FOR CONTRACT NO: 04-3A9224
PROJECT ID: 0412000340

INFORMATION HANDOUT

PERMIT

Letter from California Department of Fish and Game dated March 23, 2012 on Notification of Lake or Streambed Alteration No. 1600-2011-0435-R3

MATERIALS INFORMATION

Foundation Report
Supplemental Foundation Letter
Geotechnical Design and Materials Report
Limited Site Investigation Report
Asbestos and Lead Containing Paint Survey Report
Excerpts from Encroachment Permit Manual-Section 623.1, “Bore and Jack”
Non Storm Water Information Package

ROUTE: 04-Ala-880-PM24.0/25.5

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5520
www.dfg.ca.gov

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

March 23, 2012

Tony Wong
California Department of Transportation
111 Grand Avenue
Oakland, CA 94612

Subject: Notification of Lake or Streambed Alteration No. 1600-2011-0435-R3
I-880 Southbound HOV Lane Widening Project Impacting San Leandro Creek, Tributary to San Francisco Bay

Dear Mr. Wong:

As the Department of Fish and Game ("Department") explained in a previous letter to you dated February 14, 2012, the Department had until March 22, 2012 to submit a draft Lake or Streambed Alteration Agreement ("Agreement") to you or inform you that an Agreement is not required. The Department did not meet that date. As a result, by law, you may now complete the project described in your notification without an Agreement.

Please note that pursuant to Fish and Game Code section 1602(a)(4)(D), if you proceed with this project, it must be the same as described and conducted in the same manner as specified in the notification and any modifications to that notification received by the Department in writing prior to March 22, 2012. This includes completing the project within the proposed term and seasonal work period and implementing all avoidance and mitigation measures to protect fish and wildlife resources specified in the notification. If the term proposed in your notification has expired, you will need to re-notify the Department before you may begin your project. Beginning or completing a project that differs in any way from the one described in the notification may constitute a violation of Fish and Game Code section 1602.

Also note that while you are entitled to complete the project without an Agreement, you are still responsible for complying with other applicable local, state, and federal laws. These include, but are not limited to, the state and federal Endangered Species Acts and Fish and Game Code sections 5650 (water pollution) and 5901 (fish passage).

Finally, if you decide to proceed with your project without an Agreement, you must have a copy of this letter and your notification with all attachments available at all times at the work site. If you have any questions regarding this matter, please contact Marcia Grefsrud, Environmental Scientist, at (707) 644-2812 or mgrefsrud@dfg.ca.gov.

Sincerely,

Liam Davis
Senior Environmental Scientist
Bay Delta Region

cc: Denis Coghlan
Lieutenant Christensen
Warden O'Brien
Marcia Grefsrud

FOR DEPARTMENT USE ONLY				
Date Received	Amount Received	Amount Due	Date Complete	Notification No.
12/23/11	$4,482.75	$		1600-2011-0435-3

Ck # 2206 Alameda County Transportation Commission

Gretsud O'Brien Christensen

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

Complete EACH field, unless otherwise indicated, following the enclosed instructions and submit ALL required enclosures. Attach additional pages, if necessary.

Fish & Game
DEC 23 2011
Yountville

1. APPLICANT PROPOSING PROJECT

Name	Mr. Tony Wong		
Business/Agency	CALIFORNIA DEPARTMENT OF TRANSPORTATION		
Street Address	111 Grand Avenue		
City, State, Zip	Oakland, CA 94612		
Telephone	(510) 286-5168	Fax	(510) 286-5159
Email	Tony_Wong@dot.ca.gov		

2. CONTACT PERSON (*Complete only if different from applicant*)

Name	Denis Coghlan, CALIFORNIA DEPARTMENT OF TRANSPORTATION		
Street Address	111 Grand Avenue		
City, State, Zip	Oakland, CA 94612		
Telephone	(510) 286-5434	Fax	(510) 286-6301
Email	Denis_Coghlan@dot.ca.gov		

3. PROPERTY OWNER (*Complete only if different from applicant*)

Name			
Street Address			
City, State, Zip			
Telephone		Fax	
Email			

4. PROJECT NAME AND AGREEMENT TERM

A. Project Name	I-880 Southbound HOV Lane Widening Project
B. Agreement Term Requested	☑ Regular (*5 years or less*) ☐ Long-term (*greater than 5 years*)

C. Project Term		D. Seasonal Work Period		E. Number of Work Days
Beginning (*year*)	Ending (*year*)	Start Date (*month/day*)	End Date (*month/day*)	
2012	2014	10/01	10/01	375.00

5. AGREEMENT TYPE

Check the applicable box. If box B, C, D, or E is checked, complete the specified attachment.		
A.	☑ Standard *(Most construction projects, excluding the categories listed below)*	
B.	☐ Gravel/Sand/Rock Extraction (*Attachment A*)	*Mine I.D. Number:* _____
C.	☐ Timber Harvesting (*Attachment B*)	THP *Number:* _____
D.	☐ Water Diversion/Extraction/Impoundment (*Attachment C*)	*SWRCB Number:* _____
E.	☐ Routine Maintenance (*Attachment D*)	
F.	☐ DFG Fisheries Restoration Grant Program (FRGP)	*FRGP Contract Number:* _____
G.	☐ Master	
H.	☐ Master Timber Harvesting	

6. FEES

Please see the current fee schedule to determine the appropriate notification fee. Itemize each project's estimated cost and corresponding fee. ***Note: The Department may not process this notification until the correct fee has been received.***

	A. Project	B. Project Cost	C. Project Fee
1	I-880 Southbound HOV (North Segment), EA 3A9221	$32,000,000.00	
2			
3			
4			
5			
		D. Base Fee *(if applicable)*	
		E. TOTAL FEE ENCLOSED	

7. PRIOR NOTIFICATION OR ORDER

A. Has a notification previously been submitted to, or a Lake or Streambed Alteration Agreement previously been issued by, the Department for the project described in this notification?

☐ Yes (*Provide the information below*) ☑ No

Applicant: _____ Notification Number: _____ Date: _____

B. Is this notification being submitted in response to an order, notice, or other directive ("order") by a court or administrative agency (including the Department)?

☑ No ☐ Yes (*Enclose a copy of the order, notice, or other directive. If the directive is not in writing, identify the person who directed the applicant to submit this notification and the agency he or she represents, and describe the circumstances relating to the order.*)

☐ *Continued on additional page(s)*

8. PROJECT LOCATION

A. Address or description of project location.

(*Include a map that marks the location of the project with a reference to the nearest city or town, and provide driving directions from a major road or highway*)

The project is located on Interstate 880 (I-880) in Alameda County, within the cities of San Leandro and Oakland. The southern limit of the project is north of Davis Street interchange in San Leandro, and the northern limit of the project is the Hegenberger Road interchange in Oakland. See attached Vicinity Map (Exhibits 1a-1b).

☐ *Continued on additional page(s)*

B. River, stream, or lake affected by the project.	San Leandro Creek
C. What water body is the river, stream, or lake tributary to?	San Francisco Bay
D. Is the river or stream segment affected by the project listed in the state or federal Wild and Scenic Rivers Acts?	☐ Yes ☑ No ☐ Unknown
E. County	Alameda

F. USGS 7.5 Minute Quad Map Name	G. Township	H. Range	I. Section	J. ¼ Section
San Leandro Quadrangle, California	T3S	R3W	3	SW

☐ *Continued on additional page(s)*

K. Meridian (*check one*)	☐ Humboldt ☑ Mt. Diablo ☐ San Bernardino

L. Assessor's Parcel Number(s)

Not applicable.

☐ *Continued on additional page(s)*

M. Coordinates (*If available, provide at least latitude/longitude or UTM coordinates and check appropriate boxes*)

Latitude/Longitude	*Latitude:*	*Longitude:*	
	☐ Degrees/Minutes/Seconds	☐ Decimal Degrees	☐ Decimal Minutes
UTM	*Easting:* 572,100	*Northing:* 4,175,400	☑ Zone 10 ☐ Zone 11
Datum used for Latitude/Longitude or UTM	☑ NAD 27	☐ NAD 83 or WGS 84	

9. PROJECT CATEGORY AND WORK TYPE *(Check each box that applies)*

PROJECT CATEGORY	NEW CONSTRUCTION	REPLACE EXISTING STRUCTURE	REPAIR/MAINTAIN EXISTING STRUCTURE
Bank stabilization – bioengineering/recontouring	☐	☐	☐
Bank stabilization – rip-rap/retaining wall/gabion	☐	☐	☐
Boat dock/pier	☐	☐	☐
Boat ramp	☐	☐	☐
Bridge	☐	☐	☑
Channel clearing/vegetation management	☐	☐	☐
Culvert	☐	☐	☐
Debris basin	☐	☐	☐
Dam	☐	☐	☐
Diversion structure – weir or pump intake	☐	☐	☐
Filling of wetland, river, stream, or lake	☐	☐	☐
Geotechnical survey	☐	☐	☐
Habitat enhancement – revegetation/mitigation	☐	☐	☐
Levee	☐	☐	☐
Low water crossing	☐	☐	☐
Road/trail	☐	☐	☐
Sediment removal – pond, stream, or marina	☐	☐	☐
Storm drain outfall structure	☐	☐	☐
Temporary stream crossing	☐	☐	☐
Utility crossing : Horizontal Directional Drilling	☐	☐	☐
Jack/bore	☐	☐	☐
Open trench	☐	☐	☐
Other *(specify)*: Bridge widening overhead	☑	☐	☐

10. PROJECT DESCRIPTION

A. Describe the project in detail. Photographs of the project location and immediate surrounding area should be included.

- Include any structures (e.g., rip-rap, culverts, or channel clearing) that will be placed, built, or completed in or near the stream, river, or lake.
- Specify the type and volume of materials that will be used.
- If water will be diverted or drafted, specify the purpose or use.

Enclose diagrams, drawings, plans, and/or maps that provide all of the following: site specific construction details; the dimensions of each structure and/or extent of each activity in the bed, channel, bank or floodplain; an overview of the entire project area (i.e., "bird's-eye view") showing the location of each structure and/or activity, significant area features, and where the equipment/machinery will enter and exit the project area.

San Leandro Creek Bridge is proposed to be widened in the southbound direction in order to accommodate nine lanes of traffic. The widening section is 1410'-7" long and 17'-6" wide. The bridge widening is not expected to physically impact any area within the stream bed and the banks. There will be no new bridge footings within the creek. However, the widening will result in the creek of 0.02556 acres of permanent structure above the creek (see attached Exhibits 2a-2b showing widening over creek).

The proposed superstructure of the widening portion will be concrete slab deck over steel I-girder to match existing superstructure. Concrete barrier with sound wall and sign structures will be relocated to the proposed edge of deck. Closure pour will be used to connect existing and proposed deck. Steel I-girder and seat type abutments are proposed. The girders will be supported on rock bearings. Driving piles will provide support for seat type abutments and pier footings. The only exception is Bent # 5 where a 6-feet diameter cast-in drilled hole (CIDH) pile will be used as foundation. The foundation for Bent # 5 is the closest to the San Leandro Creek but is placed outside the creek bank.

The following plans are attached for reference:

General Plan No. 1 (Exhibit 3)
General Plan No. 2 (Exhibit 4)
Foundation Plan No. 1 (Exhibit 5)
Bent Details No. 6 (Exhibit 6)
Stage Construction Plan SC-3 (Exhibit 7)

Photos of the project area are included as Exhibits 8a-8d.

☐ *Continued on additional page(s)*

B. Specify the equipment and machinery that will be used to complete the project.

The following equipment are anticipated to be used for bridge widening adjacent to creek:
1. CIDH drilling equipment
2. Concrete mixers/pumping equipment
3. Cranes

☐ *Continued on additional page(s)*

C. Will water be present during the proposed work period (specified in box 4.D) in the stream, river, or lake (specified in box 8.B).	☑ Yes ☐ No (*Skip to box 11*)
D. Will the proposed project require work in the wetted portion of the channel?	☐ Yes (*Enclose a plan to divert water around work site*) ☑ No

14. ENVIRONMENTAL REVIEW

A. Has a draft or final document been prepared for the project pursuant to the California Environmental Quality Act (CEQA), National Environmental Protection Act (NEPA), California Endangered Species Act (CESA) and/or federal Endangered Species Act (ESA)?

☑ Yes (*Check the box for each CEQA, NEPA, CESA, and ESA document that has been prepared and enclose a copy of each*)

☐ No (*Check the box for each CEQA, NEPA, CESA, and ESA document listed below that will be or is being prepared*)

☐ Notice of Exemption	☑ Mitigated Negative Declaration	☑ NEPA document (*type*): FONSI
☑ Initial Study	☐ Environmental Impact Report	☐ CESA document (*type*):
☐ Negative Declaration	☐ Notice of Determination *(Enclose)*	☐ ESA document (*type*):
☐ THP/ NTMP	☐ Mitigation, Monitoring, Reporting Plan	

B. State Clearinghouse Number (*if applicable*)	SCH number: 2009112012
C. Has a CEQA lead agency been determined?	☑ Yes (*Complete boxes D, E, and F*) ☐ No (*Skip to box 14.G*)
D. CEQA Lead Agency	California Department of Transportation
E. Contact Person	Melanie Brent
F. Telephone Number	

G. If the project described in this notification is part of a larger project or plan, briefly describe that larger project or plan.

The California Department of Transportation (Department) and the Federal Highway Administration (FHWA), in cooperation with the Alameda County Congestion Management Agency (ACCMA), propose to extend the existing Interstate 880 (I-880) southbound High Occupancy Vehicle (HOV) lane from its current begin point at approximately 1,700 feet south of the Marina Boulevard overcrossing (PM 22.5) to the Hegenberger Road on-ramp (PM 25.5). The San Leandro Creek Bridge is proposed to be widened in the southbound direction to accommodate nine lanes of traffic.

☐ *Continued on additional page(s)*

H. Has an environmental filing fee (Fish and Game Code section 711.4) been paid?

☐ Yes (*Enclose proof of payment*) ☑ No (*Briefly explain below the reason a filing fee has not been paid*)

No impacts anticipated.

Note: If a filing fee is required, the Department may not finalize a Lake or Streambed Alteration Agreement until the filing fee is paid.

15. SITE INSPECTION

Check one box only.

☑ In the event the Department determines that a site inspection is necessary, I hereby authorize a Department representative to enter the property where the project described in this notification will take place at any reasonable time, and hereby certify that I am authorized to grant the Department such entry.

☐ I request the Department to first contact (*insert name*) _____ at (*insert telephone number*) _____ to schedule a date and time to enter the property where the project described in this notification will take place. I understand that this may delay the Department's determination as to whether a Lake or Streambed Alteration Agreement is required and/or the Department's issuance of a draft agreement pursuant to this notification.

12. MEASURES TO PROTECT FISH, WILDIFE, AND PLANT RESOURCES

A. Describe the techniques that will be used to prevent sediment from entering watercourses during and after construction.

Construction Best Management Practices (BMPs) such as installing of temporary silt fence, fiber roll, and cover shall be implemented to ensure no excess sediment enters San Leandro Creek. Water containing mud or silt from construction activities will be treated by filtration, or retention in settling tanks, adequate to prevent sediment from entering the creek. Debris-catching devices shall be placed under the bridge to prevent dust or debris from entering the creek. All collection devices will be inspected daily and the debris shall be removed and stored away from the creek and protected from run-on and run-off. The Contractor is required to prepare and gain approval of a Storm Water Pollution Prevention Plan before commencing construction activities.

☐ *Continued on additional page(s)*

B. Describe project avoidance and/or minimization measures to protect fish, wildlife, and plant resources.

1. Construction activities adjacent to San Leandro Creek shall be limited to the non-migratory period for steelhead (June through November).
2. Vibratory hammer shall be used, if feasible, instead of impact hammer to reduce the level of underwater sound within San Leandro Creek. If possible, a cushioning block shall be used between pile and hammer to further reduce sound levels.
3. Placement of access roads and staging areas shall avoid the banks and the channel.
4. Equipment maintenance and fueling area shall be located at least 100 feet away from the creek bank. All vehicles and equipment shall be checked for oil, fuel, and coolant leaks prior to initiating work.
5. The Contractor shall prepare an emergency response/clean-up plan prior to initiating work near the creek.

☐ *Continued on additional page(s)*

C. Describe any project mitigation and/or compensation measures to protect fish, wildlife, and plant resources.

Not required.

Caltrans initiated informal Section 7 consultation with NOAA Fisheries pursuant to the Endangered Species Act. It was agreed that as long as the project does not place additional piers in San Leandro Creek, and work in the creek area occurs during the dry season when steelhead are not present, then a No Effect determination was appropriate.

☐ *Continued on additional page(s)*

13. PERMITS

List any local, state, and federal permits required for the project and check the corresponding box(es). Enclose a copy of each permit that has been issued.

A. _____ ☐ Applied ☐ Issued

B. _____ ☐ Applied ☐ Issued

C. _____ ☐ Applied ☐ Issued

D. Unknown whether ☐ local, ☐ state, or ☐ federal permit is needed for the project. (*Check each box that applies*)

☐ *Continued on additional page(s)*

11. PROJECT IMPACTS

A. Describe impacts to the bed, channel, and bank of the river, stream, or lake, and the associated riparian habitat. Specify the dimensions of the modifications in length (linear feet) and area (square feet or acres) and the type and volume of material (cubic yards) that will be moved, displaced, or otherwise disturbed, if applicable.

No impact is anticipated to creek bed, banks or associated riparian habitat. All physical work will not encroach into the creek bed nor its banks. However, the widening will result in the creation of 0.02556 acres of permanent structure above the creek (see attached exhibit showing widening over creek).

☐ *Continued on additional page(s)*

B. Will the project affect any vegetation? ☐ Yes (*Complete the tables below*) ☑ No

Vegetation Type	Temporary Impact	Permanent Impact
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____

Tree Species	Number of Trees to be Removed	Trunk Diameter (range)

☐ *Continued on additional page(s)*

C. Are any special status animal or plant species, or habitat that could support such species, known to be present on or near the project site?

☑ Yes *(List each species and/or describe the habitat below)* ☐ No ☐ Unknown

Steelhead (Central California Coast Evolutionary Significant Unit [ESU]) (Oncorhynchus mykiss)

☐ *Continued on additional page(s)*

D. Identify the source(s) of information that supports a "yes" or "no" answer above in Box 11.C.

Natural Environmental Study (LSA Associates, Inc., July 2009)

☐ *Continued on additional page(s)*

E. Has a biological study been completed for the project site?

☑ Yes (*Enclose the biological study*) ☐ No

Note: A biological assessment or study may be required to evaluate potential project impacts on biological resources.

F. Has a hydrological study been completed for the project or project site?

☑ Yes (*Enclose the hydrological study*) ☐ No

Note: A hydrological study or other information on site hydraulics (e.g., flows, channel characteristics, and/or flood recurrence intervals) may be required to evaluate potential project impacts on hydrology.

16. DIGITAL FORMAT

Is any of the information included as part of the notification available in digital format (i.e., CD, DVD, etc.)?

☑ Yes (Please enclose the information via digital media with the completed notification form)

☐ No

17. SIGNATURE

I hereby certify that to the best of my knowledge the information in this notification is true and correct and that I am authorized to sign this notification as, or on behalf of, the applicant. I understand that if any information in this notification is found to be untrue or incorrect, the Department may suspend processing this notification or suspend or revoke any draft or final Lake or Streambed Alteration Agreement issued pursuant to this notification. I understand also that if any information in this notification is found to be untrue or incorrect and the project described in this notification has already begun, I and/or the applicant may be subject to civil or criminal prosecution. I understand that this notification applies only to the project(s) described herein and that I and/or the applicant may be subject to civil or criminal prosecution for undertaking any project not described herein unless the Department has been separately notified of that project in accordance with Fish and Game Code section 1602 or 1611.

Tony Wong

Signature of Applicant or Applicant's Authorized Representative

12/21/09

Date

Tony Wong

Print Name

FOUNDATION REPORT

SAN LEANDRO CREEK BRIDGE & OVERHEAD (WIDEN)
(BR. NO. 33-0100)
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880 PM 24.18 EA 04-3A9201

For

Rajappan & Meyer Consulting Engineers, Inc.
1038 Leigh Avenue, Suite 100
San Jose, CA 95126

PARIKH CONSULTANTS, INC.

2360 Qume Drive, Suite A
San Jose, CA 95131
(408) 452-9000

February 2012

Job No. 2006-139-010

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APPENDIX I: SITE MAP

Plate I-1: Project Location Map
Plate I-2: Site Map
Plate I-3: Geologic Map
Plate I-4A: Seismic Hazard Zones Map
Plate I-4B: Historical Ground Failures Map

APPENDIX II: LOGS OF TEST BORINGS

APPENDIX III: LABORATORY TEST RESULTS

APPENDIX IV: ANALYSES AND CALCULATIONS

Plate IV-1: Fault Map
Plate IV-2: ARS Curve
Plate IV-3: Analyses & Calculations
- ARS Online
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- Settlement Analyses
- Slope Stability Analyses
- Soil Strength Profiles
- APile Analyses & Lpile Analyses/Results
- Vertical & Lateral Analyses for Retaining Walls
- Vertical & Lateral Analyses for Pre-fabricated bridge (Alameda Flood Control)

APPENDIX V: COMMENTS & RESPONSES (DATED 1/25/12)
COMMENTS & RESPONSES (DATED 1/11/12)

FOUNDATION REPORT
SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
(BR. NO. 33-0100)
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880 PM 24.18 EA 04-3A9201

1.0 SCOPE OF WORK

The purpose of this investigation was to evaluate the general soil conditions at the project site, to evaluate their engineering properties, and to provide foundation design recommendations for the proposed project. The scope of work performed for this investigation included a review of the readily available geologic literature pertaining to the site, obtaining representative soil samples and logging soil materials encountered in the exploratory boring and cone penetration tests, laboratory testing of the collected samples, engineering analysis of the field and laboratory data, and preparation of this report.

This report presents the results of our geotechnical engineering investigation for the proposed San Leandro Creek Bridge and Overhead (Widen), as described herein, to be constructed in Alameda County, California. The approximate location of the site is shown on the Site Map (Plate I-1) in Appendix I of the report.

The geotechnical recommendations presented in this report are intended for design input and are not intended to be used as specifications. These recommendations should not be used directly for bidding purposes or for construction cost estimates.

2.0 PROJECT DESCRIPTION

A new High Occupancy Vehicle (HOV) lane is proposed from Hegenberger Road overcrossing to the existing HOV lane south of Marina Boulevard. The new HOV lane will increase capacity in the I-880 corridor to reduce delay for HOV lane and mixed flow vehicles, reduce the accident rate and improve safety along I-880.

The existing San Leandro Creek Bridge and Overhead is a twenty three-span structure and is 1410 feet and 7 inches long. The bridge structure crosses over San Leandro Creek and Union Pacific Rail Road. The structure was originally built in 1951, widened in 1970,and retrofitted in 1997.

The San Leandro Creek Bridge and Overhead will be widened by approximately 17.5 feet to accommodate the new HOV lane. The proposed San Leandro Creek Bridge and Overhead (Widen) will be a 23-span structure with supports at Abutment 1, Bents 2 through 23, and Abutment 24. The bridge widening structure will be on a structural steel girder with approximate length of 1410'-7" measured along the "I-880" line. The bents and abutments will be supported on pile caps with Caltrans standard Alternative "W" piles, with the exception of Bent 5, which will be supported on a 6-foot diameter Cast-In-Drilled-Hole (CIDH) concrete pile to circumvent the creek. A pre-fabricated bridge is also proposed on the east side of the UPRR, which is under Alameda Flood Control District jurisdiction. The abutments will be supported on pile cap with 24-inch diameter CIDH concrete piles.

Two soundwall on retaining walls (Type 5SWB) are proposed for the project, namely RW SB-1 and RW SB-2. They are located along the southbound I-880 at the north and south abutments of the San Leandro Creek Bridge.

3.0 EXCEPTIONS TO POLICY

Normal procedures were assumed for construction of the bridge structure throughout our analysis and represent one of the bases of recommendations presented herein. The investigation for the proposed foundations has followed Caltrans policy. Exception to policy is not needed.

4.0 FIELD INVESTIGATION AND TESTING PROGRAM

Five exploratory boring, Boring RW-30 thru RW-34, and two cone penetration tests (CPTs) were drilled up to exploratory depths of 100 feet. The approximate location of the boring is shown on the Log of Test Borings in Appendix II.

Due to limited access, Boring RW-32 was advanced using portable drilling equipment from existing sloping embankment. The remaining borings were advanced using a truck-mounted hollow stem auger drilling method. The soil samples were then obtained from 2.5 inches I.D. Modified California and 1.4 inches I.D. Standard Penetration Test samplers under the impact of a

140 lb hammer falling through 30 inches. The boring was drilled under the technical supervision of one of our engineers, who classified and logged the soils encountered during drilling and supervised the collection of soil samples at various depths for visual examination and laboratory testing. The blow counts required to drive the sampler for the last 12 inches are presented on the "Log of Test Borings", Appendix II. After visual examination, the collected samples were sealed and transported to our laboratory for further evaluation and testing.

Gregg Drilling & In Situ, Inc. performed the CPT on July 1, 2008. The CPT was conducted using a 20-Ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The soil resistance exerted to the tip and side of the cone were recorded and correlated to "Soil Behavior Type", classification and strength characteristics. Gregg's CPT report is attached in Appendix A.

The bore logs presented in Appendix II were prepared from the field logs which were edited after visual re-examination of the soil samples in the laboratory and results of classification tests on selected soil samples as indicated on the logs. The abrupt stratum changes shown on these logs may be gradual and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations.

5.0 LABORATORY TESTING PROGRAM

Laboratory tests were performed on selected samples in the laboratory to evaluate the physical and engineering properties of the subsoils. The tests performed for the study include the following: Moisture-Density (ASTM Test Method D 2216-92), Unconfined Compression Tests (ASTM Test Method D 2166-91), Atterberg Limits (ASTM Test Method D 4318-93), Grain Size Classification (ASTM Test Method D 422-63), Sulfate Content (California Test Method 417), Chloride Content (California Test Method 422), and Resistivity and pH Measurements for Soil (California Test Method 643). The laboratory test results are attached in Appendix III.

6.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

6.1 Site Geology

General geologic features pertaining to the site were evaluated by reference to the "Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California" by R.W. Graymer, 2000 (USGS Map, MF-2342). Based on the geologic map, the site subsoil's consist of Basin Deposits (Holocene, Qhb). A geologic map of the project vicinity is shown on Plate I-3.

Qhb (Basin Deposits, Holocene) – Very fine silty clay to clay deposits occupying flat-floored basins at the distal edge of alluvial fans adjacent to the bay mud (Qhbm).

The portion of the published geologic map that includes the general project area is shown on Plate I-3.

6.2 Subsurface Conditions

The subsurface conditions are based on the as-built LOTBs (Caltrans, 1955, 1966, 1968 & 1992), exploratory borings RW-30 thru RW-34, and two CPTs performed in 2008. The approximate boring locations are shown on the attached LOTB sheet and Plate I-2 (Site Plan). A complete report (6/6/08) prepared by Gregg is attached in Appendix II of the foundation report. Per Gregg's report, the interpretation follows the comprehensive review by Lunne, Robertson and Powell (1997). Note that the Gregg's CPT interpretation starts at 5 ft depth because the upper 5 ft was hand-augered as a safety practice. Parikh provided spread sheets for data correlation (attached in Appendix IV) only to read Gregg's data and present/plot certain selected parameters along depth for convenience of reading the file.

<u>San Leandro Creek BOH (Widen)</u> Based on the as-built borings, the subsurface conditions along the bridge and overhead consist of medium stiff to very stiff silty clay and sandy clay. A 20-ft to 25-ft thick sand layer was commonly encountered north of the UPRR track at an approximate Elev. -10 to -30 feet. CPT-1 and CPT-2 drilled by PARIKH is relatively consistent with the as-built borings, as shown in the following table.

CPT DATA

CPT	Depth (ft)	Description
CPT-1	0 - 30	Medium stiff to stiff clay
	30 - 50	Dense sand
	50 - 100	Stiff to hard sandy silt to clayey silt with small lens of silty sand to sandy silt
CPT-2	0 - 20	Medium stiff clay
	20 - 40	Medium dense to dense sand
	40-100	Stiff to hard sandy silt to clayey silt with small lens of silty sand to sandy silt

Retaining Wall RW SB-1 Based on Borings RW-30 and RW-31, the subsurface conditions consist of medium stiff to very stiff clay. The borings are relatively similar to the as-built borings B-5 and B-6, which are used as references for the retaining wall. The as-built borings consists of clayey silt and silty clay material. Sandy material is encountered below Elev. -10 feet, up to the maximum depth explored.

Retaining Wall RW SB-2/Sound Wall SW No. 1 Based on Borings RW-32 thru RW-34, the subsurface conditions consist of medium dense to very dense silty/well-graded sand at the shallow depths underlain by stiff to very stiff lean and fat clay with minor sand lenses. The borings are relatively similar to Caltrans as-built borings B-1 (1966), B-1 (1992), and B-1 (1966). The Caltrans as-built borings were drilled to a deeper depth and dense to very dense silty/clayey sand was encountered below Elev. -25 feet, up to the maximum depth explored.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain a properly constructed project. We, therefore, recommend that a contingency fund be provided to accommodate any additional charges resulting from technical services that may be required during construction.

Groundwater Data. Groundwater was encountered between Elev. 1 to 17 ft (approx. 8 to 20 feet below grade) in the current investigation, which appears to be higher than what is shown on

the as-built LOTB. The following table includes the borings, depth, elevation and dates drilled where groundwater was encountered/measured.

GROUNDWATER DATA

Borings	Depth (ft)	Elevation (ft)	Date Drilled
RW-30	11	13	6/17/2008
RW-31	8	17	6/17/2008
RW-32	13.5	8.5	8/13/2008
RW-33	20	1	8/13/2008
RW-34	16	2	6/17/2008
As-built Boring B-1	8	6	3/30/1992
As-built Boring TH-1	14	4	Circa 1955
As-built Boring TH-7	11	6	Circa 1955
As-built Boring TH-8	8	6	Circa 1955
As-built Boring TH-6	11	4	Circa 1955
As-built Boring TH-5	9	6	Circa 1955

The groundwater level is anticipated to vary with the passage of time due to seasonal groundwater fluctuation, surface and subsurface flows, ground surface run-off, and other factors that may not be present at the time of investigation.

7.0 SCOUR EVALUATION

The subject was considered and was determined to be not applicable for the project since the foundation is not within the San Leandro Creek.

8.0 CORROSION EVALUATION

The corrosion investigation for this project was performed on the selected sample in general accordance with the provisions of California Test Methods 417, 422 and 643. These borings were drilled for the Geotechnical Design & Materials Report of "Route I-880 SB HOV Lane Extension and other Improvements between Marina Blvd. and Hegenberger Road Interchange," and is within the vicinity of the San Leandro Bridge and Overhead structure. A summary of the corrosion test results is presented in the following table.

CORROSION TEST RESULTS

Boring	Station	Offset	Depth (ft)	pH	Minimum Resistivity (ohms-cm)	Sulfate (ppm)	Chloride (ppm)
RW-30 #2	395+07 "I-880" Line	74'± Lt.	4.5	7.40	960	102.1	22.7
RW-31 #3	398+37 "I-880" Line	80'± Lt.	9.5	7.39	1210	34.5	7.9
RW-33 #4	419+13 "I-880" Line	83'± Lt.	16.0	7.97	1150	236.1	70.6

For structural elements, Caltrans Corrosion Guidelines (September 2003) consider a site to be corrosive if one or more of the following conditions exist: Chloride concentration $\geq$ 500 ppm, Sulfate concentration $\geq$ 2000 ppm, and pH $\leq$ 5.5. Based on the test results, the on-site materials are considered non-corrosive, according to the Corrosion Guidelines by Caltrans Division of Engineering Services. The test results are presented in Appendix III.

9.0 SEISMIC RECOMMENDATIONS

9.1 Seismic Sources

The project is located in a seismically active part of northern California. Many faults that exist in the San Francisco Bay Area are capable of producing earthquakes that may cause strong ground shaking at the site. Maximum magnitudes of some of the closest faults in the area based on 2007 Caltrans Deterministic PGA Map and ARS Online Report are summarized below. These maximum magnitudes represent the largest earthquake a fault is capable of generating and is related to the seismic moment.

EARTHQUAKE DATA

Fault (I.D.)	Fault Type	Approx. Distance from Site (miles)	Maximum Magnitude
Hayward fault zone (Northern section) (353)	Right Lateral Strike Slip	2.4±	7.3
Calaveras fault zone (Northern Calaveras section) (321)	Right Lateral Strike Slip	10.9±	7.4
San Andreas fault zone (Peninsula section) (309)	Right Lateral Strike Slip	16.1±	7.9
Silver Creek fault (152)	Reverse	11.6±	7.1

Based on the USGS Deaggregation 2008 (beta), the governing fault is the Hayward fault. Refer to Plate IV-1 for the fault map.

9.2 Seismic Hazards/Liquefaction Potential

Potential seismic hazards may arise from three sources: surface fault rupture, ground shaking and liquefaction. Since no active faults pass through the site, the potential for fault rupture is relatively low. Based on the peak ground acceleration of 0.7g obtained from the recommended Probabilistic ARS Curve (USGS Deaggregation 2008 (Beta) data) and the shaking level shown on the Earthquake Shaking Potential Map by CSSC, CGS, CalEMA, and USGS (2003), the shaking potential for the site is considered strong.

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged, cohesionless sands and low plasticity silts of low relative density are the type of soils which usually are susceptible to liquefaction.

The project vicinity is located within the State Seismic Hazard Zone, areas where historical occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required. However, we have also reviewed the map in the Ground Shaking Evaluation Report for Alameda County by the Department of Conservation, California Geologic Survey, 2003, which do not show any historical ground failures within our project site. Maps of State Seismic Hazard Zones and the Historical Ground Failures are shown on Plates I-4A and I-4B.

The liquefaction potential for the project site was evaluated in accordance with the methods proposed by Youd, et al. (2001) using the procedures (for CPT and SPT) published in "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, ASCE, V. 127, No. 10." The soils are considered liquefiable when the estimated factor of safety (F.S.) is less than 1.25. The F.S. was conservatively adopted from previous projects. As indicated by recent advances in soil

liquefaction engineering (Bray, 2006), for soils with sufficient fines content so as to separate the coarser particles and control behavior, liquefaction appears to occur primarily in soils where these fines are either non-plastic or are low plasticity silts and/or silty clays (PI<12%, and LL<37%), and with high water content relative to their LL (W%> 0.85LL).

We have estimated the Peak Ground Acceleration (PGA) based on the ARS curve governed by the probabilistic USGS Deaggregations 2008 (beta), which is based on several input parameters, including the site location (longitude/latitude), average shear wave velocity for the top 30m/100 feet (Vs30m).

Based on the borings drilled by PARIKH that consisted of submerged sand, CPT and available data, liquefaction analyses was performed for CPT-1, CPT-2 and RW-34. Although RW-32 encountered a submerged loose sand layer at Elev. 0 to -12 feet, assuming the 12-ft layer of liquefaction would appear to be too conservative. Due to limited room, a portable minuteman solid stem auger equipment was used for drilling RW-32 on the slope and the data may not be representative. CPT-2 and as-built boring B-1 (Caltrans, 1966) was drilled approximately 100 feet away and did not have a 12-ft layer of potential liquefaction. Therefore, in our opinion, it will be more realistic to use the CPT data when evaluating liquefaction potential.

The majority of the soils encountered during our investigation are mainly medium stiff to very stiff lean/fat clay and medium dense to very dense clayey sand with minor soft layers. Based on our analyses, potentially liquefiable layers are identified in RW-34 and CPT-2.

The results in Boring RW-34 show that there is potentially liquefiable layer at Elev. -5 to -10 ft. However, the corrected $N_{1,60,CS}$ is 27. The anticipated 100% development of pore pressure in such materials (i.e. high $N_{1,60,CS}$) may be more correctly ascribed to "cyclic mobility", which results in limited soil deformations without liquid-like flow. In our opinion, the engineering consequences of such phenomenon in those layers may be limited to temporary loss of strength. Volumetric strain induced by liquefaction, i.e. post-liquefaction settlement, is considered relatively small and the impact on the retaining wall is low.

Thin sand lens (less than 3 feet thick in CPT-2 at 20-ft depth) near the north abutment is subject to liquefaction as shown in the liquefaction analyses in Appendix IV. We do not anticipate global failure due to these conditions. Localized settlement is anticipated to be small and considered insignificant for the project. Volumetric strain induced by liquefaction, i.e. post-liquefaction settlement, may be on the order of 0.5 inch. Therefore, the impact to the foundation design of this liquefiable layer is considered low. The capacity within the liquefiable layer has been neglected when calculating vertical pile capacity. Refer to Appendix IV for results of the liquefaction analyses.

9.3 Seismic Design Criteria

The recommended response spectrum was determined based on the new 2007 Caltrans Deterministic PGA Map and the Caltrans ARS Online (Ver. 1.0.4). The development of the design ARS curve is based on several input parameters, including site location (longitude/latitude), average shear wave velocity for the top 100 feet (V_{S30m}), and other site parameters, such as fault characteristics, site-to-fault distances. The new design methods incorporate both deterministic and probabilistic seismic hazards to produce the Design Response Spectrum.

Average shear wave velocity (Vs) for the top 100 feet at the site was estimated by using established correlations and the procedure provided in the Caltrans Design Manual (Ver. 1.0, August 2009). The site location and the relevant parameters are summarized as follows, and the recommended design curve is presented in Plate IV-2.

1. Site Location: 37.7254°N/122.1829°W
2. Estimated V_{S30m} = 230 m/s
3. Peak Ground Acceleration = 0.7g
4. The recommended ARS curve is governed by the USGS Deaggregation 2008 (beta) data.
5. An adjustment factor for near fault effects were applied to the calculated spectral acceleration values. The increase of 20% to the spectral acceleration values corresponds to periods longer than 1 second and linearly tapers to zero at a period of 0.5 second.
6. No adjustments were required for basin effect.

10.0 AS-BUILT FOUNDATION DATA

As-built plans of the widening and retrofit of the bridge and overhead structures (San Leandro Creek Bridge and Overhead, Caltrans) were provided by the designer. The 1968 General Plan of the widening shows Class I concrete piles of 45-Ton bearing capacity with tip elevation at approximately -30 to -40 feet. In 1997, the structure was retrofitted with 24-inch diameter steel pipe piles with tip elevations ranging from -33 to -39 feet (pile lengths appear to be approximately 40 feet).

11.0 FOUNDATION RECOMMENDATIONS

11.1 General

This report was prepared specifically for the proposed project as described earlier. Normal procedures were assumed for construction of the bridge structure throughout our analysis and represent one of the bases of recommendations presented herein. Our design criteria have been based upon the materials encountered at the site. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations.

11.2 Foundation

According to the boring data, the subsurface conditions consist of interbedded layers of medium stiff to very stiff clay. Some borings encountered medium dense to dense sand generally at Elev. -10 to -30 feet. Per discussion with the designer, the Abutments 1 and 24, and Bents 2 thru 4, and Bents 6 thru 23 will be supported on pile caps with Caltrans standard Class 200 Alt. "W" (16-inch diameter open end pipe) and the Bent 5 will be supported on a 6' diameter CIDH concrete pile to circumvent the creek.

Consistent with the current Caltrans requirements, Working Stress Design (WSD) is used for the abutment foundations and Load and Resistant Factor Design (LRFD) is used for the foundations for the bents of the structures.

Based on information provided by the designer, the abutment pile cut-offs are planned at approximately Elev. 20 and 17 feet for Abutments 1 and 24, respectively. At the bents, the planned pile cut-off ranges from approximately Elev. 11 to 14 feet, with the exception of Bent 5. At Bent 5, the CIDH pile cut-off elevation is at approximately 19 feet. The bottom of the footing to the pile cut-off elevation is 5 inches. The recommended minimum pile spacing is three times the pile diameter (3D).

For the proposed structure, pertinent foundation design information provided by the designer, including Foundation Design Data and Foundation Design Loads, are presented in the following tables. Based on the load demand and subsoil information, the recommended specified pile tip elevations are also shown in the Pile Data Tables per Memo-To-Designers 3-1.

