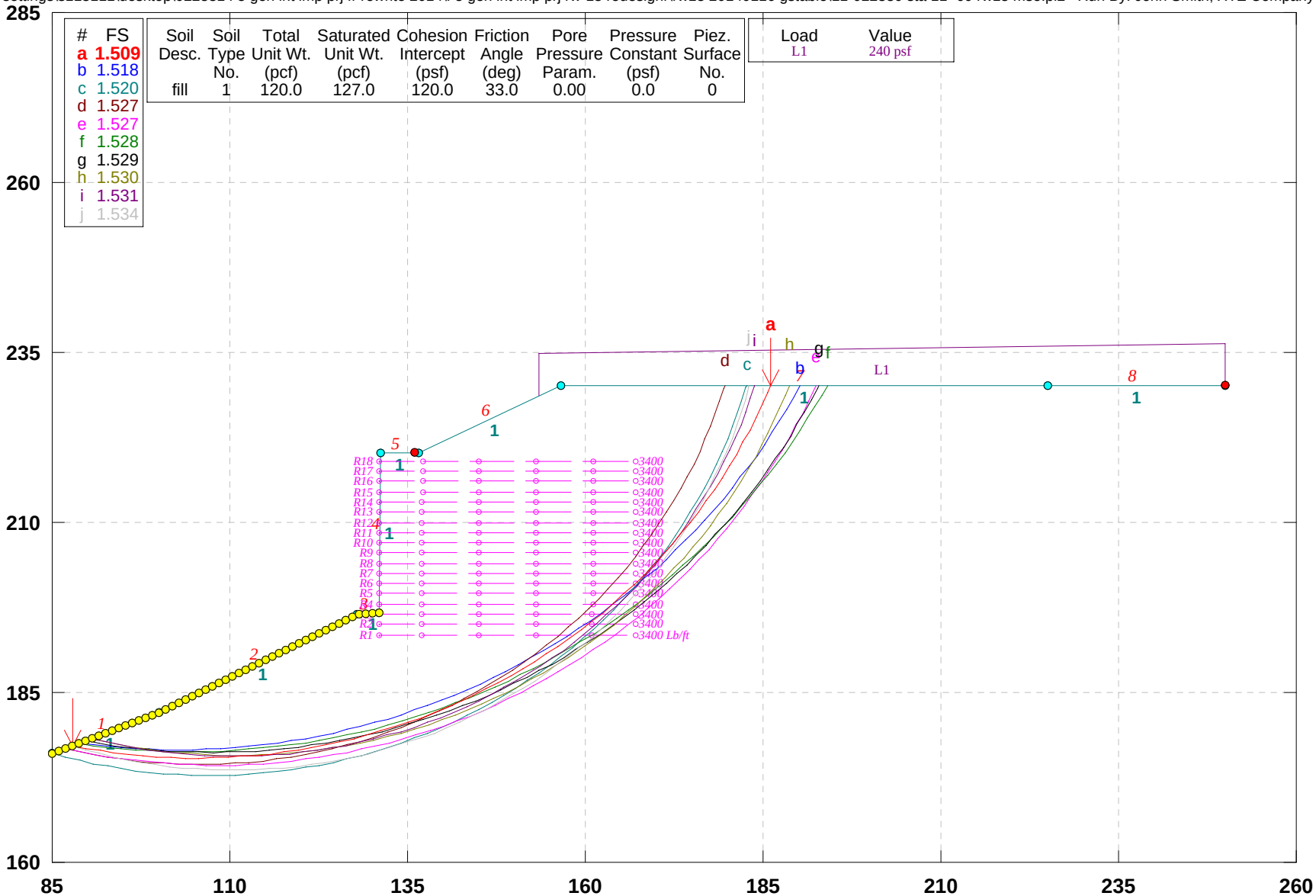

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Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

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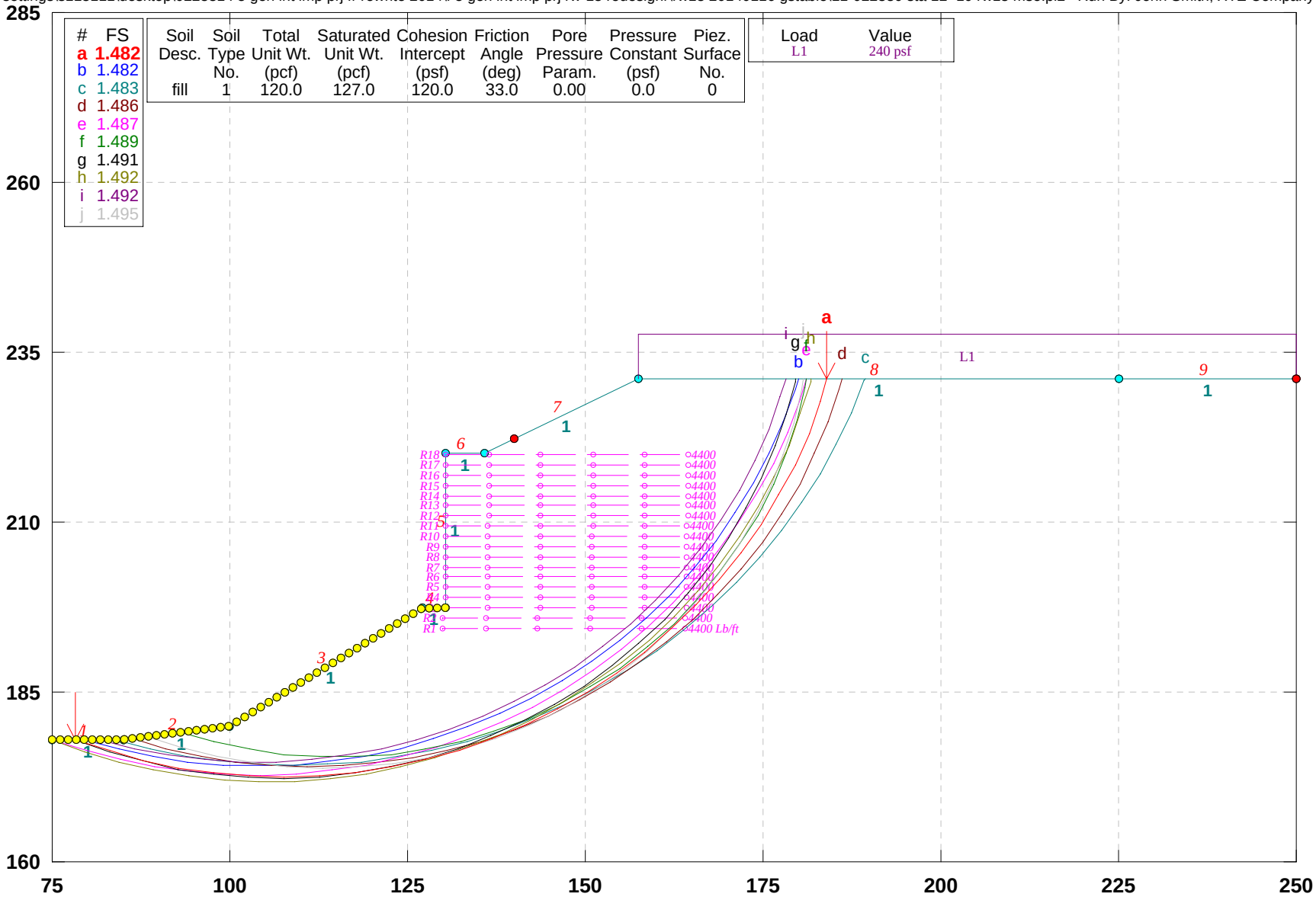

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Safety Factors Are Calculated By The Modified Bishop Method

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APPENDIX IV: ANALYSES AND CALCULATIONS

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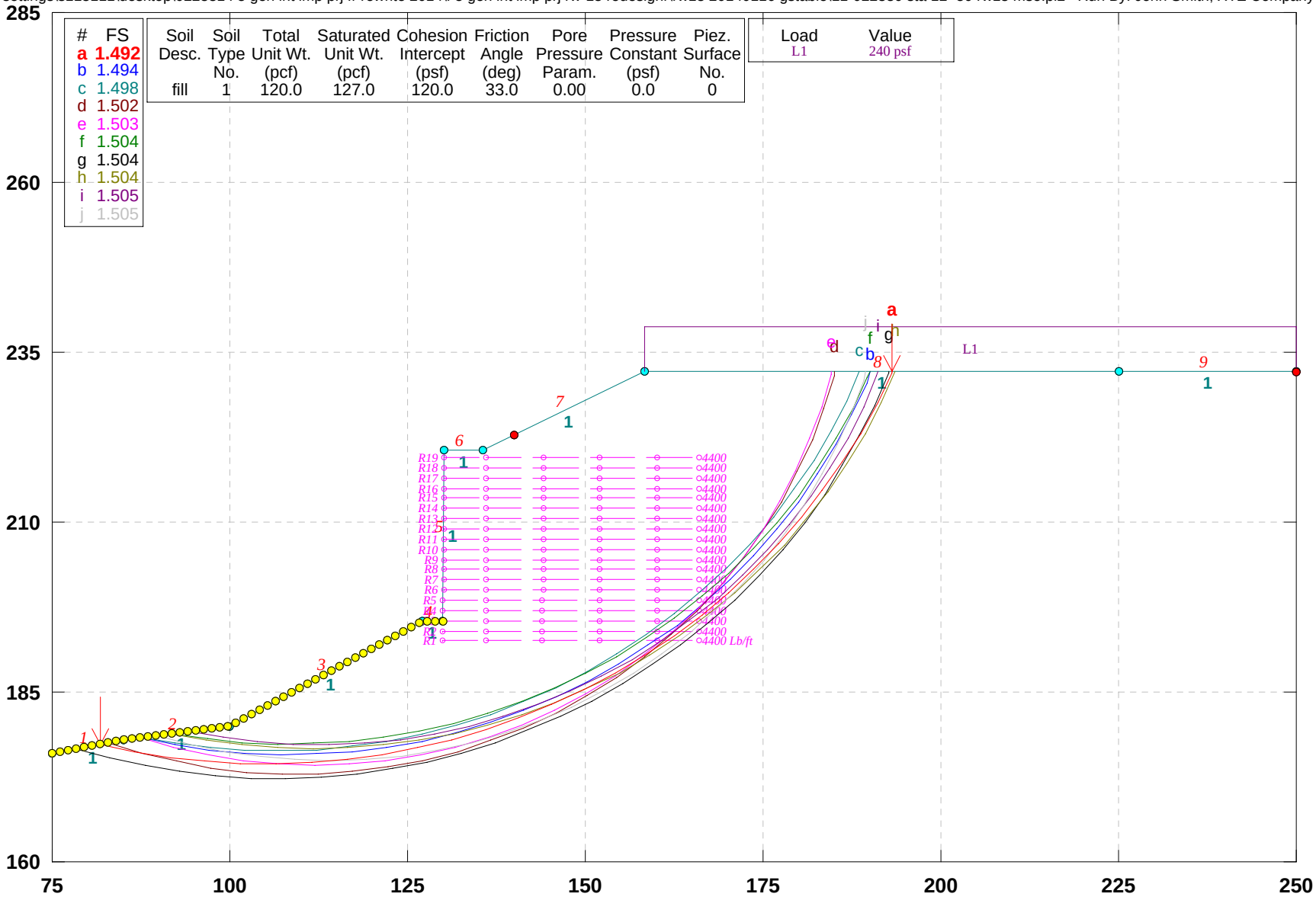

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Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

APPENDIX IV: ANALYSES AND CALCULATIONS

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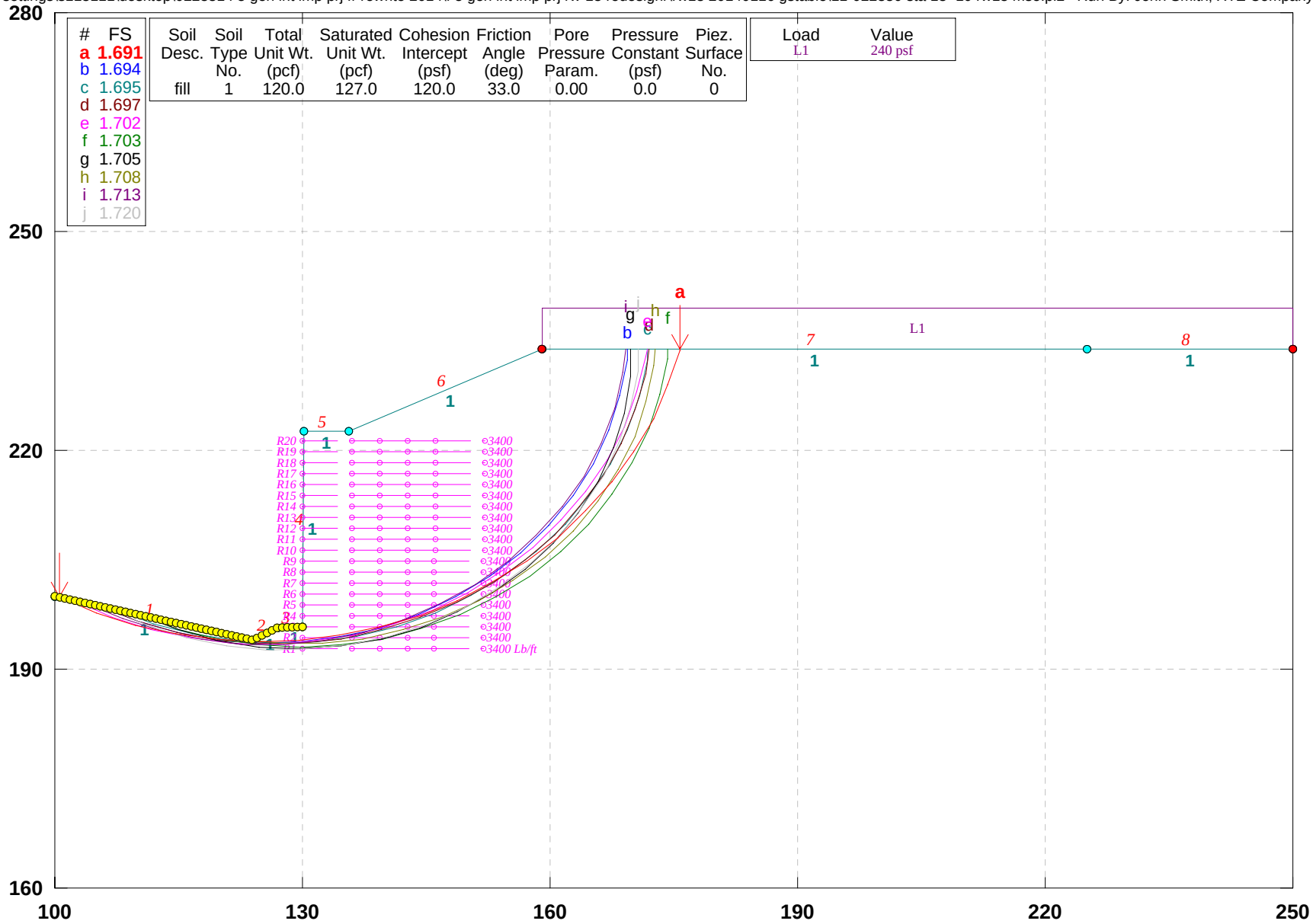

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Safety Factors Are Calculated By The Modified Bishop Method

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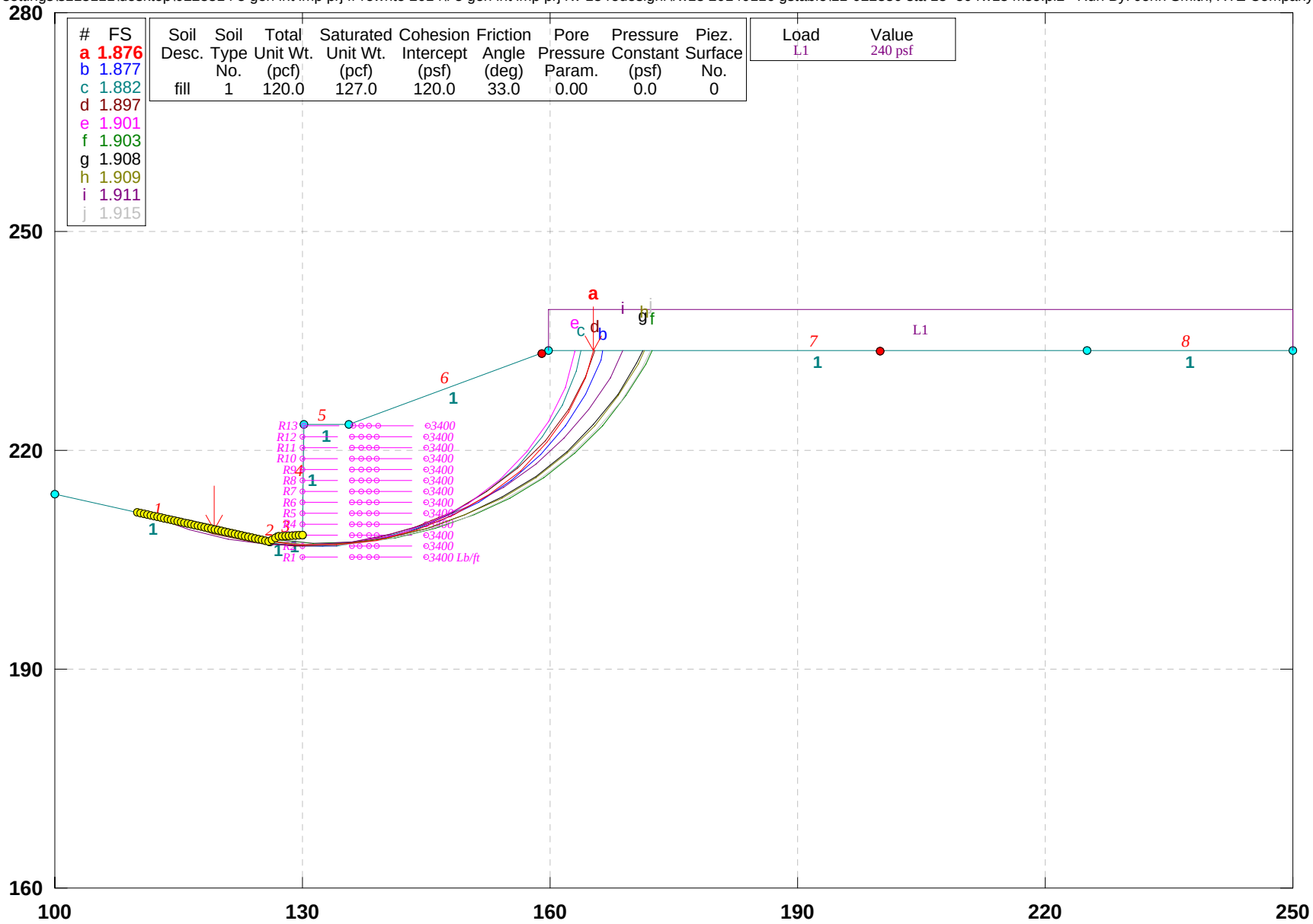

GSTABL7 v.2 FSmin=1.876

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX V

PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Caltrans

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stolarski
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-14

11-SD-5/PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

MARCH 28, 2014

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California | Business, Transportation and Housing Agency

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 28, 2014

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-14

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the I-5/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR documents the prevailing site conditions and provides specific foundation recommendations for Retaining Wall-14. The report defines the geotechnical conditions as evaluated from field investigation data and used in the geotechnical analyses and design. This report provides recommendations and specifications for project design and construction. This FR supersedes information regarding RW-14 presented in the *Caltrans Geotechnical Design Report for the Interstate-5/Genesee Avenue Interchange Improvement Project, EA 11-022331/EFIS 1100000012, dated February 29, 2012.*

No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared for the retaining wall prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

Mike Fordham P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

REGISTERED PROFESSIONAL ENGINEER
MICHAEL M. FORDHAM
C61341
EXP. 02/2015
CIVIL
STATE OF CALIFORNIA

CARBON COPY (CC) LIST

Arturo Jacobo	District Project Manager
Yong Pak	Project Engineer
Art Padilla	District Materials Engineer
Abbas Abghari	Office Chief, OGDS2
Geotechnical Archives	
District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
Mike Ross	Kimley Horn and Associates
Craig Shannon	Simon Wong Engineering

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1.0 SCOPE OF WORK

This Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for Retaining Wall-14 (RW-14) to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project, in the City of San Diego, San Diego County, California hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and to provide recommendations relevant to the design and construction of RW-14. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein.

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, engineering analyses, and retaining wall design. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all stations are referenced to the SD-5 Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Foundation Report Preparation for Retaining Walls, July 2010*. No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) for RW-14 were prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. This FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-14, are necessary to accommodate the project and the associated features. RW-14 is proposed to be a Geosynthetically Reinforced Earth (GRE) Retaining Wall. RW-14 is located north of and parallel to Genesee Avenue. A discussion of the wall type selection is provided in Section10.0

RW-14 will be located between Station 16+92 “GEN-Line” and Station 21+79 “GEN-Line”. The retaining wall will be approximately four hundred ninety-feet (490ft) in length, with a maximum height of approximately thirty two-feet (32ft). Figure 1 depicts the approximate locations and alignment of RW-14 in plan view. Figure 2A and Figure 2B are the layout sheets utilized in the preparation of this FR as provided by the project design staff that includes Caltrans District 11 Design and Kimley Horne and Associates (KHA). Figure 3 is the profile sheet provided by the project design staff and utilized in the preparation of this FR. Illustrative cross sections perpendicular to the wall alignments are shown in Figure 4A through Figure 4C. These cross sections represent the most severe cases of wall and slope geometry.

3.0 AS-BUILT FOUNDATION DATA

The east end of RW-14 will be located approximately seven hundred forty four-feet (744ft) to the west of I-5. The LOTB for the overcrossings include information relevant to the soil conditions near the project

site. LOTB for the Genesee Avenue OC are included in the Appendix I. The construction of RW-14 will not affect the Genesee Avenue OC bridge foundations.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted in December 2008. Three (3) boring were developed for RW-14. The naming convention used for the boring records includes the boring method, the two digit year, and the approximate center line Station along the metric preliminary exploration plan, followed by the notation R or L indicating that the boring was to the right or left of the GEN-line Station. For example, boring R-08-10580R is a rotary boring conducted in 2008 that was developed to the right of approximate metric Station 105+80 along the GEN-line. Metric Stationing was utilized because the subsurface investigation was performed prior to Caltrans transition back to U.S. Customary Units. The approximate locations of the borings are depicted in Figure 2A and Figure 2B. The metric plans referenced for the development of the boring records are not included in this report. LOTB for R-08-10580R, R-08-10700L, and R-08-10740L are included in Appendix II.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to determine the extent of previously unmapped fill thereby delineating the soil conditions anticipated to impact the design and construction of the retaining walls.

The request for the survey of the project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

Corrosion data provided by the laboratory for the project are presented in Appendix III.

Laboratory test data for the project are included in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site geology was interpreted based on previous field investigations, current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map is a modified version of the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975.* The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining walls and the extent of fill mapped by OGDS2. Figure 6 depicts a profile of the geology beneath the existing grade along the retaining wall alignment. Figure 7A through Figure 7C depict geologic cross sections along the RW-14 alignment.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine-hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. The

approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

Fill slopes currently exist along the proposed retaining wall alignments. RW-14 will be constructed within artificial fill over a thin layer of alluvium and sedimentary formation.

The geologic units in the project area and depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fills in the project area appear to be medium dense engineered fills derived from material excavated from nearby cuts in the sandstone and siltstone.
- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.
- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voight Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the City of San Diego, Seismic Safety Study Geologic Hazards and Faults for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC. Additionally, one or more un-named short inactive faults cross the RW-14 and the I-5 north coast corridor widening project retaining wall alignments.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC under the UCSD campus and under the Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault System running on a north-northwest trend and located offshore roughly two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

The retaining wall alignment is underlain by competent engineered fill, a thin layer of alluvium, and sedimentary formation with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible soils, or expansive soils have not been observed along the proposed alignment of RW-14.

Landslides are commonly associated with the Ardath Shale where expansive claystone locally comprises as much as twenty-five-percent (25%) of the geologic unit. Expansive claystone was not observed along the alignments of RW14. Landslides are not anticipated to be a geologic hazard at the wall locations.

Zones of loosely compacted embankment beneath the wall alignment were revealed during the exploration program. The foundation soils may settle up to four-inches (4in) during wall construction.

Depth to Bedrock

Based on observations made during the subsurface investigation, artificial fill up to seventy-feet (70ft) in depth is located along the alignment of RW-14. The artificial fill currently traverses a small canyon that bisects Genesee Avenue west of I-5. The depth of artificial fill varies along the length of the retaining wall. Based on topographic maps and the subsurface investigation, the depth of the fill decreases to the west along the RW-14 alignment.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-14 is not located along a stream course. A scour evaluation for the retaining walls is not applicable

to this project.

8.0 CORROSION EVALUATION

Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

None of the conditions considered to make the site soils corrosive were present in the onsite samples collected and analyzed for the project. Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section includes the seismic study and addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B*.

According to the *Seismic Design Criteria (SDC)Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50). Soil Profile Type D has SPT results with the number of blows per twelve-inches (12in) greater than/or equal to fifteen and less than fifty (15≤N<50).

The three (3) borings developed along the alignment of the proposed future retaining wall and RW-3 consistently had SPT results that ranged from as low as eight (8) to as high as forty-one (41) blows per twelve-inches (12in) in artificial fill and greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in the Appendix B of the SDC, the appropriate Soil Profile Type is C for sedimentary formation and D for artificial fill.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the Caltrans ARS Online Tool was three hundred and sixty-meters per second (360m/s), which correspond to Soil Profile Type D. The shear wave velocity for soil profile Type D was used to obtain the most conservative results. The closest regional active fault as indicated by the Caltrans ARS Online Tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately fifteen one hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The retaining walls are located within sedimentary formation and compact artificial fill well above any groundwater table. There is no potential for liquefaction at the project site.

Earthquakes caused by movement along nearby active faults are likely to result in ground motion impacting project features. However, since no active faults transect the project site, there is no potential for surface fault rupture.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

The retaining walls will be constructed within dense sedimentary formation and compact fill. There is little potential for seismically induced settlement.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of the retaining walls do not exist at the project site.

Pseudo-static modeling and slope stability analyses were conducted to assure that the retaining walls will meet stability requirements in a seismic event. Stability analyses are discussed in Section 10.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

RW-14 will be developed along an existing fill slope. The retaining wall will allow for the widening of Genesee Avenue. Retaining walls suitable for fill situations such as Caltrans Standard retaining walls, Mechanically Stabilized Earth (MSE) retaining walls, and GRE retaining walls are considered feasible. A Self-shoring, top-down stage construction retaining wall system such as a soil nail and ground anchors walls are not applicable to placement of additional embankment fill. A temporary back cut to facilitate the construction of a retaining wall is feasible, though shoring may be needed to lessen the impact on Genesee Avenue.

Caltrans Standard retaining walls and MSE retaining walls require the use of select backfill that is not available on-site. The proposed GRE retaining wall will utilize on site material as backfill and is therefore the most economical retaining wall system available. The GRE retaining wall system will also accommodate anticipated ground settlement without the need for remedial grading of foundation soils. The retaining wall design parameters as provided by the project development team and project plans are included in Table 4A and Table 4B.

The GRE wall design and global slope stability analyses for RW-14 were performed using STEDWIN with GSTABL7 v2.0 and MSEW v3.0. Internal, global, and mixed stability were evaluated by modeling various wall heights and adjoining slopes. The bearing capacity, overturning, sliding, and reinforcement pullout were evaluated for various wall heights. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of transient loads was modeled as a distributed vertical load of two hundred forty-pounds per square foot (240psf). The GRE backfill soil strength design parameters utilized in the analyses are presented in Table 3. The basis for the selection of the soil strength parameters was archived data, field test results, and engineering experience and judgment. The GRE design parameters utilized in the analyses are presented in Table 4A and Table 4B. The graphic results of the stability analyses are presented in Appendix IV. The need to satisfy global slope stability criteria was found to control the design of the geosynthetic reinforcement.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-14 be designed and constructed as a GRE wall.

The parameters that may be used for GRE wall design are presented in Tables 4A through Table 5.

The recommended length of geosynthetic reinforcement, the design strength of the geosynthetic reinforcement, and the vertical spacing of the geosynthetic reinforcement are provided in Table 4A and Table 4B.

12.0 NOTES TO DESIGNER

The project site soils are considered non-corrosive.

The design of the retaining walls should incorporate a gravel drainage system similar to those found on MSE retaining walls. An example drainage system is presented in Figure 10.

Surface runoff should be controlled so as to not erode or otherwise adversely affect soil above or below

the retaining wall.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining walls should be avoided. Features that promote infiltration could have an adverse impact on the performance of the retaining walls.

The temporary GRE retaining wall facing will consist of ten-foot (10ft) long by one and one-half foot (1.5ft) high by one and one-half foot (1.5ft) deep galvanized L-shaped wire basket. The basket will have a maximum opening size of four-inches (4in) by four-inches (4in). L-shaped baskets will have supporting cross struts placed every 1.5 feet along there length. L-shaped baskets should overlap one another by four-inches (4in) and a cross strut should be placed at the overlap and around the top and bottom wire of both baskets. L-shape basket will be positively connected to geogrid. The lengths of the geogrid and the vertical spacing of the geogrid are presented in Table 4B. The L-shaped basket will be lined with filter fabric and backfilled with free draining, non-corrosive sand or gravel. If the free draining material is gravel then filter fabric will be placed between the free draining material and the backfill.

The design of RW-14 assumes the use of onsite borrow material generated form project cut slopes can be utilized as backfill.

Wall facing anchors and facing may be designed to be similar to soil nails and soil nail wall facing. The wall facing may be cantilevered up to two and one-half-feet (2.5ft) at the top of wall to accommodate the sloping wall profile.

Permanent GRE retaining wall facing may consist of either sculpted shotcrete or cast-in-place concrete. Sculpted shotcrete is typically the more economical method. Parameters for the design of the permanent facing and anchors are presented in Table 5. (FHWA-HRT-11-027, 2011)

13.0 CONSTRUCTION CONSIDERATIONS

The artificial fill found along the alignment of RW-14 may be excavated using standard excavation equipment.

The occurrence of groundwater is not anticipated to impact retaining wall construction.

Temporary cut slopes proposed by the Contractor should follow the guidelines set forth in the Caltrans Trenching and Shoring Manual and the project Geotechnical Design Report. The estimated soil strength parameters presented in Table 3 should be utilized by the contractor to perform any required engineering analyses of proposed temporary slope configurations. The acceptable minimum factor of safety criteria for the stability analyses of a temporary cut slope is 1.2.

The temporary face of RW-14 should be constructed at a batter of thirty six vertical to one horizontal (36v:1h). This batter requires that each successive one and one-half foot (1.5ft) lift be set back one-half inch (0.5 in). The batter will allow for the outward deflection of the temporary GRE retaining wall facing during construction. (No. FHWA-NHI-10-024, 2009)

All geosynthetic reinforcement fabric should be place taut and remain taut during the backfill process. Spreader bars or other mechanical means of insuring the geosynthetic reinforcement remains taut should be employed during construction.

If the facing anchor system is utilized to stabilize form work for cast-in-place facing, the forces applied to the anchor during the casting of the facing should not exceed the maximum capacity of the anchor. The maximum capacity of the facing anchor is presented in Table 5.

The contractor will need to develop a large enough working bench along the top of the wall to facilitate the installation of the final wall facing. Most of the embankment fill slope above the GRE retaining wall should be placed and a settlement waiting period of sixty-days (60days) should be observed before

applying the permanent facing. It will be necessary to allow a portion of the fill slope to be placed later in order to provide a working bench for construction equipment.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2010*. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is less than what is prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to abundant geologic exposures available by inspection of the existing cut slope and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and locations that have been provided to OGDS2. If any changes are made to the project features addressed herein, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analyses. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

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FHWA, *Manual for Design and Construction Monitoring of Soil Nail Walls*, Publication No. FHWA-SA-96-069R

Ninyo & Moore, *Preliminary Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-235800), December 2005

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PBS&J, *University of California San Diego Long Range Development Plan, Final Environmental Impact Report*, September 2004

U.S. Department of Transportation, Federal Highway Administration, *Geosynthetic Reinforced Soil Integrated Bridge System Synthesis Report,* Publication No. FHWA-HRT-11-027, January 2011

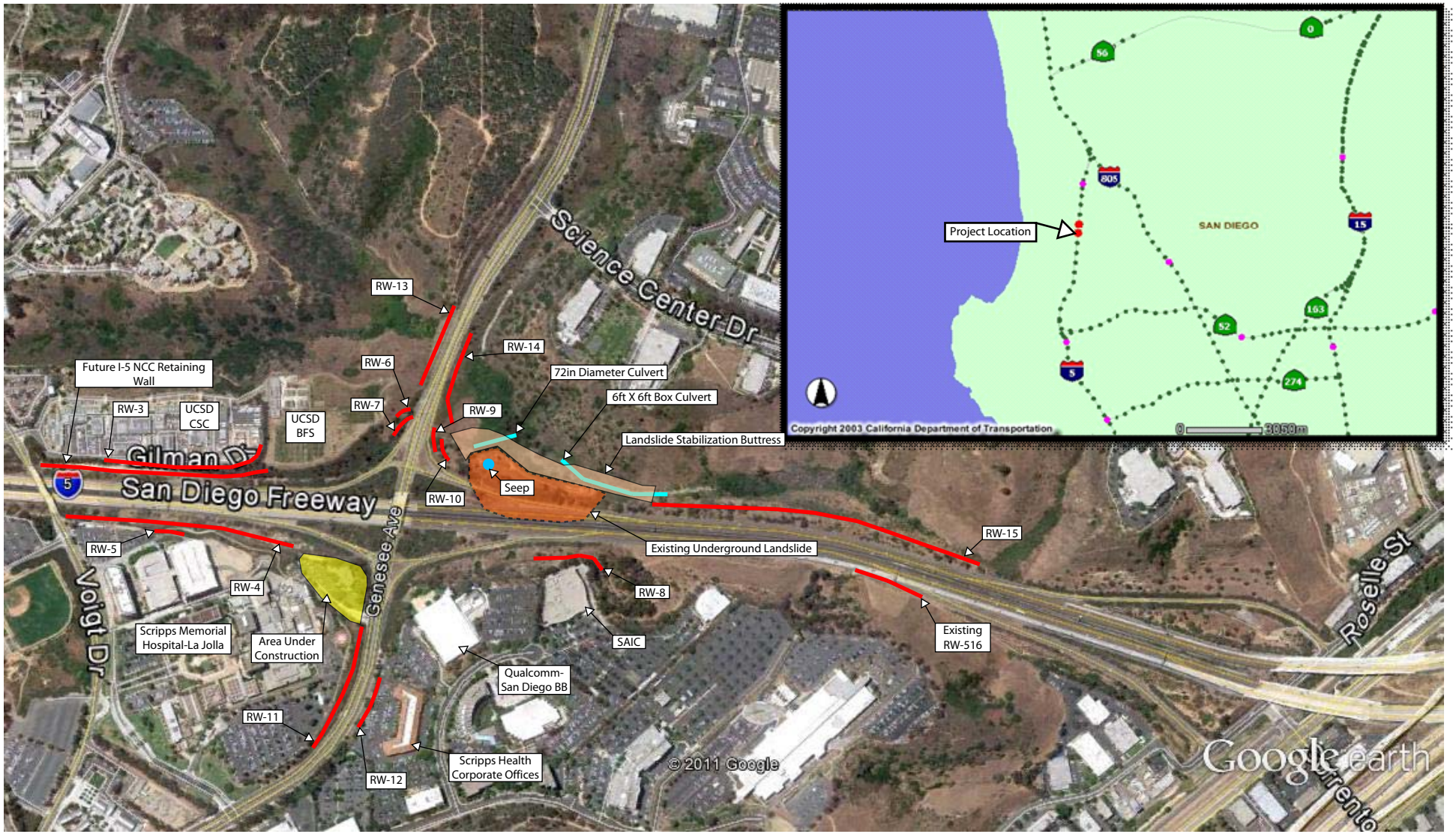
National Highway Institute, *Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I,* NHI Courses No. 132042 and 132043, Publication No. FHWA-NHI-10-024 FHWA GEC 011 – Volume I, November 2009

Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

FIGURES



Google earth

feet 5000

km 1

Note: The locations, alignments, and lengths of the retaining walls; the location of the seep; the location, length, and alignment of the landslide stabilization buttress, the location and area of the landslide are approximated.

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	15	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

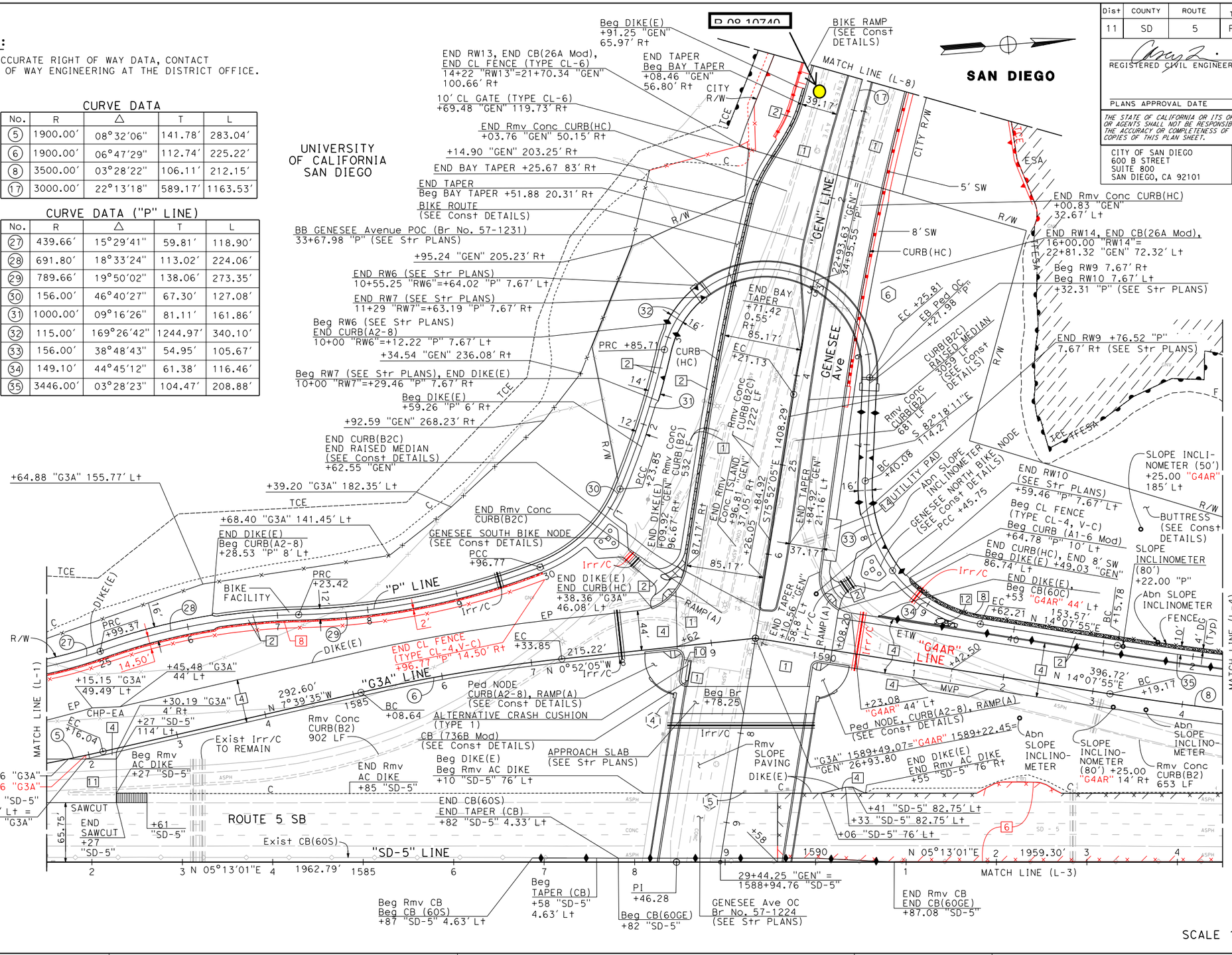
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
5	1900.00′	08°32′06"	141.78′	283.04′
6	1900.00′	06°47′29"	112.74′	225.22′
8	3500.00′	03°28′22"	106.11′	212.15′
17	3000.00′	22°13′18"	589.17′	1163.53′

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
27	439.66′	15°29′41"	59.81′	118.90′
28	691.80′	18°33′24"	113.02′	224.06′
29	789.66′	19°50′02"	138.06′	273.35′
30	156.00′	46°40′27"	67.30′	127.08′
31	1000.00′	09°16′26"	81.11′	161.86′
32	115.00′	169°26′42"	1244.97′	340.10′
33	156.00′	38°48′43"	54.95′	105.67′
34	149.10′	44°45′12"	61.38′	116.46′
35	3446.00′	03°28′23"	104.47′	208.88′



LAYOUT L-2

SCALE 1"=50′

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

CHECKED BY: CASEY L. LEWIS

REVISED BY / DATE REVISED

BORDER LAST REVISED 07/02/10

USERNAME => greg.zeitounian
DGN FILE => 1112000102ea002.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2771

PROJECT NUMBER & PHASE 11120001021

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 2A: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	21	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

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CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
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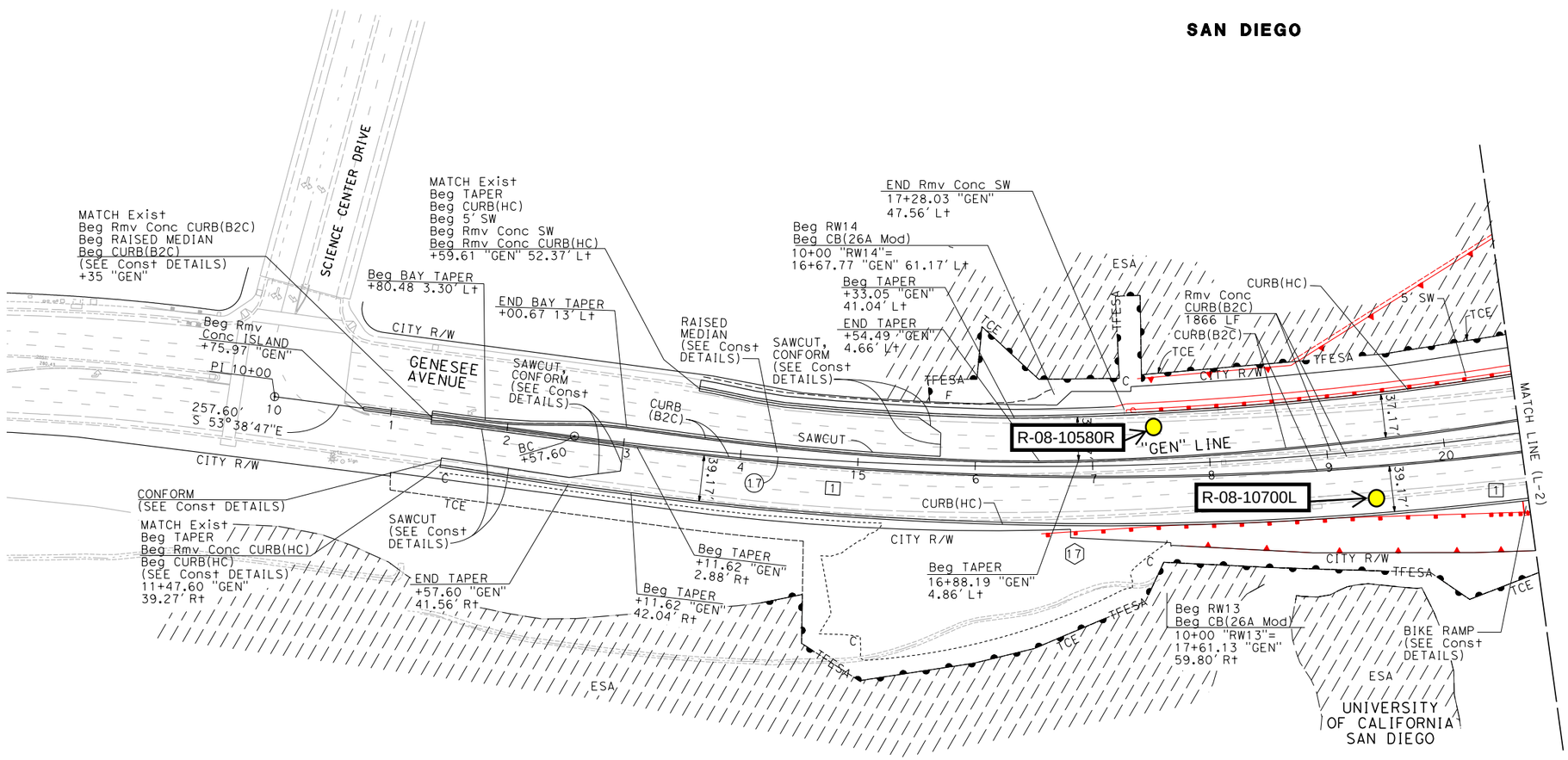

LAYOUT L-8

SCALE 1"=50′

CALCULATED-DESIGNED BY	GREGORY ZEITOUNIAN	REVISED BY			
CHECKED BY	CASEY L. LEWIS	DATE REVISED			
CONSULTANT FUNCTIONAL SUPERVISOR	MICHAEL S. ROSS				
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	Caltrans				

LAST REVISION 01-31-14 DATE PLOTTED => 1/23/2014 TIME PLOTTED => 10:27:48 AM

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FIGURE 2B: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

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Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 3: PROJECT PROFILE

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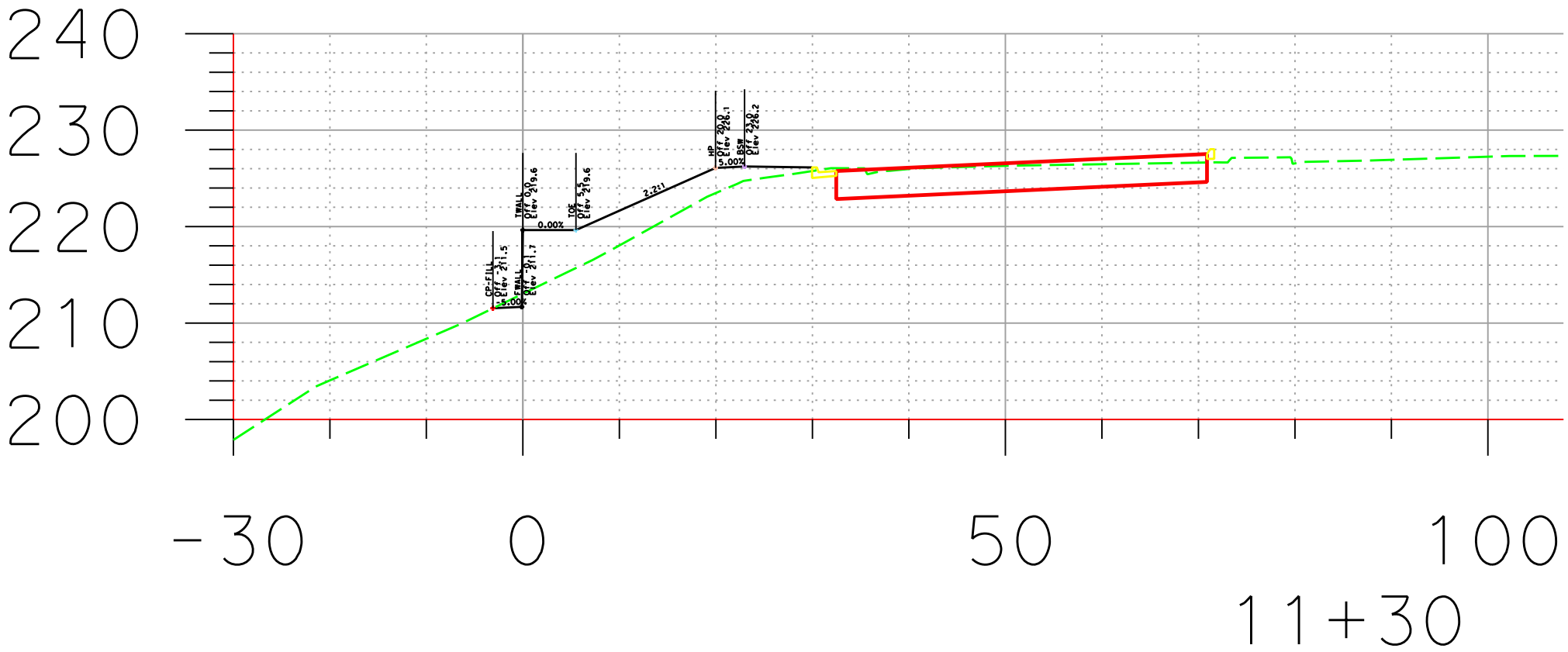

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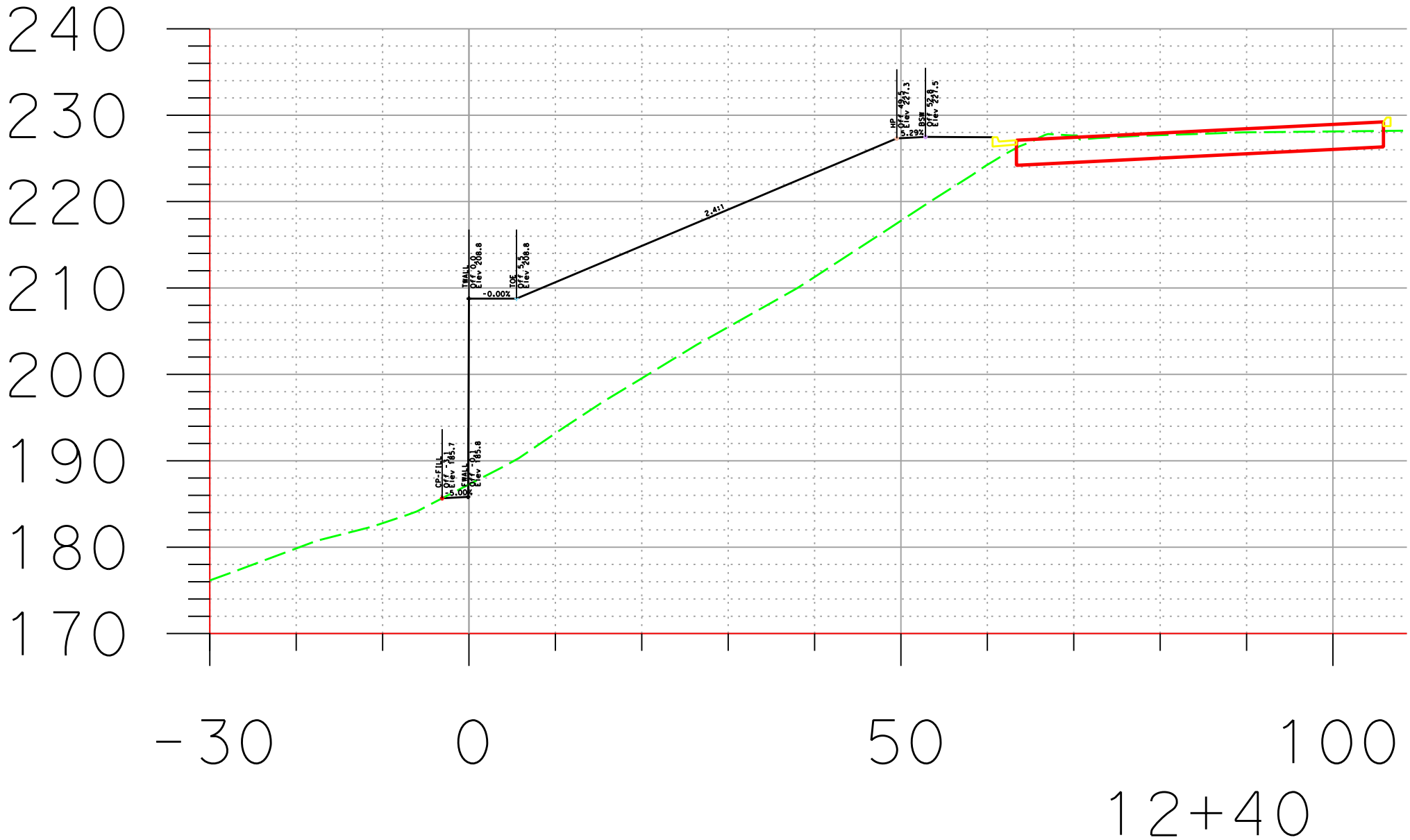
FIGURE 4A: PROJECT CROSS SERCTION



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Foundation Report
Interstate 5/Genesee Avenue Interchange Improvement Project
Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 4B: PROJECT CROSS SERCTION

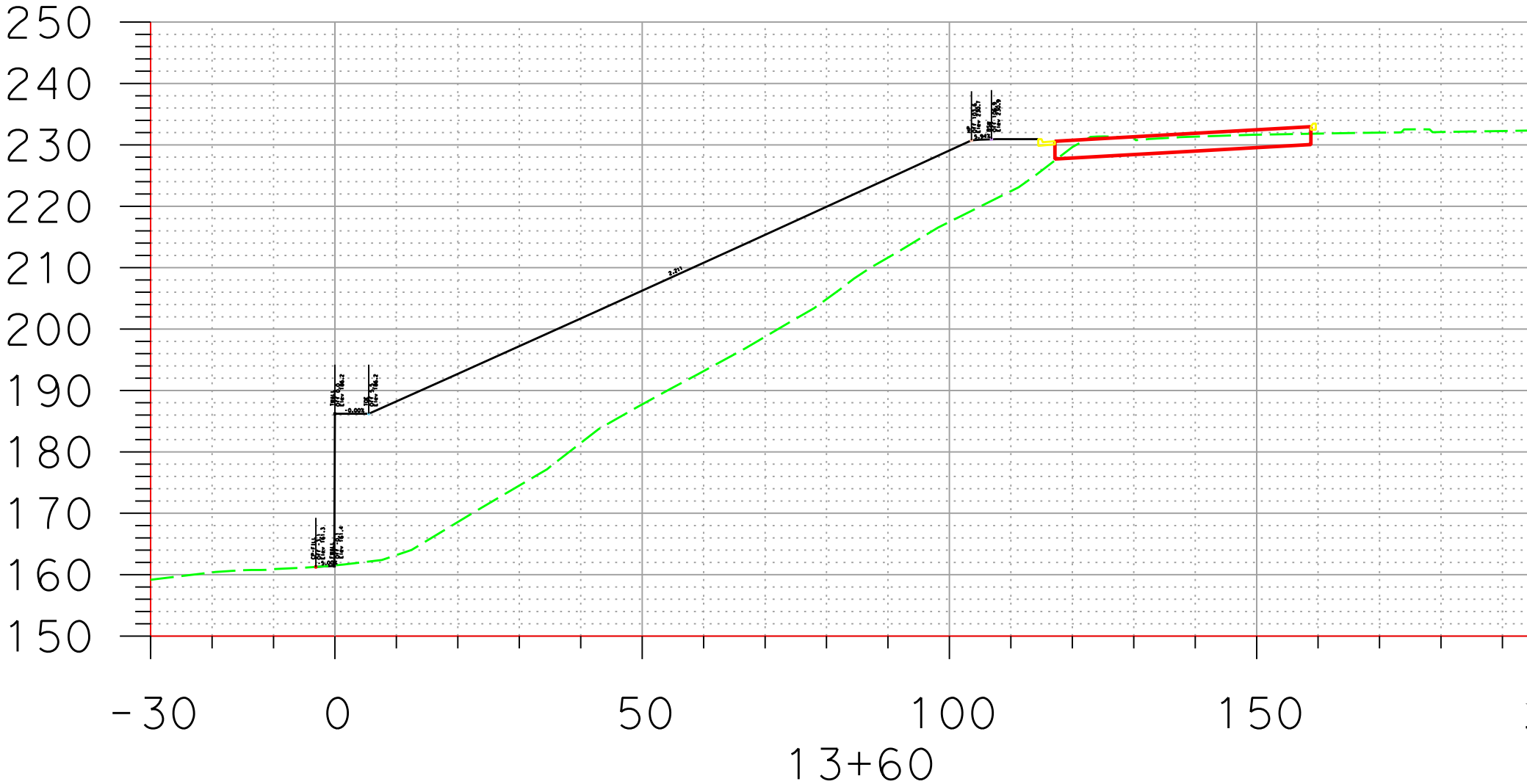

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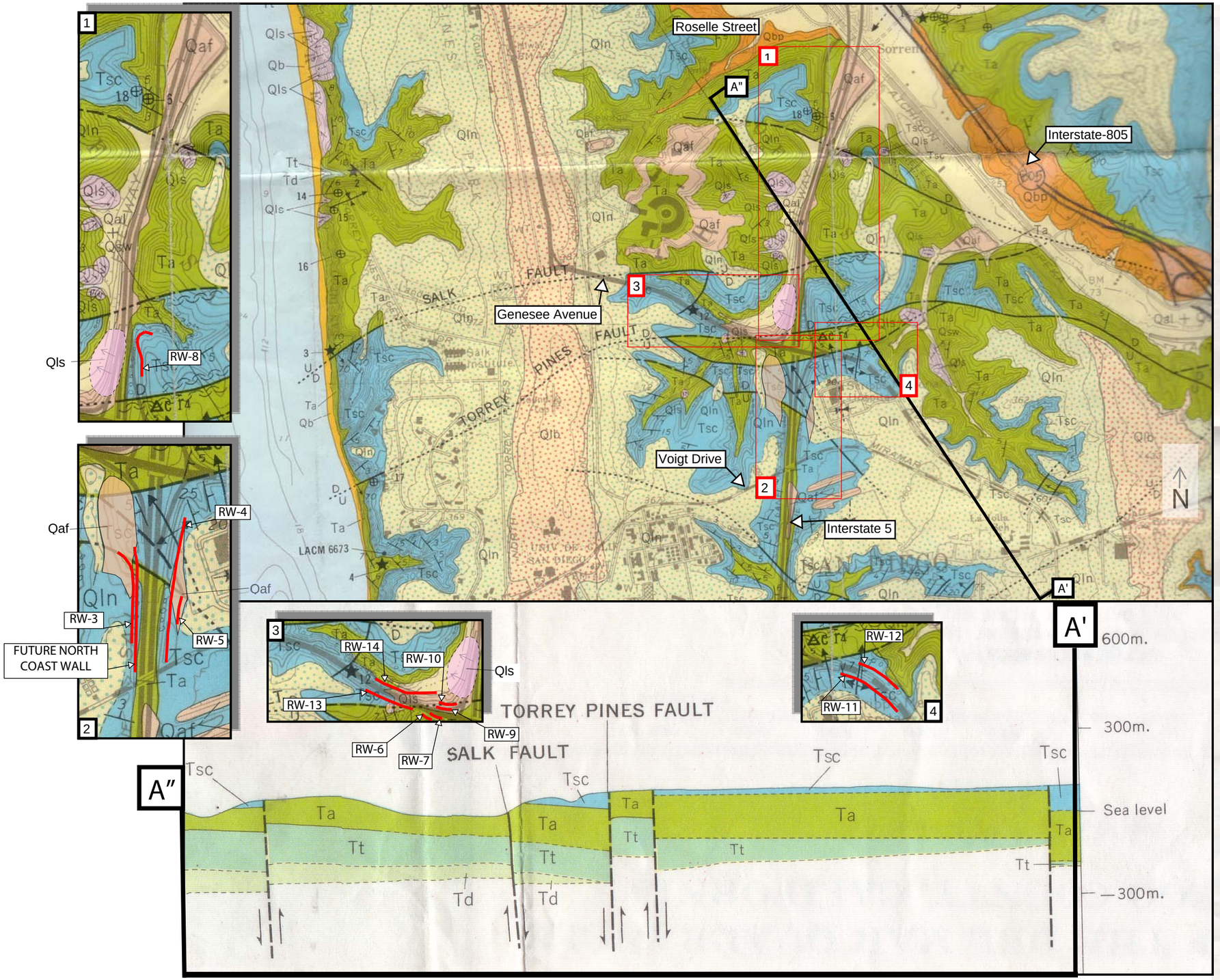
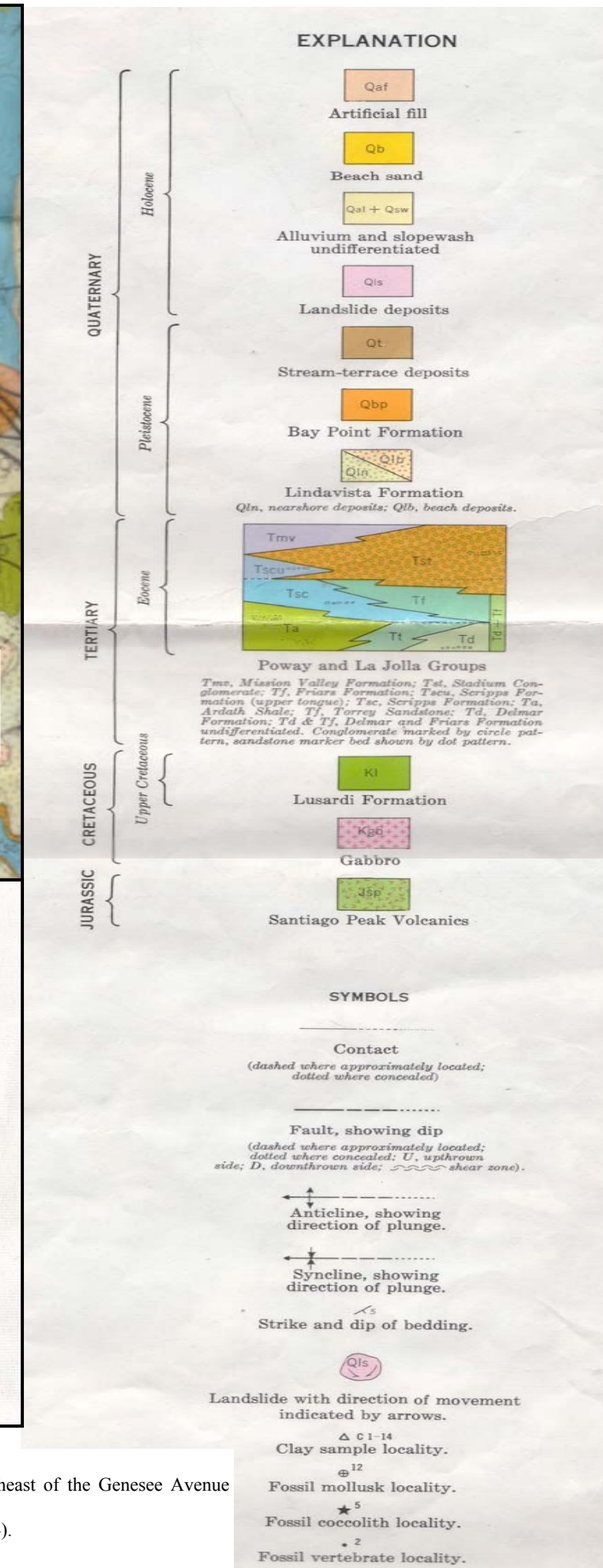
FIGURE 4C: PROJECT CROSS SERCTION





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Retaining Wall-14
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP

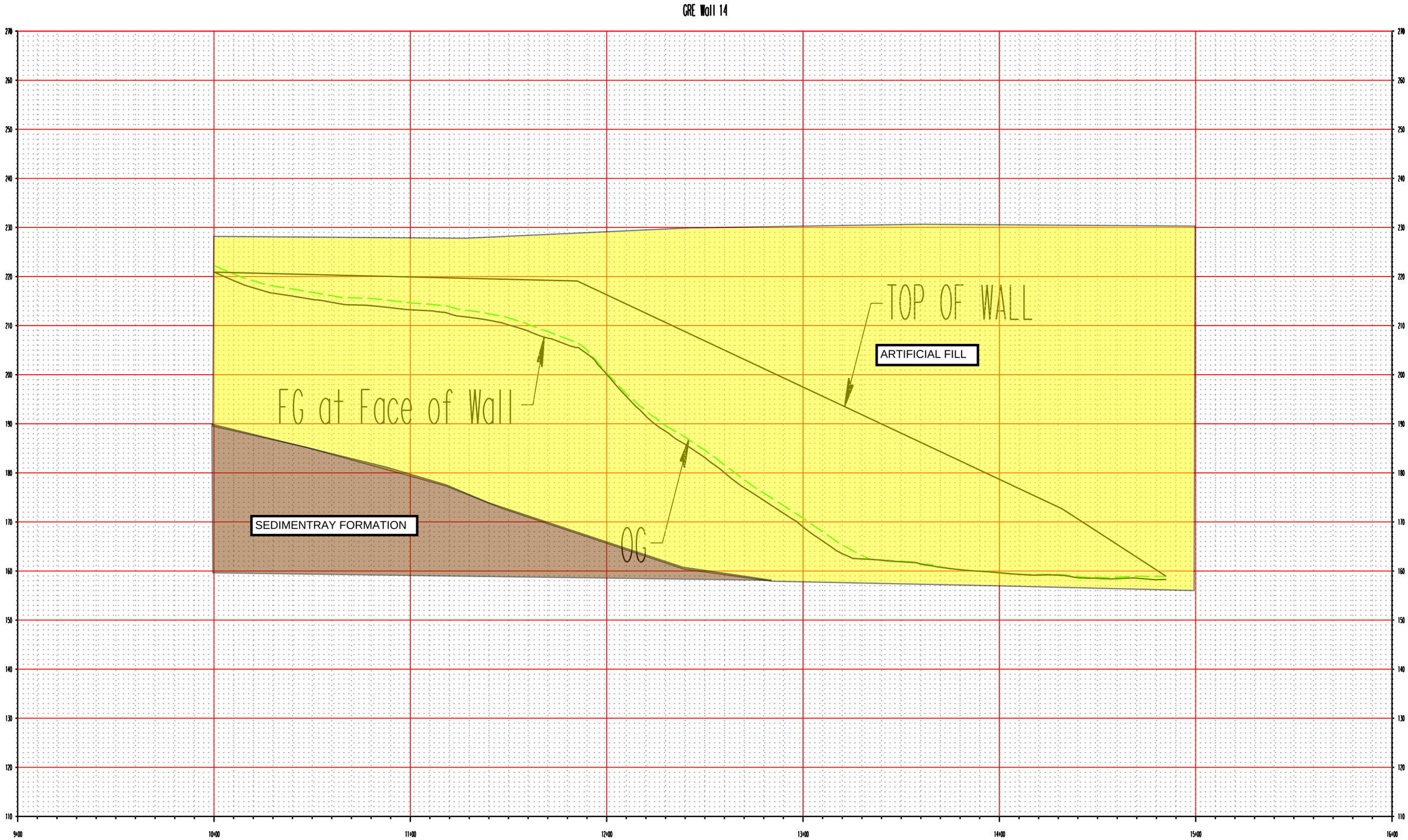

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FIGURE 6: GEOLOGIC PROFILE

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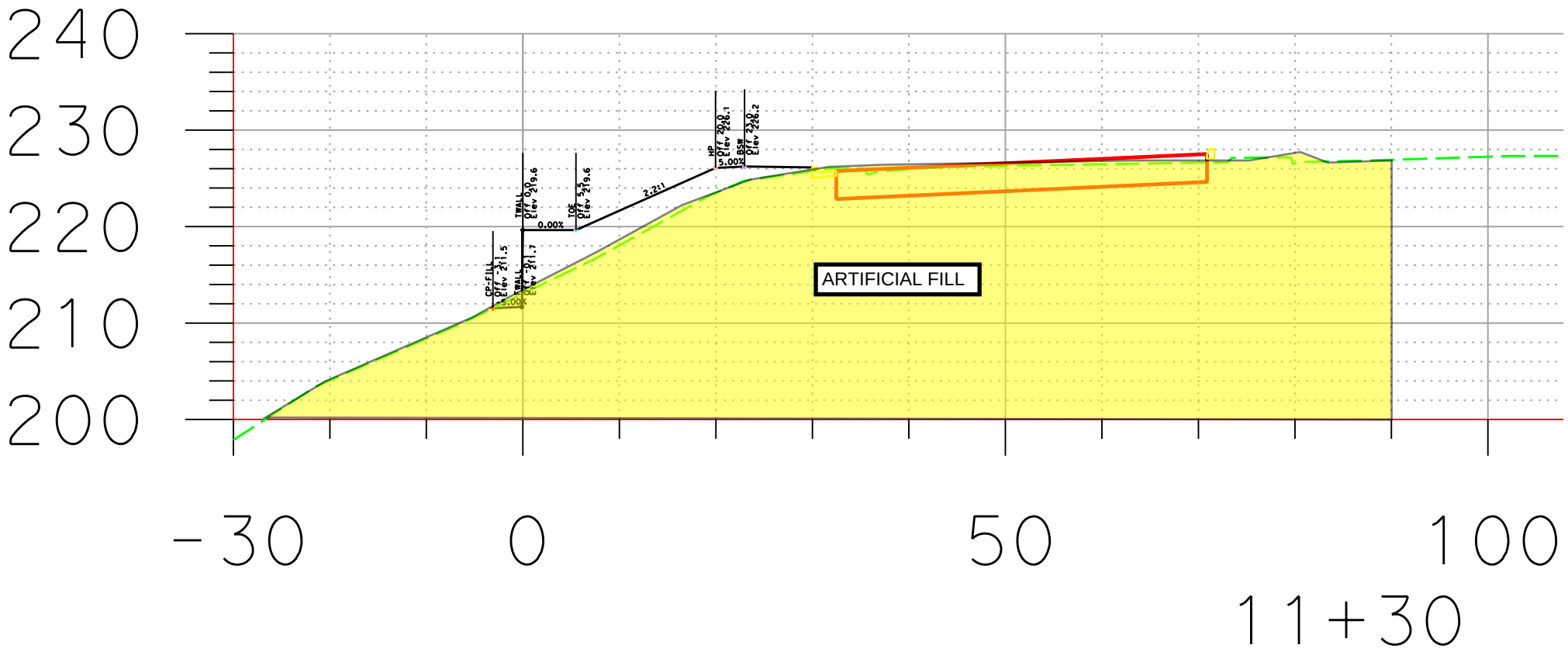