FOUNDATION DESIGN DATA (BR. NO. 33-0100)

Support No	Design Method	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size (ft)		Permissible Settlement (in)	No. of Piles per Support
					B	L		
Abutment 1	WSD	Class 140 (Alt. W)	26.3	22.72	7'	15'-11"	1.0	6
Bent 2	LRFD	Class 200 (Alt. W)	20.5	14.12	10'	12'	1.0	5
Bent 3	LRFD	Class 200 (Alt. W)	20.5	14.12	10'	12'	1.0	5
Bent 4	LRFD	Class 200 (Alt. W)	20.7	12.12	10'	12'	1.0	5
Bent 5	LRFD	6' CIDH	18.0	19.00	N/A	N/A	1.0	1
Bent 6	LRFD	Class 200 (Alt. W)	14.0	12.12	10'	12'	1.0	5
Bent 7	LRFD	Class 200 (Alt. W)	21.6	14.12	10'	12'	1.0	5
Bent 8	LRFD	Class 200 (Alt. W)	21.0	14.12	10'	12'	1.0	5
Bent 9	LRFD	Class 200 (Alt. W)	20.0	14.12	10'	12'	1.0	5
Bent 10	LRFD	Class 200 (Alt. W)	19.0	13.12	10'	12'	1.0	5
Bent 11	LRFD	Class 200 (Alt. W)	20.0	13.12	10'	12'	1.0	5
Bent 12	LRFD	Class 200 (Alt. W)	18.0	13.12	10'	12'	1.0	5
Bent 13	LRFD	Class 200 (Alt. W)	18.0	11.12	10'	12'	1.0	5
Bent 14	LRFD	Class 200 (Alt. W)	18.0	12.12	10'	12'	1.0	5
Bent 15	LRFD	Class 200 (Alt. W)	18.0	12.12	10'	12'	1.0	5
Bent 16	LRFD	Class 200 (Alt. W)	18.0	12.12	10'	12'	1.0	5
Bent 17	LRFD	Class 200 (Alt. W)	18.0	11.12	10'	12'	1.0	5
Bent 18	LRFD	Class 200 (Alt. W)	18.0	11.12	10'	12'	1.0	5
Bent 19	LRFD	Class 200 (Alt. W)	18.0	11.12	10'	12'	1.0	5
Bent 20	LRFD	Class 200 (Alt. W)	18.0	11.12	10'	12'	1.0	5
Bent 21	LRFD	Class 200 (Alt. W)	16.7	11.12	10'	12'	1.0	5
Bent 22	LRFD	Class 200 (Alt. W)	17.5	11.12	10'	12'	1.0	5
Bent 23	LRFD	Class 200 (Alt. W)	20.0	13.12	10'	12'	1.0	5
Abutment 24	WSD	Class 140 (Alt. W)	21.3	17.3	7'	20'-6"	1.0	6

FOUNDATION DESIGN LOADS (BR. NO. 33-0100)

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	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	310	65	230	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2	480	106	270	740	170	0	0	740	370	-400	-200
Bent 3	520	109	270	850	170	0	0	740	370	-400	-200
Bent 4	480	106	270	740	170	0	0	740	370	-400	-200
Bent 5	340	340	340	550	550	0	0	340	340	0	0
Bent 6	520	110	270	840	170	0	0	740	370	-400	-200
Bent 7	480	106	270	740	170	0	0	740	370	-400	-200
Bent 8	480	106	270	740	170	0	0	740	370	-400	-200
Bent 9	520	109	270	850	170	0	0	740	370	-400	-200
Bent 10	480	106	270	740	170	0	0	740	370	-400	-200
Bent 11	410	103	270	620	170	0	0	740	370	-400	-200
Bent 12	480	107	270	750	170	0	0	740	370	-400	-200
Bent 13	750	173	270	690	150	0	0	740	370	-400	-200
Bent 14	480	106	270	740	170	0	0	740	370	-400	-200
Bent 15	520	109	270	850	170	0	0	740	370	-400	-200
Bent 16	480	106	270	740	170	0	0	740	370	-400	-200
Bent 17	480	106	270	740	170	0	0	740	370	-400	-200
Bent 18	520	109	270	850	170	0	0	740	370	-400	-200
Bent 19	480	106	270	740	170	0	0	740	370	-400	-200
Bent 20	480	106	270	740	170	0	0	740	370	-400	-200
Bent 21	520	109	270	850	170	0	0	740	370	-400	-200
Bent 22	480	106	270	740	170	0	0	740	370	-400	-200
Bent 23	480	123	270	720	170	0	0	740	370	-400	-200
Abutment 24	335	65	260	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

FOUNDATION RECOMMENDATIONS FOR ABUTMENTS (BR. NO. 33-0100)

Support	Pile Type	Cut-off Elev. (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent					
Abut 1	Class 140 (Alt. W)	22.72	310	230	65	130	-23.0 (a) -8.0 (d)	-23.0	130
Abut 24	Class 140 (Alt. W)	17.3	335	260	65	130	-31.5 (a) -14.5 (d)	-31.5	130

Design tip elevations are controlled by (a) compression, (d) lateral

FOUNDATION RECOMMENDATIONS FOR BENT (BR. NO. 37-0673)

Support	Pile Type	Cut-off Elev. (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (in.)	Required Factored Nominal Resistance (kips)				Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. (ϕ=0.7)	Ten. (ϕ=0.7)	Comp. (ϕ=1)	Ten. (ϕ=1)			
Bent 2	Class 200 (Alt. W)	14.12	480	1.0	170	0	370	-200	-46.5 (a-I) -63.5 (a-II) -39.5 (b-II) -16.5 (d)	-63.5	370
Bent 3	Class 200 (Alt. W)	14.12	520	1.0	170	0	370	-200	-46.5 (a-I) -63.5 (a-II) -39.5 (b-II) -16.5 (d)	-63.5	370
Bent 4	Class 200 (Alt. W)	12.12	480	1.0	170	0	370	-200	-46.5 (a-I) -63.5 (a-II) -39.5 (b-II) -16.5 (d)	-63.5	370
Bent 5	6' CIDH	19.00	340	1.0	550	0	340	0	-54.5 (a-I) -24.5 (a-II) -51.5 (d)	-54.5	N/A
Bent 6	Class 200 (Alt. W)	12.12	520	1.0	170	0	370	-200	-47.5 (a-I) -63.5 (a-II) -38.5 (b-II) -16.5 (d)	-63.5	370
Bent 7	Class 200 (Alt. W)	14.12	480	1.0	170	0	370	-200	-47.5 (a-I) -63.5 (a-II) -38.5 (b-II) -16.5 (d)	-63.5	370
Bent 8	Class 200 (Alt. W)	14.12	480	1.0	170	0	370	-200	-47.5 (a-I) -63.5 (a-II) -38.5 (b-II) -16.5 (d)	-63.5	370
Bent 9	Class 200 (Alt. W)	14.12	520	1.0	170	0	370	-200	-46.5 (a-I) -63.5 (a-II) -38.5 (b-II) -12.0 (d)	-63.5	370
Bent 10	Class 200 (Alt. W)	13.12	480	1.0	170	0	370	-200	-46.5 (a-I) -63.5 (a-II) -38.5 (b-II) -12.0 (d)	-63.5	370
Bent 11	Class 200 (Alt. W)	13.12	410	1.0	170	0	370	-200	-45.5 (a-I) -63.5 (a-II) -37.5 (b-II) -17.0 (d)	-63.5	370
Bent 12	Class 200 (Alt. W)	13.12	480	1.0	170	0	370	-200	-45.5 (a-I) -63.5 (a-II) -37.5 (b-II) -17.0 (d)	-63.5	370
Bent 13	Class 200 (Alt. W)	11.12	750	1.0	150	0	370	-200	-41.5 (a-I) -63.5 (a-II) -37.5 (b-II) -17.0 (d)	-63.5	370
Bent 14	Class 200 (Alt. W)	12.12	480	1.0	170	0	370	-200	-45.5 (a-I) -63.5 (a-II)	-63.5	370

									-37.5 (b-II) -17.0 (d)		
Bent 15	Class 200 (Alt. W)	12.12	520	1.0	170	0	370	-200	-45.5 (a-I) -63.5 (a-II) -37.5 (b-II) -17.0 (d)	-63.5	370
Bent 16	Class 200 (Alt. W)	12.12	480	1.0	170	0	370	-200	-54.5 (a-I) -70.5 (a-II) -46.5 (b-II) -18.0 (d)	-70.5	370
Bent 17	Class 200 (Alt. W)	11.12	480	1.0	170	0	370	-200	-54.5 (a-I) -70.5 (a-II) -46.5 (b-II) -18.0 (d)	-70.5	370
Bent 18	Class 200 (Alt. W)	11.12	520	1.0	170	0	370	-200	-54.5 (a-I) -70.5 (a-II) -46.5 (b-II) -18.0 (d)	-70.5	370
Bent 19	Class 200 (Alt. W)	11.12	480	1.0	170	0	370	-200	-54.5 (a-I) -70.5 (a-II) -46.5 (b-II) -18.0 (d)	-70.5	370
Bent 20	Class 200 (Alt. W)	11.12	480	1.0	170	0	370	-200	-54.5 (a-I) -70.5 (a-II) -46.5 (b-II) -18.0 (d)	-70.5	370
Bent 21	Class 200 (Alt. W)	11.12	520	1.0	170	0	370	-200	-54.5 (a-I) -71.5 (a-II) -47.5 (b-II) -20.5 (d)	-71.5	370
Bent 22	Class 200 (Alt. W)	11.12	480	1.0	170	0	370	-200	-54.5 (a-I) -71.5 (a-II) -47.5 (b-II) -20.5 (d)	-71.5	370
Bent 23	Class 200 (Alt. W)	13.12	480	1.0	170	0	370	-200	-62.5 (a-I) -71.5 (a-II) -47.5 (b-II) -20.5 (d)	-71.5	370

Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, (d) Lateral Load.

PILE DATA TABLE (BR. NO. 33-0100)

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 140 (Alt. "W")	130	0	-23.0 (a); -8.0 (d)	-23.0	130
Bent 2	Class 200 (Alt. W)	370	200	-63.5 (a); -39.5(b); -16.5 (d)	-63.5	370
Bent 3	Class 200 (Alt. W)	370	200	-63.5 (a); -39.5(b); -16.5 (d)	-63.5	370
Bent 4	Class 200 (Alt. W)	370	200	-63.5 (a); -39.5(b); -16.5 (d)	-63.5	370
Bent 5	6' CIDH	790	0	-54.5 (a); -51.5 (d)	-54.5	N/A
Bent 6	Class 200 (Alt. W)	370	200	-63.5 (a); -38.5(b); -16.5 (d)	-63.5	370
Bent 7	Class 200 (Alt. W)	370	200	-63.5 (a); -38.5(b); -16.5 (d)	-63.5	370
Bent 8	Class 200 (Alt. W)	370	200	-63.5 (a); -38.5(b); -16.5 (d)	-63.5	370
Bent 9	Class 200 (Alt. W)	370	200	-63.5 (a); -38.5(b); -12.0 (d)	-63.5	370
Bent 10	Class 200 (Alt. W)	370	200	-63.5 (a); -38.5(b); -12.0 (d)	-63.5	370
Bent 11	Class 200 (Alt. W)	370	200	-63.5 (a); -37.5(b); -17.0 (d)	-63.5	370
Bent 12	Class 200 (Alt. W)	370	200	-63.5 (a); -37.5(b); -17.0 (d)	-63.5	370
Bent 13	Class 200 (Alt. W)	370	200	-63.5 (a); -37.5(b); -17.0 (d)	-63.5	370
Bent 14	Class 200 (Alt. W)	370	200	-63.5 (a); -37.5(b); -17.0 (d)	-63.5	370
Bent 15	Class 200 (Alt. W)	370	200	-63.5 (a); -37.5(b); -17.0 (d)	-63.5	370
Bent 16	Class 200 (Alt. W)	370	200	-70.5 (a); -46.5(b); -18.0 (d)	-70.5	370
Bent 17	Class 200 (Alt. W)	370	200	-70.5 (a); -46.5(b); -18.0 (d)	-70.5	370
Bent 18	Class 200 (Alt. W)	370	200	-70.5 (a); -46.5(b); -18.0 (d)	-70.5	370
Bent 19	Class 200 (Alt. W)	370	200	-70.5 (The a); -46.5(b); -18.0 (d)	-70.5	370
Bent 20	Class 200 (Alt. W)	370	200	-70.5 (a); -46.5(b); -18.0 (d)	-70.5	370
Bent 21	Class 200 (Alt. W)	370	200	-71.5 (a); -47.5(b); -20.5 (d)	-71.5	370
Bent 22	Class 200 (Alt. W)	370	200	-71.5 (a); -47.5(b); -20.5 (d)	-71.5	370
Bent 23	Class 200 (Alt. W)	370	200	-71.5 (a); -47.5(b); -20.5 (d)	-71.5	370
Abut 24	Class 140 (Alt. "W")	130	0	-31.5 (a); -14.5 (d)	-31.5	130

Design tip elevations for Abutments & Bent are controlled by (a) Compression; (b) Tension; (d) Lateral Loads

The pile capacities of the open end steel pipe piles (Caltrans Standard Alt. "W") were estimated based on procedures published by American Petroleum Institute (API) from "Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – Working Stress Design" (API RP 2A-WSD, 2002). We have utilized computer program "APILE Plus" (ENSOFT, v5.0) for calculation purpose.

The pile capacity of the CIDH concrete piles were estimated based on procedures given in the FHWA manual (Reese and O'Neill 1988 and O'Neill and Reese, 1999) using "Shaft" (Ensoft, v.6.0). The pile capacity of the CIDH pile is derived primarily from frictional resistance along the pile shafts, and end bearing capacity is not included when estimating the pile capacity.

Pile group settlement at the Bents was evaluated per AASHTO LRFD Specs (Interim 2006). Relatively small group settlement (approx. 1/4 inch) is anticipated based on the specified pile tip elevation provided in the above tables. In our opinion, pile group settlement is not a design concern.

11.3 Earth Retaining System

Due to right-of-way and other geometric constraints, the project will require construction of two sound walls supported on walls. Information of approximate wall locations, length and maximum wall heights provided by the designer are summarized in the following table.

SUMMARY OF PROPOSED RETAINING WALLS

Wall No.	Approximate Wall Location	Max. Wall Height (ft)	Approx. Length (ft)	Proposed Wall Type
RW SB-1	Along SB I-880, south of San Leandro Creek Bridge (Sta. 395+33 to 400+79)	20	546	Type 5SWB
RW SB-2	Along SB I-880, north of San Leandro Creek Bridge (Sta. 414+90 to 419+50)	18	460	Type 5SWB

- **Retaining Wall No. RW SB-1 (Type 5SWB)**

The wall is to retain wedge fill due to outside widening of SB I-880 just south of San Leandro Creek Bridge ("I-880 Line", Sta. 395+33 to 400+79 approx.) The wall height varies from 4 feet

on the south end to approx. 20 feet near the bridge south abutment. Majority of the footing bottom is at Elev. 18.5 feet.

The reference boring data include RW-30, RW-31 (Parikh 2008) and as-built B-5 (Caltrans 1966, Contract 04-174364). The subsurface soil material generally consists of firm to stiff clay with minor sand lenses of clayey fine sand. Groundwater was encountered at Elev. 13 and 17 feet in 2008.

For foundation support of the proposed Type 5SWB, the recommended ultimate bearing capacity is 9 ksf. Caltrans standard Type 5SWB on shallow foundations may be used for foundation ultimate demand up to 9 ksf per standard drawings. Pile foundations are recommended for higher wall portion that has a higher foundation demand. Per discussion with the designer, there is right-of-way limitation at the site and driven batter piles are not feasible. It is recommended that standard 24-inch diameter CIDH pile be used for support as groundwater is expected. The recommended service capacity is 45 Tons per pile. Based on the soil condition, the recommended pile length is 45 feet for service load of 45 Tons. For footing bottom at Elev. 18.5 feet, the anticipated pile tip is at Elev. -26.5 feet. Tip elevations are shown in the Pile Data Table together with wall RW SB-2.

- **Retaining Wall No. RW SB-2 (Type 5 SWB)**

The wall is to retain wedge fill due to outside widening of SB I-880 just north of San Leandro Creek Bridge ("I-880 Line", Sta. 414+90 to 419+50 approx.) The wall height varies from 4 feet on the south end to approx. 20 feet near the bridge south abutment. Majority of the footing bottom is at Elev. 13 feet.

The reference boring data include CPT-2, RW-32, RW-33 (Parikh 2008), as-built B-1 (Caltrans 1966, Contract 04-174364), and as-built B-1 (Caltrans 1992). Due to a small drainage path/wetland in the vicinity, just west of I-880, the CPT and boring data indicate soft clay and loose sand layer through about Elev. -4 feet near the max. height of the wall. The underlying soil consists of stiff clay over dense sand at approx. Elev. -30 feet (Caltrans as-built B-1, 1966). Groundwater was encountered at Elev. 8.5 feet in 2008.

For foundation support of the proposed Type 5SWB, the recommended ultimate bearing capacity is 9 ksf. Caltrans standard Type 5SWB on shallow foundations may be used for foundation ultimate demand up to 9 ksf per standard drawings. Pile foundations are recommended for higher wall portion that has a higher foundation demand. Per discussion with the designer, there is right-of-way limitation at the site and driven batter piles are not feasible. It is recommended that standard 24-inch diameter CIDH pile be used for support as groundwater is expected. The recommended service capacity is 45 Tons per pile. Based on the soil condition, the recommended pile length is 45 feet for service load of 45 Tons. For footing bottom at Elev. 13 feet, the anticipated pile tip is at Elev. -32 feet. Tip elevations are shown in the following table.

PILE DATA TABLE

Location	Pile Type	Nominal Resistance (kips)		Cut-off Elev. (ft)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)
		Compression	Tension			
RW SB-1	24" CIDH	180	0	18.5	-26.5 (a); -11.5 (b)	-26.5
RW SB-2	24" CIDH	180	0	13.0	-32.0 (a); -17.0 (b)	-32.0

Design Tip Elevation is controlled by the following demands: (a) Compression; (b) Lateral Loads

11.4 Foundation for Pre-fabricated Bridge (Alameda Flood Control District)

The subsoils primarily consist of medium stiff to very stiff clay and medium dense to dense sand. Based on the information provided by the designer, 24-inch diameter Cast-In-Drilled-Hole (CIDH) concrete piles are proposed for the pre-fabricated structure. Working Stress Design (WSD) is used for the abutments.

For the proposed structure, pertinent foundation design information provided by the designer, including Foundation Design Data and Foundation Design Loads, are presented in the following tables. Based on the load demand and subsoil information, the recommended specified pile tip elevations are also shown in the Pile Data Tables per Memo-To-Designers 3-1.

FOUNDATION DESIGN DATA

Support No	Design Method	Pile Type	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Pile Cap Size (ft)		No. of Piles per Support
					B	L	
Abutment 1	WSD	24" CIDH	15.00	10.00	8.50	30.50	7
Abutment 2	WSD	24" CIDH	15.30	10.30	8.50	30.50	7

FOUNDATION DESIGN LOADS

Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load		Perma-nent Loads	Compression		Tension		Compression		Tension	
	Per Support	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	530	100	400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abutment 2	530	100	400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

FOUNDATION RECOMMENDATIONS FOR ABUTMENTS

Support	Pile Type	Cut-off Elev. (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Design Tip Elev. (ft)	Specified Tip Elev. (ft)
			Total	Permanent			
Abut 1	24" CIDH	10.0	530	400	100	-30.5 (a) -10.5 (d)	-30.5
Abut 2	24" CIDH	10.3	530	400	100	-30.5 (a) -10.5 (d)	-30.5

Design tip elevations are controlled by (a) compression, (d) lateral

PILE DATA TABLE

Location	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft)	Specified Tip Elev. (ft)
		Compression	Tension		
Abut 1	24" CIDH	200	0	-30.5 (a); -10.5 (d)	-30.5
Abut 2	24" CIDH	200	0	-30.5 (a); -10.5 (d)	-30.5

Design tip elevations for Abutments & Bent are controlled by (a) Compression; (d) Lateral Loads

The pile capacity of the CIDH pile is derived primarily from frictional resistance along the pile shafts, and end bearing capacity is not included when estimating the pile capacity.

11.5 Lateral Pile Capacity

Based on discussion with the designer, LPILE analyses were performed for Bent 5 and for walls RW SB-1 and RW SB-2 with the results attached in Appendix IV showing deflection, moment, shear and soil reaction along the pile length. A "p-y Curve Modification Factor" of 0.6 was

adopted in the lateral pile analysis for pile spacing of 3 times the pile diameter. Generally, abutment piles are designed for service loads only, and batter piles are used for resisting static lateral earth pressures. The bent piles are governed by seismic loading conditions. At service condition, there is minimal shear demand on the bent piles. In common engineering practice, a maximum pile head deflection of 1/4 inch is recommended for service condition for vertical driven piles. Under seismic loading condition, pending the overall structural design and considerations, a maximum pile head deflection up to about one to two inches is generally tolerable and accepted for design of standard driven piles.

In addition to lateral capacity of the piles, passive resistance against the vertical sides of the pile caps/footings may also contribute to the lateral design for the San Leandro Creek Bridge and Overhead Structure. It is assumed that the pile caps/footings are poured neat against undisturbed native soil. The recommended passive resistance against the vertical sides of the pile caps is 3.5 ksf. The value is a uniformly distributed resistance for seismic & ultimate condition. The mobilization of the passive resistance, as shown in Appendix IV, follows the guidelines of FEMA 356 (November 2000).

11.6 Lateral Earth Pressures

Abutment retaining walls should be designed to resist the following Applied Lateral Earth Pressures and live load. These values assume no hydrostatic pore pressure buildup behind the wall and are based on well-drained backfill behind the walls supported in native soil.

<u>Applied Lateral Earth Pressure</u>

Active Condition	36 pcf Equivalent Fluid Pressure (EFP) for the engineered backfill.
At-Rest Condition	55 pcf Equivalent Fluid Pressure (EFP) for the engineered backfill.
Passive Resistance	5 ksf (ultimate) for seismic design of the abutment backwall (5.5 feet high or greater); for activated height less than 5.5 feet modify proportionally, i.e. $5\times(H/5.5)$ ksf. A minimum lateral wall movement of 2% of wall height to mobilize the full ultimate passive pressure is required.

Cantilever walls which are free to rotate at least 0.004 radian may be assumed flexible for the active condition. Walls that are not capable of this movement should be assumed rigid and

designed for the at-rest condition. The effect of any surcharge (dead, live, or traffic load) should be added to the preceding lateral earth pressures. A coefficient of 0.3 and 0.5 may be used to determine the additional earth pressure resulting from the surcharge for active and at-rest conditions, respectively.

11.7 Embankment

Based on the "Typical Cross Sections", the project requires wedge fill for the roadway widening. The wedge fill is along I-880 southbound just north and south of the San Leandro Creek Bridge where Soundwall on Retaining Walls (RW SB-1 & RW SB-2, both Type 5SWB) are planned. Recommendations for the walls are provided in the Geotechnical Design and Materials Report for the project.

For embankment settlement evaluation, we have investigated the embankment at the north abutment, which is the governing case. The reference boring data include CPT-2, RW-32, RW-33 (Parikh 2008), as-built B-1 (Caltrans 1966, Contract 04-174364), and as-built B-1 (Caltrans 1992). Due to a small drainage path/wetland in the vicinity, just west of I-880, the CPT and boring data indicate soft clay and loose sand layer through about Elev. -4 feet near the max. height of the wall. The underlying soil consists of stiff clay over dense sand at approx. Elev. -30 feet (Caltrans as-built B-1, 1966). Groundwater was encountered at Elev. 8.5 feet in 2008.

Majority of the fill weight is supported by the wall on piles. The remaining wedge fill, in a triangular shape of approximately 12 feet wide and maximum 7 feet high, will be on the existing slope embankment. Settlement estimation is based on Boring RW-32 and CPT-2. Elevation view of the wedge fill with soil profile and settlement estimation are presented in Appendix IV.

Based on the results of the settlement analyses, the total settlement is estimated to be on the order of 1 inch. The estimation of cohesionless soils was developed by the Hough method as cited in the AASHTO LRFD Guideline. The estimation of preconsolidation pressure in the cohesive material is based on Su/p per Skempton (1957) and NAVFAC DM-7.1. The modified compression index ($Cc/(1+e_0)$) were correlated with the natural moisture based on Lambe and

Whitman (1969) and the recompression index was adopted as 20% of the virgin compression index (Holtz and Kovacs, 1982). Based on available boring information and the proposed embankment dimension, the estimated consolidation settlement from the clay layers is on the order of 0.3 inch. The estimated settlement in the over- consolidated (OC)/elastic range is about 0.7 inch. The settlement amount is acceptable for project design.

Slope Stability

Stability analyses were performed for the proposed embankment at the north abutment and a retaining wall up to 18 ft high using the Slope/W Program. For slope stability under seismic condition (pseudo-static analyses), we have used the Caltrans guidelines (Guidelines for Structures Foundation Reports manual, Ver. 2.0, 2009), which recommends that the seismic factor equal to one third of the horizontal peak acceleration and not exceeding 0.2g. Therefore, a seismic coefficient (k) of 0.2g was used for pseudo-static analysis. Based on the results of the stability analyses, the global stability appears acceptable with minimum factors of safety of 1.9 and 1.2 for static and seismic condition, respectively. The analysis results and the strength parameters adopted are included in Appendix IV.

12.0 NOTES TO DESIGNER

The design loads were provided by the designer. Should the loads exceed the ones provided in the tables given in this report, the Geotechnical Engineer must be contacted for further recommendations.

13.0 CONSTRUCTION CONSIDERATIONS

13.1 General

To a degree, the performance of any structure is dependent upon construction procedures and quality. Hence, observation of grading operations should be carried out by the responsible Agency. If the encountered subsurface conditions differ from those forming the basis of our recommendations, this office should be informed in order to assess the need for design changes. Therefore, the recommendations presented in this report are contingent upon good quality control and these geotechnical observations during construction.

13.2 Construction of Steel-Pipe Pile (Alt. "W")

Due to the very stiff clay and dense sand present at the site, local hard driving conditions should be anticipated. The pile capacity is derived from the end bearing and the frictional resistance along the pile shaft. We recommend that the piles be driven to the specified tip elevations.

In the event that unanticipated pile driving conditions are encountered, it is recommended that a Pile Driving Analyzer (PDA) be used to evaluate the pile capacity and integrity. Typical applications of the PDA include capacity evaluation for both during driving and re-striking. The Gates formula per Caltrans standard specifications (Section 49-1.08) may be used in the field for driving and capacity verification.

13.3 Cast-In-Drilled-Hole Concrete Piles

Caltrans standard specification for "Cast-in-Place Concrete Piling" should generally apply for the construction of CIDH piles. Groundwater is expected during pile construction. The use of temporary casing for CIDH pile construction is anticipated.

Access tubes should be provided to allow for construction quality control (Gamma-Gamma Logging and Cross-Hole Sonic Logging). Due to presence of granular material and groundwater, raveling or caving is expected which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. It is prudent to make the contractor aware of these conditions so that he takes appropriate steps to comply with the standards and maintain the integrity of the CIDH concrete piles. Mitigation and repair procedures for CIDH anomaly should be anticipated. All piles excavations should be observed by the geotechnical engineer or regulatory agency prior to the placement of reinforcement and concrete so that if conditions differ from those anticipated, appropriate recommendations can be made.

14.0 INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our site

reconnaissance and the assumption that the subsurface conditions do not deviate from observed conditions. All work done is in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed project as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project and that necessary steps are also taken to see that the recommendations are carried out in the field.

The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

Lam Tran-Cruz, P.E. 78164
Senior Staff Engineer

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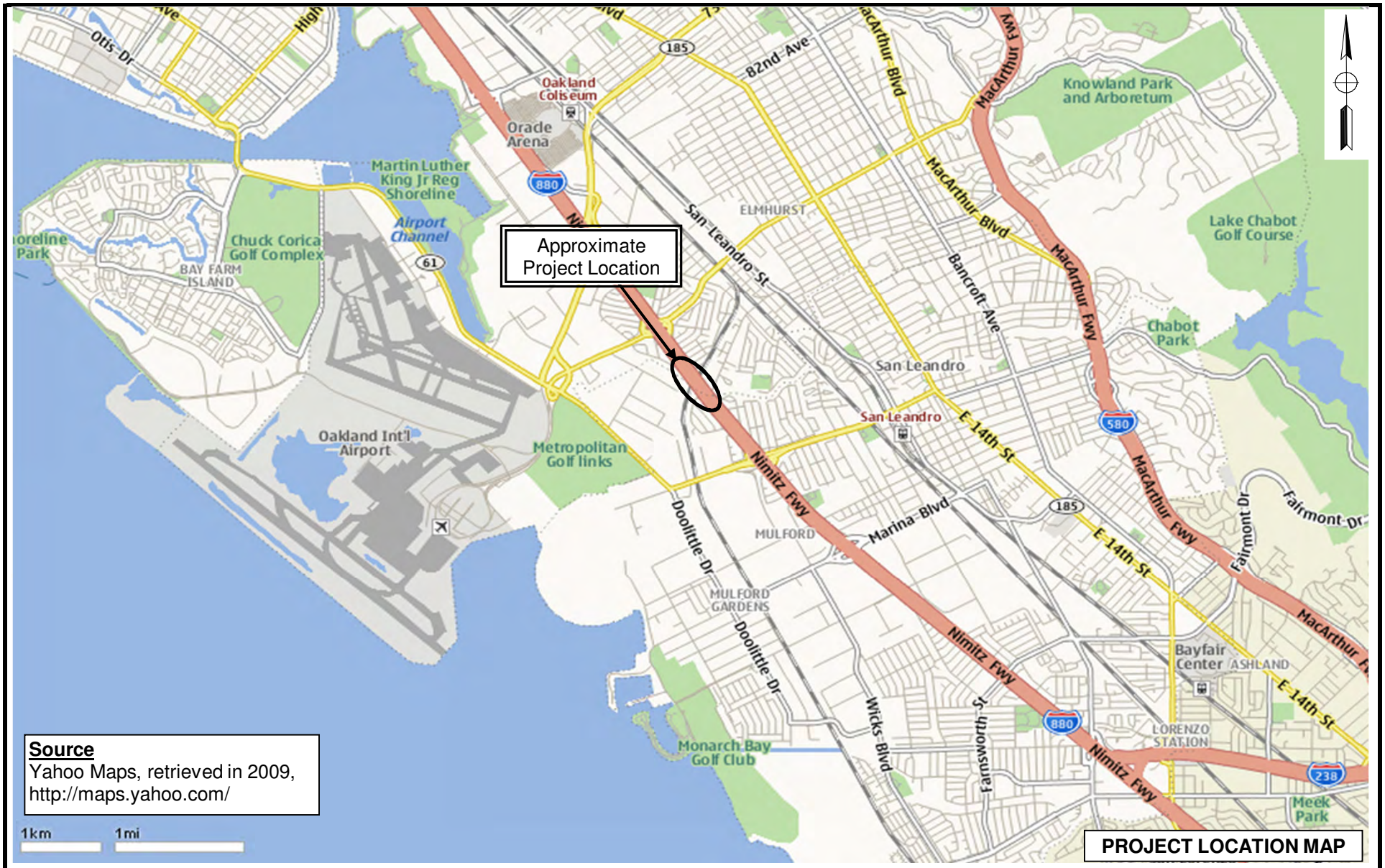
Senior Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-13
GEOTECHNICAL
STATE OF CALIFORNIA

T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT

APPENDIX I



Source
Yahoo Maps, retrieved in 2009, http://maps.yahoo.com/

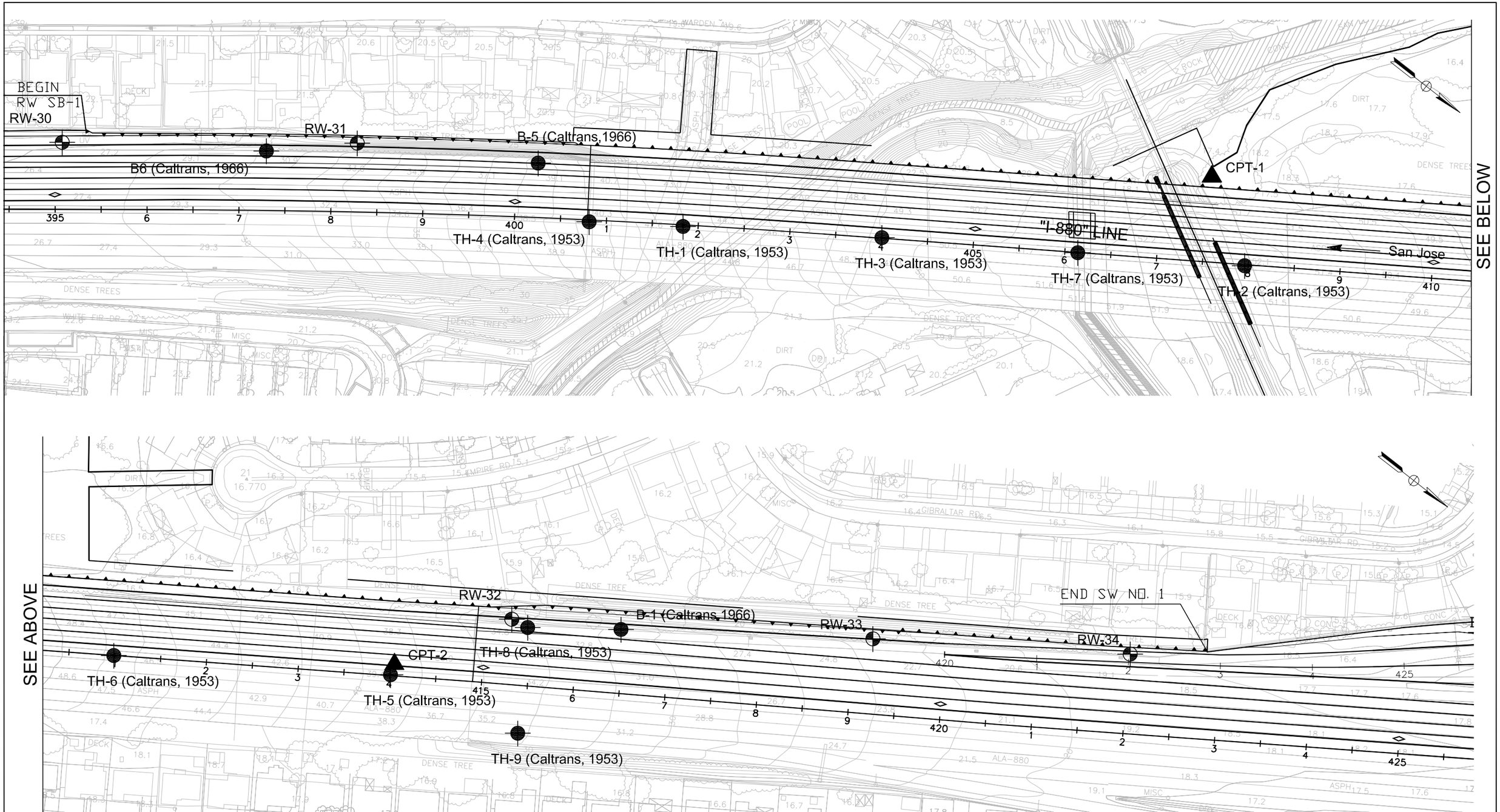
PROJECT LOCATION MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10

PLATE NO.: I-1



LEGEND

RW-32 — Approx. Boring Location

TH-1 — Approx. As-built Boring Location

CPT-1 — Approx. Cone Penetration Test Location

SCALE 1 inch = 100 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by Rajappan & Meyer

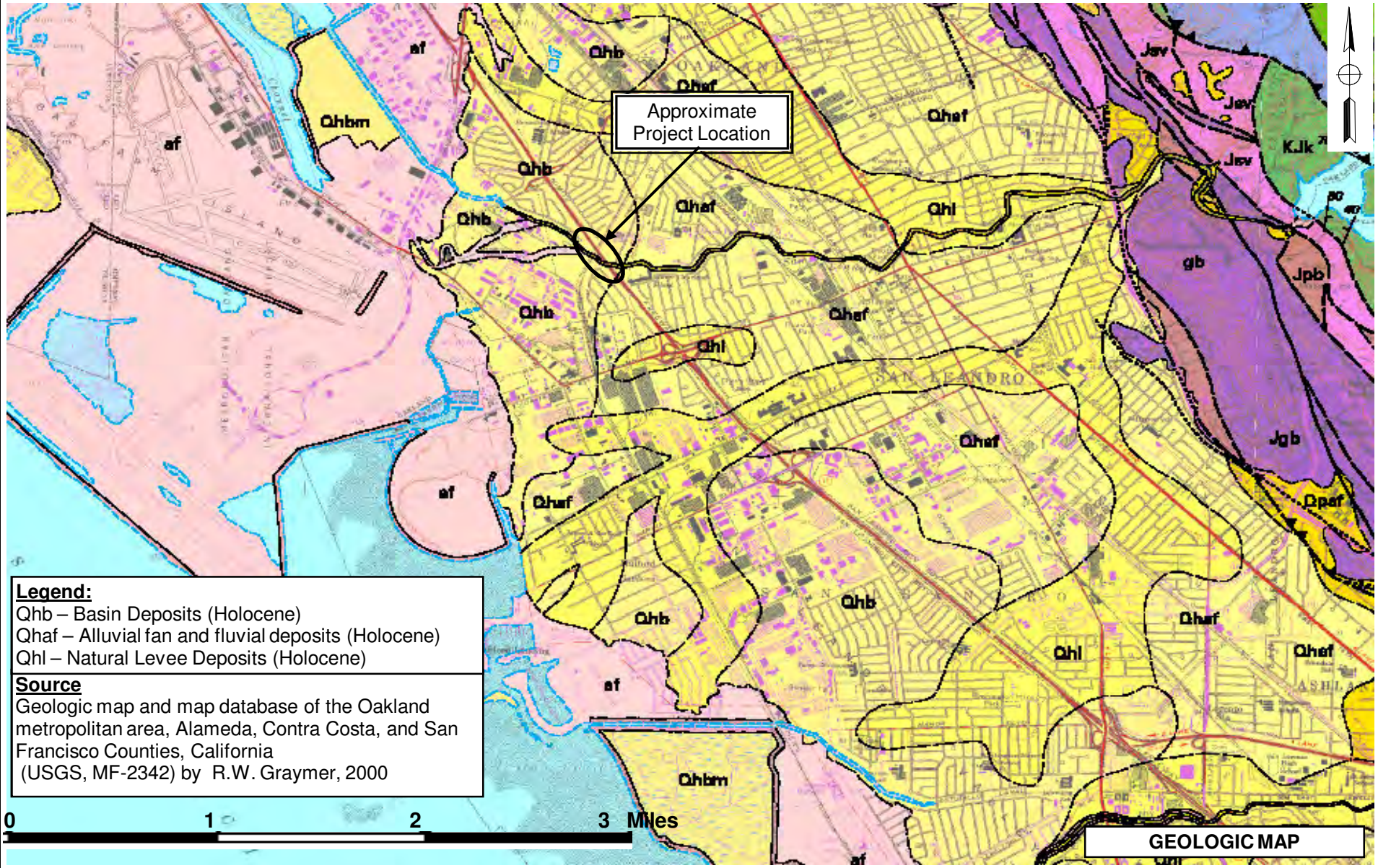
SITE PLAN

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

SAN LEANDRO AVENUE WIDEN AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 2006-139-UPR

PLATE NO: I-2



Legend:
Qhb – Basin Deposits (Holocene)
Qhaf – Alluvial fan and fluvial deposits (Holocene)
Qhl – Natural Levee Deposits (Holocene)

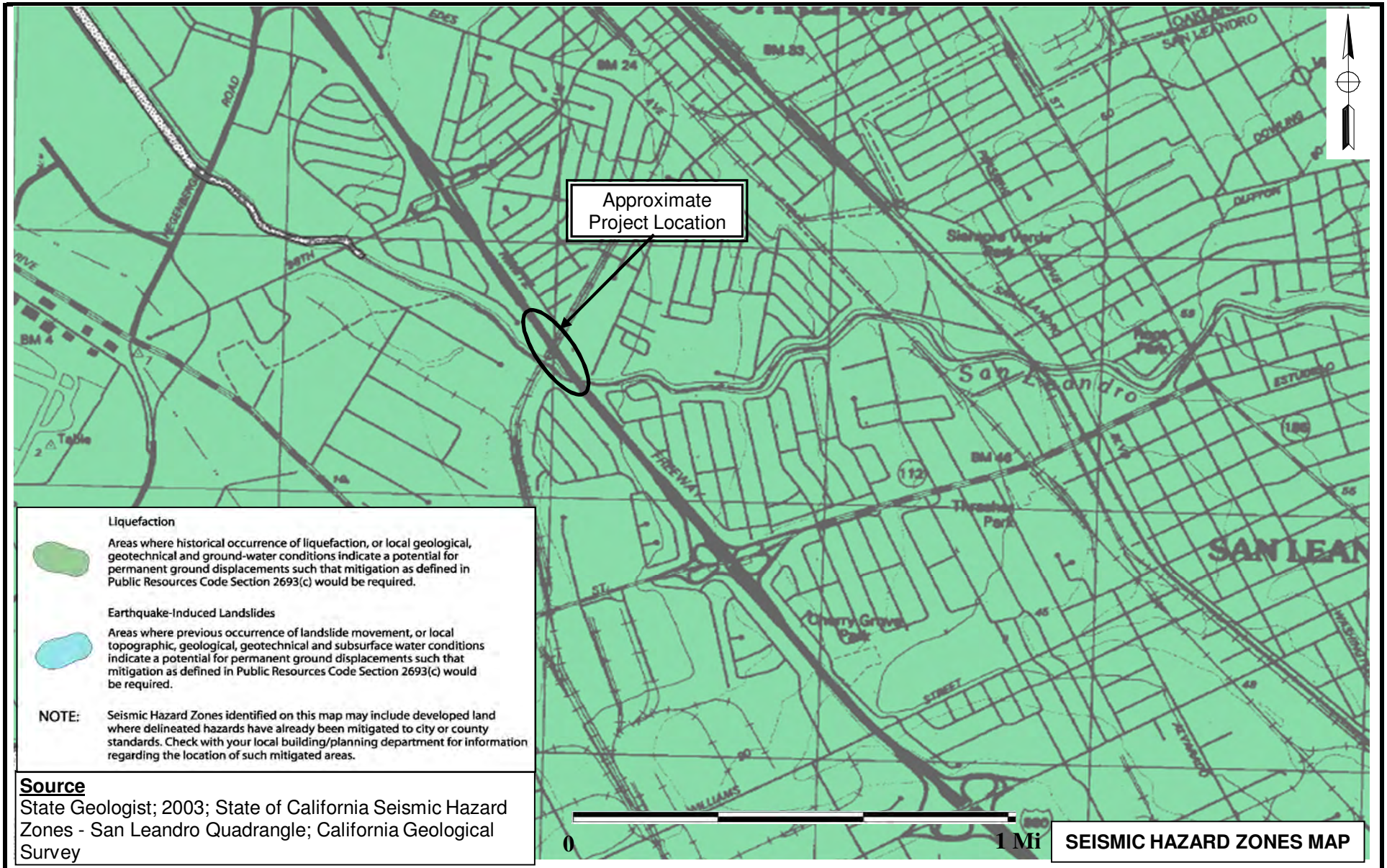
Source
Geologic map and map database of the Oakland metropolitan area, Alameda, Contra Costa, and San Francisco Counties, California
(USGS, MF-2342) by R.W. Graymer, 2000

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10

PLATE NO.: I-3



Source
State Geologist; 2003; State of California Seismic Hazard Zones - San Leandro Quadrangle; California Geological Survey

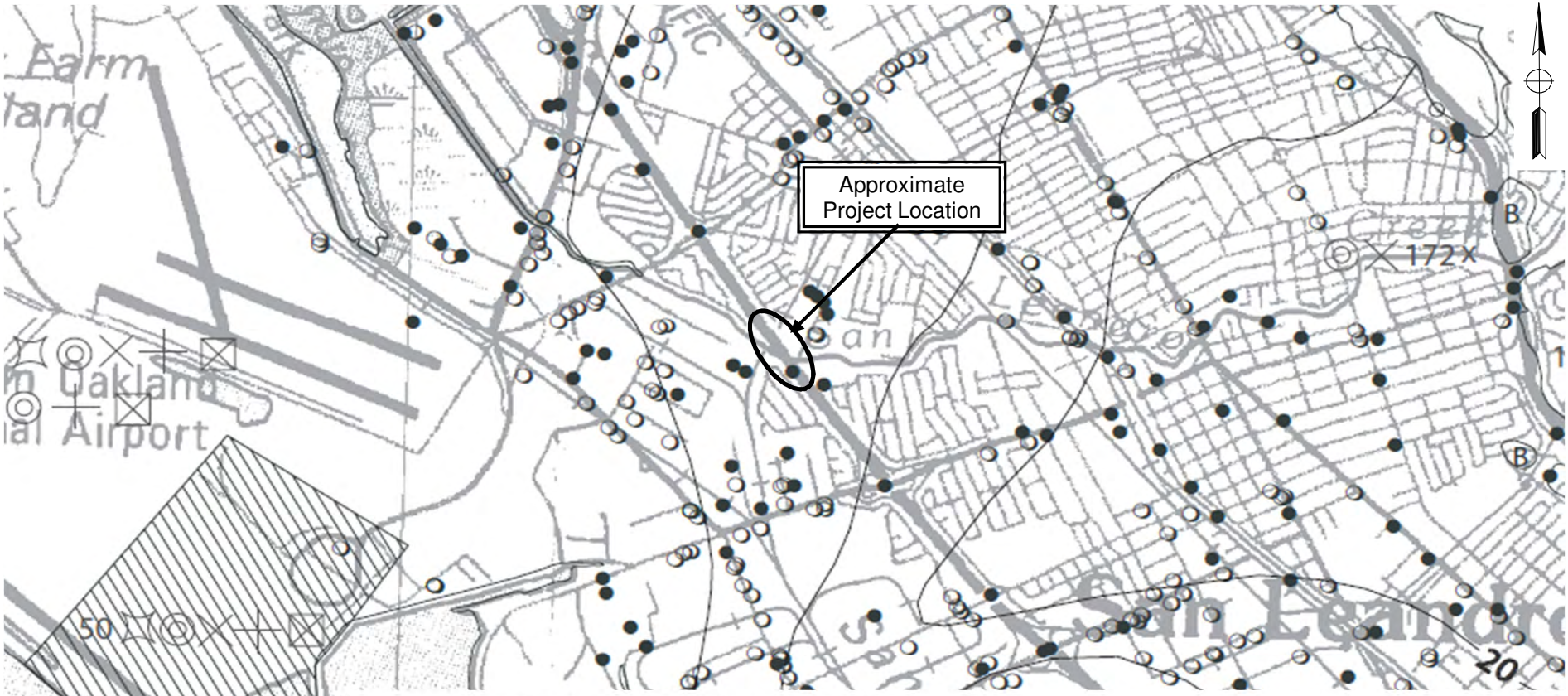
SEISMIC HAZARD ZONES MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10

PLATE NO.: I-4A



Historical Ground Failures (modified from Knudsen and others, 2000b)

Source
Petersen et. al.; 2003; Ground Shaking Evaluation Report, Potential Ground Shaking in San Leandro 7.5-Minute Quadrangle, Alameda County, California; California Department of Conservation, California Geologic Survey.

- Miscellaneous effects
- Ground settlement
- Lateral spread
- Sand boil
- Pipeline break
- Cracks in streets or ground

X — Location of multiple ground effects. (See corresponding symbols)

Areas within which multiple failures were recorded. Symbols show failure types.

172 — Number assigned to ground failure site (adapted from Youd and Hoose (1978) and Tinsley and others (1998) by Knudsen and others (2000b))

B — Pre-Quaternary bedrock. See "Bedrock and Surficial Geology" in Section 1 of report for descriptions of units.

10 — Depth to ground water, in feet (5, 10, 20 foot contours)

Geotechnical boreholes used in liquefaction evaluation

Ground-water level data provided by the California State Water Resources Control Board

0 — 1 Mi

HISTORICAL GROUND FAILURES MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10

PLATE NO.: I-4B

APPENDIX II

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5	____	____

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

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.

CONSISTENCY OF COHESIVE SOILS

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

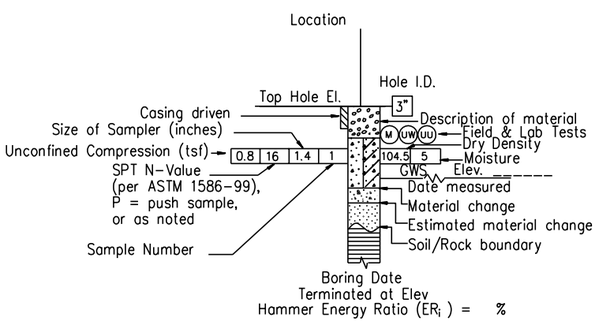
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
□	O	Other

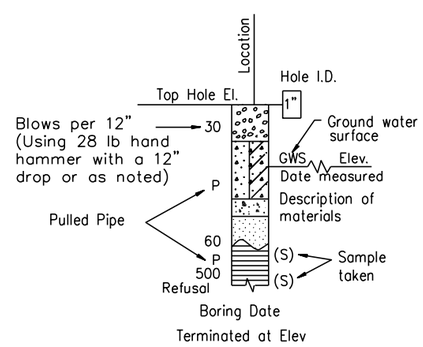
Note: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

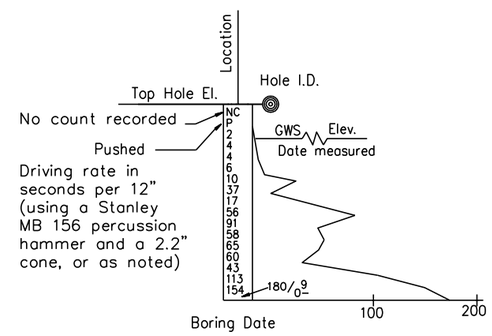
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.



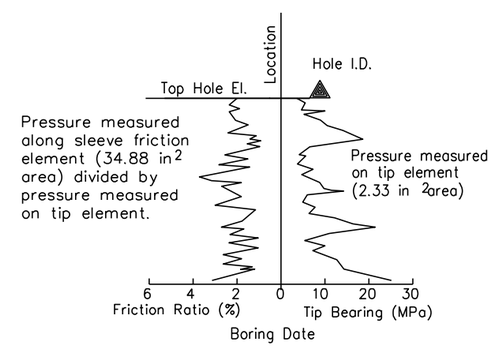
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

DESIGN OVERSIGHT	DRAWN BY L. TRAN	L. BHANGOO/G. TRIPATHI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	D. WANG PROJECT ENGINEER	BRIDGE NO. 33-0100 POST MILES 24.18
SIGN OFF DATE	CHECKED BY D. WANG	DATE: JUNE 2008			

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)

LOG OF TEST BORINGS 1 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 11/11/11

REVISION DATES | SHEET | OF

FILE => $REQUEST

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

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5	____	____

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

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
- (PP) Pocket Penetrometer
- (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)
- (TV) Pocket Torvane
- (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)
- (VS) Vane Shear (AASHTO T 223)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

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

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

DESIGN OVERSIGHT

SIGN OFF DATE

DRAWN BY L. TRAN

CHECKED BY D. WANG

L. BHANGOO/G. TRIPATHI
FIELD INVESTIGATION BY:
DATE: JUNE 2008

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

D. WANG
PROJECT ENGINEER

BRIDGE NO. 33-0100
POST MILES 24.18

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)

LOG OF TEST BORINGS 2 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 11/11/11 SHEET OF

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5	----	----

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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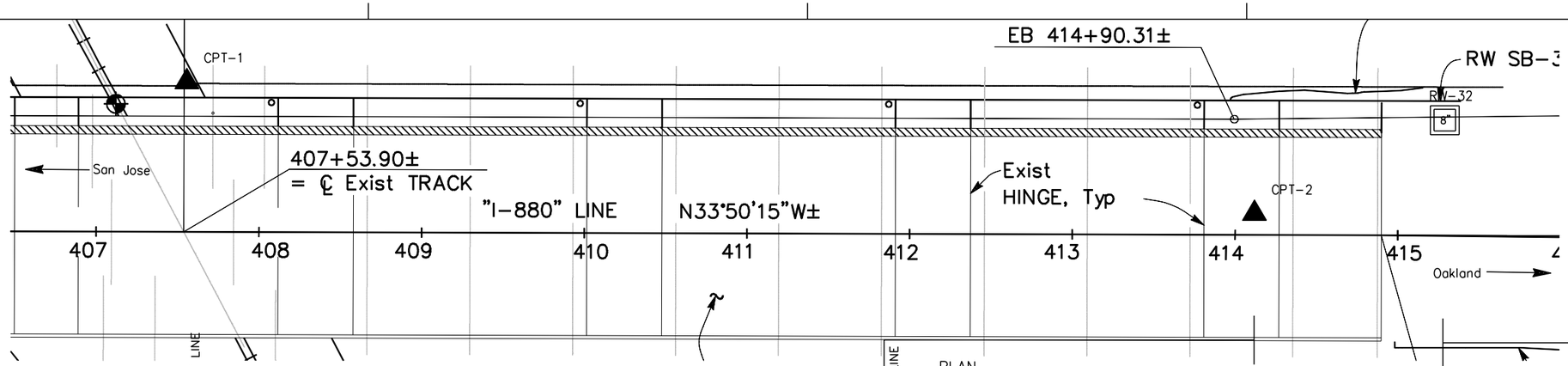
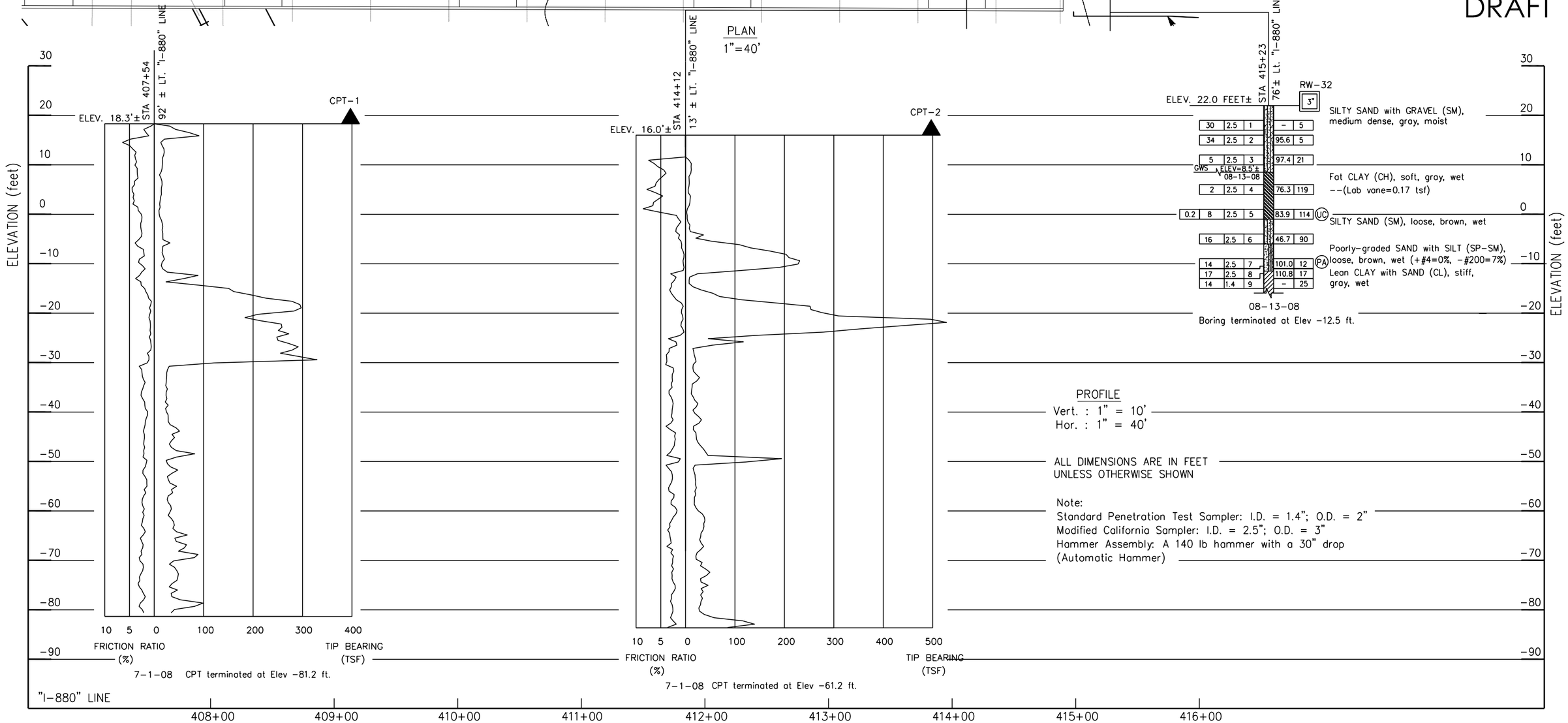
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

DRAFT



PLAN
1"=40'



PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

DESIGN OVERSIGHT	DRAWN BY	L. TRAN	L. BHANGOO/G. TRIPATHI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	D. WANG	DATE: JUNE 2008		

BRIDGE NO. 33-0100
POST MILES 24.18

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)

LOG OF TEST BORINGS 3 OF 5

CU 04248
EA 3A9201

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES 11/11/11

REVISION DATES SHEET OF

FILE => $REQUEST

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

Design Pile Loading 82 Tons
Type Pile Timber & Steel
Diameter Butt 13-18" Tip 8-13"
Total Number Piles
Lineal Ft Piles As Built
Hammer #1 Vulcan

Bent #	Aver. Tip Ele.	Min. Elev	Max Elev.	Bottom of Ftg - Elev.	Aver Tip Pen.	Minimum Tip Penetra.	Maximum Tip Penetra.
1	-46.5	-41.1	-48.0	29.0	76.0	72.0	79.5
2	-18.7	-15.5	-23.5	13.0	31.7	28.5	36.5
3	-23.8	-21.0	-26.8	12.0	35.8	33.0	38.8
4	37.0	32.5	-40.5	-1.0	36.0	31.5	39.5
5	22.7	-16.5	-27.3	11.0	33.7	27.5	38.7
6	21.4	-13.0	-25.5	12.0	33.0	25.5	37.5
7	-16.6	-15.0	-19.0	12.0	28.6	27.0	31.0
8	-21.2	-17.0	-23.0	12.0	33.2	29.0	35.0
9	-21.5	-20.0	-25.5	12.0	33.6	32.0	37.5
10	-22.0	-15.5	-27.0	12.0	34.6	27.5	39.0
11	-18.0	-16.5	-21.5	9.0	27.0	25.5	30.5

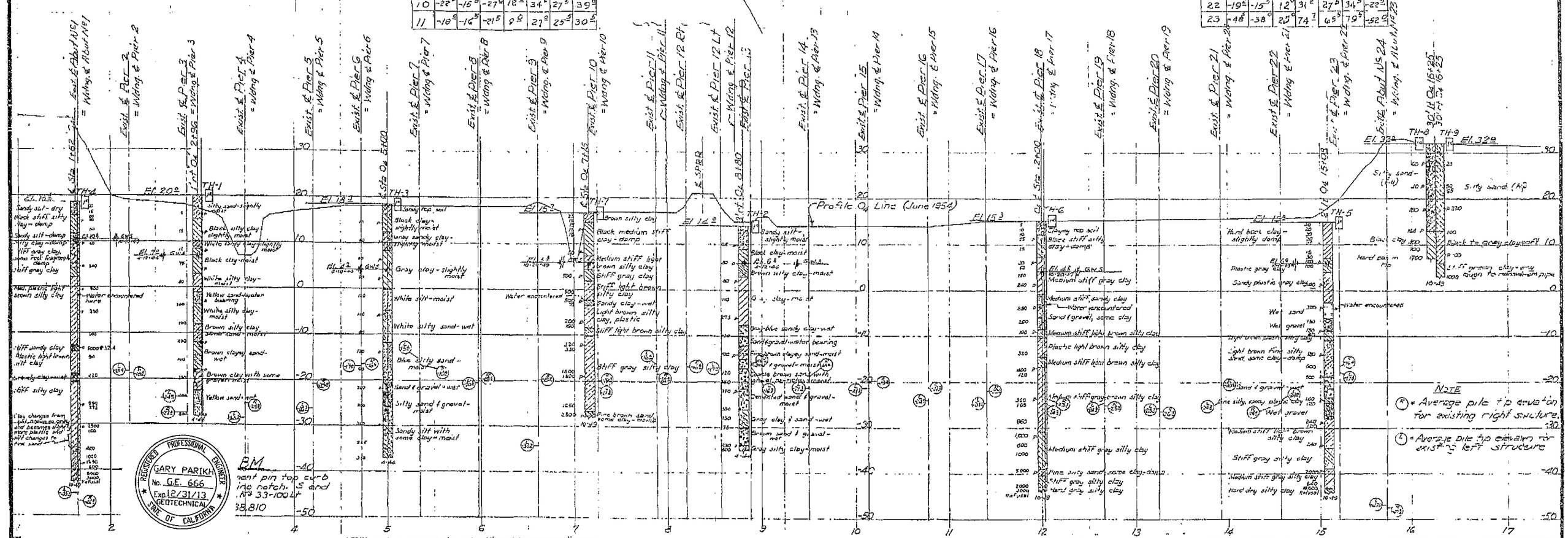
Note: due to no. bents pile Logging is shown between pg. 34-58 S.L.O.H pile Book

AS BUILT
10-2-56

Bent #	Average Tip El.	Minimum Elev.	Bottom of Footing Elev	Average Tip Penetration	Minimum Tip Penetration	Max. Tip Penet.	Max. Elev.
12	-20.3	-18.8	9.0	29.3	27.5	30.5	-21.5
13	-22.4	-19.5	✓	31.4	28.0	33.5	-24.5
14	-22.8	-19.5	✓	31.8	28.5	33.5	-24.5
15	-28.1	-24.5	✓	37.1	33.5	39.5	-30.5
16	-27.7	-23.5	✓	36.7	33.0	39.0	-30.0
17	-26.5	-21.5	✓	35.5	28.5	39.0	-30.0
18	-26.1	-21.5	✓	36.2	30.5	39.0	-30.0
19	-27.9	-23.5	✓	36.8	32.5	38.5	-29.5
20	-24.0	-12.5	✓	33.2	21.5	39.5	-30.5
21	-28.5	-21.0	✓	37.4	29.0	39.5	-30.5
22	-19.2	-15.5	12.0	31.2	27.5	34.5	-22.5
23	-48.8	-38.0	25.0	74.1	65.5	79.5	-52.0

Dist.	County	Route	Station	Sheet No.	Total Sheets
04	Ala	880	38.4	40	42

Date approved October 24, 1956



REGISTERED PROFESSIONAL ENGINEER
GARY PARIKH
No. G.E. 666
Exp. 12/31/13
GEOTECHNICAL
STATE OF CALIFORNIA

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As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILE-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)

LOG OF TEST BORINGS 4 OF 5

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9211

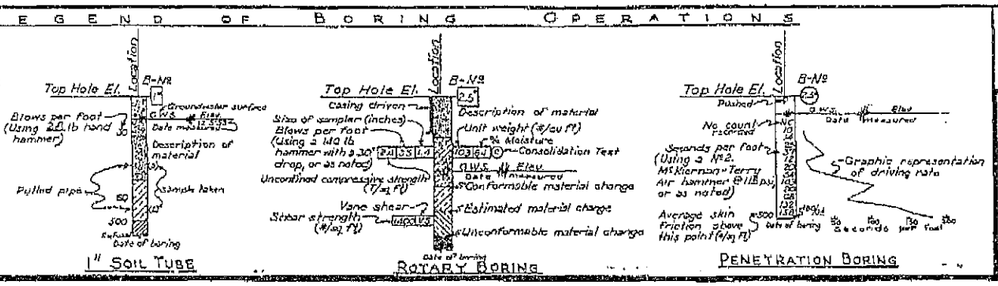
BRIDGE No. 33-0100
Sheet of

...D OF EARTH MATERIALS

- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
- PENETROMETER
- 2¼" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTES

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.

Classification of earth material as shown on this sheet is based upon field inspects and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SAN LEANDRO CREEK BRIDGE & OH WIDENING

LOG OF TEST BORINGS

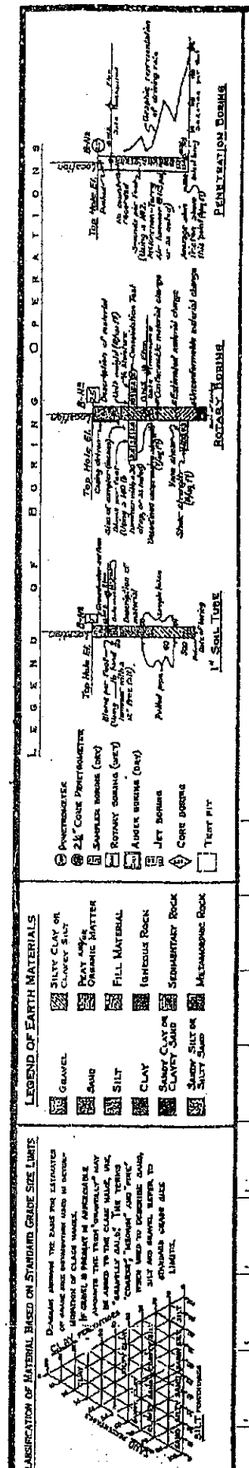
SCALE Horiz. 1" = 50' Vert. 1" = 10' | BRIDGE 33-100 | FILE | DRAWING

REL. DRAWING NO. R-1569 | 61

7	CALIF.

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
04	Ala	17	207/260	139	146

Date approved November 12, 1968



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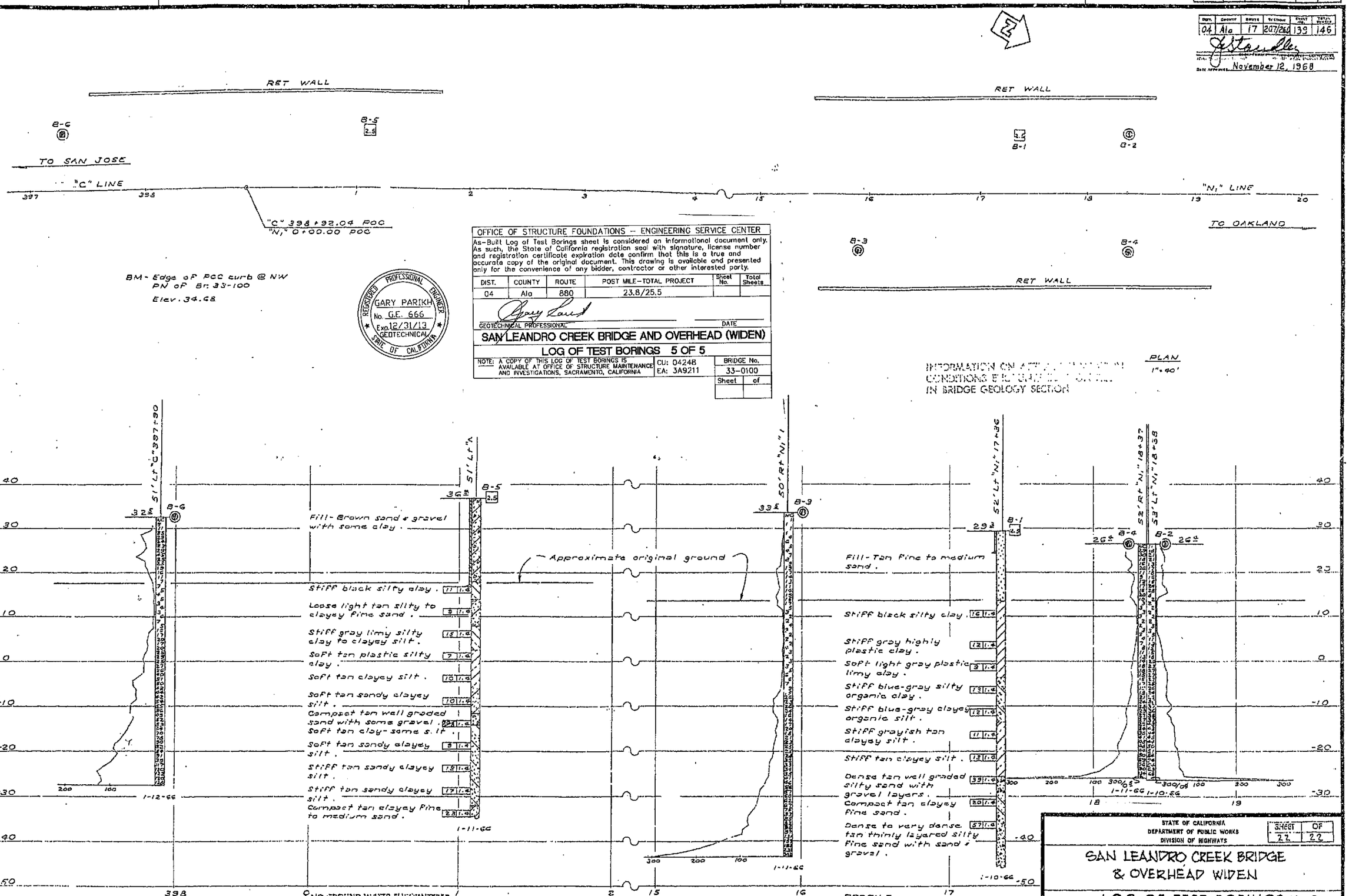

NO GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION
DATE Jan., 1966

Note: Groundwater was measured as high as Elev. 10.5, during a soil investigation, in 10-49

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DIST.	COUNTY	ROUTE	POST MILE-TOTAL PROJECT	Sheet No.	Total Sheets
04	Ala	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)

LOG OF TEST BORINGS 5 OF 5

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9211

BRIDGE No. 33-0100

Sheet ___ of ___

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SHEET 22 OF 22

SAN LEANDRO CREEK BRIDGE & OVERHEAD WIDEN

LOG OF TEST BORINGS No. 2

SCALE AS Noted | BRIDGE 33-100 | FILE | DRAWING 33100-22

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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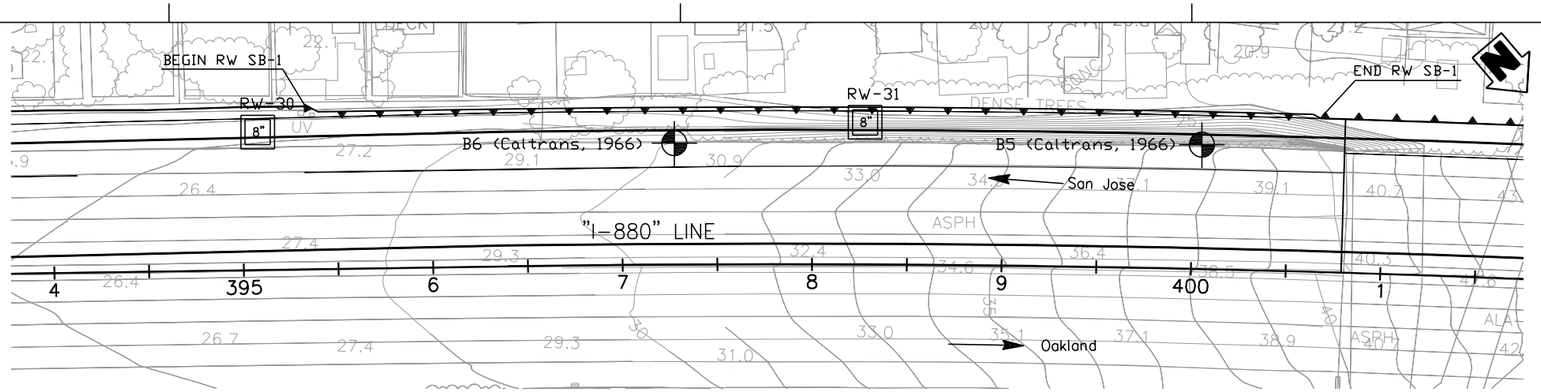
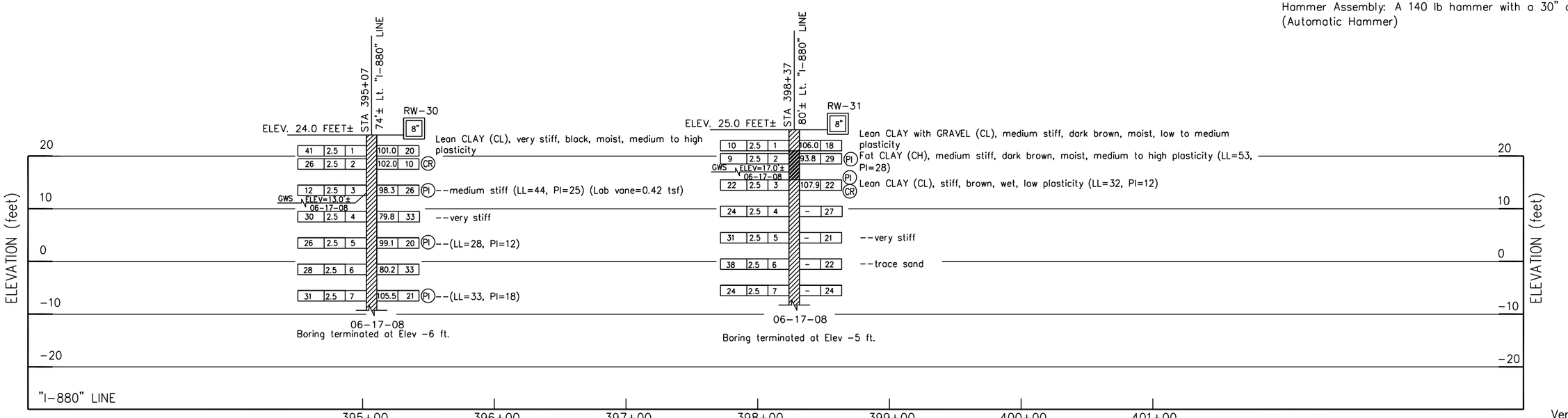


PLAN
1"=40'

Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

DESIGN OVERSIGHT	DRAWN BY	L. TRAN	L. BHANGOO/G. TRIPATHI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	D. WANG	DATE: JUNE 2008		

BRIDGE NO.

POST MILES 23.8/25.5

RETAINING WALL RW SB-1

LOG OF TEST BORINGS 1 OF 2

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 08/12/09

SHEET OF

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

7	CALIF.				
DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
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Date Approved November 12, 1968

OFFICE OF STRUCTURE FOUNDATIONS – ENGINEERING SERVICE CENTER

As-Built Log of Test Borings sheet is considered on informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILE–TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

RETAINING WALL RW SB-1

LOG OF TEST BORINGS 2 OF 2

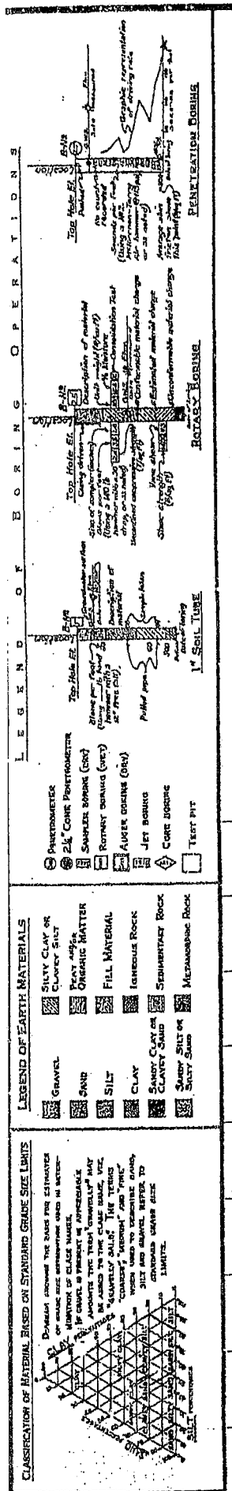
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

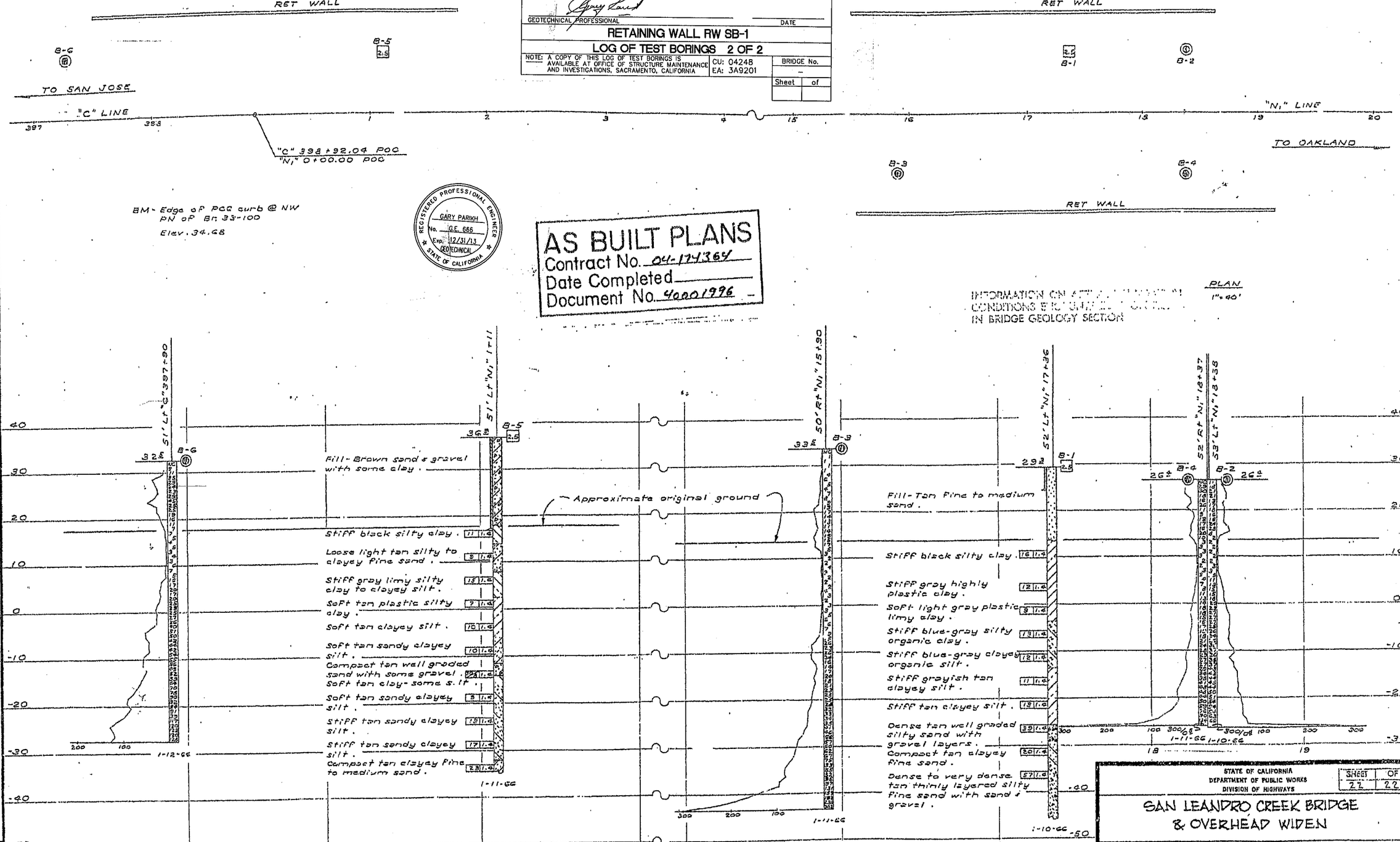
BRIDGE No. –
Sheet of

REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/13 — GEOTECHNICAL — STATE OF CALIFORNIA

AS BUILT PLANS
Contract No. 04-174364
Date Completed
Document No. 40001996



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 GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION
DATE Jan. 1966

Note: Ground water was measured as high as Elev. 10.5, during a soil investigation, in 10-48

INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXCEPTIONAL CASES IN BRIDGE GEOLOGY SECTION

PLAN 1"=40'

PROFILE
Vert. 1"=10'
Horiz. 1"=20'

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SHEET	OF
22	22

SAN LEANDRO CREEK BRIDGE & OVERHEAD WIDEN

LOG OF TEST BORINGS No. 2

SCALE AS Noted	BRIDGE 33-100	FILE:	DRAWING 33100-22

04218

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

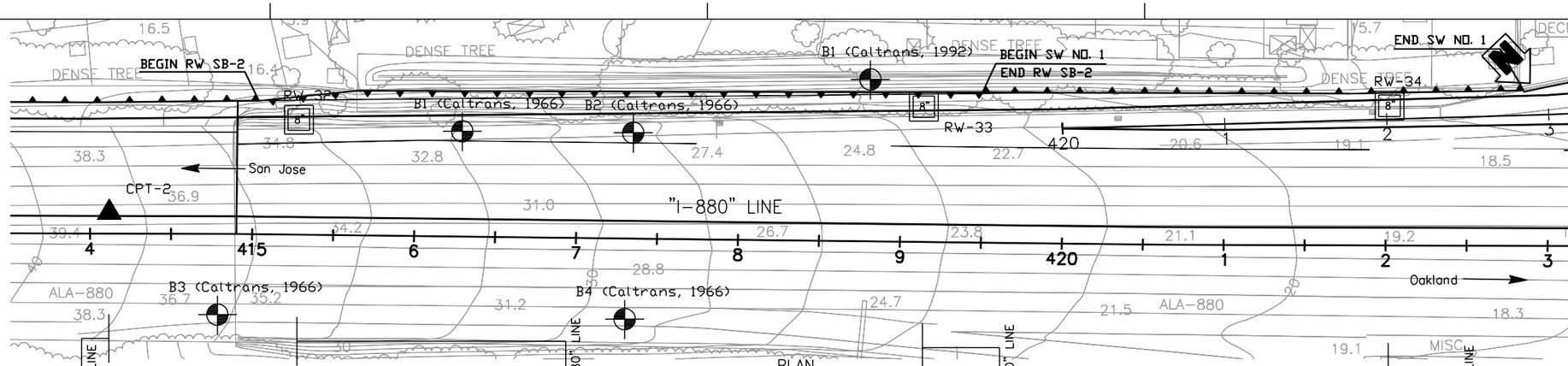
PLANS APPROVAL DATE

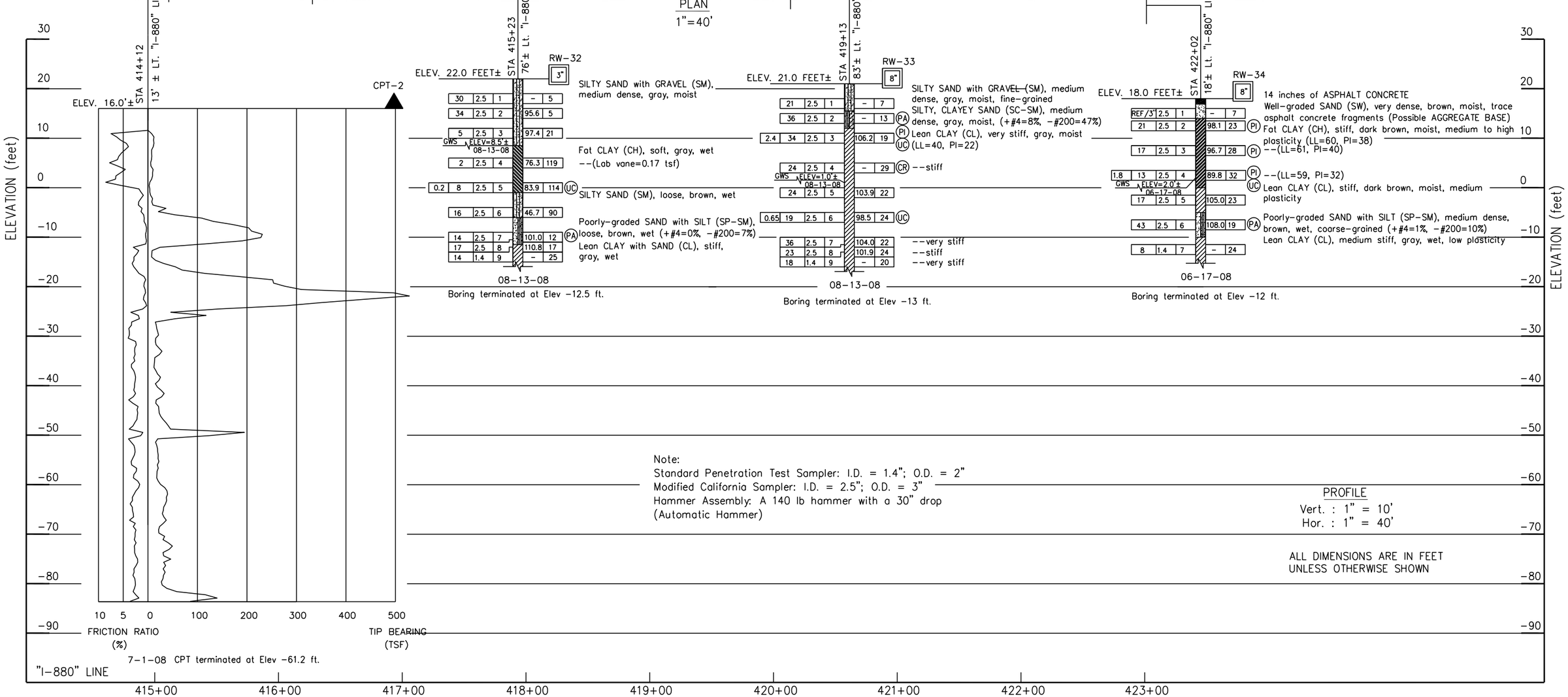
REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/13 — GEOTECHNICAL — STATE OF CALIFORNIA

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.

ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131





Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT	DRAWN BY: L. TRAN	L. BHANGOO/G. TRIPATHI — FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
SIGN OFF DATE	CHECKED BY: D. WANG	DATE: JUNE 2008	D. WANG — PROJECT ENGINEER

BRIDGE NO.
POST MILES 23.8/25.5

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

LOG OF TEST BORINGS 1 OF 4

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 08/12/09

REVISION DATES — SHEET — OF

FILE => $REQUEST

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

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	24.4/25.2	236	367

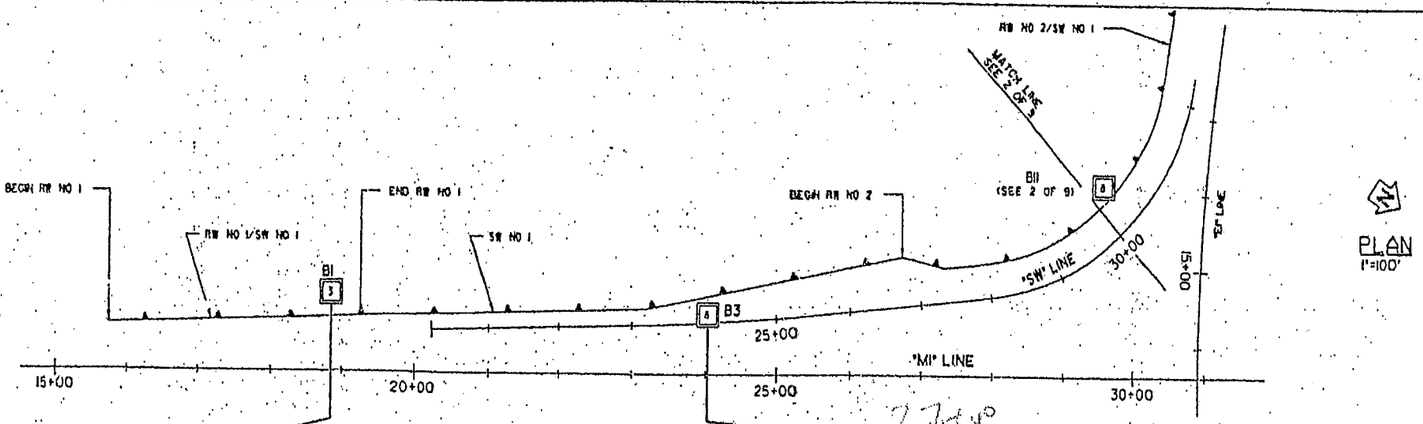
3/31/98
REGISTERED CIVIL ENGINEER

August 21, 1995
PLANS APPROVAL DATE

ALAMEDA COUNTY TRANSPORTATION AUTHORITY
1401 Lakeside Drive, Suite 1201
Oakland, CA 94612

ROODKARD-CLYDE CONSULTANTS
500 12th Street, Suite 100
Oakland, CA 94607

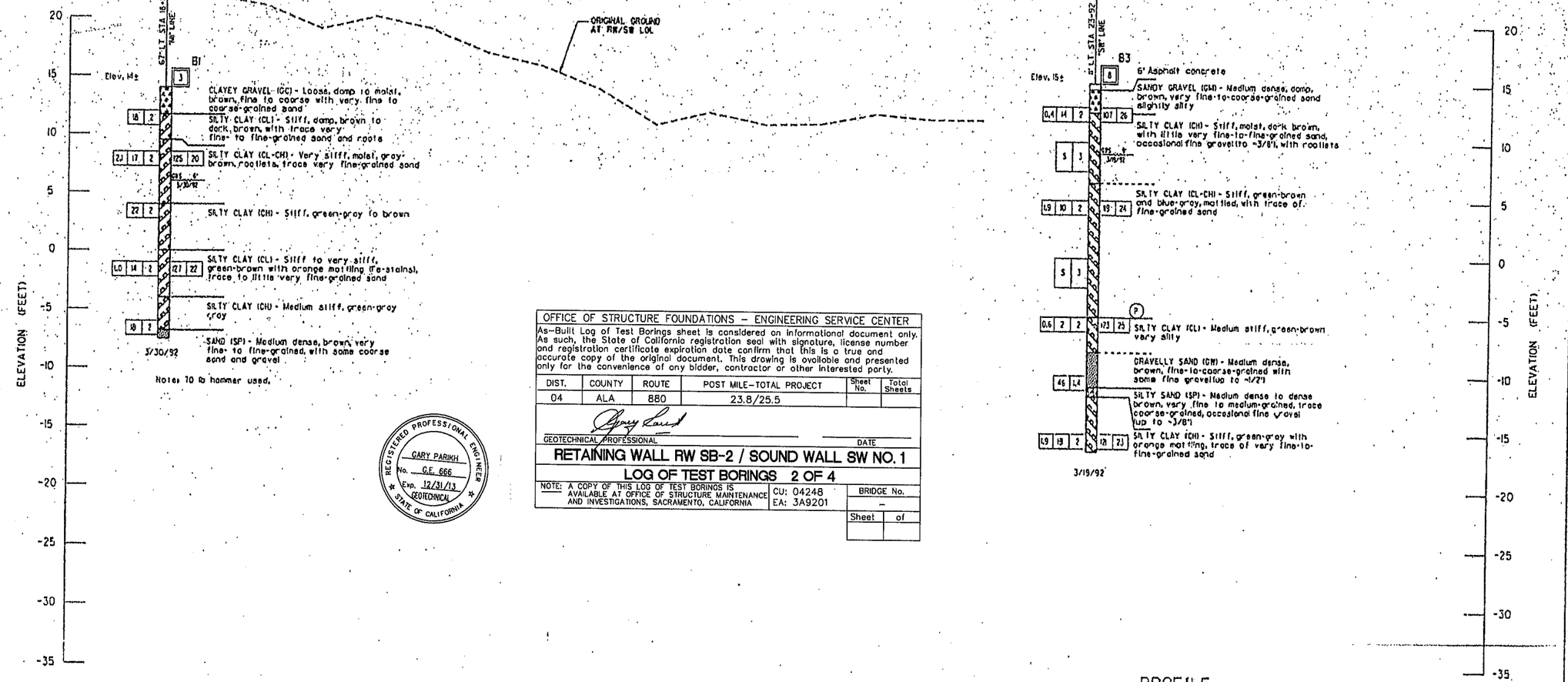
REGISTERED PROFESSIONAL ENGINEER
HORST J. BERGER
No. 0139
Exp. 3/31/98
GEOTECHNICAL
STATE OF CALIFORNIA

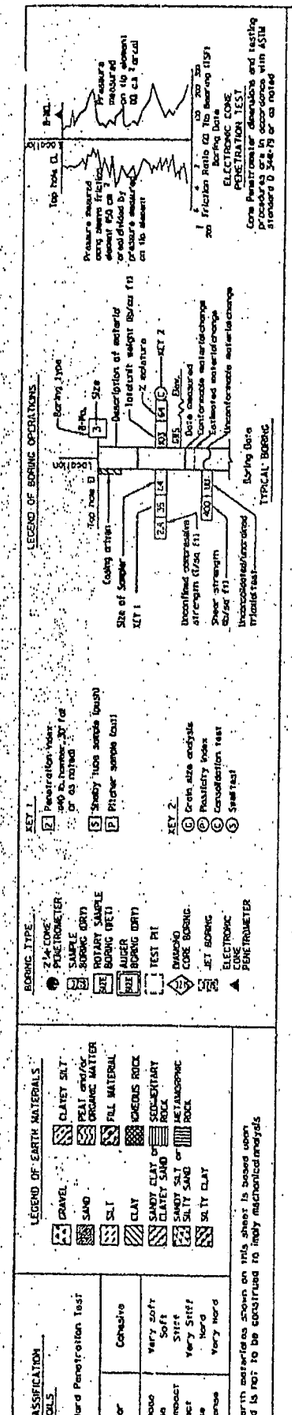


PLAN
1"=100'

BENCHMARK: CALTRANS
A-438ECC
ELEV. 33.38 FEET
LOCATED ON WEST SIDE OF EXISTING
98TH AVENUE VEHICLE BRIDGE.

AS BUILT
☒ No Changes
☐ Changes as Noted
By:
Date: 12/16/98
Resident Eng:
Surveyor Rep:





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DIST.	COUNTY	ROUTE	POST MILE–TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

REGISTERED PROFESSIONAL ENGINEER
GARY PARIKH
No. G.E. 666
Exp. 12/31/13
GEOTECHNICAL
STATE OF CALIFORNIA

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

LOG OF TEST BORINGS 2 OF 4

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

BRIDGE No. –
Sheet of

PROFILE
Scale Horiz: 1" = 100'
Scale Vert.: 1" = 5'

SW-59

DESIGN OVERSIGHT	DRAWN BY RA	PR, SC, MJ	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
SIGN OFF DATE	CHECKED BY JP	FIELD INVESTIGATOR / DATE	PROJECT ENGINEER

BRIDGE NO.
POST MILE

RETAINING WALLS / SOUND WALLS - 'SW' LINE

LOG OF TEST BORINGS 1 OF 9

ORIGINAL SCALE IN INCHES — REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET OF

880A- 414194

7	CALIF.		

DIST.	COUNTY	ROUTE	SECTION	SHEET No.	TOTAL SHEETS
04	Ala	17	207/260	139	146

Date Approved November 12, 1968

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DIST.	COUNTY	ROUTE	POST MILE-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

LOG OF TEST BORINGS 3 OF 4

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

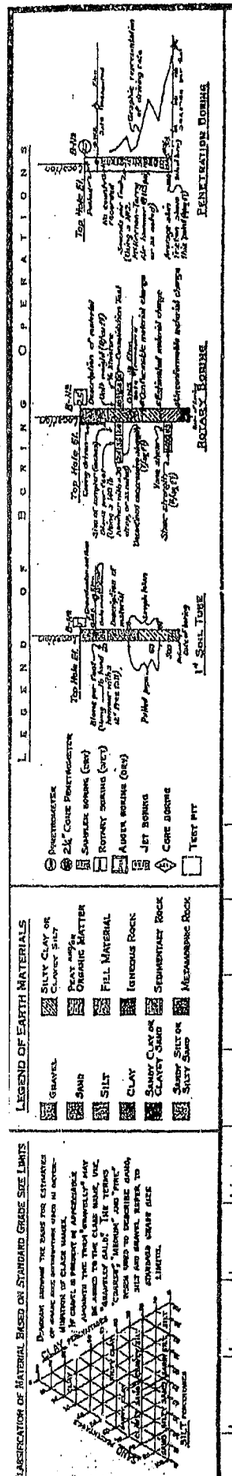
CU: 04248
EA: 3A9201

BRIDGE No. –

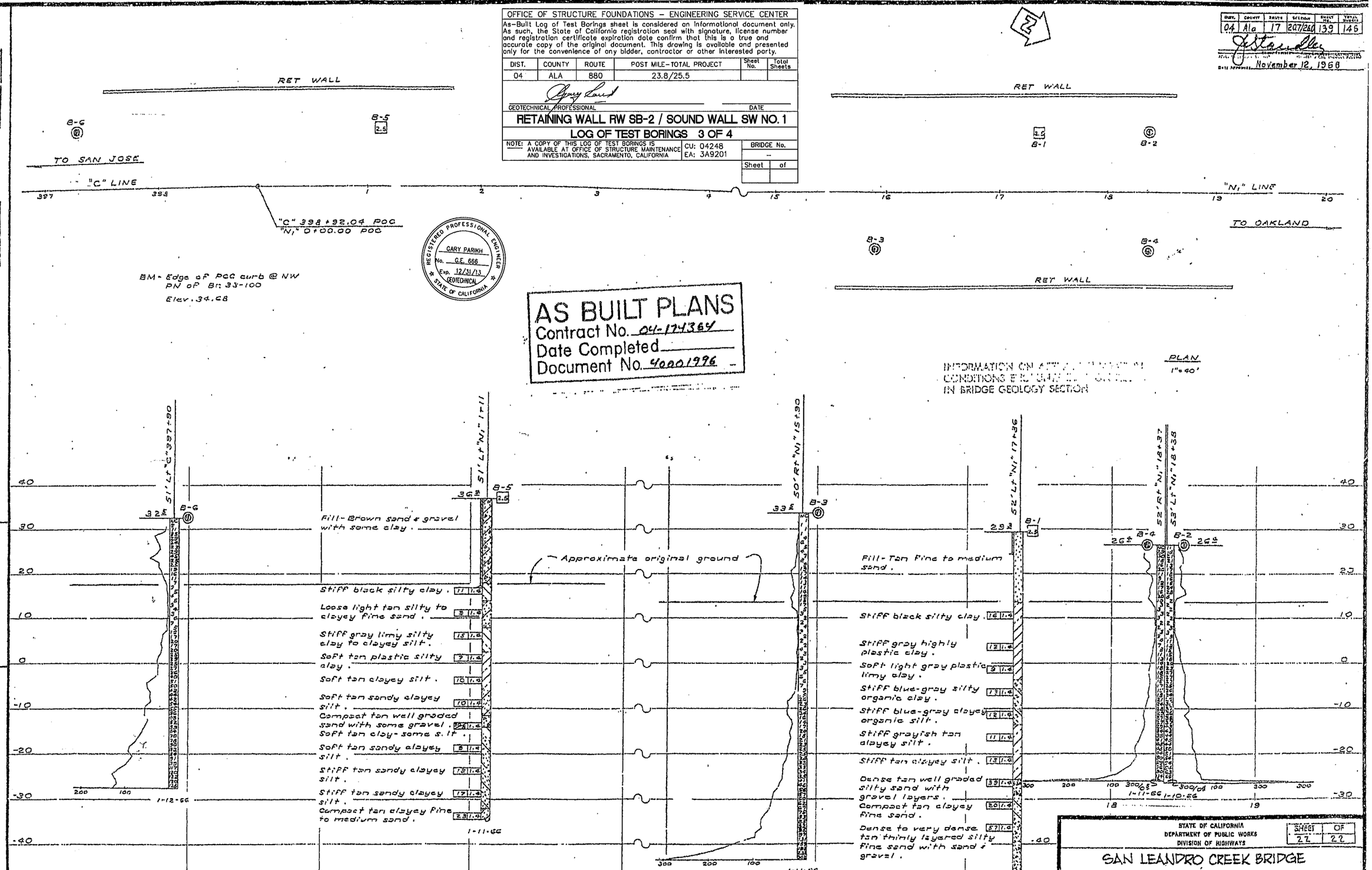
Sheet of

REGISTERED PROFESSIONAL ENGINEER
GARY PARIKH
No. G.E. 666
Exp. 12/31/13
GEOTECHNICAL
STATE OF CALIFORNIA

AS BUILT PLANS
Contract No. 04-174364
Date Completed
Document No. 40001996



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
22	22

SAN LEANDRO CREEK BRIDGE & OVERHEAD WIDEN

LOG OF TEST BORINGS No. 2

SCALE AS Noted | BRIDGE 33-100 | FILE | DRAWING 33100-22

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	17	20.7/26.0	138	146

DATE APPROVED November 12, 1968

TOTAL PROJECT EA.	STATE	ROUTE	PREFIX	POST MILES	TOTAL PROJECT
7	CAL.	17		26	62

DIST.	COUNTY	ROUTE	PREFIX	POST MILES	TOTAL PROJECT
07	Ala	880		18	12

October 24, 1966

OFFICE OF STRUCTURE FOUNDATIONS – ENGINEERING SERVICE CENTER

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DIST.	COUNTY	ROUTE	POST MILE–TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/13 — GEOTECHNICAL — STATE OF CALIFORNIA

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

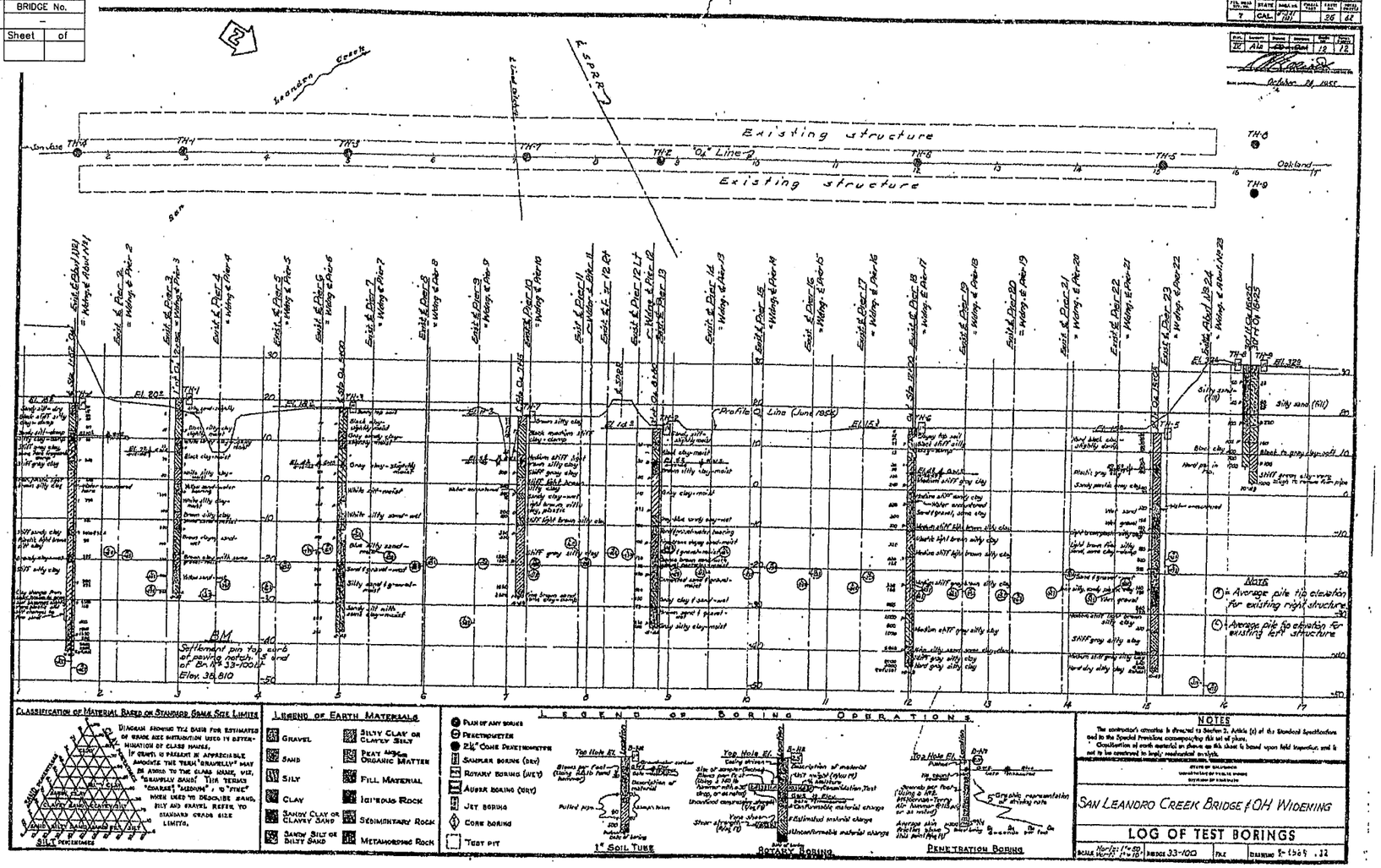
LOG OF TEST BORINGS 4 OF 4

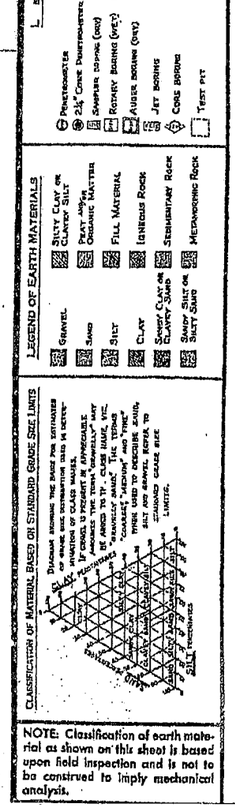
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

BRIDGE No. –

Sheet ___ of ___





NOTES

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.

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

SAN LEANDRO CREEK BRIDGE & OH WIDENING

LOG OF TEST BORINGS

SCALE Horiz. 1"=20' Vert. 1"=10' | BRIDGE 33-100 | FILE | DRAWING B-1969 .22

Approved Recommended by: [illegible]
Engineering Geologist

ENGINEERING GEOLOGY SECTION

AS BUILT PLANS
Contract No. 04-174364
Date Completed
Document No. 40001996

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION

SAN LEANDRO CREEK BRIDGE
& OVERHEAD WIDEN

LOG OF TEST BORINGS No. 1

BRIDGE 33-100 | POST | DRAWING | SHEET | OF

GREGG DRILLING & TESTING, INC.
GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

July 2, 2008

Parikh Consultants
Attn: Gary Parikh
356 S. Milpitas Blvd.
Milpitas, California 95035

Subject: CPT Site Investigation
I-880 Widening
Oakla nd, California
GREGG Project Number: 08-178MA

Dear Mr. Parikh:

The following report presents the results of GREGG Drilling & Testing's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☒
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVOST Laser Induced Fluorescence	(UVOST)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (925) 313-5800.

Sincerely,
GREGG Drilling & Testing, Inc.

Mary Walden
Operations Manager

950 Howe Rd • Martinez, California 94553 • (925) 313-5800 • FAX (925) 313-0302
OTHER OFFICES: LOS ANGELES • HOUSTON • SOUTH CAROLINA
www.greggdrilling.com

Cone Penetration Testing Procedure (CPT)

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*. The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.80.

The cone takes measurements of cone bearing (q_c), sleeve friction (f_s) and penetration pore water pressure (u_2) at 5-cm intervals during penetration to provide a nearly continuous hydrogeologic log. CPT data reduction and interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored on disk for further analysis and reference. All CPT soundings are performed in accordance with revised (2002) ASTM standards (D 5778-95).

The cone also contains a porous filter element located directly behind the cone tip (u_2), *Figure CPT.* It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain penetration pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (PPDT's) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with silicon oil under vacuum pressure to ensure accurate and fast dissipation.

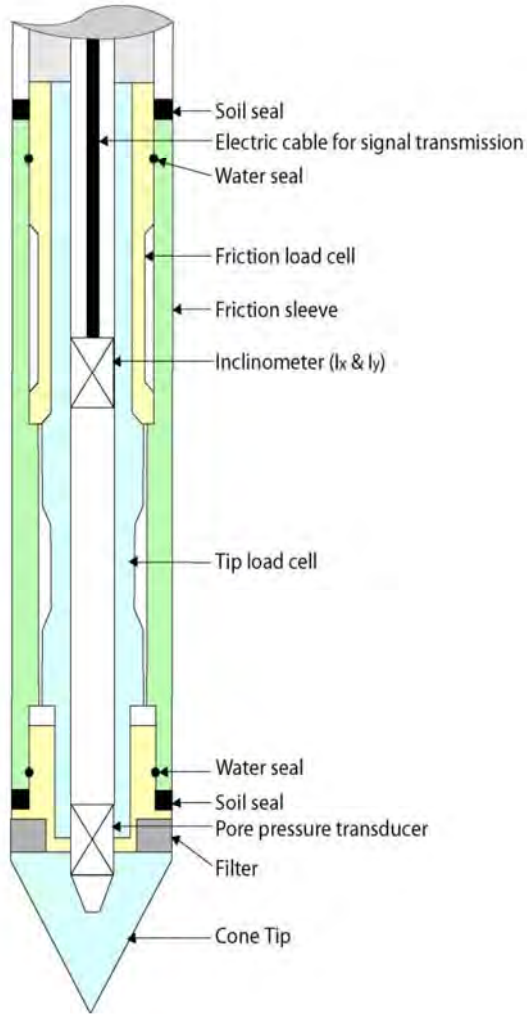


Figure CPT

When the soundings are complete, the test holes are grouted using a Gregg In Situ support rig. The grouting procedures generally consist of pushing a hollow CPT rod with a "knock out" plug to the termination depth of the test hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

Cone Penetration Test Sounding Summary

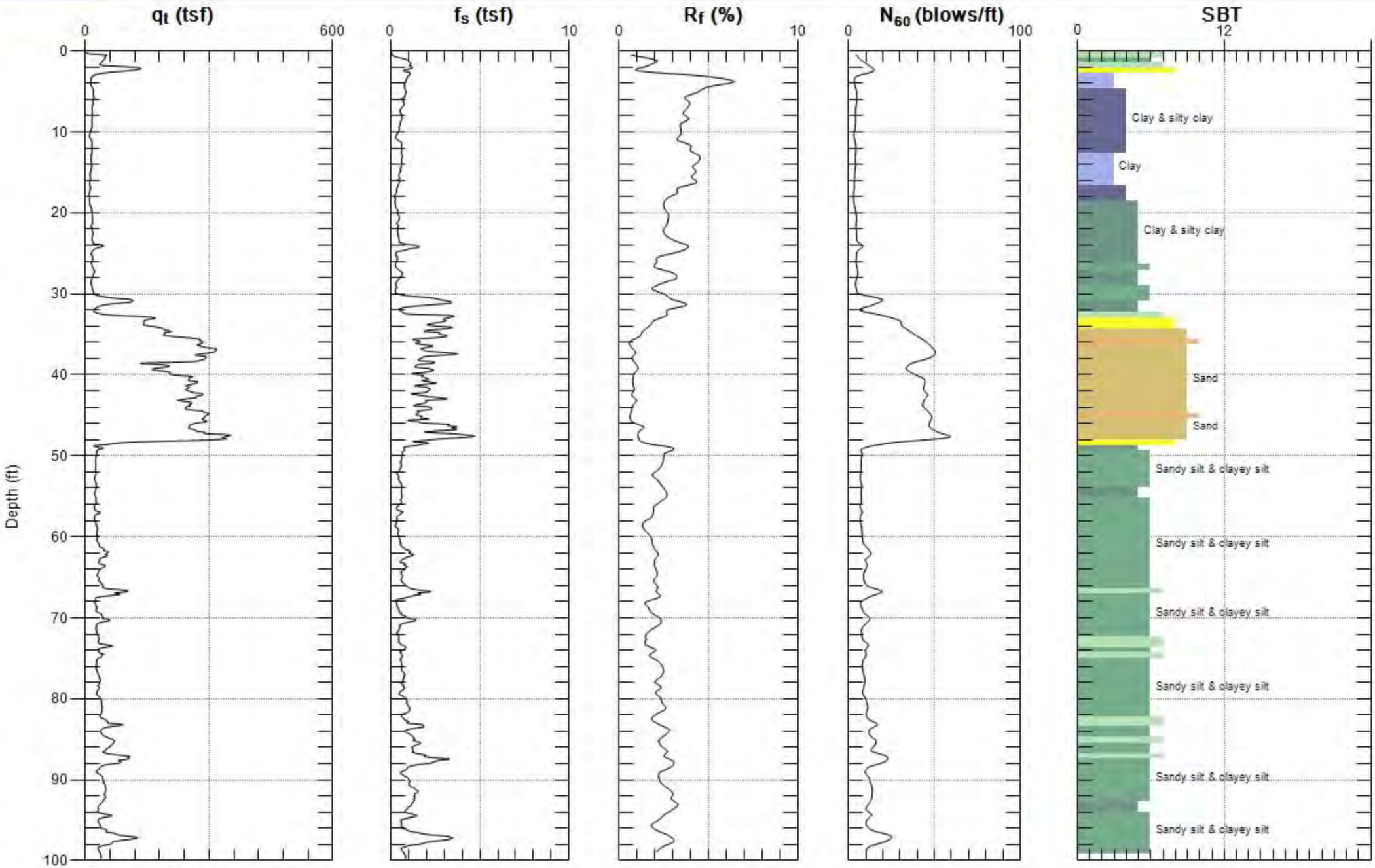
-Table 1-

CPT Sounding Identification	Date	Termination Depth (Feet)	Depth of Groundwater Samples (Feet)	Depth of Soil Samples (Feet)	Depth of Pore Pressure Dissipation Tests (Feet)
CPT-01	7/01/08	100	-	-	32.8
CPT-02	7/01/08	100	-	-	42.3

PARIKH CONSULTANTS

Site: I-880 WIDENING
Sounding: CPT-01

Engineer: G.PARIKH
Date: 7/1/2008 07:56



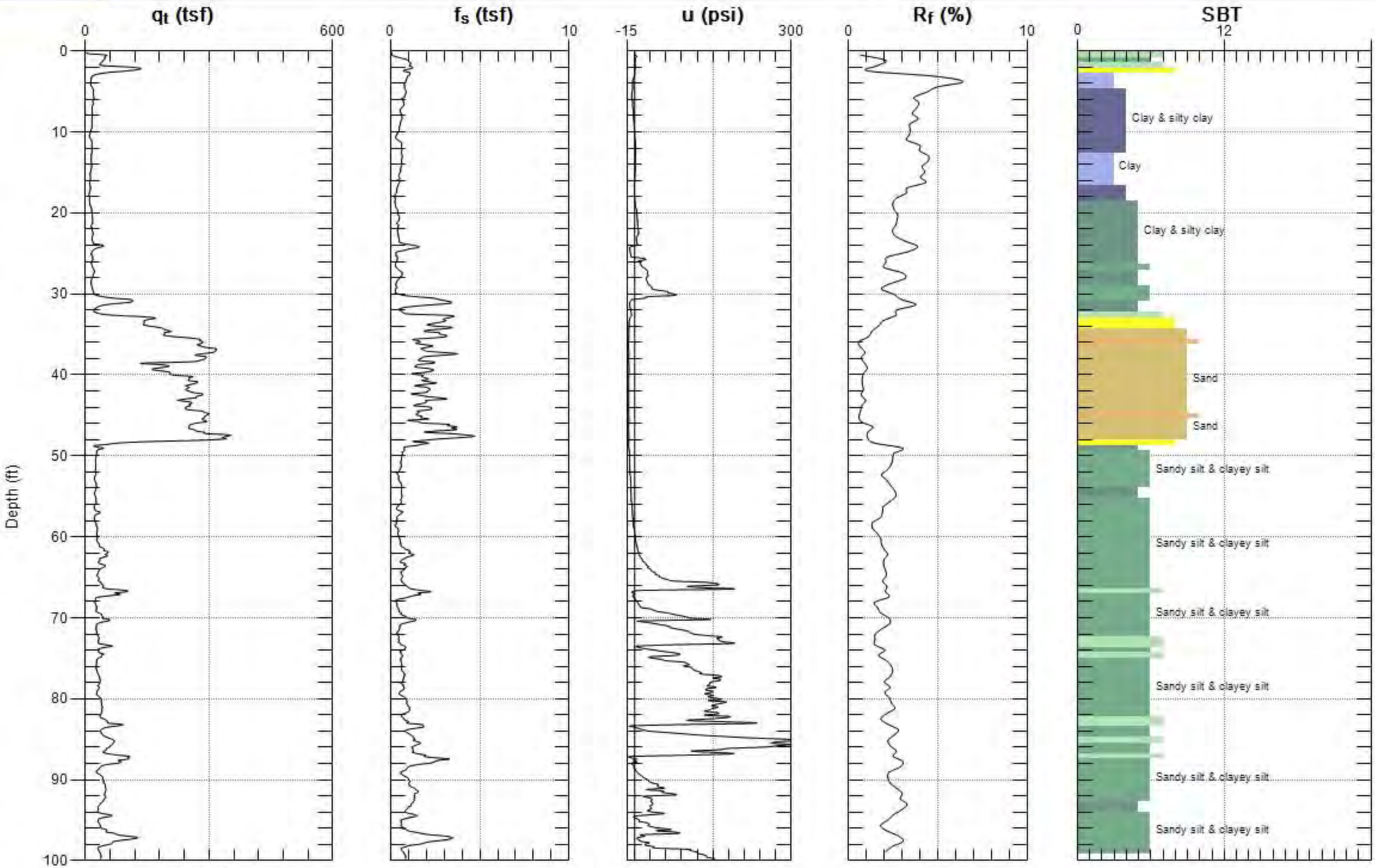
Max. Depth: 99.738 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

PARIKH CONSULTANTS

Site: I-880 WIDENING
Sounding: CPT-01

Engineer: G.PARIKH
Date: 7/1/2008 07:56



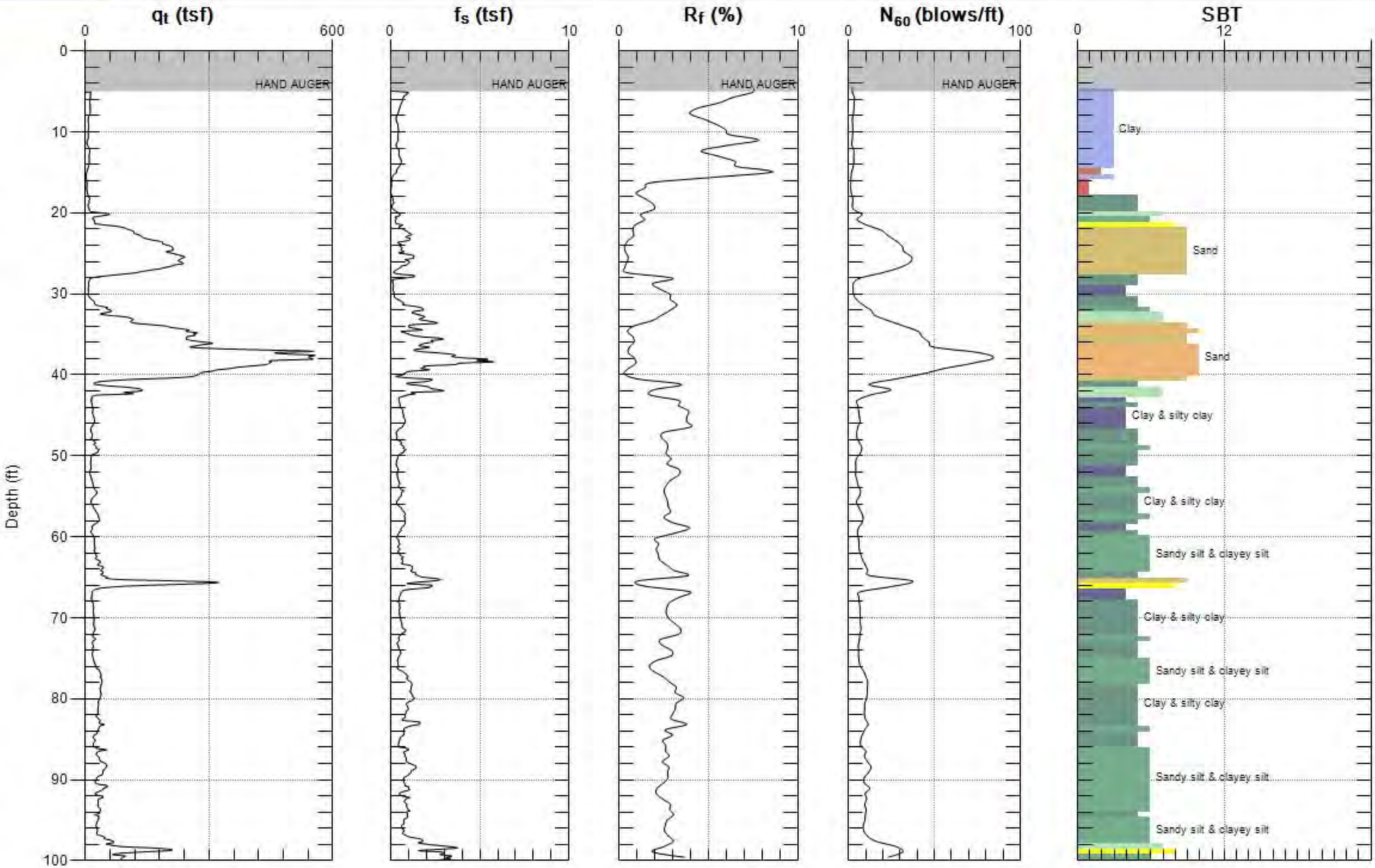
Max. Depth: 99.738 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

PARIKH CONSULTANTS

Site: I-880 WIDENING
Sounding: CPT-02

Engineer: G.PARIKH
Date: 7/1/2008 09:54



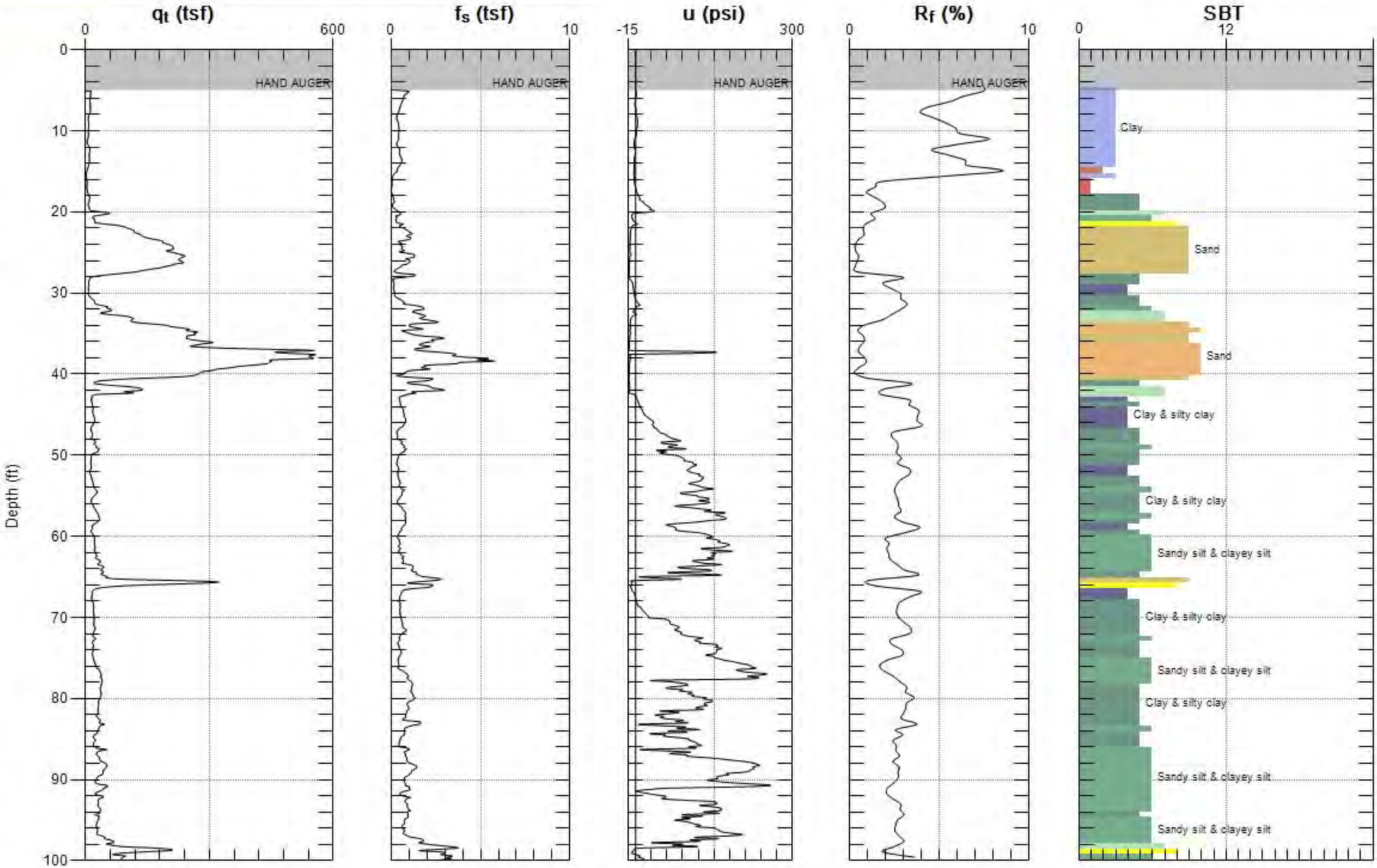
Max. Depth: 100.066 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

PARIKH CONSULTANTS

Site: I-880 WIDENING
Sounding: CPT-02

Engineer: G.PARIKH
Date: 7/1/2008 09:54



Max. Depth: 100.066 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

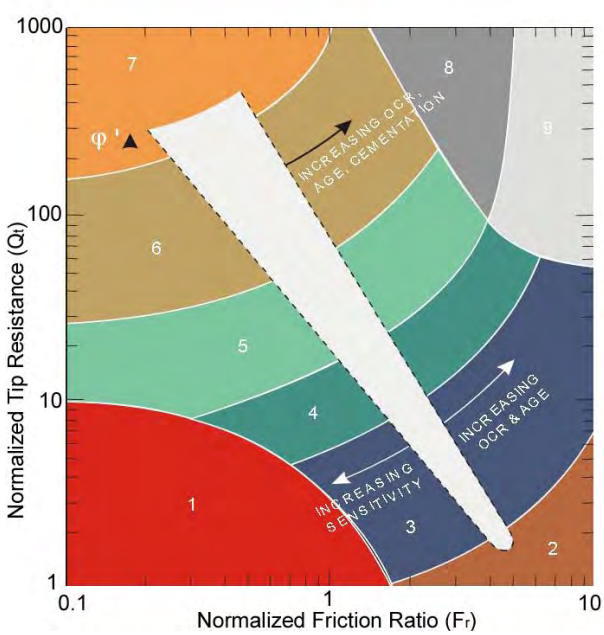
Cone Penetration Test Data & Interpretation

The Cone Penetration Test (CPT) data collected from your site are presented in graphical form in the attached report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (1990). Typical plots display SBT based on the non-normalized charts of Robertson et al (1986). For CPT soundings extending greater than 50 feet, we recommend the use of the normalized charts of Robertson (1990) which can be displayed as SBTn, upon request. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Professor Robertson. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg InSitu and Gregg Drilling & Testing Inc. do not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and do not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on the field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on q_t, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.



(After Robertson, 1990)

Zone	Normailzed Soil Behavior Type
1	sensitive fine grained
2	organic material
3	clay to silty clay
4	clayey silt to silty clay
5	silty sand to sandy silt
6	clean sands to silty sands
7	gravelly sand to sand
8	very stiff sand to clayey sand
9	very stiff fine grained

Figure SBTn

Cone Penetration Test (CPT) Interpretation

Gregg have recently updated their CPT interpretation and plotting software (2007). The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997). The interpretation is presented in tabular format using MS Excel. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameters.