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Retaining Wall-14
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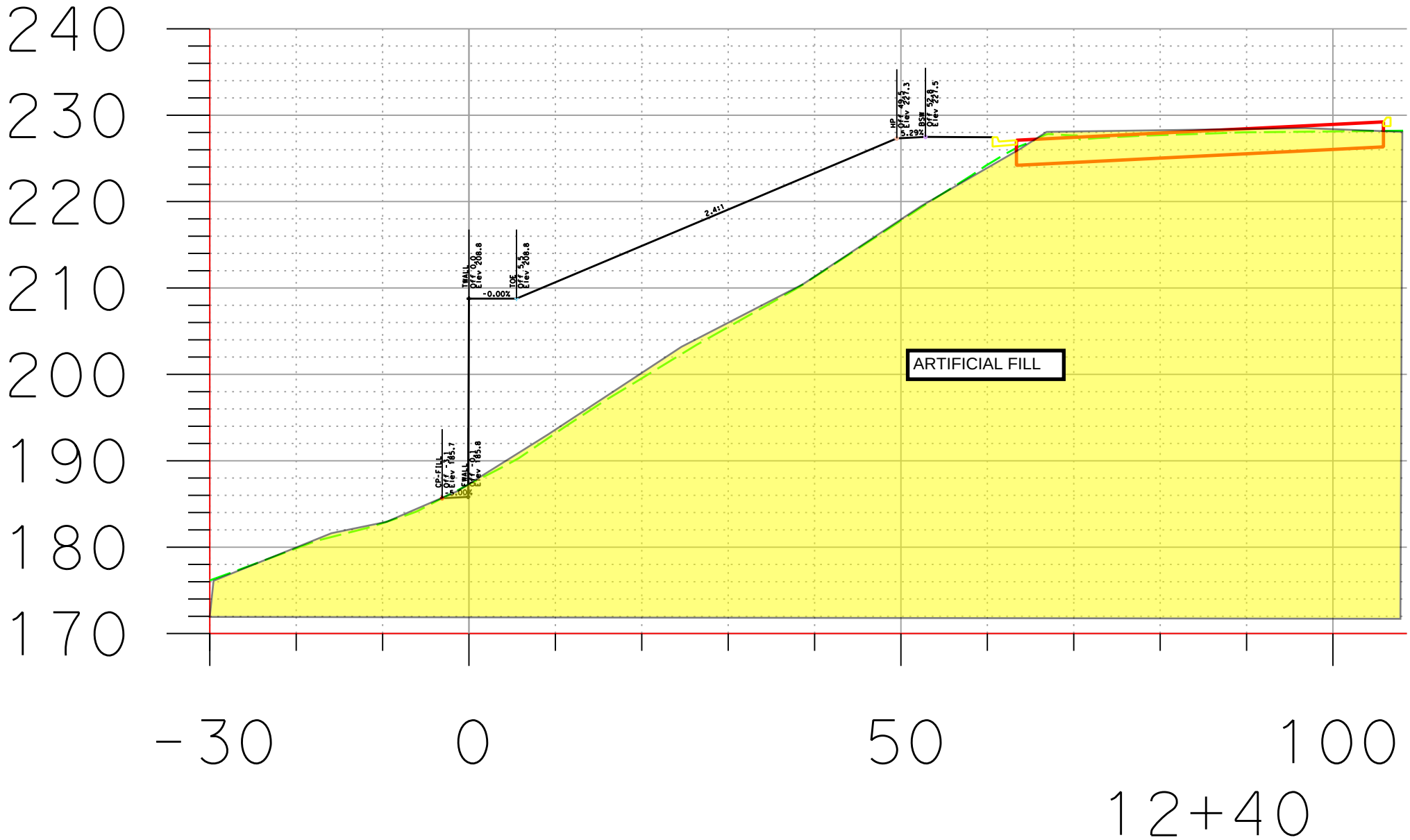
FIGURE 7A: GEOLOGIC CROSS SECTION



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Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 7B: GEOLOGIC CROSS SECTION

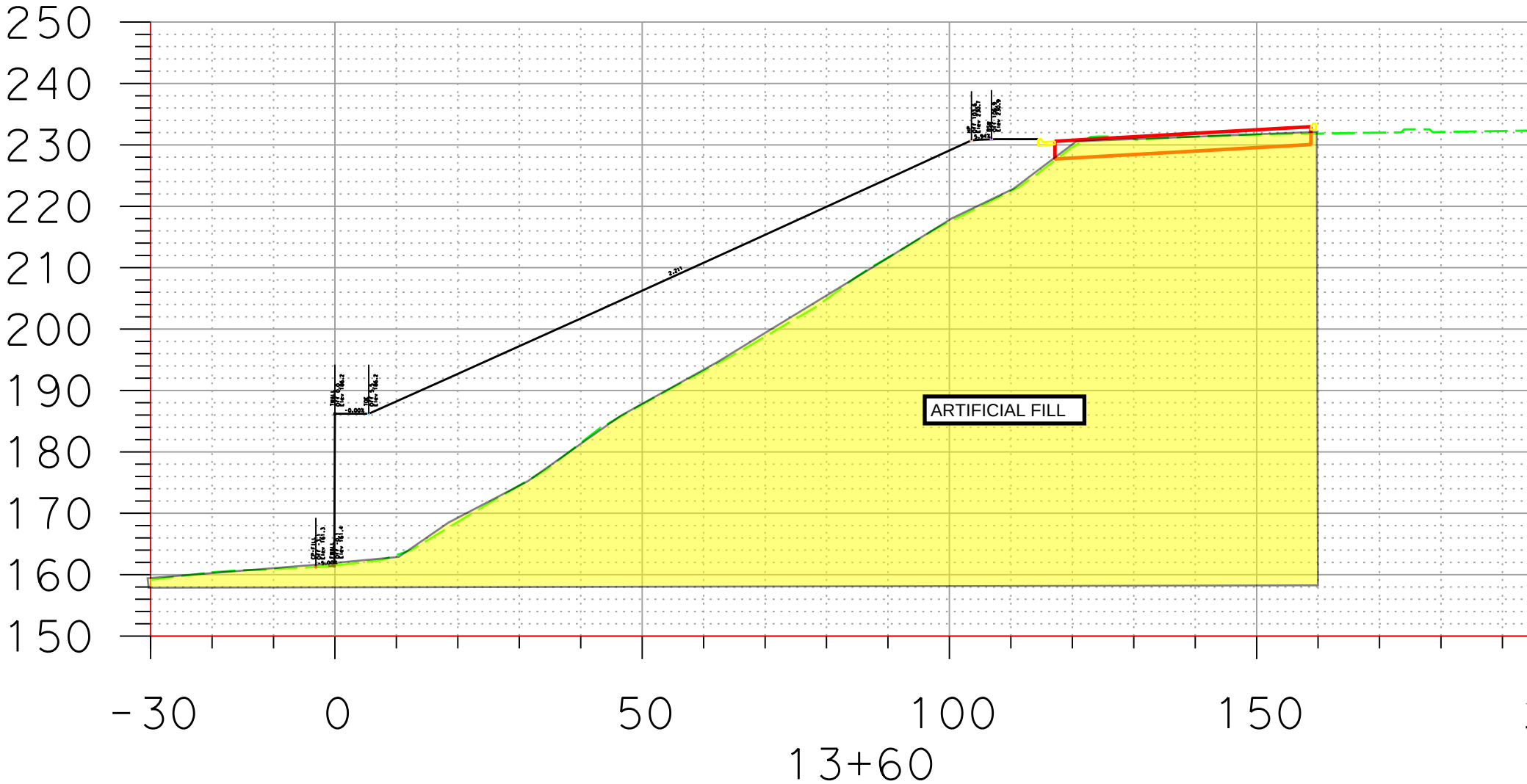

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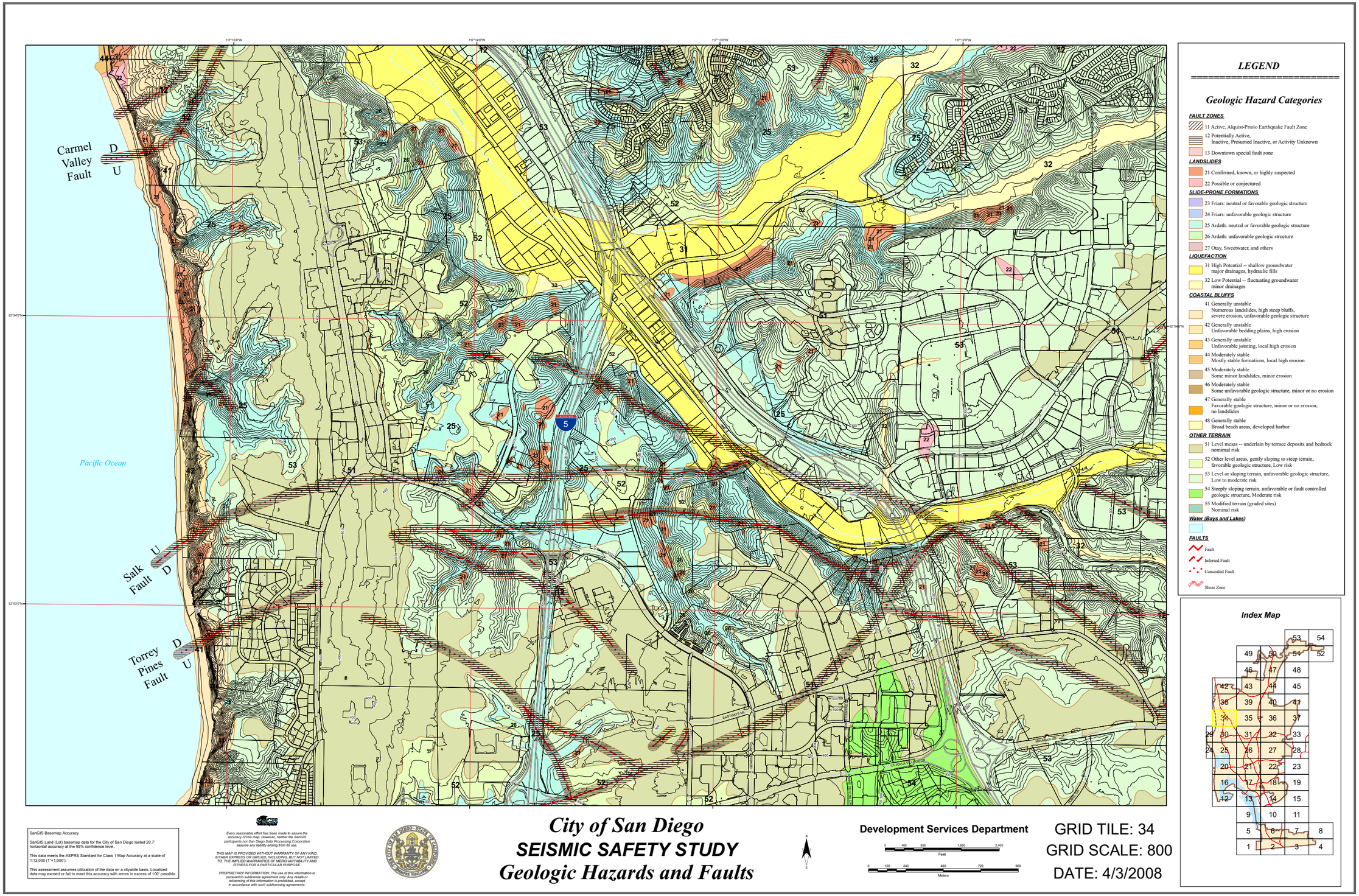
FIGURE 7C: GEOLOGIC CROSS SECTION



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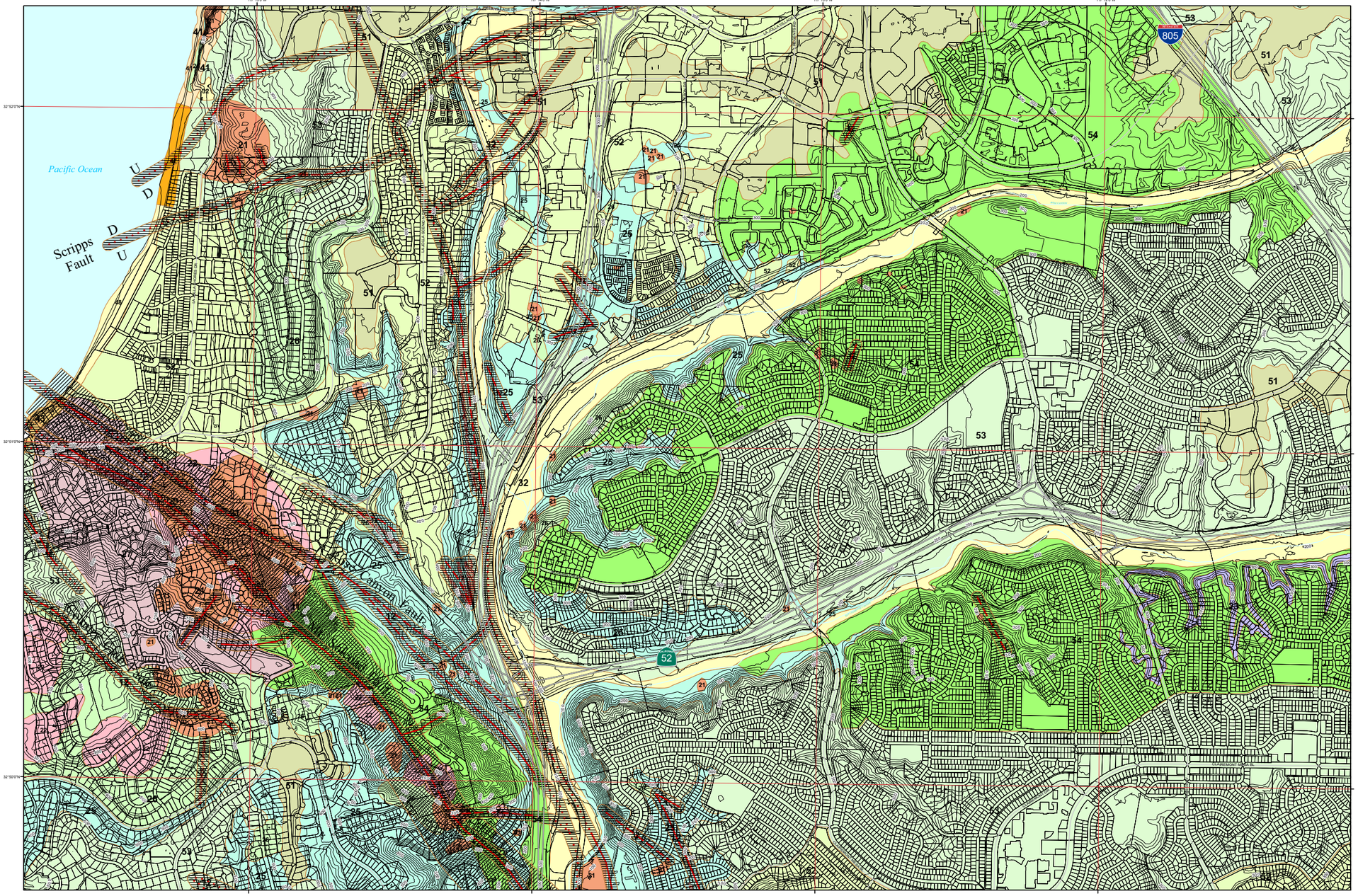
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

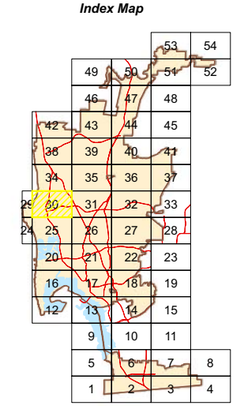
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

SanGIS

Every reasonable effort has been made to assure the accuracy of this map. However, neither the SanGIS participants nor San Diego Data Processing Corporation assume any liability arising from its use.

THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

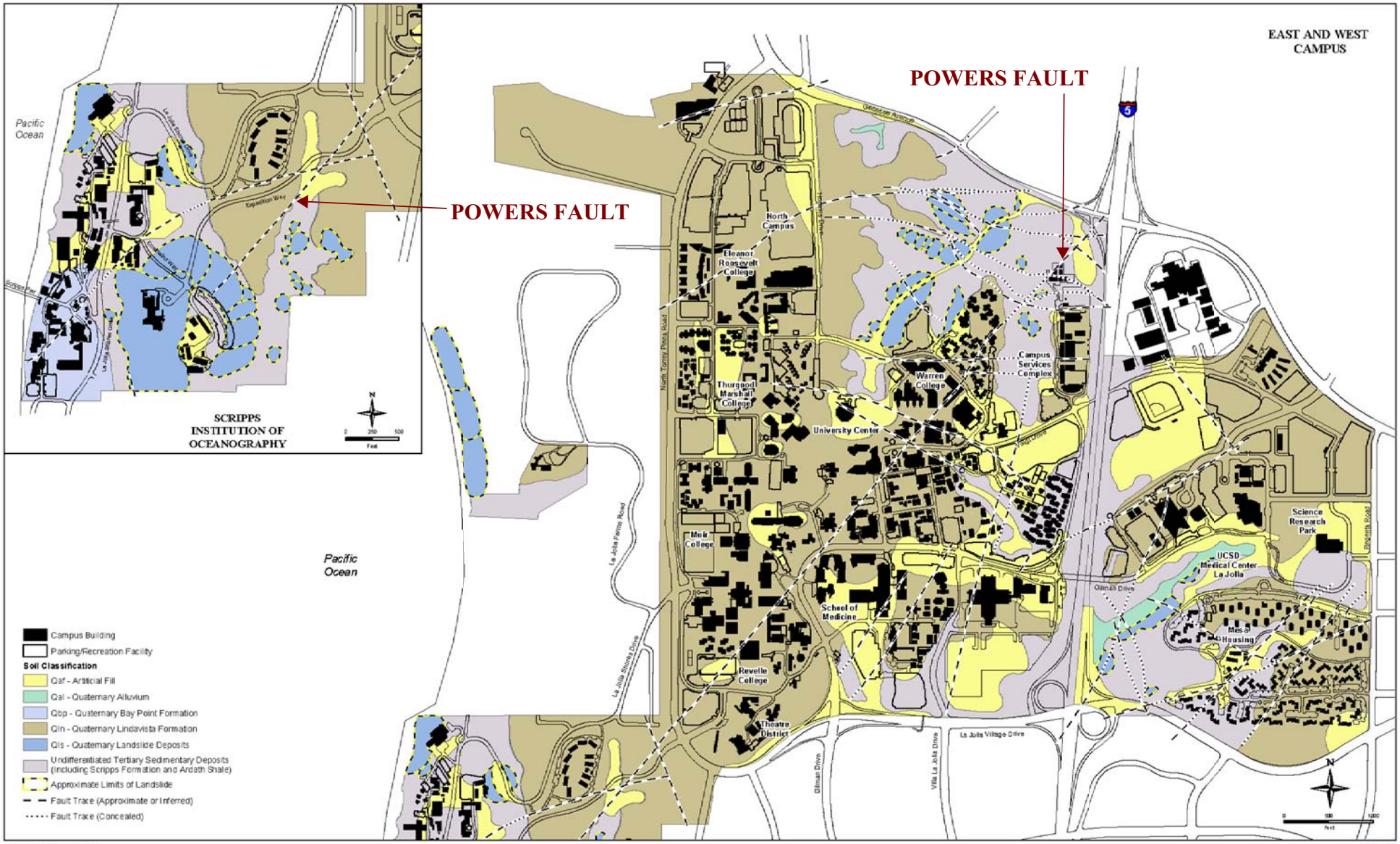
0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP

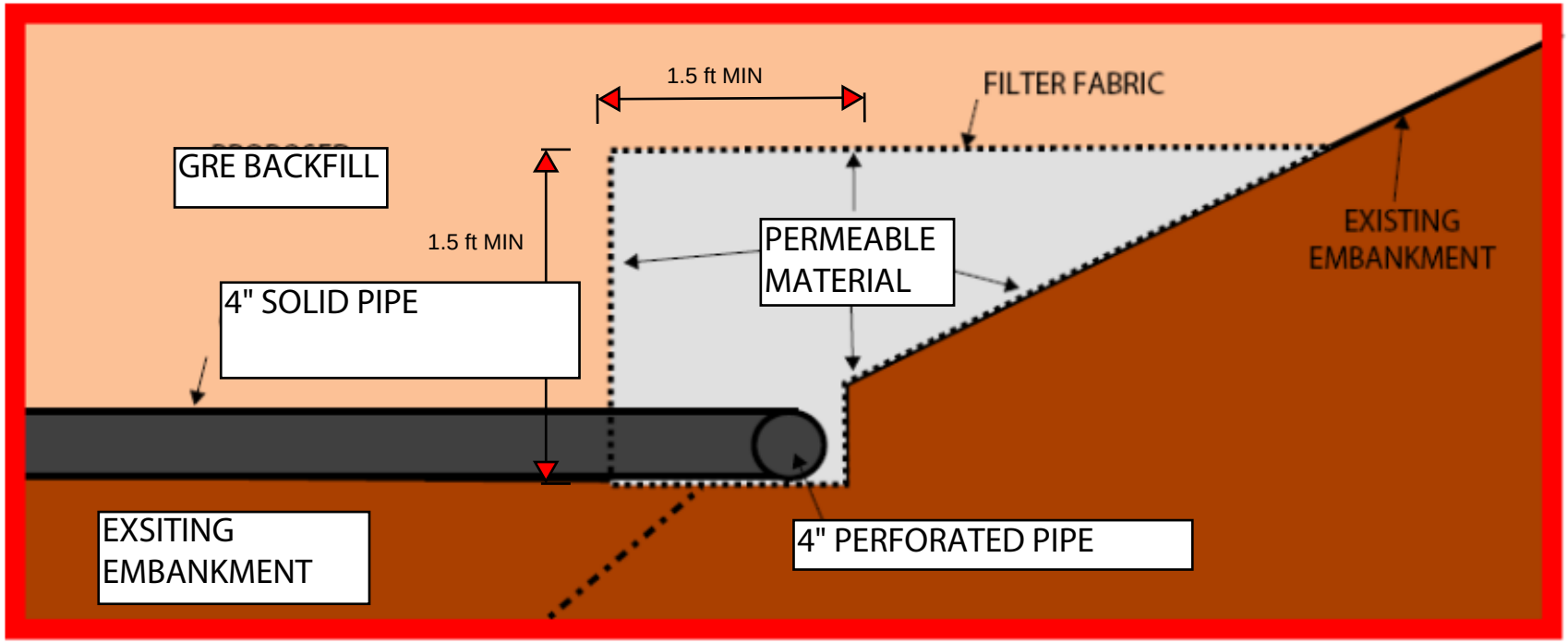


Source: Ninyo & Moore, 2003

PBSJ

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-14
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP



NOTE: DRAWINGS NOT TO SCALE

FIGURE 10: GRAVEL DRAIN DETAIL

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-479+28-23R-B01	1,300	7.50	150	298
011-481+74-40R-B02	2,600	5.43	56	191

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-14	Geosynthetically Reinforce Earth Wall	10+10 RW-14-Line	14+90 RW-14-Line	Artificial Fill	33	120	121
				GRE Backfill	33	120	121

Notes: φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 4A: GEOSYTHETICALLY REINFORCED EARTH WALL PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-14	Geosynthetically Reinforce Earth Wall	10+10 RW-14-Line	11+00 RW-14-Line	90	12	2:1	2:1	Vertical	Fill
		11+00 RW-14-Line	11+60 RW-14-Line	60	15	2:1	2:1	Vertical	Fill
		11+60 RW-14-Line	12+20 RW-14-Line	60	25.5	2:1	2:1	Vertical	Fill
		12+20 RW-14-Line	12+40 RW-14-Line	20	27	2:1	2:1	Vertical	Fill
		12+40 RW-14-Line	12+60 RW-14-Line	20	30	2:1	2:1	Vertical	Fill
		12+60 RW-14-Line	13+00 RW-14-Line	40	33	2:1	2:1	Vertical	Fill
		13+00 RW-14-Line	13+20 RW-13-Lne	20	34.5	2:1	2:1	Vertical	Fill
		13+20 RW-14-Line	13+60 RW-13-Line	40	39	2:1	2:1	Vertical	Fill
		13+60 RW-14-Line	13+80 RW-13-Line	20	39	2:1	2:1	Vertical	Fill
		13+80 RW-14-Line	14+20 RW-14-Line	40	34.5	2:1	2:1	Vertical	Fill
		14+20 RW-14-Line	14+40 RW-14-Line	20	22.5	2:1	2:1	Vertical	Fill
		14+40 RW-14-Line	14+60 RW-14-Line	20	18	2:1	2:1	Vertical	Fill
		14+60 RW-14-Line	14+90 RW-14-Line	30	12	2:1	2:1	Vertical	Fill

Notes: L = Wall Length
H_{MAX} =Approximate Maximum Wall Height including embedment
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4B: GEOSYTHETICALLY REINFORCED EARTH WALL PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Vertical Spacing Reinforcement Layers (Feet)	Reinforcement Embedment Length (Feet)	Long Term Design Strength (lbs/ft)
RW-14	Geosynthetically Reinforce Earth Wall	10+10 RW-14-Line	11+00 RW-14-Line	1.5	10	3400
		11+00 RW-14-Line	11+60 RW-14-Line	1.5	15	3400
		11+60 RW-14-Line	12+20 RW-14-Line	1.5	20	3400
		12+20 RW-14-Line	12+40 RW-14-Line	1.5	25	3400
		12+40 RW-14-Line	12+60 RW-14-Line	1.5	34	3400
		12+60 RW-14-Line	13+00 RW-18-Line	1.5	40	4400
		13+00 RW-14-Line	13+20 RW-14-Line	1.5	42	4400
		13+20 RW-14-Line	13+60 RW-14-Line	1.5	40	4400
		13+60 RW-14-Line	13+80 RW-13-Line	1.5	38	4400
		13+80 RW-14-Line	14+20 RW-14-Line	1.5	36	4400
		14+20 RW-14-Line	14+40 RW-14-Line	1.5	30	4400
		14+40 RW-14-Line	14+60 RW-14-Line	1.5	15	3400
		14+60 RW-14-Line	14+90 RW-14-Line	1.5	10	3400

TABLE 5: DESIGN PARAMETERS FOR GEOSYNTHETICALLY REINFORCED EARTH WALL FACING

Retaining Wall	Wall Type	Beginning Station	Ending Station	Design Pressure (lbs/ft^2)	Vertical Anchor Spacing (ft)	Horizontal Anchor Spacing (ft)	Minimum Anchor Length (ft)	Minimum Design Pullout Resistance (lbs)	Minimum Reinforcing Bar Diameter (in)
RW-14	Geosynthetically Reinforce Earth Wall	10+10 RW-14-Line	14+90 RW-14-Line	80	6	6	10	3000	1.0

Notes: Applied Pressure = Horizontal pressure generated along a one square foot section of the façade multiplied by a factor of safety of 2.0.

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA

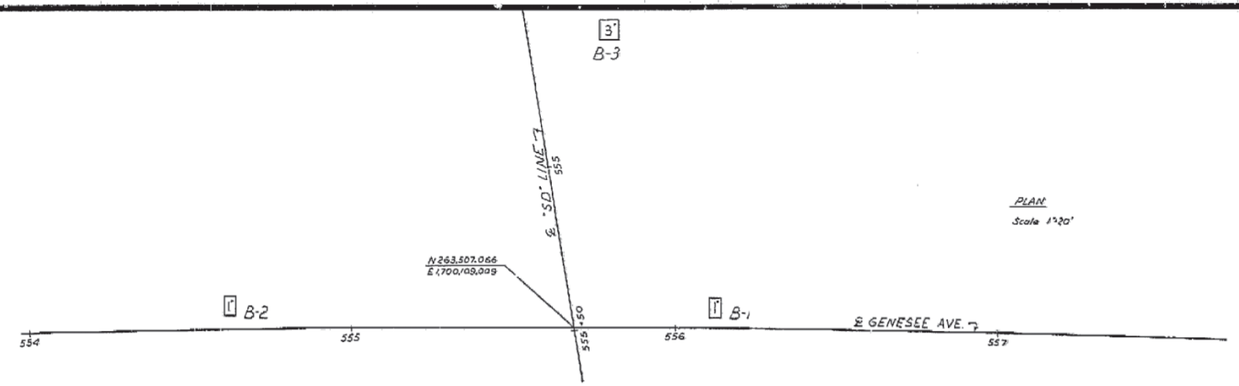
DIST.	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
XI	SD	5	28.4/31.9	118	197

Date approved July 20, 1964

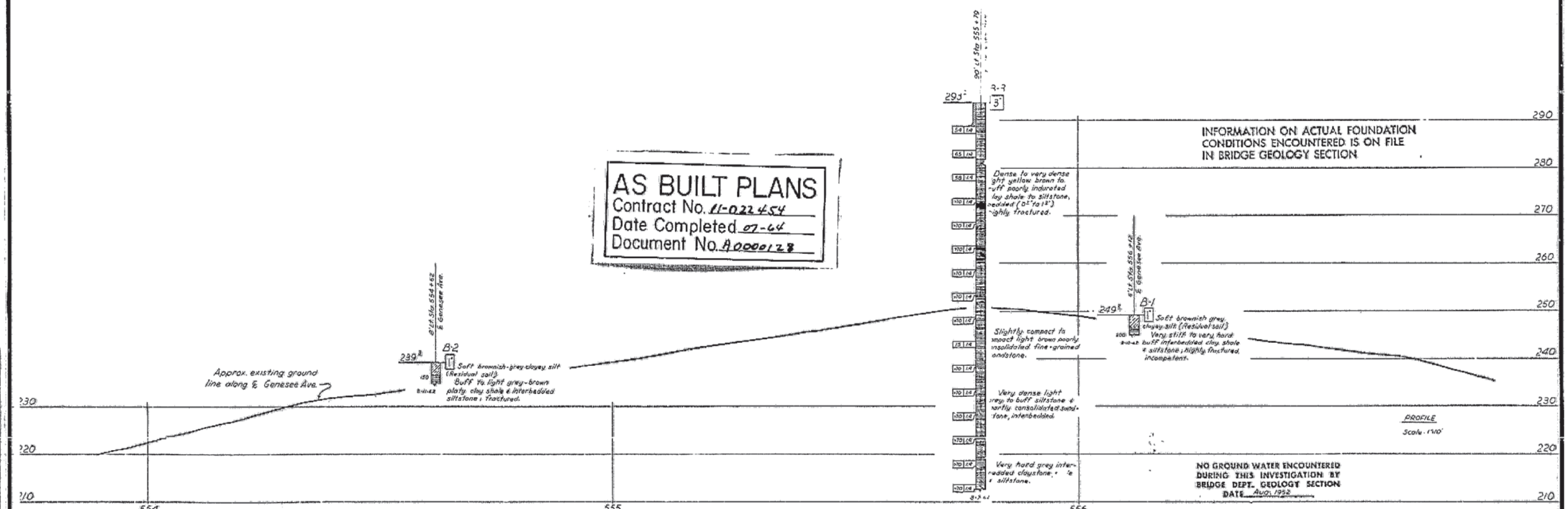
BENCH MARK

TBM #1 - ℄ Stake, sta. 554+86 "SD" top of stake; set by Dist. XI Survey Dept. ELEV. 284.73

TBM #2 - Top of stake, sta 555+00 "SD" Line. ELEV 278.66



PLAN
Scale 1"=20'



AS BUILT PLANS
Contract No. 11-022454
Date Completed 07-64
Document No. A0000128

BRIDGE DEPARTMENT

Approved Recommended By — Bridge Geologist

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

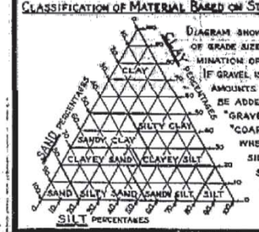


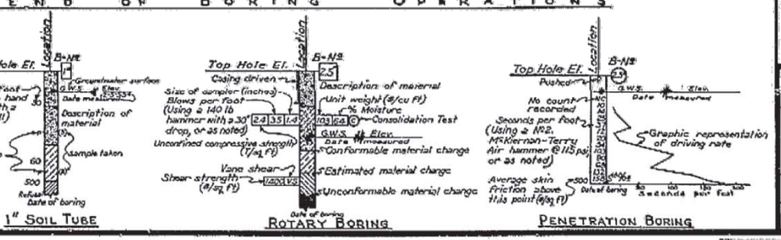
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES. IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2 1/4" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

SHEET 8 OF 8

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

GENESEE AVENUE OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 57-527	FILE	DRAWING 57527-9

PREL. DRAWING NO. P-

5-4

APPENDIX II

FIELD EXPLORATION DATA

DIST	COUNTY	ROUTE	POST MILES (KP) TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	5	R28.8/R55.3		

CERTIFIED ENGINEERING GEOLOGIST — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Michael M. Fordham — NO. C61341 — EXP. 6-30-13 — CIVIL — STATE OF CALIFORNIA

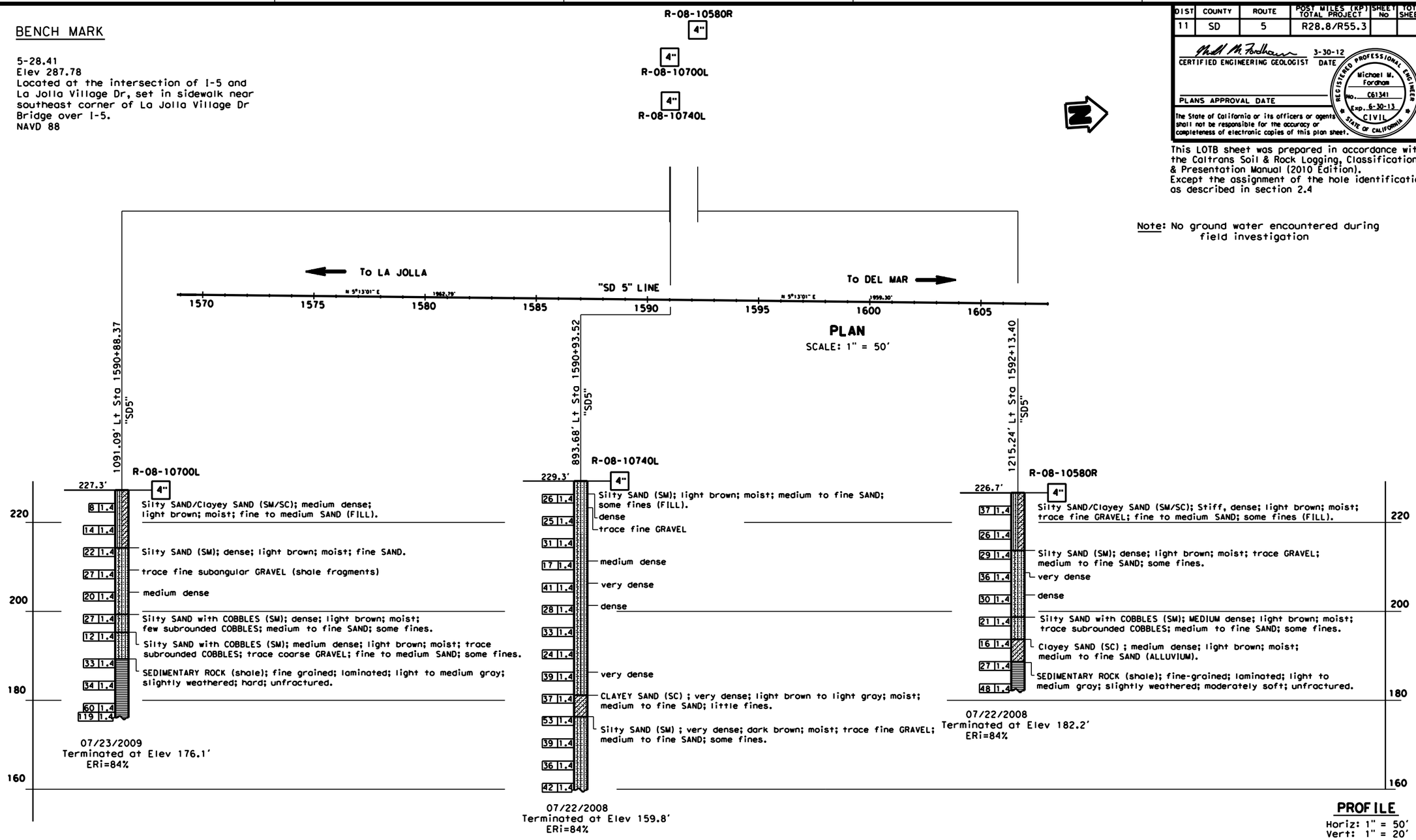
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition). Except the assignment of the hole identification as described in section 2.4

Note: No ground water encountered during field investigation

BENCH MARK

5-28.41
Elev 287.78
Located at the intersection of I-5 and La Jolla Village Dr, set in sidewalk near southeast corner of La Jolla Village Dr Bridge over I-5.
NAVD 88



ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH	BRIDGE NO. / POST MILES (KP) R28.8/R55.3	RETAINING WALL NO. 13 AND 14 LOG OF TEST BORINGS 1 of 4
FUNCTIONAL SUPERVISOR NAME: B. Hinman	DRAWN BY: K. Le; CHECKED BY: Z. Yazdani	FIELD INVESTIGATION BY: M. Fordham	CU 3643 EA 1100000012	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES; SHEET OF

ODS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — FILE => $REQUEST

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

RW-13,14 1 OF 4.dgn 5/17/2012 8:56:57 AM

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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.

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

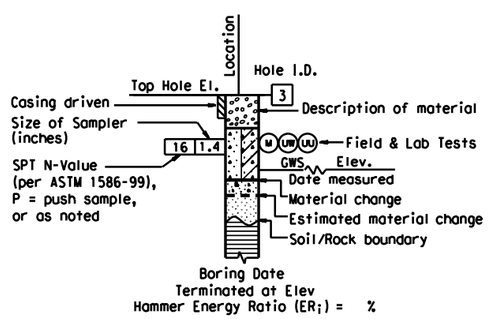
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R RW RC P	Rotary drilled boring (conventional) Rotary drilled with self-casing wire-line Rotary core with continuously-sampled, self-casing wire-line Rotary percussion boring (air)
Size	R RC	Rotary drilled diamond core Rotary drilled rock core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778)
[ ]	O	Other (note on LOTB)

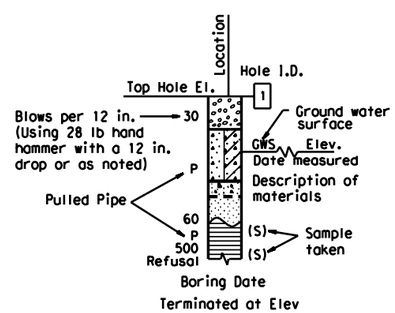
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

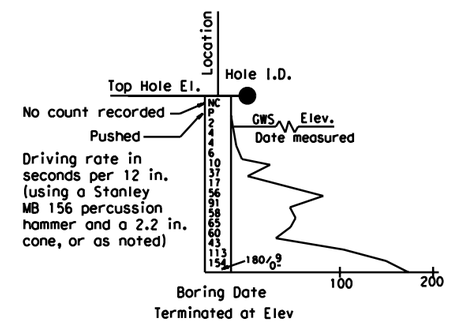
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



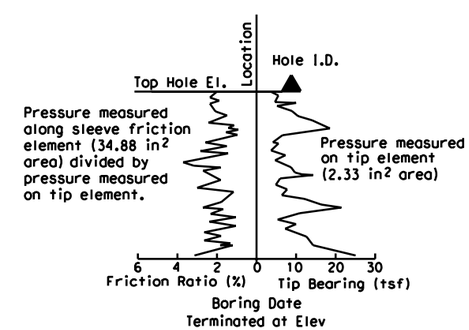
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

ENGINEERING SERVICES	MATERIALS AND GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH X	BRIDGE NO. / POST MILE 28.6/30.1	RETAINING WALL NO. 13 AND 14 LOG OF TEST BORINGS 2 OF 4
	PREPARED BY: W. Tang 02/12				

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121
CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL		
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

ENGINEERING SERVICES

MATERIALS AND GEOTECHNICAL SERVICES

PREPARED BY: W. Tang 02/12

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH X

BRIDGE NO. — POST MILE 28.6/30.1

RETAINING WALL NO. 13 AND 14

LOG OF TEST BORINGS 3 OF 4

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121 CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

RW-13,14 3of4.dgn 5/17/2012 8:57:40 AM

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

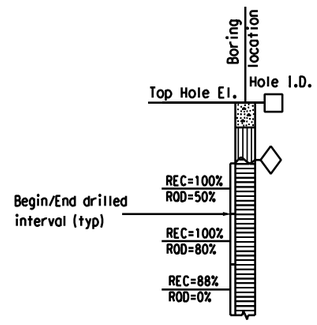
REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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.

PERCENT CORE RECOVERY (REC) & ROCK QUALITY DESIGNATION (RQD)

$$REC = \frac{\sum \text{Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100\%$$

$$RQD = \frac{\sum \text{Length of intact core pieces} \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100\%$$



RQD* Indicates soundness criteria not met.

BEDDING SPACING

Description	Thickness / Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in. - 1 ft
Thinly Bedded	1 in. - 4 in.
Very Thinly Bedded	1/4 in. - 1 in.
Laminated	Less than 1/4 in.

LEGEND OF ROCK MATERIALS

- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows.
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily by a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures.
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

WEATHERING DESCRIPTORS FOR INTACT ROCK

Description	Diagnostic Features					General Characteristics
	Chemical Weathering-Discoloration and/or Oxidation		Mechanical Weathering-Grain Boundary Conditions (Disaggregation) Primarily for Granitics and Some Coarse-Grained Sediments	Texture and Leaching		
	Body of Rock	Fracture Surfaces		Texture	Leaching	
Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved	Minor leaching of some soluble minerals.	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened.
Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes."

ENGINEERING SERVICES

MATERIALS AND GEOTECHNICAL SERVICES

PREPARED BY: W. Tang 02/12

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH X

BRIDGE NO. — POST MILE 28.6/30.1

RETAINING WALL NO. 13 AND 14

LOG OF TEST BORINGS 4 OF 4

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121 CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

(Note to user -- Click on field and Use F1 for help)

REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

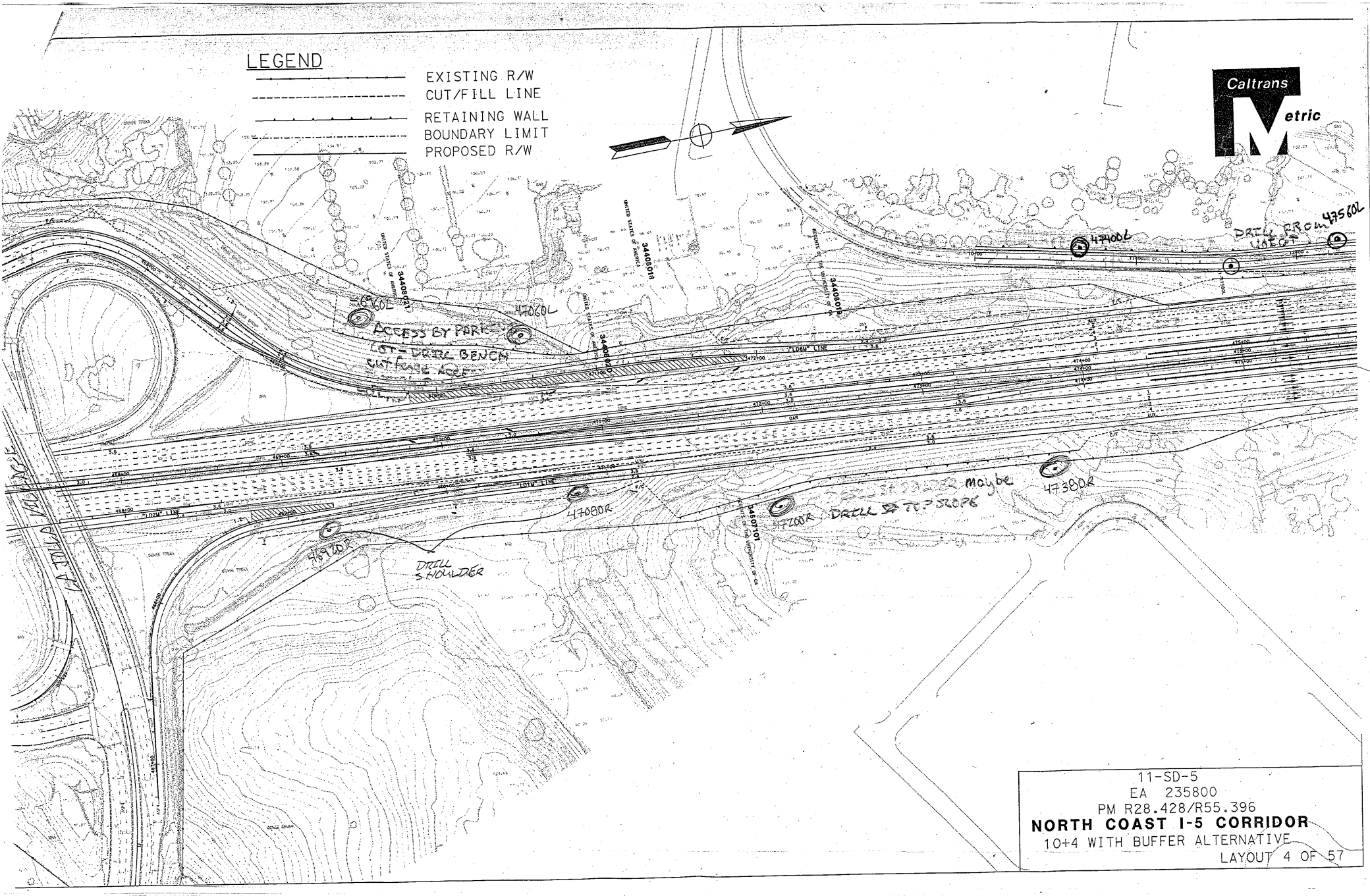
Approved by (Project Engineer or above)

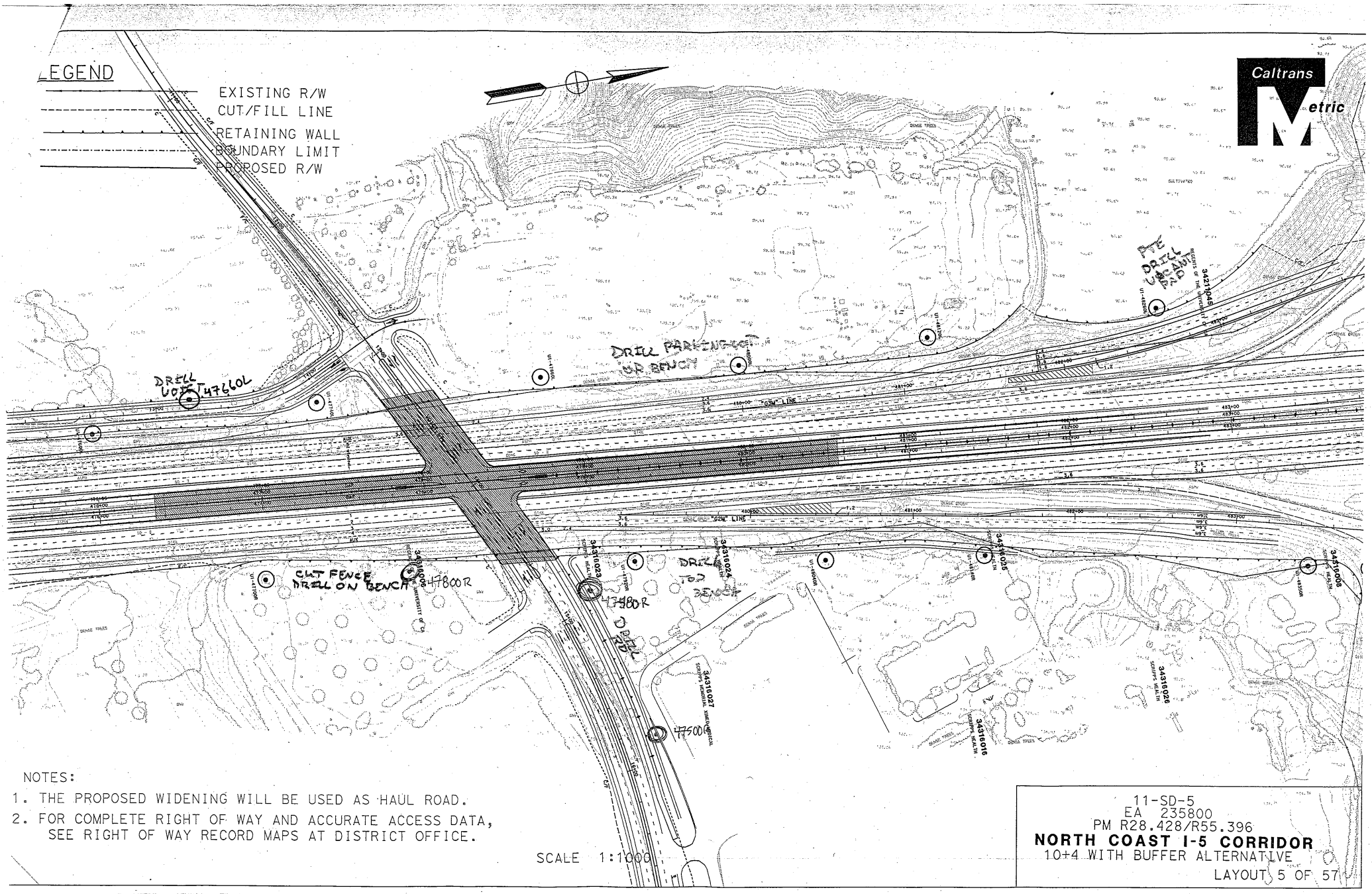
FOR SURVEYS USE ONLY

Date Received: WBS Codes:

Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

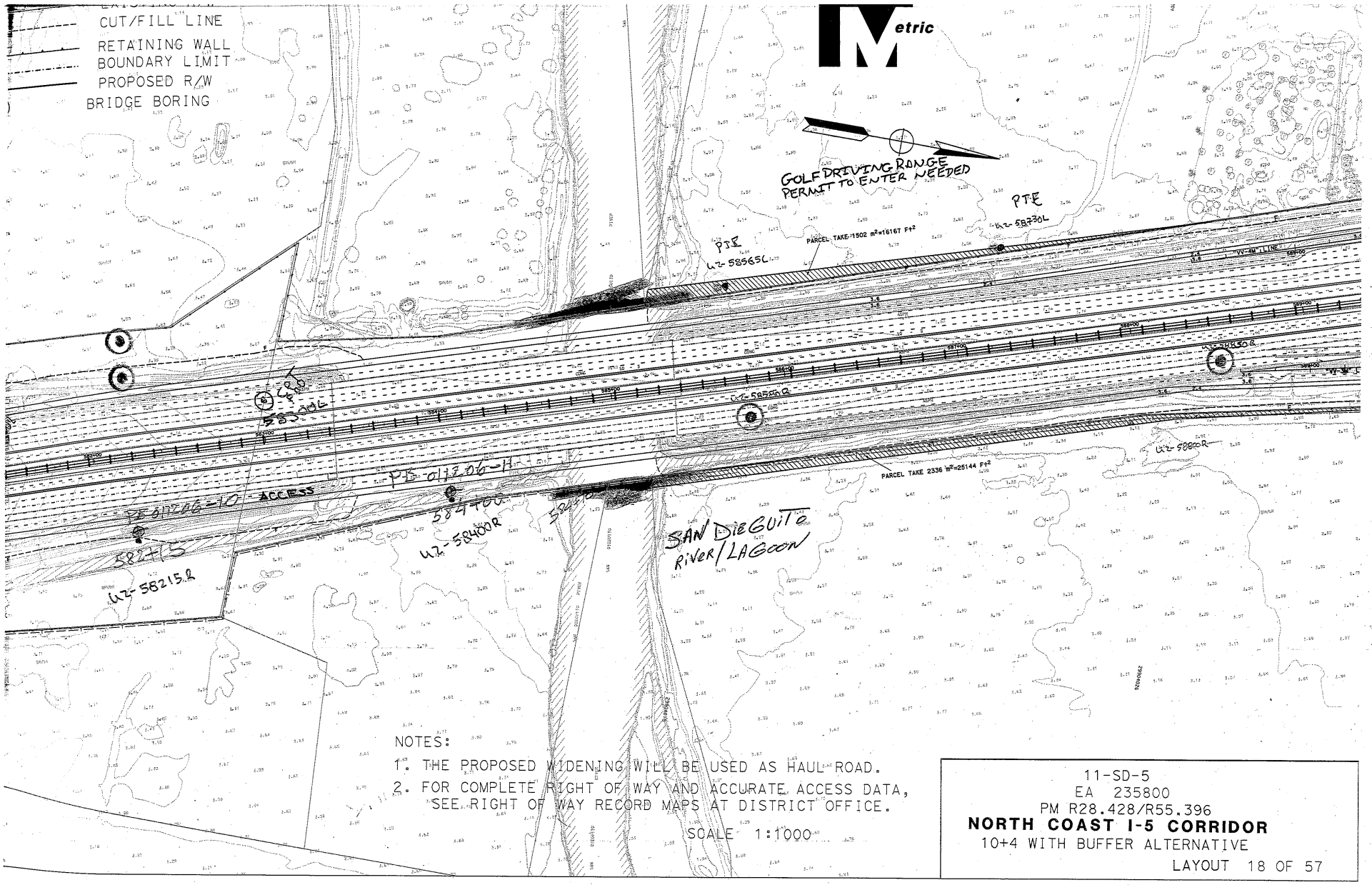
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE

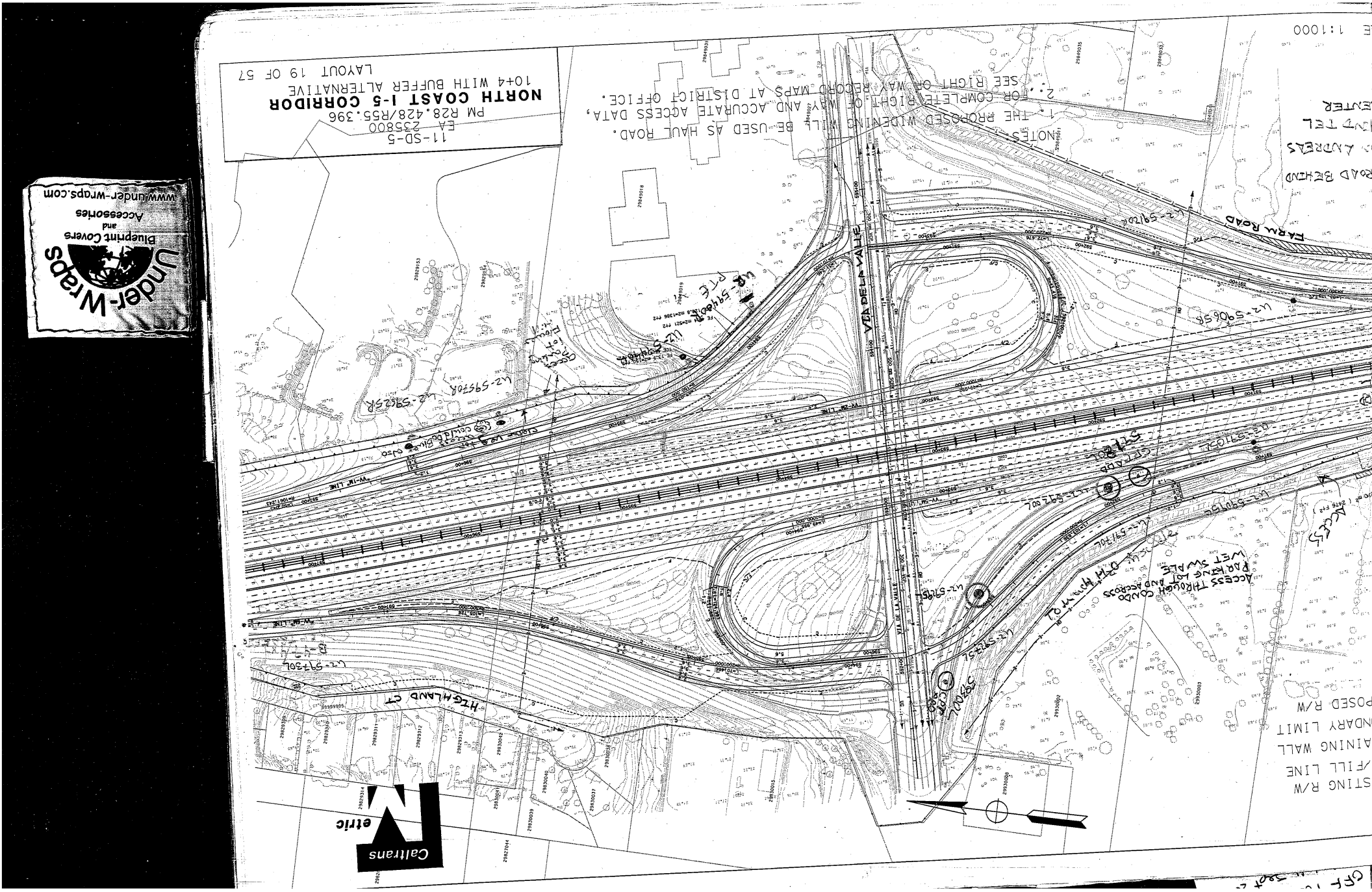

LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47080R
47380R
maybe
47200R
DRILL TO TOP SLOPE
47080R
DRILL SHOULDER
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57



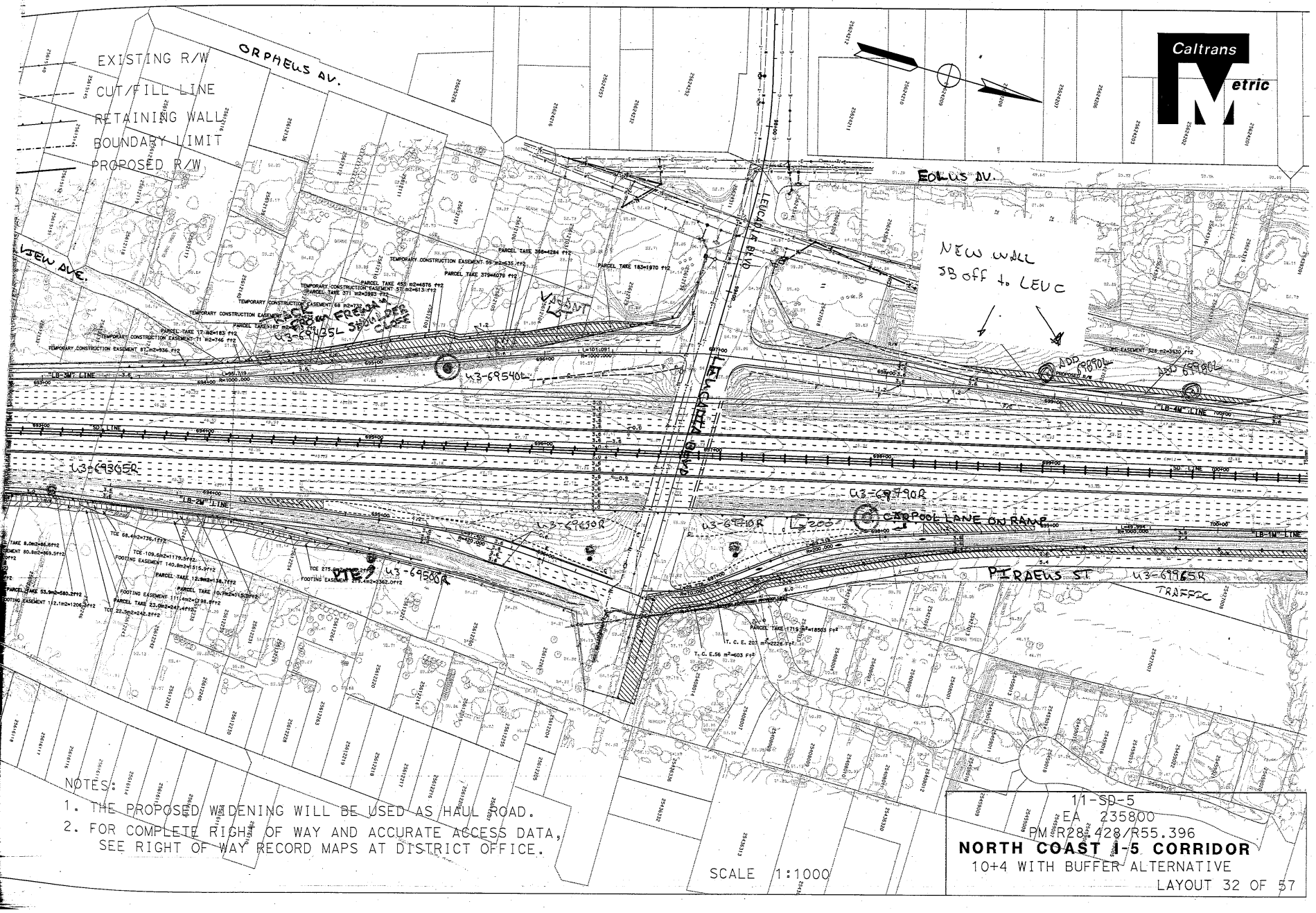
NOTES:

1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57



APPENDIX II: FIELD EXPLORATION DATA


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEUCADIA BLVD.
NEW WALL SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69780R
U3-69965R
ADD 69890L
ADD 69980L
"LB-4W" LINE
"LB-2W" LINE
"LB-1W" LINE
SD LINE
Caltrans
Metric
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS, BUCKETS,

PLASTIC BAGS, SHELBY TUBES, BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT.) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #5

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	DO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11-479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+00 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER 0.11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	5.3	5300
20	1K	2.1	2100
20	1K	1.6	1600
20	1K	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 5/1/2009

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5434

RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

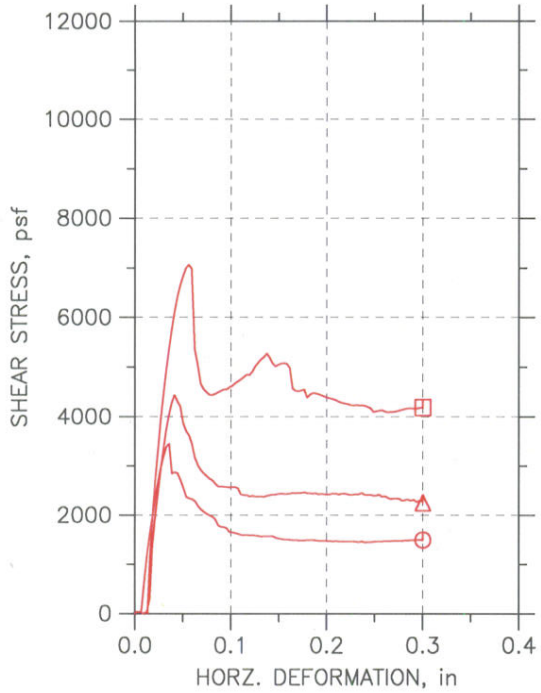
CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

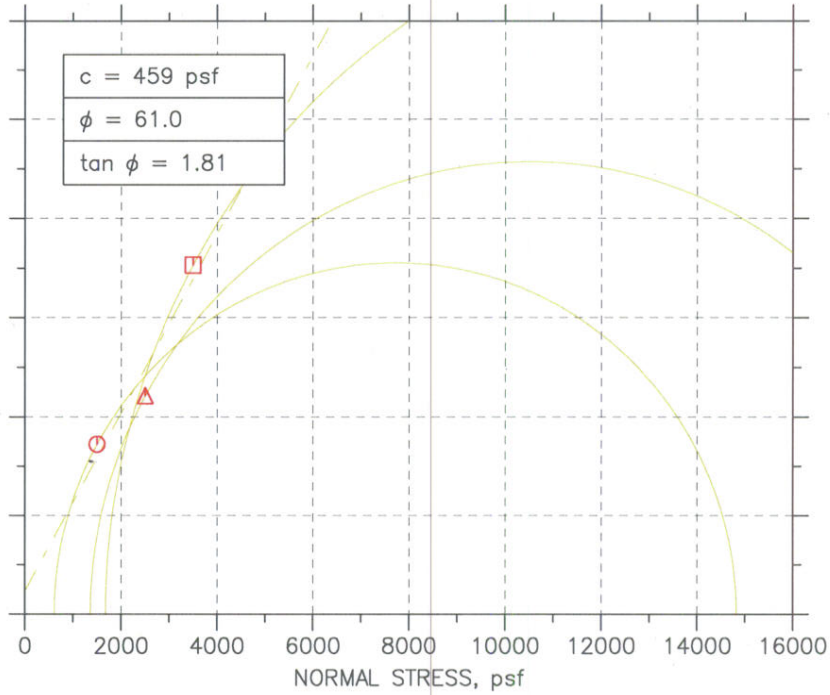
GL TRACKING NO : 08-135
Dist - EA: 11-022330
Report Date: May 1, 2009
Page: 1/1

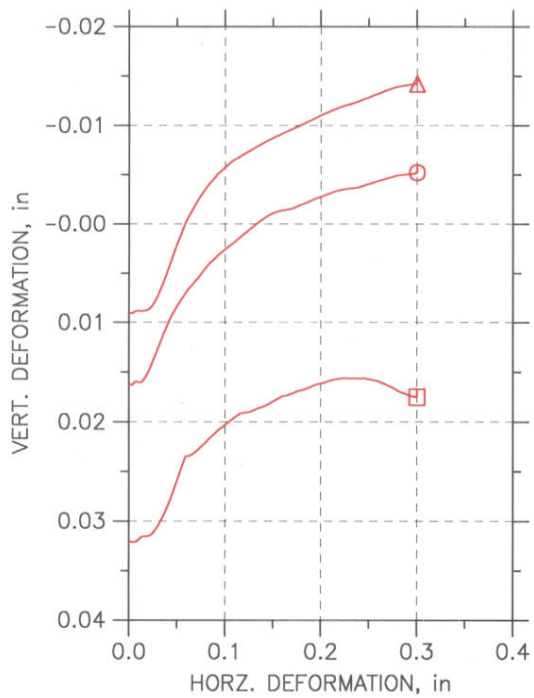
CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γ_d (pcf)	%m	
10580R_1								100	91	84	82	80	78	76	71	18	7	45	21		14.1	
10700L_1																					16.7	
48040R_2												100	92	47	20	6	1		NP		11.0	
48040R_3											100	94	51	26	16	4	1		NP		7.6	
48040R_4																					18.1	

DIRECT SHEAR TEST REPORT







Symbol		⦶	△	⊡	
Test No.		DS08081A	DS08081B	DS08081C	
Sample No.		1	1	1	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	1.94	1.94	1.94	
	Area, in^2	2.9559	2.9559	2.9559	
	Height, in	1	1	1	
	Water Content, %	17.85	18.36	17.42	
	Dry Density, pcf	110.45	113.03	114.7	
	Saturation, %	88.57	97.29	96.42	
	Void Ratio	0.55434	0.51889	0.49671	
Consol. Height, in		0.9838	0.99092	0.96807	
Consol. Void Ratio		0.52916	0.5051	0.44892	
Final	Water Content, %	20.42	19.61	17.08	
	Dry Density, pcf	109.88	111.44	116.75	
	Saturation, %	99.85	99.79	99.82	
	Void Ratio	0.56241	0.54048	0.47049	
Normal Stress, psf		1500.4	2506.9	3503	
Max. Shear Stress, psf		3443.3	4430.8	7061.7	
Ult. Shear Stress, psf		1491.4	2253.4	4185	
Time to Failure, min		13.003	15.001	20.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

Project: Genesee Widening

Location: 11-SD-8-R22.4-R55.8

Project No.: 11-022330 ELEVATION 177.3FT

Boring No.: 10700L

Sample Type: 2" BRASS

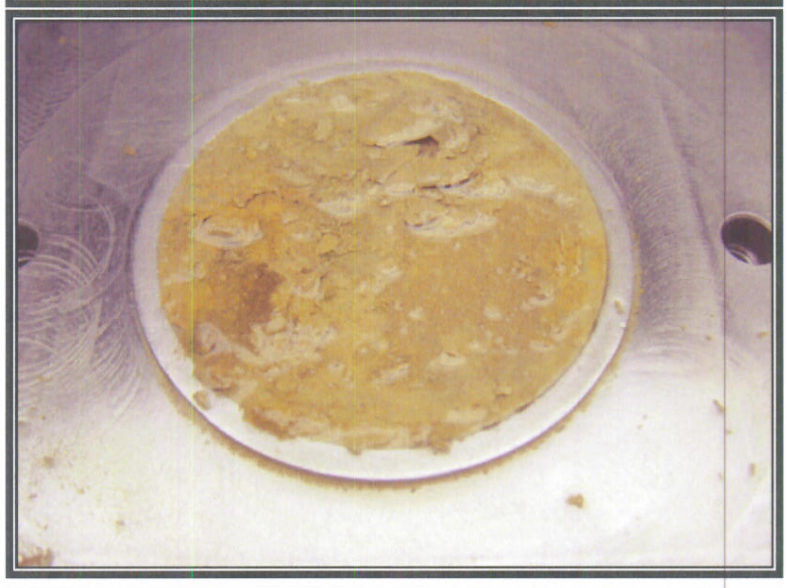
Description: Moist, Very Stiff, Tan, Clayey Silt. Sheared before sample could swell.

Remarks: ASTM D3080

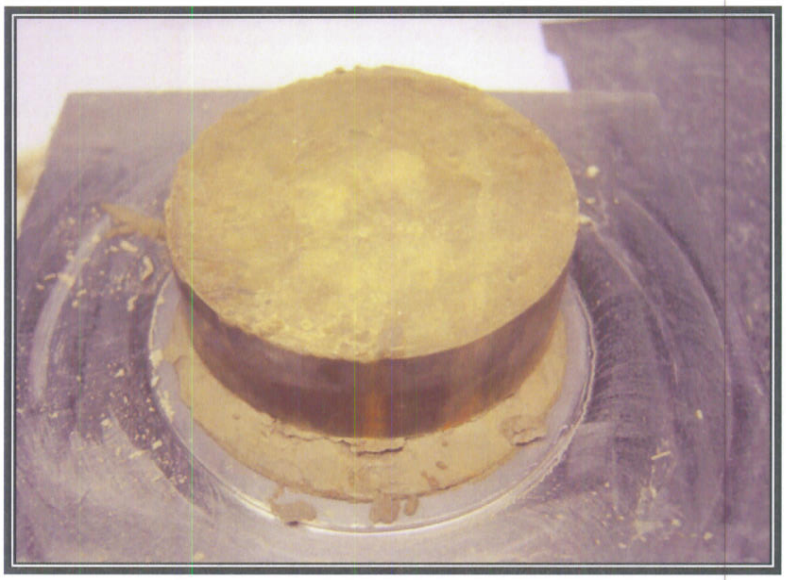
WP 1/9/12

Thu, 04-DEC-2008 16:53:16

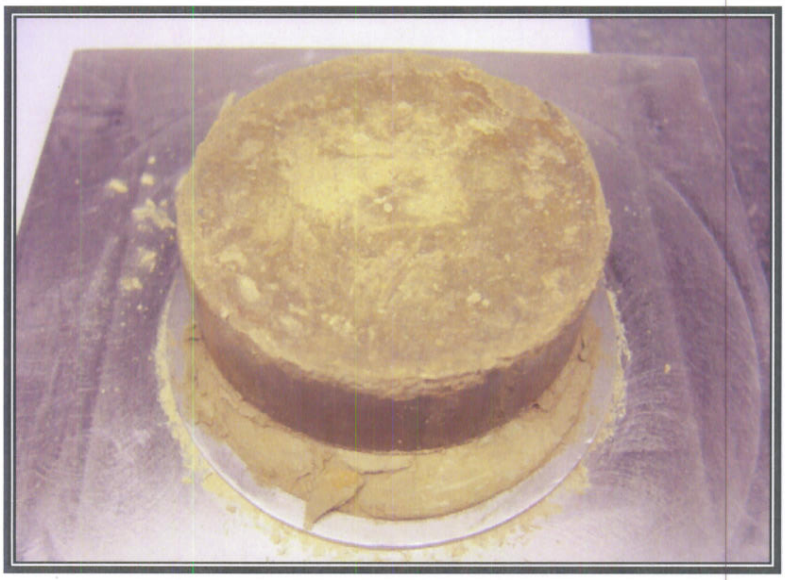
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen A



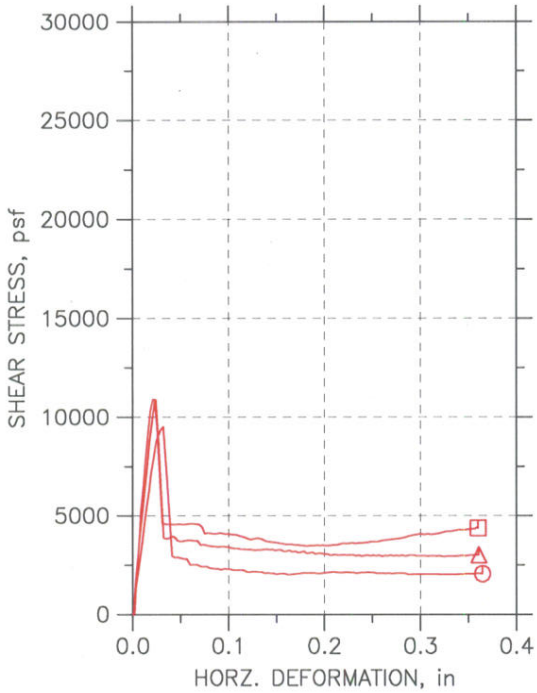
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen B

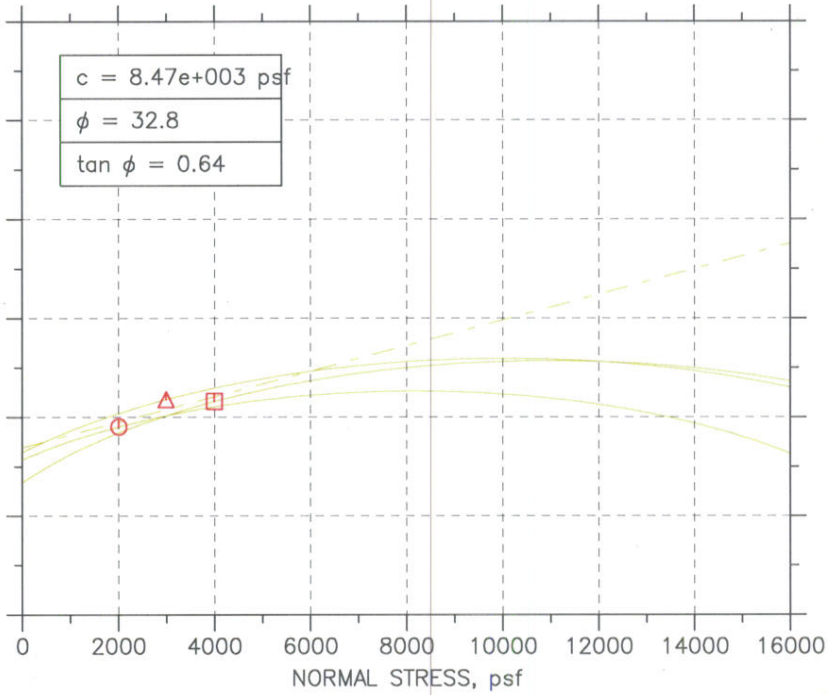


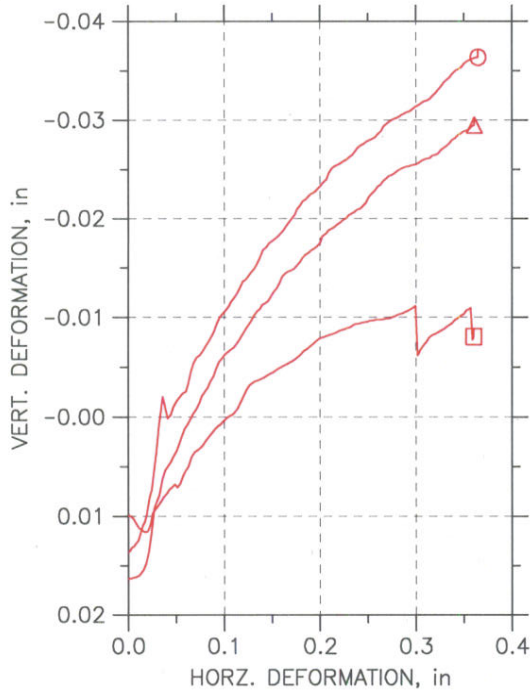
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen C



DIRECT SHEAR TEST REPORT





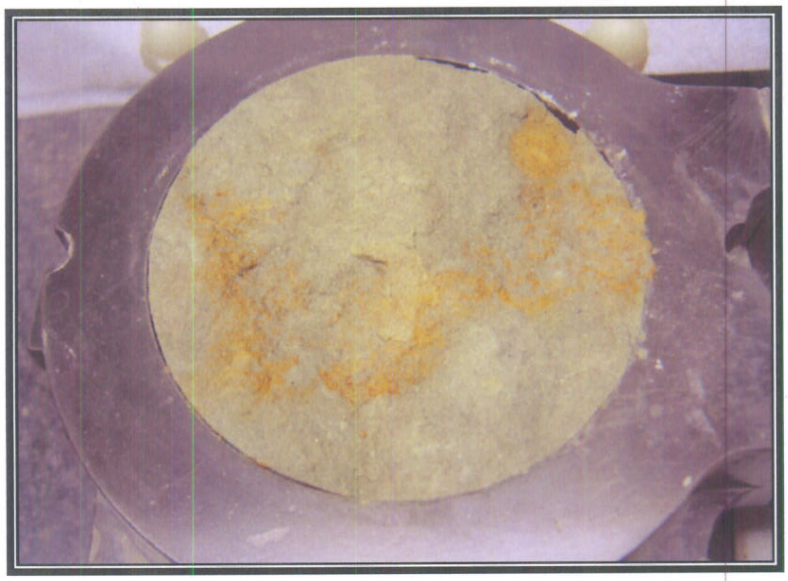


Symbol		⊙	△	⊡	
Test No.		DS08082A	DS08082B	DS08082C	
Sample No.		4	4	4	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.37	2.37	2.37	
	Area, in^2	4.4115	4.4115	4.4115	
	Height, in	1	1	1	
	Water Content, %	16.05	17.70	20.80	
	Dry Density, pcf	107.08	109.76	105.44	
	Saturation, %	73.16	86.29	91.07	
	Void Ratio	0.60324	0.56414	0.62819	
Consol. Height, in		0.98676	0.9837	0.99073	
Consol. Void Ratio		0.58201	0.53863	0.6131	
Final	Water Content, %	21.61	20.14	22.11	
	Dry Density, pcf	103.33	106.62	104.6	
	Saturation, %	89.85	90.77	94.83	
	Void Ratio	0.66149	0.61022	0.64126	
Normal Stress, psf		2016.4	3000.8	4003.7	
Max. Shear Stress, psf		9518.7	10902	10804	
Ult. Shear Stress, psf		2036.2	2996.2	4359.8	
Time to Failure, min		14.001	11.002	11.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.	
Remarks: ASTM D3080	WP 12/12

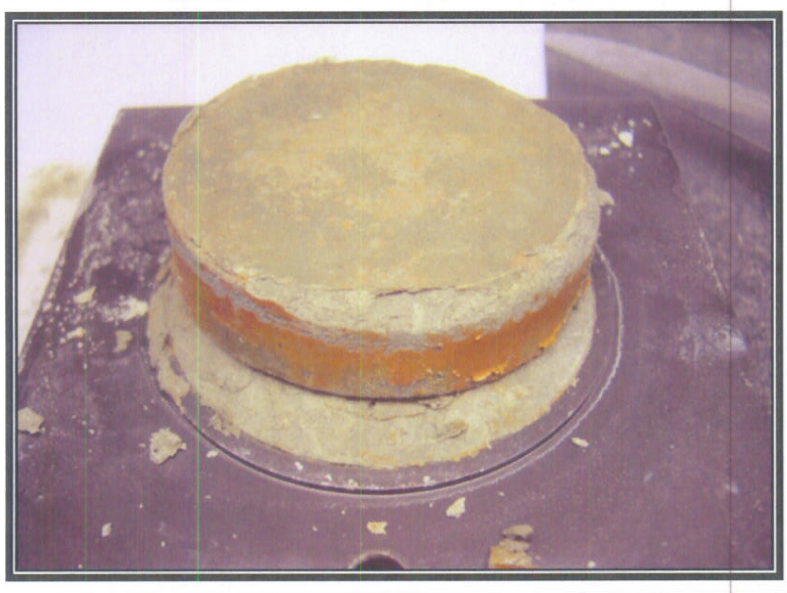
Thu, 04-DEC-2008 16:56:12

DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B

DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 1/2

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

Note: Boring location shown on Geotechnical Design Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Figure 2

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
Page: 2/2

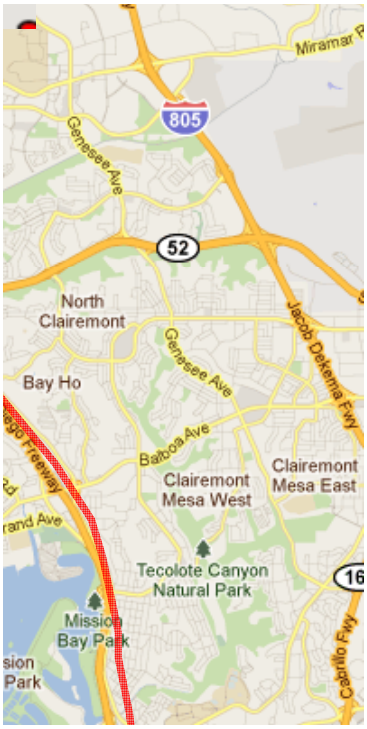
CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

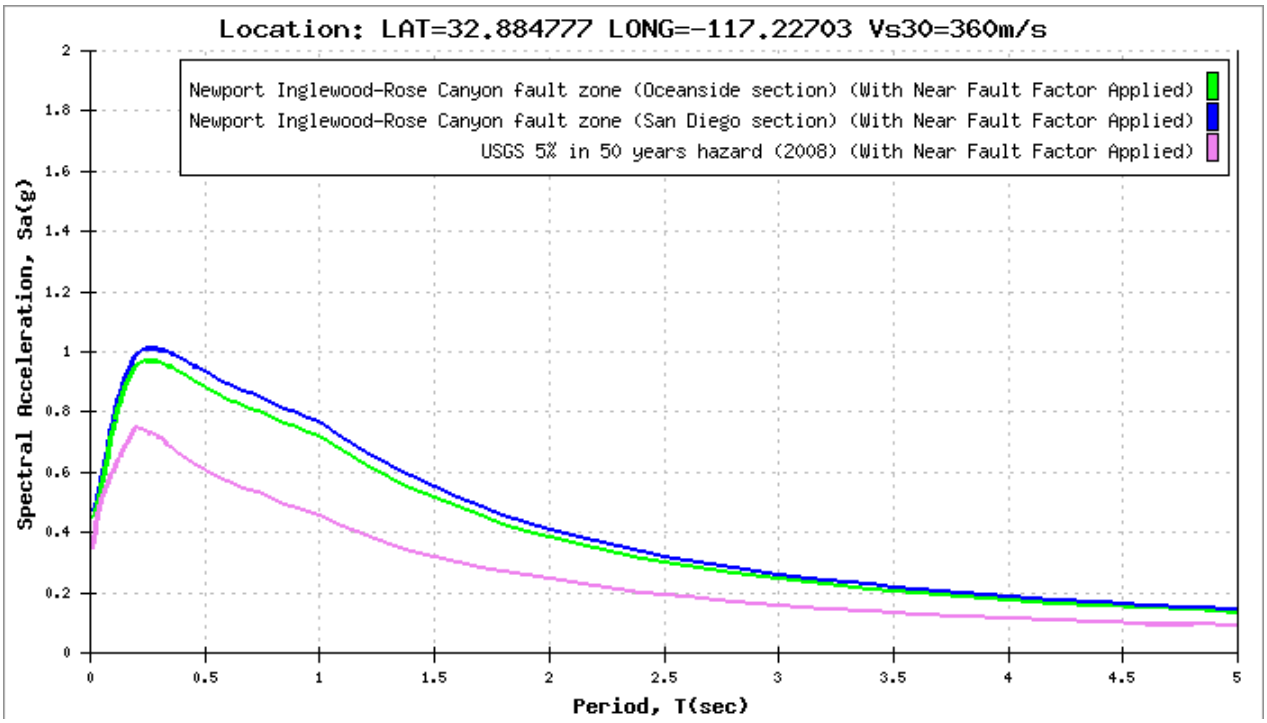
Note: Boring location shown on Geotechnical Design Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Figure 2

APPENDIX IV
ANALYSES & CALCULATIONS

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	360 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	264 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.460	1.000	1.000	0.460
0.022	0.465	1.000	1.000	0.465
0.025	0.473	1.000	1.000	0.473
0.029	0.483	1.000	1.000	0.483
0.03	0.486	1.000	1.000	0.486
0.032	0.493	1.000	1.000	0.493
0.035	0.503	1.000	1.000	0.503
0.036	0.507	1.000	1.000	0.507
0.04	0.521	1.000	1.000	0.521
0.042	0.528	1.000	1.000	0.528
0.044	0.535	1.000	1.000	0.535
0.045	0.539	1.000	1.000	0.539
0.046	0.543	1.000	1.000	0.543
0.048	0.550	1.000	1.000	0.550
0.05	0.557	1.000	1.000	0.557
0.055	0.577	1.000	1.000	0.577
0.06	0.596	1.000	1.000	0.596

0.065	0.615	1.000	1.000	0.615
0.067	0.623	1.000	1.000	0.623
0.07	0.634	1.000	1.000	0.634
0.075	0.653	1.000	1.000	0.653
0.08	0.672	1.000	1.000	0.672
0.085	0.692	1.000	1.000	0.692
0.09	0.711	1.000	1.000	0.711
0.095	0.730	1.000	1.000	0.730
0.1	0.748	1.000	1.000	0.748
0.11	0.780	1.000	1.000	0.780
0.12	0.810	1.000	1.000	0.810
0.13	0.837	1.000	1.000	0.837
0.133	0.844	1.000	1.000	0.844
0.14	0.859	1.000	1.000	0.859
0.15	0.879	1.000	1.000	0.879
0.16	0.898	1.000	1.000	0.898
0.17	0.915	1.000	1.000	0.915
0.18	0.930	1.000	1.000	0.930
0.19	0.943	1.000	1.000	0.943
0.2	0.955	1.000	1.000	0.955
0.22	0.964	1.000	1.000	0.964
0.24	0.971	1.000	1.000	0.971
0.25	0.973	1.000	1.000	0.973
0.26	0.972	1.000	1.000	0.972
0.28	0.971	1.000	1.000	0.971
0.29	0.968	1.000	1.000	0.968
0.3	0.966	1.000	1.000	0.966
0.32	0.960	1.000	1.000	0.960
0.34	0.953	1.000	1.000	0.953
0.35	0.949	1.000	1.000	0.949
0.36	0.945	1.000	1.000	0.945
0.38	0.936	1.000	1.000	0.936
0.4	0.926	1.000	1.000	0.926
0.42	0.918	1.000	1.000	0.918
0.44	0.909	1.000	1.000	0.909
0.45	0.904	1.000	1.000	0.904
0.46	0.900	1.000	1.000	0.900
0.48	0.891	1.000	1.000	0.891
0.5	0.882	1.000	1.000	0.882
0.55	0.843	1.000	1.020	0.860
0.6	0.808	1.000	1.040	0.841
0.65	0.777	1.000	1.060	0.823
0.667	0.767	1.000	1.067	0.818
0.7	0.748	1.000	1.080	0.808
0.75	0.722	1.000	1.100	0.794
0.8	0.693	1.000	1.120	0.777

0.85	0.667	1.000	1.140	0.761
0.9	0.643	1.000	1.160	0.746
0.95	0.620	1.000	1.180	0.732
1	0.599	1.000	1.200	0.719
1.1	0.557	1.000	1.200	0.668
1.2	0.520	1.000	1.200	0.624
1.3	0.486	1.000	1.200	0.583
1.4	0.456	1.000	1.200	0.547
1.5	0.429	1.000	1.200	0.514
1.6	0.402	1.000	1.200	0.482
1.7	0.378	1.000	1.200	0.453
1.8	0.356	1.000	1.200	0.427
1.9	0.337	1.000	1.200	0.404
2	0.319	1.000	1.200	0.383
2.2	0.287	1.000	1.200	0.344
2.4	0.260	1.000	1.200	0.312
2.5	0.249	1.000	1.200	0.298
2.6	0.238	1.000	1.200	0.286
2.8	0.219	1.000	1.200	0.263
3	0.202	1.000	1.200	0.243
3.2	0.188	1.000	1.200	0.225
3.4	0.175	1.000	1.200	0.210
3.5	0.169	1.000	1.200	0.203
3.6	0.164	1.000	1.200	0.197
3.8	0.154	1.000	1.200	0.184
4	0.145	1.000	1.200	0.174
4.2	0.137	1.000	1.200	0.164
4.4	0.130	1.000	1.200	0.156
4.6	0.123	1.000	1.200	0.148
4.8	0.118	1.000	1.200	0.141
5	0.112	1.000	1.200	0.135

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.473	1.000	1.000	0.473
0.02	0.481	1.000	1.000	0.481
0.022	0.487	1.000	1.000	0.487
0.025	0.495	1.000	1.000	0.495
0.029	0.506	1.000	1.000	0.506
0.03	0.508	1.000	1.000	0.508
0.032	0.516	1.000	1.000	0.516
0.035	0.527	1.000	1.000	0.527
0.036	0.530	1.000	1.000	0.530
0.04	0.545	1.000	1.000	0.545
0.042	0.552	1.000	1.000	0.552
0.044	0.560	1.000	1.000	0.560
0.045	0.563	1.000	1.000	0.563
0.046	0.567	1.000	1.000	0.567
0.048	0.575	1.000	1.000	0.575
0.05	0.582	1.000	1.000	0.582
0.055	0.601	1.000	1.000	0.601
0.06	0.621	1.000	1.000	0.621
0.065	0.640	1.000	1.000	0.640
0.067	0.648	1.000	1.000	0.648
0.07	0.659	1.000	1.000	0.659
0.075	0.678	1.000	1.000	0.678
0.08	0.697	1.000	1.000	0.697
0.085	0.717	1.000	1.000	0.717
0.09	0.736	1.000	1.000	0.736
0.095	0.755	1.000	1.000	0.755
0.1	0.773	1.000	1.000	0.773
0.11	0.806	1.000	1.000	0.806
0.12	0.837	1.000	1.000	0.837
0.13	0.864	1.000	1.000	0.864
0.133	0.871	1.000	1.000	0.871
0.14	0.887	1.000	1.000	0.887
0.15	0.907	1.000	1.000	0.907
0.16	0.928	1.000	1.000	0.928
0.17	0.945	1.000	1.000	0.945
0.18	0.962	1.000	1.000	0.962
0.19	0.976	1.000	1.000	0.976
0.2	0.989	1.000	1.000	0.989
0.22	1.001	1.000	1.000	1.001
0.24	1.010	1.000	1.000	1.010
0.25	1.013	1.000	1.000	1.013
0.26	1.012	1.000	1.000	1.012
0.28	1.012	1.000	1.000	1.012

0.29	1.011	1.000	1.000	1.011
0.3	1.009	1.000	1.000	1.009
0.32	1.005	1.000	1.000	1.005
0.34	0.999	1.000	1.000	0.999
0.35	0.995	1.000	1.000	0.995
0.36	0.991	1.000	1.000	0.991
0.38	0.983	1.000	1.000	0.983
0.4	0.974	1.000	1.000	0.974
0.42	0.966	1.000	1.000	0.966
0.44	0.957	1.000	1.000	0.957
0.45	0.953	1.000	1.000	0.953
0.46	0.949	1.000	1.000	0.949
0.48	0.940	1.000	1.000	0.940
0.5	0.932	1.000	1.000	0.932
0.55	0.893	1.000	1.020	0.911
0.6	0.857	1.000	1.040	0.892
0.65	0.825	1.000	1.060	0.875
0.667	0.815	1.000	1.067	0.870
0.7	0.796	1.000	1.080	0.860
0.75	0.769	1.000	1.100	0.846
0.8	0.739	1.000	1.120	0.828
0.85	0.712	1.000	1.140	0.811
0.9	0.686	1.000	1.160	0.795
0.95	0.662	1.000	1.180	0.781
1	0.639	1.000	1.200	0.767
1.1	0.594	1.000	1.200	0.713
1.2	0.555	1.000	1.200	0.666
1.3	0.519	1.000	1.200	0.623
1.4	0.487	1.000	1.200	0.585
1.5	0.458	1.000	1.200	0.550
1.6	0.430	1.000	1.200	0.516
1.7	0.404	1.000	1.200	0.485
1.8	0.381	1.000	1.200	0.457
1.9	0.360	1.000	1.200	0.432
2	0.341	1.000	1.200	0.410
2.2	0.307	1.000	1.200	0.368
2.4	0.279	1.000	1.200	0.334
2.5	0.266	1.000	1.200	0.319
2.6	0.255	1.000	1.200	0.306
2.8	0.234	1.000	1.200	0.281
3	0.216	1.000	1.200	0.260
3.2	0.201	1.000	1.200	0.241
3.4	0.187	1.000	1.200	0.225
3.5	0.181	1.000	1.200	0.217
3.6	0.175	1.000	1.200	0.210
3.8	0.164	1.000	1.200	0.197

4	0.155	1.000	1.200	0.186
4.2	0.147	1.000	1.200	0.176
4.4	0.139	1.000	1.200	0.167
4.6	0.132	1.000	1.200	0.159
4.8	0.126	1.000	1.200	0.151
5	0.120	1.000	1.200	0.144

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.347	1.000	1.000	0.347
0.02	0.410	1.000	1.000	0.410
0.022	0.419	1.000	1.000	0.419
0.025	0.433	1.000	1.000	0.433
0.029	0.448	1.000	1.000	0.448
0.03	0.452	1.000	1.000	0.452
0.032	0.459	1.000	1.000	0.459
0.035	0.469	1.000	1.000	0.469
0.036	0.472	1.000	1.000	0.472
0.04	0.485	1.000	1.000	0.485
0.042	0.490	1.000	1.000	0.490
0.044	0.496	1.000	1.000	0.496
0.045	0.499	1.000	1.000	0.499
0.046	0.501	1.000	1.000	0.501
0.048	0.507	1.000	1.000	0.507
0.05	0.512	1.000	1.000	0.512
0.055	0.524	1.000	1.000	0.524
0.06	0.535	1.000	1.000	0.535
0.065	0.545	1.000	1.000	0.545
0.067	0.549	1.000	1.000	0.549
0.07	0.555	1.000	1.000	0.555
0.075	0.564	1.000	1.000	0.564
0.08	0.573	1.000	1.000	0.573
0.085	0.582	1.000	1.000	0.582
0.09	0.590	1.000	1.000	0.590
0.095	0.598	1.000	1.000	0.598
0.1	0.605	1.000	1.000	0.605
0.11	0.623	1.000	1.000	0.623
0.12	0.639	1.000	1.000	0.639
0.13	0.655	1.000	1.000	0.655
0.133	0.659	1.000	1.000	0.659

0.14	0.670	1.000	1.000	0.670
0.15	0.684	1.000	1.000	0.684
0.16	0.697	1.000	1.000	0.697
0.17	0.710	1.000	1.000	0.710
0.18	0.723	1.000	1.000	0.723
0.19	0.735	1.000	1.000	0.735
0.2	0.746	1.000	1.000	0.746
0.22	0.740	1.000	1.000	0.740
0.24	0.734	1.000	1.000	0.734
0.25	0.731	1.000	1.000	0.731
0.26	0.728	1.000	1.000	0.728
0.28	0.724	1.000	1.000	0.724
0.29	0.721	1.000	1.000	0.721
0.3	0.719	1.000	1.000	0.719
0.32	0.704	1.000	1.000	0.704
0.34	0.690	1.000	1.000	0.690
0.35	0.683	1.000	1.000	0.683
0.36	0.677	1.000	1.000	0.677
0.38	0.664	1.000	1.000	0.664
0.4	0.653	1.000	1.000	0.653
0.42	0.643	1.000	1.000	0.643
0.44	0.633	1.000	1.000	0.633
0.45	0.628	1.000	1.000	0.628
0.46	0.623	1.000	1.000	0.623
0.48	0.615	1.000	1.000	0.615
0.5	0.606	1.000	1.000	0.606
0.55	0.573	1.000	1.020	0.584
0.6	0.544	1.000	1.040	0.566
0.65	0.519	1.000	1.060	0.550
0.667	0.511	1.000	1.067	0.545
0.7	0.497	1.000	1.080	0.536
0.75	0.477	1.000	1.100	0.524
0.8	0.454	1.000	1.120	0.508
0.85	0.433	1.000	1.140	0.493
0.9	0.414	1.000	1.160	0.480
0.95	0.397	1.000	1.180	0.469
1	0.382	1.000	1.200	0.458
1.1	0.350	1.000	1.200	0.420
1.2	0.323	1.000	1.200	0.388
1.3	0.301	1.000	1.200	0.361
1.4	0.281	1.000	1.200	0.337
1.5	0.264	1.000	1.200	0.317
1.6	0.249	1.000	1.200	0.299
1.7	0.236	1.000	1.200	0.283
1.8	0.224	1.000	1.200	0.268
1.9	0.213	1.000	1.200	0.255

2	0.203	1.000	1.200	0.244
2.2	0.183	1.000	1.200	0.220
2.4	0.167	1.000	1.200	0.200
2.5	0.159	1.000	1.200	0.191
2.6	0.153	1.000	1.200	0.183
2.8	0.141	1.000	1.200	0.169
3	0.130	1.000	1.200	0.157
3.2	0.121	1.000	1.200	0.145
3.4	0.113	1.000	1.200	0.135
3.5	0.109	1.000	1.200	0.131
3.6	0.105	1.000	1.200	0.126
3.8	0.099	1.000	1.200	0.119
4	0.093	1.000	1.200	0.112
4.2	0.089	1.000	1.200	0.107
4.4	0.085	1.000	1.200	0.102
4.6	0.082	1.000	1.200	0.098
4.8	0.079	1.000	1.200	0.094
5	0.076	1.000	1.200	0.091

Envelope Data

Period	SA
0.01	0.451
0.02	0.460
0.022	0.465
0.025	0.473
0.029	0.483
0.03	0.486
0.032	0.493
0.035	0.503
0.036	0.507
0.04	0.521
0.042	0.528
0.044	0.535
0.045	0.539
0.046	0.543
0.048	0.550
0.05	0.557
0.055	0.577
0.06	0.596
0.065	0.615
0.067	0.623
0.07	0.634
0.075	0.653

0.08	0.672
0.085	0.692
0.09	0.711
0.095	0.730
0.1	0.748
0.11	0.780
0.12	0.810
0.13	0.837
0.133	0.844
0.14	0.859
0.15	0.879
0.16	0.898
0.17	0.915
0.18	0.930
0.19	0.943
0.2	0.955
0.22	0.964
0.24	0.971
0.25	0.973
0.26	0.972
0.28	0.971
0.29	0.968
0.3	0.966
0.32	0.960
0.34	0.953
0.35	0.949
0.36	0.945
0.38	0.936
0.4	0.926
0.42	0.918
0.44	0.909
0.45	0.904
0.46	0.900
0.48	0.891
0.5	0.882
0.55	0.860
0.6	0.841
0.65	0.823
0.667	0.818
0.7	0.808
0.75	0.794
0.8	0.777
0.85	0.761
0.9	0.746
0.95	0.732
1	0.719

1.1	0.668
1.2	0.624
1.3	0.583
1.4	0.547
1.5	0.514
1.6	0.482
1.7	0.453
1.8	0.427
1.9	0.404
2	0.383
2.2	0.344
2.4	0.312
2.5	0.298
2.6	0.286
2.8	0.263
3	0.243
3.2	0.225
3.4	0.210
3.5	0.203
3.6	0.197
3.8	0.184
4	0.174
4.2	0.164
4.4	0.156
4.6	0.148
4.8	0.141
5	0.135

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} *(km)*	0	

Distance

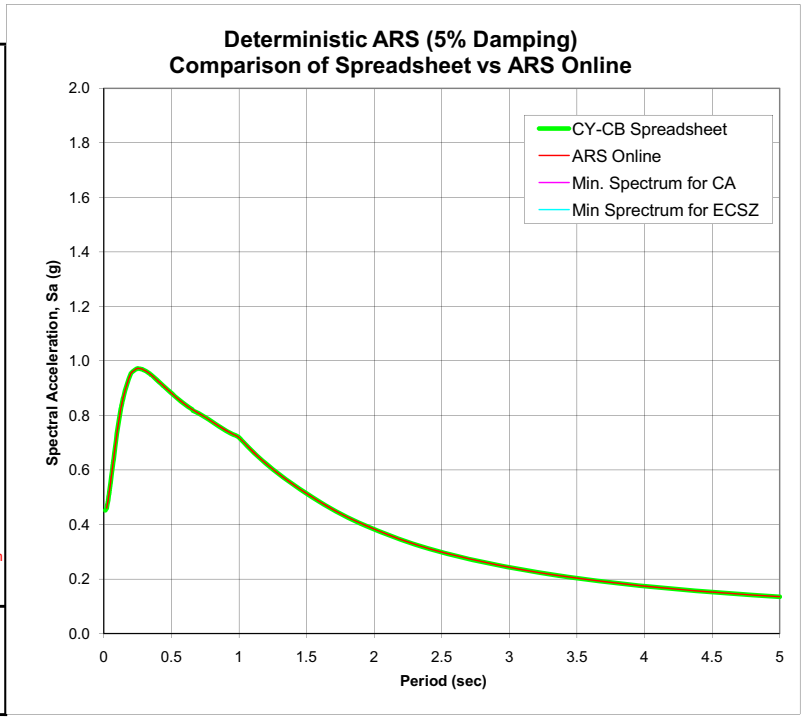
R_{RUP} *(km)*	4.2	
R_{JB} *(km)*	4.2	
R_x *(km)*	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} *(m/sec)*	360	(270 to 1500 m/s)
$Z_{1.0}$ *(m)*	264	(0 - No Basin)
$Z_{2.5}$ *(km)*	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45139
0.020	0.45947
0.022	0.46490
0.025	0.47294
0.029	0.48278
0.030	0.48562
0.032	0.49264
0.035	0.50314
0.036	0.50673
0.040	0.52058
0.042	0.52790
0.044	0.53500
0.045	0.53880
0.046	0.54250
0.048	0.54974
0.050	0.55711
0.055	0.57641
0.060	0.59603
0.065	0.61508
0.067	0.62288
0.070	0.63405
0.075	0.65285
0.080	0.67234
0.085	0.69186
0.090	0.71071
0.095	0.72940
0.100	0.74759
0.110	0.78037
0.120	0.81031
0.130	0.83671
0.133	0.84361
0.140	0.85907
0.150	0.87910
0.160	0.89809
0.170	0.91439

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.46	1	1	0.46	0%
0.022	0.465	1	1	0.465	0%
0.025	0.473	1	1	0.473	0%
0.029	0.483	1	1	0.483	0%
0.03	0.486	1	1	0.486	0%
0.032	0.493	1	1	0.493	0%
0.035	0.503	1	1	0.503	0%
0.036	0.507	1	1	0.507	0%
0.04	0.521	1	1	0.521	0%
0.042	0.528	1	1	0.528	0%
0.044	0.535	1	1	0.535	0%
0.045	0.539	1	1	0.539	0%
0.046	0.543	1	1	0.543	0%
0.048	0.55	1	1	0.55	0%
0.05	0.557	1	1	0.557	0%
0.055	0.577	1	1	0.577	0%
0.06	0.596	1	1	0.596	0%
0.065	0.615	1	1	0.615	0%
0.067	0.623	1	1	0.623	0%
0.07	0.634	1	1	0.634	0%
0.075	0.653	1	1	0.653	0%
0.08	0.672	1	1	0.672	0%
0.085	0.692	1	1	0.692	0%
0.09	0.711	1	1	0.711	0%
0.095	0.73	1	1	0.73	0%
0.1	0.748	1	1	0.748	0%
0.11	0.78	1	1	0.78	0%
0.12	0.81	1	1	0.81	0%
0.13	0.837	1	1	0.837	0%
0.133	0.844	1	1	0.844	0%
0.14	0.859	1	1	0.859	0%
0.15	0.879	1	1	0.879	0%
0.16	0.898	1	1	0.898	0%
0.17	0.915	1	1	0.915	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

Deterministic_Response_Spectrum_072809.xls 9/19/2011 10:51 AM

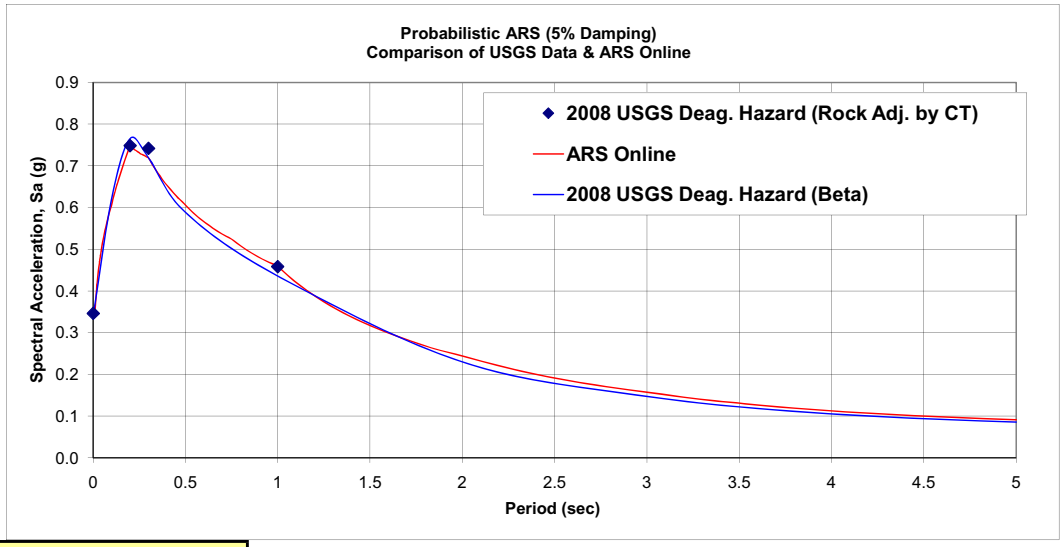
0.180	0.92942
0.190	0.94265
0.200	0.95443
0.220	0.96409
0.240	0.97074
0.250	0.97261
0.260	0.97171
0.280	0.97033
0.290	0.96791
0.300	0.96562
0.320	0.96013
0.340	0.95309
0.350	0.94896
0.360	0.94494
0.380	0.93573
0.400	0.92617
0.420	0.91759
0.440	0.90828
0.450	0.90398
0.460	0.89951
0.480	0.89025
0.500	0.88172
0.550	0.85945
0.600	0.84028
0.650	0.82311
0.660	0.81721
0.700	0.80777
0.750	0.79391
0.800	0.77635
0.850	0.76043
0.900	0.74535
0.950	0.73161
1.000	0.71844
1.100	0.66744
1.200	0.62274
1.300	0.58253
1.400	0.54648
1.500	0.51357
1.600	0.48149
1.700	0.45257
1.800	0.42652
1.900	0.40307
2.000	0.38213
2.200	0.34354
2.400	0.31177
2.500	0.29779
2.600	0.28492
2.800	0.26192
3.000	0.24206
3.200	0.22481
3.400	0.20959
3.500	0.20264
3.600	0.19608
3.800	0.18399
4.000	0.17319
4.200	0.16400
4.400	0.15555
4.600	0.14783
4.800	0.14078
5.000	0.13425

0.18	0.93	1	1	0.93	0%
0.19	0.943	1	1	0.943	0%
0.2	0.955	1	1	0.955	0%
0.22	0.964	1	1	0.964	0%
0.24	0.971	1	1	0.971	0%
0.25	0.973	1	1	0.973	0%
0.26	0.972	1	1	0.972	0%
0.28	0.971	1	1	0.971	0%
0.29	0.968	1	1	0.968	0%
0.3	0.966	1	1	0.966	0%
0.32	0.96	1	1	0.96	0%
0.34	0.953	1	1	0.953	0%
0.35	0.949	1	1	0.949	0%
0.36	0.945	1	1	0.945	0%
0.38	0.936	1	1	0.936	0%
0.4	0.926	1	1	0.926	0%
0.42	0.918	1	1	0.918	0%
0.44	0.909	1	1	0.909	0%
0.45	0.904	1	1	0.904	0%
0.46	0.9	1	1	0.9	0%
0.48	0.891	1	1	0.891	0%
0.5	0.882	1	1	0.882	0%
0.55	0.843	1	1.02	0.86	0%
0.6	0.808	1	1.04	0.841	0%
0.65	0.777	1	1.06	0.823	0%
0.667	0.767	1	1.067	0.818	0%
0.7	0.748	1	1.08	0.808	0%
0.75	0.722	1	1.1	0.794	0%
0.8	0.693	1	1.12	0.777	0%
0.85	0.667	1	1.14	0.761	0%
0.9	0.643	1	1.16	0.746	0%
0.95	0.62	1	1.18	0.732	0%
1	0.599	1	1.2	0.719	0%
1.1	0.557	1	1.2	0.668	0%
1.2	0.52	1	1.2	0.624	0%
1.3	0.486	1	1.2	0.583	0%
1.4	0.456	1	1.2	0.547	0%
1.5	0.429	1	1.2	0.514	0%
1.6	0.402	1	1.2	0.482	0%
1.7	0.378	1	1.2	0.453	0%
1.8	0.356	1	1.2	0.427	0%
1.9	0.337	1	1.2	0.404	0%
2	0.319	1	1.2	0.383	0%
2.2	0.287	1	1.2	0.344	0%
2.4	0.26	1	1.2	0.312	0%
2.5	0.249	1	1.2	0.298	0%
2.6	0.238	1	1.2	0.286	0%
2.8	0.219	1	1.2	0.263	0%
3	0.202	1	1.2	0.243	0%
3.2	0.188	1	1.2	0.225	0%
3.4	0.175	1	1.2	0.21	0%
3.5	0.169	1	1.2	0.203	0%
3.6	0.164	1	1.2	0.197	0%
3.8	0.154	1	1.2	0.184	0%
4	0.145	1	1.2	0.174	0%
4.2	0.137	1	1.2	0.164	0%
4.4	0.13	1	1.2	0.156	0%
4.6	0.123	1	1.2	0.148	0%
4.8	0.118	1	1.2	0.141	0%
5	0.112	1	1.2	0.135	1%

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	360
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.1
$Z_{1.0}$ (m) =	264
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.347	1	1	0.347
0.02	0.41	1	1	0.41
0.022	0.419	1	1	0.419
0.025	0.433	1	1	0.433
0.029	0.448	1	1	0.448
0.03	0.452	1	1	0.452
0.032	0.459	1	1	0.459
0.035	0.469	1	1	0.469
0.036	0.472	1	1	0.472
0.04	0.485	1	1	0.485
0.042	0.49	1	1	0.49
0.044	0.496	1	1	0.496
0.045	0.499	1	1	0.499
0.046	0.501	1	1	0.501
0.048	0.507	1	1	0.507
0.05	0.512	1	1	0.512
0.055	0.524	1	1	0.524
0.06	0.535	1	1	0.535
0.065	0.545	1	1	0.545
0.067	0.549	1	1	0.549
0.07	0.555	1	1	0.555
0.075	0.564	1	1	0.564
0.08	0.573	1	1	0.573
0.085	0.582	1	1	0.582
0.09	0.59	1	1	0.59
0.095	0.598	1	1	0.598
0.1	0.605	1	1	0.605
0.11	0.623	1	1	0.623
0.12	0.639	1	1	0.639
0.13	0.655	1	1	0.655
0.133	0.659	1	1	0.659
0.14	0.67	1	1	0.67
0.15	0.684	1	1	0.684
0.16	0.697	1	1	0.697
0.17	0.71	1	1	0.71
0.18	0.723	1	1	0.723
0.19	0.735	1	1	0.735
0.2	0.746	1	1	0.746
0.22	0.74	1	1	0.74
0.24	0.734	1	1	0.734
0.25	0.731	1	1	0.731
0.26	0.728	1	1	0.728
0.28	0.724	1	1	0.724

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.128	1.000	0.346	0.347	-0.3%
0.2	0.722	1.000	1.037	1.000	0.748	0.746	0.3%
0.3	0.597	1.000	1.242	1.000	0.742	0.719	3.1%
1	0.228	1.200	1.673	1.000	0.458	0.458	0.1%

Max % Difference = 3.1%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.3398	1.000	1.000	0.340	0.347	2.1%
0.1	0.6208	1.000	1.000	0.621	0.605	2.5%
0.2	0.7651	1.000	1.000	0.765	0.746	2.5%
0.3	0.7188	1.000	1.000	0.719	0.719	0.0%
0.5	0.5881	1.000	1.000	0.588	0.606	3.0%
1	0.3631	1.200	1.000	0.436	0.458	5.1%
2	0.1914	1.200	1.000	0.230	0.244	6.2%
3	0.12256	1.200	1.000	0.147	0.157	6.8%
4	0.08762	1.200	1.000	0.105	0.112	6.5%
5	0.07141	1.200	1.000	0.086	0.091	6.2%

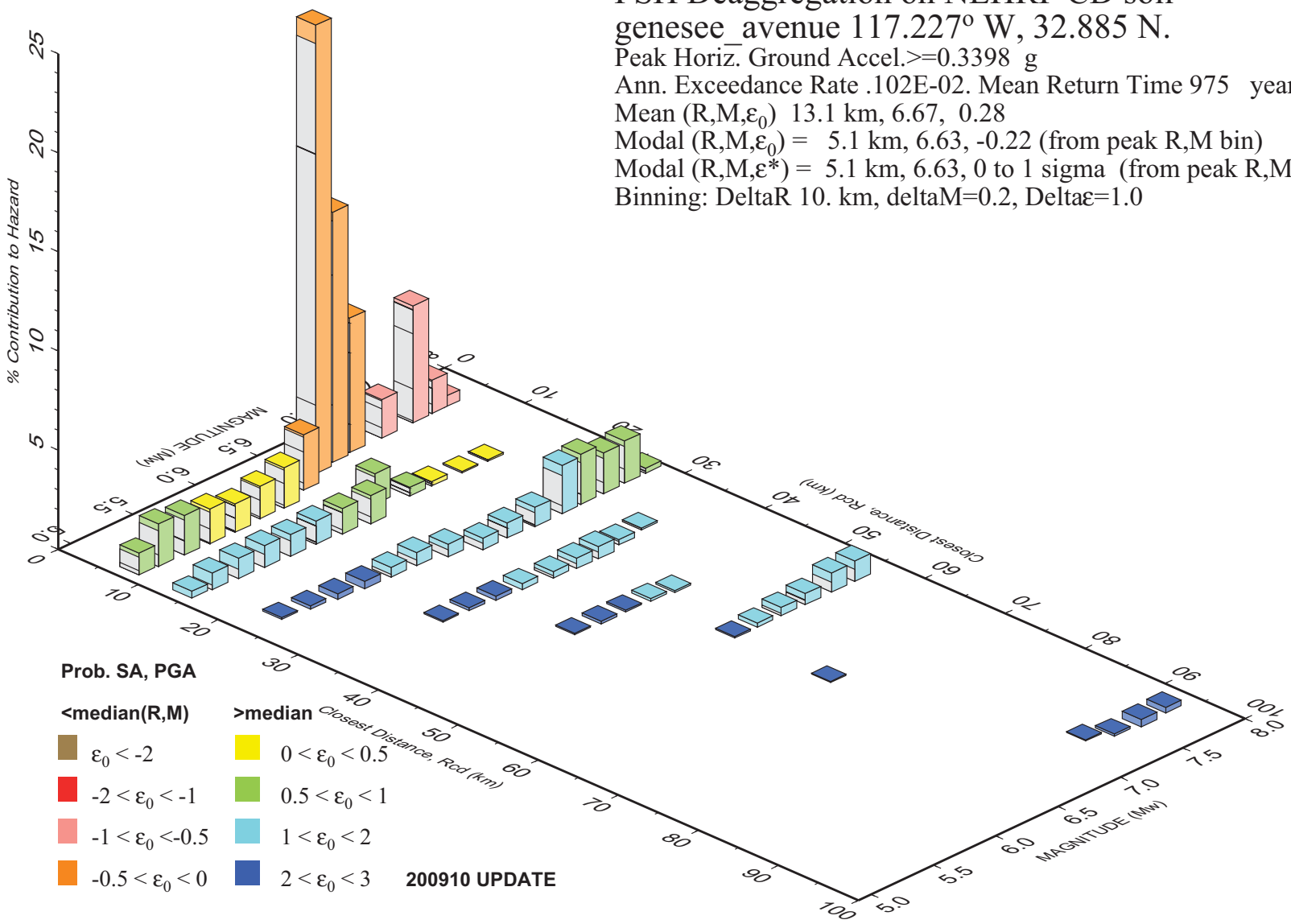
Max % Difference = 6.8%

Probabilistic_Response_Spectrum_080409.xls 9/19/2011 10:55 AM

0.29	0.721	1	1	0.721
0.3	0.719	1	1	0.719
0.32	0.704	1	1	0.704
0.34	0.69	1	1	0.69
0.35	0.683	1	1	0.683
0.36	0.677	1	1	0.677
0.38	0.664	1	1	0.664
0.4	0.653	1	1	0.653
0.42	0.643	1	1	0.643
0.44	0.633	1	1	0.633
0.45	0.628	1	1	0.628
0.46	0.623	1	1	0.623
0.48	0.615	1	1	0.615
0.5	0.606	1	1	0.606
0.55	0.573	1	1.02	0.584
0.6	0.544	1	1.04	0.566
0.65	0.519	1	1.06	0.55
0.667	0.511	1	1.067	0.545
0.7	0.497	1	1.08	0.536
0.75	0.477	1	1.1	0.524
0.8	0.454	1	1.12	0.508
0.85	0.433	1	1.14	0.493
0.9	0.414	1	1.16	0.48
0.95	0.397	1	1.18	0.469
1	0.382	1	1.2	0.458
1.1	0.35	1	1.2	0.42
1.2	0.323	1	1.2	0.388
1.3	0.301	1	1.2	0.361
1.4	0.281	1	1.2	0.337
1.5	0.264	1	1.2	0.317
1.6	0.249	1	1.2	0.299
1.7	0.236	1	1.2	0.283
1.8	0.224	1	1.2	0.268
1.9	0.213	1	1.2	0.255
2	0.203	1	1.2	0.244
2.2	0.183	1	1.2	0.22
2.4	0.167	1	1.2	0.2
2.5	0.159	1	1.2	0.191
2.6	0.153	1	1.2	0.183
2.8	0.141	1	1.2	0.169
3	0.13	1	1.2	0.157
3.2	0.121	1	1.2	0.145
3.4	0.113	1	1.2	0.135
3.5	0.109	1	1.2	0.131
3.6	0.105	1	1.2	0.126
3.8	0.099	1	1.2	0.119
4	0.093	1	1.2	0.112
4.2	0.089	1	1.2	0.107
4.4	0.085	1	1.2	0.102
4.6	0.082	1	1.2	0.098
4.8	0.079	1	1.2	0.094
5	0.076	1	1.2	0.091

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

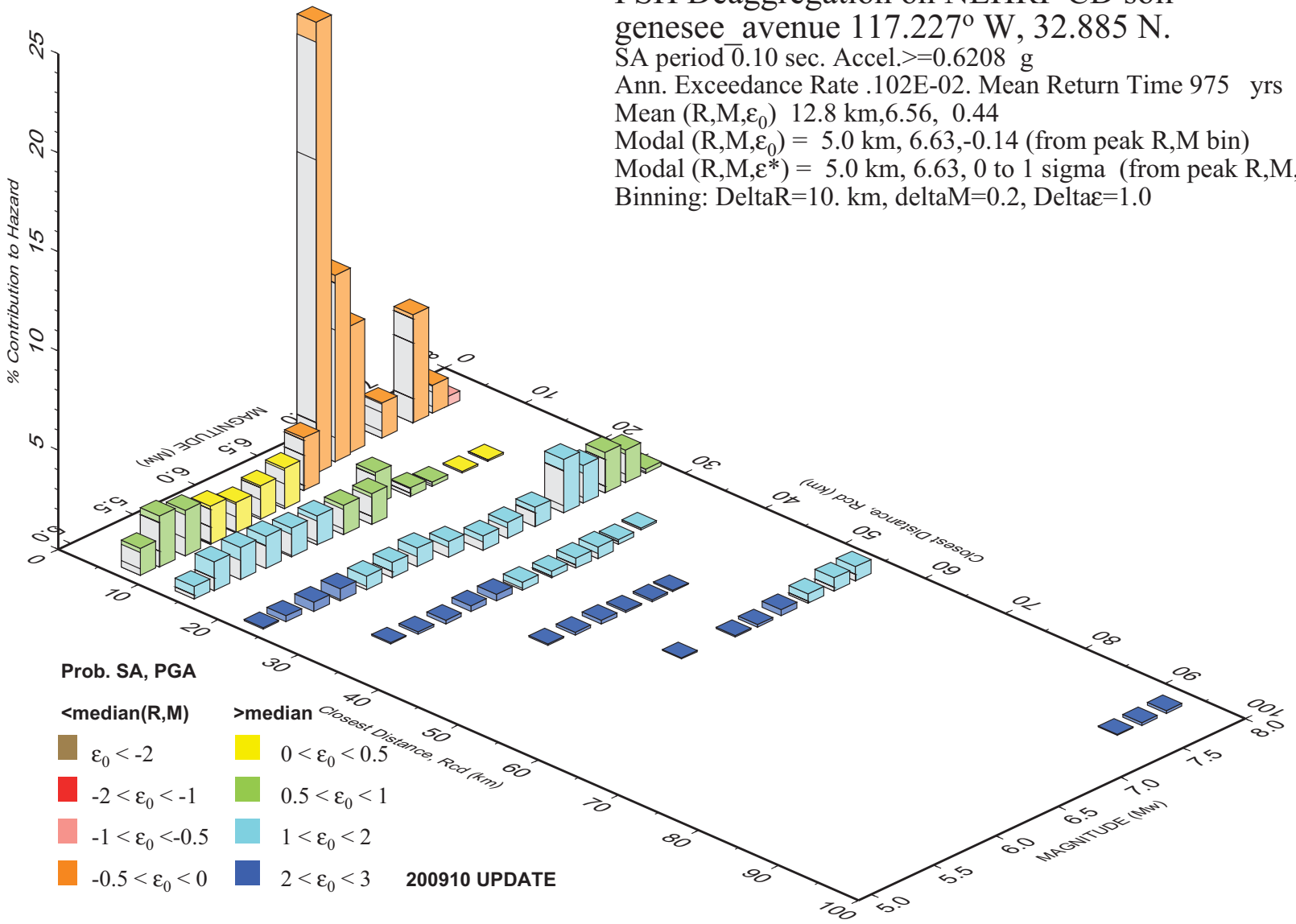
Peak Horiz. Ground Accel.>=0.3398 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 years
Mean (R,M,ε_0) 13.1 km, 6.67, 0.28
Modal (R,M,ε_0) = 5.1 km, 6.63, -0.22 (from peak R,M bin)
Modal (R,M,ε*) = 5.1 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:39:21 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

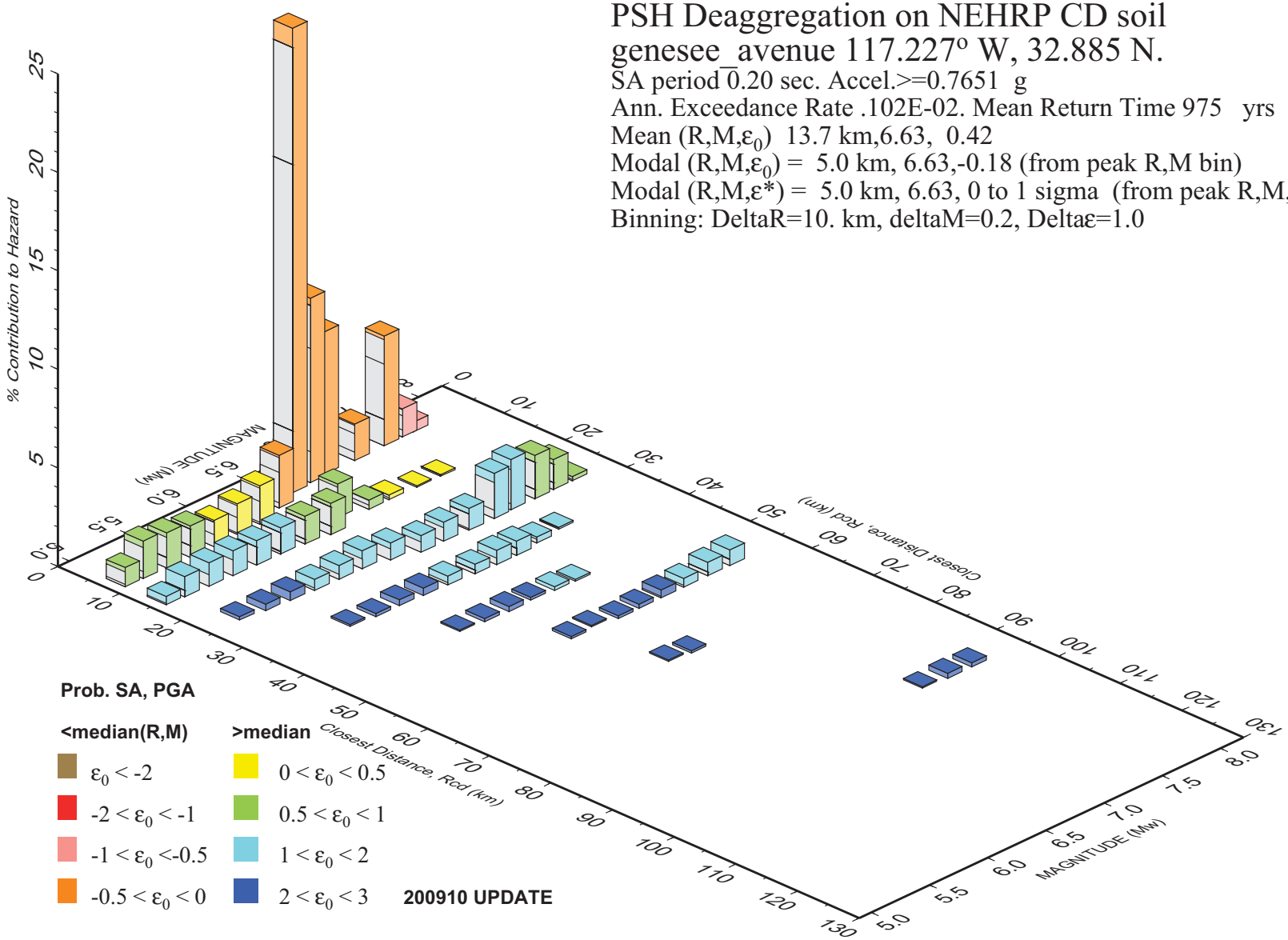
SA period 0.10 sec. Accel.>=0.6208 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 12.8 km,6.56, 0.44
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.14 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:47:02 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

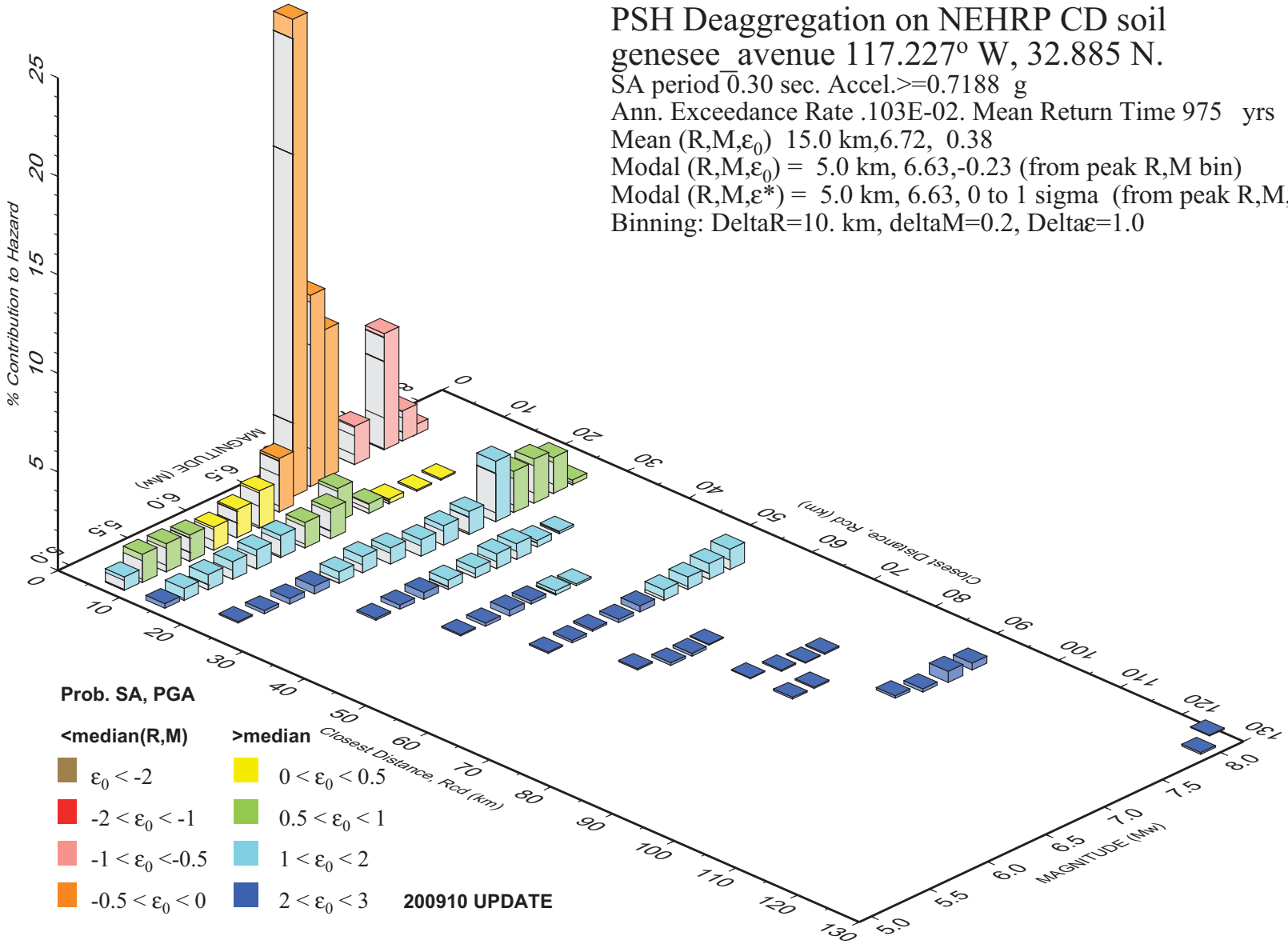
SA period 0.20 sec. Accel.>=0.7651 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 13.7 km,6.63, 0.42
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.18 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:48:40 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

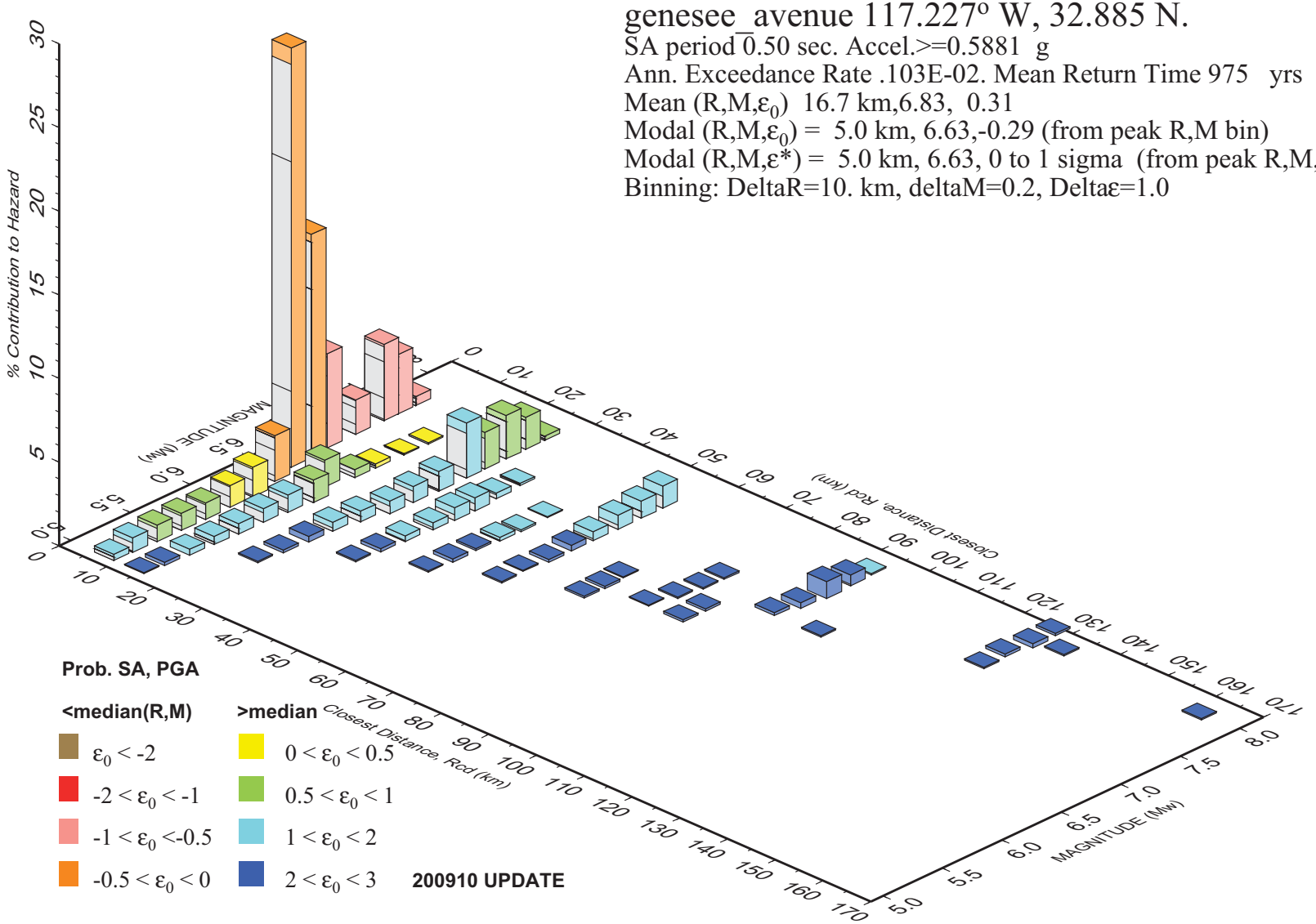
SA period 0.30 sec. Accel.>=0.7188 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 15.0 km,6.72, 0.38
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.23 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:49:49 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

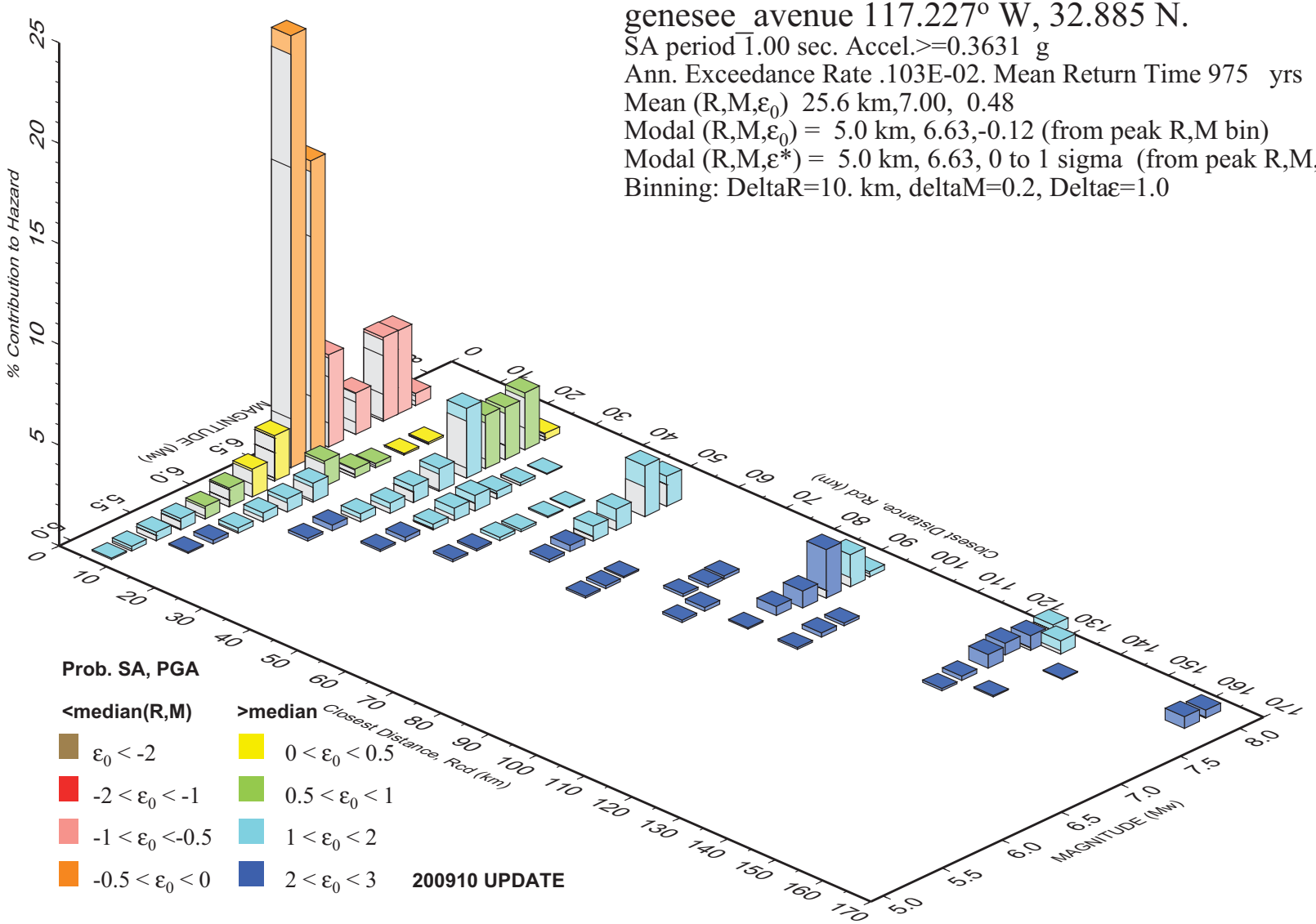
SA period 0.50 sec. Accel.>=0.5881 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 16.7 km,6.83, 0.31
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:50:55 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