Input:

1. Units for display (Imperial or metric) (atm. pressure, pa = 0.96 tsf or 0.1 MPa)
2. Depth interval to average results,(ft or m). Data are collected at either 0.02 or 0.05m and can be averaged every 1, 3 or 5 intervals.
3. Elevation of ground surface (ft or m)
4. Depth to water table, z_w (ft or m) – input required
5. Net area ratio for cone, a (default to 0.80)
6. Relative Density constant, C_{Dr} (default to 350)
7. Young's modulus number for sands, α (default to 5)
8. Small strain shear modulus number
   a. for sands, S_G (default to 180 for SBT_n 5, 6, 7)
   b. for clays, C_G (default to 50 for SBT_n 1, 2, 3 & 4)
9. Undrained shear strength cone factor for clays, N_{kt} (default to 15)
10. Over Consolidation ratio number, k_{ocr} (default to 0.3)
11. Unit weight of water, (default to γ_w = 62.4 lb/ft^3 or 9.81 kN/m^3)

Column

1. Depth, z, (m) – CPT data is collected in meters
2. Depth (ft)
3. Cone resistance, q_c (tsf or MPa)
4. Sleeve friction, f_s (tsf or MPa)
5. Penetration pore pressure, u (psi or MPa), measured behind the cone (i.e. u_2)
6. Other – any additional data, if collected, e.g. electrical resistivity or UVIF
7. Total cone resistance, q_t (tsf or MPa) $q_t = q_c + u\,(1-a)$

8	Friction Ratio, R_f (%)	$R_f = (f_s/q_t) \times 100\%$
9	Soil Behavior Type (non-normalized), SBT	see note
10	Unit weight, γ (pcf or kN/m^3)	based on SBT, see note
11	Total overburden stress, σ_v (tsf)	$\sigma_{vo} = \gamma z$
12	Insitu pore pressure, u_o (tsf)	$u_o = \gamma_w (z - z_w)$
13	Effective overburden stress, σ'_{vo} (tsf)	$\sigma'_{vo} = \sigma_{vo} - u_o$
14	Normalized cone resistance, Q_{t1}	$Q_{t1} = (q_t - \sigma_{vo}) / \sigma'_{vo}$
15	Normalized friction ratio, F_r (%)	$F_r = f_s / (q_t - \sigma_{vo}) \times 100\%$
16	Normalized Pore Pressure ratio, B_q	$B_q = u - u_o / (q_t - \sigma_{vo})$
17	Soil Behavior Type (normalized), SBT_n	see note
18	SBT_n Index, I_c	see note
19	Normalized Cone resistance, Q_{tn} (n varies with Ic)	see note
20	Estimated permeability, k_{SBT} (cm/sec or ft/sec)	see note
21	Equivalent SPT N_{60}, blows/ft	see note
22	Equivalent SPT $(N_1)_{60}$ blows/ft	see note
23	Estimated Relative Density, D_r, (%)	see note
24	Estimated Friction Angle, ϕ', (degrees)	see note
25	Estimated Young's modulus, E_s (tsf)	see note
26	Estimated small strain Shear modulus, Go (tsf)	see note
27	Estimated Undrained shear strength, s_u (tsf)	see note
28	Estimated Undrained strength ratio	s_u/σ_v'
29	Estimated Over Consolidation ratio, OCR	see note

Notes:

1 Soil Behavior Type (non-normalized), SBT — Lunne et al. (1997)
listed below

2 Unit weight, γ either constant at 119 pcf or based on Non-normalized SBT
(Lunne et al., 1997 and table below)

3 Soil Behavior Type (Normalized), SBT_n — Lunne et al. (1997)

4 SBT_n Index, I_c — $I_c = ((3.47 - \log Q_{t1})^2 + (\log F_r + 1.22)^2)^{0.5}$

5 Normalized Cone resistance, Q_{tn} (n varies with Ic)

$Q_{tn} = ((q_t - \sigma_{vo})/pa)\ (pa/(\sigma'_{vo})^n$ and recalculate I_c, then iterate:

When $I_c < 1.64$, $n = 0.5$ (clean sand)
When $I_c > 3.30$, $n = 1.0$ (clays)
When $1.64 < I_c < 3.30$, $n = (I_c - 1.64)0.3 + 0.5$
Iterate until the change in n, $\Delta n < 0.01$

6 Estimated permeability, k_{SBT} (based on Normalized SBT_n)
(Lunne et al., 1997 and table below)

7 Equivalent SPT N_{60}, blows/ft Lunne et al. (1997)

$$\frac{(q_t/p_a)}{N_{60}} = 8.5\left(1 - \frac{I_c}{4.6}\right)$$

8 Equivalent SPT $(N_1)_{60}$ blows/ft $(N_1)_{60} = N_{60}\, C_N$,
where $C_N = (pa/\sigma'_{vo})^{0.5}$

9 Relative Density, D_r, (%) $D_r^2 = Q_{tn} / C_{Dr}$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

10 Friction Angle, ϕ', (degrees) $\tan\phi' = \frac{1}{2.68}\left[\log\left(\frac{q_c}{\sigma'_{vo}}\right) + 0.29\right]$
Only SBT_n 5, 6, 7 & 8 *Show'N/A' in zones 1, 2, 3, 4 & 9*

11 Young's modulus, E_s $E_s = \alpha\, q_t$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

12 Small strain shear modulus, Go
a. $G_o = S_G\,(q_t\ \sigma'_{vo}\ pa)^{1/3}$ *For SBT_n 5, 6, 7*
b. $G_o = C_G\, q_t$ *For SBT_n 1, 2, 3& 4*
Show 'N/A' in zones 8 & 9

13 Undrained shear strength, s_u $s_u = (q_t - \sigma_{vo}) / N_{kt}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

14 Over Consolidation ratio, OCR $OCR = k_{ocr}\, Q_{t1}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

SBT Zones **SBT_n Zones**

The following updated and simplified SBT descriptions have been used in the software:

1	sensitive fine grained	1	sensitive fine grained
2	organic soil	2	organic soil
3	clay	3	clay
4	clay & silty clay	4	clay & silty clay
5	clay & silty clay		
6	sandy silt & clayey silt		
7	silty sand & sandy silt	5	silty sand & sandy silt
8	sand & silty sand	6	sand & silty sand
9	sand		
10	sand	7	sand
11	very dense/stiff soil*	8	very dense/stiff soil*
12	very dense/stiff soil*	9	very dense/stiff soil*

* heavily overconsolidated and/or cemented

Track when soils fall with zones of same description and print that description (i.e. if soils fall only within SBT zones 4 & 5, print 'clays & silty clays')

Estimated Permeability (see Lunne et al., 1997)

SBT_n	Permeability (ft/sec)	(m/sec)
1	$3x\ 10^{-8}$	$1x\ 10^{-8}$
2	$3x\ 10^{-7}$	$1x\ 10^{-7}$
3	$1x\ 10^{-9}$	$3x\ 10^{-10}$
4	$3x\ 10^{-8}$	$1x\ 10^{-8}$
5	$3x\ 10^{-6}$	$1x\ 10^{-6}$
6	$3x\ 10^{-4}$	$1x\ 10^{-4}$
7	$3x\ 10^{-2}$	$1x\ 10^{-2}$
8	$3x\ 10^{-6}$	$1x\ 10^{-6}$
9	$1x\ 10^{-8}$	$3x\ 10^{-9}$

Estimated Unit Weight (see Lunne et al., 1997)

SBT	Approximate Unit Weight (lb/ft^3)	(kN/m^3)
1	111.4	17.5
2	79.6	12.5
3	111.4	17.5
4	114.6	18.0
5	114.6	18.0
6	114.6	18.0
7	117.8	18.5
8	120.9	19.0
9	124.1	19.5
10	127.3	20.0
11	130.5	20.5
12	120.9	19.0

GREGG DRILLING & TESTING, INC.

CONE PENETRATION TEST DATA

Client:	PARIKH CONSULTANTS	Units:	Imperial
Site:	I-880 WIDENING	Data averaging interval:	0.200 meters
Engineer:	G.PARIKH	Assumed depth of water:	6.044 feet
Sounding:	CPT-01	Net area ratio of cone:	0.80
Date:	7/1/2008	Unit weight of water:	62.4 lb/ft3
Time:	7:56 AM	Relative density constant, CDR:	350
		Young's modulus for sands, a:	4
		Small strain shear modulus number, SG (sands):	180
		Small strain shear modulus number, CG (clays):	50
		Nkt for clays:	15
		OCR number, kocr:	0.3

Interpretation based on Lunne, Robertson and Powell, 1997

Col 1i	Col 2i	Col 3i	Col 4i	Col 5i	Col 6i	Col 7i	Col 8i	Col 9i	Col 10i	Col 11i	Col 12i	Col 13i	Col 14i	Col 15i	Col 16i	Col 17i	Col 18i	Col 19i	Col 20i	Col 21i	Col 22i	Col 23i	Col 24i	Col 25i	Col 26i	Col 27i	Col 28i	Col 29i
Depth	Depth	qc	fs	u	Other	qt	Rf	SBT	Unit Weight, γ	Total Overburden Stress, σv	Insitu pore pressure, uo	Effective overburden stress, σ'v	Normalized cone resistance, Qtl	Normalized Friction raio, Fr	Normalized pore pressure ratio, Bq	Soil Behavior Type (normalized) SBTn	SBTn Index, Ic	Normalized Cone resistance, Qtn	Estimated permeability, kSBT	SPT N60	SPT (N1)60	Relative Density, Dr	Friction Angle, φ'	Young's modulus, Es	Small strain shear modulus, Go	Undrained shear strength, su	Undrained strength ratio, su/σ'v	Over consolidation ratio, OCR
(m)	(ft)	(tsf)	(tsf)	(psi)		(tsf)	(%)		(pcf)	(tsf)	(tsf)	(tsf)							(ft/sec)	(blows/ft)	(blows/ft)	(%)	(degrees)	(tsf)	(tsf)	(tsf)		
0.150	0.492	31.439	0.206	1.091		31.46	0.65	7	118	0.029	0.000	0.029	>1000	0.65	0.00	7	1.12	179.47	3.00E-2	4.6	28.0	72	51	126	178			
0.350	1.148	43.395	0.903	0.829		43.41	2.08	6	115	0.067	0.000	0.067	651.02	2.08	0.00	8	1.67	167.80	3.00E-6	7.6	30.2	69	49	174				
0.550	1.804	71.270	1.153	0.524		71.28	1.62	7	118	0.105	0.000	0.105	676.47	1.62	0.00	8	1.57	213.31	3.00E-6	12.0	38.1	78	49	285				
0.750	2.461	90.812	0.997	0.205		90.81	1.10	8	121	0.145	0.000	0.145	625.77	1.10	0.00	6	1.43	231.57	3.00E-4	14.7	39.6	81	49	363	433			
0.950	3.117	20.753	0.996	-1.246		20.74	4.80	3	111	0.181	0.000	0.181	113.28	4.84	0.00	9	2.37	69.16	1.00E-8	4.8	11.5					1.37	7.55	34.0
1.150	3.773	13.379	0.853	-3.830		13.32	6.40	3	111	0.218	0.000	0.218	60.12	6.51	-0.02	9	2.64	43.93	1.00E-8	3.5	7.7					0.87	4.01	18.0
1.350	4.429	16.154	0.799	-4.029		16.10	4.96	3	111	0.255	0.000	0.255	62.24	5.04	-0.02	4	2.55	45.05	3.00E-8	4.0	8.2				805	1.06	4.15	18.7
1.550	5.085	19.715	0.855	-5.055		19.64	4.35	4	115	0.292	0.000	0.292	66.24	4.42	-0.02	4	2.49	48.31	3.00E-8	4.8	9.1				982	1.29	4.42	19.9
1.750	5.741	20.565	0.751	-5.721		20.48	3.66	4	115	0.330	0.000	0.330	61.12	3.72	-0.02	4	2.46	45.43	3.00E-8	4.9	8.8				1024	1.34	4.07	18.3
1.950	6.398	18.965	0.742	-4.092		18.91	3.93	4	115	0.367	0.011	0.356	52.04	4.00	-0.02	4	2.53	40.37	3.00E-8	4.7	8.1				945	1.24	3.47	15.6
2.150	7.054	16.608	0.628	-3.306		16.56	3.79	4	115	0.405	0.032	0.373	43.27	3.89	-0.02	4	2.58	34.44	3.00E-8	4.2	7.1				828	1.08	2.88	13.0
2.350	7.710	16.825	0.597	-2.535		16.79	3.56	4	115	0.443	0.052	0.391	41.86	3.65	-0.01	4	2.57	33.56	3.00E-8	4.2	7.0				839	1.09	2.79	12.6
2.550	8.366	16.399	0.635	-2.032		16.37	3.88	4	115	0.480	0.072	0.408	38.98	3.99	-0.01	4	2.62	32.00	3.00E-8	4.2	6.8				818	1.06	2.60	11.7
2.750	9.022	15.995	0.546	-1.317		15.98	3.42	4	115	0.518	0.093	0.425	36.39	3.53	-0.01	4	2.60	30.01	3.00E-8	4.1	6.5				799	1.03	2.43	10.9
2.950	9.678	14.287	0.491	-0.772		14.28	3.44	4	115	0.555	0.113	0.442	31.05	3.58	-0.01	4	2.66	26.19	3.00E-8	3.8	5.8				714	0.91	2.07	9.3
3.150	10.335	10.805	0.367	-0.092		10.80	3.40	4	115	0.593	0.134	0.459	22.25	3.59	-0.01	4	2.77	19.43	3.00E-8	3.0	4.6				540	0.68	1.48	6.7
3.350	10.991	13.696	0.446	0.991		13.71	3.25	4	115	0.630	0.154	0.476	27.47	3.41	-0.01	4	2.68	23.66	3.00E-8	3.7	5.4				686	0.87	1.83	8.2
3.550	11.647	15.880	0.633	1.699		15.90	3.98	4	115	0.668	0.175	0.493	30.89	4.15	0.00	4	2.70	26.90	3.00E-8	4.3	6.3				795	1.02	2.06	9.3
3.750	12.303	15.931	0.634	1.848		15.96	3.97	4	115	0.706	0.195	0.510	29.88	4.16	0.00	4	2.71	26.24	3.00E-8	4.3	6.2				798	1.02	1.99	9.0
3.950	12.959	14.597	0.652	1.465		14.62	4.46	3	111	0.742	0.216	0.526	26.36	4.70	-0.01	3	2.79	23.65	1.00E-9	4.1	5.8				731	0.93	1.76	7.9
4.150	13.615	14.402	0.638	1.090		14.42	4.43	3	111	0.779	0.236	0.543	25.14	4.68	-0.01	3	2.80	22.73	1.00E-9	4.1	5.7				721	0.91	1.68	7.5
4.350	14.272	14.828	0.609	1.147		14.84	4.10	3	111	0.815	0.257	0.559	25.11	4.34	-0.01	3	2.78	22.71	1.00E-9	4.2	5.7				742	0.94	1.67	7.5
4.550	14.928	12.708	0.543	0.616		12.72	4.27	3	111	0.852	0.277	0.575	20.65	4.58	-0.02	3	2.86	19.03	1.00E-9	3.7	5.1				636	0.79	1.38	6.2
4.750	15.584	12.089	0.486	0.085		12.09	4.02	3	111	0.888	0.298	0.591	18.96	4.34	-0.03	3	2.87	17.58	1.00E-9	3.6	4.8				605	0.75	1.26	5.7
4.950	16.240	11.223	0.482	-0.574		11.22	4.30	3	111	0.925	0.318	0.607	16.96	4.68	-0.03	3	2.93	15.93	1.00E-9	3.4	4.5				561	0.69	1.13	5.1
5.150	16.896	11.930	0.391	-0.814		11.92	3.28	4	115	0.963	0.339	0.624	17.56	3.57	-0.04	3	2.85	16.32	1.00E-9	3.5	4.5				596	0.73	1.17	5.3
5.350	17.552	9.897	0.319	-0.630		9.89	3.22	4	115	1.000	0.359	0.641	13.86	3.59	-0.05	3	2.93	13.10	1.00E-9	3.0	3.9				494	0.59	0.92	4.2
5.550	18.209	10.020	0.266	-0.156		10.02	2.65	4	115	1.038	0.380	0.658	13.64	2.96	-0.04	3	2.88	12.84	1.00E-9	3.0	3.8				501	0.60	0.91	4.1
5.750	18.865	11.281	0.279	0.701		11.29	2.47	5	115	1.075	0.400	0.675	15.13	2.73	-0.03	4	2.83	14.18	3.00E-8	3.3	4.1				565	0.68	1.01	4.5
5.950	19.521	14.691	0.372	2.783		14.73	2.53	5	115	1.113	0.420	0.692	19.67	2.73	-0.02	4	2.74	18.29	3.00E-8	4.0	5.0				737	0.91	1.31	5.9
6.150	20.177	16.334	0.450	4.361		16.40	2.74	5	115	1.151	0.441	0.710	21.49	2.95	-0.01	4	2.73	20.04	3.00E-8	4.5	5.4				820	1.02	1.43	6.4
6.350	20.833	17.365	0.473	5.084		17.44	2.71	5	115	1.188	0.461	0.727	22.36	2.91	-0.01	4	2.71	20.90	3.00E-8	4.7	5.7				872	1.08	1.49	6.7
6.550	21.490	15.966	0.423	5.891		16.05	2.64	5	115	1.226	0.482	0.744	19.93	2.85	0.00	4	2.74	18.78	3.00E-8	4.4	5.2				803	0.99	1.33	6.0
6.750	22.146	17.149	0.423	6.825		17.25	2.45	5	115	1.263	0.502	0.761	21.01	2.65	0.00	4	2.70	19.79	3.00E-8	4.6	5.5				862	1.07	1.40	6.3
6.950	22.802	17.444	0.456	5.360		17.52	2.60	5	115	1.301	0.523	0.778	20.85	2.81	-0.01	4	2.72	19.75	3.00E-8	4.8	5.5				876	1.08	1.39	6.3
7.150	23.458	17.654	0.554	3.809		17.71	3.13	5	115	1.338	0.543	0.795	20.59	3.38	-0.02	4	2.78	19.67	3.00E-8	5.0	5.7				885	1.09	1.37	6.2
7.350	24.114	31.998	1.233	-2.797		31.96	3.86	5	115	1.376	0.564	0.812	37.65	4.03	-0.03	4	2.63	35.68	3.00E-8	8.3	9.5				1598	2.04	2.51	11.3
7.550	24.770	17.553	0.583	-8.708		17.43	3.34	5	115	1.414	0.584	0.829	19.31	3.64	-0.08	4	2.82	18.63	3.00E-8	5.0	5.7				871	1.07	1.29	5.8
7.750	25.427	16.897	0.369	3.285		16.94	2.18	5	115	1.451	0.605	0.847	18.30	2.38	-0.02	4	2.72	17.60	3.00E-8	4.6	5.2				847	1.03	1.22	5.5
7.950	26.083	15.758	0.332	12.192		15.93	2.09	5	115	1.489	0.625	0.864	16.72	2.30	0.02	4	2.75	16.16	3.00E-8	4.4	4.8				797	0.96	1.11	5.0
8.150	26.739	18.165	0.366	17.098		18.41	1.99	6	115	1.526	0.646	0.881	19.17	2.17	0.03	4	2.68	18.53	3.00E-8	4.9	5.3				921	1.13	1.28	5.8
8.350	27.395	20.292	0.617	24.589		20.65	2.99	5	115	1.564	0.666	0.898	21.25	3.23	0.06	4	2.75	20.68	3.00E-8	5.6	6.1				1032	1.27	1.42	6.4
8.550	28.051	15.873	0.515	23.506		16.21	3.17	5	115	1.602	0.687	0.915	15.97	3.52	0.07	3	2.87	15.67	1.00E-9	4.7	5.1				811	0.97	1.06	4.8
8.750	28.707	14.056	0.341	26.451		14.44	2.36	5	115	1.639	0.707	0.932	13.73	2.66	0.09	4	2.85	13.50	3.00E-8	4.1	4.4				722	0.85	0.92	4.1
8.950	29.364	16.846	0.321	40.541		17.43	1.84	6	115	1.677	0.728	0.949	16.59	2.04	0.14	4	2.72	16.28	3.00E-8	4.6	4.8				871	1.05	1.11	5.0
9.150	30.020	25.568	0.665	60.832		26.44	2.51	6	115	1.714	0.748	0.966	25.59	2.69	0.15	4	2.64	25.13	3.00E-8	6.7	7.0				1322	1.65	1.71	7.7
9.350	30.676	88.599	2.614	4.850		88.67	2.95	6	115	1.752	0.769	0.984	88.37	3.01	0.00	5	2.28	86.41	3.00E-6	19.5	20.3	50	40	355	813			
9.550	31.332	60.169	2.250	-9.438		60.03	3.75	5	115	1.790	0.789	1.001	58.21	3.86	-0.03	4	2.48	57.41	3.00E-8	14.5	15.0				3002	3.88	3.88	17.5
9.750	31.988	24.300	0.650	-7.590		24.19	2.69	5	115	1.827	0.809	1.018	21.97	2.91	-0.06	4	2.71	21.82	3.00E-8	6.6	6.7				1210	1.49	1.46	6.6
9.950	32.644	89.745	2.354	-7.193		89.64	2.63	7	118	1.866	0.830	1.036	84.73	2.68	-0.02	5	2.26	84.17	3.00E-6	19.6	19.8	49	40	359	831			
10.150	33.301	150.808	2.906	-10.301		150.66	1.93	8	121	1.906	0.850	1.055	140.98	1.95	-0.01	6	2.01	140.83	3.00E-4	29.7	29.8	63	42	603	994			
10.350	33.957	161.152	2.698	-11.002		160.99	1.68	8	121	1.945	0.871	1.074	148.04	1.70	-0.01	6	1.95	148.97	3.00E-4	31.1	30.8	65	43	644	1022			
10.550	34.613	195.796	2.535	-11.300		195.63	1.30	9	124	1.986	0.891	1.095	176.91	1.31	-0.01	6	1.81	179.62	3.00E-4	35.9	35.3	72	43	783	1097			
10.750	35.269	226.316	2.525	-11.512		226.15	1.12	9	124	2.027	0.912	1.115	201.04	1.13	-0.01	6	1.73	206.08	3.00E-4	40.3	39.2	77	44	905	1159			
10.950	35.925	279.003	1.568	-11.760		278.83	0.56	10	127	2.068	0.932	1.136	243.60	0.57	-0.01	6	1.46	252.42	3.00E-4	45.4	43.8	85	45	1115	1250			
11.150	36.581	294.753	1.999	-11.767		294.58	0.68	9	124	2.109	0.953	1.156	252.92	0.68	-0.01	6	1.50	264.41	3.00E-4	48.6	46.5	87	45	1178	1281			
11.350	37.238	297.536	2.736	-11.519		297.37	0.92	9	124	2.150	0.973	1.177	250.90	0.93	-0.01	6	1.60	264.58	3.00E-4	50.7	48.1	87	45	1189	1292			
11.550	37.894	283.314	1.987	-11.434		283.15	0.70	9	124	2.191	0.994	1.197	234.74	0.71	-0.01	6	1.53	249.66	3.00E-4	47.3	44.4	84	45	1133	1279			
11.750	38.550	209.986	1.884	-11.392		209.82	0.90	9	124	2.231	1.014	1.217	170.55	0.91	-0.01	6	1.71	182.40	3.00E-4	37.1	34.6	72	43	839	1164			
11.950	39.206	183.887	1.937	-11.095		183.73	1.05	9	124	2.272	1.035	1.237	146.64	1.07	-0.01	6	1.81	157.36	3.00E-4	33.7	31.1	67	43	735	1119			
12.150	39.862	215.229	1.786	-11.356		215.07	0.83	9	124	2.313	1.055	1.258	169.16	0.84	-0.01	6	1.69	183.97	3.00E-4	37.8	34.7	72	43	860	1186			
12.350	40.518	257.335	1.956	-11.491		257.17	0.76	9	124	2.354	1.076	1.278	199.40	0.77	-0.01	6	1.61	219.13	3.00E-4	44.0	40.1	79	44	1029	1266			
12.550	41.175	258.646	1.991	-11.604		258.48	0.77	9	124	2.394	1.096	1.298	197.26	0.78	-0.01	6	1.62	218.50	3.00E-4	44.3	40.0	79	44	1034	1275			
12.750	41.831	251.179	2.087	-11.668		251.01	0.83	9	124	2.435	1.117	1.318	188.54	0.84	-0.01	6	1.65	210.26	3.00E-4	43.6	39.1	78	44	1004	1269			
12.950	42.487	272.739	1.912	-11.696		272.57	0.70	9	124	2.476	1.137	1.339	201.76	0.71	-0.01	6	1.58	226.94	3.00E-4	46.2	41.1	81	44	1090	1311			
13.150	43.143	248.382	2.375	-11.703		248.21	0.96	9	124	2.516	1.158	1.359	180.80	0.97	-0.01	6	1.71	203.82	3.00E-4	44.0	38.8	76	44	993	1277			
13.350	43.799	250.609	1.853	-11.739		250.44	0.74	9	124	2.557	1.178	1.379	179.73	0.75	-0.01	6	1.64	205.20	3.00E-4	43.2	37.9	77	44	1002	1287			
13.550	44.455	272.479	1.828	-11.640		272.31	0.67	9	124	2.598	1.198	1.399	192.73	0.68	-0.01	6	1.58	221.65	3.00E-4	46.2	40.2	80	44	1089	1330			
13.750	45.112	291.546	1.710	-11.470		291.38	0.59	10	127	2.640	1.219	1.421	203.23	0.59	-0.01	6	1.53	235.50	3.00E-4	48.5	41.9	82	44	1166	1367			
13.950	45.768	279.111	1.948	-11.477		278.95	0.70	9	124	2.680	1.239	1.441	191.72	0.71	-0.01	6	1.60	223.73	3.00E-4	47.5	40.7	80	44	1116	1354			
14.150	46.424	255.460	3.457	-11.774		255.29	1.35	9	124	2.721	1.260	1.461	172.84	1.37	-0.01	6	1.83	199.37	3.00E-4	47.2	40.2	75	43	1021	1320			
14.350	47.080	292.943	3.137	-11.562		292.78	1.07	9	124	2.762	1.280	1.482	195.76	1.08	-0.01	6	1.72	229.75	3.00E-4	52.0	44.0	81	44	1171	1388			
14.550	47.736	329.592	3.513	-11.349		329.43	1.07	9	124	2.803	1.301	1.502	217.49	1.08	-0.01	6	1.69	257.81	3.00E-4	57.9	48.6	86	44	1318	1451			
14.750	48.392	121.001	1.707	-11.477		120.84	1.41	8	121	2.842	1.321	1.521	77.58	1.45	-0.02	5	2.10	88.48	3.00E-6	24.7	20.6	50	39	483	1043			
14.950	49.049	30.730	0.924	-11.066		30.57	3.02	5	115	2.880	1.342	1.538	18.00	3.34	-0.08	4	2.82	19.02	3.00E-8	8.8	7.3				1529	1.85	1.20	5.4
15.150	49.705	27.385	0.690	-10.196		27.24	2.53	6	115	2.917	1.362	1.555	15.64	2.84	-0.09	4	2.82	16.53	3.00E-8	7.9	6.5				1362	1.62	1.04	4.7
15.350	50.361	25.446	0.626	-9.884		25.30	2.47	6	115	2.955	1.383	1.572	14.21	2.80	-0.09	4	2.85	15.00	3.00E-8	7.5	6.1				1265	1.49	0.95	4.3

Col 1i	Col 2i	Col 3i	Col 4i	Col 5i	Col 6i	Col 7i	Col 8i	Col 9i	Col 10i	Col 11i	Col 12i	Col 13i	Col 14i	Col 15i	Col 16i	Col 17i	Col 18i	Col 19i	Col 20i	Col 21i	Col 22i	Col 23i	Col 24i	Col 25i	Col 26i	Col 27i	Col 28i	Col 29i
Depth	Depth	qc	fs	u	Other	qt	Rf	SBT	Unit Weight, γ	Total Overburden Stress, σv	Insitu pore pressure, uo	Effective overburden stress, σ'v	Normalized cone resistance, Qtl	Normalized Friction raio, Fr	Normalized pore pressure ratio, Bq	Soil Behavior Type (normalized) SBTn	SBTn Index, Ic	Normalized Cone resistance, Qtn	Estimated permeability, kSBT	SPT N60	SPT (N1)60	Relative Density, Dr	Friction Angle, φ'	Young's modulus, Es	Small strain shear modulus, Go	Undrained shear strength, su	Undrained strength ratio, su/σ'v	Over consolidation ratio, OCR
(m)	(ft)	(tsf)	(tsf)	(psi)		(tsf)	(%)		(pcf)	(tsf)	(tsf)	(tsf)							(ft/sec)	(blows/ft)	(blows/ft)	(%)	(degrees)	(tsf)	(tsf)	(tsf)		
15.550	51.017	25.395	0.605	-9.643		25.26	2.39	6	115	2.993	1.403	1.589	14.01	2.72	-0.09	4	2.85	14.81	3.00E-8	7.4	6.1				1263	1.48	0.93	4.2
15.750	51.673	24.920	0.542	-9.346		24.79	2.19	6	115	3.030	1.424	1.607	13.54	2.49	-0.10	4	2.84	14.35	3.00E-8	7.3	5.9				1239	1.45	0.90	4.1
15.950	52.329	24.422	0.447	-8.659		24.30	1.84	6	115	3.068	1.444	1.624	13.07	2.11	-0.10	4	2.81	13.93	3.00E-8	7.0	5.6				1215	1.42	0.87	3.9
16.150	52.986	23.615	0.503	-7.746		23.50	2.14	6	115	3.105	1.465	1.641	12.43	2.47	-0.10	4	2.87	13.17	3.00E-8	7.0	5.6				1175	1.36	0.83	3.7
16.350	53.642	26.685	0.622	-7.285		26.58	2.34	6	115	3.143	1.485	1.658	14.14	2.65	-0.09	4	2.84	15.05	3.00E-8	7.8	6.2				1329	1.56	0.94	4.2
16.550	54.298	24.365	0.626	-7.038		24.26	2.58	5	115	3.181	1.506	1.675	12.59	2.97	-0.10	3	2.91	13.29	1.00E-9	7.4	5.9				1213	1.41	0.84	3.8
16.750	54.954	24.199	0.638	-6.868		24.10	2.65	5	115	3.218	1.526	1.692	12.34	3.06	-0.10	3	2.93	13.02	1.00E-9	7.4	5.8				1205	1.39	0.82	3.7
16.950	55.610	25.871	0.600	-6.181		25.78	2.33	6	115	3.256	1.546	1.709	13.18	2.66	-0.09	4	2.87	14.04	3.00E-8	7.6	6.0				1289	1.50	0.88	4.0
17.150	56.266	22.469	0.433	-5.112		22.39	1.94	6	115	3.293	1.567	1.726	11.06	2.27	-0.10	4	2.89	11.76	3.00E-8	6.7	5.3				1120	1.27	0.74	3.3
17.350	56.923	28.495	0.540	-4.446		28.43	1.90	6	115	3.331	1.587	1.744	14.40	2.15	-0.08	4	2.78	15.57	3.00E-8	8.0	6.3				1422	1.67	0.96	4.3
17.550	57.579	23.110	0.413	-3.795		23.06	1.79	6	115	3.369	1.608	1.761	11.18	2.10	-0.10	4	2.87	11.95	3.00E-8	6.8	5.3				1153	1.31	0.75	3.4
17.750	58.235	24.797	0.332	-3.016		24.75	1.34	6	115	3.406	1.628	1.778	12.01	1.56	-0.09	4	2.78	13.04	3.00E-8	7.0	5.4				1238	1.42	0.80	3.6
17.950	58.891	28.170	0.373	-1.430		28.15	1.33	6	115	3.444	1.649	1.795	13.76	1.51	-0.07	4	2.72	15.11	3.00E-8	7.7	5.9				1407	1.65	0.92	4.1
18.150	59.547	28.271	0.446	0.028		28.27	1.58	6	115	3.481	1.669	1.812	13.68	1.80	-0.07	4	2.76	14.94	3.00E-8	7.9	6.0				1414	1.65	0.91	4.1
18.350	60.203	28.517	0.515	1.288		28.54	1.80	6	115	3.519	1.690	1.829	13.68	2.06	-0.06	4	2.79	14.88	3.00E-8	8.1	6.1				1427	1.67	0.91	4.1
18.550	60.860	32.006	0.585	3.030		32.05	1.83	6	115	3.557	1.710	1.846	15.43	2.05	-0.05	4	2.75	16.94	3.00E-8	8.8	6.7				1602	1.90	1.03	4.6
18.750	61.516	44.296	0.881	5.721		44.38	1.99	6	115	3.594	1.731	1.863	21.89	2.16	-0.03	4	2.64	24.52	3.00E-8	11.5	8.7				2219	2.72	1.46	6.6
18.950	62.172	51.129	1.118	8.574		51.25	2.18	6	115	3.632	1.751	1.881	25.32	2.35	-0.02	4	2.61	28.57	3.00E-8	13.1	9.8				2563	3.17	1.69	7.6
19.150	62.828	35.984	0.715	14.606		36.19	1.98	6	115	3.669	1.772	1.898	17.14	2.20	-0.02	4	2.73	18.97	3.00E-8	9.8	7.3				1810	2.17	1.14	5.1
19.350	63.484	40.591	0.803	22.854		40.92	1.96	6	115	3.707	1.792	1.915	19.43	2.16	0.00	4	2.68	21.73	3.00E-8	10.8	8.0				2046	2.48	1.30	5.8
19.550	64.140	34.283	0.719	32.058		34.75	2.07	6	115	3.745	1.813	1.932	16.05	2.32	0.02	4	2.76	17.70	3.00E-8	9.6	7.1				1737	2.07	1.07	4.8
19.750	64.797	29.994	0.647	45.900		30.66	2.11	6	115	3.782	1.833	1.949	13.79	2.41	0.05	4	2.83	15.05	3.00E-8	8.7	6.4				1533	1.79	0.92	4.1
19.950	65.453	33.325	0.662	97.223		34.72	1.91	6	115	3.820	1.854	1.966	15.72	2.14	0.17	4	2.75	17.43	3.00E-8	9.2	6.8				1736	2.06	1.05	4.7
20.150	66.109	42.659	0.960	147.251		44.78	2.14	6	115	3.857	1.874	1.983	20.63	2.35	0.21	4	2.68	23.23	3.00E-8	11.4	8.3				2239	2.73	1.38	6.2
20.350	66.765	81.585	1.690	40.024		82.16	2.06	7	118	3.896	1.895	2.001	39.10	2.16	0.01	5	2.44	46.17	3.00E-6	19.3	14.0	36	35	329	1005			
20.550	67.421	45.370	1.026	-0.772		45.36	2.26	6	115	3.934	1.915	2.019	20.52	2.48	-0.05	4	2.69	23.11	3.00E-8	12.2	8.8				2268	2.76	1.37	6.2
20.750	68.077	24.307	0.357	5.218		24.38	1.46	6	115	3.971	1.935	2.036	10.03	1.75	-0.08	4	2.87	10.92	3.00E-8	7.2	5.2				1219	1.36	0.67	3.0
20.950	68.734	26.318	0.431	19.619		26.60	1.62	6	115	4.009	1.956	2.053	11.01	1.91	-0.02	4	2.85	12.04	3.00E-8	7.7	5.5				1330	1.51	0.73	3.3
21.150	69.390	31.868	0.587	60.726		32.74	1.79	6	115	4.046	1.976	2.070	13.86	2.05	0.08	4	2.79	15.39	3.00E-8	9.0	6.4				1637	1.91	0.92	4.2
21.350	70.046	46.451	1.085	89.853		47.75	2.27	6	115	4.084	1.997	2.087	20.92	2.48	0.10	4	2.69	23.73	3.00E-8	12.4	8.9				2387	2.91	1.39	6.3
21.550	70.702	35.199	0.823	37.864		35.74	2.30	6	115	4.121	2.017	2.104	15.03	2.60	0.02	4	2.82	16.63	3.00E-8	10.1	7.2				1787	2.11	1.00	4.5
21.750	71.358	25.568	0.497	82.108		26.75	1.86	6	115	4.159	2.038	2.121	10.65	2.20	0.17	4	2.90	11.59	3.00E-8	7.7	5.4				1338	1.51	0.71	3.2
21.950	72.014	27.010	0.431	125.806		28.82	1.49	6	115	4.197	2.058	2.138	11.52	1.75	0.28	4	2.82	12.77	3.00E-8	7.8	5.5				1441	1.64	0.77	3.5
22.150	72.671	29.857	0.477	164.860		32.23	1.48	7	118	4.235	2.079	2.157	12.98	1.70	0.35	4	2.77	14.57	3.00E-8	8.3	5.8				1612	1.87	0.87	3.9
22.350	73.327	44.123	0.661	88.565		45.40	1.46	7	118	4.274	2.099	2.175	18.91	1.61	0.10	4	2.62	21.95	3.00E-8	11.4	7.9				2270	2.74	1.26	5.7
22.550	73.983	34.377	0.706	39.146		34.94	2.02	6	115	4.312	2.120	2.192	13.97	2.31	0.02	4	2.81	15.57	3.00E-8	9.8	6.8				1747	2.04	0.93	4.2
22.750	74.639	36.511	0.630	60.634		37.38	1.68	7	118	4.350	2.140	2.210	14.95	1.91	0.07	4	2.74	16.93	3.00E-8	10.1	7.0				1869	2.20	1.00	4.5
22.950	75.295	27.370	0.600	67.353		28.34	2.12	6	115	4.388	2.161	2.227	10.75	2.50	0.11	3	2.93	11.71	1.00E-9	8.4	5.8				1417	1.60	0.72	3.2
23.150	75.951	25.078	0.634	103.645		26.57	2.39	6	115	4.425	2.181	2.244	9.87	2.86	0.24	3	2.99	10.60	1.00E-9	8.0	5.5				1329	1.48	0.66	3.0
23.350	76.608	26.722	0.702	119.929		28.45	2.47	6	115	4.463	2.202	2.261	10.61	2.93	0.27	3	2.97	11.45	1.00E-9	8.4	5.7				1422	1.60	0.71	3.2
23.550	77.264	31.169	0.770	153.029		33.37	2.31	6	115	4.501	2.222	2.278	12.67	2.67	0.30	4	2.88	13.97	3.00E-8	9.3	6.3				1669	1.92	0.84	3.8
23.750	77.920	32.589	0.695	151.981		34.78	2.00	6	115	4.538	2.243	2.296	13.17	2.30	0.29	4	2.83	14.71	3.00E-8	9.4	6.4				1739	2.02	0.88	4.0
23.950	78.576	29.771	0.737	142.911		31.83	2.32	6	115	4.576	2.263	2.313	11.78	2.71	0.29	3	2.91	12.92	1.00E-9	9.0	6.1				1591	1.82	0.79	3.5
24.150	79.232	26.318	0.577	143.442		28.38	2.03	6	115	4.613	2.283	2.330	10.20	2.43	0.34	3	2.94	11.13	1.00E-9	8.1	5.5				1419	1.58	0.68	3.1
24.350	79.888	32.899	0.799	150.076		35.06	2.28	6	115	4.651	2.304	2.347	12.96	2.63	0.28	4	2.87	14.38	3.00E-8	9.7	6.5				1753	2.03	0.86	3.9
24.550	80.545	37.051	0.945	157.008		39.31	2.40	6	115	4.689	2.324	2.364	14.65	2.73	0.26	4	2.84	16.40	3.00E-8	10.8	7.2				1966	2.31	0.98	4.4
24.750	81.201	38.608	1.051	146.735		40.72	2.58	6	115	4.726	2.345	2.381	15.12	2.92	0.23	4	2.84	16.92	3.00E-8	11.2	7.5				2036	2.40	1.01	4.5
24.950	81.857	35.696	0.796	153.397		37.90	2.10	6	115	4.764	2.365	2.398	13.82	2.40	0.26	4	2.83	15.55	3.00E-8	10.3	6.8				1895	2.21	0.92	4.1
25.150	82.513	42.803	0.811	152.158		44.99	1.80	7	118	4.802	2.386	2.417	16.63	2.02	0.21	4	2.72	19.25	3.00E-8	11.6	7.7				2250	2.68	1.11	5.0
25.350	83.169	65.294	1.480	100.664		66.74	2.22	7	118	4.841	2.406	2.435	25.43	2.39	0.08	4	2.61	30.25	3.00E-8	16.8	11.1				3337	4.13	1.70	7.6
25.550	83.825	41.585	1.171	21.941		41.90	2.79	6	115	4.879	2.427	2.452	15.10	3.16	-0.02	3	2.86	16.88	1.00E-9	12.3	8.1				2095	2.47	1.01	4.5
25.750	84.482	42.753	1.136	132.985		44.67	2.54	6	115	4.916	2.447	2.469	16.10	2.86	0.18	4	2.82	18.24	3.00E-8	12.3	8.0				2233	2.65	1.07	4.8
25.950	85.138	61.430	1.443	271.797		65.34	2.21	7	118	4.955	2.468	2.487	24.28	2.39	0.28	4	2.63	28.90	3.00E-8	15.9	10.4				3267	4.03	1.62	7.3
26.150	85.794	57.408	1.414	253.169		61.05	2.32	6	115	4.992	2.488	2.504	22.39	2.52	0.28	4	2.67	26.40	3.00E-8	15.2	9.9				3053	3.74	1.49	6.7
26.350	86.450	46.711	1.310	158.339		48.99	2.67	6	115	5.030	2.509	2.521	17.44	2.98	0.20	4	2.80	19.90	3.00E-8	13.3	8.6				2450	2.93	1.16	5.2
26.550	87.106	88.030	2.222	59.048		88.88	2.50	7	118	5.069	2.529	2.539	33.00	2.65	0.02	4	2.55	40.25	3.00E-8	22.0	14.2				4444	5.59	2.20	9.9
26.750	87.762	81.304	2.472	-1.097		81.29	3.04	6	115	5.106	2.550	2.557	29.80	3.24	-0.03	4	2.64	35.53	3.00E-8	21.2	13.7				4064	5.08	1.99	8.9
26.950	88.419	39.538	1.133	-1.607		39.51	2.87	6	115	5.144	2.570	2.574	13.35	3.30	-0.08	3	2.92	14.81	1.00E-9	12.0	7.7				1976	2.29	0.89	4.0
27.150	89.075	30.607	0.698	5.430		30.69	2.27	6	115	5.181	2.591	2.591	9.84	2.74	-0.09	3	2.98	10.75	1.00E-9	9.7	6.2				1534	1.70	0.66	3.0
27.350	89.731	40.980	0.909	18.012		41.24	2.20	6	115	5.219	2.611	2.608	13.81	2.52	-0.04	4	2.84	15.68	3.00E-8	11.9	7.6				2062	2.40	0.92	4.1
27.550	90.387	45.348	1.064	35.131		45.85	2.32	6	115	5.257	2.632	2.625	15.47	2.62	0.00	4	2.81	17.72	3.00E-8	12.9	8.2				2293	2.71	1.03	4.6
27.750	91.043	48.433	1.319	44.611		49.08	2.69	6	115	5.294	2.652	2.642	16.57	3.01	0.01	4	2.82	18.94	3.00E-8	13.9	8.8				2454	2.92	1.10	5.0
27.950	91.699	47.114	1.438	54.254		47.90	3.00	6	115	5.332	2.672	2.659	16.01	3.38	0.03	3	2.86	18.10	1.00E-9	13.9	8.7				2395	2.84	1.07	4.8
28.150	92.356	45.824	1.337	28.441		46.23	2.89	6	115	5.369	2.693	2.676	15.27	3.27	-0.02	3	2.87	17.24	1.00E-9	13.5	8.5				2312	2.72	1.02	4.6
28.350	93.012	35.703	1.184	31.974		36.16	3.27	5	115	5.407	2.713	2.694	11.42	3.85	-0.01	3	3.01	12.40	1.00E-9	11.5	7.2				1808	2.05	0.76	3.4
28.550	93.668	30.052	0.911	30.062		30.48	2.99	5	115	5.445	2.734	2.711	9.24	3.64	-0.02	3	3.07	9.87	1.00E-9	10.1	6.3				1524	1.67	0.62	2.8
28.750	94.324	46.848	1.180	24.242		47.20	2.50	6	115	5.482	2.754	2.728	15.29	2.83	-0.02	4	2.83	17.50	3.00E-8	13.5	8.4				2360	2.78	1.02	4.6
28.950	94.980	34.219	0.748	9.140		34.35	2.18	6	115	5.520	2.775	2.745	10.50	2.60	-0.07	3	2.94	11.65	1.00E-9	10.6	6.6				1718	1.92	0.70	3.2
29.150	95.636	35.184	0.636	30.841		35.63	1.78	6	115	5.557	2.795	2.762	10.89	2.11	-0.02	4	2.88	12.30	3.00E-8	10.1	6.5				1781	2.00	0.73	3.3
29.350	96.293	51.757	1.124	63.204		52.67	2.13	6	115	5.595	2.816	2.779	16.94	2.39	0.04	4	2.75	19.89	3.00E-8	14.3	8.8				2633	3.14	1.13	5.1
29.550	96.949	98.770	2.777	25.361		99.14	2.80	6	115	5.633	2.836	2.796	33.44	2.97	-0.01	4	2.58	41.34	3.00E-8	25.0	15.4				4957	6.23	2.23	10.0
29.750	97.605	81.578	2.497	14.712		81.79	3.05	6	115	5.670	2.857	2.813	27.06	3.28	-0.02	4	2.68	32.55	3.00E-8	21.7	13.3				4089	5.07	1.80	8.1
29.950	98.261	40.295	0.989	44.165		40.93	2.42	6	115	5.708	2.877	2.831	12.44	2.81	0.01	3	2.90	14.02	1.00E-9	12.1	7.4				2047	2.35	0.83	3.7
30.150	98.917	32.805	0.716	116.255		34.48	2.08	6	115	5.745	2.898	2.848	10.09	2.49	0.19	3	2.95	11.22	1.00E-9	10.2	6.2				1724	1.92	0.67	3.0

GREGG DRILLING & TESTING, INC.