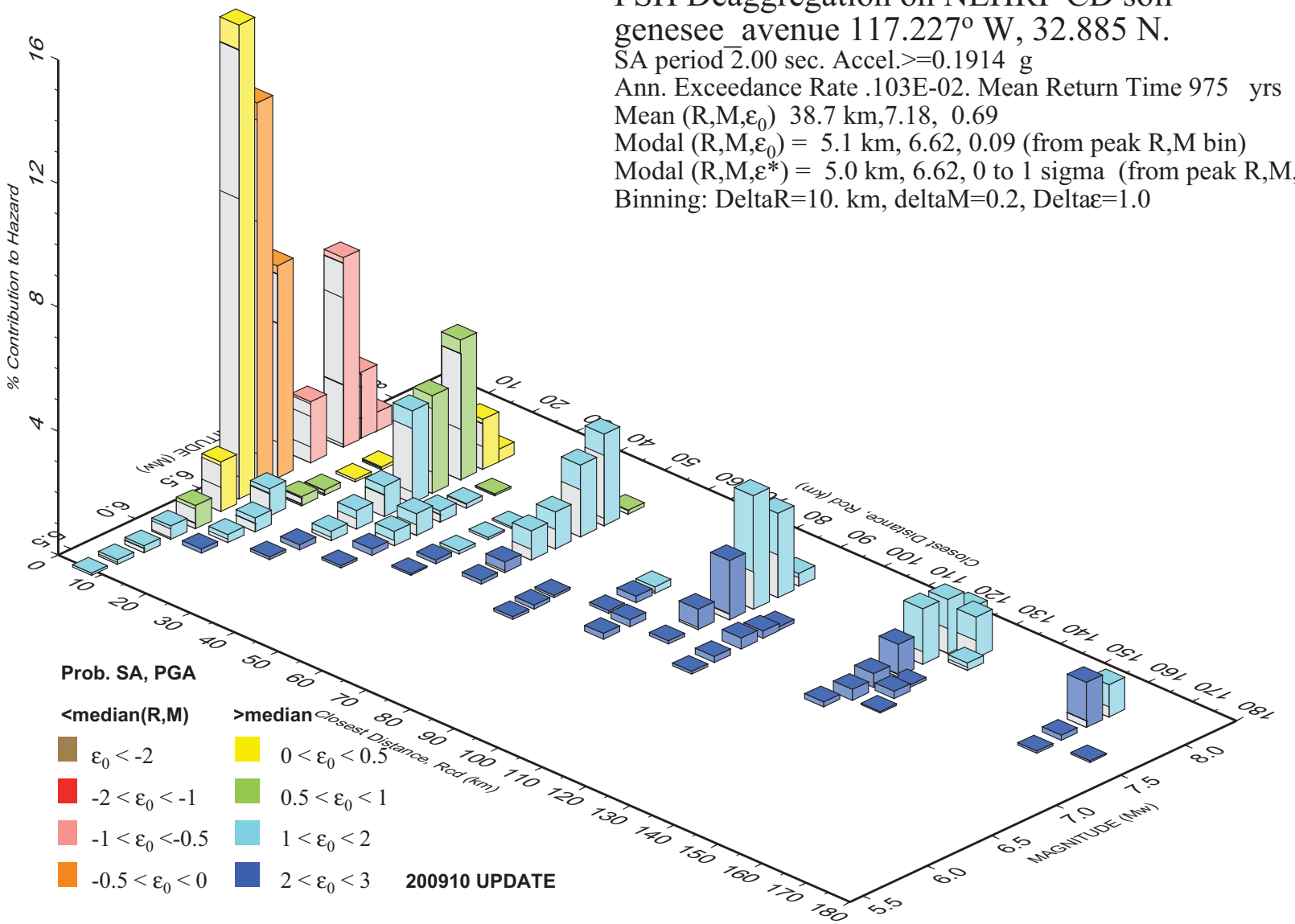
SA period 1.00 sec. Accel.>=0.3631 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 25.6 km,7.00, 0.48
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.12 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:52:12 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

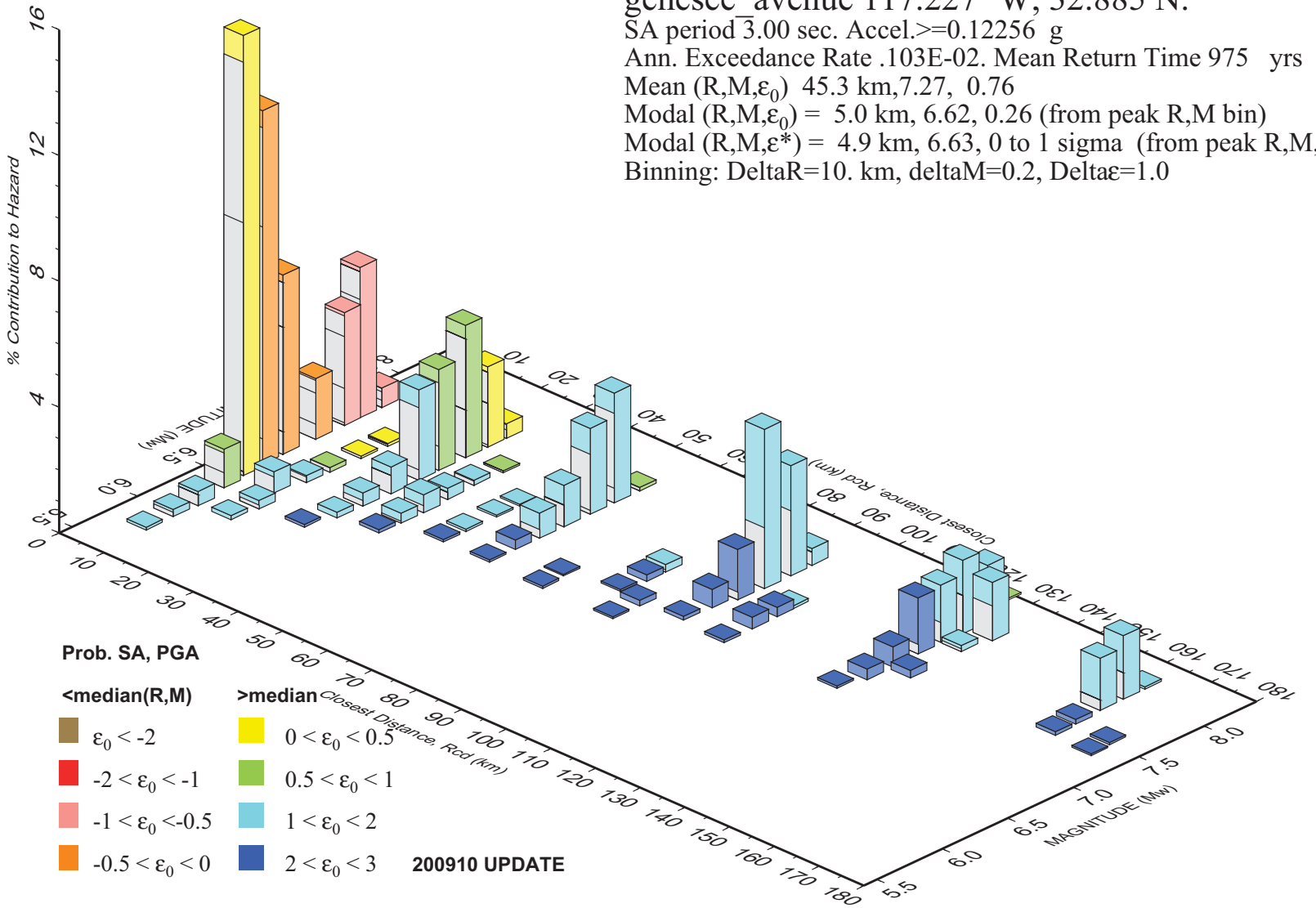
SA period 2.00 sec. Accel.>=0.1914 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 38.7 km,7.18, 0.69
Modal (R,M,ε_0) = 5.1 km, 6.62, 0.09 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.62, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:53:10 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

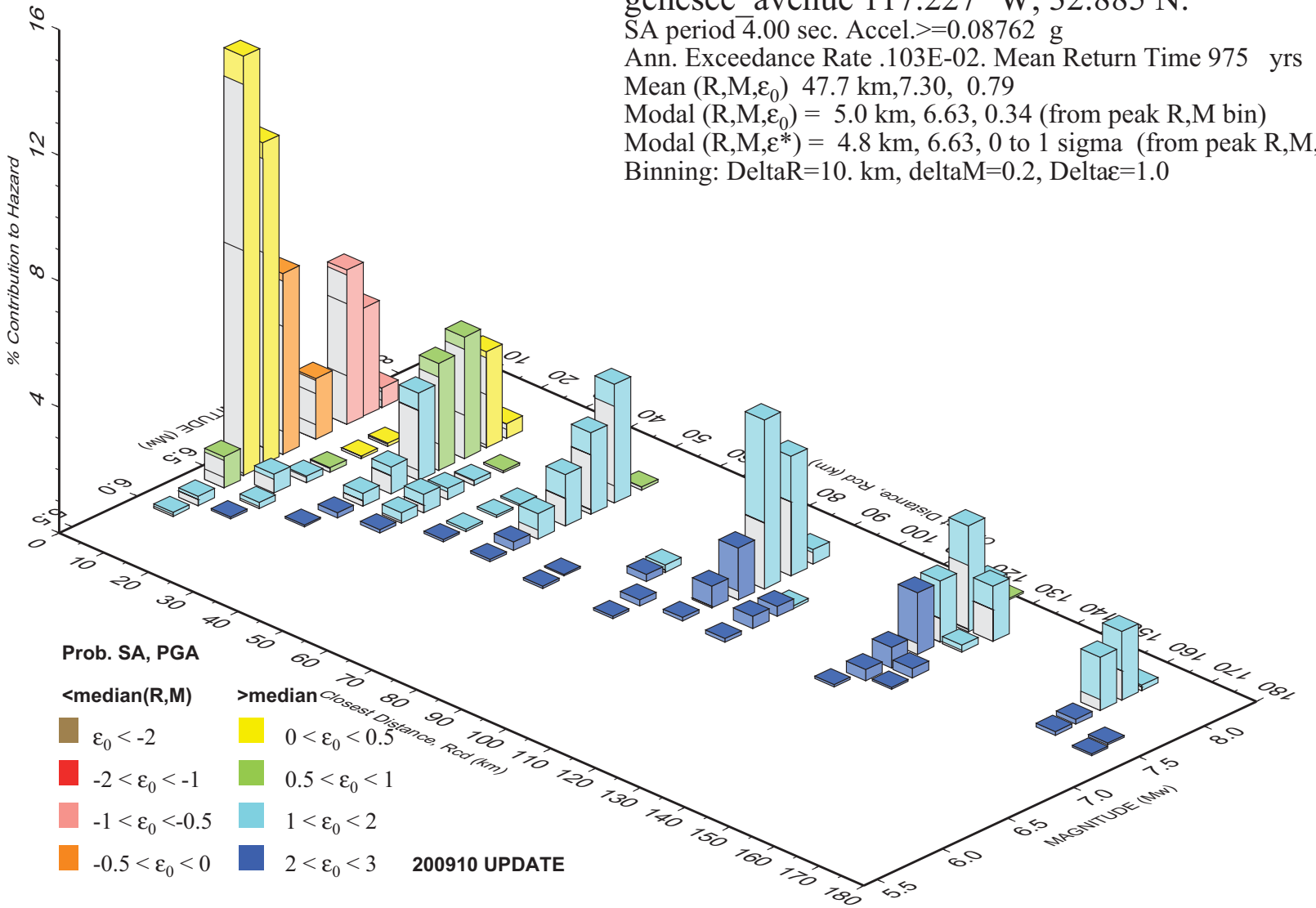
SA period 3.00 sec. Accel.>=0.12256 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 45.3 km,7.27, 0.76
Modal (R,M,ε_0) = 5.0 km, 6.62, 0.26 (from peak R,M bin)
Modal (R,M,ε*) = 4.9 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



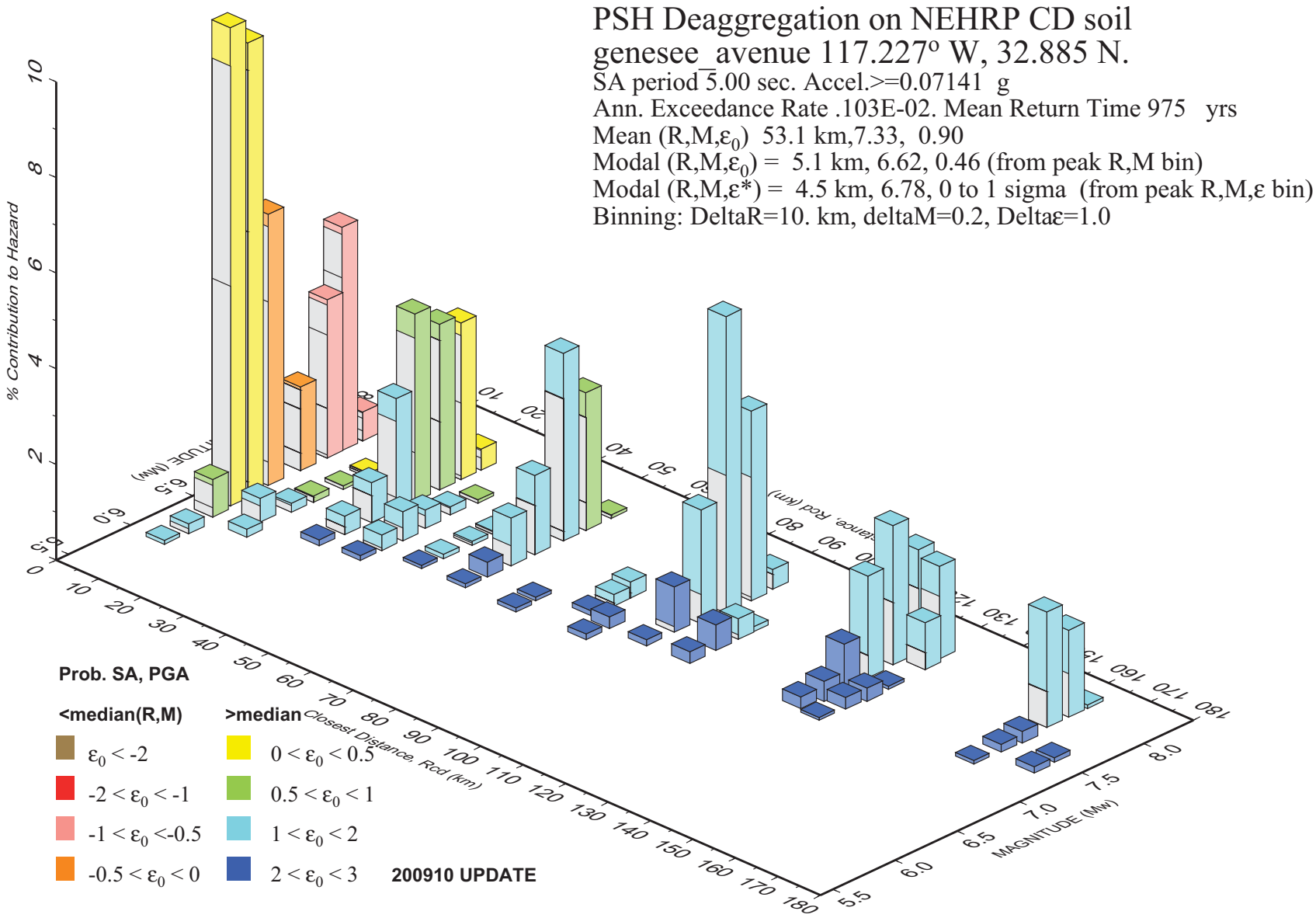
GMT 2011 Jul 20 16:54:05 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

SA period 4.00 sec. Accel.>=0.08762 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 47.7 km,7.30, 0.79
Modal (R,M,ε_0) = 5.0 km, 6.63, 0.34 (from peak R,M bin)
Modal (R,M,ε*) = 4.8 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:54:57 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:55:47 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: R-1,2,and3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

Fault Information (#1)

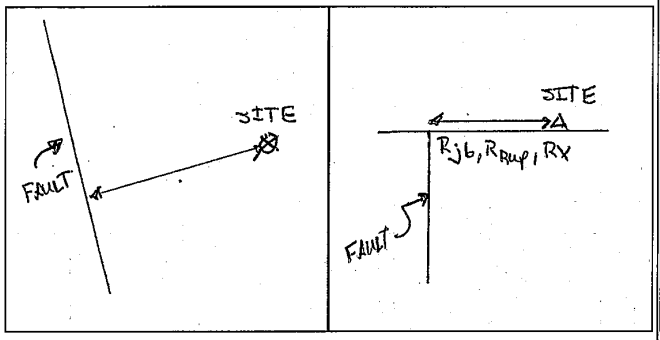
Fault Name: Newport Inglewood (Oceanside) Fault ID#: 223

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.00

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 4.21

R_{JB}: 4.21

R_X: 4.21

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

Fault Information (#2)

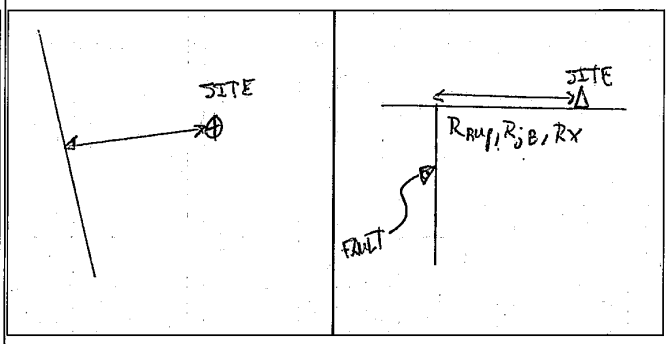
Fault Name: Newport Inglewood (San Diego) Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.0

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: RW-1, 2 and 3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

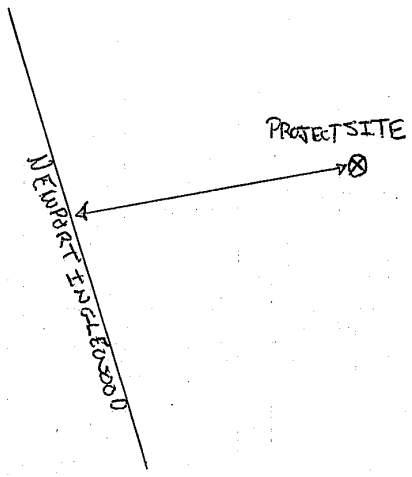
Deterministic Fault Information

Fault Name: ~~New Port Inglewood~~ Rose Canyon Fault ID#: 223 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13.00 km

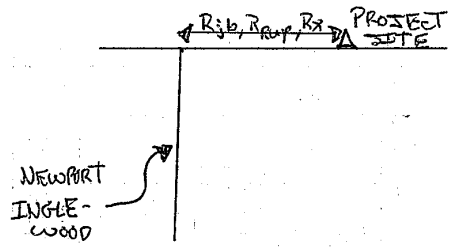
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	4.21 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT Correlation (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 20km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☒	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

ZIA YAZDANI — 11-7-11
Checker (Print) — Title

Checker (Signature) — 11-7-11
Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

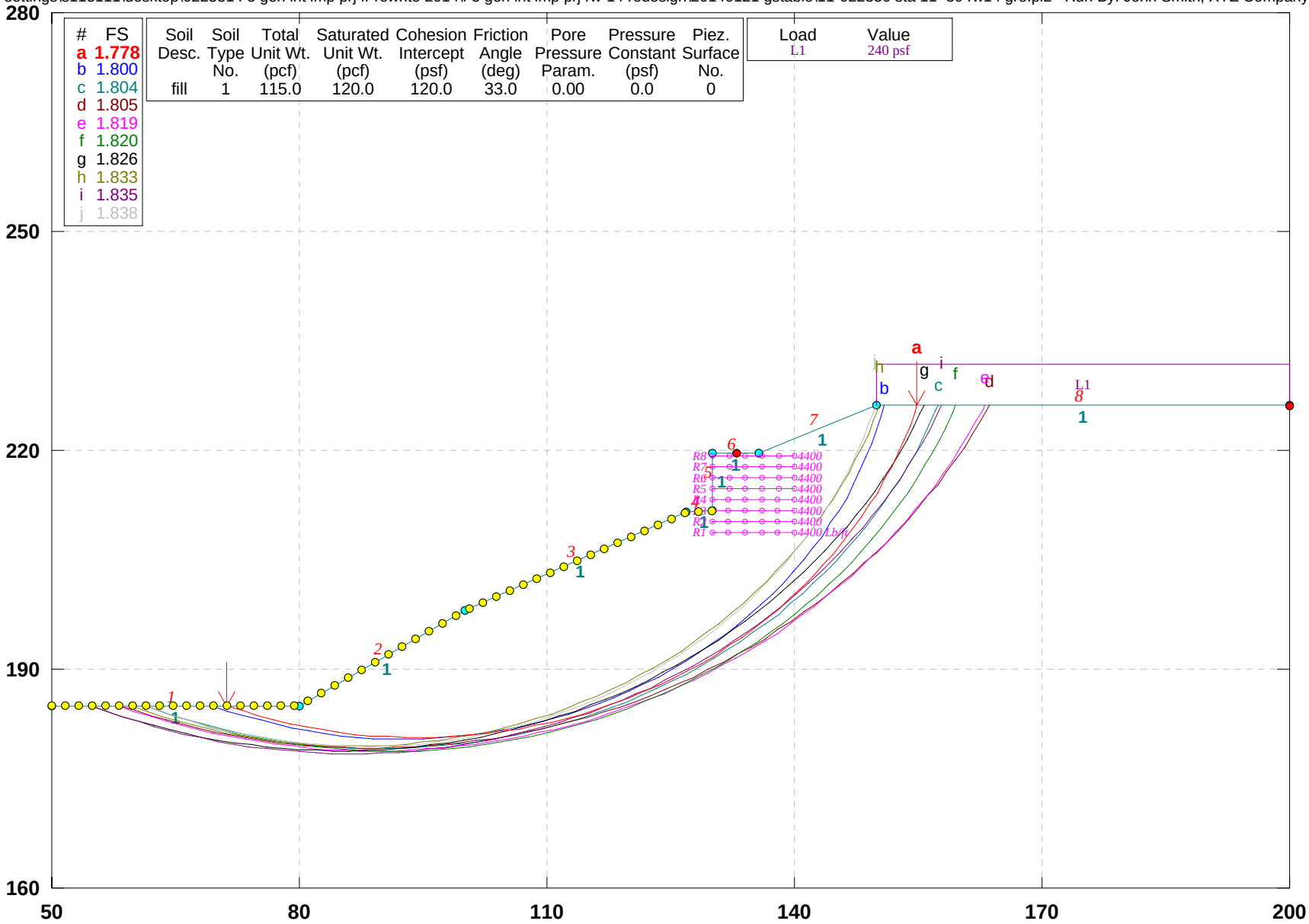
BRIAN HINMAN — SENIOR TE
Functional Supervisor (Print) — Title

Functional Supervisor (Signature) — 11/8/11
Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Genesee Int Imp Proj 11-022331 RW-14 11+30.00 H=7.4 gre global vertical

c:\documents and settings\s113111\desktop\022331 i-5 gen int imp prj fr rewrite 2014\i-5 gen int imp prj rw-14 redesign\20140121 gstable\11-022330 sta 11+30 rw14 gre.pl2 Run By: John Smith, XYZ Company 1/29/2014 1



GSTABL7 v.2 FSmin=1.778

Safety Factors Are Calculated By The Modified Bishop Method

Genesee Int Imp Proj 11-022331 RW-14 12+40.00 H=23.1 gre global vert

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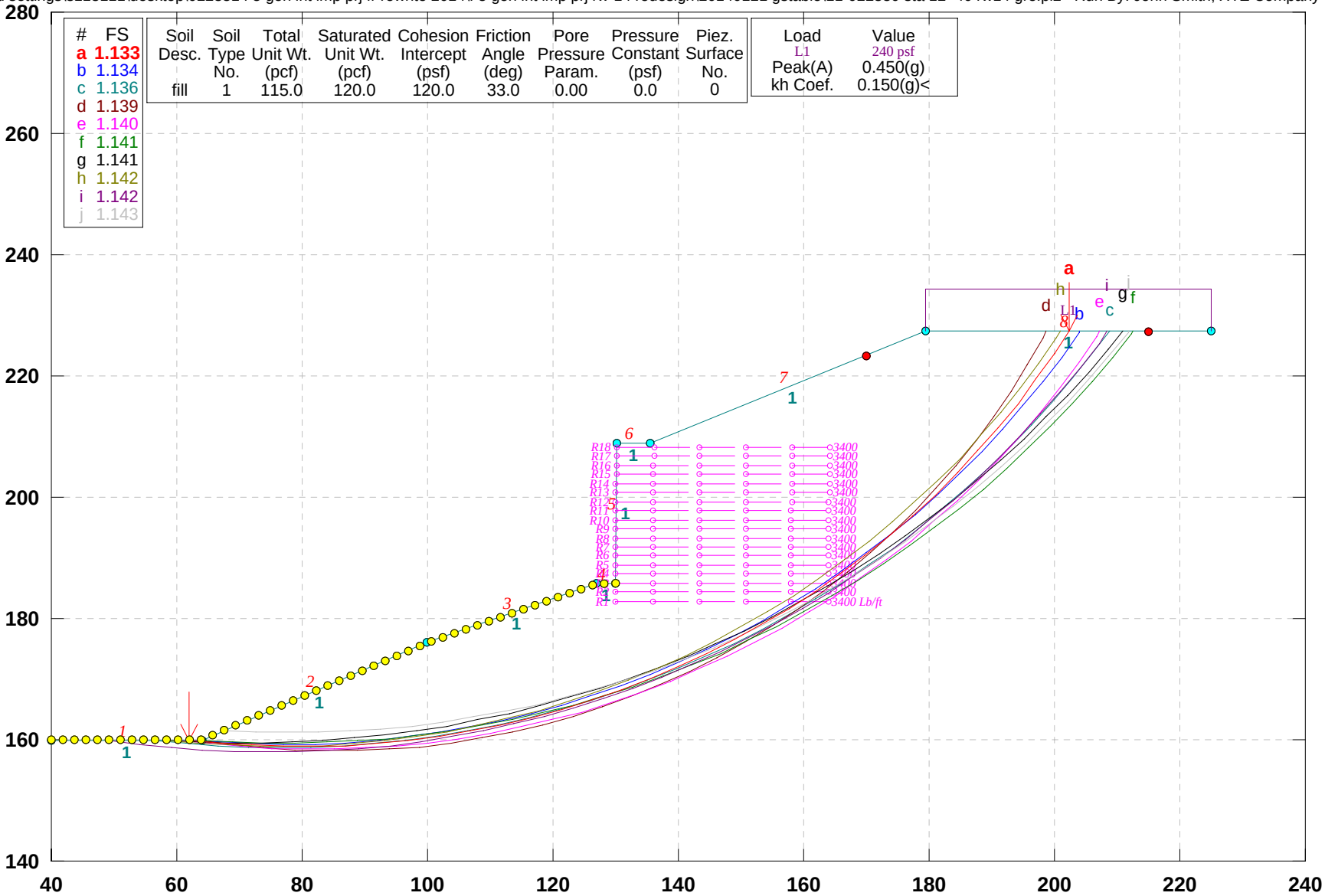

GSTABL7 v.2 FSmin=1.133

Safety Factors Are Calculated By The Modified Bishop Method

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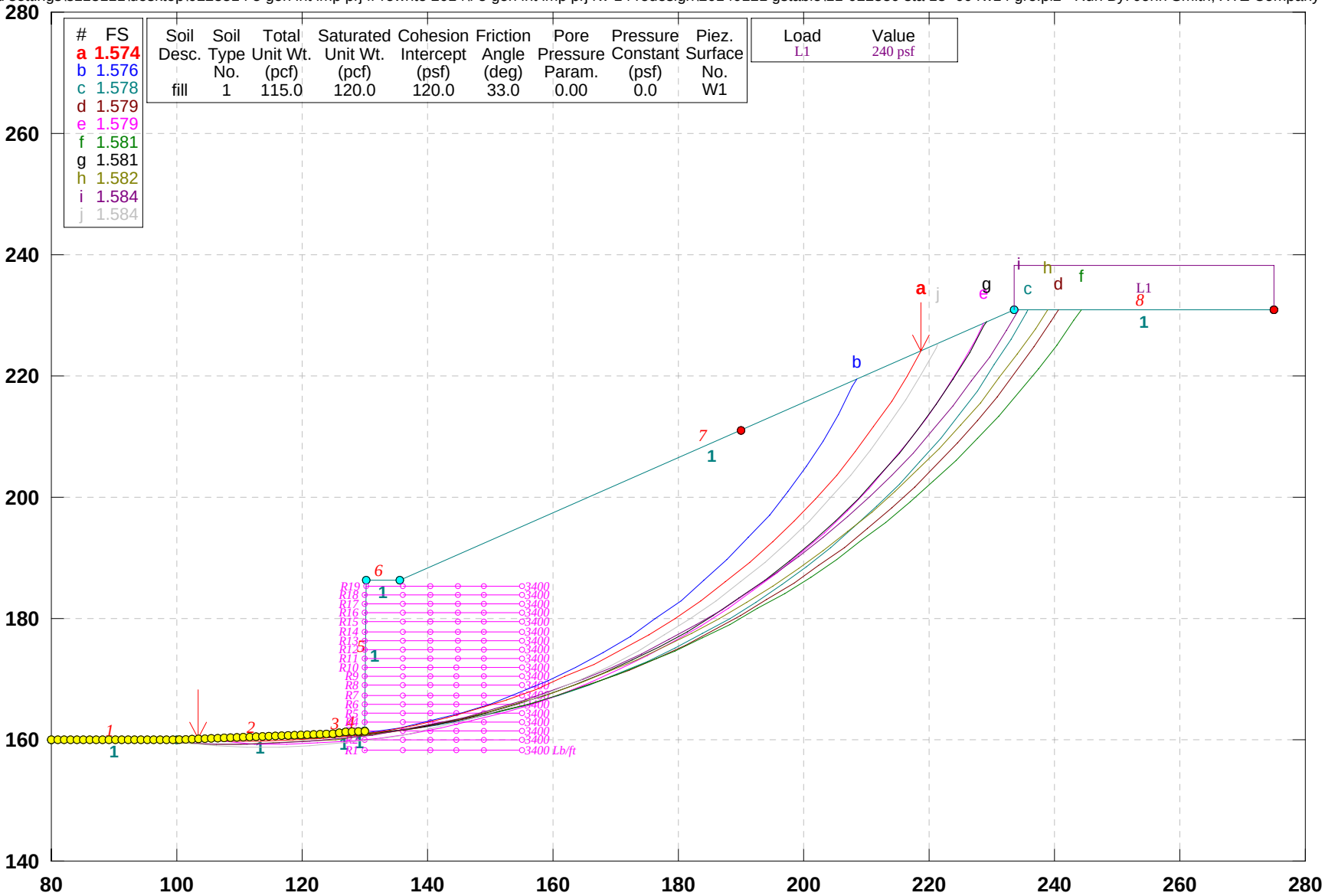

GSTABL7 v.2 FSmin=1.574

Safety Factors Are Calculated By The Modified Bishop Method

APPENDIX V

PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Caltrans

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stolarski
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

FOUNDATION REPORT

Interstate-5/Genesee Avenue Interchange Improvement Project

Retaining Wall-15

11-SD-5/PM R28.6/R30.5

EA 11-022331/EFIS 1100000012

MARCH 28, 2014

Prepared By:

OFFICE OF GEOTECHNICAL DESIGN-SOUTH 2
7177 OPPORTUNITY ROAD
SAN DIEGO, CA 92111

State of California | Business, Transportation and Housing Agency

Memorandum

To: Mr. Majid Kharrati
Project Design Manager

Date: March 28, 2014

File: 11-SD-5-(PM) R28.6-R 30.5
EA 11-022331/EFIS 1100000012

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2

Subject: Foundation Report for the Interstate-5/Genesee Avenue Interchange Improvement Project Retaining Wall-15

Pursuant to your request, the Office of Geotechnical Design-South 2 (OGDS2) has prepared this Foundation Report (FR) for the I-5/Genesee Avenue Interchange Improvement Project in the City of San Diego, in San Diego County, California.

This FR documents the prevailing site conditions and provides specific foundation recommendations for Retaining Wall-15. The report defines the geotechnical conditions as evaluated from field investigation data and used in the geotechnical analyses and design. This report provides recommendations and specifications for project design and construction. This FR supersedes information regarding RW-14 presented in the *Caltrans Geotechnical Design Report for the Interstate-5/Genesee Avenue Interchange Improvement Project, EA 11-022331/EFIS 1100000012, dated February 29, 2012.*

No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) were prepared for the retaining wall prior to the preparation of this FR. Please ensure that this FR is included in both the District and Structure Construction Resident Engineer (RE) Pending Files. OGDS2 staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Mike Fordham at (858) 467-3290 or Brian Hinman at (858) 467-4051.

Mike Fordham P.E.
Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

REGISTERED PROFESSIONAL ENGINEER
MICHAEL M. FORDHAM
C61341
EXP. 06/2015
CIVIL
STATE OF CALIFORNIA

Brian Hinman P.E.
Senior Transportation Engineer (Civil)
Office of Geotechnical Design - South 2

CARBON COPY (CC) LIST

Arturo Jacobo	District Project Manager
Yong Pak	Project Engineer
Art Padilla	District Materials Engineer
Abbas Abghari	Office Chief, OGDS2
Geotechnical Archives	
District Construction R.E. Pending File	It is the responsibility of the Project Design Manager to include this document in the District Construction R.E. Pending File.
Structure Construction R.E. Pending File	RE_Pending_File@dot.ca.gov
Mike Ross	Kimley Horn and Associates
Craig Shannon	Simon Wong Engineering

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FIGURE 3: PROJECT PROFILE

FIGURE 4: PROJECT CROSS SECTIONS

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FIGURE 6: GEOLOGIC PROFILE

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FIGURE 10: GRAVEL DRAIN

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TABLE 2: CORROSION TEST RESULTS

TABLE 3: SOIL STRENGTH DESIGN PARAMETERS

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APPENDIX II FIELD EXPLORATION DATA

APPENDIX III LABORATORY TEST DATA

APPENDIX IV ANALYSES AND CALCULATIONS

APPENDIX V PROJECT MEMORANDUM

1.0 SCOPE OF WORK

This Foundation Report (FR) has been prepared by the Office of Geotechnical Design-South 2 (OGDS2) to address the geotechnical design considerations for Retaining Wall-15 (RW-15) to be constructed within the Interstate-5 (I-5)/Genesee Avenue Improvement Project, in the City of San Diego, San Diego County, California hereafter referred to as the project. Figure 1 depicts the project location and an aerial photograph of the project site.

The purpose of this FR is to document subsurface geotechnical conditions, provide engineering evaluation of site conditions, and to provide recommendations relevant to the design and construction of RW-15. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. The geotechnical information, evaluations, recommendations, and advisories contained in this FR supersede any information that may have been previously conveyed through correspondences or documents concerning the retaining wall addressed herein.

The geotechnical investigation consisted of site reconnaissance, research of archived resources, subsurface exploration, engineering analyses, and retaining wall design. A list of documents utilized to prepare this FR is contained in Section 16.0. All elevations referenced in this report are in feet and referenced to the NAVD88 vertical datum. Unless otherwise noted, all stations are referenced to the SD-5 Line.

This FR was prepared in accordance with the guidelines set forth in the *Caltrans: Foundation Report Preparation for Retaining Walls, July 2010*. No Structure Preliminary Geotechnical Report (SPGR) and/or Preliminary Foundation Report (PFR) for RW-15 were prepared prior to the preparation of this FR.

2.0 PROJECT DESCRIPTION

The project, between Post Mile (PM) R28.6 and R30.5, is encompassed by the much larger I-5 North Coast Corridor Widening Project, EA 11-235800/EFIS 1100000159, between PM R28.4 and R55.3. Features constructed for the project are generally configured to accommodate the freeway expansion and ultimate footprint of the I-5 North Coast Corridor Widening Project. This FR is applicable to the segment of the I-5 North Coast Corridor Widening Project that coincides with the project limits.

The project will widen the Genesee Avenue Overcrossing (OC), widen adjoining portions of Genesee Avenue, and reconfigure adjoining freeway lanes and ramps between Post Mile (PM) R28.6 and R30.5. Numerous retaining walls, including RW-15, are necessary to accommodate the I-5/Genesee Avenue Improvement Project and the associated features. RW-15 is proposed to be a Geosynthetic Reinforced Earth (GRE) Retaining Wall. RW-15 is located north of Genesee Avenue along and parallel to southbound I-5. A discussion of the wall type selection is provided in Section10.0.

RW-15 will be located between Station 1603+75 and Station 1621+50 “SD-5 Line”. The retaining wall will be approximately one thousand seven hundred ninety three-feet (1793ft) in length, with a maximum height of approximately thirty two-feet (32ft). Figure 1 depicts the approximate locations and alignment of RW-15 in plan view. Figure 2A and Figure 2B are the layout sheets utilized in the preparation of this FR as provided by the project design staff that includes Caltrans District 11 Design and Kimley Horne and Associates (KHA). Figure 3 is the profile sheet provided by the project design staff and utilized in the preparation of this FR. Illustrative cross sections perpendicular to the wall alignments are shown in Figure 4A through Figure 4D. These cross sections represent the most severe cases of wall and slope geometry.

Current preliminary plans indicate that RW-15 will be permanently buried by embankment placed for the ultimate footprint of the I-5 North Coast Corridor Widening Project.

3.0 AS-BUILT FOUNDATION DATA

The north end of RW-15 will be located approximately one thousand four hundred seventy five-feet (1475ft) to the north of the Genesee Avenue OC. The LOTB for the overcrossings include information relevant to the soil conditions near the project site. LOTB for the Genesee Avenue OC are included in Appendix I. The construction of RW-15 will not affect the Genesee Avenue OC bridge foundations.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

A subsurface investigation was conducted in December 2008. Three (3) boring were developed for RW-15. The naming convention used for the boring records includes the boring method, the two digit year, and the approximate center line Station along the metric preliminary exploration plan, followed by the notation R or L indicating that the boring was to the right or left of the 11-SD-5-line Station. For example, boring R-07-49175L is a rotary boring conducted in 2007 that was developed to the left of approximate metric Station 491+75 along the 11-SD-5-line. Metric Stationing was utilized because the subsurface investigation was performed prior to Caltrans transition back to U.S. Customary Units. The approximate locations of the borings are depicted in Figure 2A and Figure 2B. The metric plans referenced for the development of the boring records are not included in this report. LOTB for R-07-48720L, R-07-48920L, and R-07-49175L are included in Appendix II.

Limited geologic mapping of the project site was conducted as necessary to verify previously mapped site geology and to determine the extent of previously unmapped fill thereby delineating the soil conditions anticipated to impact the design and construction of the retaining walls.

The request for the survey of the project exploratory borings and the subsequent survey notes provided to OGDS2 by District 11-Office of Land Surveys are included in Appendix II.

5.0 LABORATORY TESTING PROGRAM

Corrosion data provided by the laboratory for the project are presented in Appendix III.

Laboratory test data including grain size analysis, plasticity index, and direct shear for the project are included in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site geology was interpreted based on previous field investigations, current field investigation, geotechnical archives, as-built documents, and published reports.

The project site geologic overview map is displayed in Figure 5. The map is a modified version of the *California Division of Mines and Geology, Geology of the San Diego Metropolitan Area, California: Del Mar 7/12 Minute Quadrangles, Kennedy, 1975.* The map depicts an overview of the geologic formations present along the highway cut slope at the proposed project site and surrounding area. The modifications to the map, in particular the project location inset, display the approximate locations of the proposed retaining walls and the extent of fill mapped by OGDS2. Figure 6 depicts a profile of the geology beneath the existing grade along the retaining wall alignment. Figure 7A through Figure 7D depicts geologic cross sections along the RW-15 alignment.

Topography and Geology

The project site lies within the coastal plain section of the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are a group of mountain ranges that extend nine-hundred-miles (900mi) from the Transverse Ranges and the Los Angeles Basin in Southern California to the southern tip of Mexico's Baja California (Wikipedia 1). The southern segment of the Peninsular Ranges in Southern California is referred to as the San Diego Embayment. The San Diego Embayment consists of thick sequences of marine and non-marine sediments. The sedimentary rocks within the San Diego

Embayment form an eastward thinning wedge of continental margin deposits that extend from Oceanside to the US-Mexico border.

The project site topography may be described as a somewhat planar, coastal, terrace dissected by incised canyons. I-5 is constructed on a north/south trending depressed through cut of the terrace. The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above mean sea level (MSL).

Soil and Rock

Fill slopes currently exist along the proposed retaining wall alignment. RW-15 will be constructed within artificial fill over a thin layer of alluvium and sedimentary formation.

The geologic units in the project area and depicted in Figure 5 may generally be described as follows:

- Artificial Fill (Qaf): Artificial fills in the project area appear to be medium dense engineered fills derived from material excavated from nearby cuts in the sandstone and siltstone.
- Alluvium/Slope Wash (Qal/Qsw): Poorly consolidated silt, clay, sand and gravel. Alluvium/Slope Wash is primarily soft to loose and located in or near drainages.
- Landslide Deposits (Qls): Landslide deposits are derived from underlying Scripps Formation and Ardath Shale.
- Linda Vista Formation (Qln): The Linda Vista Formation is a reddish-brown sandstone and conglomerate consisting of nearshore marine, beach, and nonmarine deposits. Ferruginous cement, mainly hematite, gives the formation the reddish-brown color and resistant ledgy nature. The Linda Vista Formation is depicted on the geologic map but was not encountered along the retaining wall alignment.
- Scripps Formation (Tsc): The Scripps Formation consists of yellow brown to gray silty to clayey sand, interbedded with clay and silt. Deposits within the formation include gravel lenses that can be several feet thick. (Kleinfelder, 2006). Kennedy describes the Scripps Formation as consisting of pale yellowish-brown, medium-grained, sandstone and occasional cobble-conglomerate interbeds. The Scripps Formation conforms to the Ardath Shale.
- Ardath Shale (Ta): The Ardath Shale is predominantly weak fissle, olive-gray shale. Concretionary beds containing molluscan fossils are common. It grades alternatingly and conformably into the overlying Scripps Formation. (Kennedy, 1975)

Faulting

The sedimentary formations found along coastal San Diego are generally flat lying and laterally continuous for large distances. However, the area around I-5 and Genesee Avenue is complicated by deformation and offset that has occurred along ancient faults. Faults cross I-5 to the south and north of the Genesee Avenue OC. Between La Jolla Village Drive and Sorrento Valley, several fault blocks have been up-lifted and down-dropped relative to one another. A northwest plunging anticline exists between Voight Drive and Genesee Avenue. The limbs of the anticline dip five-degree (5°) to the southwest and twenty-five-degree (25°) to the northeast. Because of the relative movement between these geologic structures, the sedimentary strata in the project area display more abrupt changes in lateral continuity than elsewhere along coastal San Diego.

No active faults have been identified that transect the project site. Figure 5 depicts faults in the project area. Figure 8A and Figure 8B depict the City of San Diego, Seismic Safety Study Geologic Hazards and Faults for the project site. These maps depict several potentially active, inactive, presumed inactive, or activity unknown faults within or in the vicinity of the project site.

An inactive fault has not ruptured in the past one million six hundred thousand-years (1.6mil-yr). In general the inactive faults in the region offset the Eocene-aged (55.8±0.2 to 33.9±0.1 million years ago) Scripps Formation and Ardath Shale, but not the Pleistocene-aged (2.588 million to 12,000 years ago) Linda Vista Formation.

The named inactive faults at the project site include the Salk Fault, which is located approximately fifteen hundred-feet (1,500ft) to the north of the Genesee Avenue OC, and the Torrey Pines Fault, which is below the Genesee Avenue OC. Both of these faults are east west trending, high-angle, normal faults. There is an un-named inactive east-west trending fault approximately thirty-six hundred-feet (3,600ft) to the north of the Genesee Avenue OC. Additionally, one or more un-named short inactive faults cross the RW-15 and the I-5 north coast corridor widening project retaining wall alignments.

A potentially active fault has not ruptured in the past eleven thousand-years (11,000yr), but has ruptured in the past one million six hundred thousand years (1.6mil-yr). A potentially active, southwesterly-trending, not formally named fault in the region is the Powers Fault. This fault is described in the *UCSD Long Range Development Plan (LRDP) September 2004*; the *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project, San Diego California, prepared by Ninyo & Moore, December 2007 (EA 11-022330)*; and the *Caltrans, Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction, January 2009 (EA 11-06500)*. The Powers Fault potentially extends from the southwest corner of the Genesee Avenue OC under the UCSD campus and under the Scripps Institution of Oceanography. Figure 9 was acquired from the UCSD LRDP and depicts the geologic formations and faults on the UCSD campus, including the Powers Fault. The Powers Fault is not depicted in Figures 8A and 8B.

The closest regional active fault to the project site is the Newport Inglewood Rose Canyon Fault System running on a north-northwest trend and located offshore roughly two-miles (2.0mi) to the west. Data pertaining to the regional active faults are included in Table 1. There is a potential that regional earthquakes will produce ground motion at the project site due to the proximity of active and potentially active faults.

Pertinent Soil Conditions or Geologic Hazards

The wall alignment is underlain by engineered fill, thin layer of alluvium, and sedimentary formation with no significantly unfavorable or adverse structure. Adverse conditions such as sanitary landfill, collapsible soils, or expansive soils have not been observed along the proposed alignment of RW-15.

Landslides are commonly associated with the Ardath Shale where expansive claystone locally comprises as much as twenty-five-percent (25%) of the geologic unit. Expansive claystone was not observed along the alignments of RW-15. Landslides are not anticipated to be a geologic hazard at the wall locations.

Zones of loosely compacted embankment beneath the wall alignment were revealed during the exploration program. The foundation soils may settle from one to four-inches (1-4in) during wall construction.

Depth to Bedrock

Based on observations made during the subsurface investigation artificial fill up to seventy-feet (70ft) in depth is located along the alignment of RW-15. The artificial fill currently runs parallel to a small canyon that runs along the west side of I-5. The depth of artificial fill varies along the length of the retaining wall. Based on topographic maps and the subsurface investigation, the depth of the fill decreases to the north along the RW-15 alignment.

Groundwater

Groundwater was not encountered during the subsurface investigation. No seeps or springs were identified at the project site during the field investigation.

7.0 SCOUR EVALUATION

RW-15 is located on a slope above a low land that hosts a concrete lined highway drainage channel. A scour evaluation for the retaining walls is not applicable to this project.

8.0 CORROSION EVALUATION

Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

None of the conditions considered to make the site soils corrosive were present in the onsite samples collected and analyzed for the project. Therefore, the site soils are considered non-corrosive.

9.0 SEISMIC EVALUATION

This section includes the seismic study and addresses ground motion, soil liquefaction, surface fault rupture potential, seismic settlement, and seismically induced slope instability of the project site. The Caltrans Acceleration Response Spectra (ARS) Online Tool Version 1.0.4 (Caltrans ARS Online Tool) was used to determine pertinent seismic data. The Caltrans ARS Online Tool is a web based tool that calculates both deterministic and probabilistic ARS for any location in California based on the criteria set in *Caltrans, Seismic Design Criteria (SDC) Version 1.6, November 2010, Appendix B*.

According to the *Seismic Design Criteria (SDC)Version 1.6, November 2010 Appendix B, Figure B.12*, Soil Profile Type C has Standard Penetration Test (SPT) results with the number of blows per twelve-inches (12in) greater than fifty (N>50). Soil Profile Type D has SPT results with the number of blows per twelve-inches (12in) greater than/or equal to fifteen and less than fifty ($15 \leq N < 50$).

The three (3) borings developed along the alignment of the proposed future retaining wall and RW-3 consistently had SPT results that ranged from as low as eight (8) to as high as forty-one (41) blows per twelve-inches (12in) in artificial fill and greater than fifty (50) blows per twelve-inches (12in) in sedimentary formation. Therefore, as defined in the Appendix B of the SDC, the appropriate Soil Profile Type is C for sedimentary formation and D for artificial fill.

The latitude and longitude input into the Caltrans ARS Online Tool were 32.884777 and –117.22703, respectively. The shear wave velocity used in the Caltrans ARS Online Tool was three hundred and sixty-meters per second (360m/s), which correspond to Soil Profile Type D. The shear wave velocity for soil profile Type D was used to obtain the most conservative results. The closest regional active fault as indicated by the Caltrans ARS Online Tool is the Newport Inglewood Rose Canyon Fault. Data pertaining to the regional active faults are provided in Table 1.

Based on the results produced by the Caltrans ARS Online Tool, the anticipated Peak Ground Acceleration (PGA) for the project site is forty five one hundredths-gravity (0.45g). The PGA corresponds to the Spectral Acceleration at a period of zero-seconds (0sec). The horizontal acceleration factor (K_h) used for design was one-third (1/3) the PGA developed for the site or approximately fifteen one hundredths (0.15). The results produced by the Caltrans ARS Online Tool and the Caltrans ARS Online Tool QA/QC Checklist are included in Appendix IV.

The retaining walls are located within sedimentary formation and compact artificial fill well above any groundwater table. There is no potential for liquefaction at the project site.

Earthquakes caused by movement along nearby active faults are likely to result in ground motion impacting project features. However, since no active faults transect the project site, there is no potential for surface fault rupture.

The approximate elevation of I-5 at the project site is two hundred and sixty-feet (260ft) above MSL. There is no potential for the project site to be impacted by a tsunami.

The retaining walls will be constructed atop dense sedimentary formation and compact fill. There is little potential for seismically induced settlement.

Features that would create a potential for seismically induced instability in the form of landslides, mudslides, and/or rockslides as it relates to the safety and performance of the retaining walls do not exist at the project site.

Pseudo-static modeling and slope stability analyses were conducted to assure that the retaining walls will meet stability requirements in a seismic event. Stability analyses are discussed in Section 10.0.

10.0 WALL SELECTION AND STABILITY EVALUATION

RW-15 will be developed on the slope of an existing I-5fill embankment. The retaining wall will allow for the widening of I-5 and the addition of a bike path. Retaining walls suitable for fill situations such as Caltrans Standard retaining walls, Mechanically Stabilized Earth (MSE) retaining walls, and GRE retaining walls are considered feasible. Self-shoring, top-down stage construction retaining wall systems such as a soil nail and ground anchor walls are not applicable to placement of additional embankment fill. A temporary back cut to facilitate the construction of a retaining wall is feasible, though shoring may be needed to lessen the impact on southbound I-5.

Caltrans Standard retaining walls and MSE retaining walls require the use of select backfill that is not available on-site. The proposed GRE wall will utilize on site material as backfill and is therefore the most economical retaining wall system available. The GRE retaining wall system will also accommodate anticipated ground settlement without the need for remedial grading of foundation soils. The retaining wall design parameters as provided by the project development team and in the project plans are included in Table 4A and Table 4B.

The GRE wall design and global slope stability analyses for RW-15 were performed using STEDWIN with GSTABL7 v2.0 and MSEW v3.0. Internal, global, and mixed stability were evaluated by modeling various wall heights and adjoining slopes. The bearing capacity, overturning, sliding and reinforcement pullout were evaluated for various wall height. Both static and pseudo-static stability analyses were conducted for each wall and slope configuration. The influence of transient loads was modeled as a distributed vertical load of two hundred forty-pounds per square foot (240psf). The GRE backfill soil strength design parameters utilized in the analyses are presented in Table 3. The basis for the selection of the soil strength parameters was archived data, field test results, and engineering experience and judgment. It is anticipated that soil generated from project cuts will meet or exceed design soil strength parameters. GRE design parameters utilized in the analyses are presented in Table 4A and Table 4B. The graphic results of the stability analyses are presented in Appendix IV. The need to satisfy global slope stability criteria was found to control the design of the geosynthetic reinforcement.

11.0 FOUNDATION RECOMMENDATIONS

OGDS2 recommends that RW-15 be designed and constructed as a GRE retaining wall.

The parameters that may be used for GRE wall design are presented in Table 4A through Table 5.

The recommended length of geosynthetic reinforcement, the design strength of the geosynthetic reinforcement, and the vertical spacing of the geosynthetic reinforcement are provided in Table 4A and Table 4B.

12.0 NOTES TO DESIGNER

The project site soils are considered non-corrosive.

The design of the retaining walls should incorporate a gravel drainage system similar to those found in on MSE walls. An example drainage system is presented in Figure 10.

Surface runoff should be controlled so as to not erode or otherwise adversely affect soil above or below the retaining wall.

The placement of bioswales or other water detention features that may promote the infiltration of surface water in the vicinity of the retaining wall should be avoided. Features that promote infiltration could have an adverse impact on the performance of the retaining wall.

The temporary GRE retaining wall facing will consist of ten-foot (10ft) long by one and one-half foot (1.5ft) high by one and one-half foot (1.5ft) deep galvanized L-shaped wire basket. The basket will have a maximum opening size of four-inches (4in) by four-inches (4in). L-shaped baskets will have supporting cross struts placed every 1.5 feet along there length. L-shaped baskets should overlap one another by four-inches (4in) and a cross strut should be placed at the overlap and around the top and bottom wire of both baskets. L-shape basket will be positively connected to geogrid. The lengths of the geogrid and the vertical spacing of the geogrid are presented in Table 4B. The L-shaped basket will be lined with filter fabric and backfilled with free draining, non-corrosive sand or gravel. If the free draining material is gravel then filter fabric will be placed between the free draining material and the backfill.

The design of RW-15 assumes the use of onsite borrow material generated form project cut slopes can be utilized as backfill.

Wall facing anchors and facing may be designed to be similar to soil nails and soil nail wall facing. The wall facing may be cantilevered up to two and one-half-feet (2.5ft) at the top of wall to accommodate the sloping wall profile.

Permanent GRE retaining wall facing may consist of either sculpted shotcrete or cast-in-place concrete. Sculpted shotcrete is typically the more economical method. Parameters for the design of the permanent facing and anchors are presented in Table 5. (FHWA-HRT-11-027, 2011)

13.0 CONSTRUCTION CONSIDERATIONS

The artificial fill found along the alignment of RW-15 may be excavated using standard excavation equipment.

The occurrence of groundwater is not anticipated to impact retaining wall construction.

Temporary cut slopes proposed by the Contractor should follow the guidelines set forth in the Caltrans Trenching and Shoring Manual and the project Geotechnical Design Report. The estimated soil strength parameters presented in Table 3 should be utilized by the contractor to perform any required engineering analyses of proposed temporary slope configurations. The acceptable minimum factor of safety criteria for the stability analyses of a temporary cut slope is 1.2.

The temporary face of RW-15 should be constructed at a batter of thirty six vertical to one horizontal (36v:1h). This batter requires that each successive one and one-half foot (1.5ft) lift be set back one-half inch (0.5 in). The batter will allow for the outward deflection of the temporary GRE retaining wall facing during construction. (No. FHWA-NHI-10-024, 2009)

All geosynthetic reinforcement fabric should be place taut and remain taut during the backfill process. Spreader bars or other mechanical means of insuring the geosynthetic reinforcement remains taut should be employed during construction.

If the facing anchor system is utilized to stabilize form work for cast-in-place facing, the forces applied to the anchor during the casting of the facing should not exceed the maximum capacity of the anchor. The maximum capacity of the facing anchor is presented in Table 5.

The contractor will need to develop a large enough working bench along the top of the wall to facilitate the installation of the final wall facing. Most of the embankment fill slope above the GRE retaining wall should be placed and a settlement waiting period of sixty-days (60days) should be observed before applying the permanent facing. It will be necessary to allow a portion of the fill slope to be placed later in order to provide a working bench for construction equipment.

14.0 EXCEPTIONS TO POLICY

The naming convention used for the exploratory borings and the slope logs performed, as well as the corrosion samples collected for this project are a Department approved exception to the *Caltrans, Soil and Rock Logging, Classification, and Presentation Manual June 2010*. The exception approval is included in Appendix V. The naming convention utilized is described in Section 4.0.

The number of exploratory borings performed for the investigation of the site is less than what is prescribed by generic guidelines offered by the Federal Highway Administration and others. The number of exploratory borings performed was judged to be sufficient to accurately characterize the prevailing soil conditions due to abundant geologic exposures available by inspection of the existing cut slope and the lateral continuity of the sedimentary formation that will host the retaining wall.

15.0 ACTUAL VS. REPORTED SITE CONDITIONS

The recommendations contained in this report are based on specific project information regarding structure type and locations that have been provided to OGDS2. If any changes are made to the project features addressed herein, OGDS2 should review those changes to determine if these foundation recommendations are still applicable.

The information used to characterize the geotechnical conditions in this area was gathered from project plans, pertinent maps, geologic literature, archived reports, field reconnaissance, subsurface investigation, testing, and engineering analyses. Project design features may change, and localized soil conditions encountered during construction grading and excavation may vary from those described in this report. If suspected differing site conditions are encountered during construction, or if construction difficulties related to soil conditions are encountered, a representative of OGDS2 should be consulted to assist with the assessment of the prevailing geotechnical conditions and to assist in formulating appropriate strategies to facilitate project completion.

Any questions regarding the above recommendations should be directed to the attention of Mike Fordham, (858) 467-3290 or Brian Hinman, (858) 467-4051.

16.0 REFERENCES

California Division of Mines and Geology, *Geology of the San Diego Metropolitan Area, California: Del Mar, La Jolla, Poway, and SW1/4 Escondido 7/12-Minute Quadrangles*, Bulletin 200, 1975

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Caltrans, *Geotechnical Design Report, Auxiliary Lane Southbound Interstate-5 Off Ramp to Genesee Avenue and Landslide Buttress Construction*, EA 11-06500, January 2009

Caltrans, *Geotechnical Services Design Manual*, Version 1.0, August 2009

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Caltrans, *Seismic Design Criteria, Version 1.6, Appendix B*, November 2010

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FHWA, *Manual for Design and Construction Monitoring of Soil Nail Walls*, Publication No. FHWA-SA-96-069R

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Ninyo & Moore, *Updated Geotechnical Evaluation Interstate-5/Genesee Avenue Interchange Reconstruction Project*, San Diego California, (EA 11-022330), December 2007

PBS&J, *University of California San Diego Long Range Development Plan, Final Environmental Impact Report*, September 2004

U.S. Department of Transportation, Federal Highway Administration, *Geosynthetic Reinforced Soil Integrated Bridge System Synthesis Report,* Publication No. FHWA-HRT-11-027, January 2011

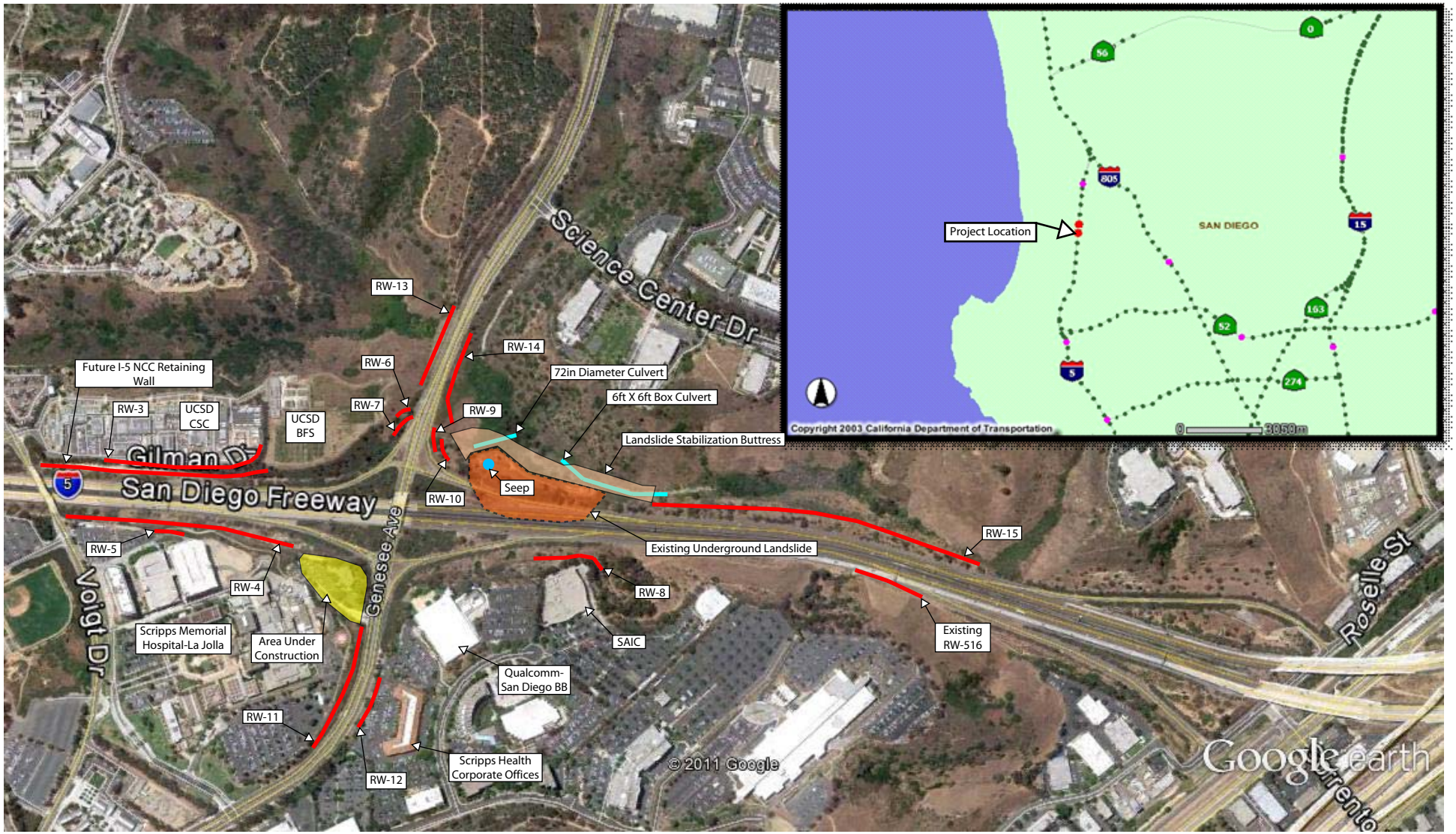
National Highway Institute, *Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I,* NHI Courses No. 132042 and 132043, Publication No. FHWA-NHI-10-024 FHWA GEC 011 – Volume I, November 2009

Wikipedia 1: http://en.wikipedia.org/wiki/Peninsular_Ranges

Wikipedia 2: http://en.wikipedia.org/wiki/Eocene

Wikipedia 3: http://en.wikipedia.org/wiki/Pleistocene

FIGURES



Google earth

feet 5000

km 1

Note: The locations, alignments, and lengths of the retaining walls; the location of the seep; the location, length, and alignment of the landslide stabilization buttress, the location and area of the landslide are approximated.

FIGURE 1: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	18	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

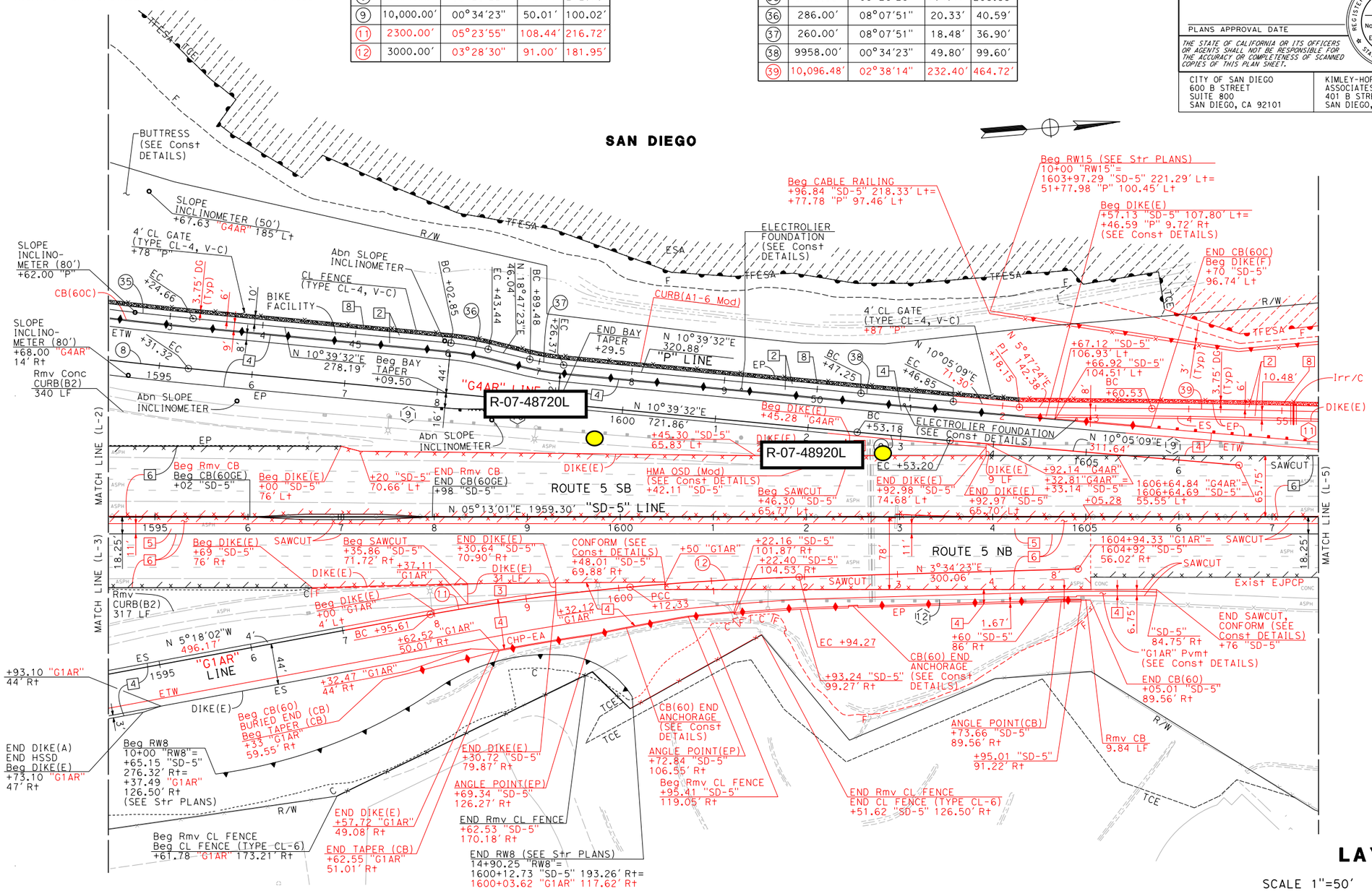
FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

CURVE DATA

No.	R	Δ	T	L
8	3500.00′	03°28′22″	106.11′	212.15′
9	10,000.00′	00°34′23″	50.01′	100.02′
11	2300.00′	05°23′55″	108.44′	216.72′
12	3000.00′	03°28′30″	91.00′	181.95′

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
35	3446.00′	03°28′23″	104.47′	208.88′
36	286.00′	08°07′51″	20.33′	40.59′
37	260.00′	08°07′51″	18.48′	36.90′
38	9958.00′	00°34′23″	49.80′	99.60′
39	10,096.48′	02°38′14″	232.40′	464.72′



LAYOUT L-4

SCALE 1″=50′

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN | CHECKED BY: CASEY L. LEWIS

REVISED BY | DATE REVISED

LAST REVISION 01-31-14 | DATE PLOTTED => 2/20/2014 | TIME PLOTTED => 7:35:20 PM

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FIGURE 2A: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	19	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

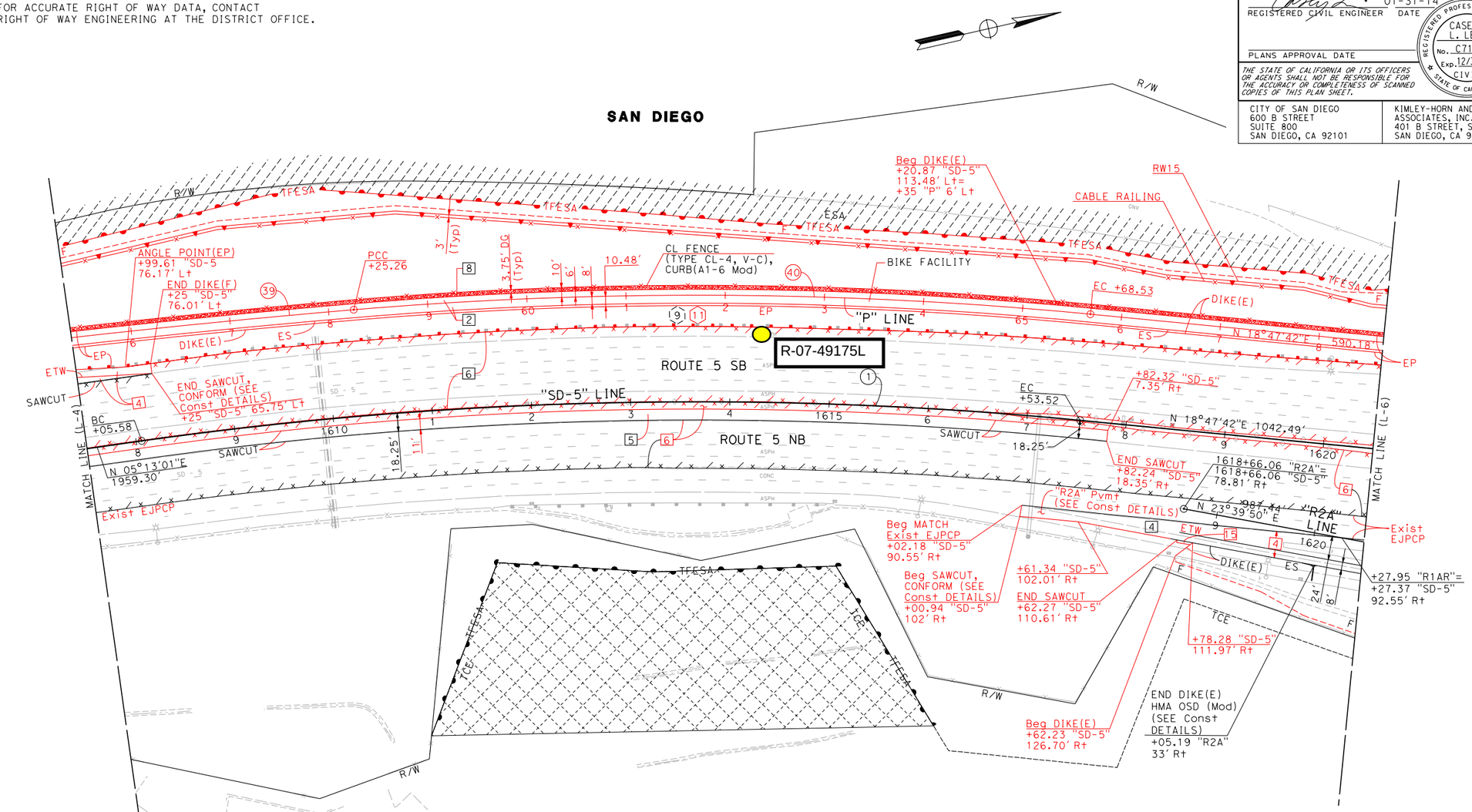
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



CURVE DATA

No.	R	Δ	T	L
1	4000.00'	13°34'41"	476.20'	947.94'

CURVE DATA ("P" LINE)

No.	R	Δ	T	L
39	10,096.48'	02°38'14"	232.40'	464.72'
40	4107.48'	10°22'05"	372.65'	743.27'

LAYOUT

SCALE 1"=50' **L-5**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: GREGORY ZEITOUNIAN

CHECKED BY: CASEY L. LEWIS

REVISED BY / DATE REVISED

LAST REVISION 01-31-14

DATE PLOTTED => 2/20/2014
TIME PLOTTED => 7:35:24 PM

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FIGURE 2B: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R29.1/R30.5	20	964

REGISTERED CIVIL ENGINEER 01-31-14 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER CASEY L. LEWIS No. C71492 Exp. 12/31/15 CIVIL STATE OF CALIFORNIA

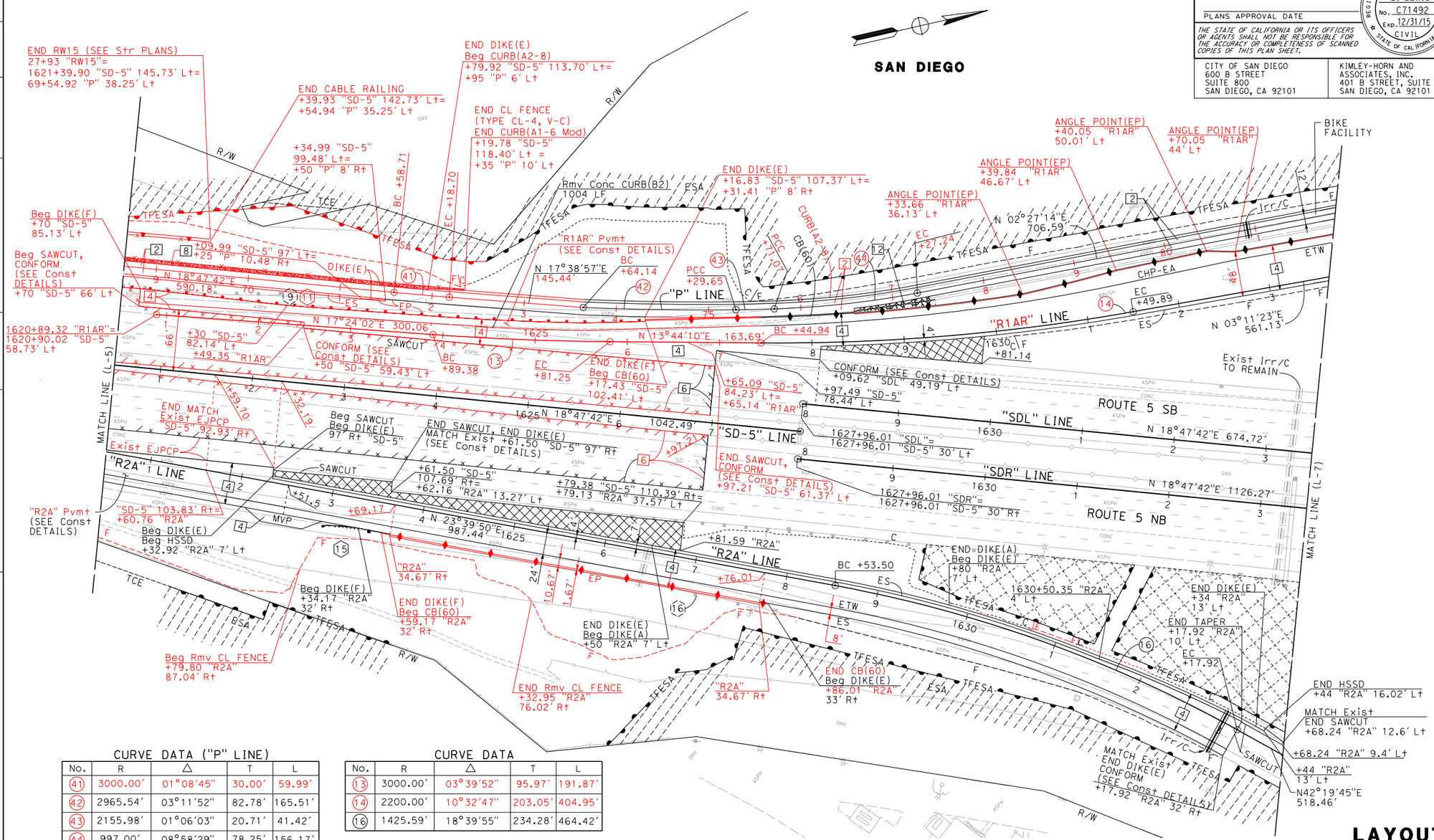
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CITY OF SAN DIEGO
600 B STREET
SUITE 800
SAN DIEGO, CA 92101

KIMLEY-HORN AND ASSOCIATES, INC.
401 B STREET, SUITE 600
SAN DIEGO, CA 92101

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



CURVE DATA ("P" LINE)

No.	R	Δ	T	L
41	3000.00'	01°08'45"	30.00'	59.99'
42	2965.54'	03°11'52"	82.78'	165.51'
43	2155.98'	01°06'03"	20.71'	41.42'
44	997.00'	08°58'29"	78.25'	156.17'

CURVE DATA

No.	R	Δ	T	L
13	3000.00'	03°39'52"	95.97'	191.87'
14	2200.00'	10°32'47"	203.05'	404.95'
16	1425.59'	18°39'55"	234.28'	464.42'

LAYOUT L-6

SCALE 1"=50'

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MICHAEL S. ROSS

CALCULATED-DESIGNED BY: CASEY L. LEWIS

CHECKED BY: GREGORY ZEITOUNIAN

REVISED BY / DATE REVISED

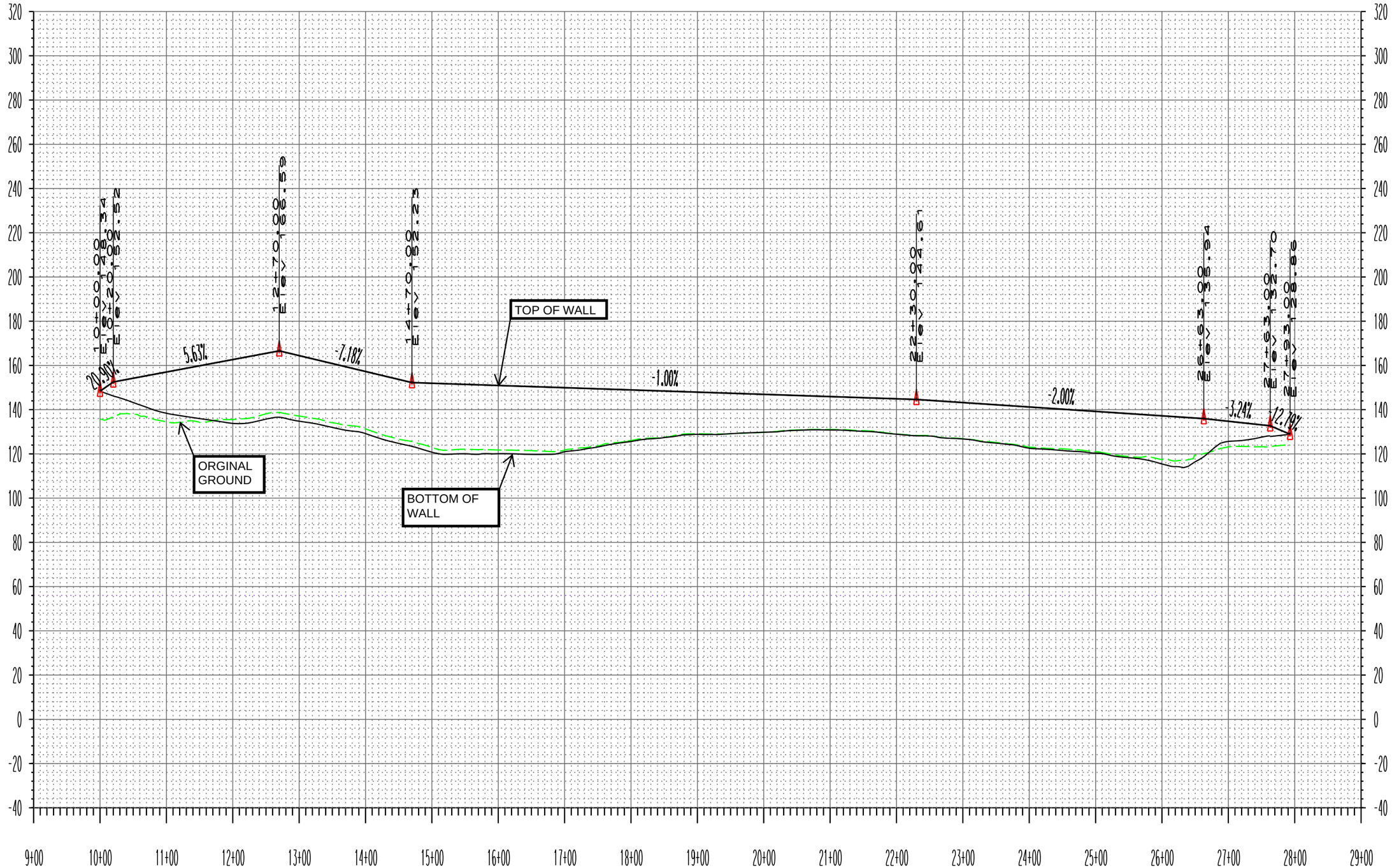
LAST REVISION 01-31-14

DATE PLOTTED => 2/20/2014
TIME PLOTTED => 7:35:26 PM

BORDER LAST REVISED 07/02/10 | USERNAME => greg.zeitounian DGN FILE => 1112000102ea006.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 2771 | PROJECT NUMBER & PHASE 11120000102I

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

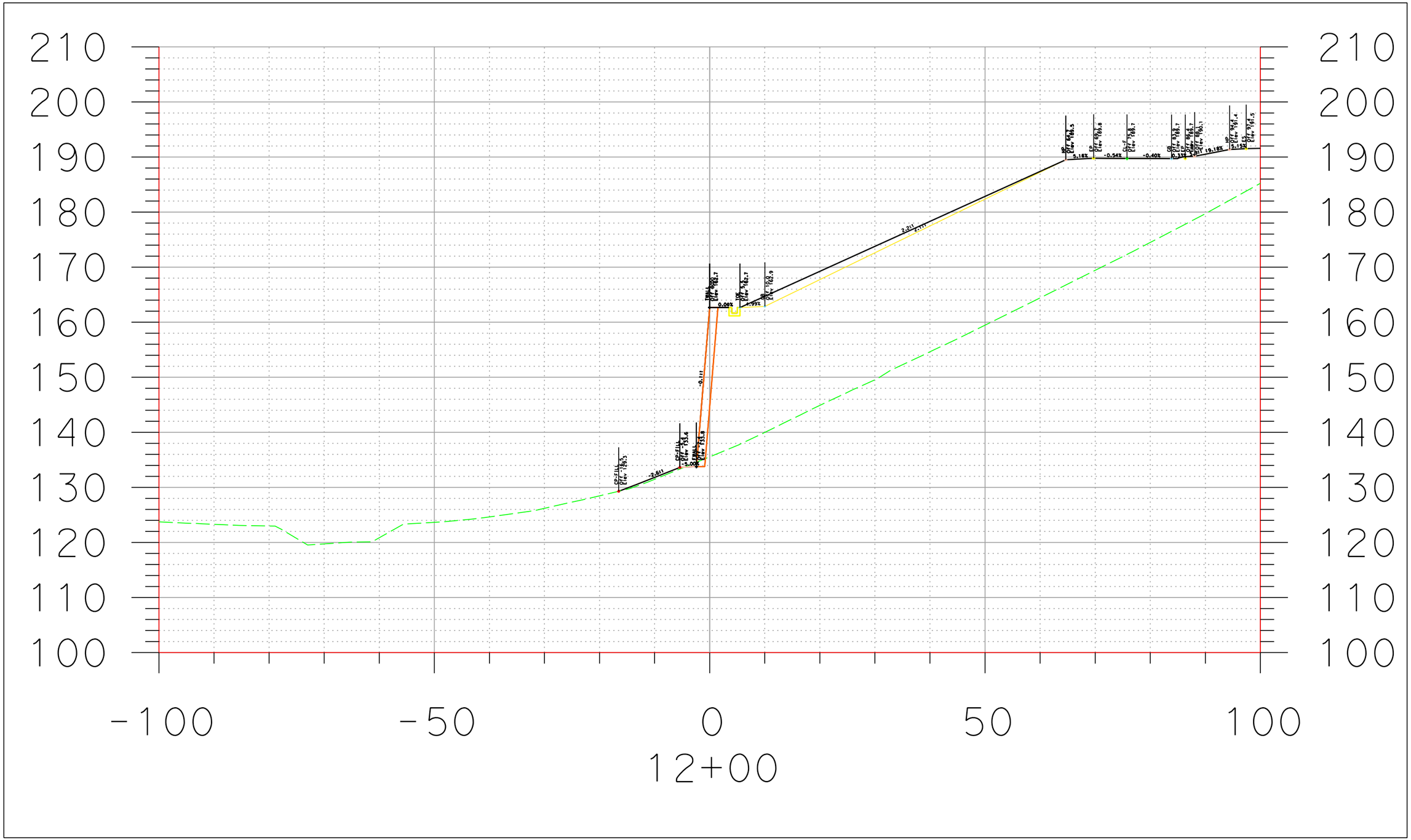
FIGURE 2C: PROJECT LOCATION MAP AND AERIAL PHOTOGRAPH



Wall15 XSec_Contours_Profile_Plan_RWxscExtend.dgn 2/21/2014 12:39:42 PM

Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

FIGURE 3: PROJECT PROFILE



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Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

FIGURE 4A: PROJECT CROSS SERCTION

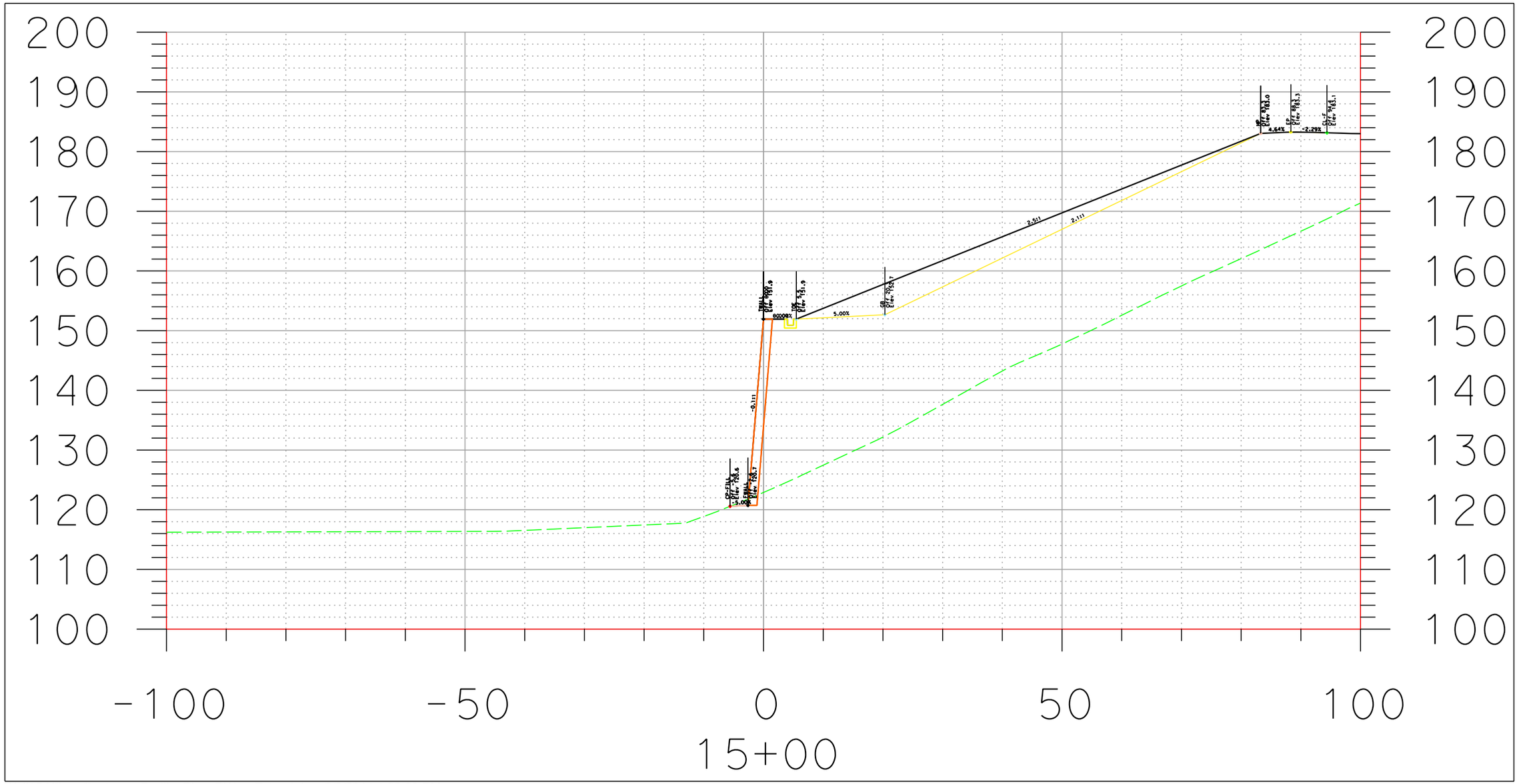

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FIGURE 4B: PROJECT CROSS SERCTION

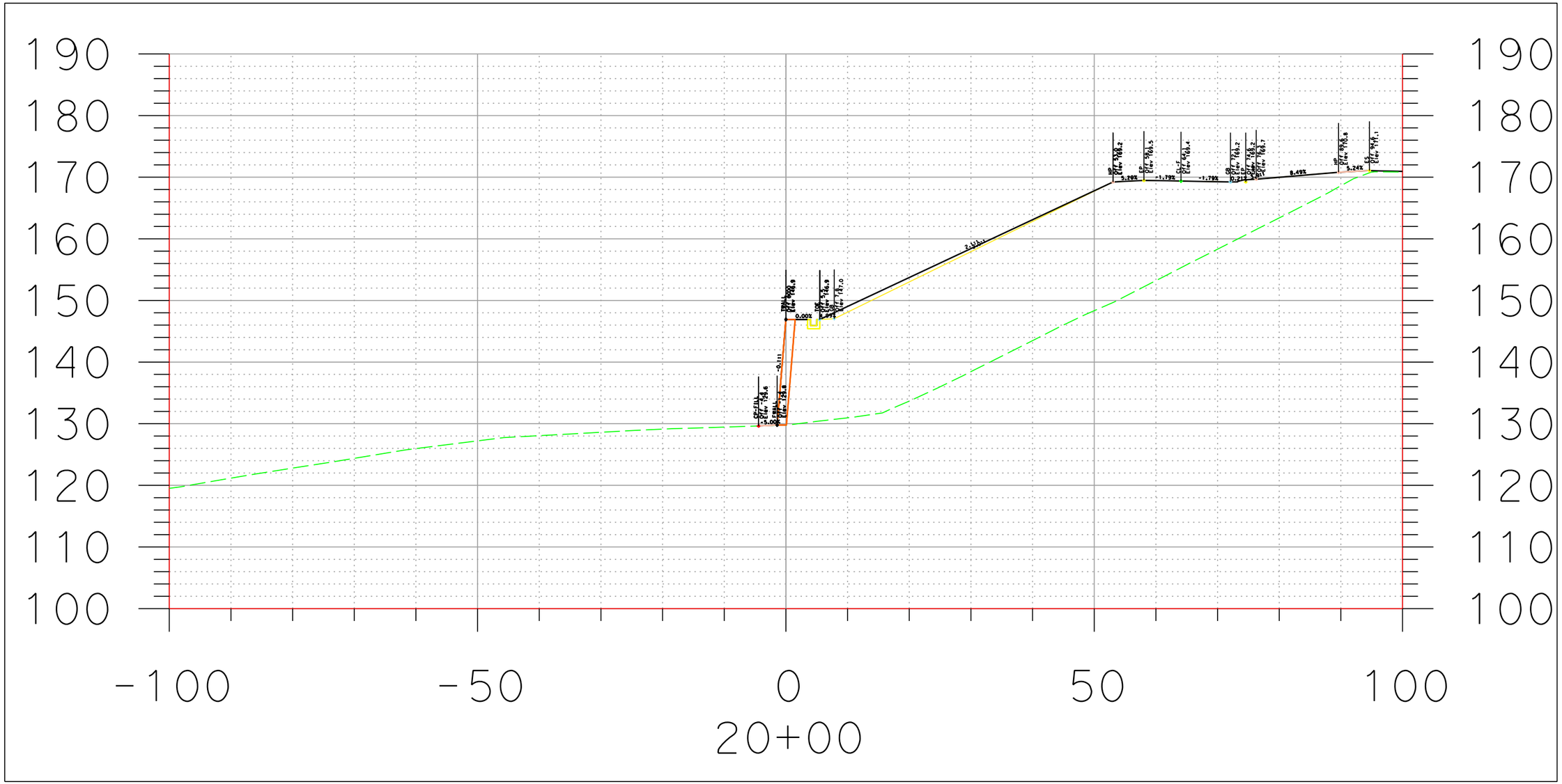

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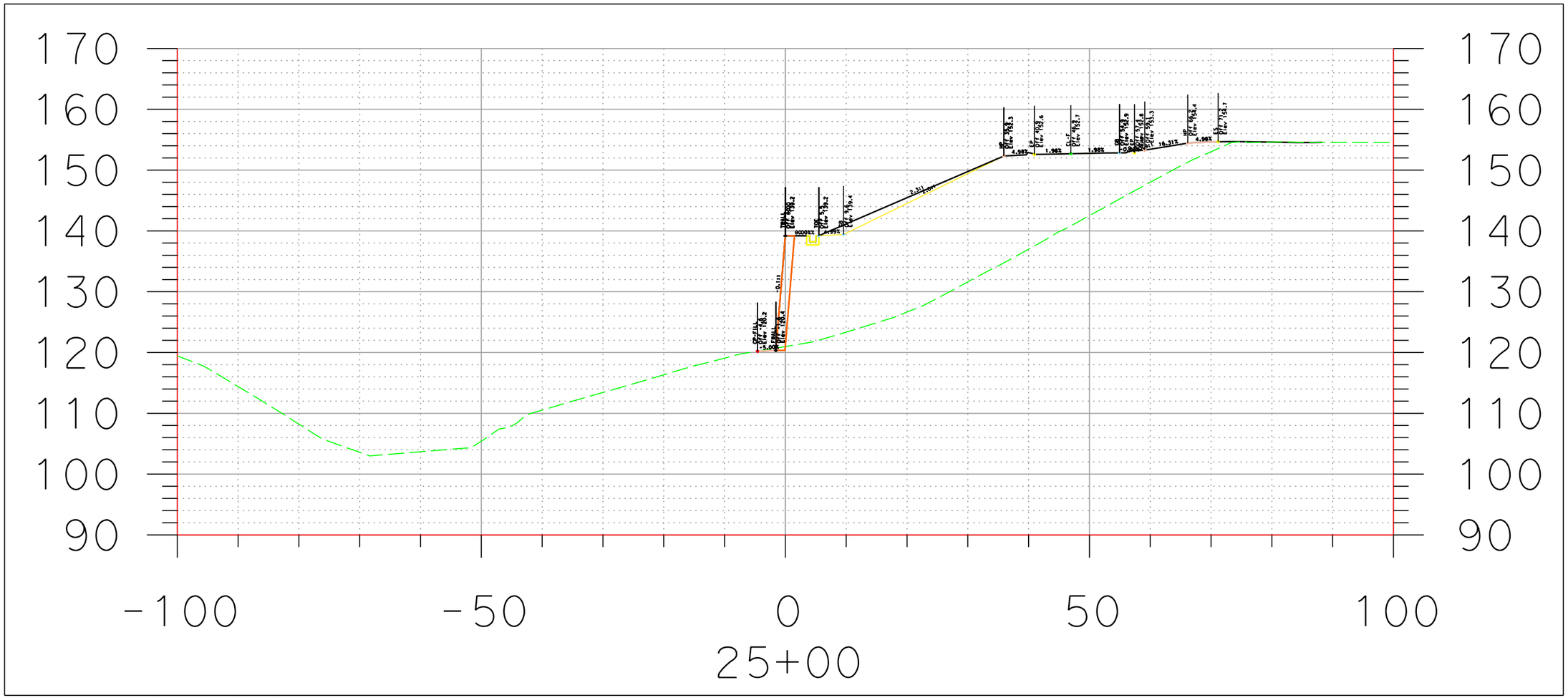
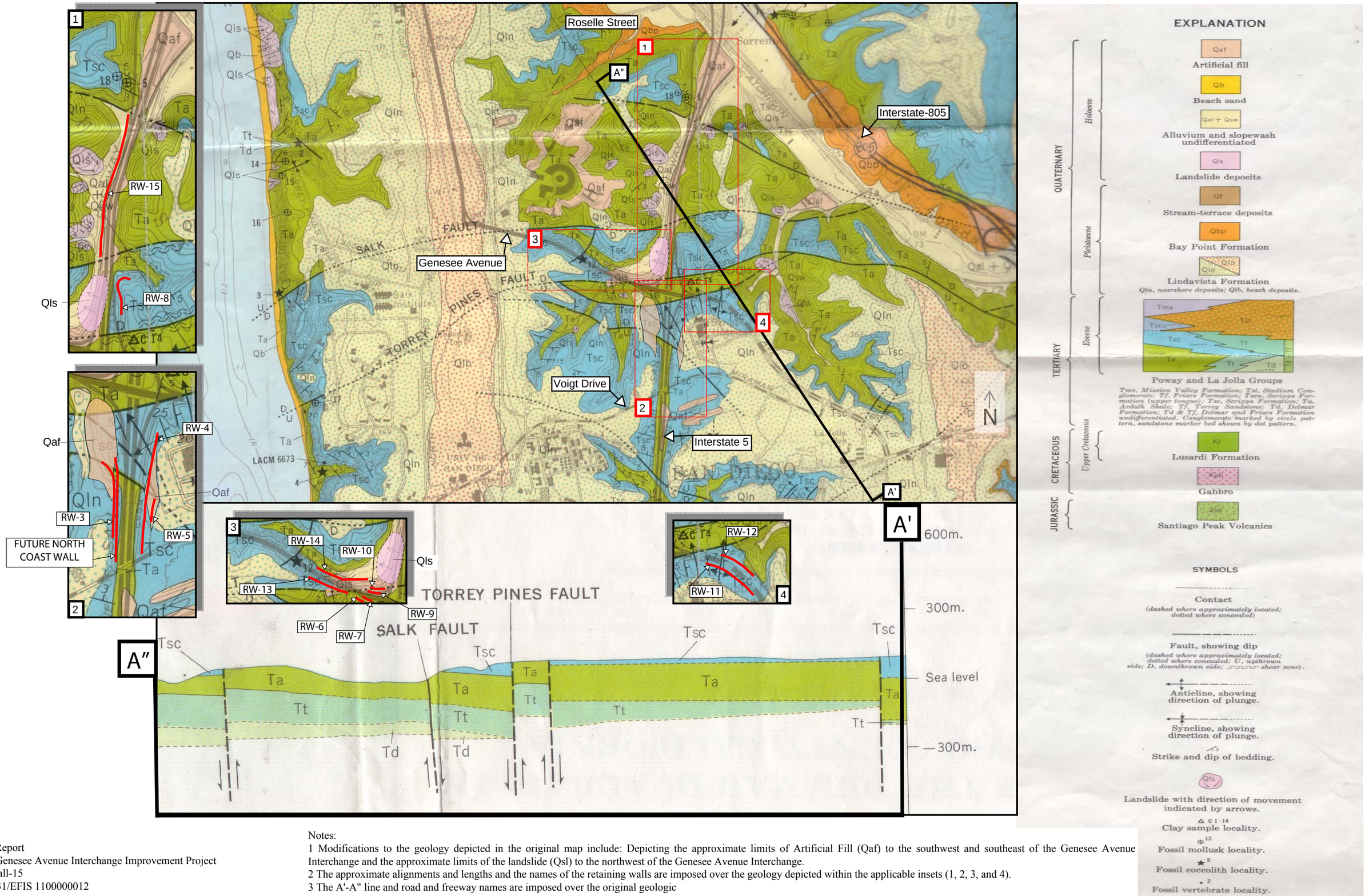
FIGURE 4C: PROJECT CROSS SERCTION



Wall15 XSec_Contours_Profile_Plan_RWxscExtend.dgn 2/6/2014 2:08:32 PM

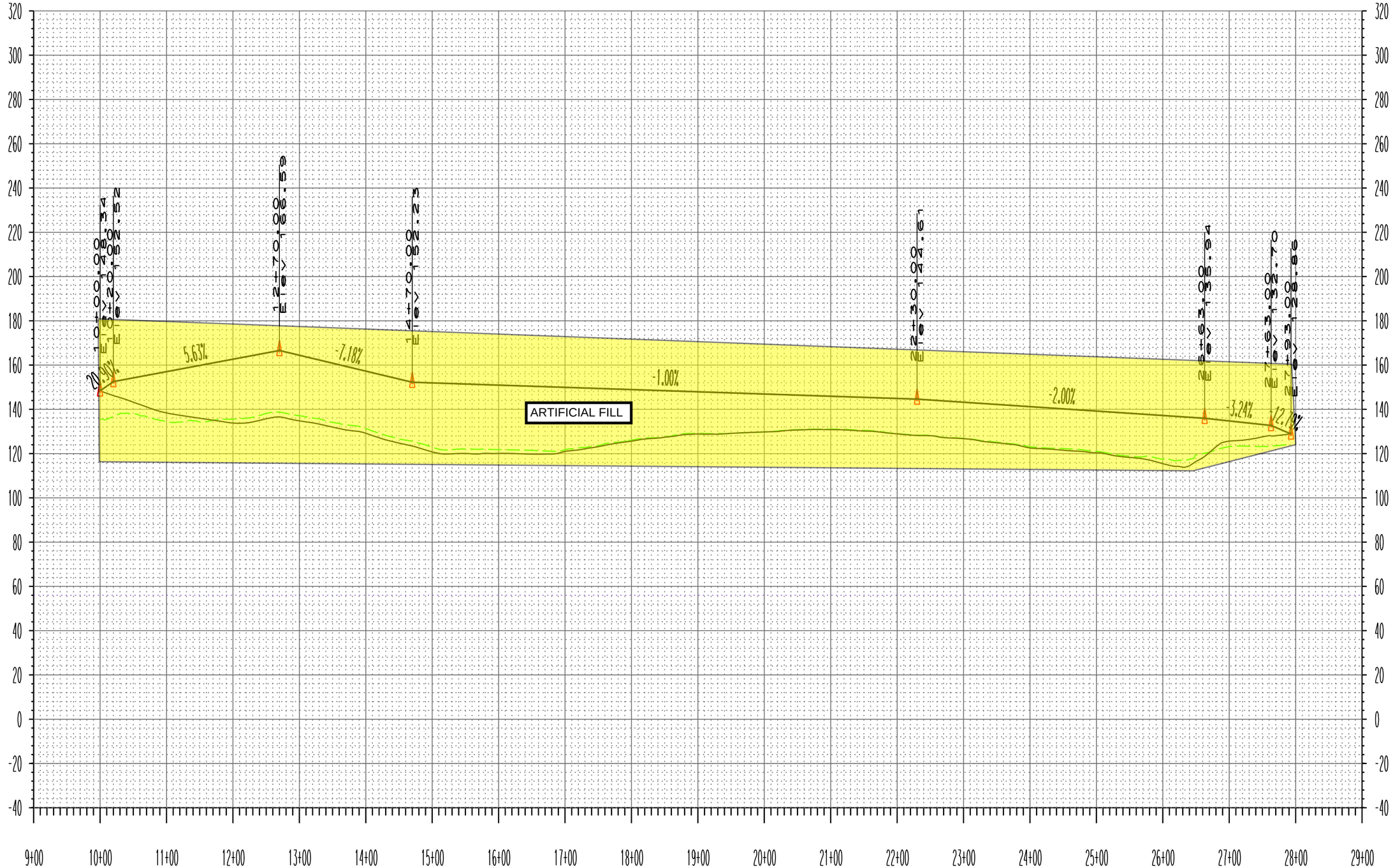
FIGURE 4D: PROJECT CROSS SERCTION



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

Notes:
1 Modifications to the geology depicted in the original map include: Depicting the approximate limits of Artificial Fill (Qaf) to the southwest and southeast of the Genesee Avenue Interchange and the approximate limits of the landslide (Qsl) to the northwest of the Genesee Avenue Interchange.
2 The approximate alignments and lengths and the names of the retaining walls are imposed over the geology depicted within the applicable insets (1, 2, 3, and 4).
3 The A'-A" line and road and freeway names are imposed over the original geologic
4 Surficial deposits not shown on cross section.

FIGURE 5: GEOLOGIC OVERVIEW MAP



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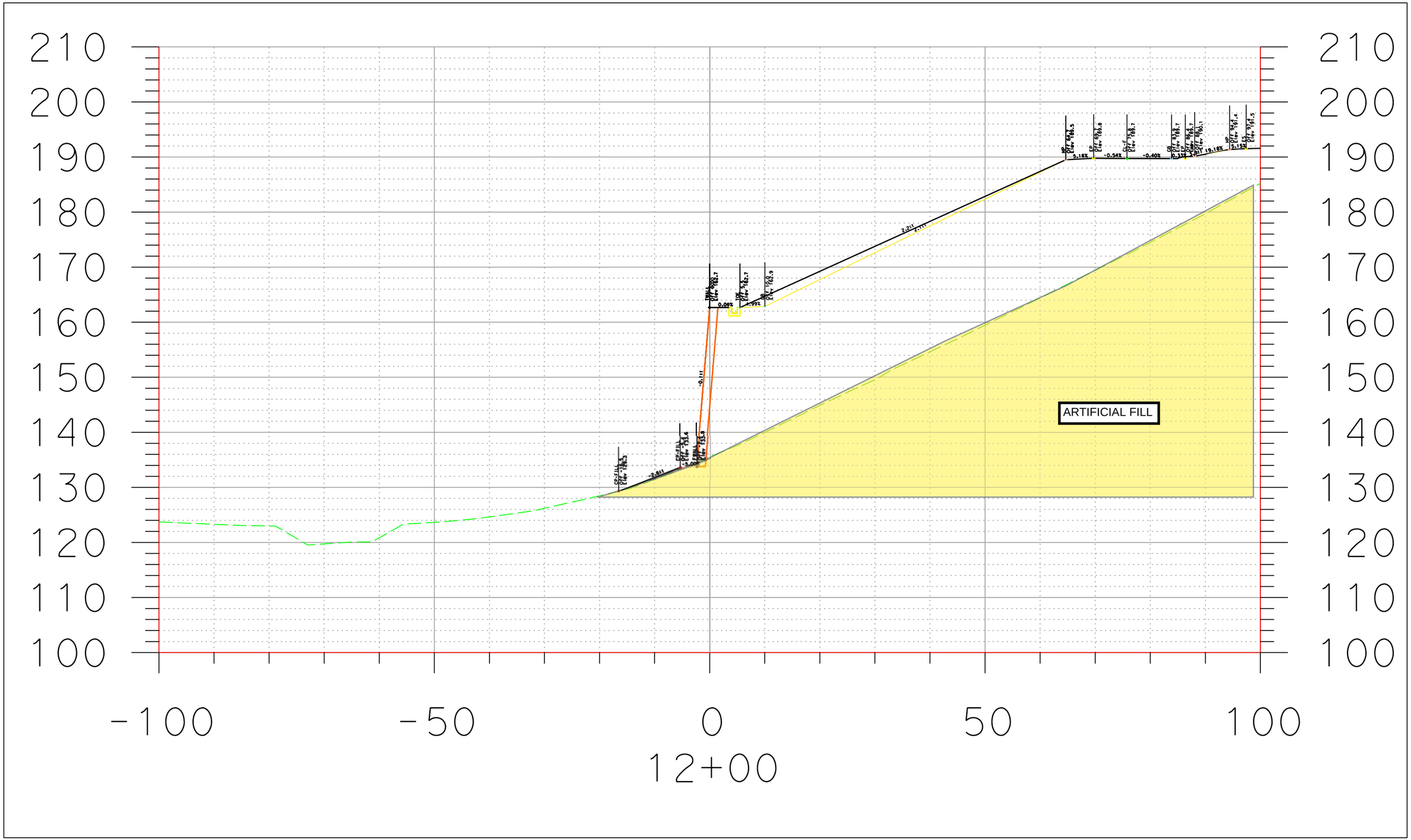
Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

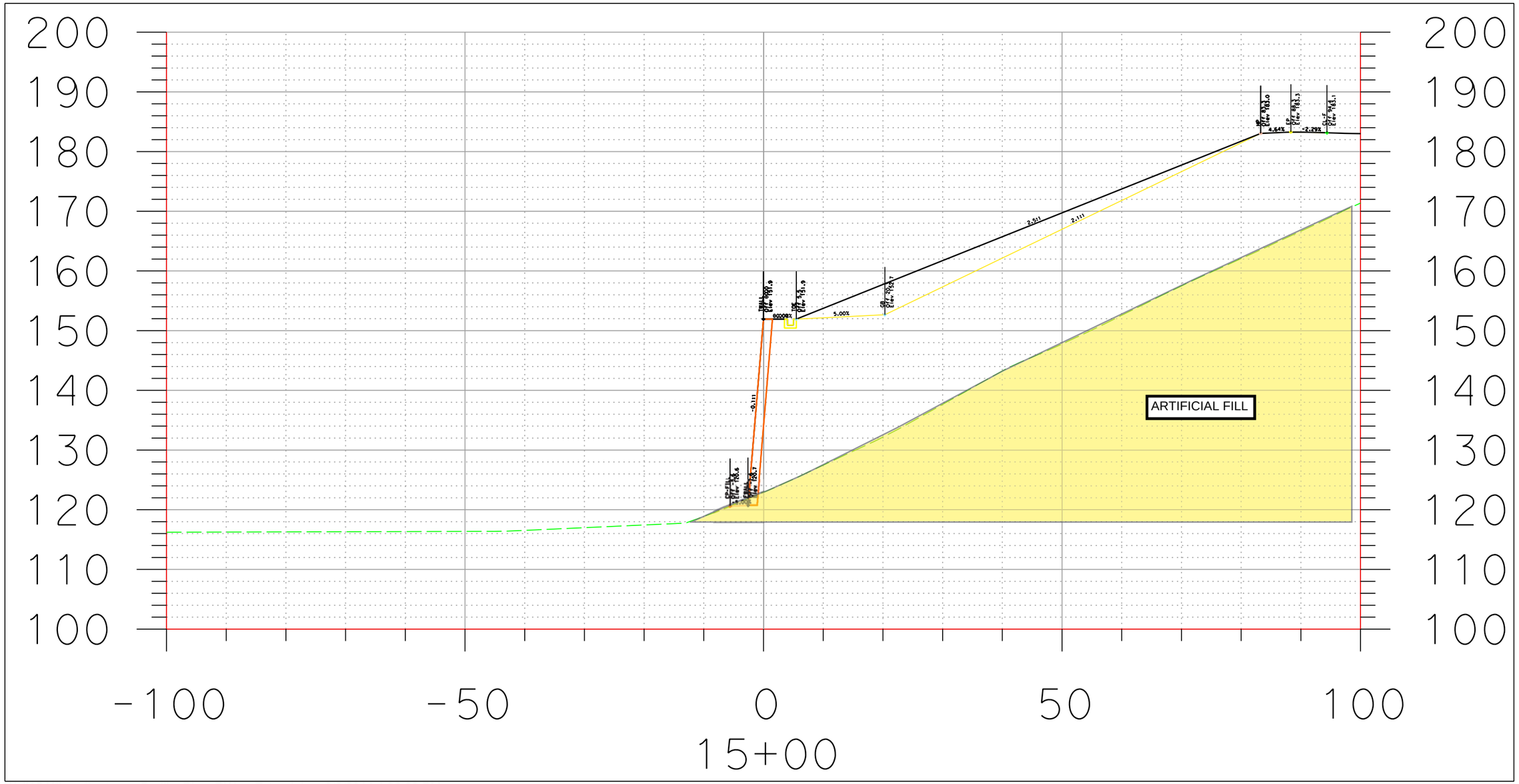
FIGURE 6: GEOLOGIC PROFILE



Wall15 XSec_Contours_Profile_Plan_RWxscExtend.dgn 2/6/2014 1:28:44 PM

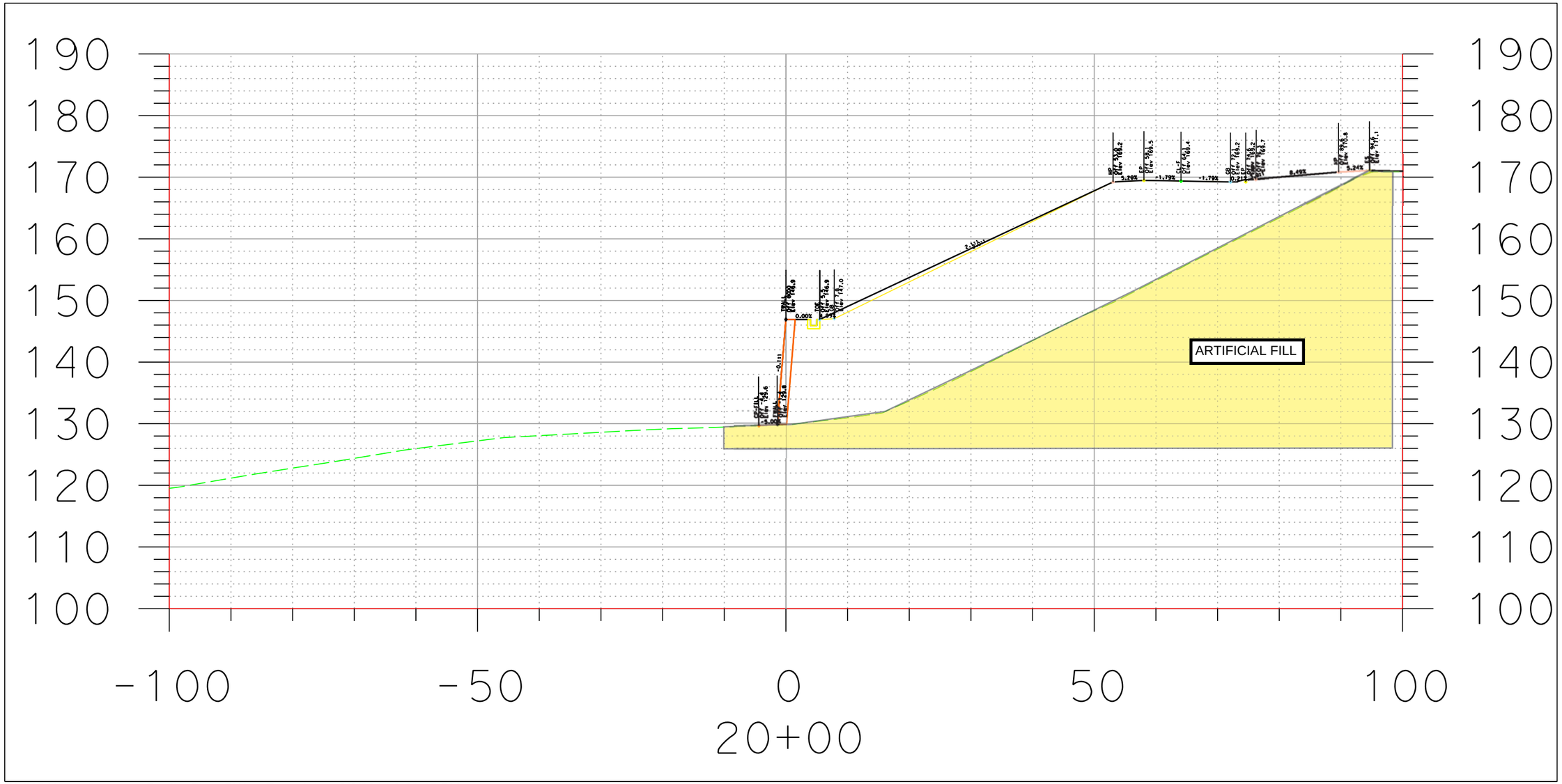
Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

FIGURE 7A: GEOLOGIC CROSS SECTION



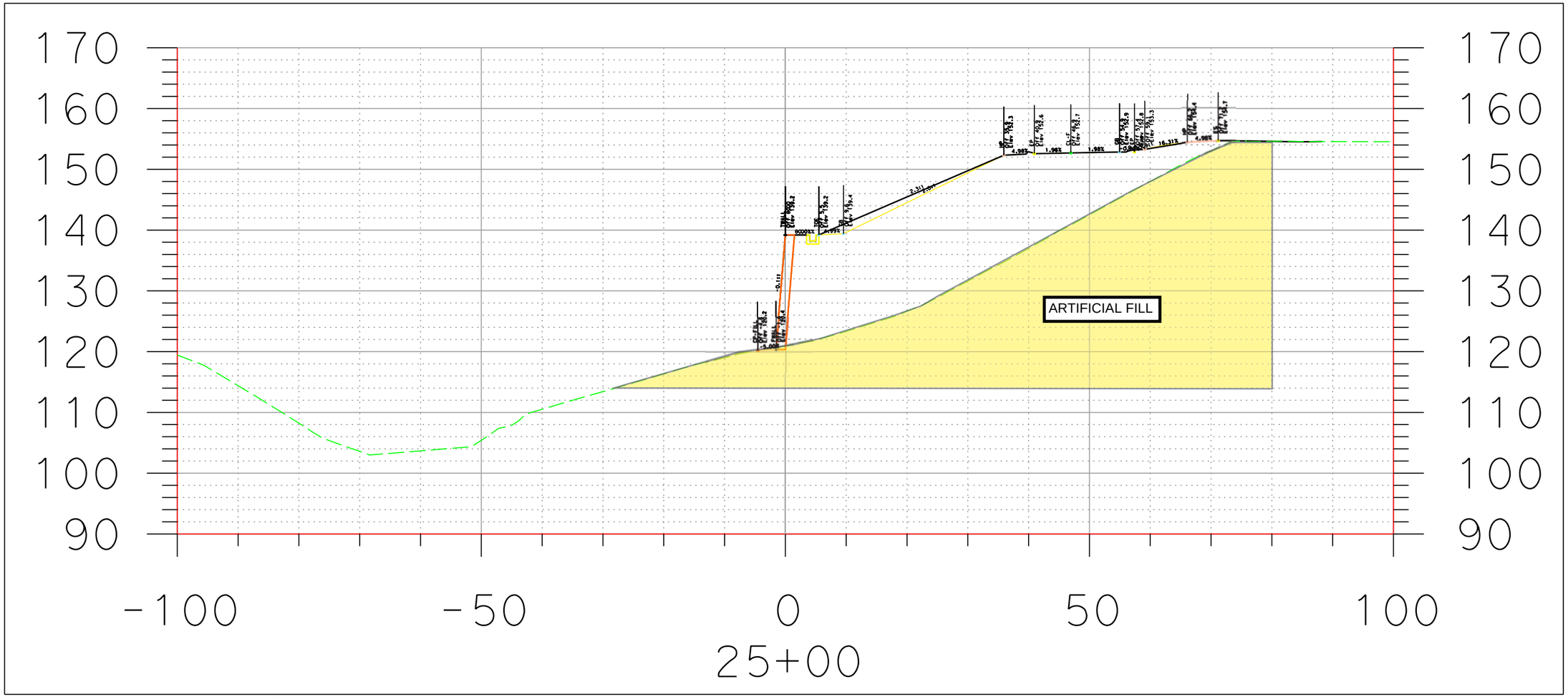
Wall15 XSec_Contours_Profile_Plan_RWxscExtend.dgn 2/6/2014 1:32:09 PM

FIGURE 7B: GEOLOGIC CROSS SECTION



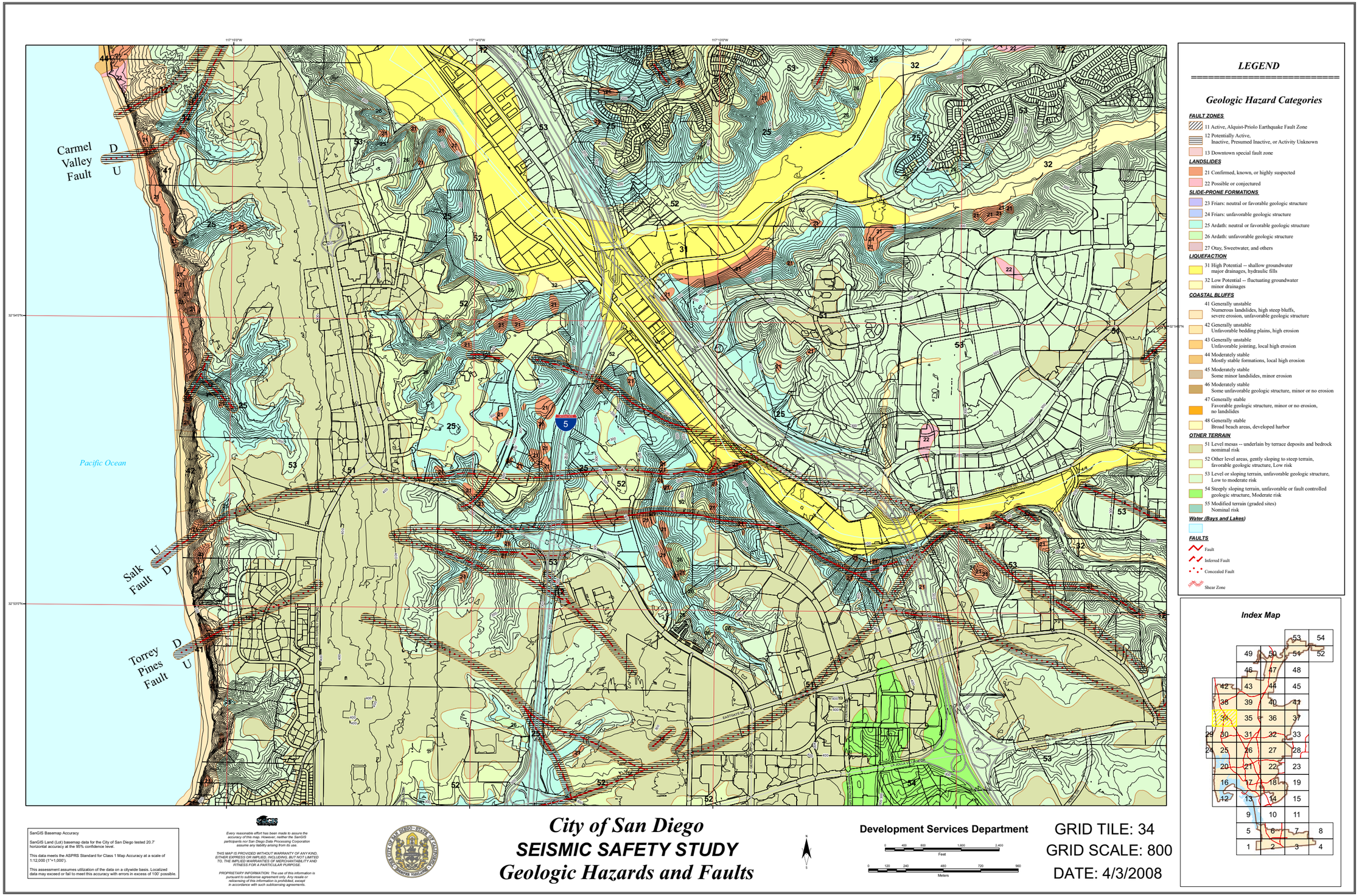
Wall15 XSec_Contours_Profile_Plan_RWxscExtend.dgn 2/6/2014 2:02:15 PM

FIGURE 7C: GEOLOGIC CROSS SECTION



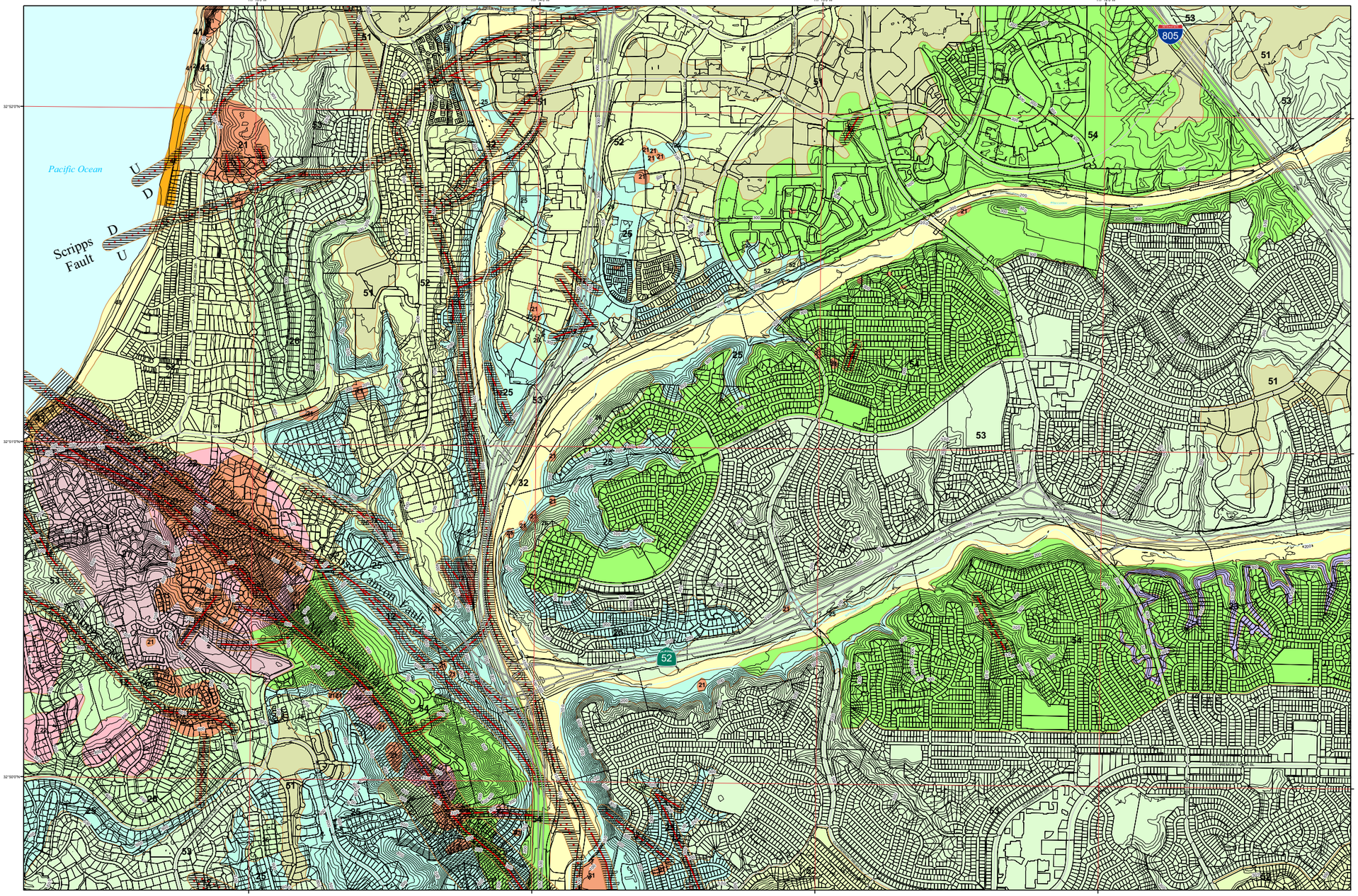
Wall15 XSec_Contours_Profile_Plan_RWxscExtend.dgn 2/6/2014 2:08:32 PM

FIGURE 7D: GEOLOGIC CROSS SECTION



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

FIGURE 8A: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

SanGIS

Every reasonable effort has been made to assure the accuracy of this map. However, neither the SanGIS participants nor San Diego Data Processing Corporation assume any liability arising from its use.

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City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

Development Services Department

0 400 800 1,600 2,400 Feet

0 120 240 480 720 960 Meters

GRID TILE: 30
GRID SCALE: 800
DATE: 4/3/2008

LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

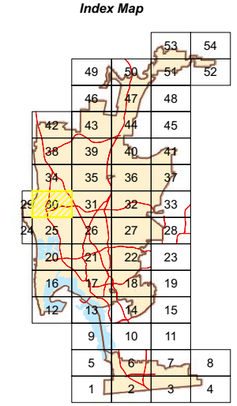
- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

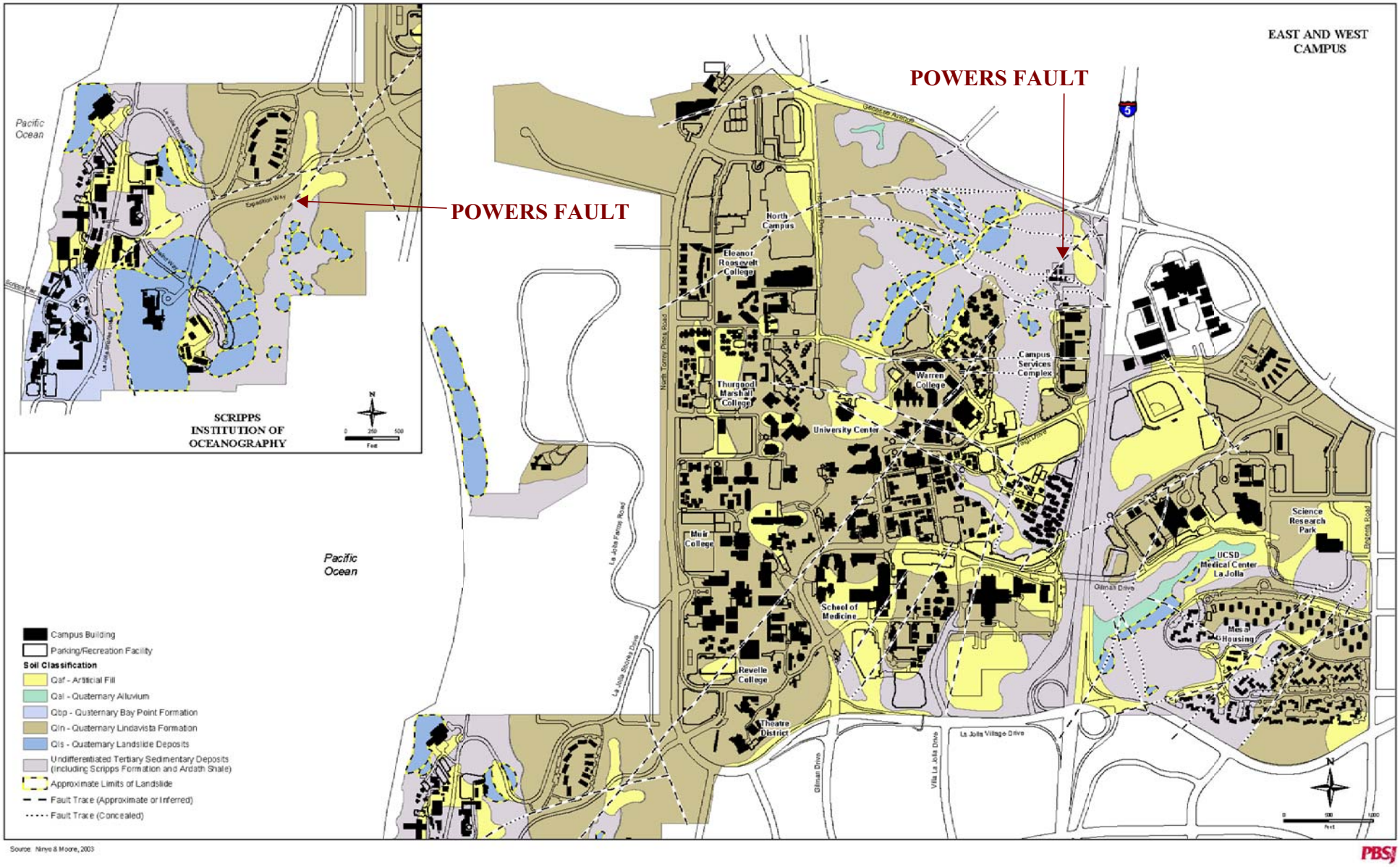
- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

Index Map



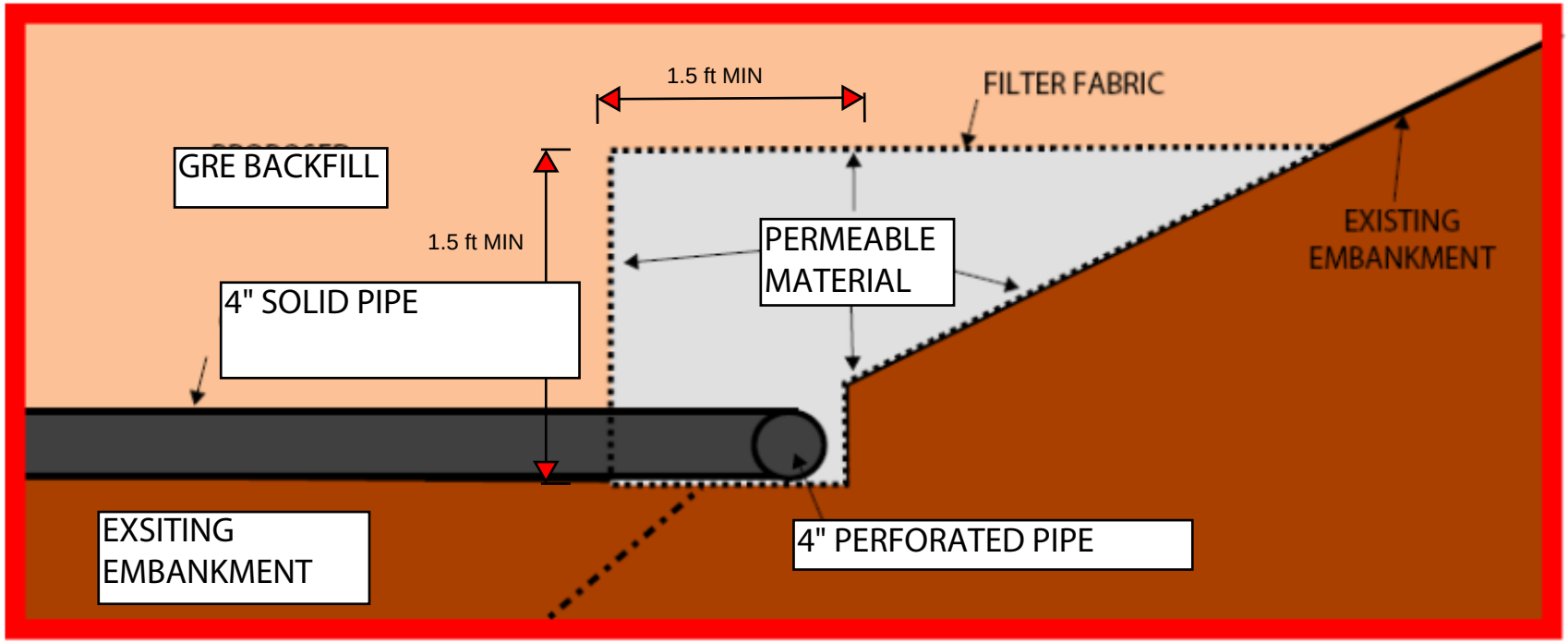
Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

FIGURE 8B: CITY OF SAN DIEGO, GEOLOGIC HAZARDS AND FAULTS MAP



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 1100000012

FIGURE 9: UNIVERSITY OF CALIFORNIA SAN DIEGO 2004 LONG RANGE DEVELOPMENT PLAN GEOLOGIC FORMATIONS AND FAULTS MAP



NOTE: DRAWINGS NOT TO SCALE

FIGURE 10: GRAVEL DRAIN DETAIL

TABLES

TABLE 1: REGIONAL ACTIVE FAULT(S)

Fault Name (Initials)	FID	M_{MAX}	Fault Type	Fault Dip	Dip Direction	Z_{BOT}	Z_{TOR}	R_{RUP}	R_{JB}	R_X	F_{NM}	F_{RV}
Newport Inglewood-Rose Canyon fz (Oceanside section)	223	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.6mi (4.2km)	2.6mi (4.2km)	2.6mi (4.2km)	0	0
Newport Inglewood-Rose Canyon fz (San Diego section)	224	7.5	RLSS	90º	Vertical	8.1mi (13.0km)	0.0	2.1mi (3.4km)	2.1mi (3.4km)	2.1mi (3.4km)	0	0

Notes: FID = The fault ID number. Fault Identification Number (FID), used to identify a fault trace on the Caltrans Deterministic PGA Map.
M_{MAX} = Maximum Moment Magnitude: Defined as the largest earthquake a fault is capable of generating.
Fault Type = Right Lateral Strike Slip (RLSS).
Fault Dip = The angle between the fault plane and the horizontal plane.
Dip Direction = The direction the fault dips.
Z_{BOT} = The depth to the bottom of the rupture plane.
Z_{TOR} = The depth to the top of the rupture plane.
R_{RUP} = The closest distance to the fault rupture plane.
R_{JB} = The shortest horizontal distance to the surface projection of the rupture area (a.k.a. Joyner-Boone Distance).
R_X = The horizontal distance to the fault trace or surface projection of the top of the rupture plane.
F_{NM} = The faults identified as a normal fault.
F_{RV} = The faults identified as a reverse fault.

TABLE 2: CORROSION TEST RESULTS

Location	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
011-479+28-23R-B01	1,300	7.50	150	298
011-481+74-40R-B02	2,600	5.43	56	191

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2,000ppm), or the pH is five and one-half (5.5) or less.