CONE PENETRATION TEST DATA

Client:	PARIKH CONSULTANTS	Units:	Imperial
Site:	I-880 WIDENING	Data averaging interval:	0.200 meters
Engineer:	G.PARIKH	Assumed depth of water:	6.044 feet
Sounding:	CPT-02	Net area ratio of cone:	0.80
Date:	7/1/2008	Unit weight of water:	62.4 lb/ft3
Time:	9:54 AM	Relative density constant, CDR:	350
		Young's modulus for sands, a:	4
		Small strain shear modulus number, SG (sands):	180
		Small strain shear modulus number, CG (clays):	50
		Nkt for clays:	15
		OCR number, kocr:	0.3

Interpretation based on Lunne, Robertson and Powell, 1997

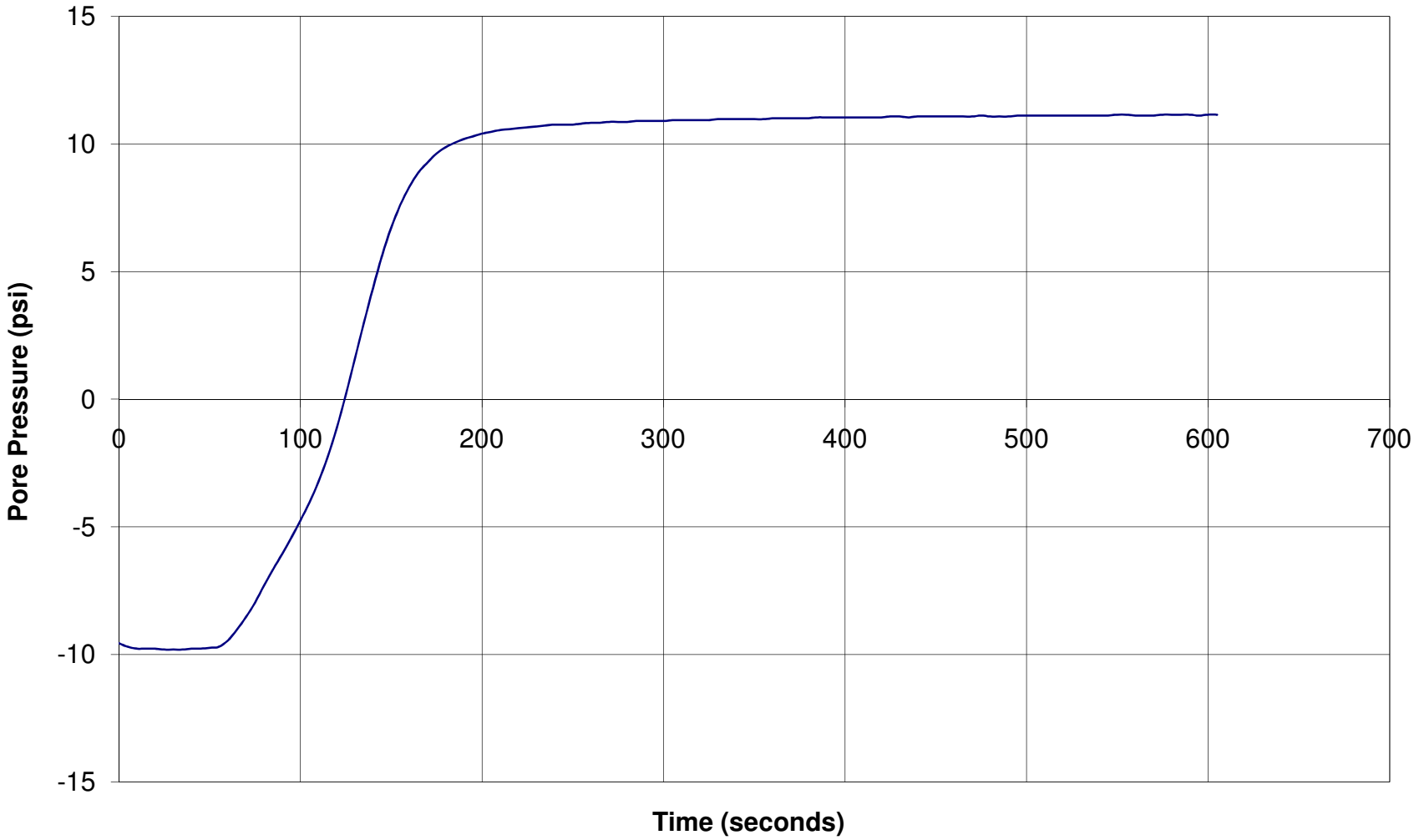
Col 1i	Col 2i	Col 3i	Col 4i	Col 5i	Col 6i	Col 7i	Col 8i	Col 9i	Col 10i	Col 11i	Col 12i	Col 13i	Col 14i	Col 15i	Col 16i	Col 17i	Col 18i	Col 19i	Col 20i	Col 21i	Col 22i	Col 23i	Col 24i	Col 25i	Col 26i	Col 27i	Col 28i	Col 29i
Depth (m)	Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf (%)	SBT	Unit Weight, γ (pcf)	Total Overburden Stress, σv (tsf)	Insitu pore pressure, uo (tsf)	Effective overburden stress, σ'v (tsf)	Normalized cone resistance, Qtl	Normalized Friction raio, Fr	Normalized pore pressure ratio, Bq	Soil Behavior Type (normalized) SBTn	SBTn Index, Ic	Normalized Cone resistance, Qtn	Estimated permeability, kSBT (ft/sec)	SPT N60 (blows/ft)	SPT (N1)60 (blows/ft)	Relative Density, Dr (%)	Friction Angle, φ' (degrees)	Young's modulus, Es (tsf)	Small strain shear modulus, Go (tsf)	Undrained shear strength, su (tsf)	Undrained strength ratio, su/σ'v	Over consolidation ratio, OCR
0.150	0.492	0.000	0.000	0.000							0.000																	
0.350	1.148	0.000	0.000	0.000							0.000																	
0.550	1.804	0.000	0.000	0.000							0.000																	
0.750	2.461	0.000	0.000	0.000							0.000																	
0.950	3.117	0.000	0.000	0.000							0.000																	
1.150	3.773	0.000	0.000	0.000							0.000																	
1.350	4.429	0.000	0.000	0.000							0.000																	
1.550	5.085	7.497	0.559	0.772		7.51	7.45	3	111	0.283	0.000	0.283	25.51	7.74	0.01	3	2.95	22.15	1.00E-9	2.3	4.5				375	0.48	1.70	7.7
1.750	5.741	11.966	0.758	0.630		11.98	6.33	3	111	0.320	0.000	0.320	36.45	6.50	0.00	3	2.79	30.26	1.00E-9	3.4	6.1				599	0.78	2.43	10.9
1.950	6.398	11.339	0.631	-0.991		11.32	5.57	3	111	0.356	0.011	0.345	31.76	5.75	-0.01	3	2.79	26.72	1.00E-9	3.2	5.6				566	0.73	2.12	9.5
2.150	7.054	11.916	0.522	-0.425		11.91	4.38	3	111	0.393	0.032	0.361	31.87	4.53	-0.01	4	2.72	26.36	3.00E-8	3.2	5.5				595	0.77	2.12	9.6
2.350	7.710	10.661	0.419	0.333		10.67	3.93	3	111	0.429	0.052	0.377	27.12	4.10	0.00	4	2.74	22.76	3.00E-8	2.9	4.9				533	0.68	1.81	8.1
2.550	8.366	7.252	0.339	2.223		7.28	4.65	3	111	0.466	0.072	0.394	17.32	4.97	0.01	3	2.94	15.54	1.00E-9	2.2	3.7				364	0.45	1.15	5.2
2.750	9.022	7.475	0.404	3.413		7.52	5.37	3	111	0.503	0.093	0.410	17.14	5.76	0.02	3	2.99	15.65	1.00E-9	2.4	3.8				376	0.47	1.14	5.1
2.950	9.678	7.648	0.454	2.209		7.68	5.91	3	111	0.539	0.113	0.426	16.77	6.36	0.01	3	3.02	15.52	1.00E-9	2.5	3.9				384	0.48	1.12	5.0
3.150	10.335	7.094	0.437	1.048		7.11	6.15	3	111	0.576	0.134	0.442	14.79	6.69	-0.01	3	3.08	13.93	1.00E-9	2.4	3.7				355	0.44	0.99	4.4
3.350	10.991	5.421	0.420	-1.501		5.40	7.78	3	111	0.612	0.154	0.458	10.46	8.78	-0.05	3	3.27	10.36	1.00E-9	2.1	3.2				270	0.32	0.70	3.1
3.550	11.647	5.897	0.355	-2.669		5.86	6.06	3	111	0.649	0.175	0.474	10.99	6.81	-0.07	3	3.18	10.66	1.00E-9	2.1	3.2				293	0.35	0.73	3.3
3.750	12.303	10.222	0.466	-1.437		10.20	4.57	3	111	0.685	0.195	0.490	19.42	4.90	-0.03	3	2.90	17.68	1.00E-9	3.1	4.5				510	0.63	1.29	5.8
3.950	12.959	9.414	0.514	-1.190		9.40	5.47	3	111	0.722	0.216	0.506	17.14	5.92	-0.03	3	3.00	16.00	1.00E-9	3.0	4.3				470	0.58	1.14	5.1
4.150	13.615	9.327	0.599	-2.464		9.29	6.45	3	111	0.758	0.236	0.522	16.34	7.02	-0.05	3	3.06	15.51	1.00E-9	3.1	4.4				465	0.57	1.09	4.9
4.350	14.272	7.461	0.488	-2.761		7.42	6.57	3	111	0.795	0.257	0.538	12.31	7.36	-0.07	3	3.17	11.96	1.00E-9	2.7	3.7				371	0.44	0.82	3.7
4.550	14.928	3.767	0.318	-3.123		3.72	8.54	2	80	0.821	0.277	0.544	5.33	10.96	-0.17	2	3.55	5.33	3.00E-7	1.8	2.6				186	0.19	0.36	1.6
4.750	15.584	2.386	0.124	-3.328		2.34	5.30	3	111	0.858	0.298	0.560	2.64	8.36	-0.36	2	3.73	2.64	3.00E-7	1.4	1.9				117	0.10	0.18	0.8
4.950	16.240	3.619	0.065	-2.358		3.58	1.82	1	111	0.894	0.318	0.576	4.67	2.42	-0.18	3	3.23	4.60	1.00E-9	1.3	1.8				179	0.18	0.31	1.4
5.150	16.896	3.556	0.051	-0.559		3.55	1.44	1	111	0.931	0.339	0.592	4.42	1.96	-0.14	3	3.20	4.34	1.00E-9	1.3	1.7				177	0.17	0.29	1.3
5.350	17.552	5.176	0.048	2.414		5.21	0.93	1	111	0.967	0.359	0.608	6.98	1.14	-0.04	4	2.92	6.54	3.00E-8	1.6	2.1				261	0.28	0.47	2.1
5.550	18.209	9.097	0.130	6.719		9.19	1.42	5	115	1.005	0.380	0.625	13.10	1.59	0.01	4	2.75	11.99	3.00E-8	2.5	3.3				460	0.55	0.87	3.9
5.750	18.865	7.584	0.145	15.180		7.80	1.86	5	115	1.042	0.400	0.642	10.52	2.15	0.10	4	2.90	9.90	3.00E-8	2.3	2.9				390	0.45	0.70	3.2
5.950	19.521	9.587	0.193	27.725		9.99	1.94	5	115	1.080	0.420	0.660	13.50	2.17	0.18	4	2.81	12.59	3.00E-8	2.7	3.5				499	0.59	0.90	4.1
6.150	20.177	36.244	0.437	8.624		36.37	1.20	7	118	1.119	0.441	0.678	52.01	1.24	0.01	5	2.19	44.81	3.00E-6	7.7	9.6	36	37	145	534			
6.350	20.833	21.162	0.298	-5.770		21.08	1.41	6	115	1.156	0.461	0.695	28.67	1.50	-0.04	5	2.45	25.73	3.00E-6	5.0	6.2	27	33	84	449			
6.550	21.490	54.013	0.471	-2.556		53.98	0.87	8	121	1.196	0.482	0.714	73.92	0.89	-0.01	6	1.98	63.23	3.00E-4	10.6	12.9	43	39	216	620			
6.750	22.146	108.624	0.812	-8.744		108.50	0.75	9	124	1.237	0.502	0.734	146.07	0.76	-0.01	6	1.71	122.58	3.00E-4	19.2	23.0	59	43	434	789			
6.950	22.802	132.167	1.050	-10.160		132.02	0.80	9	124	1.277	0.523	0.755	173.27	0.80	-0.01	6	1.67	146.74	3.00E-4	23.1	27.3	65	43	528	850			
7.150	23.458	171.057	0.805	-10.663		170.90	0.47	9	124	1.318	0.543	0.775	218.87	0.47	-0.01	6	1.44	187.30	3.00E-4	27.7	32.4	73	45	684	935			
7.350	24.114	203.502	0.598	-10.875		203.35	0.29	9	124	1.359	0.564	0.795	254.05	0.30	-0.01	7	1.27	220.22	3.00E-2	31.3	36.1	79	45	813	999			
7.550	24.770	209.564	0.684	-11.052		209.41	0.33	9	124	1.400	0.584	0.815	255.12	0.33	-0.01	7	1.29	223.95	3.00E-2	32.4	36.9	80	45	838	1018			
7.750	25.427	231.175	1.136	-10.635		231.02	0.49	9	124	1.440	0.605	0.836	274.76	0.49	-0.01	6	1.38	244.16	3.00E-4	36.7	41.3	84	46	924	1060			
7.950	26.083	228.147	0.961	-11.675		227.98	0.42	9	124	1.481	0.625	0.856	264.65	0.42	-0.01	6	1.35	238.02	3.00E-4	35.9	39.9	82	45	912	1064			
8.150	26.739	190.779	0.566	-12.008		190.61	0.30	9	124	1.522	0.646	0.876	215.83	0.30	-0.01	7	1.33	196.39	3.00E-2	29.9	32.8	75	44	762	1010			
8.350	27.395	112.776	0.519	-12.263		112.60	0.46	9	124	1.562	0.666	0.896	123.88	0.47	-0.01	6	1.64	114.02	3.00E-4	19.5	21.2	57	42	450	854			
8.550	28.051	24.581	0.725	-11.498		24.42	2.97	5	115	1.600	0.687	0.913	24.98	3.18	-0.07	4	2.69	24.31	3.00E-8	6.6	7.1				1221	1.52	1.67	7.5
8.750	28.707	8.434	0.156	-6.811		8.34	1.87	5	115	1.638	0.707	0.931	7.20	2.33	-0.18	3	3.06	7.13	1.00E-9	2.8	3.0				417	0.45	0.48	2.2
8.950	29.364	7.605	0.169	-4.241		7.54	2.23	4	115	1.675	0.728	0.948	6.19	2.87	-0.18	3	3.16	6.16	1.00E-9	2.7	2.9				377	0.39	0.41	1.9
9.150	30.020	7.540	0.211	-2.768		7.50	2.82	4	115	1.713	0.748	0.965	6.00	3.65	-0.16	3	3.23	5.99	1.00E-9	2.8	2.9				375	0.39	0.40	1.8
9.350	30.676	15.397	0.436	-0.481		15.39	2.84	5	115	1.750	0.769	0.982	13.89	3.20	-0.06	3	2.90	13.76	1.00E-9	4.6	4.8				770	0.91	0.93	4.2
9.550	31.332	31.753	1.019	4.213		31.81	3.20	5	115	1.788	0.789	0.999	30.05	3.40	-0.02	4	2.65	29.72	3.00E-8	8.3	8.6				1591	2.00	2.00	9.0
9.750	31.988	55.188	1.574	-1.459		55.17	2.85	6	115	1.826	0.809	1.016	52.49	2.95	-0.02	5	2.43	51.94	3.00E-6	13.0	13.3	39	37	221	702			
9.950	32.644	69.079	1.613	-3.611		69.03	2.34	7	118	1.864	0.830	1.034	64.93	2.40	-0.02	5	2.30	64.49	3.00E-6	15.4	15.6	43	38	276	761			
10.150	33.301	114.550	2.077	-9.275		114.42	1.82	7	118	1.903	0.850	1.053	106.90	1.85	-0.01	5	2.07	106.69	3.00E-6	23.2	23.2	55	41	458	906			
10.350	33.957	182.886	1.477	-10.238		182.74	0.81	9	124	1.944	0.871	1.073	168.53	0.82	-0.01	6	1.68	169.67	3.00E-4	32.1	31.8	70	43	731	1066			
10.550	34.613	252.137	1.127	-10.259		251.99	0.45	10	127	1.985	0.891	1.094	228.51	0.45	-0.01	6	1.41	232.36	3.00E-4	40.5	39.8	81	45	1008	1194			
10.750	35.269	253.817	1.907	-10.663		253.66	0.75	9	124	2.026	0.912	1.114	225.82	0.76	-0.01	6	1.57	231.74	3.00E-4	42.8	41.7	81	45	1015	1204			
10.950	35.925	276.646	2.257	-11.704		276.48	0.82	9	124	2.067	0.932	1.135	241.86	0.82	-0.01	6	1.57	250.45	3.00E-4	46.7	45.1	85	45	1106	1246			
11.150	36.581	310.223	1.730	-12.064		310.05	0.56	10	127	2.109	0.953	1.156	266.41	0.56	-0.01	6	1.43	278.45	3.00E-4	50.0	47.8	89	45	1240	1303			
11.350	37.238	495.732	2.446	47.231		496.41	0.49	10	127	2.150	0.973	1.177	419.87	0.49	0.00	7	1.25	442.87	3.00E-2	75.6	71.7	112	47	1986	1533			
11.550	37.894	528.149	4.302	-10.266		528.00	0.81	10	127	2.192	0.994	1.198	438.73	0.82	0.00	6	1.40	466.93	3.00E-4	84.5	79.4	116	48	2112	1575			
11.750	38.550	438.995	4.017	-11.328		438.83	0.92	10	127	2.234	1.014	1.220	357.93	0.92	0.00	6	1.50	384.31	3.00E-4	72.4	67.4	105	47	1755	1489			
11.950	39.206	351.383	1.793	-12.015		351.21	0.51	10	127	2.276	1.035	1.241	281.16	0.51	-0.01	6	1.38	304.50	3.00E-4	55.8	51.6	93	46	1405	1391			
12.150	39.862	279.327	0.751	-12.440		279.15	0.27	10	127	2.318	1.055	1.262	219.29	0.27	-0.01	7	1.30	239.53	3.00E-2	43.3	39.7	83	45	1117	1296			
12.350	40.518	141.920	1.521	-12.737		141.74	1.07	9	124	2.358	1.076	1.283	108.67	1.09	-0.01	6	1.91	117.81	3.00E-4	27.0	24.5	58	41	567	1039			
12.550	41.175	46.228	1.594	-12.135		46.05	3.46	5	115	2.396	1.096	1.300	33.59	3.65	-0.05	4	2.64	35.01	3.00E-8	12.0	10.9				2303	2.91	2.24	10.1
12.750	41.831	117.484	2.257	-11.796		117.31	1.92	7	118	2.434	1.117	1.318	87.17	1.96	-0.02	5	2.15	94.06	3.00E-6	24.5	22.0	52	40	469	984			
12.950	42.487	55.159	0.951	-5.558		55.08	1.73	7	118	2.473	1.137	1.336	39.37	1.81	-0.03	5	2.39	41.99	3.00E-6	12.7	11.3	35	35	220	769			
13.150	43.143	15.037	0.498	3.016		15.08	3.30	4	115	2.511	1.158	1.353	9.29	3.96	-0.07	3	3.09	9.44	1.00E-9	5.1	4.5				754	0.84	0.62	2.8
13.350	43.799	16.637	0.556	7.052		16.74	3.32	5	115	2.548	1.178	1.370	10.36	3.92	-0.05	3	3.05	10.56	1.00E-9	5.5	4.8				837	0.95	0.69	3.1
13.550	44.455	17.567	0.685	12.397		17.75	3.86	4	115	2.586	1.198	1.387	10.93	4.52	-0.02	3	3.07	11.14	1.00E-9	5.9	5.1				887	1.01	0.73	3.3
13.750	45.112	19.564	0.750	19.527		19.84	3.78	4	115	2.623	1.219	1.405	12.26	4.35	0.01	3	3.02	12.56	1.00E-9	6.3	5.5				992	1.15	0.82	3.7
13.950	45.768	20.955	0.806	30.876		21.40	3.76	4	115	2.661	1.239	1.422	13.18	4.30	0.05	3	2.99	13.55	1.00E-9	6.7	5.8				1070	1.25	0.88	4.0
14.150	46.424	15.239	0.629	35.181		15.75	3.99	4	115	2.699	1.260	1.439	9.07	4.82	0.10	3	3.15	9.20	1.00E-9	5.4	4.6				787	0.87	0.60	2.7
14.350	47.080	14.403	0.376	46.636		15.07	2.50	5	115	2.736	1.280	1.456	8.47	3.05	0.17	3	3.06	8.68	1.00E-9	4.8	4.1				754	0.82	0.56	2.5
14.550	47.736	15.311	0.382	65.420		16.25	2.35	5	115	2.774	1.301	1.473	9.15	2.84	0.25	3	3.02	9.42	1.00E-9	4.9	4.2				813	0.90	0.61	2.7
14.750	48.392	20.970	0.583	69.633		21.97	2.65	5	115	2.811	1.321	1.490	12.86	3.04	0.19	3	2.91	13.39	1.00E-9	6.4	5.4				1099	1.28	0.86	3.9
14.950	49.049	27.436	0.765	69.463		28.44	2.69	6	115	2.849	1.342	1.507	16.98	2.99	0.14	4	2.81	17.90	3.00E-8	7.8	6.6				1422	1.71	1.13	5.1
15.150	49.705	22.368	0.606	56.598		23.18	2.61	5	115	2.887	1.362	1.524	13.31	2.99	0.13	3	2.89	13.93	1.00E-9	6.7	5.6				1159	1.35	0.89	4.0
15.350	50.361	12.536	0.398	88.657		13.81	2.88	5	115	2.924	1.383	1.542	7.06	3.66	0.46	3	3.17	7.17	1.00E-9	4.5	3.7				691	0.73	0.47	2.1

Col 1i	Col 2i	Col 3i	Col 4i	Col 5i	Col 6i	Col 7i	Col 8i	Col 9i	Col 10i	Col 11i	Col 12i	Col 13i	Col 14i	Col 15i	Col 16i	Col 17i	Col 18i	Col 19i	Col 20i	Col 21i	Col 22i	Col 23i	Col 24i	Col 25i	Col 26i	Col 27i	Col 28i	Col 29i
Depth	Depth	qc	fs	u	Other	qt	Rf	SBT	Unit Weight, γ	Total Overburden Stress, σv	Insitu pore pressure, uo	Effective overburden stress, σ'v	Normalized cone resistance, Qtl	Normalized Friction raio, Fr	Normalized pore pressure ratio, Bq	Soil Behavior Type (normalized) SBTn	SBTn Index, Ic	Normalized Cone resistance, Qtn	Estimated permeability, kSBT	SPT N60	SPT (N1)60	Relative Density, Dr	Friction Angle, φ'	Young's modulus, Es	Small strain shear modulus, Go	Undrained shear strength, su	Undrained strength ratio, su/σ'v	Over consolidation ratio, OCR
(m)	(ft)	(tsf)	(tsf)	(psi)		(tsf)	(%)		(pcf)	(tsf)	(tsf)	(tsf)							(ft/sec)	(blows/ft)	(blows/ft)	(%)	(degrees)	(tsf)	(tsf)	(tsf)		
15.550	51.017	11.771	0.356	108.021		13.33	2.67	5	115	2.962	1.403	1.559	6.65	3.43	0.61	3	3.18	6.75	1.00E-9	4.2	3.5				666	0.69	0.44	2.0
15.750	51.673	11.101	0.420	104.467		12.61	3.33	4	115	2.999	1.424	1.576	6.10	4.37	0.63	3	3.27	6.13	1.00E-9	4.3	3.5				630	0.64	0.41	1.8
15.950	52.329	10.301	0.399	116.630		11.98	3.33	4	115	3.037	1.444	1.593	5.61	4.47	0.78	3	3.30	5.61	1.00E-9	4.1	3.3				599	0.60	0.37	1.7
16.150	52.986	14.165	0.458	124.361		15.96	2.87	5	115	3.075	1.465	1.610	8.00	3.55	0.58	3	3.12	8.19	1.00E-9	4.9	4.0				798	0.86	0.53	2.4
16.350	53.642	17.517	0.503	116.205		19.19	2.62	5	115	3.112	1.485	1.627	9.88	3.13	0.43	3	3.01	10.26	1.00E-9	5.6	4.5				960	1.07	0.66	3.0
16.550	54.298	23.514	0.630	121.912		25.27	2.49	6	115	3.150	1.506	1.644	13.45	2.85	0.33	3	2.88	14.24	1.00E-9	7.0	5.6				1263	1.47	0.90	4.0
16.750	54.954	20.523	0.571	110.612		22.12	2.58	5	115	3.187	1.526	1.661	11.39	3.02	0.34	3	2.95	11.95	1.00E-9	6.4	5.1				1106	1.26	0.76	3.4
16.950	55.610	13.098	0.404	134.734		15.04	2.69	5	115	3.225	1.546	1.679	7.04	3.42	0.69	3	3.16	7.19	1.00E-9	4.6	3.7				752	0.79	0.47	2.1
17.150	56.266	17.625	0.524	107.539		19.17	2.73	5	115	3.263	1.567	1.696	9.38	3.29	0.39	3	3.04	9.74	1.00E-9	5.8	4.6				959	1.06	0.63	2.8
17.350	56.923	24.307	0.753	144.802		26.39	2.85	5	115	3.300	1.587	1.713	13.48	3.26	0.38	3	2.91	14.27	1.00E-9	7.4	5.8				1320	1.54	0.90	4.0
17.550	57.579	30.196	0.811	164.095		32.56	2.49	6	115	3.338	1.608	1.730	16.89	2.78	0.35	4	2.79	18.22	3.00E-8	8.5	6.7				1628	1.95	1.13	5.1
17.750	58.235	25.914	0.814	113.501		27.55	2.96	5	115	3.375	1.628	1.747	13.84	3.37	0.27	3	2.91	14.68	1.00E-9	7.9	6.1				1377	1.61	0.92	4.2
17.950	58.891	15.585	0.650	71.417		16.61	3.91	4	115	3.413	1.649	1.764	7.48	4.92	0.26	3	3.22	7.58	1.00E-9	5.8	4.5				831	0.88	0.50	2.2
18.150	59.547	14.215	0.489	113.302		15.85	3.08	5	115	3.451	1.669	1.781	6.96	3.94	0.52	3	3.19	7.08	1.00E-9	5.2	4.0				792	0.83	0.46	2.1
18.350	60.203	19.067	0.422	147.570		21.19	1.99	6	115	3.488	1.690	1.798	9.84	2.38	0.50	3	2.95	10.42	1.00E-9	5.9	4.5				1060	1.18	0.66	3.0
18.550	60.860	19.456	0.480	168.839		21.89	2.19	6	115	3.526	1.710	1.815	10.11	2.61	0.57	3	2.96	10.70	1.00E-9	6.1	4.6				1094	1.22	0.67	3.0
18.750	61.516	20.227	0.464	160.158		22.53	2.06	6	115	3.563	1.731	1.833	10.35	2.45	0.52	3	2.93	11.01	1.00E-9	6.2	4.7				1127	1.26	0.69	3.1
18.950	62.172	23.276	0.557	156.484		25.53	2.18	6	115	3.601	1.751	1.850	11.86	2.54	0.43	3	2.90	12.70	1.00E-9	7.0	5.3				1276	1.46	0.79	3.6
19.150	62.828	28.560	0.682	133.445		30.48	2.24	6	115	3.639	1.772	1.867	14.38	2.54	0.29	4	2.83	15.61	3.00E-8	8.2	6.2				1524	1.79	0.96	4.3
19.350	63.484	34.615	0.963	123.668		36.40	2.65	6	115	3.676	1.792	1.884	17.37	2.94	0.22	4	2.80	18.97	3.00E-8	9.8	7.4				1820	2.18	1.16	5.2
19.550	64.140	39.741	1.253	104.233		41.24	3.04	6	115	3.714	1.813	1.901	19.74	3.34	0.15	4	2.79	21.63	3.00E-8	11.2	8.4				2062	2.50	1.32	5.9
19.750	64.797	44.491	1.735	78.213		45.62	3.80	5	115	3.751	1.833	1.918	21.83	4.14	0.09	3	2.81	23.83	1.00E-9	12.7	9.5				2281	2.79	1.46	6.5
19.950	65.453	194.225	2.013	21.686		194.54	1.03	9	124	3.792	1.854	1.938	98.40	1.06	0.00	6	1.93	126.34	3.00E-4	37.2	27.5	60	41	778	1325			
20.150	66.109	122.306	1.778	-8.390		122.19	1.46	8	121	3.832	1.874	1.958	60.46	1.50	-0.02	5	2.19	74.27	3.00E-6	26.0	19.1	46	38	489	1139			
20.350	66.765	19.636	0.766	-5.324		19.56	3.92	4	115	3.869	1.895	1.975	7.95	4.88	-0.15	3	3.20	8.10	1.00E-9	7.2	5.3				978	1.05	0.53	2.4
20.550	67.421	15.412	0.522	-0.984		15.40	3.39	4	115	3.907	1.915	1.992	5.77	4.54	-0.17	3	3.30	5.78	1.00E-9	6.0	4.4				770	0.77	0.38	1.7
20.750	68.077	17.567	0.497	1.784		17.59	2.82	5	115	3.944	1.935	2.009	6.79	3.64	-0.13	3	3.18	6.96	1.00E-9	6.3	4.6				880	0.91	0.45	2.0
20.950	68.734	19.312	0.515	8.142		19.43	2.65	5	115	3.982	1.956	2.026	7.62	3.33	-0.09	3	3.12	7.91	1.00E-9	6.7	4.8				971	1.03	0.51	2.3
21.150	69.390	19.513	0.516	17.275		19.76	2.61	5	115	4.020	1.976	2.043	7.70	3.28	-0.05	3	3.11	8.01	1.00E-9	6.7	4.8				988	1.05	0.51	2.3
21.350	70.046	20.141	0.570	39.223		20.71	2.75	5	115	4.057	1.997	2.060	8.08	3.42	0.05	3	3.11	8.41	1.00E-9	6.9	4.9				1035	1.11	0.54	2.4
21.550	70.702	19.521	0.633	68.592		20.51	3.09	5	115	4.095	2.017	2.078	7.90	3.86	0.18	3	3.14	8.17	1.00E-9	6.9	4.9				1025	1.09	0.53	2.4
21.750	71.358	20.869	0.750	79.707		22.02	3.41	5	115	4.132	2.038	2.095	8.54	4.19	0.21	3	3.14	8.84	1.00E-9	7.3	5.2				1101	1.19	0.57	2.6
21.950	72.014	17.848	0.634	90.229		19.15	3.31	5	115	4.170	2.058	2.112	7.09	4.23	0.30	3	3.20	7.24	1.00E-9	6.5	4.6				957	1.00	0.47	2.1
22.150	72.671	18.958	0.474	117.628		20.65	2.30	6	115	4.208	2.079	2.129	7.72	2.88	0.39	3	3.08	8.10	1.00E-9	6.4	4.5				1033	1.10	0.51	2.3
22.350	73.327	16.162	0.429	142.133		18.21	2.36	5	115	4.245	2.099	2.146	6.51	3.07	0.58	3	3.16	6.71	1.00E-9	5.7	4.0				910	0.93	0.43	2.0
22.550	73.983	15.909	0.524	156.951		18.17	2.88	5	115	4.283	2.120	2.163	6.42	3.77	0.66	3	3.21	6.55	1.00E-9	5.9	4.1				908	0.93	0.43	1.9
22.750	74.639	15.527	0.518	148.285		17.66	2.93	5	115	4.320	2.140	2.180	6.12	3.88	0.64	3	3.24	6.21	1.00E-9	5.8	4.1				883	0.89	0.41	1.8
22.950	75.295	18.252	0.427	174.588		20.77	2.06	6	115	4.358	2.161	2.197	7.47	2.60	0.63	3	3.07	7.87	1.00E-9	6.1	4.2				1038	1.09	0.50	2.2
23.150	75.951	22.347	0.425	216.572		25.47	1.67	6	115	4.396	2.181	2.214	9.51	2.02	0.64	3	2.92	10.36	1.00E-9	6.8	4.7				1273	1.40	0.63	2.9
23.350	76.608	31.011	0.654	218.484		34.16	1.91	6	115	4.433	2.202	2.232	13.32	2.20	0.46	4	2.82	14.86	3.00E-8	8.9	6.1				1708	1.98	0.89	4.0
23.550	77.264	34.896	0.932	230.308		38.21	2.44	6	115	4.471	2.222	2.249	15.00	2.76	0.43	4	2.83	16.70	3.00E-8	10.1	6.9				1911	2.25	1.00	4.5
23.750	77.920	38.161	1.106	99.248		39.59	2.79	6	115	4.508	2.243	2.266	15.48	3.15	0.14	3	2.86	17.16	1.00E-9	11.2	7.6				1980	2.34	1.03	4.6
23.950	78.576	35.826	1.175	82.341		37.01	3.18	5	115	4.546	2.263	2.283	14.22	3.62	0.11	3	2.92	15.54	1.00E-9	10.9	7.4				1851	2.16	0.95	4.3
24.150	79.232	36.122	1.172	98.909		37.55	3.12	5	115	4.584	2.283	2.300	14.33	3.55	0.15	3	2.91	15.71	1.00E-9	11.0	7.4				1877	2.20	0.96	4.3
24.350	79.888	33.700	1.275	126.372		35.52	3.59	5	115	4.621	2.304	2.317	13.33	4.13	0.22	3	2.98	14.41	1.00E-9	10.6	7.2				1776	2.06	0.89	4.0
24.550	80.545	29.569	1.002	138.769		31.57	3.17	5	115	4.659	2.324	2.334	11.53	3.72	0.28	3	3.00	12.39	1.00E-9	9.5	6.4				1578	1.79	0.77	3.5
24.750	81.201	29.310	0.967	109.493		30.89	3.13	5	115	4.696	2.345	2.351	11.14	3.69	0.21	3	3.01	11.96	1.00E-9	9.4	6.3				1544	1.75	0.74	3.3
24.950	81.857	28.127	0.862	57.405		28.95	2.98	5	115	4.734	2.365	2.369	10.23	3.56	0.07	3	3.03	10.93	1.00E-9	9.2	6.1				1448	1.61	0.68	3.1
25.150	82.513	31.004	0.927	66.453		31.96	2.90	5	115	4.772	2.386	2.386	11.40	3.41	0.09	3	2.98	12.33	1.00E-9	9.8	6.5				1598	1.81	0.76	3.4
25.350	83.169	36.014	1.380	64.032		36.94	3.74	5	115	4.809	2.406	2.403	13.37	4.29	0.07	3	2.99	14.46	1.00E-9	11.4	7.6				1847	2.14	0.89	4.0
25.550	83.825	29.836	0.801	91.496		31.15	2.57	6	115	4.847	2.427	2.420	10.87	3.04	0.16	3	2.97	11.82	1.00E-9	9.4	6.2				1558	1.75	0.72	3.3
25.750	84.482	22.577	0.693	63.862		23.50	2.95	5	115	4.884	2.447	2.437	7.64	3.72	0.12	3	3.15	7.95	1.00E-9	7.9	5.2				1175	1.24	0.51	2.3
25.950	85.138	19.759	0.514	102.803		21.24	2.42	5	115	4.922	2.468	2.454	6.65	3.15	0.30	3	3.16	6.91	1.00E-9	7.0	4.6				1062	1.09	0.44	2.0
26.150	85.794	20.278	0.569	114.867		21.93	2.59	5	115	4.960	2.488	2.471	6.87	3.35	0.34	3	3.16	7.13	1.00E-9	7.2	4.7				1097	1.13	0.46	2.1
26.350	86.450	32.748	0.873	70.624		33.77	2.59	6	115	4.997	2.509	2.488	11.56	3.04	0.09	3	2.95	12.67	1.00E-9	10.1	6.6				1688	1.92	0.77	3.5
26.550	87.106	28.855	0.844	111.306		30.46	2.77	6	115	5.035	2.529	2.506	10.15	3.32	0.22	3	3.02	10.94	1.00E-9	9.3	6.1				1523	1.69	0.68	3.0
26.750	87.762	37.989	0.987	201.909		40.90	2.41	6	115	5.072	2.550	2.523	14.20	2.76	0.33	4	2.85	15.99	3.00E-8	11.1	7.2				2045	2.39	0.95	4.3
26.950	88.419	46.055	1.357	228.701		49.35	2.75	6	115	5.110	2.570	2.540	17.42	3.07	0.31	4	2.81	19.86	3.00E-8	13.1	8.5				2467	2.95	1.16	5.2
27.150	89.075	39.719	1.146	200.500		42.61	2.69	6	115	5.147	2.591	2.557	14.65	3.06	0.32	3	2.87	16.46	1.00E-9	11.7	7.5				2130	2.50	0.98	4.4
27.350	89.731	28.250	0.826	156.852		30.51	2.71	6	115	5.185	2.611	2.574	9.84	3.26	0.34	3	3.02	10.61	1.00E-9	9.2	5.9				1525	1.69	0.66	3.0
27.550	90.387	28.827	0.782	193.952		31.62	2.47	6	115	5.223	2.632	2.591	10.19	2.96	0.43	3	2.99	11.10	1.00E-9	9.1	5.8				1581	1.76	0.68	3.1
27.750	91.043	44.274	0.965	111.801		45.88	2.10	6	115	5.260	2.652	2.608	15.58	2.37	0.13	4	2.78	17.96	3.00E-8	12.4	7.9				2294	2.71	1.04	4.7
27.950	91.699	31.314	0.654	25.148		31.68	2.06	6	115	5.298	2.672	2.625	10.05	2.48	-0.03	3	2.95	11.08	1.00E-9	9.7	6.2				1584	1.76	0.67	3.0
28.150	92.356	34.507	0.856	79.997		35.66	2.40	6	115	5.335	2.693	2.643	11.48	2.82	0.10	3	2.93	12.72	1.00E-9	10.6	6.7				1783	2.02	0.77	3.4
28.350	93.012	28.733	0.874	144.653		30.82	2.84	6	115	5.373	2.713	2.660	9.57	3.44	0.30	3	3.05	10.28	1.00E-9	9.5	6.0				1541	1.70	0.64	2.9
28.550	93.668	32.381	0.972	152.639		34.58	2.81	6	115	5.411	2.734	2.677	10.90	3.33	0.28	3	2.99	11.89	1.00E-9	10.3	6.5				1729	1.94	0.73	3.3
28.750	94.324	29.613	0.946	119.235		31.33	3.02	5	115	5.448	2.754	2.694	9.61	3.65	0.23	3	3.06	10.29	1.00E-9	9.8	6.2				1566	1.73	0.64	2.9
28.950	94.980	29.065	0.812	93.478		30.41	2.67	6	115	5.486	2.775	2.711	9.19	3.26	0.16	3	3.05	9.89	1.00E-9	9.6	6.0				1521	1.66	0.61	2.8
29.150	95.636	25.266	0.691	121.891		27.02	2.56	6	115	5.523	2.795	2.728	7.88	3.21	0.28	3	3.10	8.36	1.00E-9	8.6	5.4				1351	1.43	0.53	2.4
29.350	96.293	26.225	0.721	163.521		28.58	2.52	6	115	5.561	2.816	2.745	8.38	3.13	0.39	3	3.07	8.97	1.00E-9	8.8	5.4				1429	1.53	0.56	2.5
29.550	96.949	35.733	1.044	167.316		38.14	2.74	6	115	5.599	2.836	2.762	11.78	3.21	0.28	3	2.96	13.04	1.00E-9	11.1	6.9				1907	2.17	0.79	3.5
29.750	97.605	56.723	1.749	101.174		58.18	3.01	6	115	5.636	2.857	2.779	18.90	3.33	0.08	4	2.80	21.89	3.00E-8	16.1	10.0				2909	3.50	1.26	5.7
29.950	98.261	115.162	2.865	58.007		116.00	2.47	7	118	5.675	2.877	2.798	39.43	2.60	0.01	4	2.49	50.09	3.00E-8	27.9	17.1				5800	7.35	2.63	11.8
30.150	98.917	139.830	2.576	-3.505		139.78	1.84	8	121	5.715	2.898	2.817	47.59	1.92	-0.02	5	2.34	63.23	3.00E-6	31.6	19.4	43	37	559	1344			
30.350	99.573	85.327	3.099	8.446		85.45	3.63	6	115	5.752	2.918	2.834	28.12	3.89	-0.03	4	2.71	33.52	3.00E-8	23.1	14.1				4272	5.31	1.87	8.4

GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

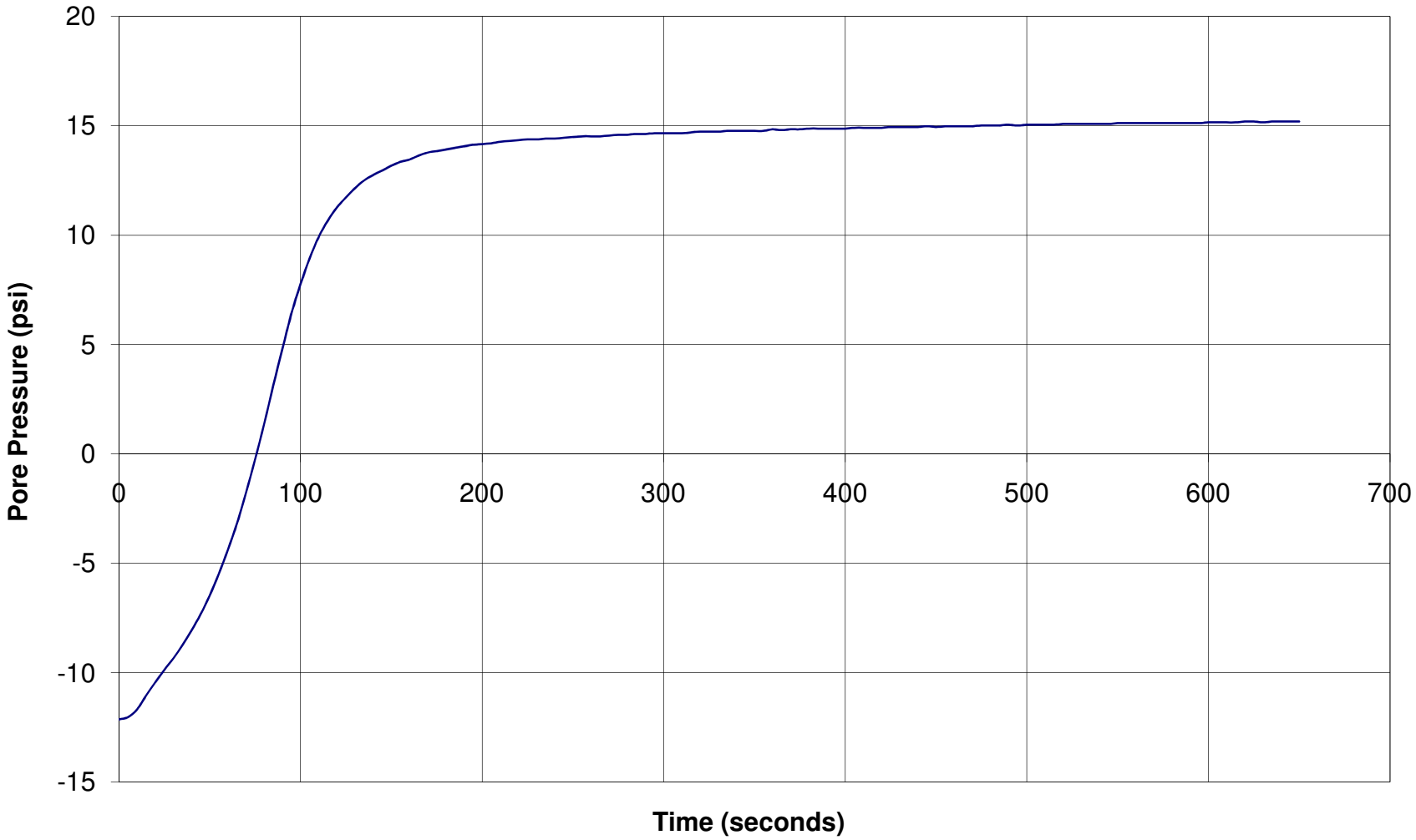
Sounding: CPT-01
Depth: 32.808
Site: I-880 WIDENING
Engineer: G.PARIKH



GREGG DRILLING & TESTING

Pore Pressure Dissipation Test

Sounding: CPT-02
Depth: 42.323
Site: I-880 WIDENING
Engineer: G.PARIKH



Pore Pressure Dissipation Tests (PPDT)

Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals measured hydrostatic water pressures and determined the approximate depth of the ground water table. A PPDT is conducted when the cone is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure (u) with time is measured behind the tip of the cone and recorded by a computer system.