TABLE 3: SOIL STRENGTH DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Soil Type	φ	Coh (psf)	γ (pcf)
RW-15	Geosynthetically Reinforce Earth Wall	10+00 RW-15-Line	27+93 RW-15-Line	Artificial Fill	33	120	121
				GRE Backfill	33	120	121

Notes: φ = Friction Angle
Coh = Cohesion
γ = Unit Weight

TABLE 4A: GEOSYTHETICALLY REINFORCED EARTH WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	L (ft)	H_{MAX} (ft)	Slope Below	Slope Above	Wall Batter	Cut/Fill
RW-15	Geosynthetically Reinforce Earth Wall	10+00 RW-15-Line	10+40 RW-15-Line	40	13.5	2:1	2:1	Vertical	Fill
		10+40 RW-15-Line	10+80 RW-15-Line	40	21	2:1	2:1	Vertical	Fill
		10+80 RW-15-Line	11+40 RW-15-Line	60	27	2:1	2:1	Vertical	Fill
		11+40 RW-15-Line	12+00 RW-15-Line	40	33	2:1	2:1	Vertical	Fill
		12+00 RW-15-Line	12+40 RW-15-Line	40	36	2:1	2:1	Vertical	Fill
		12+40 RW-15-Line	14+00 RW-15-Line	160	36	2:1	2:1	Vertical	Fill
		14+00 RW-15-Line	14+60 RW-15-Line	60	36	2:1	2:1	Vertical	Fill
		14+60 RW-15-Line	15+00 RW-15-Line	40	36	2:1	2:1	Vertical	Fill
		15+00 RW-15-Line	16+98 RW-15-Line	198	36	2:1	2:1	Vertical	Fill
		16+98 RW-15-Line	17+58 RW-15-Line	60	34.5	2:1	2:1	Vertical	Fill
		17+58 RW-15-Line	17+98 RW-15-Line	40	30	2:1	2:1	Vertical	Fill
		17+98 RW-15-Line	18+98 RW-15-Line	100	28.5	2:1	2:1	Vertical	Fill
		18+98 RW-15- Line	20+98 RW-15-Line	200	22.5	2:1	2:1	Vertical	Fill
		21+98 RW-15-Line	22+98 RW-15-Line	200	21	2:1	2:1	Vertical	Fill
		22+98 RW-15- Line	23+98 RW-15-Line	100	23	2:1	2:1	Vertical	Fill
		23+98 RW-15-Line	25+58 RW-15-Line	160	25.5	2:1	2:1	Vertical	Fill
		25+58 RW-15-Line	25+98 RW-15-Line	40	25.5	2:1	2:1	Vertical	Fill
		25+98 RW-15-Line	26+38 RW-15-Line	40	27	2:1	2:1	Vertical	Fill
		26+38 RW-15-Line	26+78 RW-15-Line	40	27	2:1	2:1	Vertical	Fill
		26+78 RW-15-Line	27+93 RW-15-Line	115	18	2:1	2:1	Vertical	Fill

Notes: L = Wall Length
H_{MAX} =Approximate Maximum Wall Height including embedment
Wall Batter = Horizontal (H) to Vertical (V)

TABLE 4B: GEOSYTHETICALLY REINFORCED EARTH WALL DESIGN PARAMETERS

Retaining Wall	Wall Type	Beginning Station	Ending Station	Vertical Spacing Reinforcement Layers (Feet)	Reinforcement Embedment Length (Feet)	Minimum Long Term Design Strength (lbs/ft)
RW-15	Geosynthetically Reinforce Earth Wall	10+00 RW-15-Line	10+40 RW-15-Line	1.5	10	3400
		10+40 RW-15-Line	10+80 RW-15-Line	1.5	15	3400
		10+80 RW-15-Line	11+40 RW-15-Line	1.5	20	3400
		11+40 RW-15-Line	12+00 RW-15-Line	1.5	25	3400
		12+00 RW-15-Line	12+40 RW-15-Line	1.5	35	3400
		12+40 RW-15-Line	14+00 RW-15-Line	1.5	42	4400
		14+00 RW-15-Line	14+60 RW-15-Line	1.5	38	4400
		14+60 RW-15-Line	15+00 RW-15-Line	1.5	32	3400
		15+00 RW-15-Line	16+98 RW-15-Line	1.5	26	3400
		16+98 RW-15-Line	17+58 RW-15-Line	1.5	24	3400
		17+58 RW-15-Line	17+98 RW-15-Line	1.5	22	3400
		17+98 RW-15-Line	18+98 RW-15-Line	1.5	20	3400
		18+98 RW-15- Line	20+98 RW-15-Line	1.5	16	3400
		20+98 RW-15-Line	22+98 RW-15-Line	1.5	14	3400
		22+98 RW-15- Line	23+98 RW-15-Line	1.5	16	3400

TABLE 4B: CONT.

Retaining Wall	Wall Type	Beginning Station	Ending Station	Vertical Spacing Reinforcement Layers (Feet)	Reinforcement Embedment Length (Feet)	Minimum Long Term Design Strength (lbs/ft)
RW-15	Geosynthetically Reinforce Earth Wall	23+98 RW-15-Line	25+58 RW-15-Line	1.5	18	3400
		25+58 RW-15-Line	25+98 RW-15-Line	1.5	22	3400
		25+98 RW-15-Line	26+38 RW-15-Line	1.5	30	3400
		26+38 RW-15-Line	26+78 RW-15-Line	1.5	18	3400
		26+78 RW-15-Line	27+93 RW-15-Line	1.5	10	3400

TABLE 5: DESIGN PARAMETERS FOR GEOSYNTHETICALLY REINFORCED EARTH WALL FACING

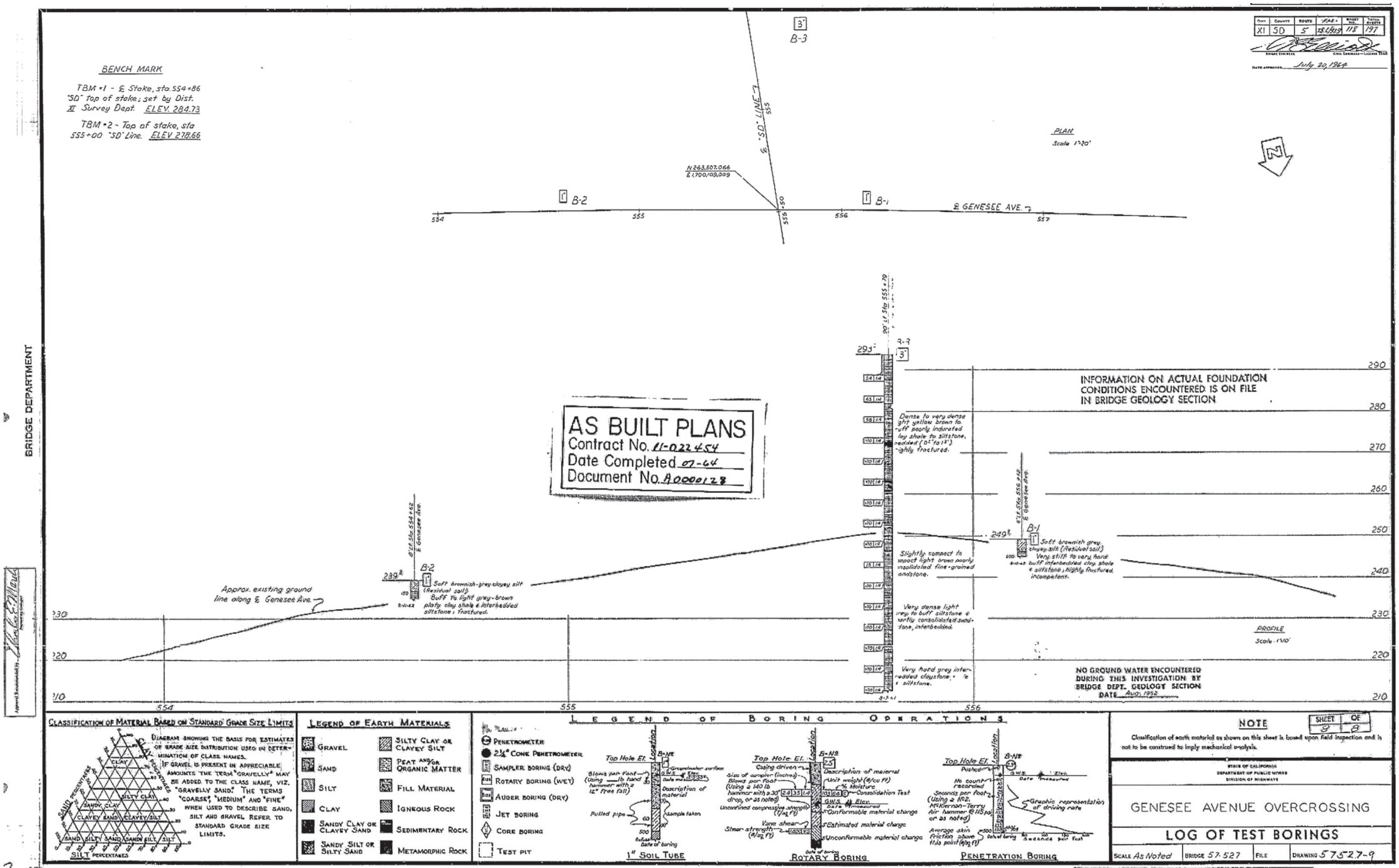
Retaining Wall	Wall Type	Beginning Station	Ending Station	Design Pressure (lbs/ft^2)	Vertical Anchor Spacing (ft)	Horizontal Anchor Spacing (ft)	Minimum Anchor Length (ft)	Minimum Design Pullout Resistance (lbs)	Minimum Reinforcing Bar Diameter (in)
RW-15	Geosynthetically Reinforce Earth Wall	10+00 RW-15-Line	27+93 RW-15-Line	80	6	6	10	3000	1.0

Notes: Applied Pressure = Horizontal pressure generated along a one square foot section of the façade multiplied by a factor of safety of 2.0.

APPENDICES

APPENDIX I

LOG OF TEST BORING AND SITE DATA



Foundation Report
Interstate-5/Genesee Avenue Interchange Improvement Project
Retaining Wall-15
EA 11-022331/EFIS 11000000012

APPENDIX I: LOG OF TEST BORINGS AND SITE DATA

APPENDIX II

FIELD EXPLORATION DATA

DIST	COUNTY	ROUTE	POST MILES (KP) TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	5	R28.8/R55.3		

CERTIFIED ENGINEERING GEOLOGIST — DATE 3-30-12

REGISTERED PROFESSIONAL ENGINEER — Michael M. Fordham — NO. C61341 — EXP. 6-30-13 — CIVIL — STATE OF CALIFORNIA

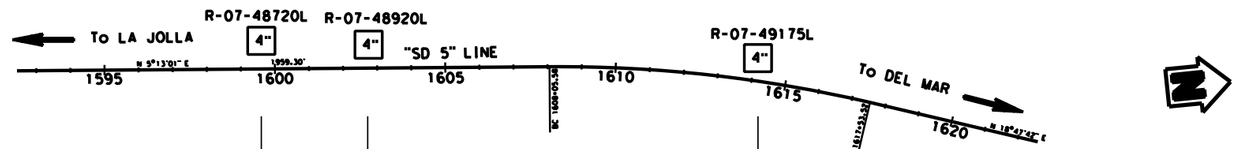
PLANS APPROVAL DATE

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.

This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, & Presentation Manual (2010 Edition). Except the assignment of the hole identification as described in section 2.4

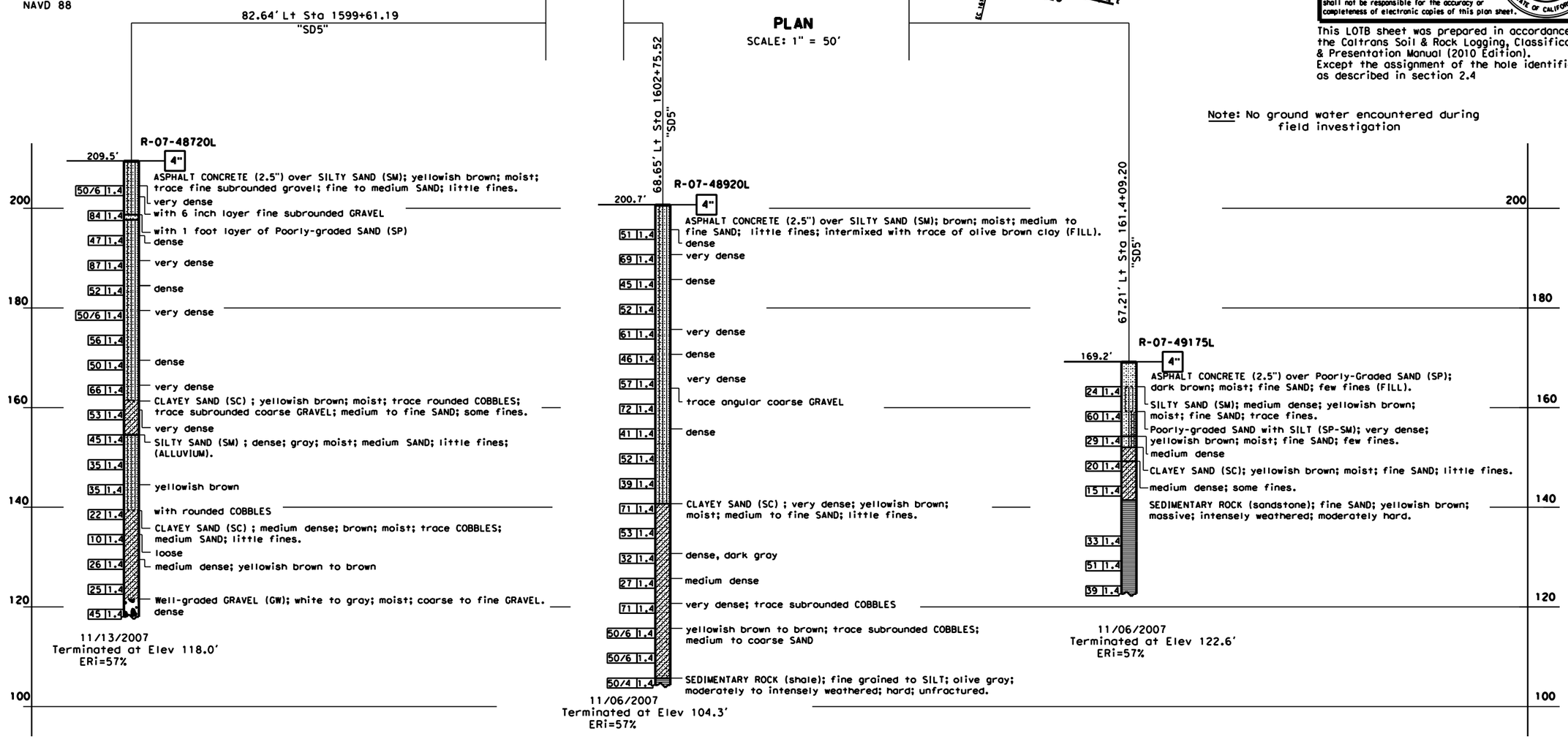
BENCH MARK

5-28-41
Elev 287.78
Located at the intersection of I-5 and La Jolla Village Dr, set in sidewalk near southeast corner of La Jolla Village Dr Bridge over I-5.
NAVD 88



PLAN
SCALE: 1" = 50'

Note: No ground water encountered during field investigation



PROFILE
Horiz: 1" = 50'
Vert: 1" = 20'

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH	BRIDGE NO. / POST MILES (KP) R28.8/R55.3	RETAINING WALL NO. 15 LOG OF TEST BORINGS 1 of 4
FUNCTIONAL SUPERVISOR NAME: B. Hinman	DRAWN BY: K. Le; CHECKED BY: Z. Yazdani	FIELD INVESTIGATION BY: M. Fordham	CU 3643 EA 1100000012	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES / SHEET OF

ODS CIVIL LOG OF TEST BORINGS SHEET — ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 — FILE => $REQUEST

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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.

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

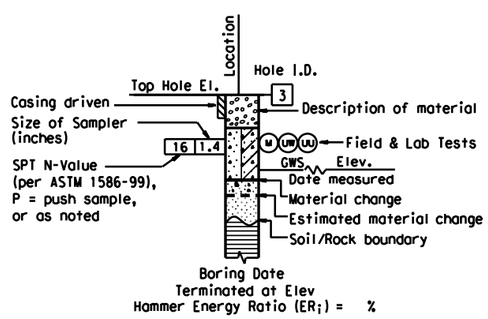
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R	Rotary drilled boring (conventional)
	RW	Rotary drilled with self-casing wire-line
	RC	Rotary core with continuously-sampled, self-casing wire-line
	P	Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
	RC	Rotary drilled rock core
Size	HD	Hand driven (1-inch soil tube)
	HA	Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778)
[ ]	O	Other (note on LOTB)

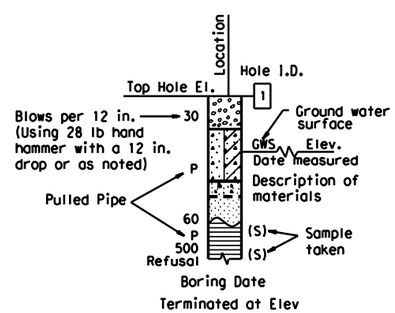
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

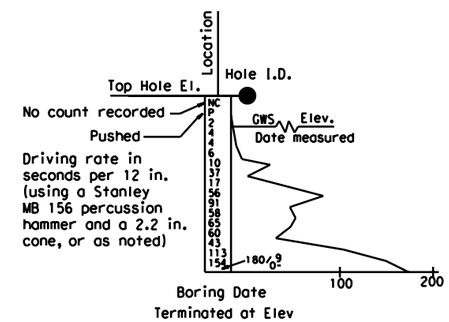
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



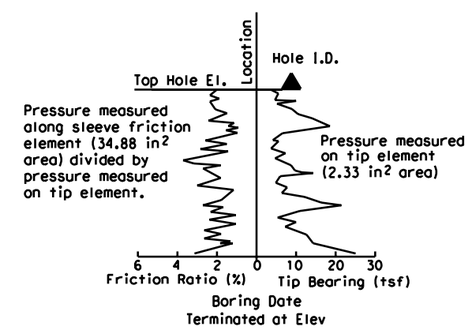
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

ENGINEERING SERVICES	MATERIALS AND GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH X	BRIDGE NO. / POST MILE 28.6/30.1	RETAINING WALL NO. 15 LOG OF TEST BORINGS 2 OF 4
	PREPARED BY: W. Tang 02/12				

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121
CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

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REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER — DATE 3-30-12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mike Fordham — No. C61341 — Exp. 6-30-13 — CIVIL — STATE OF CALIFORNIA

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.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

ENGINEERING SERVICES

MATERIALS AND GEOTECHNICAL SERVICES

PREPARED BY: W. Tang 02/12

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH X

BRIDGE NO. — POST MILE 28.6/30.1

RETAINING WALL NO. 15

LOG OF TEST BORINGS 3 OF 4

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643
PROJECT NUMBER & PHASE: 11000000121 CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES — SHEET X OF X

FILE => $REQUEST

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

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5			

REGISTERED CIVIL ENGINEER 3-30-12 DATE

PLANS APPROVAL DATE

Mike Fordham No. C61341 Exp. 6-30-13 CIVIL STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER

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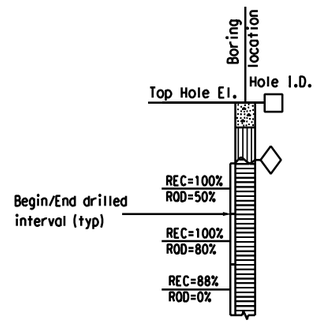
PERCENT CORE RECOVERY (REC) & ROCK QUALITY DESIGNATION (RQD)

$$REC = \frac{\sum \text{Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100\%$$

$$RQD = \frac{\sum \text{Length of intact core pieces} \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100\%$$



RQD* Indicates soundness criteria not met.

BEDDING SPACING

Description	Thickness / Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in. - 1 ft
Thinly Bedded	1 in. - 4 in.
Very Thinly Bedded	1/4 in. - 1 in.
Laminated	Less than 1/4 in.

LEGEND OF ROCK MATERIALS

- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows.
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily by a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures.
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

WEATHERING DESCRIPTORS FOR INTACT ROCK

Description	Diagnostic Features					General Characteristics
	Chemical Weathering-Discoloration and/or Oxidation		Mechanical Weathering-Grain Boundary Conditions (Disaggregation) Primarily for Granitics and Some Coarse-Grained Sediments	Texture and Leaching		
	Body of Rock	Fracture Surfaces		Texture	Leaching	
Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved	Minor leaching of some soluble minerals.	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened.
Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes."

ENGINEERING SERVICES

MATERIALS AND GEOTECHNICAL SERVICES

PREPARED BY: W. Tang 02/12

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN DESIGN BRANCH X

BRIDGE NO.

POST MILE 28.6/30.1

RETAINING WALL NO. 15

LOG OF TEST BORINGS 4 OF 4

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3643

PROJECT NUMBER & PHASE: 11000000121

CONTRACT NO.: 11-022331

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET X OF X

FILE => $REQUEST

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

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REQUEST FOR SURVEY

California
Department of Transportation
District 11

Request Number:

Date: **1/20/2009**

Co. SD *Rte.* 5 *PM:* R28.4 *to* R54.5
EA: 022330 *KP:* ____ *to* _____
Charge Unit:

Request by: MIKE FORDHAM *Division:* OGDS II *Ph:* 858-467-3290

Project Description: 10+4 MANAGED LANES PROJECT

Job Location: SD 5 FROM LA JOLLA VILLAGE DR. TO VANDEGRIFT BLVD.

Project. Mgr: *Ph:* *Units:* Feet ☐ Meters ☒

Descriptions and Limits of Work:

1. LOCATE 12 BORINGS AS REQUESTED BY GEOTECH PROVIDE N, E, AND ELEVATIONS FOR EACH POINT AND A STATION AND OFFSET FROM SD ALIGNMENT (PROVIDED). THE FINAL DELIVERABLE WILL BE THIS REPORT

Attachments and/or References:

PROJECT LAYOUTS

Desired Completion Date: **3/31/2009**

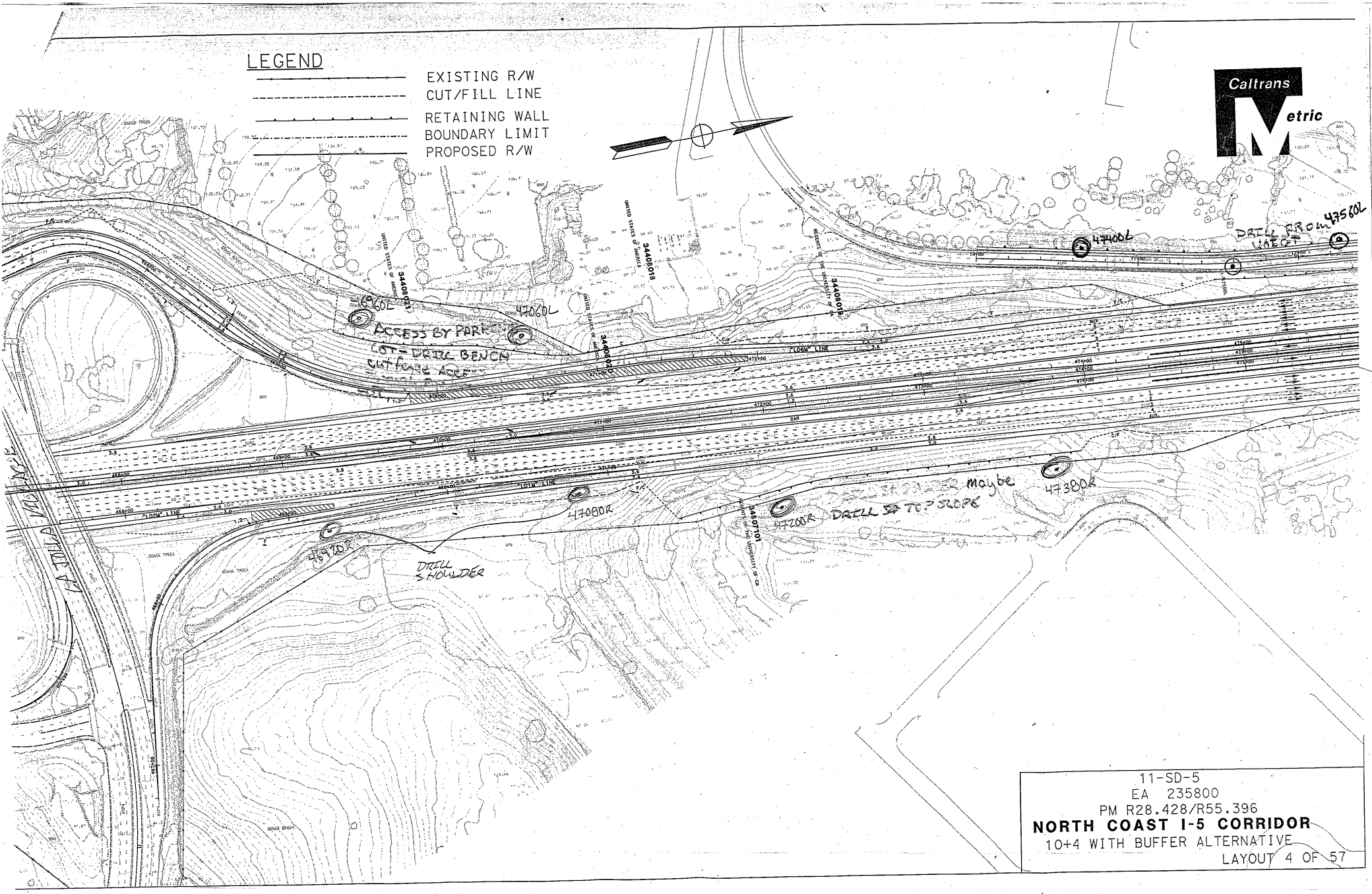
Approved by (Project Engineer or above)

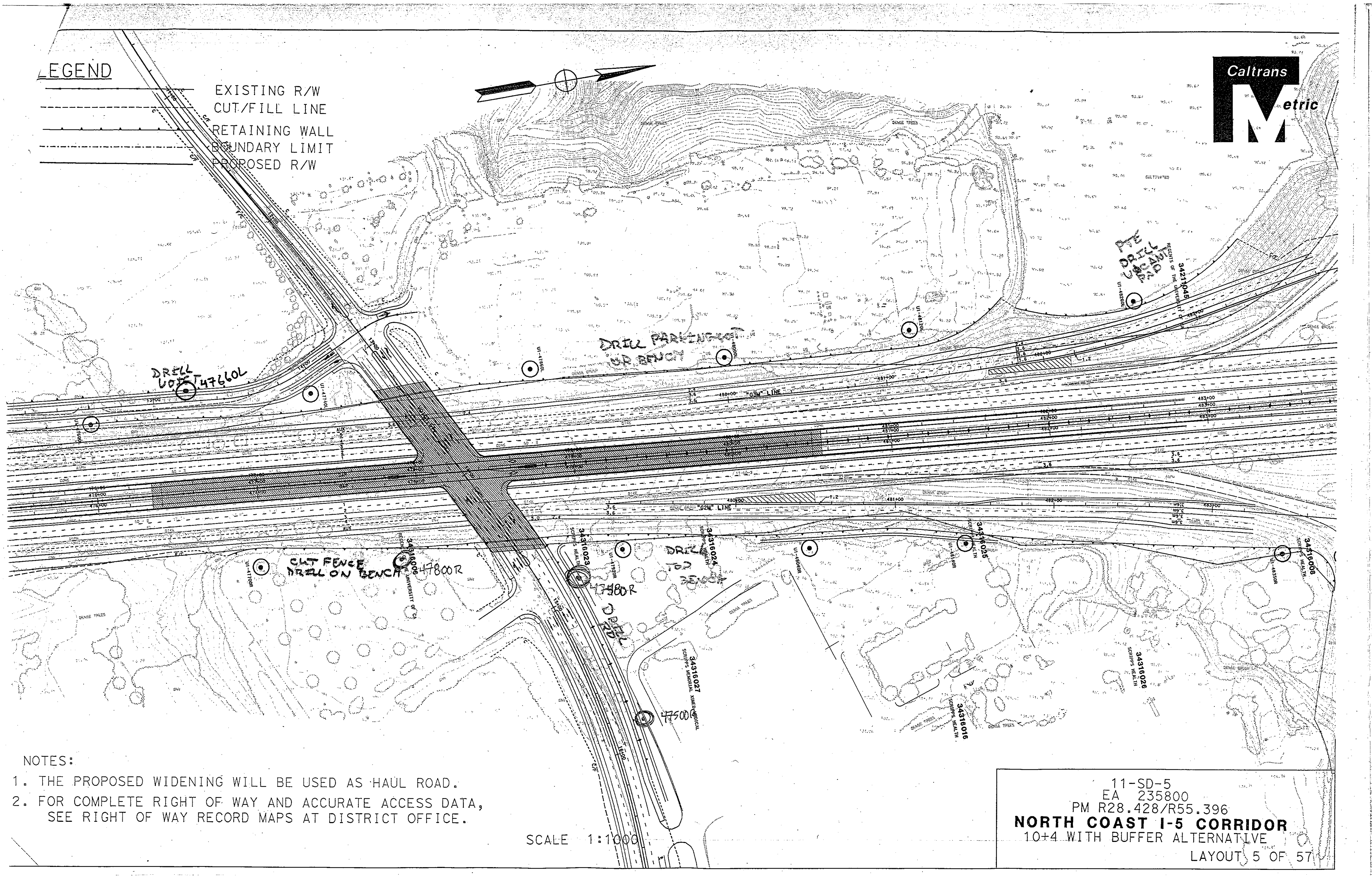
FOR SURVEYS USE ONLY

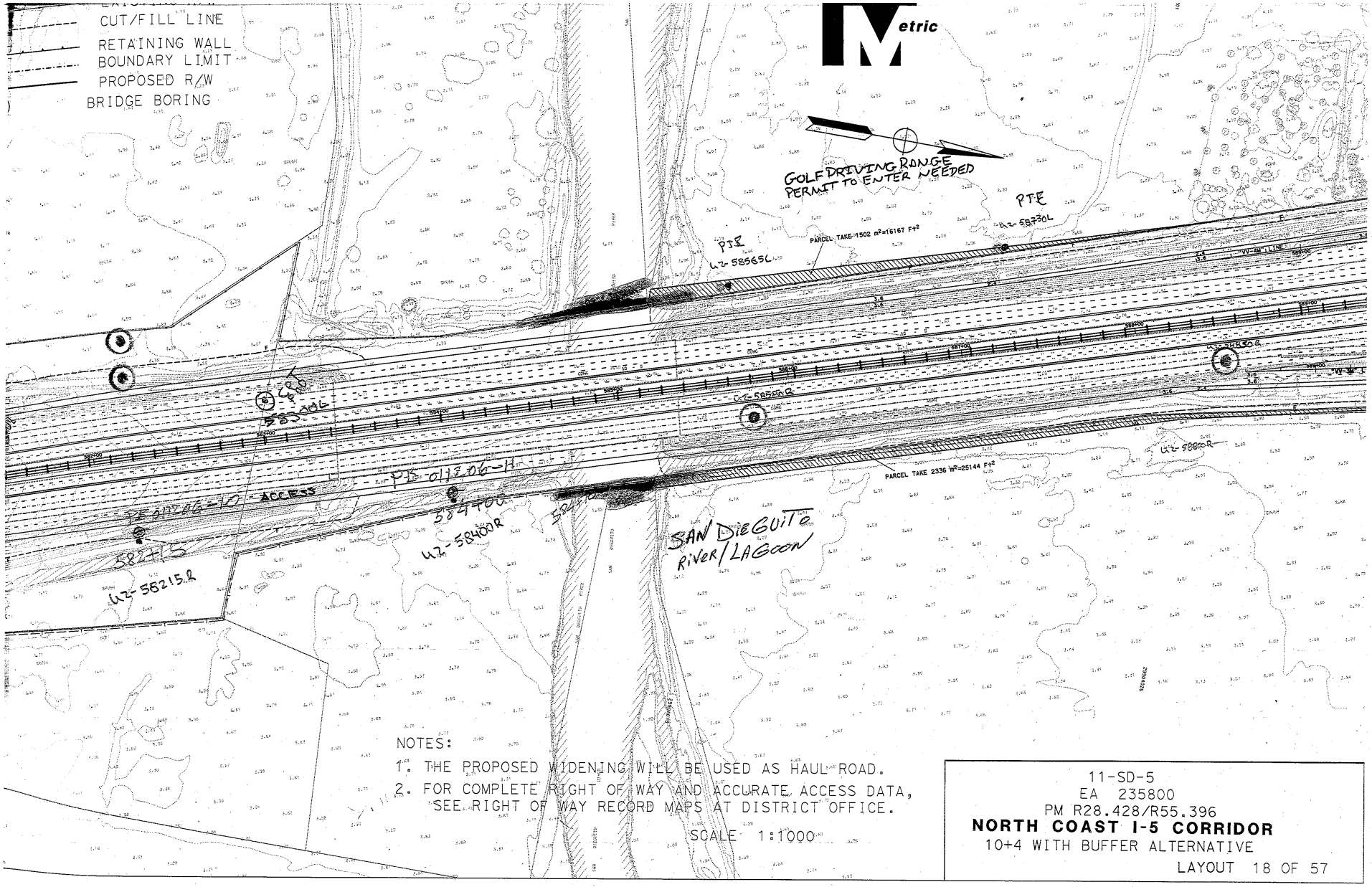
Date Received: WBS Codes:

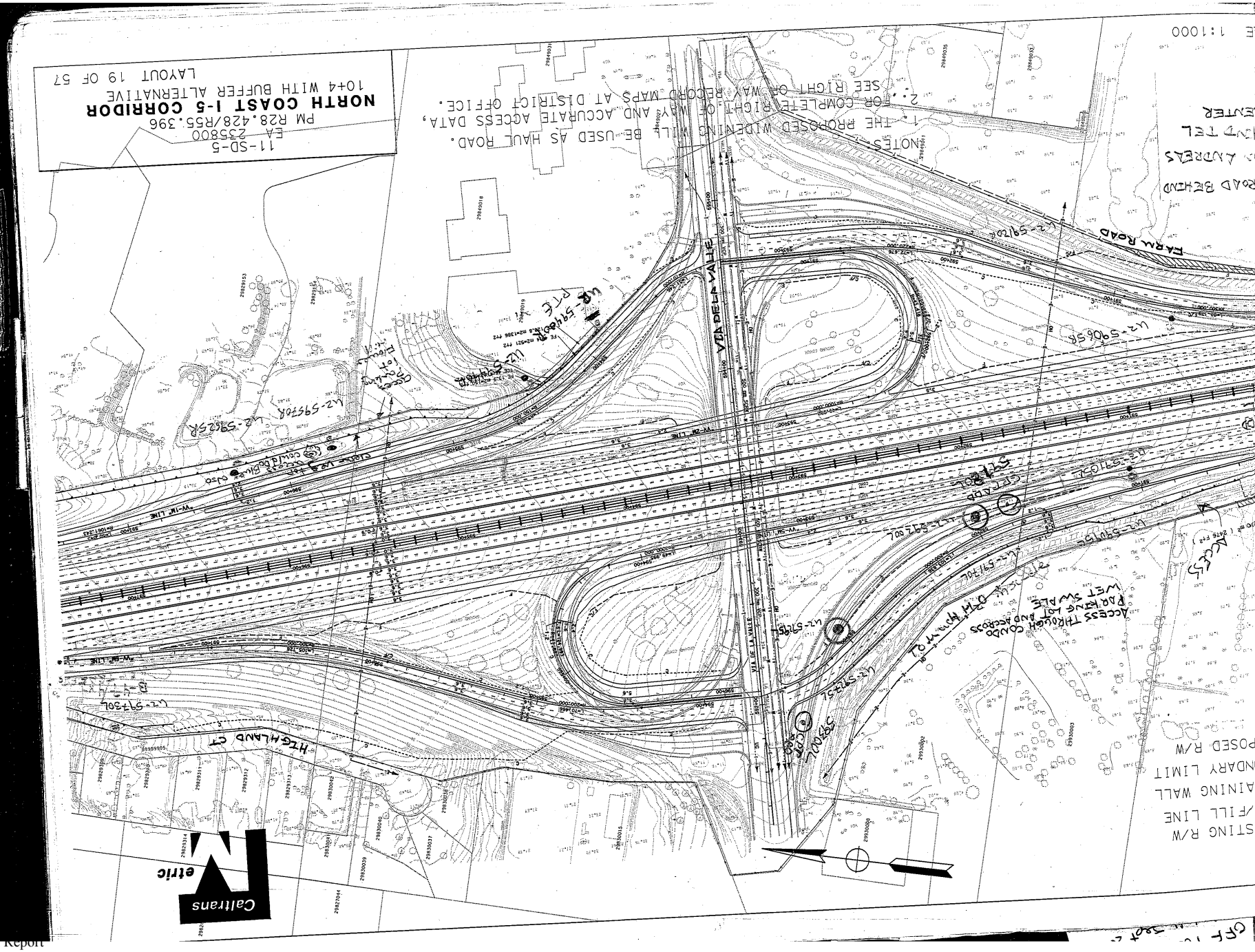
Horiz.Datum: L NAD27 ☐ NAD83 (Pre HPGN) ☐ NAD83 (HPGN) ☐ NAD83 (2007) ☐
Vert.Datum: N NGVD29 + 500ft. ☐ NAVD88 ☐ NAVD88 + 100m ☐ NAVD88 (CGPS) ☐

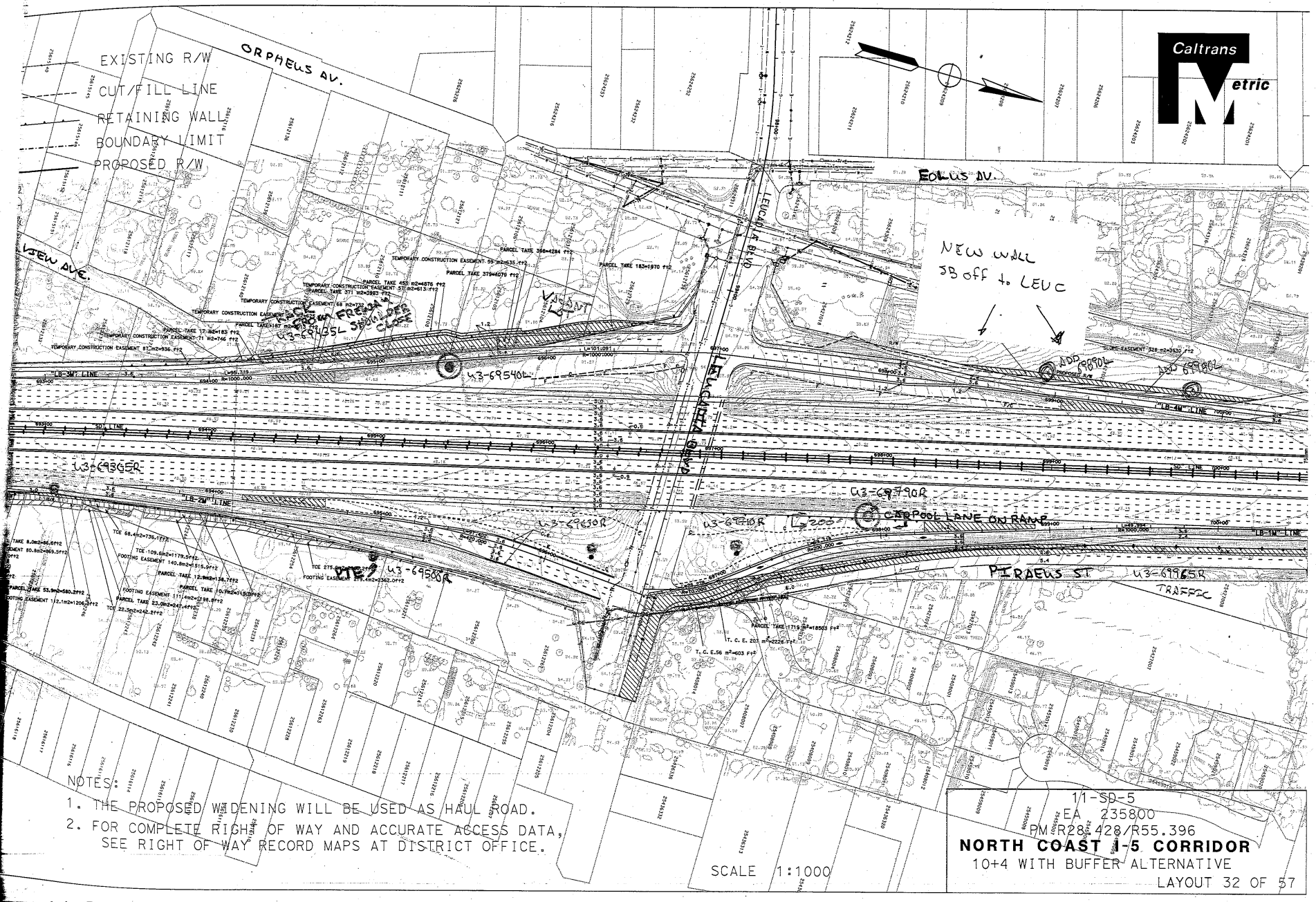
	DONE	**U1**	47360R	TOP OF SLOPE/SHOULDER/THORNTON HOSPITAL PARKING LOT
	DONE	**U1**	47700R	DRILL IN UCSD PARKING LOT OFF VOIGT ST.
	DONE	**U1**	47860L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48000L	UCSD MOTOR POOL OFF VOIGT ST.
	DONE	**U1**	48040R	WALKING PATH BEHIND MEDICAL CENTER
	DONE	**U1**	48260L	BUILD ACCESS ROAD
	DONE	**GEN**	10580R	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10700L	DRILL SHOULDER OF GENESEE
	DONE	**GEN**	10740R	DRILL SHOULDER OF GENESEE
	DONE	**U2**	58800R	AT BASE OF EMBANKMENT (FARM RD), ACCESS SAN ANDREAS DRIVE.
	DONE	**U2**	59120R	AT BASE OF EMBANKMENT (FARM RD)
	DONE	**U3**	69435L	ACCESS FROM BEHIND GURADRAIL THROUGH R/W FENCE, TOP OF SLOPE


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
47400L
DRILL FROM 47560L
47060L
ACCESS BY PARK
CUT-VERTIC BENCH
CUT FORCE ACCE
47080R
47380R
maybe
DRILL TOP SLOPE
47200R
47080R
DRILL SHOULDER
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 4 OF 57


LEGEND
EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
Caltrans
Metric
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 5 OF 57


CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
BRIDGE BORING
Metric
GOLF DRIVING RANGE
PERMIT TO ENTER NEEDED
PTE
PTE
PARCEL TAKE 1502 m²=16167 Ft²
PARCEL TAKE 2336 m²=25144 Ft²
ACCESS
SAN DIEGUITO
RIVER/LAGOON
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 18 OF 57


Caltrans
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 19 OF 57
11-SD-5
EA 235800
PM R28.428/R55.396
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
VIA DE LA VALLE
FARM ROAD
HIGHLAND CT
Under-Wraps
Blueprint Covers and Accessories
www.under-wraps.com


EXISTING R/W
CUT/FILL LINE
RETAINING WALL
BOUNDARY LIMIT
PROPOSED R/W
ORPHEUS AV.
VIEW AVE.
EOLUS AV.
PIRAEUS ST.
LEUCADIA BLVD.
NEW WALL SB off to LEUC
CARPOOL LANE ON RAMP
TRAFFIC
U3-69540L
U3-69360R
U3-69790R
U3-69630R
U3-69670R
U3-69965R
U3-69965R
U3-69965R
ADD 69890L
ADD 69986L
"LB-2W" LINE
"LB-4W" LINE
"LB-1W" LINE
SD LINE
NOTES:
1. THE PROPOSED WIDENING WILL BE USED AS HAUL ROAD.
2. FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
SCALE 1:1000
11-SD-5
EA 235800
PM R28.428/R55.396
NORTH COAST I-5 CORRIDOR
10+4 WITH BUFFER ALTERNATIVE
LAYOUT 32 OF 57

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1551+74.64    219.643619' EL  349.753  CHAIN 11SD5A2 N 1900275.6384175 E
6261399.9017158
                FEATURE:REFR PD:, Monument              REFR47360
                CM:2009-120 dea

1565+49.41    144.766802' EL  322.250  CHAIN 11SD5A2 N 1901651.5182117 E
6261450.3379667
                FEATURE:REFR PD:, Monument              REFR47700
                CM:2009-120 dea

1571+85.06    -154.657916' EL  335.790  CHAIN 11SD5A2 N 1902311.7629542 E
6261209.9513083
                FEATURE:REFR PD:, Monument              REFR47860
                CM:2009-120 dea

1574+08.85    -158.869166' EL  331.623  CHAIN 11SD5A2 N 1902535.0105392 E
6261226.1061317
                FEATURE:REFR PD:, Monument              REFR48000
                CM:2009-120 dea

1574+23.92    156.536240' EL  338.648  CHAIN 11SD5A2 N 1902521.3327450 E
6261541.5746608
                FEATURE:REFR PD:, Monument              REFR48040
                CM:2009-120 dea

1582+86.55    -224.013736' EL  297.503  CHAIN 11SD5A2 N 1903414.9923750 E
6261241.0372042
                FEATURE:REFR PD:, Monument              REFR48260
                CM:2009-120 dea

1590+88.37    -1091.094883' EL  227.303  CHAIN 11SD5A2 N 1904292.3331400 E
6260450.4547958
                FEATURE:REFR PD:, Monument              REFR10700
                CM:2009-120 dea

1590+93.52    -893.678862' EL  229.258  CHAIN 11SD5A2 N 1904279.5116433 E
6260647.5213308
                FEATURE:REFR PD:, Monument              REFR10740
                CM:2009-120 dea

1592+13.40    -1215.244228' EL  226.699  CHAIN 11SD5A2 N 1904428.1301125 E
6260338.1879600
                FEATURE:REFR PD:, Monument              REFR10580
                CM:2009-120 dea
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1540+92.73        70.71' EL  272.093  CHAIN 11SD5A2 N 1899211.753 E 6261153.206
                FEATURE:REFR PD:46920R, Test bore hole          REFR7000
                CM:2008-140 WGS
1545+22.57        84.39' EL  278.612  CHAIN 11SD5A2 N 1899638.566 E 6261205.922
                FEATURE:REFR PD:47080R, Test bore hole          REFR7001
                CM:2008-140 WGS
1594+91.05      -124.04' EL  227.440  CHAIN 11SD5A2 N 1904605.417 E 6261450.121
                FEATURE:REFR PD:48560L, Test bore hole          REFR7007
                CM:2008-140 WGS
1599+61.19       -82.64' EL  209.498  CHAIN 11SD5A2 N 1905069.845 E 6261534.091
                FEATURE:REFR PD:48720L, Test bore hole          REFR7006
                CM:2008-140 WGS
1602+75.52       -68.65' EL  200.708  CHAIN 11SD5A2 N 1905381.603 E 6261576.611
                FEATURE:REFR PD:48920L, Test bore hole          REFR7005
                CM:2008-140 WGS
1614+09.20       -67.21' EL  169.156  CHAIN 11SD5A2 N 1906514.035 E 6261727.860
                FEATURE:REFR PD:49175L, Test bore hole          REFR7004
                CM:2008-140 WGS
1624+82.85        98.79' EL  133.248  CHAIN 11SD5A2 N 1907486.871 E 6262218.391
                FEATURE:REFR PD:49600R, Test bore hole          REFR7002
                CM:2008-140 WGS
1627+60.29      -130.80' EL  122.923  CHAIN 11SD5A2 N 1907823.487 E 6262090.432
                FEATURE:REFR PD:49380L, Test bore hole          REFR7098
                CM:2008-140 WGS
```

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CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5L1

1628+74.04       129.38' EL  123.586  CHAIN 11SD5L1 N 1907857.004 E 6262344.992
                FEATURE:REFR PD:49700R, Test  o e hole          REFR7003
                CM:2008-140   S
1631+46.17      -206.22' EL  101.456  CHAIN 11SD5L1 N 1908222.752 E 6262114.959
                FEATURE:REFR PD:49460L, Test  o e hole          REFR7095
                CM:2008-140   S
1638+08.07      -351.21' EL   64.895  CHAIN 11SD5L1 N 1908865.588 E 6262163.877
                FEATURE:REFR PD:49820L, Test  o e hole          REFR7097
                CM:2008-140   S
1640+04.30      -318.02' EL   54.377  CHAIN 11SD5L1 N 1909031.717 E 6262229.959
                FEATURE:REFR PD:49940L, Test  o e hole          REFR7096
                CM:2008-140   S
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1594+24.68      -350.90' EL  178.166  CHAIN 11SD5A2 N 1904559.951 E 6261218.167
                FEATURE:REFR PD:48580L, Test bore hole          REFR48580
                CM:2008-168 rrv
1595+59.67      -243.72' EL  185.301  CHAIN 11SD5A2 N 1904684.636 E 6261337.175
                FEATURE:REFR PD:48630L, Test bore hole          REFR48630
                CM:2008-168 rrv
1597+53.40      -193.21' EL  183.628  CHAIN 11SD5A2 N 1904872.968 E 6261405.085
                FEATURE:REFR PD:48680L, Test bore hole          REFR48680
                CM:2008-168 rrv
1599+05.56      -170.82' EL  182.201  CHAIN 11SD5A2 N 1905022.466 E 6261441.221
                FEATURE:REFR PD:48740L, Test bore hole          REFR48740
                CM:2008-168 rrv
```

```
CAiCE
STATION & OFFSET REPORT FROM CHAIN 11SD5A2

1586+68.40      1106.39' EL  303.810  CHAIN 11SD5A2 N 1903674.290 E 6262600.650
                FEATURE: PD:             H8002
                CM:SR 09-125 dea
1587+50.65       742.03' EL  288.830  CHAIN 11SD5A2 N 1903789.330 E 6262245.280
                FEATURE: PD:             H8001
                CM:SR 09-125 dea
```

APPENDIX III
LABORATORY TEST DATA

CORROSION TEST RESULTS SUMMARY

Retaining Wall	Location	SIC No.	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
RW-1, RW-2, RW-3	011-478+81-42L-B01		940	6.67	177	61
RW-1, RW-2, RW-3	011-482+40-58L-B02		820	6.95	356	210
RW-4	011-479+28-23R-B01		1,300	7.50	150	298
RW-4	011-481+74-40R-B02		2,600	5.43	56	191
RW-8	011-487+10-40R-B01		5,000	6.81	56	43

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exit: Chloride concentration is greater than or equal to five hundred-parts per million (500ppm), sulfate concentration is greater than or equal to two thousand-parts per million (2000ppm), or the pH is five and one-half (5.5) or less.

GEOCON

SOIL LABORATORY

RECEIVING ORDER AND SCHEDULE OF TEST

PROJECT NO. G1398-52-01

DATE 10/31/2011 SHEET 1 OF 1

PROJECT NAME I-5/GENESEE AVE IMPROVEMENT PROJECT

ENGINEER / GEOLOGIST B. HINMAN TECHNICIAN B. HINMAN

SAMPLE DESCRIPTION, (NUMBER OF): BULK 5 CLOTH BAGS BUCKETS, ____ PLASTIC BAGS, ____ SHELBY TUBES, ____ BRASS LINERS

LAB NO. 2297

DATE TO BE COMPLETED ASAP

DATE COMPLETED

SAMPLE NO	SAMPLE TYPE	MOISTURE - DENSITY - RING	MOISTURE - DENSITY - WAX	PLASTICITY INDEX	GRAINSIZE ANALYSIS - HYDRO	SIEVE ANALYSIS	SPECIFIC GRAVITY - SOIL	SPECIFIC GRAVITY - AGGREGATE	DIRECT SHEAR (KIPS / SQFT.) NORMAL PRESSURES 1	2	4	RESIDUAL	EXPANSION INDEX	CONSOLIDATION MAX. LOAD (KIPS)	UNLOADING (CHECK)	SATURATE AT (KIPS)	ASPHALT	PH & RESISTIVITY	COMPACTION CURVE	CHLORIDE	"R" VALUE	SAND EQUIVALENT	SULFATE	CONCRETE CYLINDER	REMARKS
011-478+	81-42L-B01																	X		X			X		#1
011-482+	40-58L-B02																	X		X			X		#2
011-479+	28-23R-B01																	X		X			X		#3
011-481+	74-40R-B02																	X		X			X		#4
011-487+	10-40R-B01																	X		X			X		#5
TOTAL																									

Chloride Sample #s

Brian (858) 467 4051

SAMPLE TYPE
R = RING
B = BAG
PB = PLASTIC BAG
CK = CHUNK
KB = KNOCKER BAR

L-102A / X-XX10 / RSS

MISC. TESTING AND REMARKS Richard_Rusnak@DOT.CA.Gov (858) 467-4065

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5/Genesee Ave Imp.
Number:	G1398-52-01
Date	11-2-11
Tech:	JO

SILVER NITRATE SOLUTION 1ml = **0.5** mg Cl

SAMPLE NUMBER	0-11-478+81 -42L-B01	0-11-482+40 -58L-B02	0-11 479+28 -23R-B01	0-11-481+74 -40R-B02	0-11-487+60 -40R-B01	
BLANK	0.3	0.3	0.3	0.3	0.3	
DRY MASS	200	200	200	200	200	
WET MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.4	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	30.00
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	177	356	150	56	56	
% CHLORIDE	0.018	0.036	0.015	0.006	0.006	

Remarks:

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-478+81-42L-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	6.5	6500
20	1K	3.8	3800
20	1K	2.4	2400
20	1K	1.7	1700
20	1K	1.4	1400
20	1K	1.2	1200
20	1K	1.1	1100
20	1K	1.0	1000
20	100	9.4	940
20	1K	1.0	1000
20	1K	1.2	1200

MINIMUM RESISTIVITY (OHM CM) : 940

PH: 6.67

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER B1398-52-01

DATE 11-4-11

TECHNICIAN JO

SAMPLE NUMBER 0.11-482+40-58L-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	5.3	5300
20	1k	2.1	2100
20	1k	1.6	1600
20	1k	1.0	1000
20	100	8.8	880
20	100	8.2	820
20	100	8.7	870
20	100	9.5	950

MINIMUM RESISTIVITY (OHM CM) : 820

PH: 6.95

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5 / Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SO

SAMPLE NUMBER 0-11-479 + 28-23R B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1k	4.3	4300
20	1k	3.4	3400
20	1k	2.6	2600
20	1k	1.7	1700
20	1k	1.5	1500
20	1k	1.3	1300
20	1k	1.4	1400
20	1k	1.4	1400

MINIMUM RESISTIVITY (OHM CM) : 1300 ✓

PH: 7.50

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1398-52-01

DATE 11-4-11

TECHNICIAN SD

SAMPLE NUMBER 0-11-481+74 40R-B02

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR

SMALL BOX = 1.0

LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	9.1	9100
20	1K	5.3	5300
20	1K	3.9	3900
20	1K	3.1	3100
20	1K	3.0	3100
20	1K	2.6	2600
20	1K	2.7	2700
20	1K	3.2	3200

MINIMUM RESISTIVITY (OHM CM) : 2600

PH: 5.43

GEOCON

INCORPORATED

41571 Corning Place, Suite 101 * Murrirta, CA 92562-7605

PROJECT NAME I-5/Genesee

PROJECT NUMBER G1388-52-01

DATE 11-4-11

TECHNICIAN JD

SAMPLE NUMBER 0.11 487+10 -40R-B01

CORROSIVITY TEST DATA

CAL 634

VOLUME FACTOR
SMALL BOX = 1.0
LARGE BOX = 6.76

1.0

MOISTURE ADDED	RESISTIVITY OHMS MULT BY	OHMS	RESISTIVITY
20	1K	8.4	8400
20	1K	7.9	7900
20	1K	7.2	7200
20	1K	6.0	6000
20	1K	5.4	5400
20	1K	5.2	5200
20	1K	5.0	5000
20	1K	5.3	5300
20	1K	5.3	5300

MINIMUM RESISTIVITY (OHM CM) : 5000

PH: 6.81

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / Genesee Ave Improvement
Project Number: G1398-52-01
Date: 11-2-11 Technician: JD

Sample No. 0-11-478+81-42L-B01			
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
			0.006

Sample No. 0-11-482+40-58L-B02			
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
			0.021

Sample No. 0-11-479+28-23R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
			0.030

Sample No. 0-11-481+74-40R-B02			
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84.0	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
			0.019

Sample No. 0-11-487+10-40R-B01			
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
			0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight			
Dilution			
Time (minutes)	Blank	Reading	
0:30			
1:00			
1:30			
2:00			

GEOCON

6960 FLANDER DRIVE SAN DIEGO CA 92121

CHLORIDE CONTENT

AASHTO T291-94

Project:	I-5 / GENESEE AVE IMPROV.
Number:	G1398-52-01
Date	11/2/2011
Tech:	JD

SILVER NITRATE SOLUTION **0.5** mg Cl

SAMPLE NUMBER	1	2	3	4	5	
BLANK	0.3	0.3	0.3	0.3	0.3	
WET MASS	200.0	200.0	200.0	200.0	200.0	
DRY MASS	187.6	193.9	193.5	196.5	195.9	
MOISTURE CONTENT	6.6	3.1	3.4	1.8	2.1	
PH (6.0 TO 8.0)	OK	OK	OK	OK	OK	
SAMPLE MASS	30.00	30.00	30.00	30.00	30.00	
TITRATION						
start	0.0	0.0	13.0	14.8	16.2	
end	3.6	7.2	16.2	16.2	17.6	
AgNO4	3.6	7.2	3.2	1.4	1.4	
PPM	**177**	**356**	**150**	**56**	**56**	
% CHLORIDE	**0.018**	**0.036**	**0.015**	**0.006**	**0.006**	

Remarks: SEE SCHEDULING SHEET TO MATCH GEOCON SAMPLE NUMBERS TO CALTRAN SAMPLE NUMBERS.

GEOCON

GEOCON INC 6960 FLANDERS DRIVE SAN DIEGO CA 92121

SULFATE CONTENT CAL TEST 417

Project Name: I-5 / GENESEE AVE IMPROVEMENTS

Project Number: G1398-52-01

Date: 11/2/2011 Technician: JD

Sample No.	0-11-478+81-42L-B01		
Wet Weight	200	Moisture Content	
Dry Weight	187.6	6.6	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	163	179	16
1:00	156	178	22
1:30	155	178	23
2:00	156	178	22
PPM	61		0.006

Sample No.	0-11-482+40-58L-B02		
Wet Weight	200	Moisture Content	
Dry Weight	193.9	3.1	
Dilution	2		
Time (minutes)	Blank	Reading	
0:30	117	155	38
1:00	115	156	41
1:30	115	155	40
2:00	115	155	40
PPM	210		0.021

Sample No.	0-11-479+28-23R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	193.5	3.4	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	159	241	82
1:00	143	243	100
1:30	132	243	111
2:00	127	243	116
PPM	298		0.030

Sample No.	0-11-481+74-40R-B02		
Wet Weight	200	Moisture Content	
Dry Weight	196.5	1.8	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	83.8	159	75.2
1:00	84	159	75
1:30	83.4	159	75.6
2:00	83.5	159	75.5
PPM	191		0.019

Sample No.	0-11-487+10-40R-B01		
Wet Weight	200	Moisture Content	
Dry Weight	195.9	2.1	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30	38.5	48.7	10.2
1:00	38.7	49.9	11.2
1:30	37.7	54.7	17
2:00	37.5	48.9	11.4
PPM	43		0.004

Sample No.			
Wet Weight		Moisture Content	
Dry Weight		#DIV/0!	
Dilution	1		
Time (minutes)	Blank	Reading	
0:30			0
1:00			0
1:30			0
2:00			0
PPM	#DIV/0!		#DIV/0!

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 5/1/2009

To: Mike Fordham / GDS-2

From: Lilibeth C. Purta / (916) 227-5434

RE: Laboratory Test Report -- EA: 11-022330
GL 08-135

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

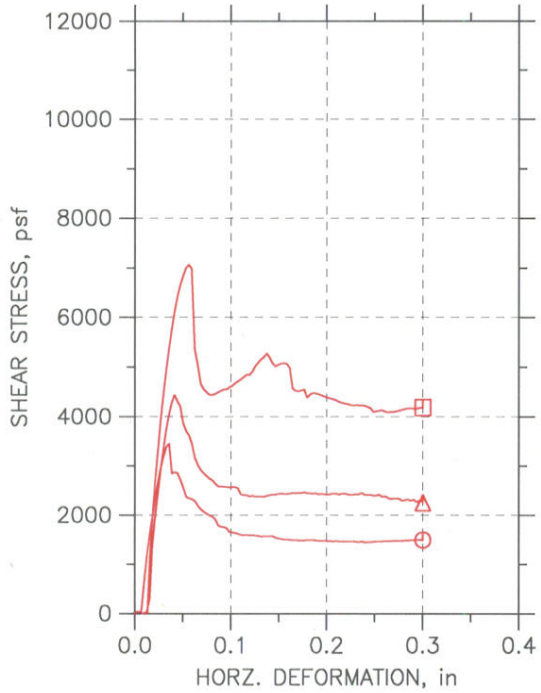
CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

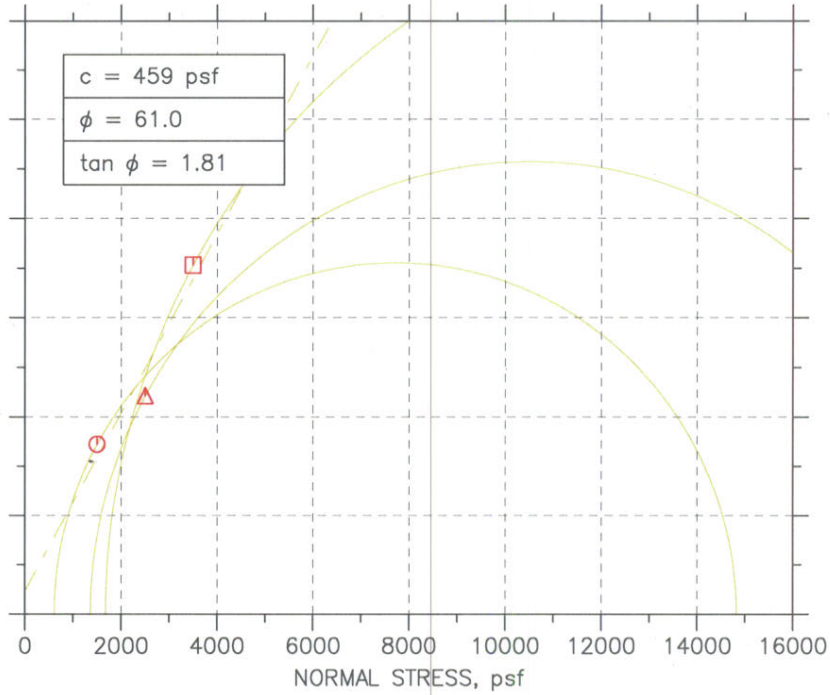
GL TRACKING NO : 08-135
Dist - EA: 11-022330
Report Date: May 1, 2009
Page: 1/1

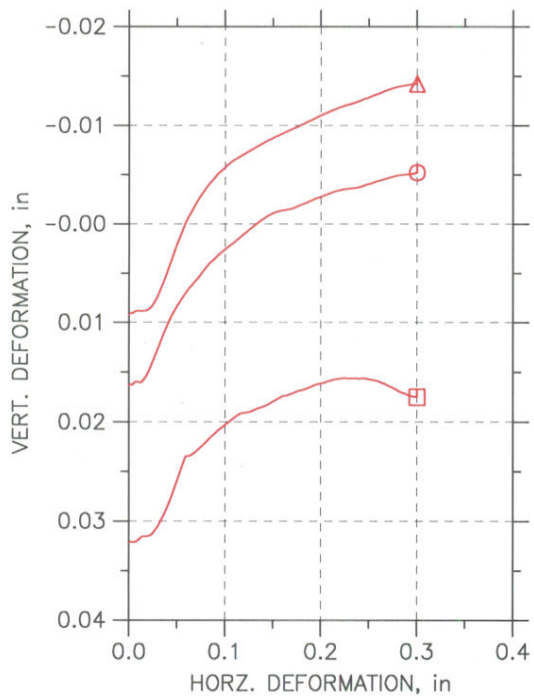
CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
10580R_1								100	91	84	82	80	78	76	71	18	7	45	21		14.1	
10700L_1																					16.7	
48040R_2												100	92	47	20	6	1		NP		11.0	
48040R_3											100	94	51	26	16	4	1		NP		7.6	
48040R_4																					18.1	

DIRECT SHEAR TEST REPORT





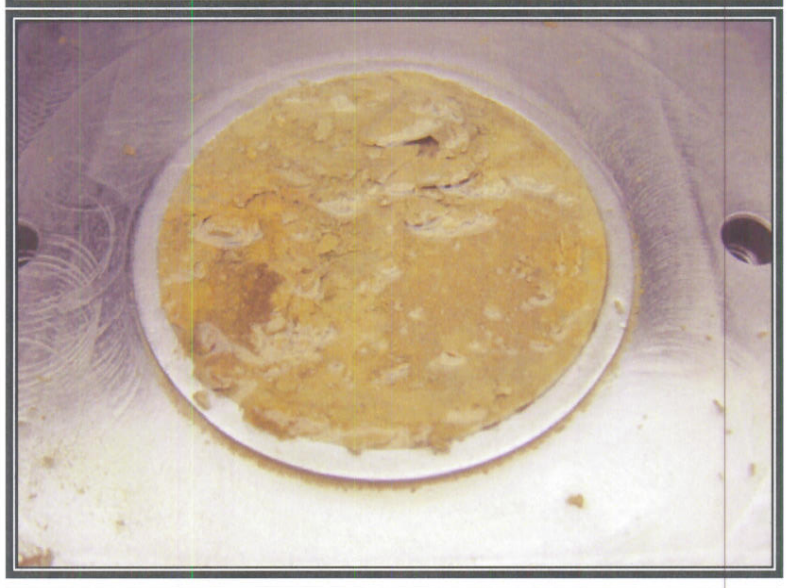


Symbol		⊙	△	⊡	
Test No.		DS08081A	DS08081B	DS08081C	
Sample No.		1	1	1	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	1.94	1.94	1.94	
	Area, in^2	2.9559	2.9559	2.9559	
	Height, in	1	1	1	
	Water Content, %	17.85	18.36	17.42	
	Dry Density, pcf	110.45	113.03	114.7	
	Saturation, %	88.57	97.29	96.42	
	Void Ratio	0.55434	0.51889	0.49671	
Consol. Height, in		0.9838	0.99092	0.96807	
Consol. Void Ratio		0.52916	0.5051	0.44892	
Final	Water Content, %	20.42	19.61	17.08	
	Dry Density, pcf	109.88	111.44	116.75	
	Saturation, %	99.85	99.79	99.82	
	Void Ratio	0.56241	0.54048	0.47049	
Normal Stress, psf		1500.4	2506.9	3503	
Max. Shear Stress, psf		3443.3	4430.8	7061.7	
Ult. Shear Stress, psf		1491.4	2253.4	4185	
Time to Failure, min		13.003	15.001	20.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

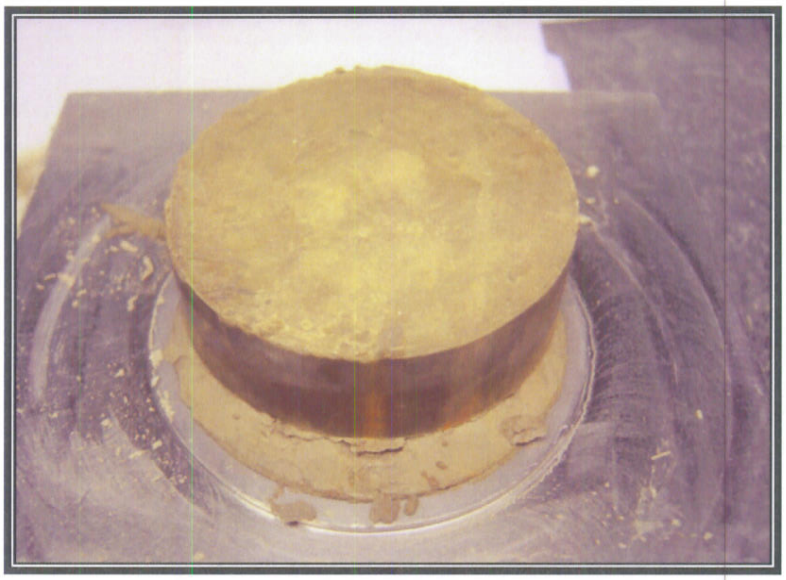
Project: Genesee Widening
Location: 11-SD-8-R22.4-R55.8
Project No.: 11-022330 ELEVATION 177.3FT
Boring No.: 10700L
Sample Type: 2" BRASS
Description: Moist, Very Stiff, Tan, Clayey Silt. Sheared before sample could swell.
Remarks: ASTM D3080

WP 12/12

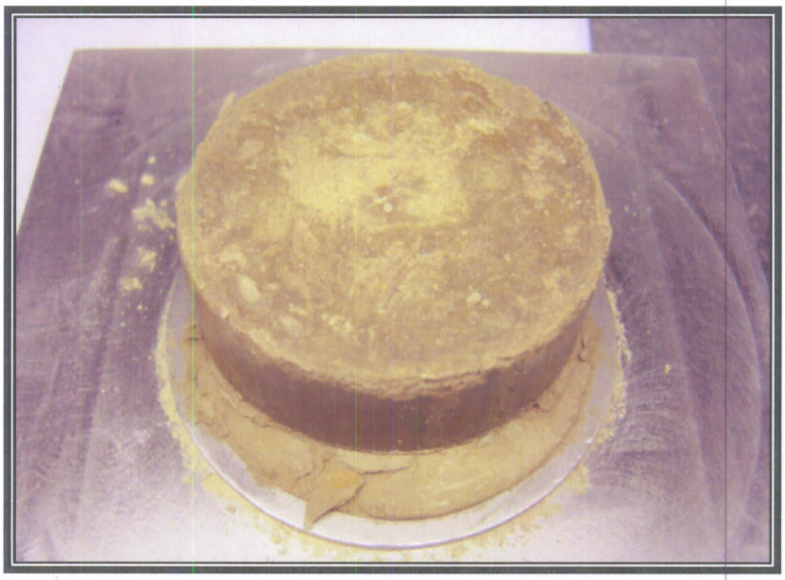
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen A



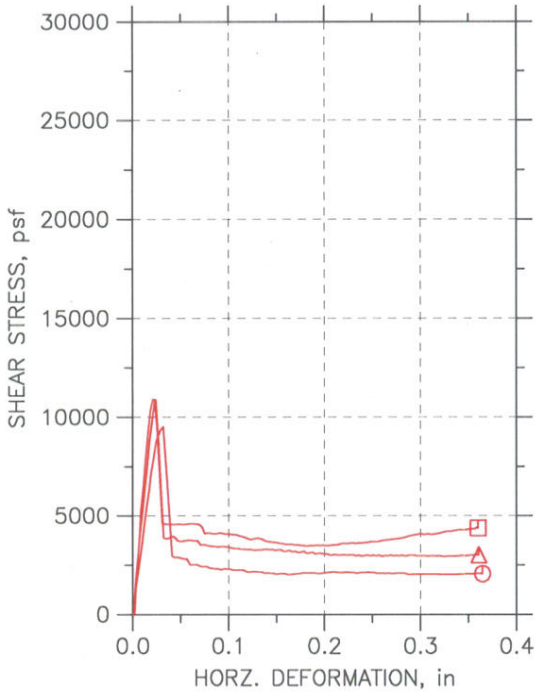
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen B