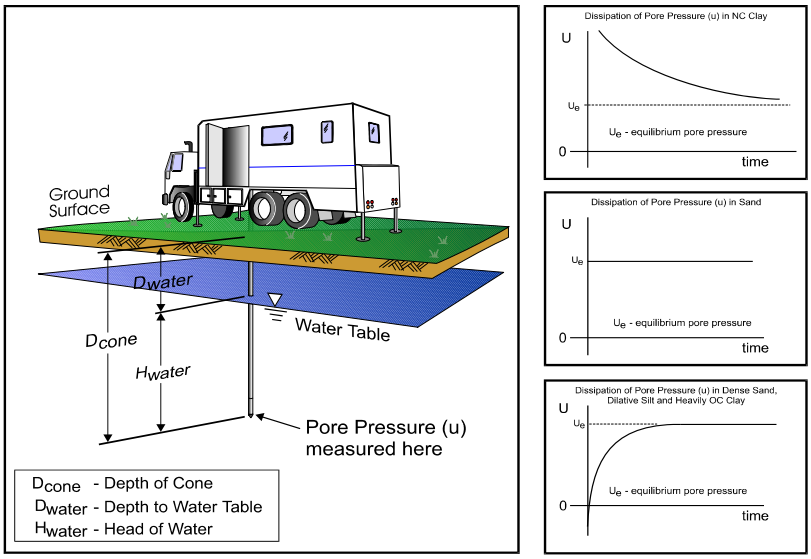
Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In situ horizontal coefficient of consolidation (c_h)
- In situ horizontal coefficient of permeability (k_h)

In order to correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until such time as there is no variation in pore pressure with time, *Figure PPDT*. This time is commonly referred to as t_{100}, the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992.

A summary of the pore pressure dissipation tests is summarized in Table 1.



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

Useful Conversion Factors:
1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

Figure PPDT

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Zemo, D.A., T.A. Delfino, J.D. Gallinatti, V.A. Baker and L.R. Hilpert, "Field Comparison of Analytical Results from Discrete-Depth Groundwater Samplers" BAT EnviroProbe and QED HydroPunch, Sixth national Outdoor Action Conference, Las Vegas, Nevada Proceedings, 1992, pp 299-312.

Copies of ASTM Standards are available through www.astm.org

APPENDIX III

APPENDIX III

LABORATORY TESTS

Classification Tests
The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented in "Log of Test Borings", Appendix II.

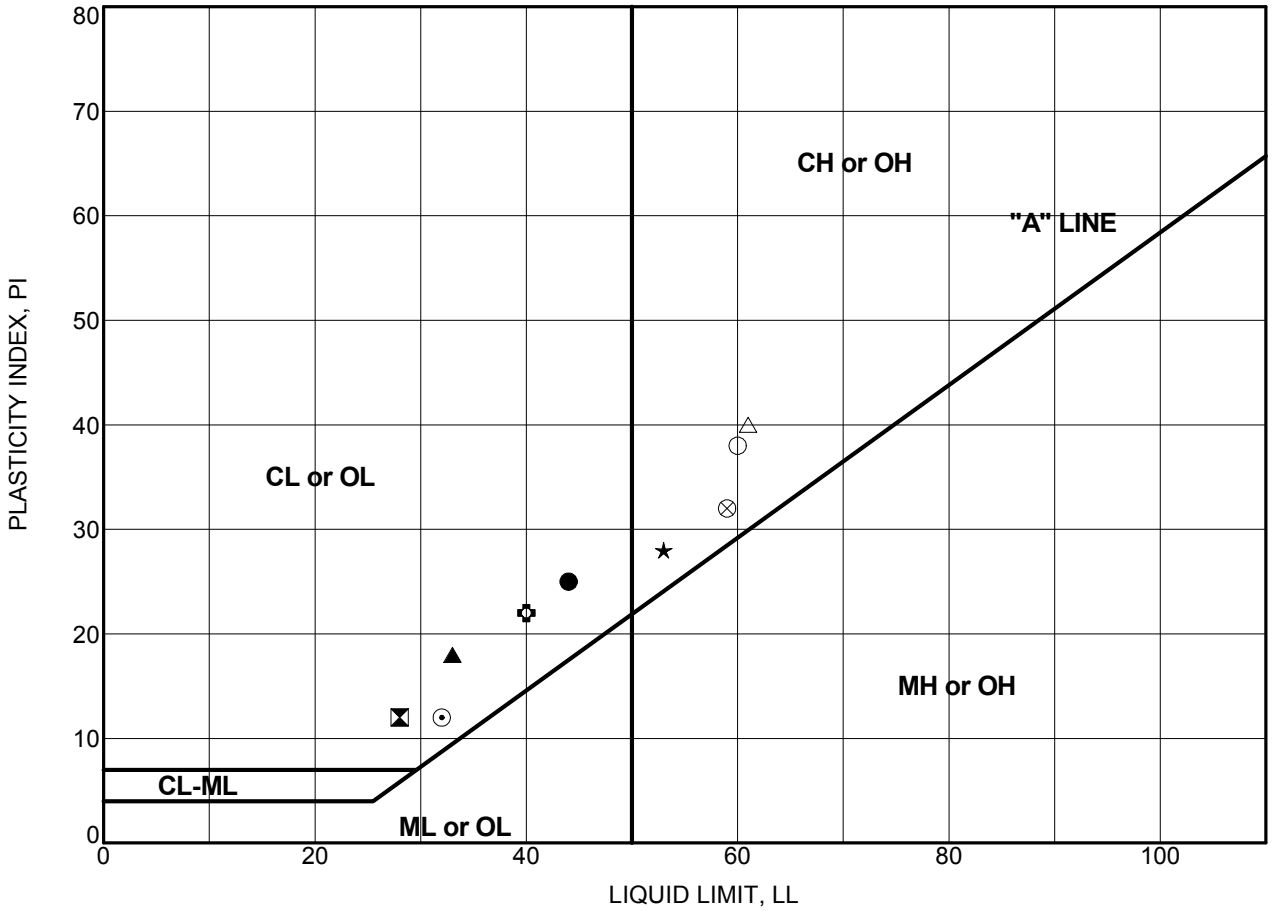
Moisture-Density
The natural moisture contents and dry unit weights were determined for selected undisturbed samples of the soils in general accordance with ASTM Test Method D 2216-92. This information was used to classify and correlate the soils. The results are presented at the appropriate depths on the "Log of Test Borings", Appendix II.

Atterberg Limits
The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the effective strength characteristics and expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM Test Method D 4318-93. The results of these tests are presented on Plate III-2, "Plasticity Chart".

Grain Size Classification
Grain size classification tests (ASTM Test Method D422-63) were performed on selected samples of granular soil to aid in the classification. The results are presented on Plate III-3, "Grain Size Distribution Curves".

Unconfined Compression Tests
Strength tests were performed on selected undisturbed samples using unconfined compression machine. Unconfined compression tests were performed in general accordance with ASTM Test Method D 2166-91. The results are presented on "Log of Test Borings", Appendix II.

Corrosion Tests
Corrosion tests were performed on selected samples to determine the corrosion potential of the soils. The pH and minimum resistively tests were performed according to California Test Method 643. The tests were performed by Sunland Analytical. The test results are presented on Plates III-4A thru III-4C, Appendix III.



PLASTICITY CHART

Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
RW-30	MC-3	9.5	●	26	44	19	25	LEAN CLAY (CL)
RW-30	MC-5	19.5	⧗	20	28	16	12	LEAN CLAY (CL)
RW-30	MC-7	29.5	▲	21	33	15	18	LEAN CLAY (CL)
RW-31	MC-2	4.5	★	29	53	25	28	FAT CLAY (CH)
RW-31	MC-3	9.5	⊙	22	32	20	12	LEAN CLAY (CL)
RW-33	MC-3	11.0	✿	19	40	18	22	LEAN CLAY (CL)
RW-34	MC-2	4.5	○	23	60	22	38	FAT CLAY (CH)
RW-34	MC-3	9.5	△	28	61	21	40	FAT CLAY (CH)
RW-34	MC-4	14.5	⊗	32	59	27	32	FAT CLAY (CH)

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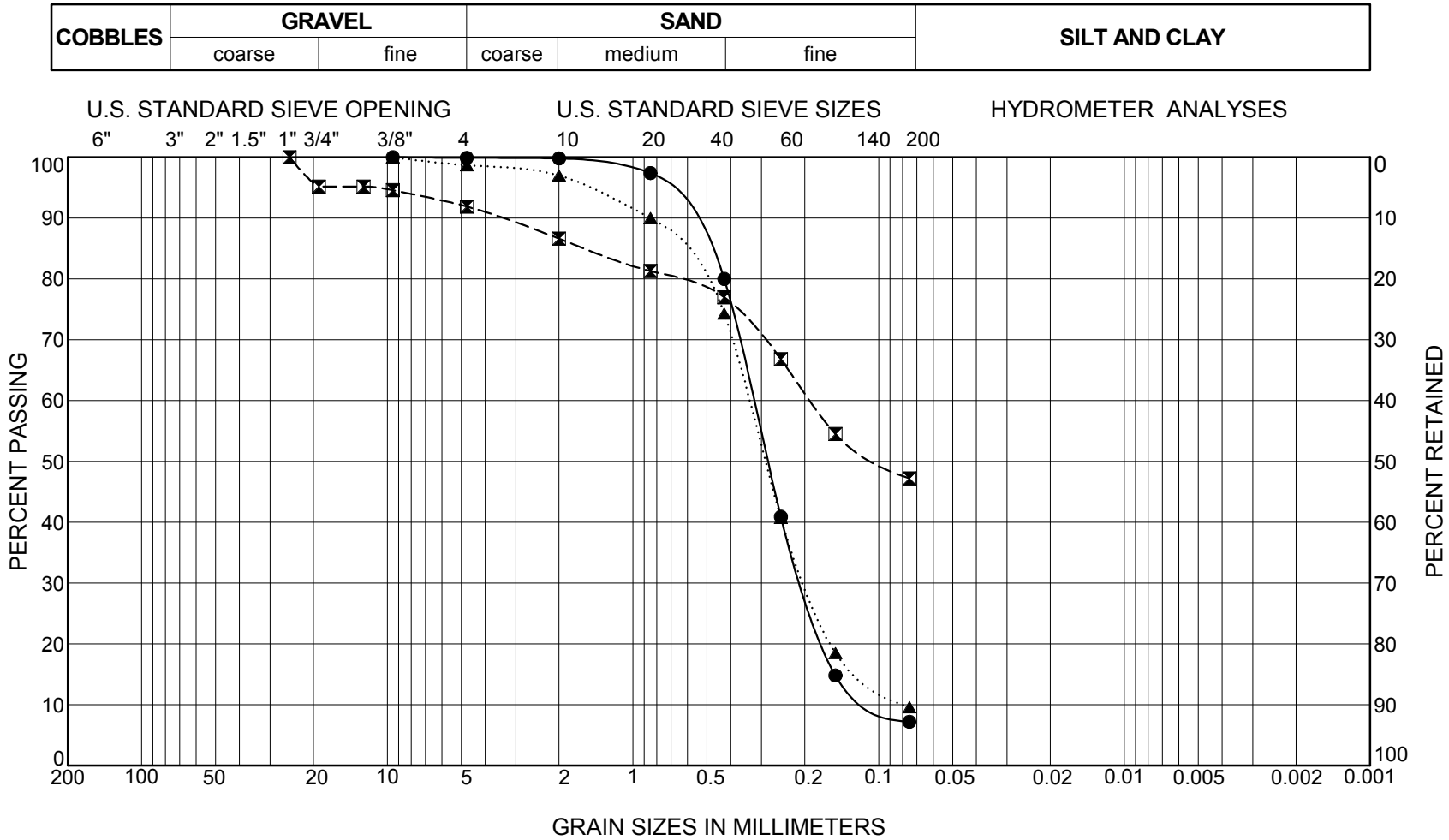
MATERIALS ENGINEERING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO: 2006-139-UPR

PLATE NO: III-2

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
RW-32	MC-7	31.0	●			POORLY-GRADED SAND WITH SILT (SP-SM)
RW-33	MC-2	6.0	⊠			SILTY CLAYEY SAND (SC)
RW-34	MC-6	24.5	▲			POORLY-GRADED SAND WITH SILT (SP-SM)

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MATERIALS ENGINEERING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO: 2006-139-UPR

PLATE NO: III-3

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/06/2008
Date Submitted 08/01/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139.GDR/ I-880 Site ID : RW-30 #2 @ 4.5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 54032-108393.

EVALUATION FOR SOIL CORROSION

Soil pH	7.40	
Minimum Resistivity	0.96 ohm-cm (x1000)	
Chloride	22.7 ppm	00.00227 %
Sulfate	102.1 ppm	00.01021 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 07/18/2008
Date Submitted 07/14/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139-GDR/ I-880 Site ID : RW31#3 @ 9.5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53807-107957.

EVALUATION FOR SOIL CORROSION

Soil pH	7.39	
Minimum Resistivity	1.21 ohm-cm (x1000)	
Chloride	7.9 ppm	00.00079 %
Sulfate	34.5 ppm	00.00345 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 09/17/2008
Date Submitted 09/10/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139.GDR Site ID : RW33#4@16'.
Thank you for your business.

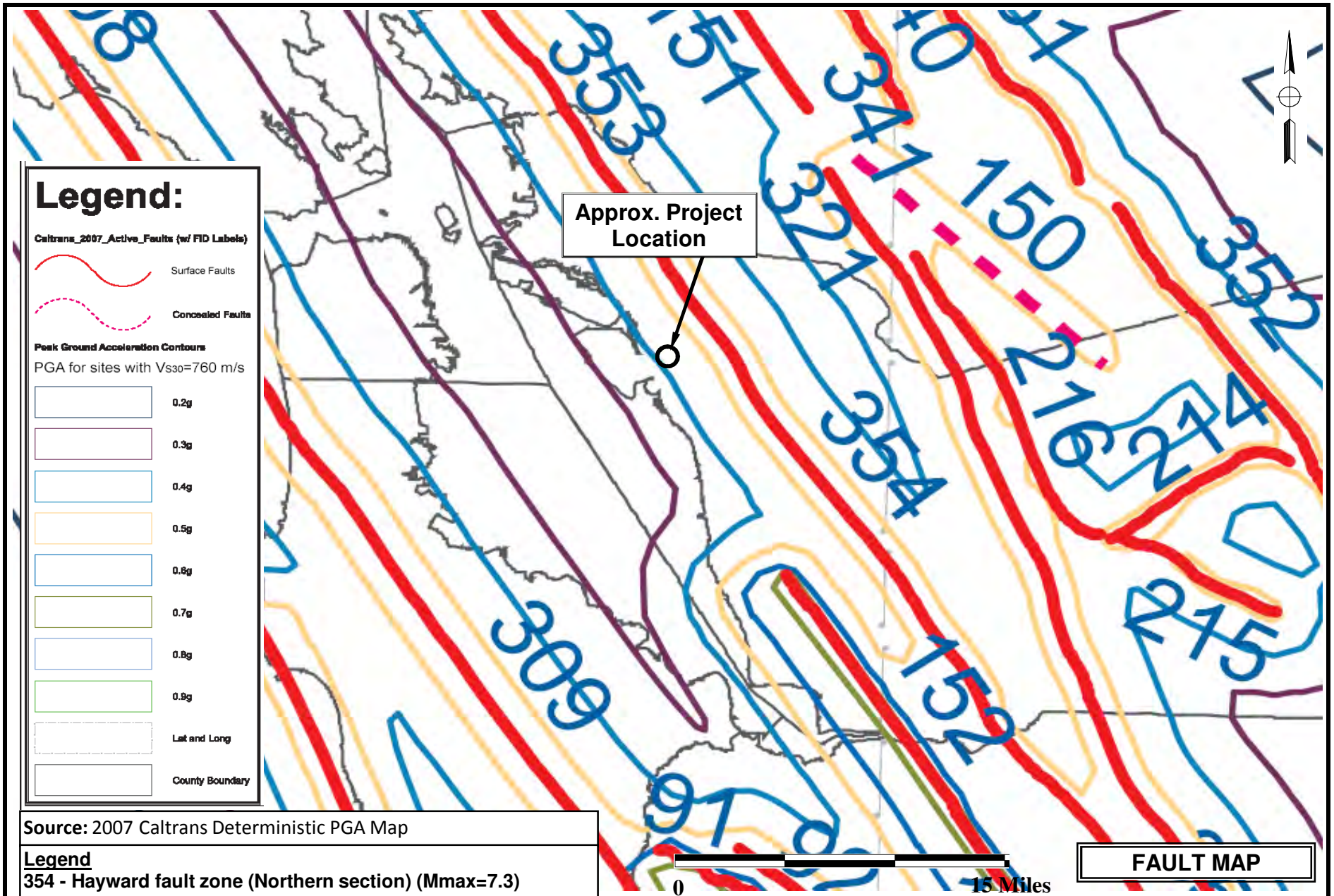
* For future reference to this analysis please use SUN # 54378-109147.

EVALUATION FOR SOIL CORROSION

Soil pH	7.97	
Minimum Resistivity	1.15 ohm-cm (x1000)	
Chloride	70.6 ppm	00.00706 %
Sulfate	236.1 ppm	00.02361 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

APPENDIX IV



Source: 2007 Caltrans Deterministic PGA Map

Legend
354 - Hayward fault zone (Northern section) (Mmax=7.3)

FAULT MAP

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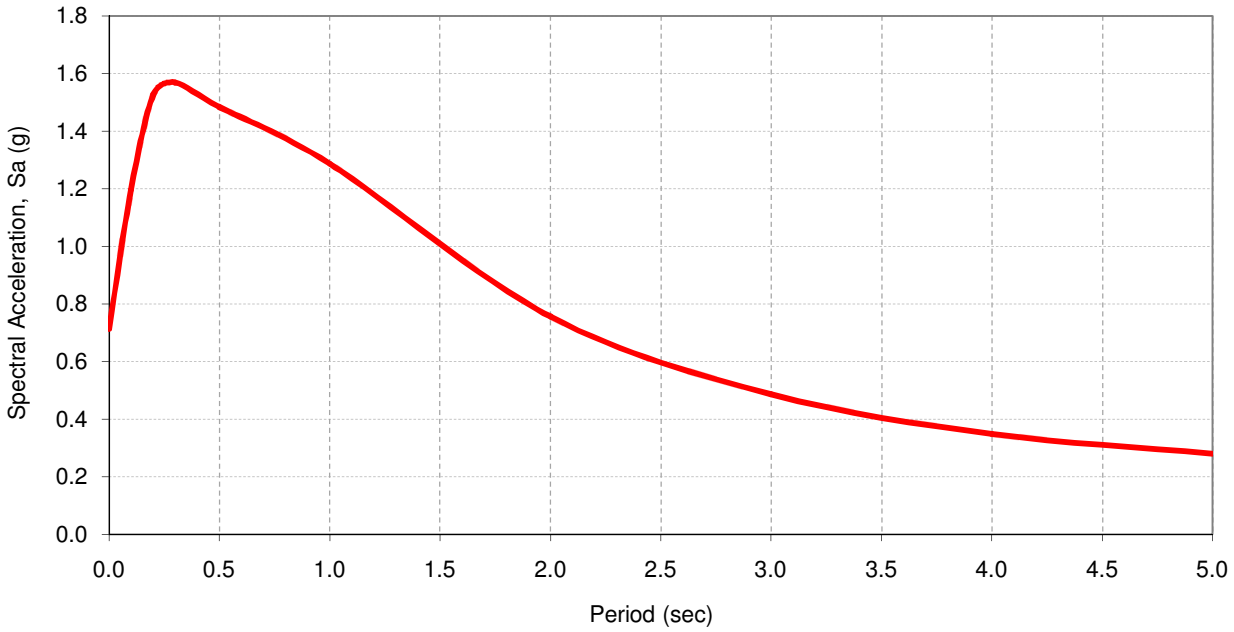
MATERIALS TESTING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10 | **PLATE NO.: IV-1**

RECOMMENDED ACCELERATION RESPONSE SPECTRUM

Probabilistic Approach (5% Damping)



Site Information

Latitude:	37.7254
Longitude	-122.1829
V_{S30} (m/s) =	230
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	4.9

Governing Curve:

USGS Deaggregation 2008 (beta)

Recommended Response Spectrum

Period (sec)	USGS Deagg. Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.7126	1.000	1.000	0.713
0.1	1.1945	1.000	1.000	1.195
0.2	1.5259	1.000	1.000	1.526
0.3	1.5692	1.000	1.000	1.569
0.5	1.4841	1.000	1.000	1.484
1.0	1.0717	1.200	1.000	1.286
2.0	0.6301	1.200	1.000	0.756
3.0	0.4058	1.200	1.000	0.487
4.0	0.2911	1.200	1.000	0.349
5.0	0.2326	1.200	1.000	0.279

Source:

1. Caltrans ARS Online tool (V.1.0.4, http://dap3.dot.ca.gov/shake_stable/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Geotechnical Services Design Manual (Version 1.0)

Note:

Refer to "Probablistic Response Spectum Spreadsheet" (attached) for development of the recommended ARS curve. The 2008 USGS Deaggregation Spectral Acceleration data was generated in 2009.

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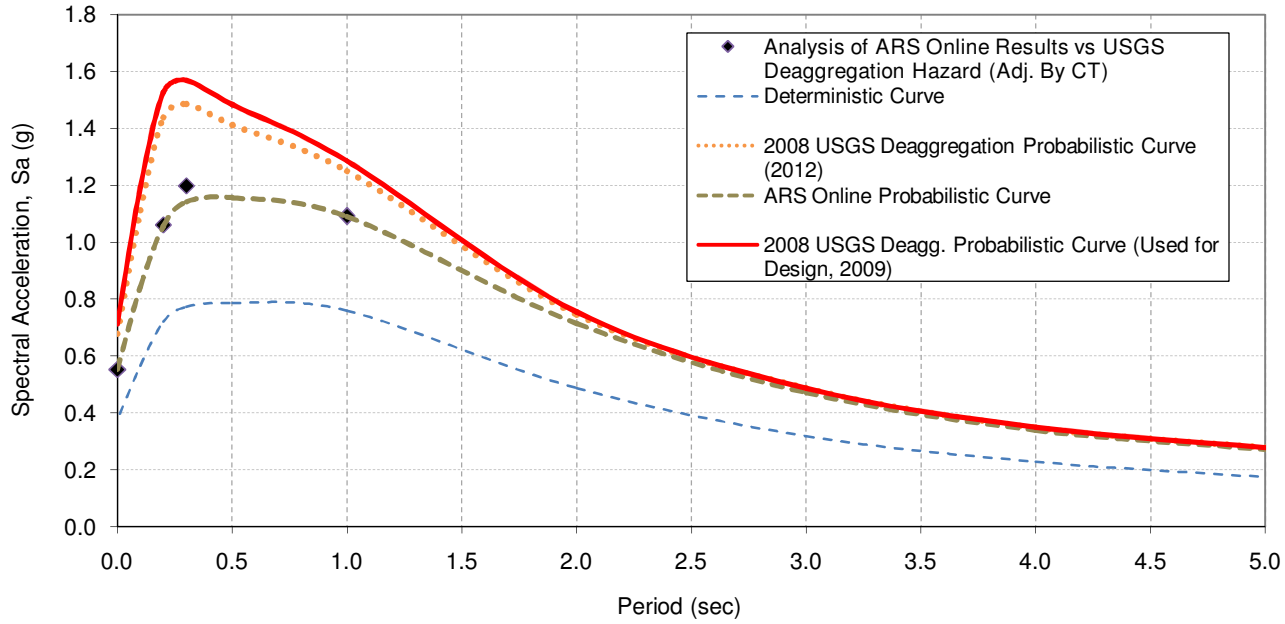
SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

Project No.: 2006-139-UPR | **Plate No.: IV-2A**

ACCELERATION RESPONSE SPECTRUM COMPARISONS



Final Adjusted Spectral Acceleration				
Period (sec)	Deterministic Final Adjusted Spectral Acceleration (g)	Caltrans Probabilistic Final Adjusted Spectral Acceleration (g)	USGS 2008 Deaggregation Probabilistic Final Adjusted Spectral Acceleration (g) (2012)	USGS 2008 Deaggregation Probabilistic Final Adjusted Spectral Acceleration (g) (Used for Design, 2009)
0.0	0.397	0.552	0.680	0.713
0.1	0.567	0.842	1.114	1.195
0.2	0.721	1.057	1.438	1.526
0.3	0.774	1.142	1.485	1.569
0.5	0.787	1.157	1.412	1.484
1.0	0.759	1.091	1.249	1.286
2.0	0.488	0.715	0.746	0.756
3.0	0.320	0.473	0.487	0.487
4.0	0.228	0.340	0.348	0.349
5.0	0.175	0.271	0.279	0.279

Site Information

Latitude:	37.7254
Longitude	-122.1829
V_{S30} (m/s) =	230
Basin Effect	No
Near Fault Effect	Yes
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	4.9

Note:
The increase of 20% to the spectral acceleration values corresponds to periods longer than 1 second and linearly tapers to zero at a period of 0.5 second.

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SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

Project No.: 2006-139-UPR | **Plate No.: IV-2B**

ARS ONLINE DATA

Route 880 North Seg - UPRR OH & San Leandro Creek

Sand $Vs=100.5(N_{60})^{0.29}$

Clay $Vs=86.9(N_{60})^{0.333}$

Rock $Vs=109(N_{60})^{0.319}$

Generalized Strength Profile per CPT-1 & CPT-2

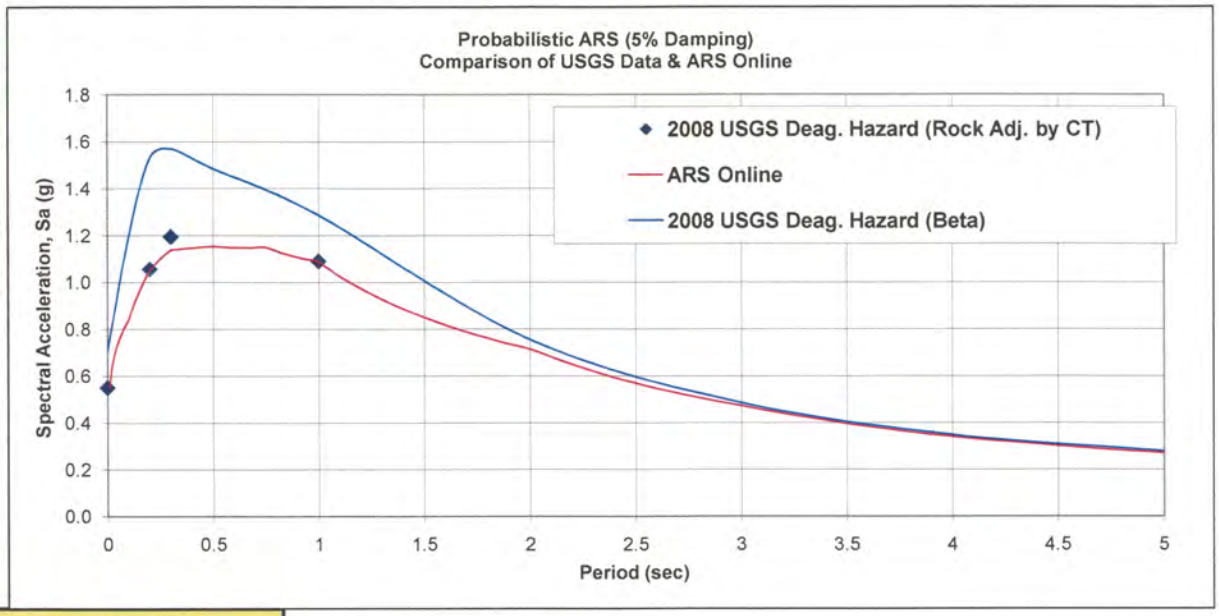
Depth (ft)	**Thickness, D (ft)**	**Soil Type**	**N_{60}**	**Vs (m/s)**	**Vs (ft/s)**	**D/V**	**Vs30 (m/s)**
0-10	10	Clay	12	198.8	652.0	0.015	
10-20	10	Clay	5	148.5	487.1	0.021	
20-30	10	Clay	12	198.8	652.0	0.015	
30-50	20	Sand	40	292.9	960.8	0.021	
50-60	10	Clay	16	218.8	717.6	0.014	
60-70	10	Clay	20	235.6	772.9	0.013	
70-80	10	Clay	28	263.6	864.6	0.012	
80-100	20	Clay	32	275.6	903.9	0.022	229.9

Use Vs30 of 230 m/sec for design.

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
37.7254	-122.1829
V_{S30} (m/s) =	229
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	4.9
$Z_{1.0}$ (m) =	336
$Z_{2.5}$ (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	0.55	1	1	0.55
0.02	0.624	1	1	0.624
0.022	0.635	1	1	0.635
0.025	0.65	1	1	0.65
0.029	0.668	1	1	0.668
0.03	0.672	1	1	0.672
0.032	0.68	1	1	0.68
0.035	0.691	1	1	0.691
0.036	0.695	1	1	0.695
0.04	0.708	1	1	0.708
0.042	0.715	1	1	0.715
0.044	0.721	1	1	0.721
0.045	0.724	1	1	0.724
0.046	0.727	1	1	0.727
0.048	0.732	1	1	0.732
0.05	0.738	1	1	0.738
0.055	0.751	1	1	0.751
0.06	0.763	1	1	0.763
0.065	0.774	1	1	0.774
0.067	0.778	1	1	0.778
0.07	0.784	1	1	0.784
0.075	0.794	1	1	0.794
0.08	0.804	1	1	0.804
0.085	0.813	1	1	0.813
0.09	0.821	1	1	0.821
0.095	0.829	1	1	0.829
0.1	0.837	1	1	0.837
0.11	0.864	1	1	0.864
0.12	0.889	1	1	0.889
0.13	0.913	1	1	0.913
0.133	0.919	1	1	0.919
0.14	0.935	1	1	0.935
0.15	0.957	1	1	0.957
0.16	0.977	1	1	0.977
0.17	0.997	1	1	0.997
0.18	1.016	1	1	1.016
0.19	1.034	1	1	1.034
0.2	1.052	1	1	1.052
0.22	1.071	1	1	1.071
0.24	1.089	1	1	1.089
0.25	1.098	1	1	1.098

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	0.730	1.000	0.755	1.000	0.551	0.55	0.3%
0.2	1.828	1.000	0.578	1.000	1.057	1.052	0.4%
0.3	1.532	1.000	0.779	1.000	1.194	1.136	4.8%
1	0.577	1.200	1.573	1.000	1.090	1.088	0.1%

Max % Difference = 4.8%

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	0.7126	1.000	1.000	0.713	0.55	22.8%
0.1	1.1945	1.000	1.000	1.195	0.837	29.9%
0.2	1.5259	1.000	1.000	1.526	1.052	31.1%
0.3	1.5692	1.000	1.000	1.569	1.136	27.6%
0.5	1.4841	1.000	1.000	1.484	1.152	22.4%
1	1.0717	1.200	1.000	1.286	1.088	15.4%
2	0.6301	1.200	1.000	0.756	0.716	5.3%
3	0.4058	1.200	1.000	0.487	0.474	2.7%
4	0.2911	1.200	1.000	0.349	0.34	2.7%
5	0.2326	1.200	1.000	0.279	0.272	2.6%

Max % Difference = 22.4%

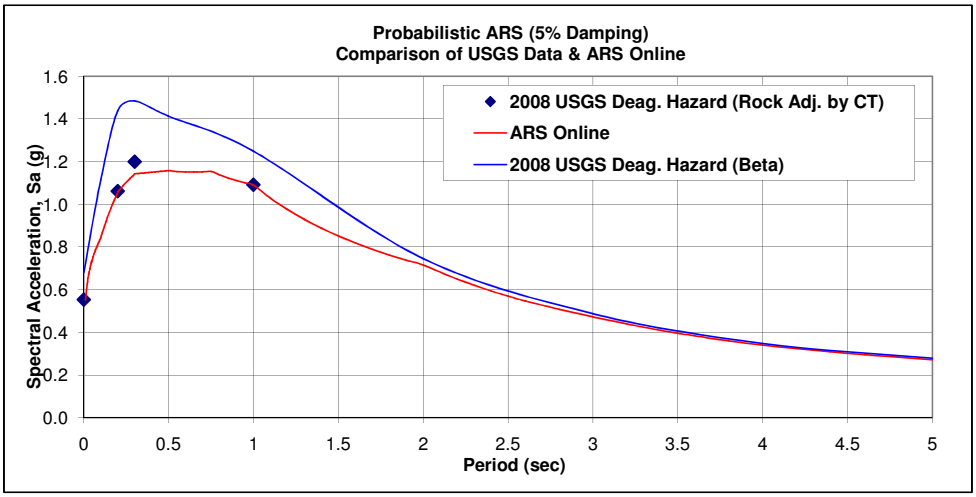
Design ARS Curve per Caltrans 2009 Seismic Criteria is governed by 2008 USGS Deaggregation Hazard (Beta)- Probabilistic ARS

PROBABILISTIC DATA (GENERATED IN 2009)

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
37.7254	-122.1829
V_{S30} (m/s) =	230
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	4.9
$Z_{1.0}$ (m) =	0
$Z_{2.5}$ (km) =	0.00



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	0.552	1	1	0.552
0.02	0.627	1	1	0.627
0.022	0.638	1	1	0.638
0.025	0.653	1	1	0.653
0.029	0.671	1	1	0.671
0.03	0.675	1	1	0.675
0.032	0.683	1	1	0.683
0.035	0.695	1	1	0.695
0.036	0.698	1	1	0.698
0.04	0.712	1	1	0.712
0.042	0.718	1	1	0.718
0.044	0.724	1	1	0.724
0.045	0.727	1	1	0.727
0.046	0.73	1	1	0.73
0.048	0.736	1	1	0.736
0.05	0.741	1	1	0.741
0.055	0.754	1	1	0.754
0.06	0.767	1	1	0.767
0.065	0.778	1	1	0.778
0.067	0.782	1	1	0.782
0.07	0.788	1	1	0.788
0.075	0.798	1	1	0.798
0.08	0.808	1	1	0.808
0.085	0.817	1	1	0.817
0.09	0.825	1	1	0.825
0.095	0.834	1	1	0.834
0.1	0.842	1	1	0.842
0.11	0.868	1	1	0.868
0.12	0.894	1	1	0.894
0.13	0.917	1	1	0.917
0.133	0.924	1	1	0.924
0.14	0.94	1	1	0.94
0.15	0.962	1	1	0.962
0.16	0.982	1	1	0.982
0.17	1.002	1	1	1.002
0.18	1.021	1	1	1.021
0.19	1.039	1	1	1.039
0.2	1.057	1	1	1.057
0.22	1.076	1	1	1.076
0.24	1.094	1	1	1.094
0.25	1.103	1	1	1.103
0.26	1.111	1	1	1.111
0.28	1.127	1	1	1.127
0.29	1.134	1	1	1.134

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	0.730	1.000	0.758	1.000	0.554	0.552	0.3%
0.2	1.828	1.000	0.581	1.000	1.062	1.057	0.4%
0.3	1.532	1.000	0.783	1.000	1.199	1.142	4.8%
1	0.578	1.200	1.575	1.000	1.092	1.09	0.2%

Max % Difference = 4.8%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors

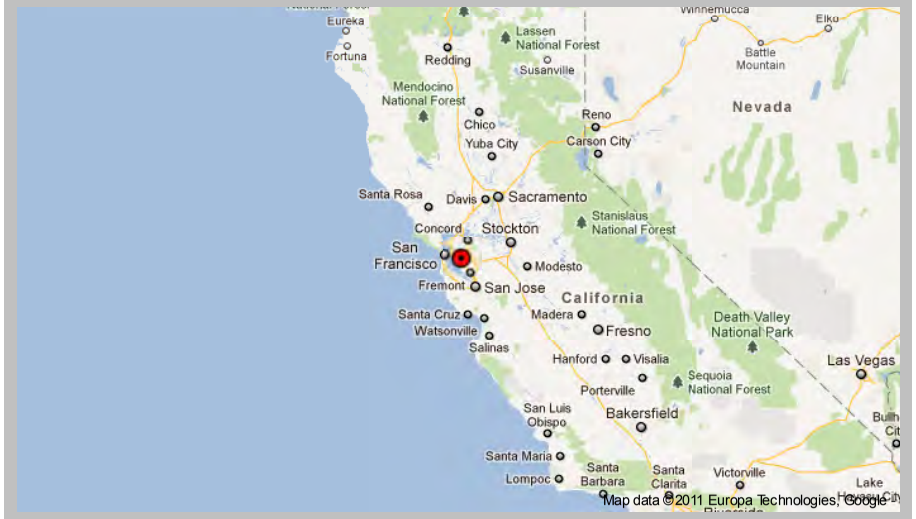
Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.6796	1.000	1.000	0.680	0.552	18.8%
0.1	1.1136	1.000	1.000	1.114	0.842	24.4%
0.2	1.438	1.000	1.000	1.438	1.057	26.5%
0.3	1.4852	1.000	1.000	1.485	1.142	23.1%
0.5	1.4124	1.000	1.000	1.412	1.157	18.1%
1	1.041	1.200	1.000	1.249	1.09	12.7%
2	0.6216	1.200	1.000	0.746	0.715	4.1%
3	0.4058	1.200	1.000	0.487	0.473	2.9%
4	0.2904	1.200	1.000	0.348	0.34	2.4%
5	0.2321	1.200	1.000	0.279	0.272	2.3%

Max % Difference = 18.1%

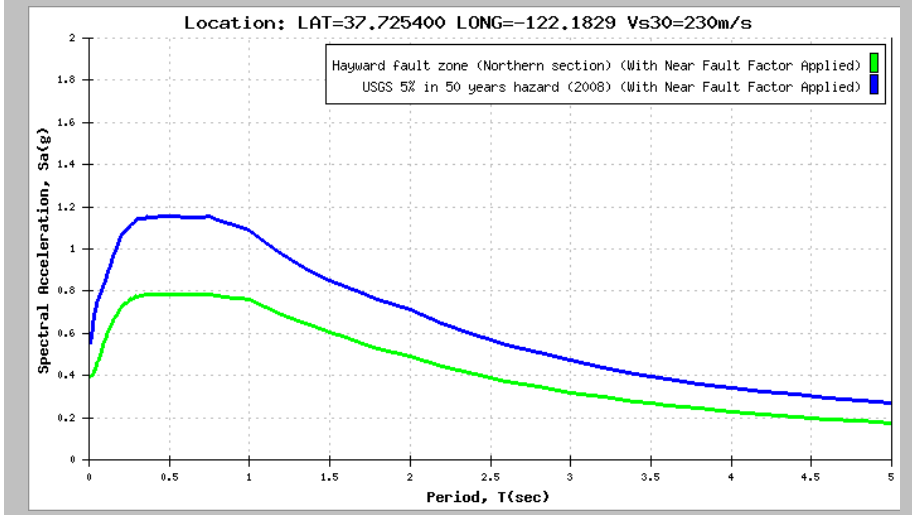
PROBABILISTIC DATA (GENERATED IN 2012)