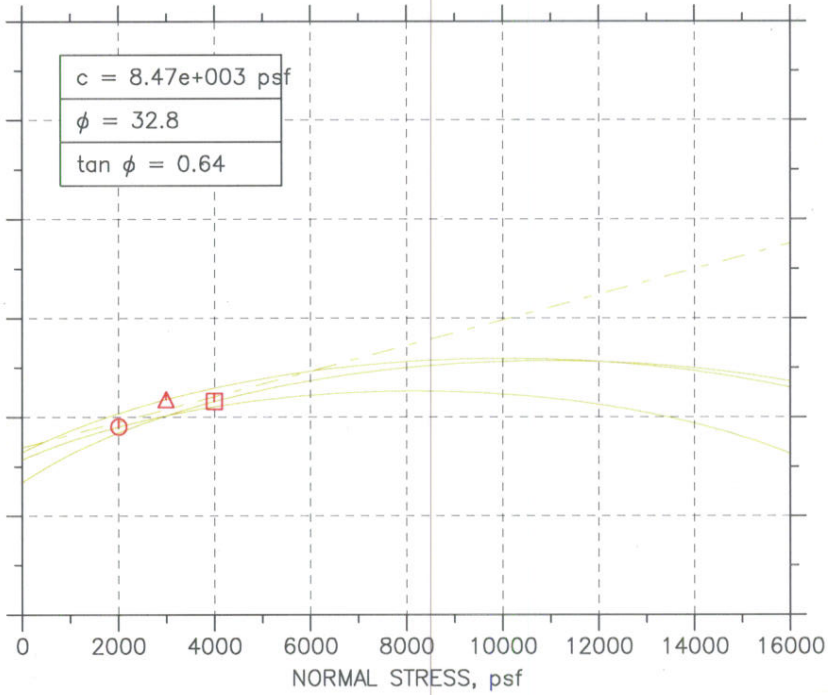


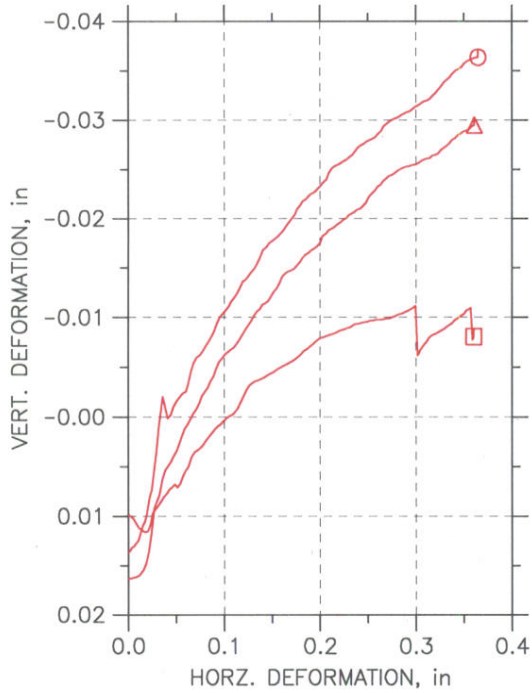
DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 10700L_1
Test Specimen C



DIRECT SHEAR TEST REPORT





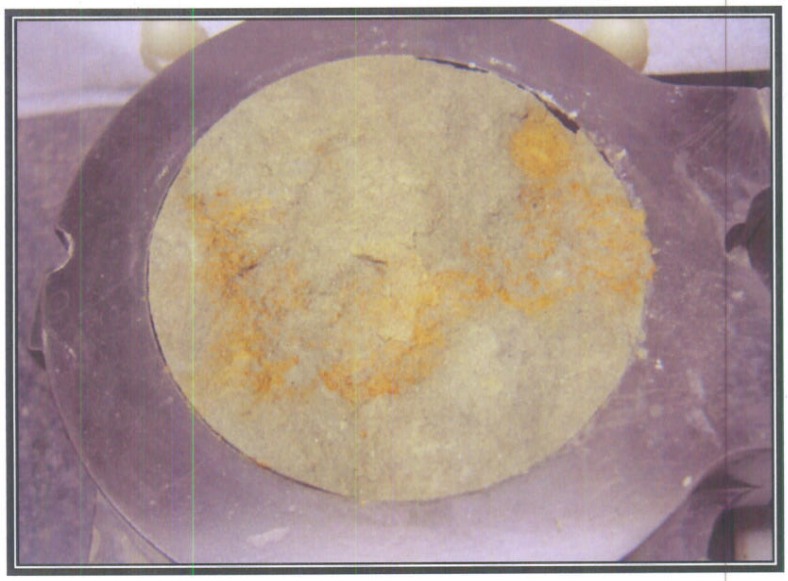


Symbol		⏲	△	⊡	
Test No.		DS08082A	DS08082B	DS08082C	
Sample No.		4	4	4	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.37	2.37	2.37	
	Area, in^2	4.4115	4.4115	4.4115	
	Height, in	1	1	1	
	Water Content, %	16.05	17.70	20.80	
	Dry Density, pcf	107.08	109.76	105.44	
	Saturation, %	73.16	86.29	91.07	
	Void Ratio	0.60324	0.56414	0.62819	
Consol. Height, in		0.98676	0.9837	0.99073	
Consol. Void Ratio		0.58201	0.53863	0.6131	
Final	Water Content, %	21.61	20.14	22.11	
	Dry Density, pcf	103.33	106.62	104.6	
	Saturation, %	89.85	90.77	94.83	
	Void Ratio	0.66149	0.61022	0.64126	
Normal Stress, psf		2016.4	3000.8	4003.7	
Max. Shear Stress, psf		9518.7	10902	10804	
Ult. Shear Stress, psf		2036.2	2996.2	4359.8	
Time to Failure, min		14.001	11.002	11.002	
Disp. Rate, in/min		0.003	0.003	0.003	
Implied Specific Gravity		2.75	2.75	2.75	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

Project: Genesee Widening	
Location: 11-SD-8-R22.4-R55.8	
Project No.: 11-022330	
Boring No.: 48040R	
Sample Type: 2" Brass	
Description: Moist, Very Stiff, Tan with Red, Clayey Silt. Sheared before sample could swell.	
Remarks: ASTM D3080	

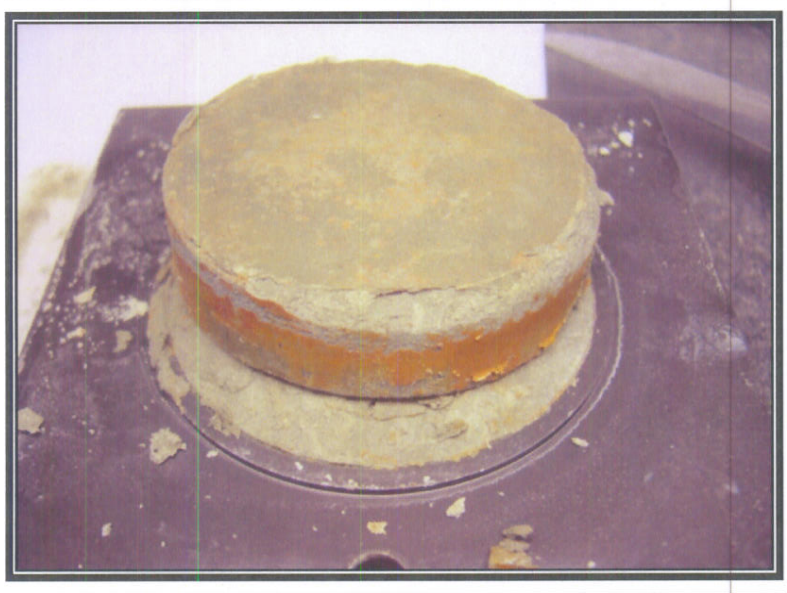
WP 12/12

DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen A



DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen B

DIRECT SHEAR
JOB #: use 11-022330
SAMPLE #: 48040R_4
Test Specimen C



CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
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CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
46920R_01									100	96	94	92	90	88	83	27	11	43	19		28.4	
46920R_02																		47	21		23.1	2.78
46980R_03									100	91	85	83	81	80	76	26	4	44	19		25.4	
46980R_04																		46	20		24.7	2.72
48560L_02									100	88	83	80	76	67	54	16	9				21.2	
48560L_04																		37	17		19.0	2.72
48560L_06												100	95	59	17	6	3				18.9	
48560L_14																		50	23		27.1	2.75
48580L_02								100	93	93	92	91	85	66	50	17	10				10.7	
48580L_07									100	98	96	95	93	89	82	24	9	45	19		25.8	
48580L_08									100	94	91	88	86	83	78	24	9				20.8	2.76
48580L_09								100	84	84	84	84	84	84	82	33	13	49	24		21.0	
48630L_06									100	99	99	98	96	94	88	30	14				16.1	2.74
48630L_07																		47	20		18.4	2.75
48630L_08									100	94	90	87	85	83	75	21	7				18.8	2.77
48630L_09									100	95	93	91	89	87	83	28	11				16.8	2.76
48630L_10																		43	18		21.8	2.80
48680L_04									100	94	90	88	85	77	62	22	13				14.2	2.73
48680L_07									100	99	99	98	92	73	49	28	19				15.9	2.71
48680L_08									100	99	99	98	91	69	49	23	13	27	9		20.4	
48680L_10									100	98	97	97	95	91	84	26	9	47	22		21.3	
48720L_04					100	81	72	71	53	52	51	50	45	39	33	12	6				16.8	
48720L_11						100	99	98	96	95	95	94	86	63	37	13	7				20.7	
48720L_14				100	90	90	88	88	87	87	87	86	82	67	50	22	14	31	15		18.9	
48720L_15																					21.7	2.71
48740L_02									100	97	95	93	91	84	68	22	8				7.0	2.72
48740L_09									100	88	83	81	79	73	59	21	10				16.2	2.71
48740L_11								100	99	98	98	96	88	71	51	26	17	26	11		20.5	

Note: Boring location shown on Geotechnical Design Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Figure 2

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 08-070
Dist - EA: 11-022330
Report Date: July 18, 2008
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CLASSIFICATION TEST SUMMARY

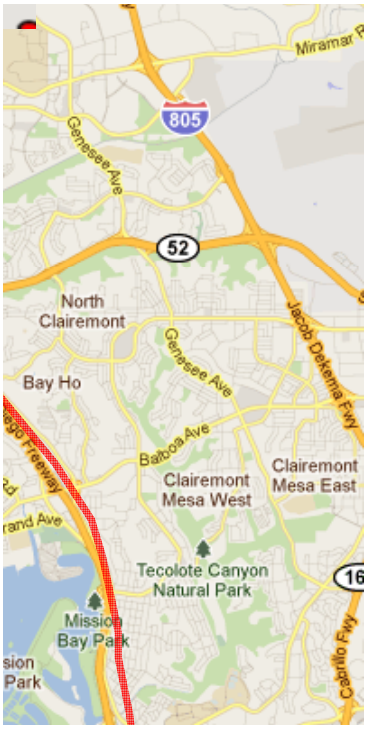
SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
48740L_12									100	99	99	93	65	53	47	23	13	24	8		30.0	
48740L_13									100	99	98	94	74	52	40	20	10	25	10		22.8	
48740L_15												100	98	91	79	31	14	34	16		20.6	
48740L_16											100	99	95	80	60	23	12	28	11		16.2	
48920L_04									100	90	85	83	80	72	53	14	7				18.5	2.73
48920L_07					100	97	92	87	74	73	73	72	68	60	52	18	8	34	16		26.7	
48920L_15								100	95	95	94	94	86	67	52	27	18	28	12		20.5	
48920L_19																		49	21		23.5	2.75
49175L_05									100	88	84	81	79	78	73	25	10	40	19		22.1	
49175L_07									100	94	91	88	76	61	48	12	4				19.3	2.75
49600R_02					100	95	76	63	47	46	45	44	43	41	38	15	1	45	23		19.9	
49600R_08									100	94	92	91	83	60	39	13	5				23.1	2.74
49700R_01									100	78	73	68	61	55	49	20	9	39	16		21.4	
49700R_08									100	99	98	98	97	96	93	36	10				22.9	2.74
49940L_02									100	90	83	79	76	74	71	28	13				15.4	2.79

Note: Boring location shown on Geotechnical Design Report, Interstate-5/Genesee Avenue Interchange Improvement Project, Figure 2

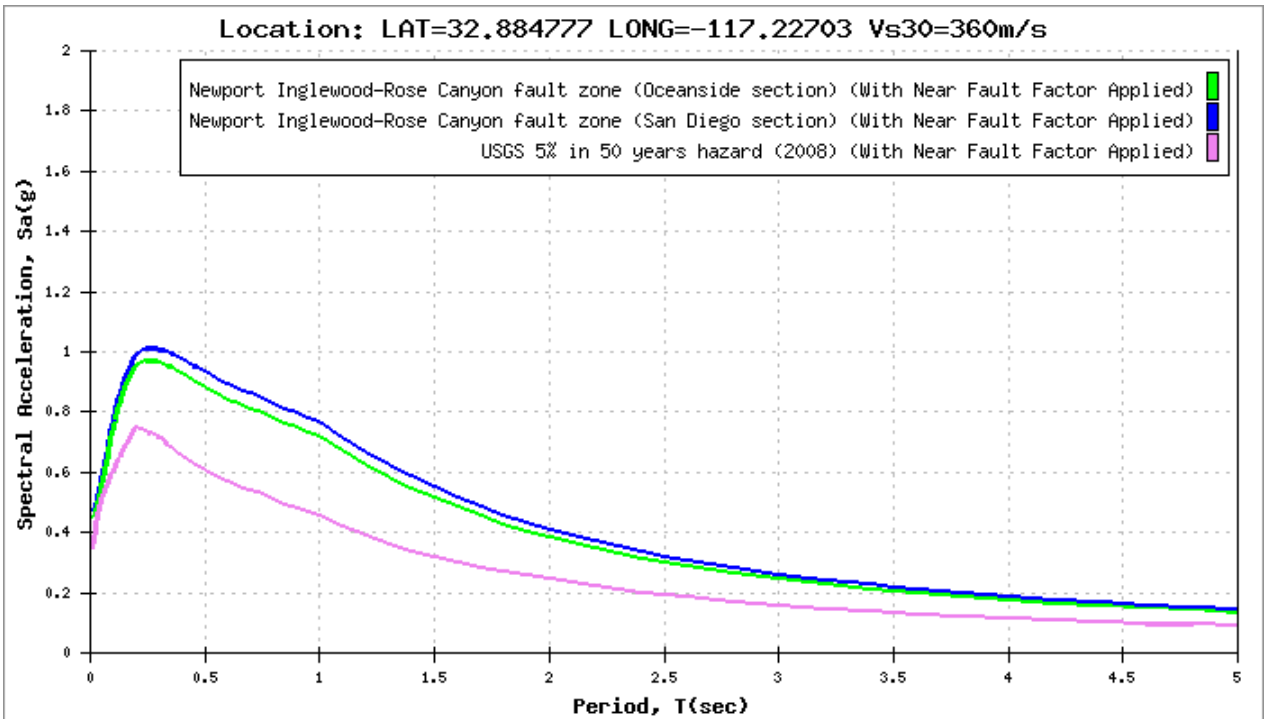
APPENDIX IV

ANALYSES & CALCULATIONS

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	360 m/s
Latitude:	32.884777
Longitude:	-117.227030
Depth to Vs = 1.0 km/s:	264 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Oceanside section)

Fault ID:	223
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.21 km
Rjb:	4.21 km
Rx:	4.21 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.451	1.000	1.000	0.451
0.02	0.460	1.000	1.000	0.460
0.022	0.465	1.000	1.000	0.465
0.025	0.473	1.000	1.000	0.473
0.029	0.483	1.000	1.000	0.483
0.03	0.486	1.000	1.000	0.486
0.032	0.493	1.000	1.000	0.493
0.035	0.503	1.000	1.000	0.503
0.036	0.507	1.000	1.000	0.507
0.04	0.521	1.000	1.000	0.521
0.042	0.528	1.000	1.000	0.528
0.044	0.535	1.000	1.000	0.535
0.045	0.539	1.000	1.000	0.539
0.046	0.543	1.000	1.000	0.543
0.048	0.550	1.000	1.000	0.550
0.05	0.557	1.000	1.000	0.557
0.055	0.577	1.000	1.000	0.577
0.06	0.596	1.000	1.000	0.596

0.065	0.615	1.000	1.000	0.615
0.067	0.623	1.000	1.000	0.623
0.07	0.634	1.000	1.000	0.634
0.075	0.653	1.000	1.000	0.653
0.08	0.672	1.000	1.000	0.672
0.085	0.692	1.000	1.000	0.692
0.09	0.711	1.000	1.000	0.711
0.095	0.730	1.000	1.000	0.730
0.1	0.748	1.000	1.000	0.748
0.11	0.780	1.000	1.000	0.780
0.12	0.810	1.000	1.000	0.810
0.13	0.837	1.000	1.000	0.837
0.133	0.844	1.000	1.000	0.844
0.14	0.859	1.000	1.000	0.859
0.15	0.879	1.000	1.000	0.879
0.16	0.898	1.000	1.000	0.898
0.17	0.915	1.000	1.000	0.915
0.18	0.930	1.000	1.000	0.930
0.19	0.943	1.000	1.000	0.943
0.2	0.955	1.000	1.000	0.955
0.22	0.964	1.000	1.000	0.964
0.24	0.971	1.000	1.000	0.971
0.25	0.973	1.000	1.000	0.973
0.26	0.972	1.000	1.000	0.972
0.28	0.971	1.000	1.000	0.971
0.29	0.968	1.000	1.000	0.968
0.3	0.966	1.000	1.000	0.966
0.32	0.960	1.000	1.000	0.960
0.34	0.953	1.000	1.000	0.953
0.35	0.949	1.000	1.000	0.949
0.36	0.945	1.000	1.000	0.945
0.38	0.936	1.000	1.000	0.936
0.4	0.926	1.000	1.000	0.926
0.42	0.918	1.000	1.000	0.918
0.44	0.909	1.000	1.000	0.909
0.45	0.904	1.000	1.000	0.904
0.46	0.900	1.000	1.000	0.900
0.48	0.891	1.000	1.000	0.891
0.5	0.882	1.000	1.000	0.882
0.55	0.843	1.000	1.020	0.860
0.6	0.808	1.000	1.040	0.841
0.65	0.777	1.000	1.060	0.823
0.667	0.767	1.000	1.067	0.818
0.7	0.748	1.000	1.080	0.808
0.75	0.722	1.000	1.100	0.794
0.8	0.693	1.000	1.120	0.777

0.85	0.667	1.000	1.140	0.761
0.9	0.643	1.000	1.160	0.746
0.95	0.620	1.000	1.180	0.732
1	0.599	1.000	1.200	0.719
1.1	0.557	1.000	1.200	0.668
1.2	0.520	1.000	1.200	0.624
1.3	0.486	1.000	1.200	0.583
1.4	0.456	1.000	1.200	0.547
1.5	0.429	1.000	1.200	0.514
1.6	0.402	1.000	1.200	0.482
1.7	0.378	1.000	1.200	0.453
1.8	0.356	1.000	1.200	0.427
1.9	0.337	1.000	1.200	0.404
2	0.319	1.000	1.200	0.383
2.2	0.287	1.000	1.200	0.344
2.4	0.260	1.000	1.200	0.312
2.5	0.249	1.000	1.200	0.298
2.6	0.238	1.000	1.200	0.286
2.8	0.219	1.000	1.200	0.263
3	0.202	1.000	1.200	0.243
3.2	0.188	1.000	1.200	0.225
3.4	0.175	1.000	1.200	0.210
3.5	0.169	1.000	1.200	0.203
3.6	0.164	1.000	1.200	0.197
3.8	0.154	1.000	1.200	0.184
4	0.145	1.000	1.200	0.174
4.2	0.137	1.000	1.200	0.164
4.4	0.130	1.000	1.200	0.156
4.6	0.123	1.000	1.200	0.148
4.8	0.118	1.000	1.200	0.141
5	0.112	1.000	1.200	0.135

Newport Inglewood-Rose Canyon fault zone (San Diego section)

Fault ID:	224
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	3.44 km
Rjb:	3.44 km
Rx:	3.44 km
Fnorm:	0
Frev:	0

SA	**Near**	**SA**

Period	(Base Spectrum)	Basin Factor	Fault Factor (Applied)	(Final Spectrum)
0.01	0.473	1.000	1.000	0.473
0.02	0.481	1.000	1.000	0.481
0.022	0.487	1.000	1.000	0.487
0.025	0.495	1.000	1.000	0.495
0.029	0.506	1.000	1.000	0.506
0.03	0.508	1.000	1.000	0.508
0.032	0.516	1.000	1.000	0.516
0.035	0.527	1.000	1.000	0.527
0.036	0.530	1.000	1.000	0.530
0.04	0.545	1.000	1.000	0.545
0.042	0.552	1.000	1.000	0.552
0.044	0.560	1.000	1.000	0.560
0.045	0.563	1.000	1.000	0.563
0.046	0.567	1.000	1.000	0.567
0.048	0.575	1.000	1.000	0.575
0.05	0.582	1.000	1.000	0.582
0.055	0.601	1.000	1.000	0.601
0.06	0.621	1.000	1.000	0.621
0.065	0.640	1.000	1.000	0.640
0.067	0.648	1.000	1.000	0.648
0.07	0.659	1.000	1.000	0.659
0.075	0.678	1.000	1.000	0.678
0.08	0.697	1.000	1.000	0.697
0.085	0.717	1.000	1.000	0.717
0.09	0.736	1.000	1.000	0.736
0.095	0.755	1.000	1.000	0.755
0.1	0.773	1.000	1.000	0.773
0.11	0.806	1.000	1.000	0.806
0.12	0.837	1.000	1.000	0.837
0.13	0.864	1.000	1.000	0.864
0.133	0.871	1.000	1.000	0.871
0.14	0.887	1.000	1.000	0.887
0.15	0.907	1.000	1.000	0.907
0.16	0.928	1.000	1.000	0.928
0.17	0.945	1.000	1.000	0.945
0.18	0.962	1.000	1.000	0.962
0.19	0.976	1.000	1.000	0.976
0.2	0.989	1.000	1.000	0.989
0.22	1.001	1.000	1.000	1.001
0.24	1.010	1.000	1.000	1.010
0.25	1.013	1.000	1.000	1.013
0.26	1.012	1.000	1.000	1.012
0.28	1.012	1.000	1.000	1.012

0.29	1.011	1.000	1.000	1.011
0.3	1.009	1.000	1.000	1.009
0.32	1.005	1.000	1.000	1.005
0.34	0.999	1.000	1.000	0.999
0.35	0.995	1.000	1.000	0.995
0.36	0.991	1.000	1.000	0.991
0.38	0.983	1.000	1.000	0.983
0.4	0.974	1.000	1.000	0.974
0.42	0.966	1.000	1.000	0.966
0.44	0.957	1.000	1.000	0.957
0.45	0.953	1.000	1.000	0.953
0.46	0.949	1.000	1.000	0.949
0.48	0.940	1.000	1.000	0.940
0.5	0.932	1.000	1.000	0.932
0.55	0.893	1.000	1.020	0.911
0.6	0.857	1.000	1.040	0.892
0.65	0.825	1.000	1.060	0.875
0.667	0.815	1.000	1.067	0.870
0.7	0.796	1.000	1.080	0.860
0.75	0.769	1.000	1.100	0.846
0.8	0.739	1.000	1.120	0.828
0.85	0.712	1.000	1.140	0.811
0.9	0.686	1.000	1.160	0.795
0.95	0.662	1.000	1.180	0.781
1	0.639	1.000	1.200	0.767
1.1	0.594	1.000	1.200	0.713
1.2	0.555	1.000	1.200	0.666
1.3	0.519	1.000	1.200	0.623
1.4	0.487	1.000	1.200	0.585
1.5	0.458	1.000	1.200	0.550
1.6	0.430	1.000	1.200	0.516
1.7	0.404	1.000	1.200	0.485
1.8	0.381	1.000	1.200	0.457
1.9	0.360	1.000	1.200	0.432
2	0.341	1.000	1.200	0.410
2.2	0.307	1.000	1.200	0.368
2.4	0.279	1.000	1.200	0.334
2.5	0.266	1.000	1.200	0.319
2.6	0.255	1.000	1.200	0.306
2.8	0.234	1.000	1.200	0.281
3	0.216	1.000	1.200	0.260
3.2	0.201	1.000	1.200	0.241
3.4	0.187	1.000	1.200	0.225
3.5	0.181	1.000	1.200	0.217
3.6	0.175	1.000	1.200	0.210
3.8	0.164	1.000	1.200	0.197

4	0.155	1.000	1.200	0.186
4.2	0.147	1.000	1.200	0.176
4.4	0.139	1.000	1.200	0.167
4.6	0.132	1.000	1.200	0.159
4.8	0.126	1.000	1.200	0.151
5	0.120	1.000	1.200	0.144

PROBABILISTIC

Probabilistic Model
USGS Seismic Hazard Map(2008) 975 Year Return Period

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.347	1.000	1.000	0.347
0.02	0.410	1.000	1.000	0.410
0.022	0.419	1.000	1.000	0.419
0.025	0.433	1.000	1.000	0.433
0.029	0.448	1.000	1.000	0.448
0.03	0.452	1.000	1.000	0.452
0.032	0.459	1.000	1.000	0.459
0.035	0.469	1.000	1.000	0.469
0.036	0.472	1.000	1.000	0.472
0.04	0.485	1.000	1.000	0.485
0.042	0.490	1.000	1.000	0.490
0.044	0.496	1.000	1.000	0.496
0.045	0.499	1.000	1.000	0.499
0.046	0.501	1.000	1.000	0.501
0.048	0.507	1.000	1.000	0.507
0.05	0.512	1.000	1.000	0.512
0.055	0.524	1.000	1.000	0.524
0.06	0.535	1.000	1.000	0.535
0.065	0.545	1.000	1.000	0.545
0.067	0.549	1.000	1.000	0.549
0.07	0.555	1.000	1.000	0.555
0.075	0.564	1.000	1.000	0.564
0.08	0.573	1.000	1.000	0.573
0.085	0.582	1.000	1.000	0.582
0.09	0.590	1.000	1.000	0.590
0.095	0.598	1.000	1.000	0.598
0.1	0.605	1.000	1.000	0.605
0.11	0.623	1.000	1.000	0.623
0.12	0.639	1.000	1.000	0.639
0.13	0.655	1.000	1.000	0.655
0.133	0.659	1.000	1.000	0.659

0.14	0.670	1.000	1.000	0.670
0.15	0.684	1.000	1.000	0.684
0.16	0.697	1.000	1.000	0.697
0.17	0.710	1.000	1.000	0.710
0.18	0.723	1.000	1.000	0.723
0.19	0.735	1.000	1.000	0.735
0.2	0.746	1.000	1.000	0.746
0.22	0.740	1.000	1.000	0.740
0.24	0.734	1.000	1.000	0.734
0.25	0.731	1.000	1.000	0.731
0.26	0.728	1.000	1.000	0.728
0.28	0.724	1.000	1.000	0.724
0.29	0.721	1.000	1.000	0.721
0.3	0.719	1.000	1.000	0.719
0.32	0.704	1.000	1.000	0.704
0.34	0.690	1.000	1.000	0.690
0.35	0.683	1.000	1.000	0.683
0.36	0.677	1.000	1.000	0.677
0.38	0.664	1.000	1.000	0.664
0.4	0.653	1.000	1.000	0.653
0.42	0.643	1.000	1.000	0.643
0.44	0.633	1.000	1.000	0.633
0.45	0.628	1.000	1.000	0.628
0.46	0.623	1.000	1.000	0.623
0.48	0.615	1.000	1.000	0.615
0.5	0.606	1.000	1.000	0.606
0.55	0.573	1.000	1.020	0.584
0.6	0.544	1.000	1.040	0.566
0.65	0.519	1.000	1.060	0.550
0.667	0.511	1.000	1.067	0.545
0.7	0.497	1.000	1.080	0.536
0.75	0.477	1.000	1.100	0.524
0.8	0.454	1.000	1.120	0.508
0.85	0.433	1.000	1.140	0.493
0.9	0.414	1.000	1.160	0.480
0.95	0.397	1.000	1.180	0.469
1	0.382	1.000	1.200	0.458
1.1	0.350	1.000	1.200	0.420
1.2	0.323	1.000	1.200	0.388
1.3	0.301	1.000	1.200	0.361
1.4	0.281	1.000	1.200	0.337
1.5	0.264	1.000	1.200	0.317
1.6	0.249	1.000	1.200	0.299
1.7	0.236	1.000	1.200	0.283
1.8	0.224	1.000	1.200	0.268
1.9	0.213	1.000	1.200	0.255

2	0.203	1.000	1.200	0.244
2.2	0.183	1.000	1.200	0.220
2.4	0.167	1.000	1.200	0.200
2.5	0.159	1.000	1.200	0.191
2.6	0.153	1.000	1.200	0.183
2.8	0.141	1.000	1.200	0.169
3	0.130	1.000	1.200	0.157
3.2	0.121	1.000	1.200	0.145
3.4	0.113	1.000	1.200	0.135
3.5	0.109	1.000	1.200	0.131
3.6	0.105	1.000	1.200	0.126
3.8	0.099	1.000	1.200	0.119
4	0.093	1.000	1.200	0.112
4.2	0.089	1.000	1.200	0.107
4.4	0.085	1.000	1.200	0.102
4.6	0.082	1.000	1.200	0.098
4.8	0.079	1.000	1.200	0.094
5	0.076	1.000	1.200	0.091

Envelope Data

Period	SA
0.01	0.451
0.02	0.460
0.022	0.465
0.025	0.473
0.029	0.483
0.03	0.486
0.032	0.493
0.035	0.503
0.036	0.507
0.04	0.521
0.042	0.528
0.044	0.535
0.045	0.539
0.046	0.543
0.048	0.550
0.05	0.557
0.055	0.577
0.06	0.596
0.065	0.615
0.067	0.623
0.07	0.634
0.075	0.653

0.08	0.672
0.085	0.692
0.09	0.711
0.095	0.730
0.1	0.748
0.11	0.780
0.12	0.810
0.13	0.837
0.133	0.844
0.14	0.859
0.15	0.879
0.16	0.898
0.17	0.915
0.18	0.930
0.19	0.943
0.2	0.955
0.22	0.964
0.24	0.971
0.25	0.973
0.26	0.972
0.28	0.971
0.29	0.968
0.3	0.966
0.32	0.960
0.34	0.953
0.35	0.949
0.36	0.945
0.38	0.936
0.4	0.926
0.42	0.918
0.44	0.909
0.45	0.904
0.46	0.900
0.48	0.891
0.5	0.882
0.55	0.860
0.6	0.841
0.65	0.823
0.667	0.818
0.7	0.808
0.75	0.794
0.8	0.777
0.85	0.761
0.9	0.746
0.95	0.732
1	0.719

1.1	0.668
1.2	0.624
1.3	0.583
1.4	0.547
1.5	0.514
1.6	0.482
1.7	0.453
1.8	0.427
1.9	0.404
2	0.383
2.2	0.344
2.4	0.312
2.5	0.298
2.6	0.286
2.8	0.263
3	0.243
3.2	0.225
3.4	0.210
3.5	0.203
3.6	0.197
3.8	0.184
4	0.174
4.2	0.164
4.4	0.156
4.6	0.148
4.8	0.141
5	0.135

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} (km)	0	

Distance

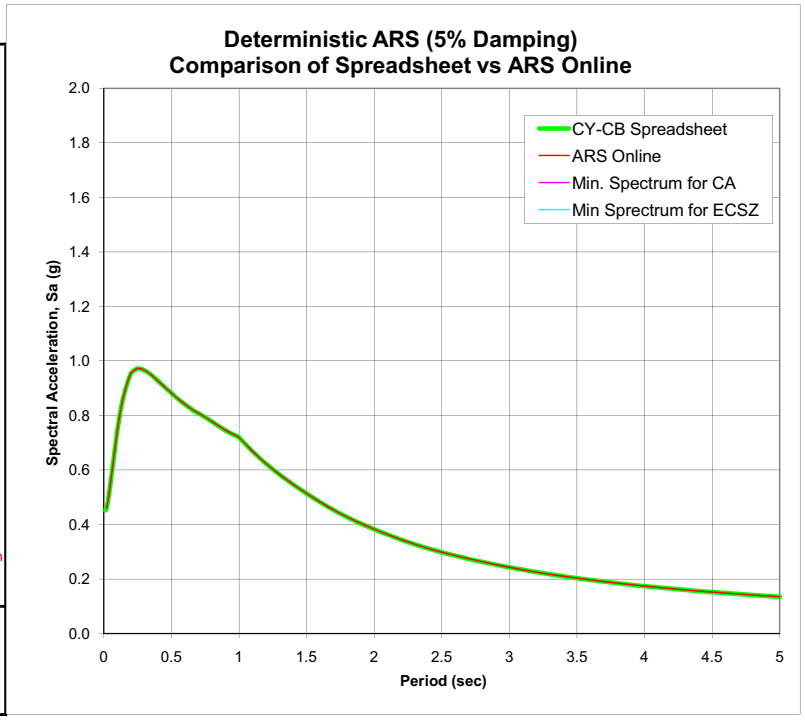
R_{RUP} (km)	4.2	
R_{JB} (km)	4.2	
R_x (km)	4.2	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} (m/sec)	360	(270 to 1500 m/s)
$Z_{1.0}$ (m)	264	(0 - No Basin)
$Z_{2.5}$ (km)	2	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 1%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.45139
0.020	0.45947
0.022	0.46490
0.025	0.47294
0.029	0.48278
0.030	0.48562
0.032	0.49264
0.035	0.50314
0.036	0.50673
0.040	0.52058
0.042	0.52790
0.044	0.53500
0.045	0.53880
0.046	0.54250
0.048	0.54974
0.050	0.55711
0.055	0.57641
0.060	0.59603
0.065	0.61508
0.067	0.62288
0.070	0.63405
0.075	0.65285
0.080	0.67234
0.085	0.69186
0.090	0.71071
0.095	0.72940
0.100	0.74759
0.110	0.78037
0.120	0.81031
0.130	0.83671
0.133	0.84361
0.140	0.85907
0.150	0.87910
0.160	0.89809
0.170	0.91439

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.451	1	1	0.451	0%
0.02	0.46	1	1	0.46	0%
0.022	0.465	1	1	0.465	0%
0.025	0.473	1	1	0.473	0%
0.029	0.483	1	1	0.483	0%
0.03	0.486	1	1	0.486	0%
0.032	0.493	1	1	0.493	0%
0.035	0.503	1	1	0.503	0%
0.036	0.507	1	1	0.507	0%
0.04	0.521	1	1	0.521	0%
0.042	0.528	1	1	0.528	0%
0.044	0.535	1	1	0.535	0%
0.045	0.539	1	1	0.539	0%
0.046	0.543	1	1	0.543	0%
0.048	0.55	1	1	0.55	0%
0.05	0.557	1	1	0.557	0%
0.055	0.577	1	1	0.577	0%
0.06	0.596	1	1	0.596	0%
0.065	0.615	1	1	0.615	0%
0.067	0.623	1	1	0.623	0%
0.07	0.634	1	1	0.634	0%
0.075	0.653	1	1	0.653	0%
0.08	0.672	1	1	0.672	0%
0.085	0.692	1	1	0.692	0%
0.09	0.711	1	1	0.711	0%
0.095	0.73	1	1	0.73	0%
0.1	0.748	1	1	0.748	0%
0.11	0.78	1	1	0.78	0%
0.12	0.81	1	1	0.81	0%
0.13	0.837	1	1	0.837	0%
0.133	0.844	1	1	0.844	0%
0.14	0.859	1	1	0.859	0%
0.15	0.879	1	1	0.879	0%
0.16	0.898	1	1	0.898	0%
0.17	0.915	1	1	0.915	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)

Deterministic_Response_Spectrum_072809.xls 9/19/2011 10:51 AM

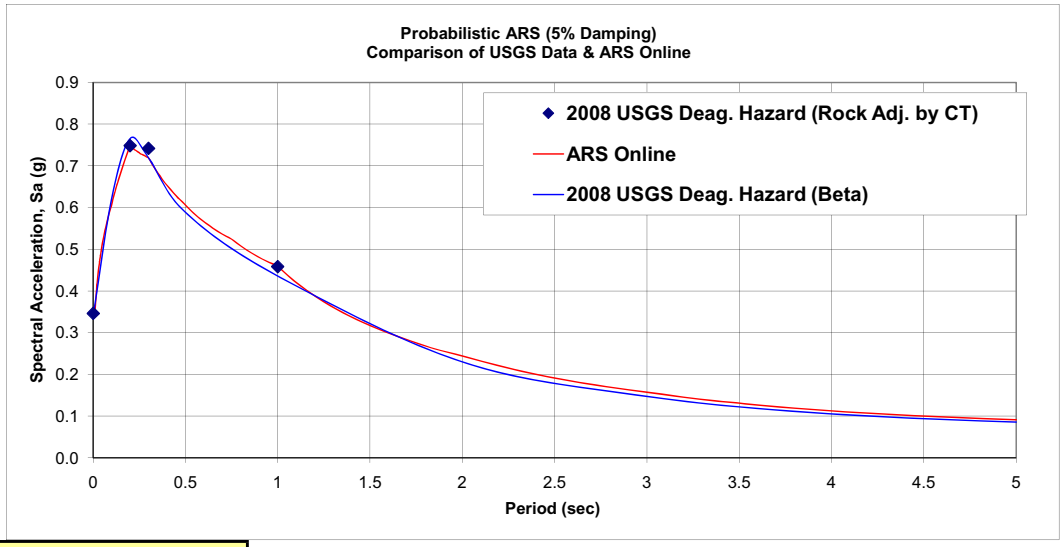
0.180	0.92942
0.190	0.94265
0.200	0.95443
0.220	0.96409
0.240	0.97074
0.250	0.97261
0.260	0.97171
0.280	0.97033
0.290	0.96791
0.300	0.96562
0.320	0.96013
0.340	0.95309
0.350	0.94896
0.360	0.94494
0.380	0.93573
0.400	0.92617
0.420	0.91759
0.440	0.90828
0.450	0.90398
0.460	0.89951
0.480	0.89025
0.500	0.88172
0.550	0.85945
0.600	0.84028
0.650	0.82311
0.660	0.81721
0.700	0.80777
0.750	0.79391
0.800	0.77635
0.850	0.76043
0.900	0.74535
0.950	0.73161
1.000	0.71844
1.100	0.66744
1.200	0.62274
1.300	0.58253
1.400	0.54648
1.500	0.51357
1.600	0.48149
1.700	0.45257
1.800	0.42652
1.900	0.40307
2.000	0.38213
2.200	0.34354
2.400	0.31177
2.500	0.29779
2.600	0.28492
2.800	0.26192
3.000	0.24206
3.200	0.22481
3.400	0.20959
3.500	0.20264
3.600	0.19608
3.800	0.18399
4.000	0.17319
4.200	0.16400
4.400	0.15555
4.600	0.14783
4.800	0.14078
5.000	0.13425

0.18	0.93	1	1	0.93	0%
0.19	0.943	1	1	0.943	0%
0.2	0.955	1	1	0.955	0%
0.22	0.964	1	1	0.964	0%
0.24	0.971	1	1	0.971	0%
0.25	0.973	1	1	0.973	0%
0.26	0.972	1	1	0.972	0%
0.28	0.971	1	1	0.971	0%
0.29	0.968	1	1	0.968	0%
0.3	0.966	1	1	0.966	0%
0.32	0.96	1	1	0.96	0%
0.34	0.953	1	1	0.953	0%
0.35	0.949	1	1	0.949	0%
0.36	0.945	1	1	0.945	0%
0.38	0.936	1	1	0.936	0%
0.4	0.926	1	1	0.926	0%
0.42	0.918	1	1	0.918	0%
0.44	0.909	1	1	0.909	0%
0.45	0.904	1	1	0.904	0%
0.46	0.9	1	1	0.9	0%
0.48	0.891	1	1	0.891	0%
0.5	0.882	1	1	0.882	0%
0.55	0.843	1	1.02	0.86	0%
0.6	0.808	1	1.04	0.841	0%
0.65	0.777	1	1.06	0.823	0%
0.667	0.767	1	1.067	0.818	0%
0.7	0.748	1	1.08	0.808	0%
0.75	0.722	1	1.1	0.794	0%
0.8	0.693	1	1.12	0.777	0%
0.85	0.667	1	1.14	0.761	0%
0.9	0.643	1	1.16	0.746	0%
0.95	0.62	1	1.18	0.732	0%
1	0.599	1	1.2	0.719	0%
1.1	0.557	1	1.2	0.668	0%
1.2	0.52	1	1.2	0.624	0%
1.3	0.486	1	1.2	0.583	0%
1.4	0.456	1	1.2	0.547	0%
1.5	0.429	1	1.2	0.514	0%
1.6	0.402	1	1.2	0.482	0%
1.7	0.378	1	1.2	0.453	0%
1.8	0.356	1	1.2	0.427	0%
1.9	0.337	1	1.2	0.404	0%
2	0.319	1	1.2	0.383	0%
2.2	0.287	1	1.2	0.344	0%
2.4	0.26	1	1.2	0.312	0%
2.5	0.249	1	1.2	0.298	0%
2.6	0.238	1	1.2	0.286	0%
2.8	0.219	1	1.2	0.263	0%
3	0.202	1	1.2	0.243	0%
3.2	0.188	1	1.2	0.225	0%
3.4	0.175	1	1.2	0.21	0%
3.5	0.169	1	1.2	0.203	0%
3.6	0.164	1	1.2	0.197	0%
3.8	0.154	1	1.2	0.184	0%
4	0.145	1	1.2	0.174	0%
4.2	0.137	1	1.2	0.164	0%
4.4	0.13	1	1.2	0.156	0%
4.6	0.123	1	1.2	0.148	0%
4.8	0.118	1	1.2	0.141	0%
5	0.112	1	1.2	0.135	1%

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data (unlock spreadsheet "shmi")
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
32.8848	-117.2270
V_{S30} (m/s) =	360
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	5.1
$Z_{1.0}$ (m) =	264
$Z_{2.5}$ (km) =	2



Place ARS Online Probabilistic Data Here "Paste"

T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.347	1	1	0.347
0.02	0.41	1	1	0.41
0.022	0.419	1	1	0.419
0.025	0.433	1	1	0.433
0.029	0.448	1	1	0.448
0.03	0.452	1	1	0.452
0.032	0.459	1	1	0.459
0.035	0.469	1	1	0.469
0.036	0.472	1	1	0.472
0.04	0.485	1	1	0.485
0.042	0.49	1	1	0.49
0.044	0.496	1	1	0.496
0.045	0.499	1	1	0.499
0.046	0.501	1	1	0.501
0.048	0.507	1	1	0.507
0.05	0.512	1	1	0.512
0.055	0.524	1	1	0.524
0.06	0.535	1	1	0.535
0.065	0.545	1	1	0.545
0.067	0.549	1	1	0.549
0.07	0.555	1	1	0.555
0.075	0.564	1	1	0.564
0.08	0.573	1	1	0.573
0.085	0.582	1	1	0.582
0.09	0.59	1	1	0.59
0.095	0.598	1	1	0.598
0.1	0.605	1	1	0.605
0.11	0.623	1	1	0.623
0.12	0.639	1	1	0.639
0.13	0.655	1	1	0.655
0.133	0.659	1	1	0.659
0.14	0.67	1	1	0.67
0.15	0.684	1	1	0.684
0.16	0.697	1	1	0.697
0.17	0.71	1	1	0.71
0.18	0.723	1	1	0.723
0.19	0.735	1	1	0.735
0.2	0.746	1	1	0.746
0.22	0.74	1	1	0.74
0.24	0.734	1	1	0.734
0.25	0.731	1	1	0.731
0.26	0.728	1	1	0.728
0.28	0.724	1	1	0.724

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)

Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.307	1.000	1.128	1.000	0.346	0.347	-0.3%
0.2	0.722	1.000	1.037	1.000	0.748	0.746	0.3%
0.3	0.597	1.000	1.242	1.000	0.742	0.719	3.1%
1	0.228	1.200	1.673	1.000	0.458	0.458	0.1%

Max % Difference = 3.1%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.3398	1.000	1.000	0.340	0.347	2.1%
0.1	0.6208	1.000	1.000	0.621	0.605	2.5%
0.2	0.7651	1.000	1.000	0.765	0.746	2.5%
0.3	0.7188	1.000	1.000	0.719	0.719	0.0%
0.5	0.5881	1.000	1.000	0.588	0.606	3.0%
1	0.3631	1.200	1.000	0.436	0.458	5.1%
2	0.1914	1.200	1.000	0.230	0.244	6.2%
3	0.12256	1.200	1.000	0.147	0.157	6.8%
4	0.08762	1.200	1.000	0.105	0.112	6.5%
5	0.07141	1.200	1.000	0.086	0.091	6.2%

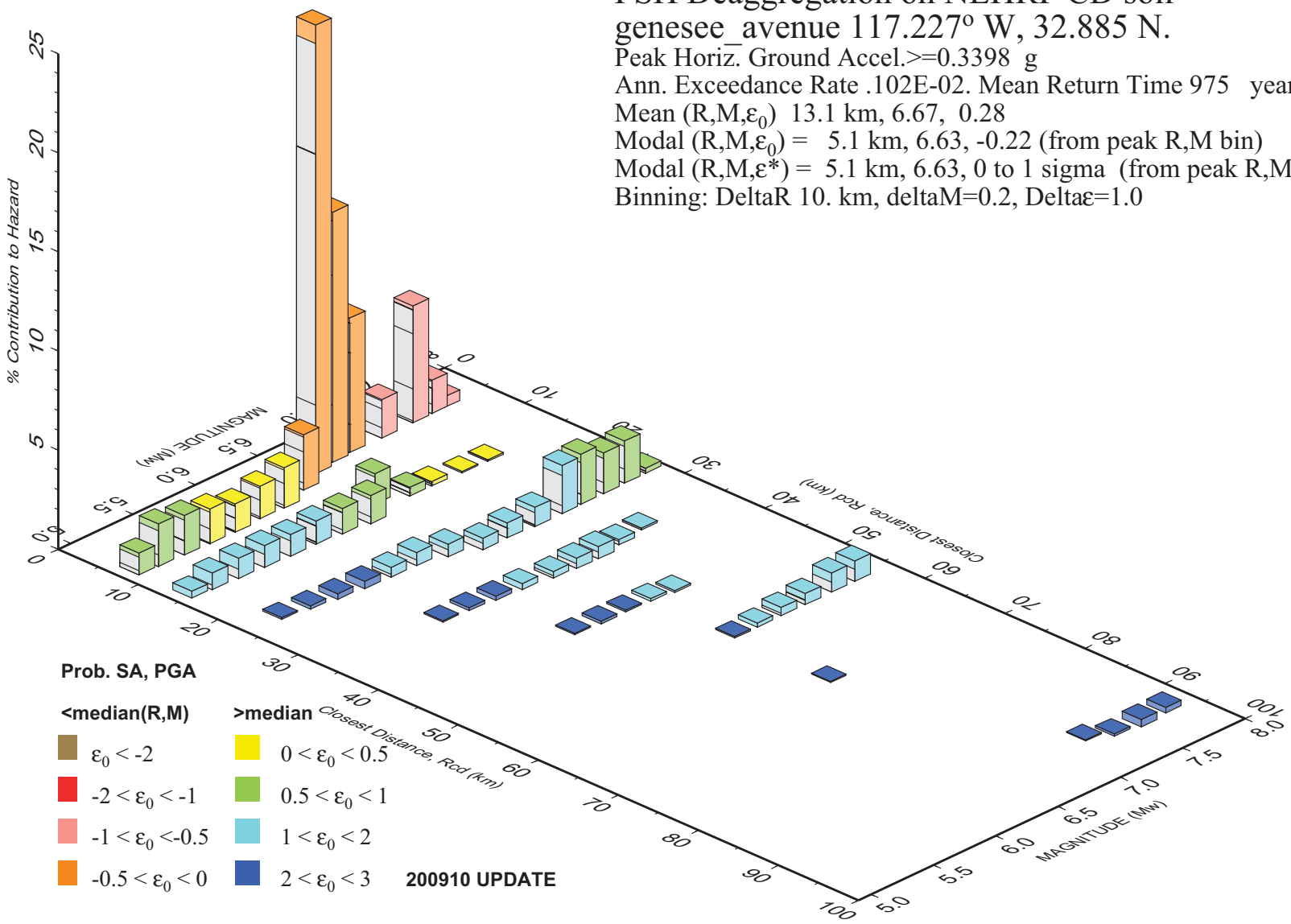
Max % Difference = 6.8%

Probabilistic_Response_Spectrum_080409.xls 9/19/2011 10:55 AM

0.29	0.721	1	1	0.721
0.3	0.719	1	1	0.719
0.32	0.704	1	1	0.704
0.34	0.69	1	1	0.69
0.35	0.683	1	1	0.683
0.36	0.677	1	1	0.677
0.38	0.664	1	1	0.664
0.4	0.653	1	1	0.653
0.42	0.643	1	1	0.643
0.44	0.633	1	1	0.633
0.45	0.628	1	1	0.628
0.46	0.623	1	1	0.623
0.48	0.615	1	1	0.615
0.5	0.606	1	1	0.606
0.55	0.573	1	1.02	0.584
0.6	0.544	1	1.04	0.566
0.65	0.519	1	1.06	0.55
0.667	0.511	1	1.067	0.545
0.7	0.497	1	1.08	0.536
0.75	0.477	1	1.1	0.524
0.8	0.454	1	1.12	0.508
0.85	0.433	1	1.14	0.493
0.9	0.414	1	1.16	0.48
0.95	0.397	1	1.18	0.469
1	0.382	1	1.2	0.458
1.1	0.35	1	1.2	0.42
1.2	0.323	1	1.2	0.388
1.3	0.301	1	1.2	0.361
1.4	0.281	1	1.2	0.337
1.5	0.264	1	1.2	0.317
1.6	0.249	1	1.2	0.299
1.7	0.236	1	1.2	0.283
1.8	0.224	1	1.2	0.268
1.9	0.213	1	1.2	0.255
2	0.203	1	1.2	0.244
2.2	0.183	1	1.2	0.22
2.4	0.167	1	1.2	0.2
2.5	0.159	1	1.2	0.191
2.6	0.153	1	1.2	0.183
2.8	0.141	1	1.2	0.169
3	0.13	1	1.2	0.157
3.2	0.121	1	1.2	0.145
3.4	0.113	1	1.2	0.135
3.5	0.109	1	1.2	0.131
3.6	0.105	1	1.2	0.126
3.8	0.099	1	1.2	0.119
4	0.093	1	1.2	0.112
4.2	0.089	1	1.2	0.107
4.4	0.085	1	1.2	0.102
4.6	0.082	1	1.2	0.098
4.8	0.079	1	1.2	0.094
5	0.076	1	1.2	0.091

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

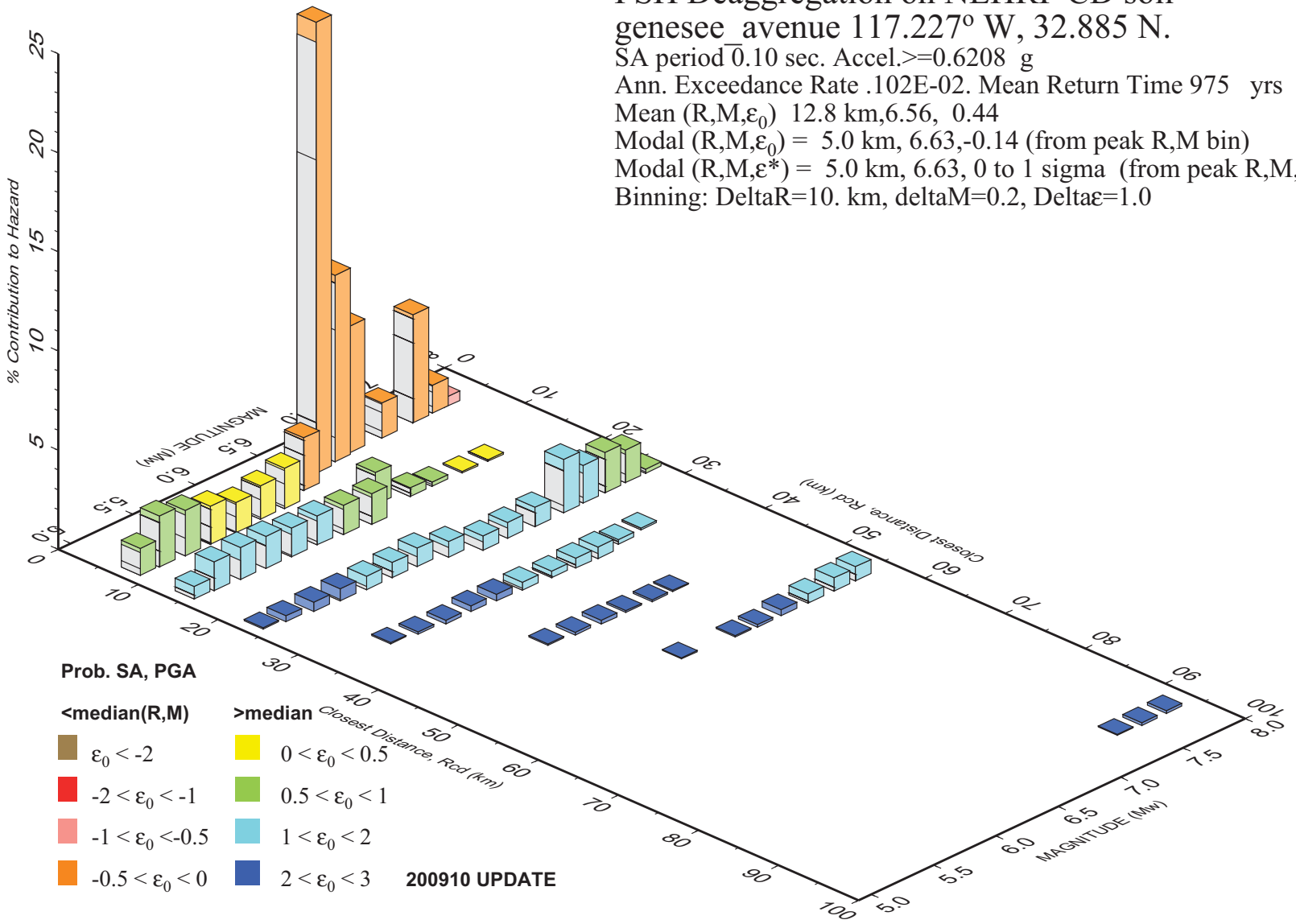
Peak Horiz. Ground Accel.>=0.3398 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 years
Mean (R,M,ε_0) 13.1 km, 6.67, 0.28
Modal (R,M,ε_0) = 5.1 km, 6.63, -0.22 (from peak R,M bin)
Modal (R,M,ε*) = 5.1 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:39:21 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

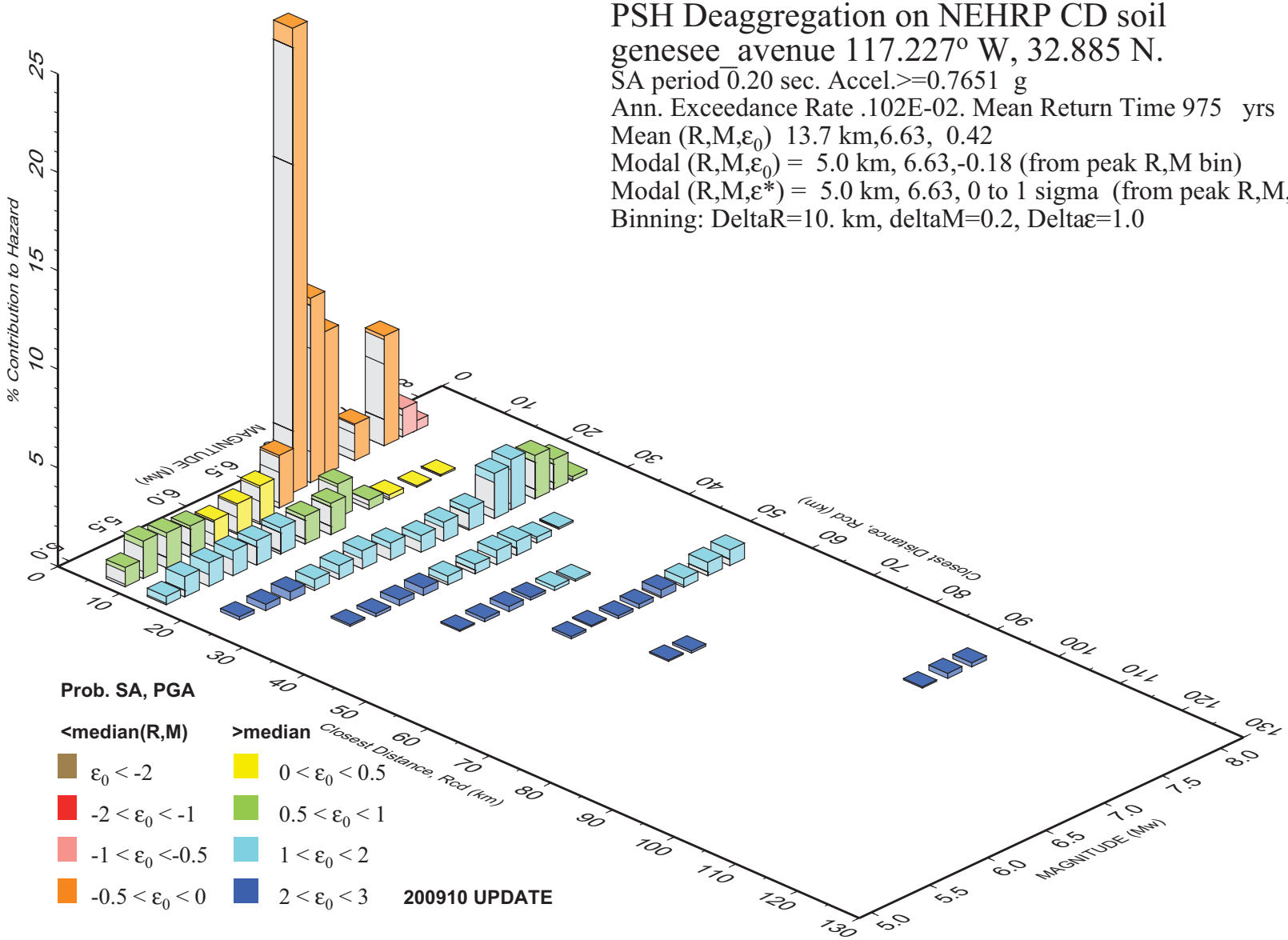
SA period 0.10 sec. Accel.>=0.6208 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 12.8 km,6.56, 0.44
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.14 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:47:02 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

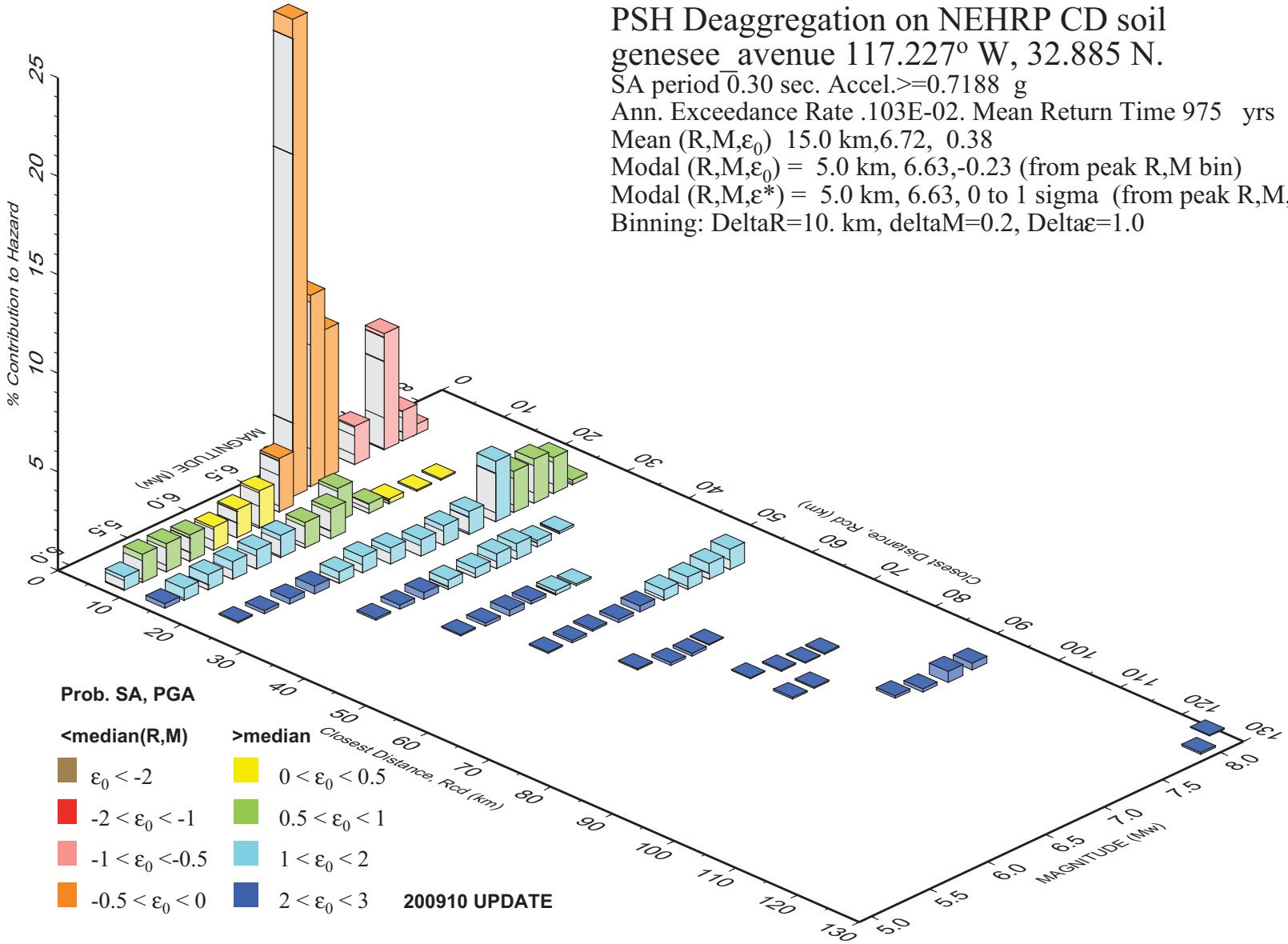
SA period 0.20 sec. Accel.>=0.7651 g
Ann. Exceedance Rate .102E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 13.7 km,6.63, 0.42
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.18 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:48:40 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

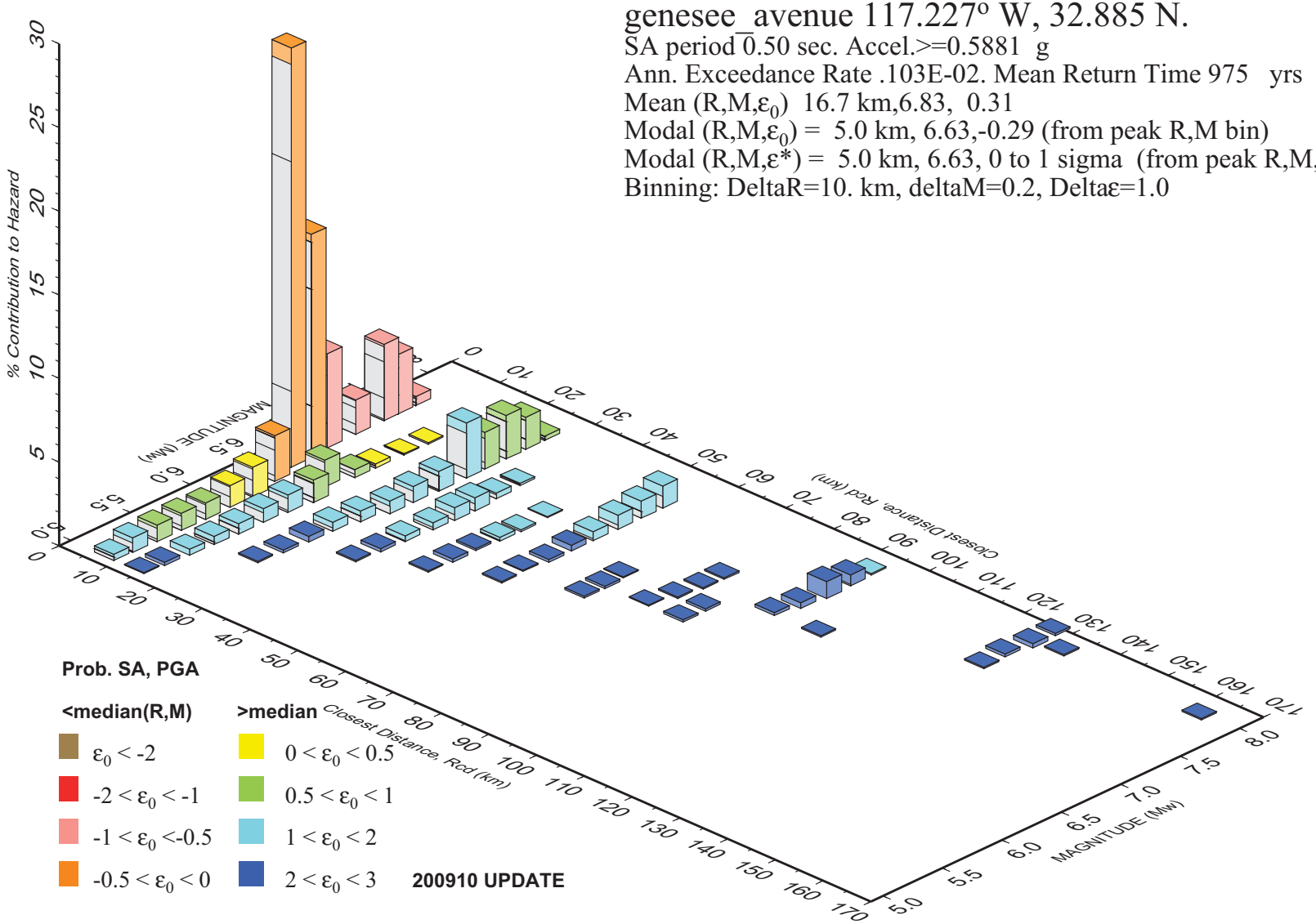
SA period 0.30 sec. Accel.>=0.7188 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 15.0 km,6.72, 0.38
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.23 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:49:49 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

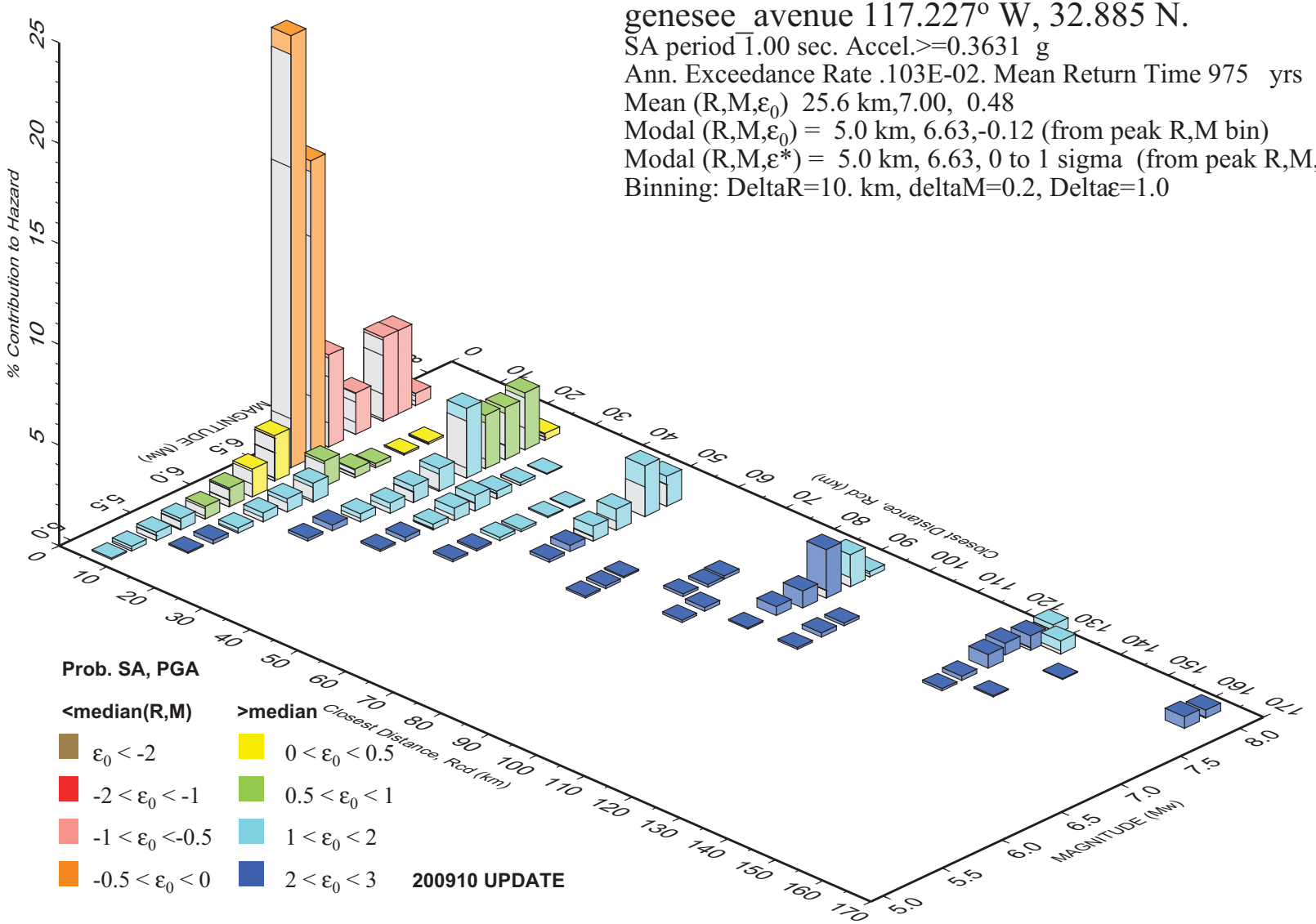
SA period 0.50 sec. Accel.>=0.5881 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 16.7 km,6.83, 0.31
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.29 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:50:55 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

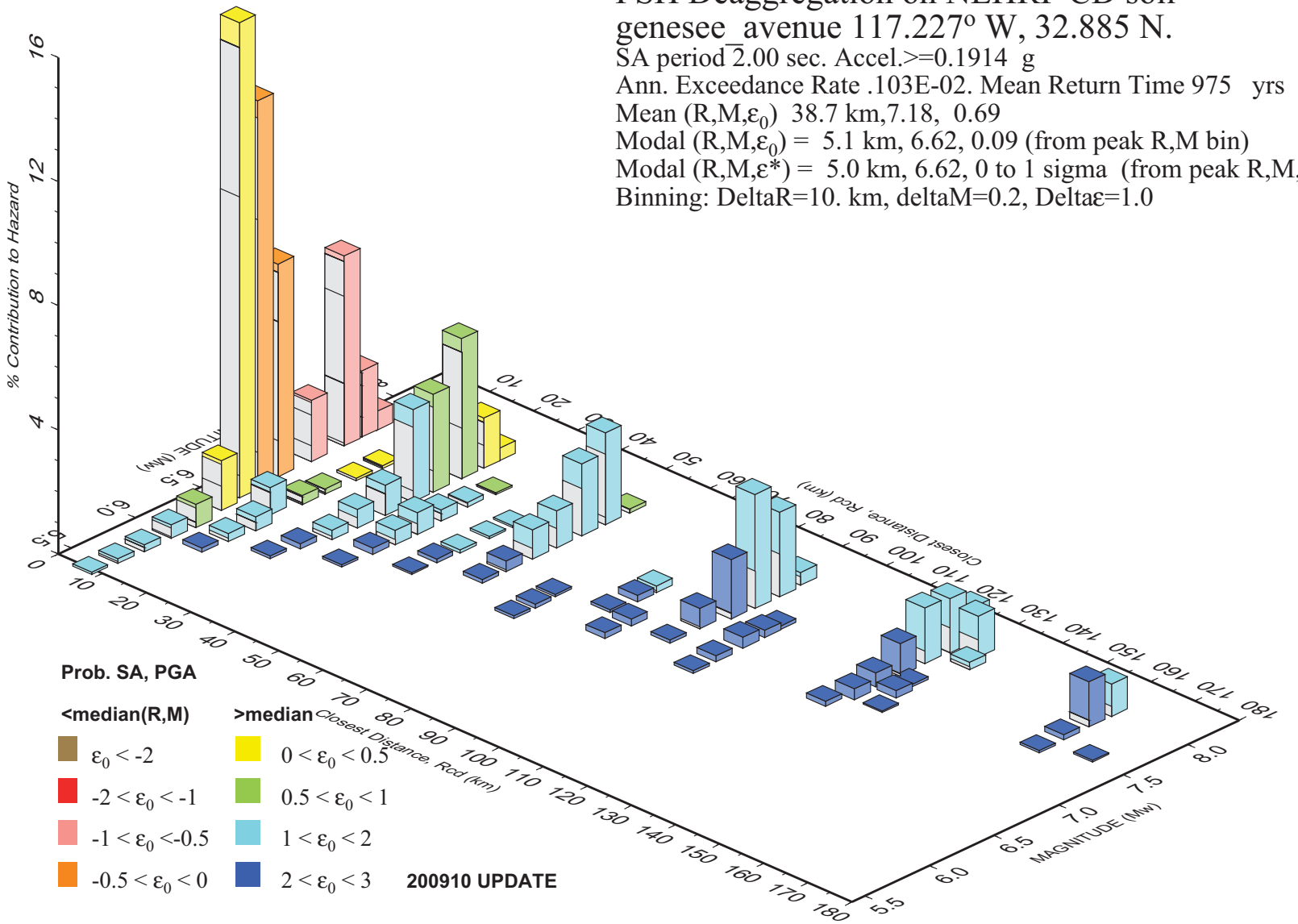
SA period 1.00 sec. Accel.>=0.3631 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 25.6 km,7.00, 0.48
Modal (R,M,ε_0) = 5.0 km, 6.63,-0.12 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:52:12 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

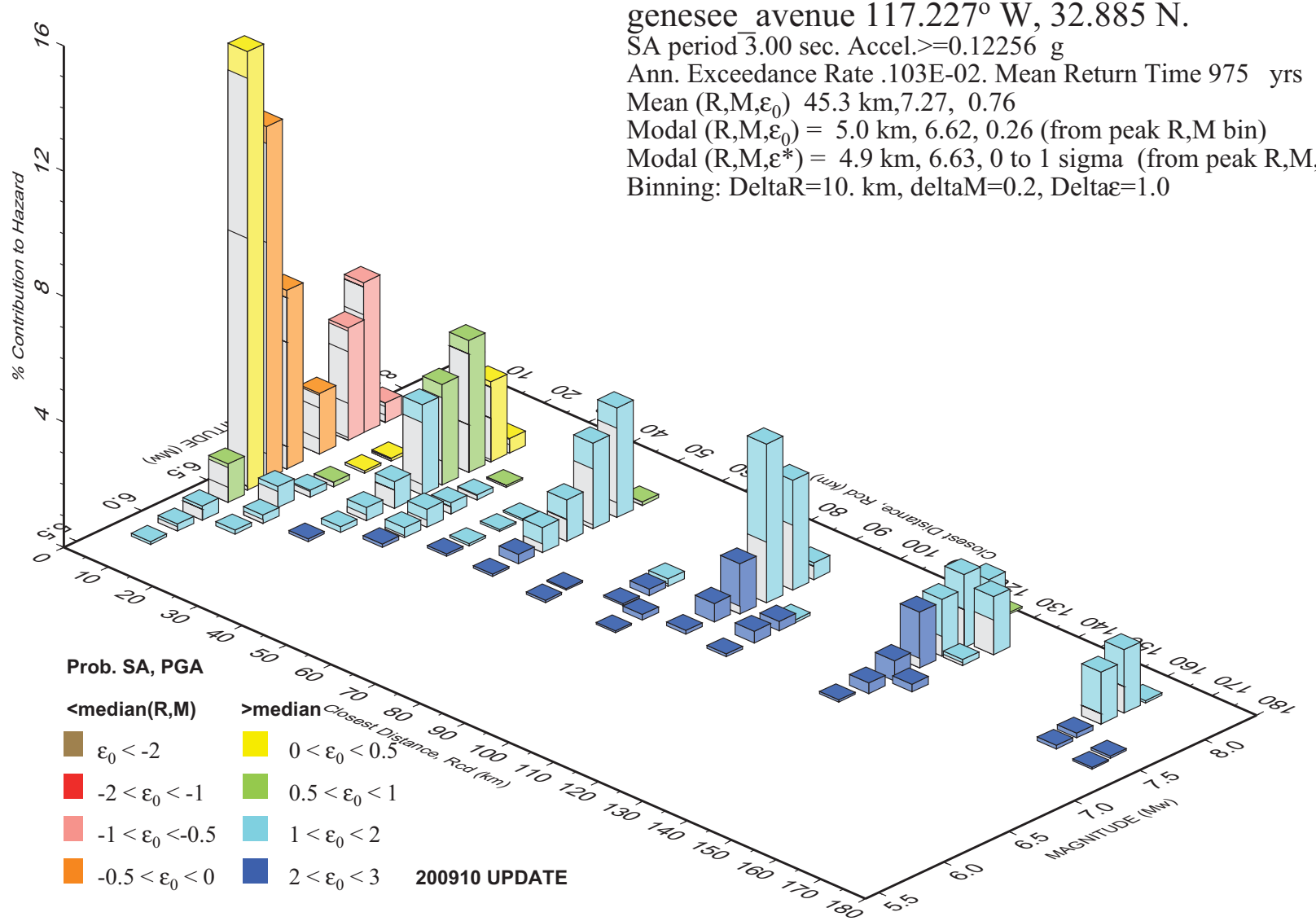
SA period 2.00 sec. Accel.>=0.1914 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 38.7 km,7.18, 0.69
Modal (R,M,ε_0) = 5.1 km, 6.62, 0.09 (from peak R,M bin)
Modal (R,M,ε*) = 5.0 km, 6.62, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:53:10 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil
genesee_avenue 117.227° W, 32.885 N.

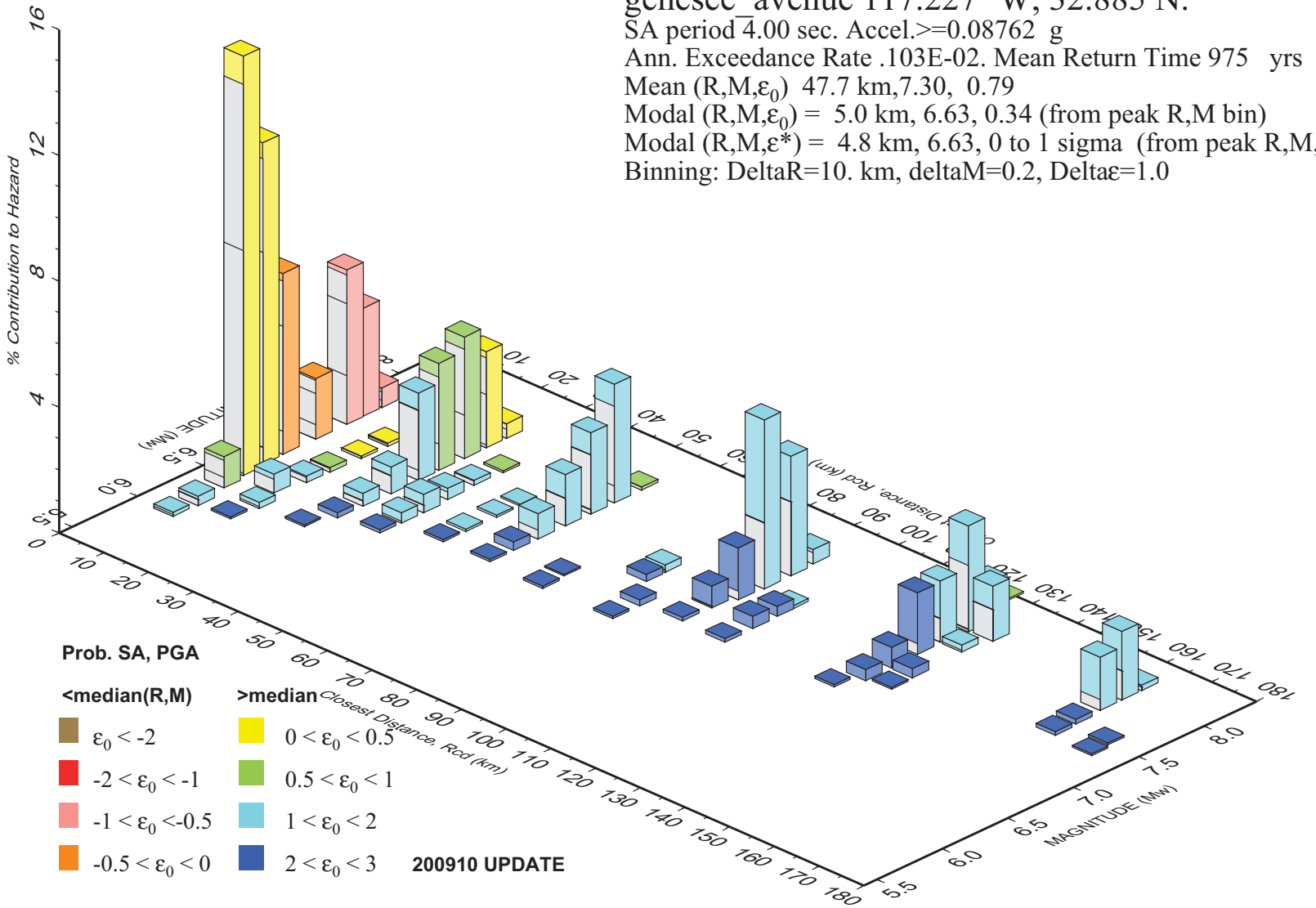
SA period 3.00 sec. Accel.>=0.12256 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 45.3 km,7.27, 0.76
Modal (R,M,ε_0) = 5.0 km, 6.62, 0.26 (from peak R,M bin)
Modal (R,M,ε*) = 4.9 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



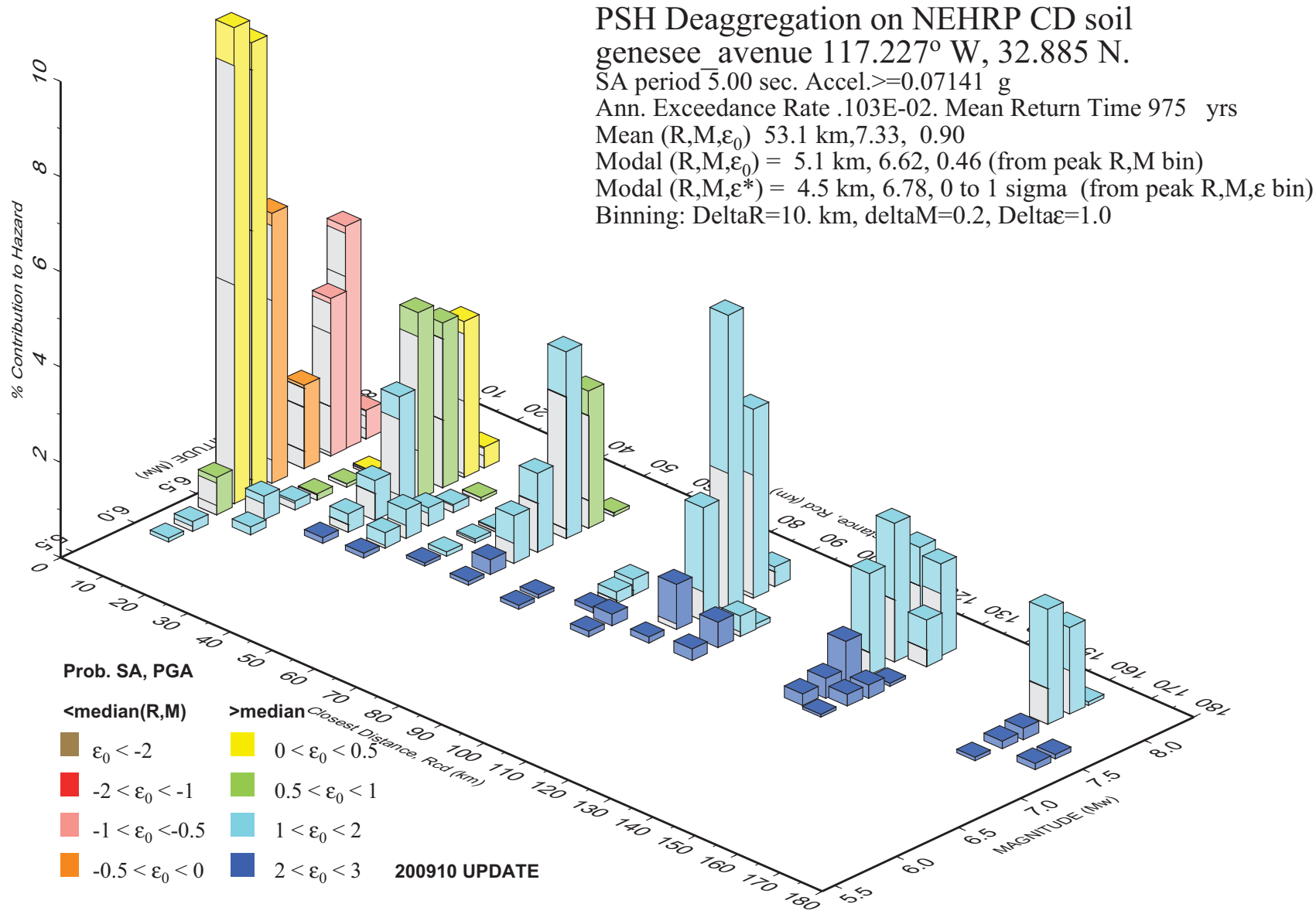
GMT 2011 Jul 20 16:54:05 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

PSH Deaggregation on NEHRP CD soil genesee_avenue 117.227° W, 32.885 N.

SA period 4.00 sec. Accel.>=0.08762 g
Ann. Exceedance Rate .103E-02. Mean Return Time 975 yrs
Mean (R,M,ε_0) 47.7 km,7.30, 0.79
Modal (R,M,ε_0) = 5.0 km, 6.63, 0.34 (from peak R,M bin)
Modal (R,M,ε*) = 4.8 km, 6.63, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR=10. km, deltaM=0.2, Deltaε=1.0



GMT 2011 Jul 20 16:54:57 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**



GMT 2011 Jul 20 16:55:47 **Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 360. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted**

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: R-1,2,and3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

Fault Information (#1)

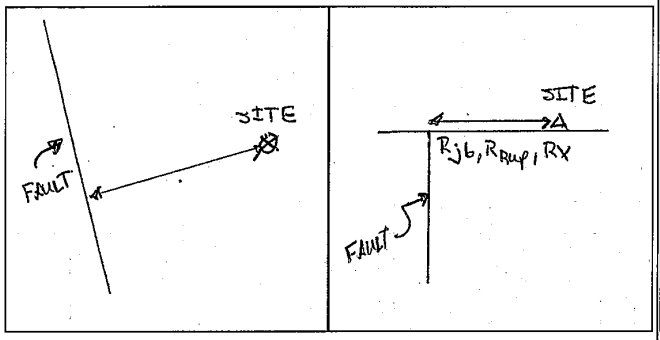
Fault Name: Newport Inglewood (Oceanside) Fault ID#: 223

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.00

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 4.21

R_{JB}: 4.21

R_X: 4.21

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

Fault Information (#2)

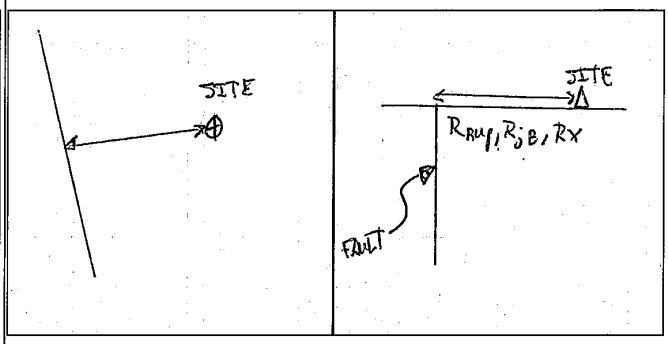
Fault Name: Newport Inglewood (San Diego) Fault ID#: 224

MMax: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13.0

Plan View **Elevation View**



Calculated or Measure Distances

R_{RUP}: 3.44

R_{JB}: 3.44

R_X: 3.44

Determination of V_{S30}

V_{S30} (m/s): 560

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 74m

$Z_{2.5}$ (km/s): 2.0 km

Notes: No Basin

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 11-022331 County: SD Route: 5 PM: 28.6/30.1

Bridge/Facility Name: RW-1, 2 and 3 Bridge/Facility No.: _____

Latitude: 32.884777 Longitude: -117.22703

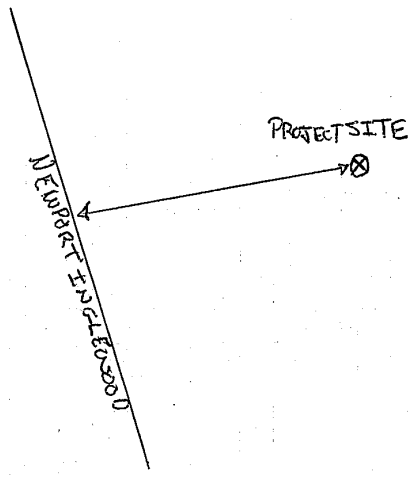
Deterministic Fault Information

Fault Name: ~~New Port Inglewood~~ Rose Canyon Fault ID#: 223 M_{MAX}: 7.5 Fault Type: RLSS

Fault Dip: 90° Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13.00 km

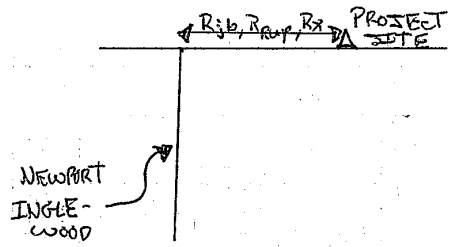
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_{JB}:	4.21 km	☒	Calculated / graphically	☐	Same as Rx (by definition)
R_X:	4.21 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 560

Method of Determining V_{S30}: SPT Correlation (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 74m $Z_{2.5}$ (km/s): 20km

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☐	☐	☒	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

ZIA YAZDANI — 11-7-11
Checker (Print) — Title

Checker (Signature) — 11-7-11
Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

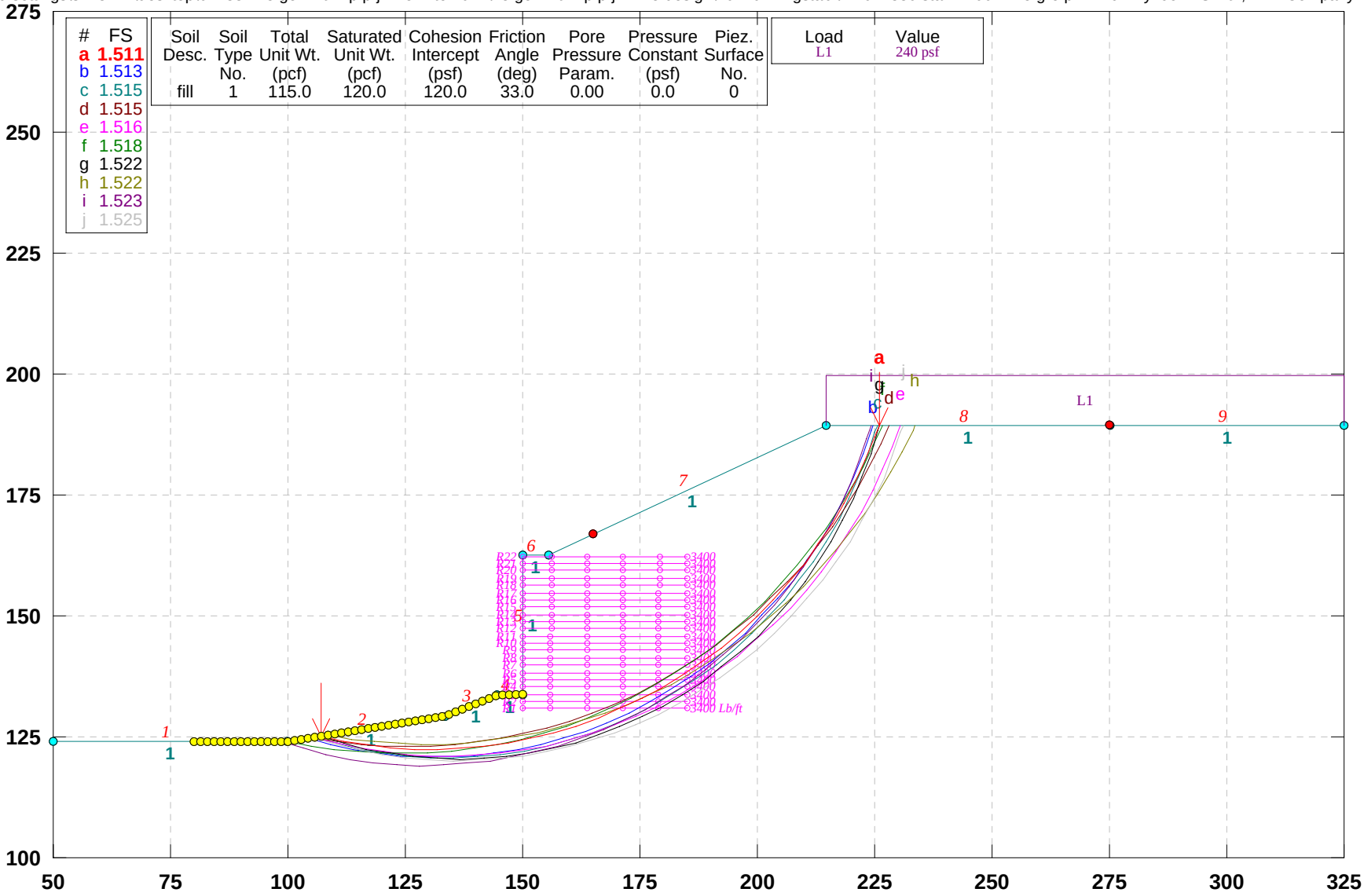
BRIAN HINMAN — SENIOR TE
Functional Supervisor (Print) — Title

Functional Supervisor (Signature) — 11/8/11
Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Genesee Int Imp Proj 11-022331 RW-15 12+00.00 H=29 gre global vertical

c:\documents and settings\s113111\desktop\022331 i-5 gen int imp prj fr rewrite 2014\i-5 gen int imp prj rw-15 design\20140212 gstabl\11-022330 sta 12+00 rw15 gre.pl2 Run By: John Smith, XYZ Company 2/24/2014 09:



GSTABL7 v.2 FSmin=1.511

Safety Factors Are Calculated By The Modified Bishop Method

Genesee Int Imp Proj 11-022331 RW-15 15+00.00 H=31 gre global vertical

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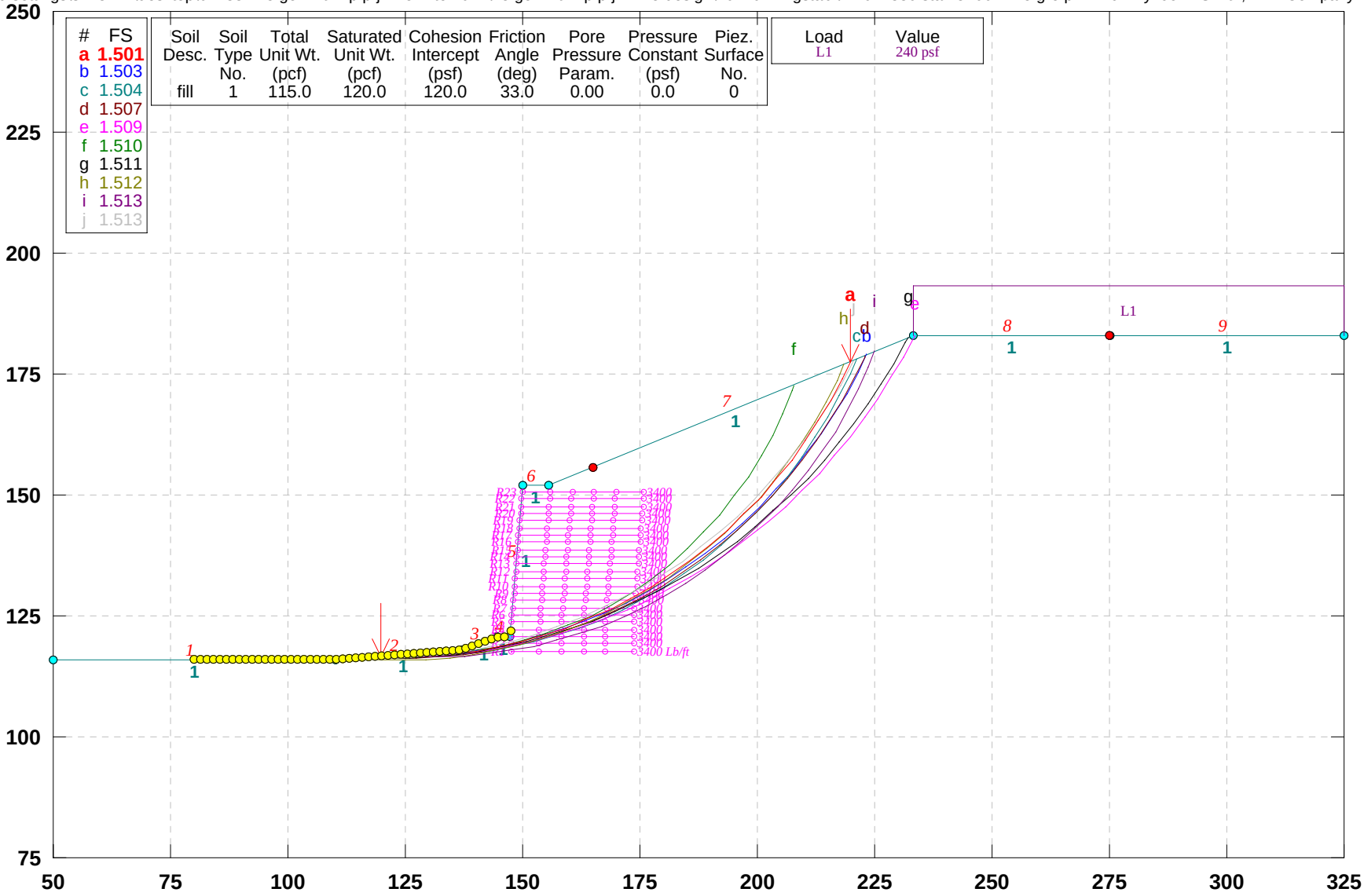

GSTABL7 v.2 FSmin=1.501

Safety Factors Are Calculated By The Modified Bishop Method

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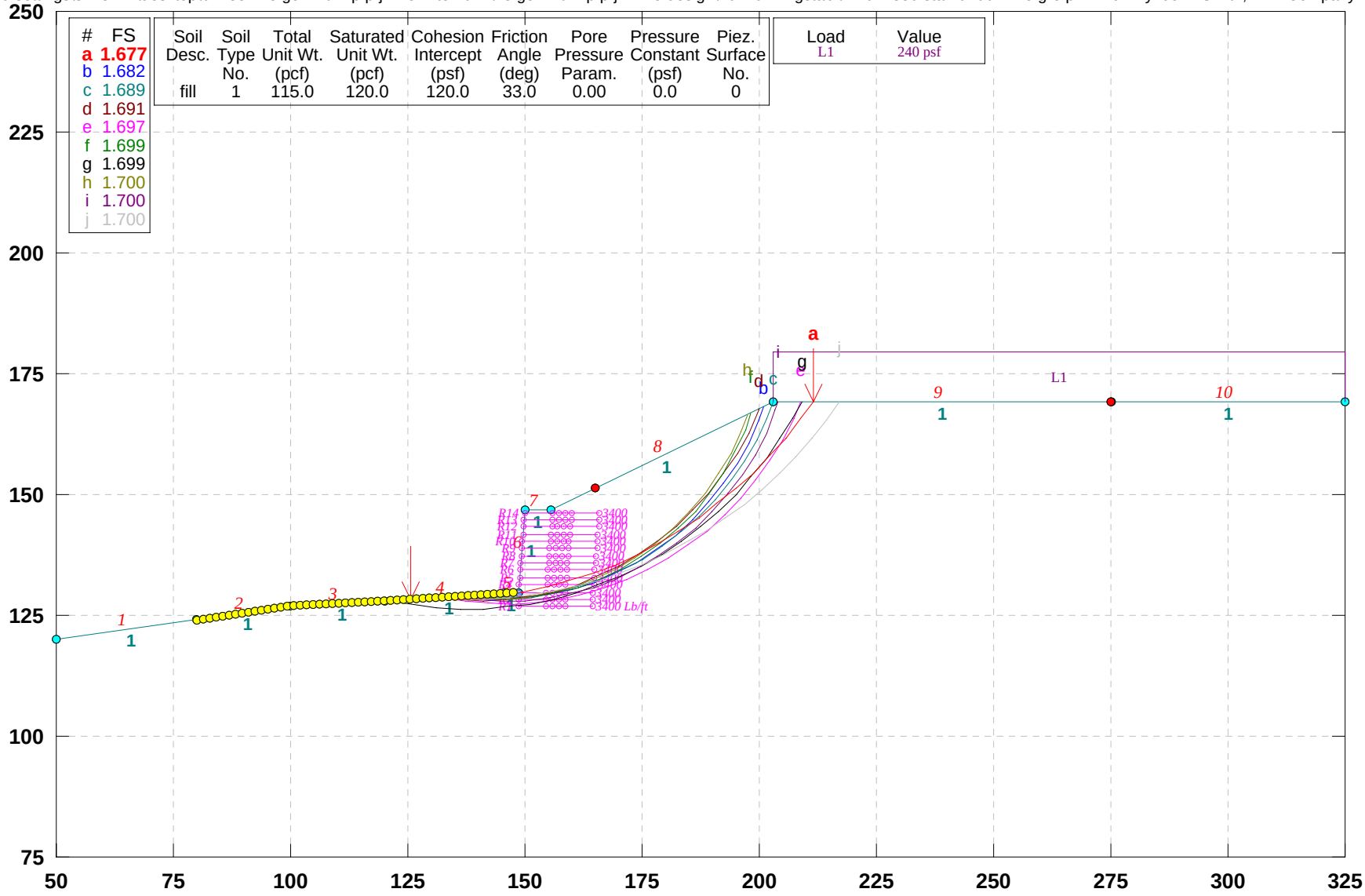

GSTABL7 v.2 FSmin=1.677

Safety Factors Are Calculated By The Modified Bishop Method

Genesee Int Imp Proj 11-022331 RW-15 25+00.00 H=19 gre global vertical

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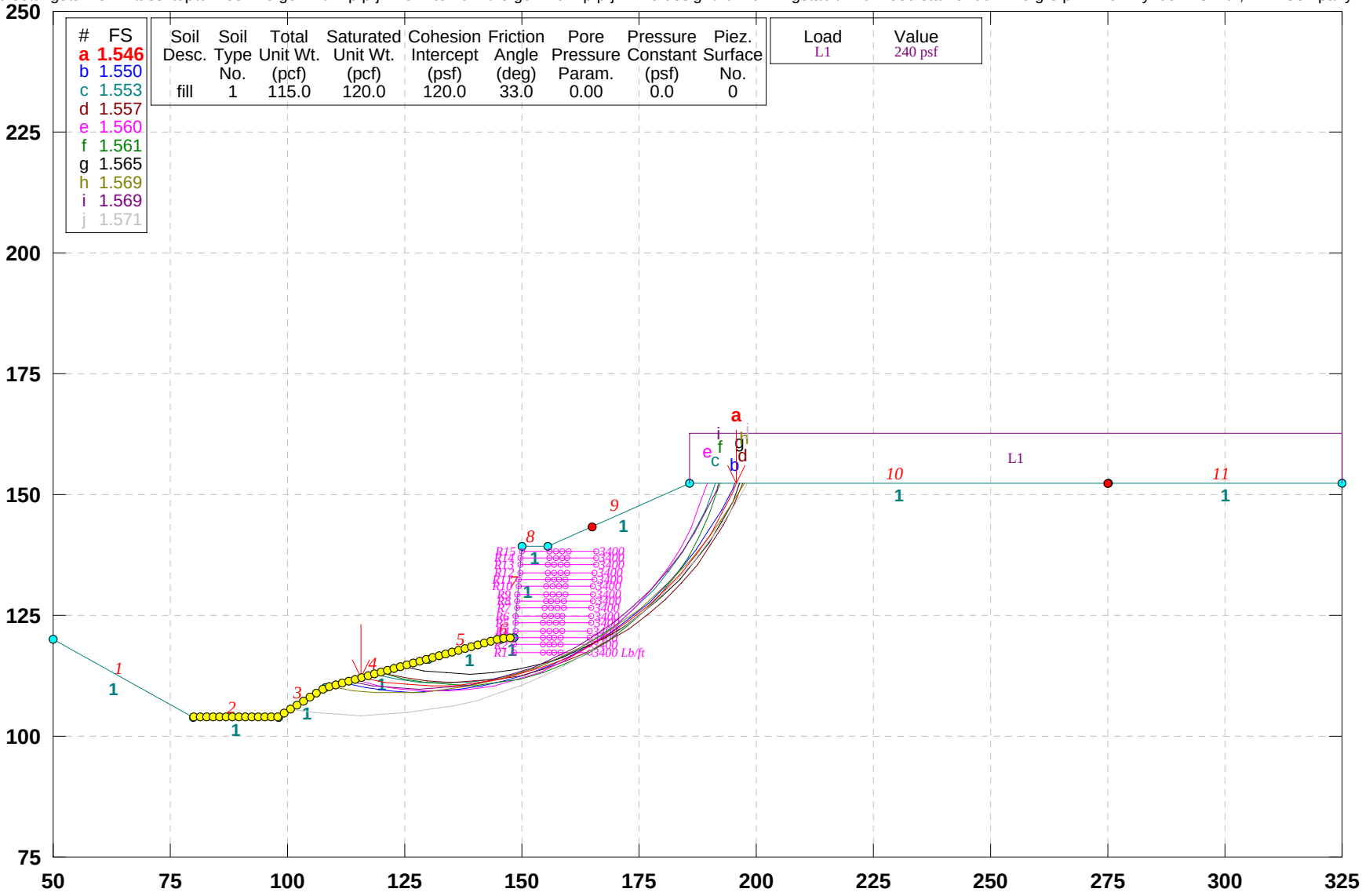

GSTABL7 v.2 FSmin=1.546

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

APPENDIX V

PROJECT MEMORANDUM

Geotechnical Services - Request for Exception Form

Caltrans

Name: Mike Fordham
Office: OGDS2 Branch D
District-EA: 11-022330-/110000 0012
Project Name: Interstate 5/Genesee Avenue Interchange Improvement Project
Manual Section No.: 2.4

Description of Exception Being Requested:
Alternative bore hole identification for all project borings:
manual example: HA-11-NNN ← sequential begin with 101
alternate example: HA-08-47860L ← Left of centerline station 478+60 L

Discussion of Why the Exception to Policy is Necessary:
Prior to drilling an exploration plan is developed and used to obtain approval from caltrans environmental. We have preliminary borings according to their location so they are easy to find on the plans and no two borings have the same name. The alternative identification allows for the tracking of a large number of boring. The investigation began prior to the 2007 edition of the "Rock and Soil Classification manual". The logs have cross referenced lab tests and preliminary reports. A change to the naming convention developed in 2006 will cause confusion and possible mistakes leading to claims.

Should the standard be revised to allow for the exception? Please discuss.

Brian Hinman
Branch Chief

A. Abhari
Office Chief
(Advisory & Mandatory Standards)

Philip J. Stokoe
Deputy Division Chief
(Mandatory Standards)

9-29-11
Date Approved

cc: Project File, GS Corporate

77 APPROVED MATERIALS INFORMATION HANDOUT

Item	Description	Manufacturer	Items
POLYVINYL CHLORIDE (PVC) PRESSURE PIPE - 4 INCH TO 12 INCH	AWWA C-900 Pressure Pipe, Recycled Pipe must be purple (Panetone 522)	Any Manufacturer Meeting Specifications	Relocate Fire Hydrant
POLYVINYL CHLORIDE (PVC) PRESSURE PIPE - 3 INCH AND SMALLER	Schedule 80, Type I, Grade 1 (Class 12454-B) per ASTM D1784 and D1785	Any Manufacturer Meeting Specifications	Cathodic Protection Test Station
DUCTILE IRON PIPE AND FITTINGS	AWWA C-104 with double thickness lining, Class 250 flanges, AWWA C-153, AWWA C-111, AWWA C-217, Restrained Joints.	Any Manufacturer Meeting Specifications, restrained joints Lok-Ring, Flex Ring, US Pipe TR-Flex, Megalug	Relocate Fire Hydrant 4" Recycled Water Lateral
COPPER PIPE AND FITTINGS	Type M Rigid Copper Pipe	Any Manfacturer Meeting Specifications	4" Recycled Water Lateral
WELDED STEEL WATERLINE AND FITTINGS	Steel pipe must be ASTM A36, ASTM A283 Grade C or D, ASTM A285 Grade C or D, ASTM A1011 Grade 30 or 33, ASTM A1018 Grade 33. Welded steel pipe must be manufactured per AWWA C200. The carbon content must not exceed 0.25 percent maximum. Specials AWWA M11, Fittings ANSI B16.9 ASTM A234, Grade WPB, ANSI B 16.5 Flanges, PE Tape Coating AWWA C214, C209. AWWA 213, 208, 205. The joint filler material must be 100% solid mastic-like butyl-rubber filler with a minimum thickness of 1/8-inch. All welded steel pipe and mill-type steel pipe must be cement mortar lined and coated in conformance with AWWA C205, "Standard for Cement Mortar Protective Lining and Coating for Steel Water Pipe, 4-inches and Larger - Shop Applied," with thickness as specified: The minimum thickness of cement mortar lining over steel pipe and specials must be as follows: Nominal Pipe Size Lining Thickness 4-inch through 12-inch 5/16-inch, 14-inch and larger ¾-inch. The minimum thickness of cement mortar coating over all metal surfaces of pipe and specials is 1-inch, except at flanges. Coating within one bolt length of a flange must be held to 50 percent of the above thickness.	Any Manufacturer Meeting Specifications, The filler material must be Tapecoat "Moldable Sealant," Polyken No. 939 Filler Tape or equal.	36" Cement Mortar Lined Waterline (Tape and Cement Coated) 24" Cement Mortar Lined Waterline (Tape and Cement Coated) 24" Cement Mortar Lined & Fusion Bonded Epoxy Coated
BURIED WATER LINE WARNING AND IDENTIFICATION TAPES	Polyethylene and Metallic Core/Faced acid and alkali reistant plastic tape, min strenth lengthwise 1500 psi and crosswise 1200 psi.	Any Manufacturer Meeting Specifications	36" Cement Mortar Lined Pipe (Tape and Cement Coated) 24" Cement Mortar Lined Pipe (Tape and Cement Coated) 4" Air Release Vacuum Valve 6" Blowoff Assy, Relocate Fire Hydrant, Relocate Blowoff, Relocate Air Release Valve 4" Recycled Water Lateral
GATE VALVES	ANSI/AWWA C500, C509 Cl 250, AWWA C213, EPDM, Fusion bonded epoxy must be a100% solids dry powder epoxy resin(15 mils) Scotchote 134 or 206N, or approved equal.	Mueller, Kennedy Valve Co, Clow, M&H(Dresser), K-Flow. Fusion bonded epoxy must be a100% solids dry powder epoxy resin Scotchote 134 or 206N, or approved equal.	4" Air Release Vacuum Valve 6" Blowoff Assy, Relocate Fire Hydrant, Relocate Blowoff, Relocate Air Release Valve 4" Recycled Water Lateral
PLUG VALVES	AWWA C517, C110 and C213, EPDM. Fusion bonded epoxy must be a100% solids dry powder epoxy resin (15 mils) Scotchote 134 or 206N, or approved equal.	Dezurik. Fusion bonded epoxy must be a100% solids dry powder epoxy resin Scotchote 134 or 206N, or approved equal.	6" Plug Valve
BUTTERFLY VALVES	ANSI/AWWA C504, C207, C213 Cl 250 ASME/ANSI B16.1 flanges, shop applied liquid epoxy (15 mils). Operator must conform to ANSI/AWWA C540. EPDM	Pratt, K-Flow, Dezurik. Fusion bonded epoxy must be a100% solids dry powder epoxy resin Scotchote 134 or 206N, or approved equal.	24" Butterfly Valve
VALVE BOX AND EXTENSION STEM	Round or Square hot dipped galvanized steel tubing for extension stem, valve box cast iron marked as shown on plans	Any Manufacturer Meeting Specifications	24" Butterfly Valve 6" Plug Valve, Relocate Fire Hydrant 4" Air Release Vacuum Valve 6" Blowoff Assy, Relocate Blowoff, Relocate Air Release Valve 4" Recycled Water Lateral
AIR RELEASE AND VACUUM VALVE ASSEMBLY	Valve, 2-inch and smaller, must have screwed ends conforming to ANSI B1.20.1, NPT. Valve, 3-inch and larger, must have flanged ends conforming to ANSI B16.1 Class 125. Valve body must be constructed of cast iron conforming to ASTM A 126 Grade B and trimmed with stainless steel internal components. All ferrous surfaces must be factory coated both inside and outside with fusion bonded epoxy. Coating must have minimum 12 mils dry thickness measured using a magnetic thickness gauge in accordance with the method described in SSPC PA2. Polyethylene enclosure.	APCO, Val-Matic, GA Industries, Crispin, Pipeline Products for Poly Enclosure	4" Air Release Vacuum Valve
BLOWOFF VALVE ASSEMBLY	Size as shown on plans - tangential flanged outlet AWWA M11. Vault per plans, manhole cover per plans.	Any Manufacturer Meeting Specifications	6" Blow Off Assy Relocate Blow Off
FLEXIBLE EXPANSION JOINT	Flexible expansion joints must be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53. Cl 250 psi. Lining 15 mils of fusion bonded epoxy AWWA C116/A21.16	EBAA Iron or equal. Fusion bonded epoxy must be a100% solids dry powder epoxy resin Scotchote 134 or 206N, or approved equal.	24" Flexible Expansion Joint
PIPE ROLLER SUPPORTS	Cast Iron with nonconductive (nylon coated) roller sized to fit pipe. Galvanized ASTM A12	Anvil or equal	24" Cement Mortar Lined & Fusion Bonded Epoxy Coated
STEEL CASING	1/2" Thickness Steel Casing Diameter per plans, asphaltic enamel and wrapped with bonded felt wrapper AWWA C203. End Seal	Any Manufacturer Meeting Specifications - Steel Casing. Advanced Products - End Seal	48" Steel Casing 42" Steel Casing
FIRE HYDRANTS	AWWA C-207, AWWA C-503 and C-550	Clow, James Jones, American AVK	Relocate Fire Hydrant
CATHODIC PROTECTION TEST BOX	Test box must be a round, precast concrete with dimensions of 14-inch outside diameter by 11-inch high, with a cast iron supporting ring and lid and have sufficient strength to support occasional vehicular traffic	Any Manufacturer Meeting Specifications	Cathodic Protection Test Station Relocate Cathodic Protection Test Station
CATHODIC PROTECTION WIRE AND CABLE	All wires must be stranded copper with HMWPE insulation suitable for direct burial in corrosive soil and water, complying with UL 83 and ASTM standards B3 or B8. HMWPE insulation must conform to ASTM D1248 type 1, Class c, Grade 5. Test leads No. 6 AWG HMWPE. Connectors UL486-76	Any Manufacturer Meeting Specifications	Cathodic Protection Test Station Relocate Cathodic Protection Test Station
INSULATING FLANGE GASKETS	Insulating Flange Kit Gaskets shall be ANSI B-16.21, Type E, NEMA G10 glass with a rectangular o-ring seal for operation between 20-degress F and 150-degrees F.	Any Manufacturer Meeting Specifications	24" Cement Mortar Lined Pipe (Tape and Cement Coated) 24" Flexible Expansion Joint
INSULATING SLEEVES AND WASHERS	Insulating sleeves shall be 1/32-inch thick tube, full length, G10 glass material per NEMA LI-1 for operation between 20-degrees F and 150-degrees F. For installation at threaded valve flange, use half-length sleeveInsulating washers shall be 1/8-inch thick, full length, G10 glass per NEMA LI-1 for operation between 20-degrees F and 150-degrees F.Steel washers shall be 1/8-inch cadmium plated steel placed between the nut and insulating washer.	Any Manufacturer Meeting Specifications	24" Cement Mortar Lined Pipe (Tape and Cement Coated) 24" Flexible Expansion Joint 24" Cement Mortar Lined & Fusion Bonded Epoxy Coated
EXOTHERMIC WELD KIT WELD CAPS	Cold-applied fast-drying mastic shall consist of a bituminous resin and solvents per Mil. Spec. Mil-C-18480B such as Koppers bitumastic 50 or 505, Tnemec 40-h-413, tape-coat TC mastic or 3M Scotch Clad 244. The minimum coating thickness must be 25 mils (0.025 inch).	Exothermic weld kit weld caps must be Royston Roybond Primer 747 and Royston Handy Cap 2 or equal.	36" Cement Mortar Lined Pipe (Tape and Cement Coated) 24" Cement Mortar Lined Pipe (Tape and Cement Coated) 24" Cement Mortar Lined & Fusion Bonded Epoxy Coated 24" Flexible Expansion Joint 24" Butterfly Valve 6" Plug Valve 4" Air Release Vacuum Valve 6" Blowoff Assy, Relocate Fire Hydrant, Relocate Blowoff, Relocate Air Release Valve 4" Recycled Water Lateral
FO CONDUIT	Four inch diameter PVC conduit, stiffness of DB-60, in accordance with ASTM F 512-Smooth-Wall Poly-Vinyl Chloride (PVC) Conduit and Fittings for Underground Installation	Any Manufacturer Meeting Specifications	Fiber Optic System
FO PULL BOXES	Pull boxes must be approximately 32 inches wide by 49-5/8 inches long by 36 inches deep, designed for H-20 traffic loading	Any Manufacturer Meeting Specifications	Fiber Optic System
FO CONDUIT SEALANT	Conduit Sealant	Semco duct sealing compound or equal	Fiber Optic System
FO IDENTIFICATION TAPE	A 6 inch wide magnetically detectable warning tape with orange protective polyethylene jacket resistant to alkalies, acids, and other destructive elements must be installed beside the warning tape for the pipeline along the entire length of the conduit rout	Teletrace, Vikamatic or equal	Fiber Optic System
FO PULL ROPE	Low friction, polyethylene jacketed polypropylene rope with 1800 psi tensile strengtl	Vikamatic or equal	Fiber Optic System
PAINT AND PROTECTIVE COATING SYSTEMS	System No. 5 -- Submerged Metal, Potable Water	System No. 5 -- Submerged Metal, Potable Water	24" Cement Mortar Lined & Fusion Bonded Epoxy Coated 4" Air Release Vacuum Valve 6" Blowoff Assy, Relocate Fire Hydrant, 4" Recycled Water Lateral
	1. Type: Two component, three coat epoxy system.	Ameron 395, Kop-Coat Hi-Gard, Engard 460 HS, or approved equal.	
	2. Steel Surface Preparation: SSPC-SP 10.		
	3. Ductile Iron and Cast Iron Surface Preparation: NAPF-500-0		
	4. Coating System: Apply three coats. Apply to a minimum dry film thickness of 12 mils (0.012 inch)		
	System No. 10 -- Exposed Metal, Corrosive Environment	System No. 10 -- Exposed Metal, Corrosive Environment	
	1. Type: High build epoxy finish coat having a minimum volume solids of 60%, with an inorganic zinc prime coat.		
	2. Surface Preparation: SSPC-SP 10.		
	3. Ductile Iron and Cast Iron Surface Preparation: NAPF-500-0		
	4. Prime Coat: Self curing, two component inorganic zinc rich coating recommended by the manufacturer for overcoating with a high build epoxy finish coat. Minimum zinc content must be 12 pounds per gallon. Apply to a thickness of 3 mils (0.003 inch).	Ameron 3105, Kop-Coat Inorganic Zinc No. 701, Engard 519, or approved equal.	
	5. Finish Coat: Apply to a minimum dry film thickness of 12 mils (0.012 inch) total.	Ameron 383HS, Kop-Coat Hi-Gard, Engard 460 HS, or approved equal.	
	System No. 20 -- Exposed Metal, Exterior	System No. 20 -- Exposed Metal, Exterior	
	1. Type: Gloss synthetic enamel with OSHA safety color coding		
	2. Surface Preparation: SSPC-SP 1. Apply one coat of vinyl wash primer on galvanized, zinc, or bronze surfaces use Sinclair No. 7113, or approved equal.		
	3. Ductile Iron and Cast Iron Surface Preparation: NAPF-500-0		
	4. Prime Coat: 2 mils (0.002 inch).	Sinclair No. 15 (non-ferrous or ferrous) or No. 25 (galvanized or zinc) or approved equal.	
	5. Intermediate Coat: 1.5 mils (0.0015 inch).	Sinclair No. 248, or approved equal.	
	6. Finish Coat: 2 mils (0.002 inch).	Sinclair No. 7500 (OSHA White), No. 7571 (OSHA Yellow), No. 7573 (OSHA Green), or No. 7574 (OSHA Blue), or approved equal.	
	System No. 21 – Buried Metal	System No. 21 – Buried Metal	
	1. Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D2697)		
	2. Surface Preparation: SSPC SP-10.		
	3. Ductile Iron and Cast Iron Surface Preparation: NAPF-500-0		
	4. Coating System: Apply three or more coats, 30 mils (0.030 inch) total. Maximum thickness of an individual coating must not exceed the manufacturer's recommendation.	PPG Amerlock 400 or 400 VOC, Tnemec 104HS or 80, ICI Devoe Bar-rust 233H, Carboline 890LT, Sherwin-Williams Tank Clad HS B62-80 Series, or equal	

THE CITY OF SAN DIEGO

June 19, 2014

Mr. Shahbaz Alvi
Project Engineer (I-5 Corridor)
Department of Transportation
District 11
4050 Taylor Street, M.S. 340
San Diego, CA 92110

Dear Mr. Alvi:

Subject: EA 0223U1/ I-5 Genesee Project

This is in response to your letter dated June 10, 2014 regarding reconstruction of I-5/Genesee Avenue construction project. Based upon the volume and duration of the project you provided, the City of San Diego has sufficient and available potable water capacity to serve your project during the construction. Please note that a temporary construction meter is only good for maximum of two years. Your construction duration of three years may be subject to paying capacity fees if the extension is not granted. Please also note that this existing potable water irrigation meter as well as other existing potable water irrigation meters City-wide will be subject to any City of San Diego City Council drought actions to conserve water, if enacted by City Council.

As you already know reclaimed water is also available in the area and you are encouraged to use reclaimed water for temporary construction purposes if possible.

If you have any questions, please call me at 619-446-5420 or email me at Mrastakhiz@sandiego.gov.

Sincerely,

Mehdi Rastakhiz, PE
Associate Civil Engineer
Development Services Department
Water and Sewer Development Review
1222 First Avenue, MS 401
San Diego, CA 92101

DEPARTMENT OF TRANSPORTATION
DISTRICT 11
4050 TAYLOR STREET, M.S. 120
SAN DIEGO, CA 92110
PHONE (619) 688-6431
FAX (619) 688-3321
TTY 711
www.dot.ca.gov

VIA EMAIL

May 15, 2014

11-SD-5
P.M. R29.1/R30.5
EA 0223U1

Leonard Wilson
Senior Civil Engineer
City of San Diego
Development Services Department
Water and Sewer Development Review
1222 First Avenue, MS 401
San Diego, California 92101-4101
LLWilson@sandiego.gov

Mr. Wilson,

Caltrans is developing a contract to install Landscape, Irrigation and Plant Establishment as part of a larger Highway Construction project on Route 5 and Genesee Avenue. Please see attached title sheet for project area and water meter location. To comply with the Governor's emergency drought declaration and Caltrans policy we are requesting written concurrence from the San Diego Water Department- Water and Sewer Development Review that Caltrans will have adequate water resources for the duration of the project. This project utilizes both Recycled and Potable Water. We will request concurrence for Recycled Water under a separate cover to that reviewer.

The Project is anticipated to start September 1, 2014 for four years. This letter addresses only water needs for the landscape construction and plant establishment which is estimated to start January 1, 2017. The work is estimated to last 160 Working Days or 8 months and will be followed by a plant establishment period of 250 Working Days or one year. The annual Potable water usage will be approximately 4,000 HCF Units for construction and plant establishment annually. Following plant establishment, water usage will decrease 1,000 HCF per year. Ultimately water usage will be decreased to 200 HCF annually to water trees on bubbler systems intermittently.

Thank you for your assistance in planning for our water use needs. Caltrans would appreciate if you could please respond by June 15, 2014 so we can move forward with the project. If you have any questions please contact me at 619-688-6431 or email me at joel.hortizuela@dot.ca.gov.

Sincerely,

Joel Hortizuela
Caltrans Landscape Architecture Dept.

cc: Stephen Alvarez, Senior Landscape Architect, Caltrans District 11

From: Wilson, Leonard [mailto:LLWilson@sandiego.gov]
Sent: Wednesday, May 28, 2014 3:08 PM
To: Hortizuela, Joel V@DOT
Cc: Phung, Tung; Rastakhiz, Mehdi
Subject: RE: Caltrans Drought Action Plan/ Rte 5 Genesee

Joel,

In response to your letter dated May 15, 2014 (copy attached), the City has reviewed the potable water usage for the subject project. The existing 3-inch potable water irrigation meter on Roselle Street as shown on the attached TitleSht.pdf drawing and on the attached City Water maps has sufficient and available water capacity for the duration of the subject project. However, this existing potable water irrigation meter as well as other existing potable water irrigation meters City-wide will be subject to any City of San Diego City Council drought actions to conserve water, if enacted by City Council.

If you have any questions, please let me know.

Thank you,
Leonard

Leonard L. Wilson, P.E.
Senior Civil Engineer
City of San Diego
Development Services Department
Water and Sewer Development Review
1222 First Avenue, MS 401
San Diego, CA 92101-4101

(619) 446-5421
LLWilson@sandiego.gov

DEPARTMENT OF TRANSPORTATION
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TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

March 17, 2014

11-SD-5
P.M. R29.1/R30.5
EA 0223U1

Hooman Partow
City of San Diego
Public Utilities Department
Long Range Planning & Water Resources
Recycled Water Program
600 B Street
Ste 600, MS 906
San Diego, California

Mr. Partow,

Caltrans is developing a contract to install Landscape, Irrigation and Plant Establishment as part of a larger Highway Construction project on Route 5 and Genesee Avenue. Please see attached title sheet for project area and water meter locations. To comply with the Governor's emergency drought declaration and Caltrans policy we are requesting written concurrence from the San Diego Water District- Recycled water division that Caltrans will have adequate water resources for the duration of the project. This project utilizes both Recycled and Potable Water. We will request concurrence for Potable Water under a separate cover to that reviewer.

The Project is anticipated to start September 1, 2014 for four years. This letter addresses only water needs for the landscape construction and plant establishment which is estimated to start January 1, 2017. The work is estimated to last 160 Working Days or 8 months and will be followed by a plant establishment period of 250 Working Days or one year. Approximately 41,000 HCF Units are anticipated to use in construction and plant establishment annually. Following plant establishment, water usage will decrease substantially.

Thank you for your assistance in planning for our water use needs. Caltrans would appreciate if you could please respond by April 3, 2014 so we can move forward with the project. If you have any questions please contact me at 619-688-6431 or email me at joel.hortizuela@dot.ca.gov.

Sincerely,

Joel Hortizuela
Caltrans Landscape Architecture Dept.

cc: Stephen Alvarez, Senior Landscape Architect, Caltrans District 11

From: Partow, Hooman
To: Hortizuela, Joel V@DOT
Cc: Kiros, Azeib; Arroyo, Ramil; Amarillas, Fabiola
Subject: RE: EA 0223U1
Date: Tuesday, March 25, 2014 2:26:34 PM
Attachments: SanDiegoRecycledPurveyorLettter.docx

Joel,

In response to your attached letter dated March 17, 2014, The City of San Diego Recycled Water System can provide the 41,000 HCF units of recycled water annually for CalTrans anticipated use in construction and plant establishment at the intersection of Genesee Road and State Route 5. CalTrans will have to provide plans to the City for required services and meter installations.

Sincerely,

Hooman Partow, P.E.
Senior Civil Engineer
Recycled Water Program
Public Utilities Department
City of San Diego

From: Hortizuela, Joel V@DOT [mailto:joel.hortizuela@dot.ca.gov]
Sent: Thursday, March 20, 2014 2:34 PM
To: Kiros, Azeib
Cc: Amarillas, Fabiola; Alvarez, Stephen@DOT
Subject: EA 0223U1

Hello Azeib,

As I mentioned previously to you by phone, the State is under a moratorium for it's water usage in Highway Planting work. As part of the State Drought Action Plan, a Memorandum "Evaluation of Current Planting Work" has been issued with requirements/guidelines for Caltrans to follow. One of the requirements is to get concurrence/assurance from the Water Purveyor that water will be available for the duration of the project. This entails both Potable and Recycled water use. You had previously asked me to address this letter to Hooman for Recycled water concurrence which is attached along with the Title sheet and a copy of the Memorandum.

Can you or Fabiola give me a City contact name and email to whom we can send the letter for Potable water concurrence?

Thank You!

Joel Hortizuela
Caltrans District 11
Landscape Architecture
619-688-6431

BATTERY BACK UP SYSTEM (BBS)

DIMENSIONS AND DETAILS FOR THE EXTERNAL CABINET

DETAILS FOR ATTACHING THE EXTERNAL CABINET

ATTACHED:

1) Electric System (BBS Power Connection Diagram, Type A, Case-1)

2) Electric System (BBS Power Connection Diagram, Type B, Case-1)

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Theresa A. Gabriel No. E15129 Exp. 6-30-10 ELECT STATE OF CALIFORNIA

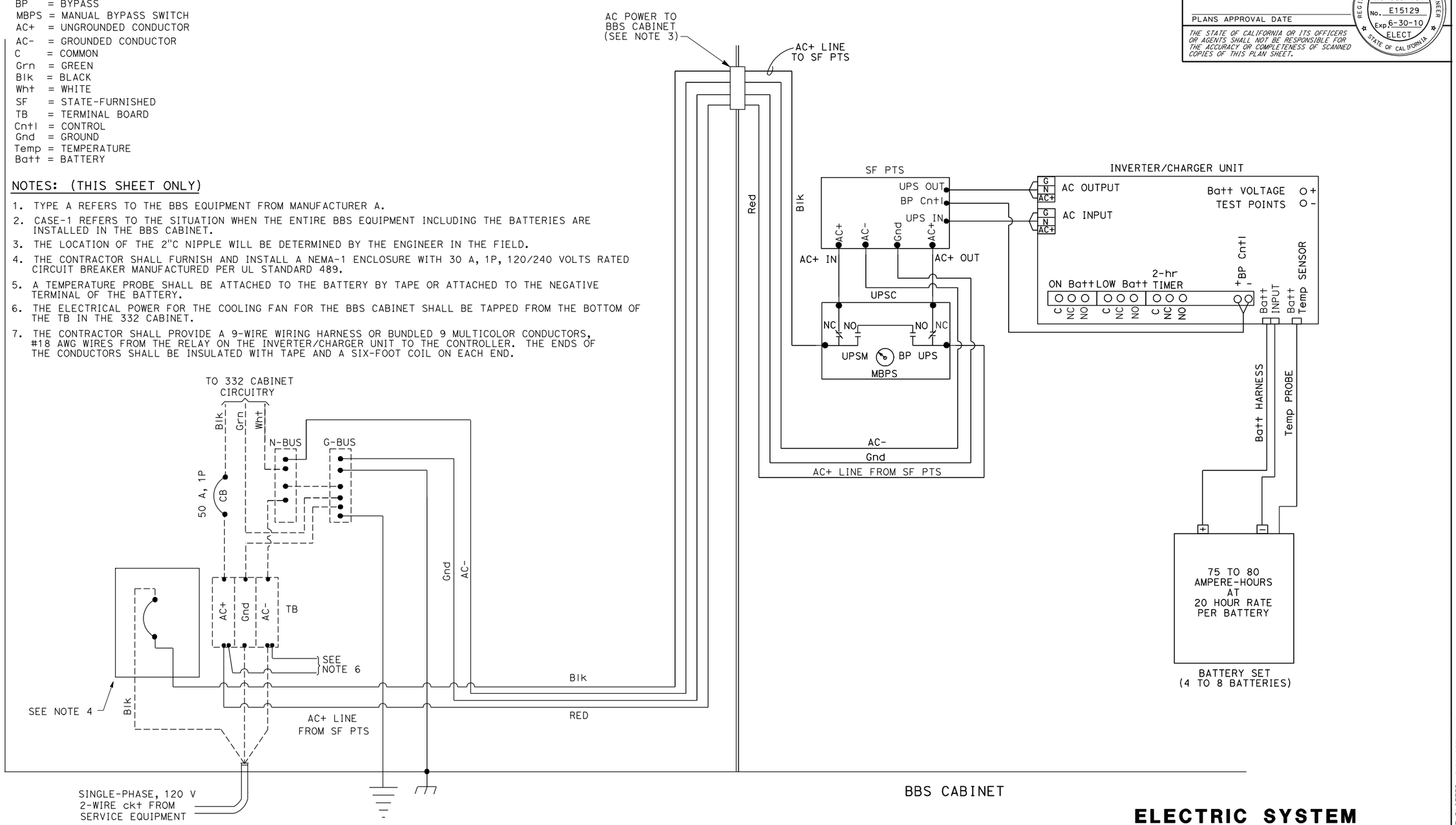
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

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 2"C 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 SIX-FOOT COIL ON EACH END.



ELECTRIC SYSTEM
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-1)

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LAST REVISION 3-11-09
DATE PLOTTED => 22-SEP-2009
TIME PLOTTED => 09:16

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED CIVIL 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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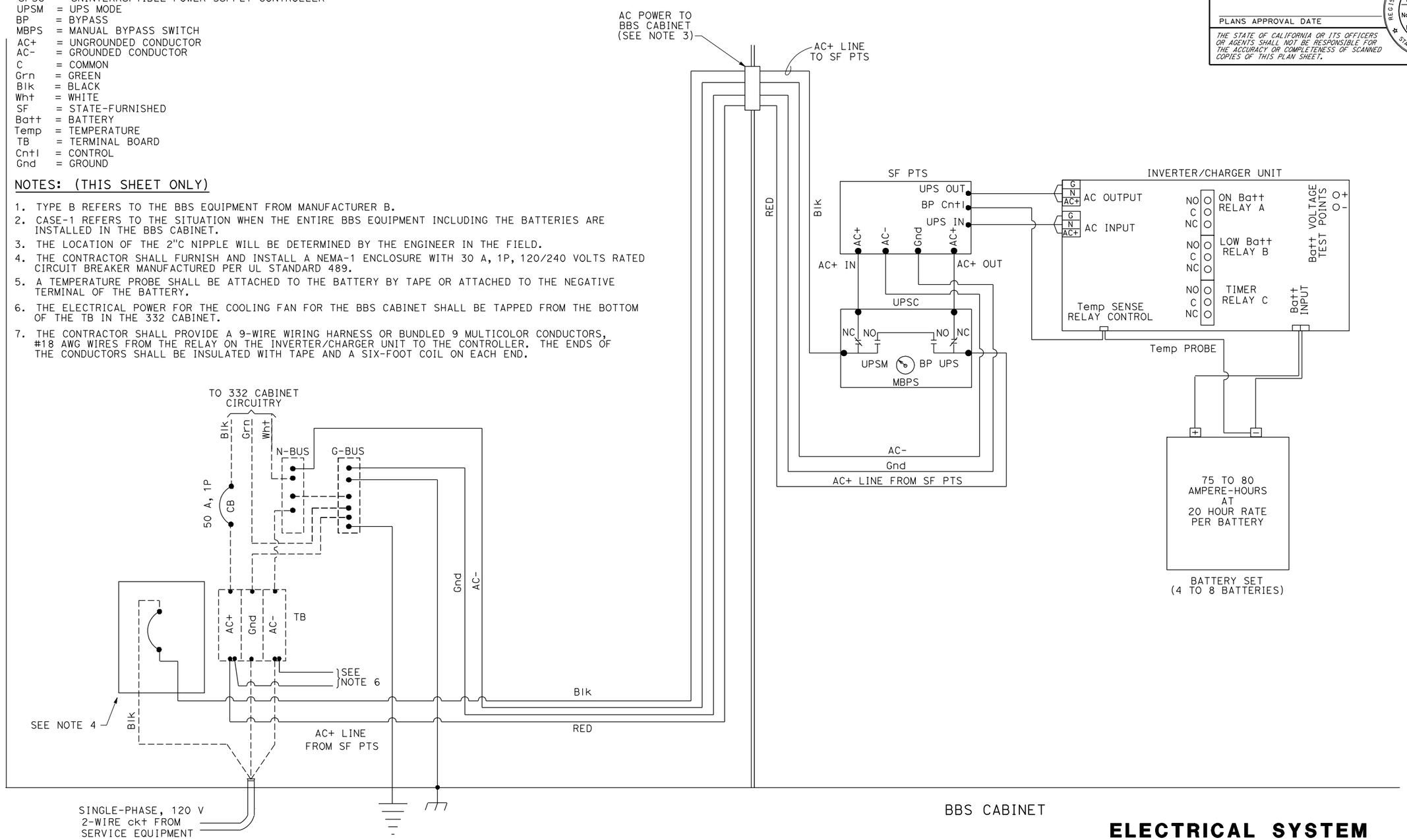
Batt = BATTERY
Temp = TEMPERATURE
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND

NOTES: (THIS SHEET ONLY)

1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-1 REFERS TO THE SITUATION WHEN THE ENTIRE BBS EQUIPMENT INCLUDING THE BATTERIES ARE INSTALLED IN THE BBS CABINET.
3. THE LOCATION OF THE 2"C 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 SIX-FOOT COIL ON EACH END.



ELECTRICAL SYSTEM

(BBS POWER CONNECTION DIAGRAM, TYPE B, CASE-1)

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