0.3	1.142	1	1	1.142
0.32	1.144	1	1	1.144
0.34	1.145	1	1	1.145
0.35	1.146	1	1	1.146
0.36	1.147	1	1	1.147
0.38	1.149	1	1	1.149
0.4	1.15	1	1	1.15
0.42	1.152	1	1	1.152
0.44	1.153	1	1	1.153
0.45	1.154	1	1	1.154
0.46	1.155	1	1	1.155
0.48	1.156	1	1	1.156
0.5	1.157	1	1	1.157
0.55	1.131	1	1.02	1.153
0.6	1.107	1	1.04	1.151
0.65	1.086	1	1.06	1.151
0.667	1.079	1	1.067	1.151
0.7	1.067	1	1.08	1.152
0.75	1.049	1	1.1	1.154
0.8	1.016	1	1.12	1.138
0.85	0.985	1	1.14	1.123
0.9	0.958	1	1.16	1.111
0.95	0.932	1	1.18	1.1
1	0.909	1	1.2	1.09
1.1	0.857	1	1.2	1.029
1.2	0.813	1	1.2	0.976
1.3	0.774	1	1.2	0.929
1.4	0.74	1	1.2	0.888
1.5	0.71	1	1.2	0.852
1.6	0.682	1	1.2	0.819
1.7	0.658	1	1.2	0.789
1.8	0.635	1	1.2	0.762
1.9	0.615	1	1.2	0.738
2	0.596	1	1.2	0.715
2.2	0.541	1	1.2	0.649
2.4	0.495	1	1.2	0.594
2.5	0.475	1	1.2	0.57
2.6	0.456	1	1.2	0.547
2.8	0.423	1	1.2	0.508
3	0.394	1	1.2	0.473
3.2	0.366	1	1.2	0.439
3.4	0.341	1	1.2	0.41
3.5	0.33	1	1.2	0.396
3.6	0.32	1	1.2	0.384
3.8	0.3	1	1.2	0.36
4	0.283	1	1.2	0.34
4.2	0.27	1	1.2	0.324
4.4	0.257	1	1.2	0.309
4.6	0.246	1	1.2	0.295
4.8	0.236	1	1.2	0.283
5	0.226	1	1.2	0.272

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	230 m/s
Latitude:	37.725400
Longitude:	-122.182900
Depth to Vs = 1.0 km/s:	335 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Hayward fault zone (Northern section)	
Fault ID:	353
Maximum Magnitude (MMax):	7.3
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	12.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	4.00 km
Rjb:	3.99 km
Rx:	4.00 km
Fnorm:	0
Frev:	0

Period	SA(Base Spectrum)	Basin Factor	Near Fault Factor(Applied)	SA(Final Spectrum)
0.01	0.397	1.000	1.000	0.397
0.02	0.402	1.000	1.000	0.402
0.022	0.405	1.000	1.000	0.405
0.025	0.410	1.000	1.000	0.410
0.029	0.414	1.000	1.000	0.414
0.03	0.416	1.000	1.000	0.416
0.032	0.420	1.000	1.000	0.420
0.035	0.426	1.000	1.000	0.426
0.036	0.428	1.000	1.000	0.428
0.04	0.435	1.000	1.000	0.435
0.042	0.438	1.000	1.000	0.438
0.044	0.442	1.000	1.000	0.442
0.045	0.445	1.000	1.000	0.445
0.046	0.447	1.000	1.000	0.447
0.048	0.451	1.000	1.000	0.451
0.05	0.454	1.000	1.000	0.454
0.055	0.464	1.000	1.000	0.464

0.06	0.475	1.000	1.000	0.475
0.065	0.485	1.000	1.000	0.485
0.067	0.489	1.000	1.000	0.489
0.07	0.496	1.000	1.000	0.496
0.075	0.507	1.000	1.000	0.507
0.08	0.519	1.000	1.000	0.519
0.085	0.531	1.000	1.000	0.531
0.09	0.543	1.000	1.000	0.543
0.095	0.555	1.000	1.000	0.555
0.1	0.567	1.000	1.000	0.567
0.11	0.588	1.000	1.000	0.588
0.12	0.608	1.000	1.000	0.608
0.13	0.626	1.000	1.000	0.626
0.133	0.631	1.000	1.000	0.631
0.14	0.642	1.000	1.000	0.642
0.15	0.656	1.000	1.000	0.656
0.16	0.671	1.000	1.000	0.671
0.17	0.685	1.000	1.000	0.685
0.18	0.698	1.000	1.000	0.698
0.19	0.709	1.000	1.000	0.709
0.2	0.721	1.000	1.000	0.721
0.22	0.736	1.000	1.000	0.736
0.24	0.750	1.000	1.000	0.750
0.25	0.755	1.000	1.000	0.755
0.26	0.760	1.000	1.000	0.760
0.28	0.768	1.000	1.000	0.768
0.29	0.771	1.000	1.000	0.771
0.3	0.774	1.000	1.000	0.774
0.32	0.778	1.000	1.000	0.778
0.34	0.781	1.000	1.000	0.781
0.35	0.782	1.000	1.000	0.782
0.36	0.783	1.000	1.000	0.783
0.38	0.784	1.000	1.000	0.784
0.4	0.784	1.000	1.000	0.784
0.42	0.786	1.000	1.000	0.786
0.44	0.786	1.000	1.000	0.786
0.45	0.787	1.000	1.000	0.787
0.46	0.787	1.000	1.000	0.787
0.48	0.787	1.000	1.000	0.787
0.5	0.787	1.000	1.000	0.787
0.55	0.770	1.000	1.020	0.785
0.6	0.754	1.000	1.040	0.785
0.65	0.740	1.000	1.060	0.784
0.667	0.735	1.000	1.067	0.784
0.7	0.725	1.000	1.080	0.783
0.75	0.712	1.000	1.100	0.783

0.8	0.695	1.000	1.120	0.778
0.85	0.678	1.000	1.140	0.773
0.9	0.662	1.000	1.160	0.768
0.95	0.647	1.000	1.180	0.764
1	0.633	1.000	1.200	0.759
1.1	0.603	1.000	1.200	0.723
1.2	0.575	1.000	1.200	0.690
1.3	0.550	1.000	1.200	0.660
1.4	0.527	1.000	1.200	0.633
1.5	0.505	1.000	1.200	0.606
1.6	0.482	1.000	1.200	0.578
1.7	0.460	1.000	1.200	0.553
1.8	0.441	1.000	1.200	0.529
1.9	0.423	1.000	1.200	0.508
2	0.407	1.000	1.200	0.488
2.2	0.371	1.000	1.200	0.445
2.4	0.339	1.000	1.200	0.407
2.5	0.325	1.000	1.200	0.390
2.6	0.312	1.000	1.200	0.374
2.8	0.288	1.000	1.200	0.345
3	0.267	1.000	1.200	0.320
3.2	0.248	1.000	1.200	0.297
3.4	0.231	1.000	1.200	0.277
3.5	0.223	1.000	1.200	0.268
3.6	0.216	1.000	1.200	0.259
3.8	0.202	1.000	1.200	0.243
4	0.190	1.000	1.200	0.228
4.2	0.180	1.000	1.200	0.216
4.4	0.170	1.000	1.200	0.204
4.6	0.162	1.000	1.200	0.194
4.8	0.154	1.000	1.200	0.184
5	0.146	1.000	1.200	0.175

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	0.552	1.000	1.000	0.552
0.02	0.627	1.000	1.000	0.627
0.022	0.638	1.000	1.000	0.638
0.025	0.653	1.000	1.000	0.653
0.029	0.671	1.000	1.000	0.671
0.03	0.675	1.000	1.000	0.675

0.032	0.683	1.000	1.000	0.683
0.035	0.695	1.000	1.000	0.695
0.036	0.698	1.000	1.000	0.698
0.04	0.712	1.000	1.000	0.712
0.042	0.718	1.000	1.000	0.718
0.044	0.724	1.000	1.000	0.724
0.045	0.727	1.000	1.000	0.727
0.046	0.730	1.000	1.000	0.730
0.048	0.736	1.000	1.000	0.736
0.05	0.741	1.000	1.000	0.741
0.055	0.754	1.000	1.000	0.754
0.06	0.767	1.000	1.000	0.767
0.065	0.778	1.000	1.000	0.778
0.067	0.782	1.000	1.000	0.782
0.07	0.788	1.000	1.000	0.788
0.075	0.798	1.000	1.000	0.798
0.08	0.808	1.000	1.000	0.808
0.085	0.817	1.000	1.000	0.817
0.09	0.825	1.000	1.000	0.825
0.095	0.834	1.000	1.000	0.834
0.1	0.842	1.000	1.000	0.842
0.11	0.868	1.000	1.000	0.868
0.12	0.894	1.000	1.000	0.894
0.13	0.917	1.000	1.000	0.917
0.133	0.924	1.000	1.000	0.924
0.14	0.940	1.000	1.000	0.940
0.15	0.962	1.000	1.000	0.962
0.16	0.982	1.000	1.000	0.982
0.17	1.002	1.000	1.000	1.002
0.18	1.021	1.000	1.000	1.021
0.19	1.039	1.000	1.000	1.039
0.2	1.057	1.000	1.000	1.057
0.22	1.076	1.000	1.000	1.076
0.24	1.094	1.000	1.000	1.094
0.25	1.103	1.000	1.000	1.103
0.26	1.111	1.000	1.000	1.111
0.28	1.127	1.000	1.000	1.127
0.29	1.134	1.000	1.000	1.134
0.3	1.142	1.000	1.000	1.142
0.32	1.144	1.000	1.000	1.144
0.34	1.145	1.000	1.000	1.145
0.35	1.146	1.000	1.000	1.146
0.36	1.147	1.000	1.000	1.147
0.38	1.149	1.000	1.000	1.149
0.4	1.150	1.000	1.000	1.150
0.42	1.152	1.000	1.000	1.152

0.44	1.153	1.000	1.000	1.153
0.45	1.154	1.000	1.000	1.154
0.46	1.155	1.000	1.000	1.155
0.48	1.156	1.000	1.000	1.156
0.5	1.157	1.000	1.000	1.157
0.55	1.131	1.000	1.020	1.153
0.6	1.107	1.000	1.040	1.151
0.65	1.086	1.000	1.060	1.151
0.667	1.079	1.000	1.067	1.151
0.7	1.067	1.000	1.080	1.152
0.75	1.049	1.000	1.100	1.154
0.8	1.016	1.000	1.120	1.138
0.85	0.985	1.000	1.140	1.123
0.9	0.958	1.000	1.160	1.111
0.95	0.932	1.000	1.180	1.100
1	0.909	1.000	1.200	1.090
1.1	0.857	1.000	1.200	1.029
1.2	0.813	1.000	1.200	0.976
1.3	0.774	1.000	1.200	0.929
1.4	0.740	1.000	1.200	0.888
1.5	0.710	1.000	1.200	0.852
1.6	0.682	1.000	1.200	0.819
1.7	0.658	1.000	1.200	0.789
1.8	0.635	1.000	1.200	0.762
1.9	0.615	1.000	1.200	0.738
2	0.596	1.000	1.200	0.715
2.2	0.541	1.000	1.200	0.649
2.4	0.495	1.000	1.200	0.594
2.5	0.475	1.000	1.200	0.570
2.6	0.456	1.000	1.200	0.547
2.8	0.423	1.000	1.200	0.508
3	0.394	1.000	1.200	0.473
3.2	0.366	1.000	1.200	0.439
3.4	0.341	1.000	1.200	0.410
3.5	0.330	1.000	1.200	0.396
3.6	0.320	1.000	1.200	0.384
3.8	0.300	1.000	1.200	0.360
4	0.283	1.000	1.200	0.340
4.2	0.270	1.000	1.200	0.324
4.4	0.257	1.000	1.200	0.309
4.6	0.246	1.000	1.200	0.295
4.8	0.236	1.000	1.200	0.283
5	0.226	1.000	1.200	0.272

Envelope Data

Period	SA
0.01	0.552
0.02	0.627
0.022	0.638
0.025	0.653
0.029	0.671
0.03	0.675
0.032	0.683
0.035	0.695
0.036	0.698
0.04	0.712
0.042	0.718
0.044	0.724
0.045	0.727
0.046	0.730
0.048	0.736
0.05	0.741
0.055	0.754
0.06	0.767
0.065	0.778
0.067	0.782
0.07	0.788
0.075	0.798
0.08	0.808
0.085	0.817
0.09	0.825
0.095	0.834
0.1	0.842
0.11	0.868
0.12	0.894
0.13	0.917
0.133	0.924
0.14	0.940
0.15	0.962
0.16	0.982
0.17	1.002
0.18	1.021
0.19	1.039
0.2	1.057
0.22	1.076
0.24	1.094
0.25	1.103

0.26	1.111
0.28	1.127
0.29	1.134
0.3	1.142
0.32	1.144
0.34	1.145
0.35	1.146
0.36	1.147
0.38	1.149
0.4	1.150
0.42	1.152
0.44	1.153
0.45	1.154
0.46	1.155
0.48	1.156
0.5	1.157
0.55	1.153
0.6	1.151
0.65	1.151
0.667	1.151
0.7	1.152
0.75	1.154
0.8	1.138
0.85	1.123
0.9	1.111
0.95	1.100
1	1.090
1.1	1.029
1.2	0.976
1.3	0.929
1.4	0.888
1.5	0.852
1.6	0.819
1.7	0.789
1.8	0.762
1.9	0.738
2	0.715
2.2	0.649
2.4	0.594
2.5	0.570
2.6	0.547
2.8	0.508
3	0.473
3.2	0.439
3.4	0.410
3.5	0.396

3.6	0.384
3.8	0.360
4	0.340
4.2	0.324
4.4	0.309
4.6	0.295
4.8	0.283
5	0.272

LIQUEFACTION ANALYSES

LIQUEFACTION POTENTIAL ANALYSIS (SPT procedures per Youd et al, 2001)

PROJECT NAME ***San Leandro Creek BOH (Widen)***
PROJECT NO. ***2006-139-UPR***
BORING NO. ***RW-34***

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS

FAULT INFO

a_{max} (g)= 0.7
FAULT M_w = 7.5

GW DEPTH (ft)= 16 *(below OG, during drilling)*

BOREHOLE DIA (in)= 5
HAMMER ENERGY = 60%

MAJOR CUT(-)/FILL(+) (ft) 0
DESIGN GW DEPTH (ft)= 0 *(below OG)*

MSF = 1.00

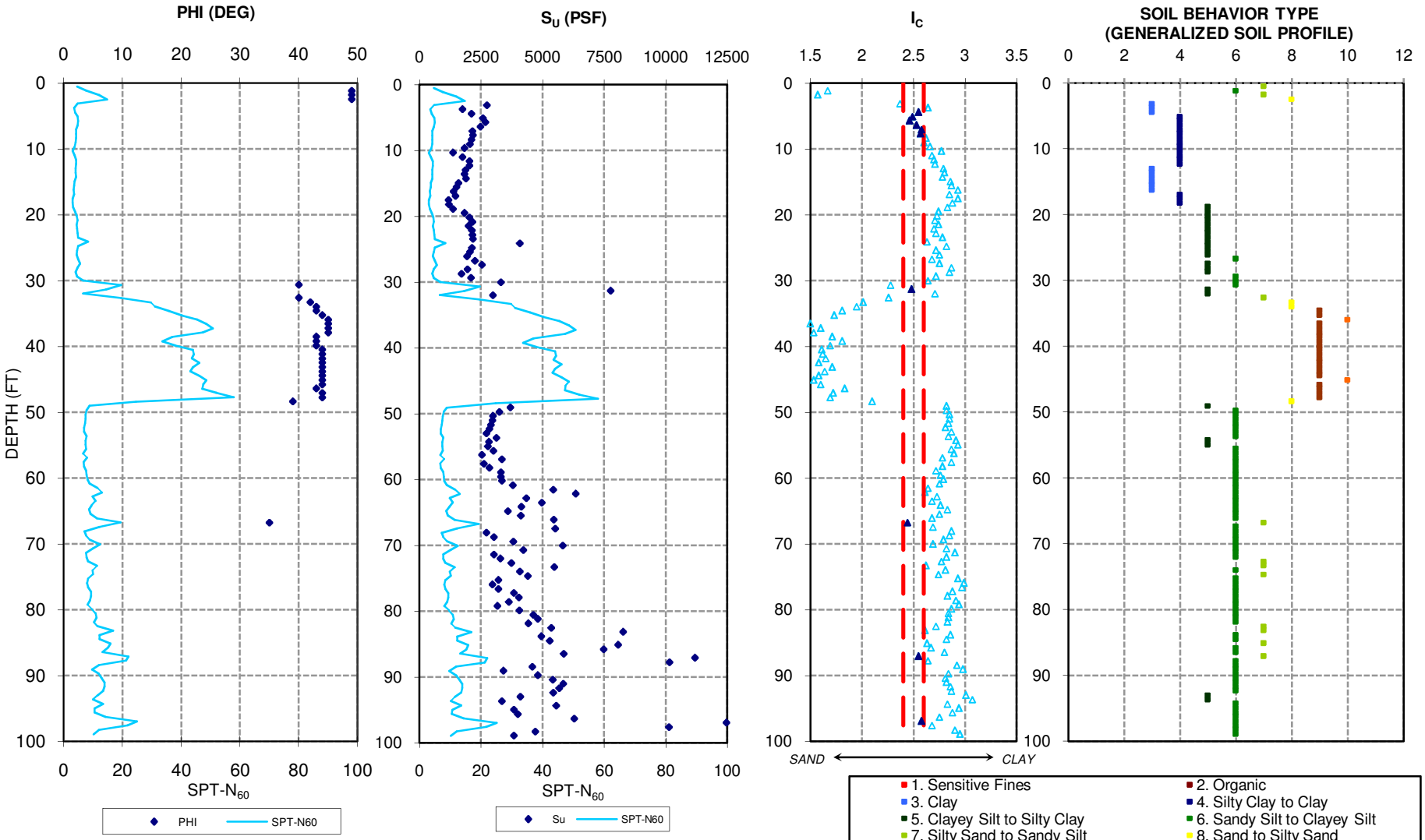
SOIL STRATA							*LIQUEFACTION RESISTANCE ($CRR_{7.5}$)*								*CYCLIC STRESS RATIO (CSR)*				*F.S.=($CRR_{7.5}$/CSR)*MSF*Ks*Ka*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	N_{60}	s_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{7.5}$	s_v (psf)	s_v' (psf)	r_d	CSR	Ks	Ka	F.S.	e (%)	D (in)
0.0	4.0	1	2	2	100	MC	65	48.8	202	1.70	82.9				201.8	77	1.00		1.00	1			
4.0	8.0	2	4	2	21	MC	14	10.2	404	1.70	17.4				403.6	154	0.99		1.00	1			
8.0	13.0	3	9.5	2	17	MC	11	9.4	896	1.49	14.0				896	303.2	0.98		1.00	1			
13.0	18.0	4	14.5	2	13	MC	8	7.2	1395	1.20	8.6				1394.8	489.95	0.97		1.00	1			
18.0	23.0	5	19.5	2	17	MC	11	12.1	1792	1.06	12.8				2010.7	793.85	0.96		1.00	1			
23.0	28.0	6	24.5	1	43	MC	28	26.6	2120	0.97	25.8	10%	27.2	0.34	2650.2	1121.4	0.94	1.01	0.98	1	(0.33)		
28.0	33.0	6	24.5	2	8	SPT	8	9.1	2116	0.97	8.9				2646.7	1117.9	0.94		0.98	1			

Notes:
1. The correction factors C_E (Energy Ratio), C_B (Borehole Diameter), C_R (Rod Length) and C_S (Sampling Method-liner) are per Youd et al. (2001).
2. For correction of overburden, $C_N = (1/s_v')^{0.5}$ with a maximum value of 1.7.
3. The influence of Fines Contents are expressed by the following correction: $(N_1)_{60cs} = a + b\,(N_1)_{60}$
   where a and b = coefficients determined from the following relationships
   for FC $\leq$ 5% a = 0, b = 1.0
   for 5% < FC < 35% a = exp(1.76-(190/FC^2)), b = (0.99+($FC^{1.5}$/1000))
   for FC $\geq$ 35% a = 5.0, b = 1.2
4. For $(N_1)_{60,cs}$ greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.

Reference:
Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

CPT DATA CORRELATION

CPT-1



Reference: CPT data and correlation provided by Gregg Drilling and Testing, Inc.

PARIKH

Practicing in the Geosciences

SAN LEANDRO CREEK & OVERHEAD AT RTE 880
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10

PLATE NO.:

LIQUEFACTION POTENTIAL ANALYSIS (per Youd & Idriss, 2001)

PROJECT NAME	***San Leandro Creek Bridge and Overhead (Widen)***	*FAULT INFO*	
PROJECT NO.	***206139.UPR***	*COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)*	
CPT NO.	***CPT-1***	*a_{max} (g)=* 0.7	*FAULT M_w =* 7.5
			MSF = 1.00

			CPT RESULT INPUT							*CSR*		*$CRR_{7.5}$*						*F.S.=(CRR $_{7.5}$/CSR)*MSF*Kσ*Kα*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	Kσ	Kα	F.S.
0.492	7	Silty Sand to Sandy Silt	31.439	0.206	0.029		0.029	1.12	1.7	1.00	0.455	1.120	1.70	53.45	1.000	53.446	0.09	1.00	1	
1.148	6	Sandy Silt to Clayey Silt	43.395	0.903	0.067		0.067	1.67	1.7	1.00	0.455	1.670	1.70	73.77	1.017	75.053	0.12	1.00	1	
1.804	7	Silty Sand to Sandy Silt	71.27	1.153	0.105		0.105	1.57	1.68582	1.00	0.454	1.570	1.69	120.15	1.000	120.149	0.24	1.00	1	
2.461	8	Sand to Silty Sand	90.812	0.997	0.145		0.145	1.43	1.63569	1.00	0.453	1.430	1.64	148.54	1.000	148.540	0.38	1.00	1	
3.117	3	Clay	20.753	0.996	0.181		0.181	2.37	1.59305	0.99	0.453	2.370	1.59	33.06	2.194	72.536	0.12	1.00	1	
3.773	3	Clay	13.379	0.853	0.218		0.218	2.64	1.55148	0.99	0.452							1.00	1	
4.429	3	Clay	16.154	0.799	0.255		0.255	2.55	1.51203	0.99	0.451	2.550	1.51	24.43	3.034	74.112	0.12	1.00	1	
5.085	4	Silty Clay to Clay	19.715	0.855	0.292		0.292	2.49	1.47453	0.99	0.450	2.490	1.47	29.07	2.718	79.024	0.13	1.00	1	
5.741	4	Silty Clay to Clay	20.565	0.751	0.33		0.33	2.46	1.43791	0.99	0.450	2.460	1.44	29.57	2.574	76.123	0.12	1.00	1	
6.398	4	Silty Clay to Clay	18.965	0.742	0.367	0.011	0.356	2.53	1.41388	0.99	0.463	2.530	1.41	26.81	2.925	78.426	0.12	1.00	1	0.27
7.054	4	Silty Clay to Clay	16.608	0.628	0.405	0.032	0.373	2.58	1.3986	0.99	0.487	2.580	1.40	23.23	3.206	74.479	0.12	1.00	1	0.24
7.71	4	Silty Clay to Clay	16.825	0.597	0.443	0.052	0.391	2.57	1.38278	0.98	0.507	2.570	1.38	23.27	3.148	73.238	0.12	1.00	1	0.23
8.366	4	Silty Clay to Clay	16.399	0.635	0.48	0.072	0.408	2.62	1.36816	0.98	0.526							1.00	1	
9.022	4	Silty Clay to Clay	15.995	0.546	0.518	0.093	0.425	2.6	1.35385	0.98	0.544							1.00	1	
9.678	4	Silty Clay to Clay	14.287	0.491	0.555	0.113	0.442	2.66	1.33983	0.98	0.560							1.00	1	
10.335	4	Silty Clay to Clay	10.805	0.367	0.593	0.134	0.459	2.77	1.3261	0.98	0.575							1.00	1	
10.991	4	Silty Clay to Clay	13.696	0.446	0.63	0.154	0.476	2.68	1.31265	0.98	0.588							1.00	1	
11.647	4	Silty Clay to Clay	15.88	0.633	0.668	0.175	0.493	2.7	1.29947	0.98	0.602							1.00	1	
12.303	4	Silty Clay to Clay	15.931	0.634	0.706	0.195	0.51	2.71	1.28655	0.97	0.614							1.00	1	
12.959	3	Clay	14.597	0.652	0.742	0.216	0.526	2.79	1.27462	0.97	0.624							1.00	1	
13.615	3	Clay	14.402	0.638	0.779	0.236	0.543	2.8	1.26219	0.97	0.634							1.00	1	
14.272	3	Clay	14.828	0.609	0.815	0.257	0.559	2.78	1.25071	0.97	0.644							1.00	1	
14.928	3	Clay	12.708	0.543	0.852	0.277	0.575	2.86	1.23944	0.97	0.653							1.00	1	
15.584	3	Clay	12.089	0.486	0.888	0.298	0.591	2.87	1.22836	0.97	0.661							1.00	1	
16.24	3	Clay	11.223	0.482	0.925	0.318	0.607	2.93	1.21749	0.97	0.670							1.00	1	
16.896	4	Silty Clay to Clay	11.93	0.391	0.963	0.339	0.624	2.85	1.20614	0.96	0.677							1.00	1	
17.552	4	Silty Clay to Clay	9.897	0.319	1	0.359	0.641	2.93	1.195	0.96	0.683							1.00	1	
18.209	4	Silty Clay to Clay	10.02	0.266	1.038	0.38	0.658	2.88	1.18407	0.96	0.690							1.00	1	
18.865	5	Clayey Silt to Silty Clay	11.281	0.279	1.075	0.4	0.675	2.83	1.17333	0.96	0.695							1.00	1	
19.521	5	Clayey Silt to Silty Clay	14.691	0.372	1.113	0.42	0.692	2.74	1.16279	0.96	0.701							1.00	1	
20.177	5	Clayey Silt to Silty Clay	16.334	0.45	1.151	0.441	0.71	2.73	1.15183	0.96	0.705							1.00	1	
20.833	5	Clayey Silt to Silty Clay	17.365	0.473	1.188	0.461	0.727	2.71	1.14167	0.95	0.710							1.00	1	
21.49	5	Clayey Silt to Silty Clay	15.966	0.423	1.226	0.482	0.744	2.74	1.13169	0.95	0.714							1.00	1	
22.146	5	Clayey Silt to Silty Clay	17.149	0.423	1.263	0.502	0.761	2.7	1.12188	0.95	0.718							1.00	1	
22.802	5	Clayey Silt to Silty Clay	17.444	0.456	1.301	0.523	0.778	2.72	1.11223	0.95	0.722							1.00	1	
23.458	5	Clayey Silt to Silty Clay	17.654	0.554	1.338	0.543	0.795	2.78	1.10276	0.95	0.725							1.00	1	
24.114	5	Clayey Silt to Silty Clay	31.998	1.233	1.376	0.564	0.812	2.63	1.09344	0.94	0.729							1.00	1	
24.77	5	Clayey Silt to Silty Clay	17.553	0.583	1.414	0.584	0.829	2.82	1.08428	0.94	0.732							1.00	1	
25.427	5	Clayey Silt to Silty Clay	16.897	0.369	1.451	0.605	0.847	2.72	1.07474	0.94	0.733							1.00	1	
26.083	5	Clayey Silt to Silty Clay	15.758	0.332	1.489	0.625	0.864	2.75	1.06589	0.94	0.735							1.00	1	
26.739	6	Sandy Silt to Clayey Silt	18.165	0.366	1.526	0.646	0.881	2.68	1.05718	0.94	0.737							1.00	1	
27.395	5	Clayey Silt to Silty Clay	20.292	0.617	1.564	0.666	0.898	2.75	1.04862	0.93	0.739							1.00	1	
28.051	5	Clayey Silt to Silty Clay	15.873	0.515	1.602	0.687	0.915	2.87	1.04019	0.93	0.741							1.00	1	
28.707	5	Clayey Silt to Silty Clay	14.056	0.341	1.639	0.707	0.932	2.85	1.03189	0.93	0.742							1.00	1	
29.364	6	Sandy Silt to Clayey Silt	16.846	0.321	1.677	0.728	0.949	2.72	1.02373	0.92	0.743							1.00	1	
30.02	6	Sandy Silt to Clayey Silt	25.568	0.665	1.714	0.748	0.966	2.64	1.0157	0.92	0.743							1.00	1	
30.676	6	Sandy Silt to Clayey Silt	88.599	2.614	1.752	0.769	0.984	2.28	1.00733	0.92	0.743	2.280	1.01	89.25	1.886	168.337		1.00	1	
31.332	5	Clayey Silt to Silty Clay	60.169	2.25	1.79	0.789	1.001	2.48	0.99955	0.91	0.743	2.480	1.00	60.14	2.669	160.539		1.00	1	
31.988	5	Clayey Silt to Silty Clay	24.3	0.65	1.827	0.809	1.018	2.71	0.99188	0.91	0.743							1.00	1	
32.644	7	Silty Sand to Sandy Silt	89.745	2.354	1.866	0.83	1.036	2.26	0.9839	0.91	0.742	2.260	0.98	88.30	1.827	161.305		0.99	1	
33.301	8	Sand to Silty Sand	150.808	2.906	1.906	0.85	1.055	2.01	0.97561	0.90	0.741	2.010	0.98	147.13	1.313	193.223		0.98	1	
33.957	8	Sand to Silty Sand	161.152	2.698	1.945	0.871	1.074	1.95	0.96746	0.90	0.740	1.950	0.97	155.91	1.240	193.304		0.98	1	
34.613	9	Sand	195.796	2.535	1.986	0.891	1.095	1.81	0.95861	0.89	0.737	1.810	0.96	187.69	1.114	209.090		0.97	1	
35.269	9	Sand	226.316	2.525	2.027	0.912	1.115	1.73	0.95032	0.89	0.735	1.730	0.95	215.07	1.058	227.560		0.96	1	
35.925	10	Gravelly Sand to Sand	279.003	1.568	2.068	0.932	1.136	1.46	0.94178	0.88	0.732	1.460	0.94	262.76	1.000	262.760		0.95	1	
36.581	9	Sand	294.753	1.999	2.109	0.953	1.156	1.5	0.93379	0.88	0.730	1.500	0.93	275.24	1.000	275.236		0.94	1	
37.238	9	Sand	297.536	2.736	2.15	0.973	1.177	1.6	0.92554	0.87	0.726	1.600	0.93	275.38	1.000	275.380		0.94	1	
37.894	9	Sand	283.314	1.987	2.191	0.994	1.197	1.53	0.91781	0.87	0.724	1.530	0.92	260.03	1.000	260.030		0.93	1	
38.55	9	Sand	209.986	1.884	2.231	1.014	1.217	1.71	0.91022	0.86	0.720	1.710	0.91	191.13	1.045	199.658		0.93	1	
39.206	9	Sand	183.887	1.937	2.272	1.035	1.237	1.81	0.90275	0.86	0.717	1.810	0.90	166.00	1.114	184.930		0.93	1	
39.862	9	Sand	215.229	1.786	2.313	1.055	1.258	1.69	0.89504	0.85	0.713	1.690	0.90	192.64	1.031	198.626		0.92	1	
40.518	9	Sand	257.335	1.956	2.354	1.076	1.278	1.61	0.88781	0.85	0.709	1.610	0.89	228.47	1.000	228.465		0.91	1	
41.175	9	Sand	258.646	1.991	2.394	1.096	1.298	1.62	0.8807	0.84	0.705	1.620	0.88	227.79	1.000	227.791		0.90	1	
41.831	9	Sand	251.179	2.087	2.435	1.117	1.318	1.65	0.87371	0.83	0.701	1.650	0.87	219.46	1.003	220.190		0.90	1	
42.487	9	Sand	272.739	1.912	2.476	1.137	1.339	1.58	0.86648	0.83	0.697	1.580	0.87	236.32	1.000	236.324		0.89	1	
43.143	9	Sand	248.382	2.375	2.516	1.158	1.359	1.71	0.85971	0.82	0.692	1.710	0.86	213.54	1.045	223.060		0.89	1	
43.799	9	Sand	250.609	1.853	2.557	1.178	1.379	1.64	0.85304	0.82	0.688	1.640	0.85	213.78	1.000	213.780		0.88	1	
44.455	9	Sand	272.479	1.828	2.598	1.198	1.399	1.58	0.84648	0.81	0.684	1.580	0.85	230.65	1.000	230.648		0.87	1	
45.112	10	Gravelly Sand to Sand	291.546	1.71	2.64	1.219	1.421	1.53	0.83937	0.80	0.678	1.530	0.84	244.72	1.000	244.716		0.87	1	
45.768	9	Sand	279.111	1.948	2.68	1.239	1.441	1.6	0.83302	0.80	0.674	1.600	0.83	232.50	1.000	232.504		0.86	1	
46.424	9	Sand	255.46	3.457	2.721	1.26	1.461	1.83	0.82676	0.79	0.669	1.830	0.83	211.20	1.129	238.487		0.87	1	
47.08	9	Sand	292.943	3.137	2.762	1.28	1.482	1.72	0.82028	0.78	0.664	1.720	0.82	240.30	1.051	252.630		0.85	1	
47.736	9	Sand	329.592	3.513	2.803	1.301	1.502	1.69	0.81421	0.78	0.659	1.690	0.81	268.36	1.031	276.699		0.85	1	
48.392	8	Sand to Silty Sand	121.001	1.707	2.842	1.321	1.521	2.1	0.80853	0.77	0.654	2.100	0.81	97.83	1.455	142.322	0.35	0.90	1	0.53
49.049	5	Clayey Silt to Silty Clay	30.73	0.924	2.88	1.342	1.538	2.82	0.80351	0.76	0.650							0.92	1	
49.705	6	Sandy Silt to Clayey Silt	27.385	0.69	2.917	1.362	1.555	2.82	0.79855	0.76	0.645							0.92	1	
50.361	6	Sandy Silt to Clayey Silt	25.446	0.626	2.955	1.383	1.572	2.85	0.79365	0.75	0.641							0.91	1	
51.017	6	Sandy Silt to Clayey Silt	25.395	0.605	2.993	1.403	1.589	2.85	0.78881	0.74	0.636							0.91	1	
51.673	6	Sandy Silt to Clayey Silt	24.92	0.542	3.03	1.424	1.607	2.84	0.78375	0.74	0.631							0.91	1	
52.329	6	Sandy Silt to Clayey Silt	24.422	0.447	3.068	1.444	1.624	2.81	0.77904	0.73	0.627							0.91	1	
52.986	6	Sandy Silt to Clayey Silt	23.615	0.503	3.105	1.465	1.641	2.87	0.77438	0.72	0.622							0.91	1	
53.642	6	Sandy Silt to Clayey Silt	26.685	0.622	3.143	1.485	1.658	2.84	0.76977	0.72	0.618							0.90	1	
54.298	5	Clayey Silt to Silty Clay	24.365	0.626	3.181	1.506	1.675	2.91	0.76522	0.71	0.614							0.90	1	
54.954	5	Clayey Silt to Silty Clay	24.199	0.638	3.218	1.526	1.692	2.93	0.76072	0.70	0.609							0.90	1	
55.61	6	Sandy Silt to Clayey Silt	25.871	0.6	3.256	1.546	1.709	2.87	0.75627	0.70	0.605							0.90	1	
56.266	6	Sandy Silt to Clayey Silt	22.469	0.433	3.293	1.567	1.726	2.89	0.75188	0.69	0.600							0.90	1	
56.923	6	Sandy Silt to Clayey Silt	28.495	0.54	3.331	1.587	1.744	2.78	0.74728	0.69	0.596							0.89	1	
57.579	6	Sandy Silt to Clayey Silt	23.11	0.413	3.369	1.608	1.761	2.87	0.74299	0.68	0.592							0.89	1	
58.235	6	Sandy Silt to Clayey Silt	24.797	0.332	3.406	1.628	1.778	2.78	0.73875	0.67	0.588							0.89	1	
58.891	6	Sandy Silt to Clayey Silt	28.17	0.373	3.444	1.649	1.795	2.72	0.73456	0.67	0.584							0.89	1	
59.547	6	Sandy Silt to Clayey Silt	28.271	0.446	3.481	1.669	1.812	2.76	0.73041	0.66	0.579							0.89	1	
60.203	6	Sandy Silt to Clayey Silt	28.517	0.515	3.519	1.69	1.829	2.79	0.72631	0.66	0.576							0.89	1	
60.86	6	Sandy Silt to Clayey Silt	32.006	0.585	3.557	1.71	1.846	2.75	0.72226	0.65	0.572							0.88	1	

LIQUEFACTION POTENTIAL ANALYSIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge and Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-1***

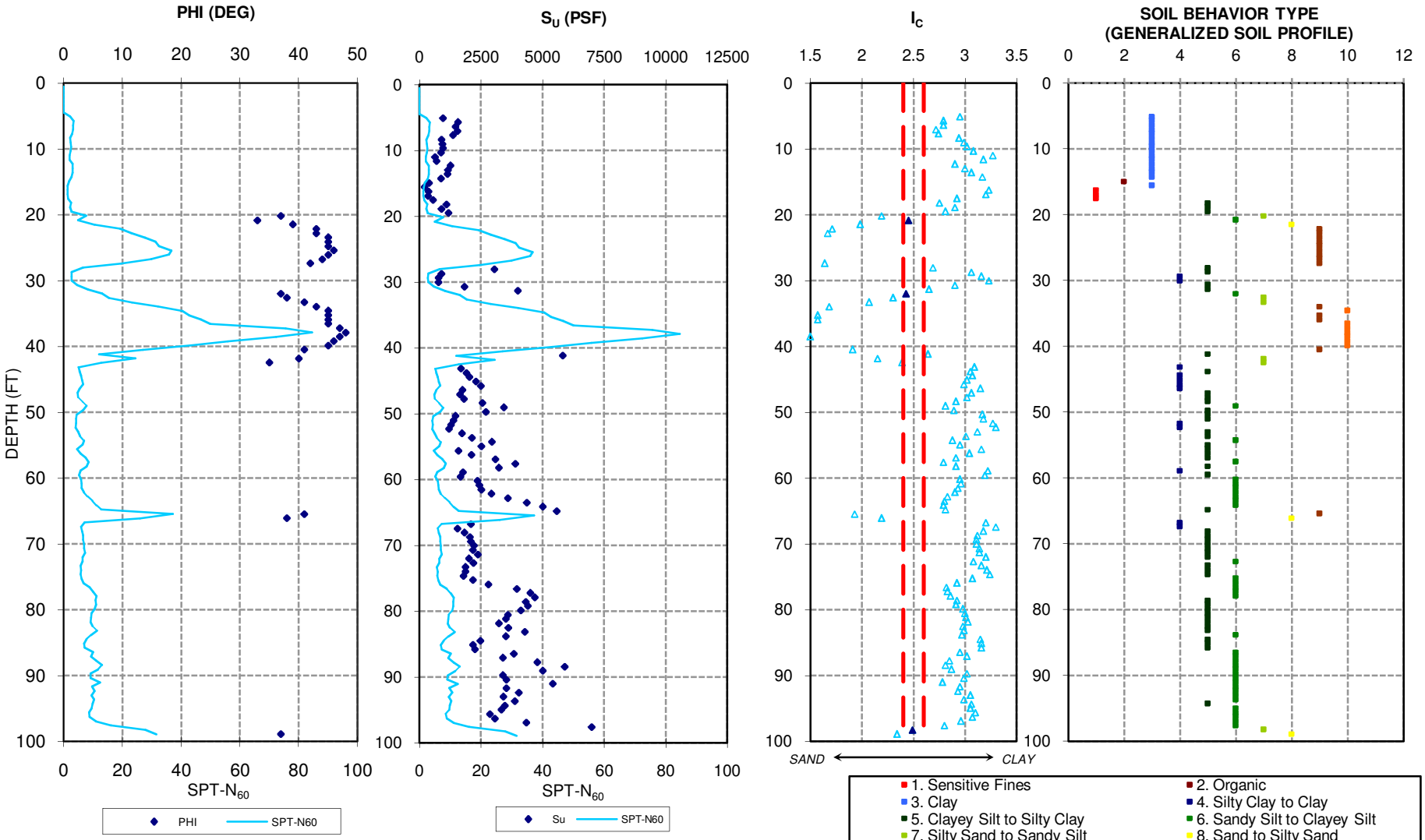
FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} *(g)=* 0.7

FAULT M_w *=* 7.5
MSF = 1.00

			CPT RESULT INPUT							*CSR*		*$CRR_{7.5}$*						*F.S.=(CRR 7.5/CSR)*MSF*Kσ*Kα*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	Kσ	Kα	F.S.
61.516	6	Sandy Silt to Clayey Silt	44.296	0.881	3.594	1.731	1.863	2.64	0.71825	0.65	0.568							0.88	1	
62.172	6	Sandy Silt to Clayey Silt	51.129	1.118	3.632	1.751	1.881	2.61	0.71405	0.64	0.564							0.88	1	
62.828	6	Sandy Silt to Clayey Silt	35.984	0.715	3.669	1.772	1.898	2.73	0.71014	0.64	0.561							0.88	1	
63.484	6	Sandy Silt to Clayey Silt	40.591	0.803	3.707	1.792	1.915	2.68	0.70626	0.63	0.557							0.88	1	
64.14	6	Sandy Silt to Clayey Silt	34.283	0.719	3.745	1.813	1.932	2.76	0.70243	0.63	0.554							0.88	1	
64.797	6	Sandy Silt to Clayey Silt	29.994	0.647	3.782	1.833	1.949	2.83	0.69863	0.62	0.550							0.88	1	
65.453	6	Sandy Silt to Clayey Silt	33.325	0.662	3.82	1.854	1.966	2.75	0.69488	0.62	0.547							0.87	1	
66.109	6	Sandy Silt to Clayey Silt	42.659	0.96	3.857	1.874	1.983	2.68	0.69117	0.61	0.544							0.87	1	
66.765	7	Silty Sand to Sandy Silt	81.585	1.69	3.896	1.895	2.001	2.44	0.68729	0.61	0.541	2.440	0.69	56.07	2.483	139.235	0.33	0.87	1	0.61
67.421	6	Sandy Silt to Clayey Silt	45.37	1.026	3.934	1.915	2.019	2.69	0.68344	0.61	0.538							0.87	1	
68.077	6	Sandy Silt to Clayey Silt	24.307	0.357	3.971	1.935	2.036	2.87	0.67985	0.60	0.535							0.87	1	
68.734	6	Sandy Silt to Clayey Silt	26.318	0.431	4.009	1.956	2.053	2.85	0.6763	0.60	0.532							0.87	1	
69.39	6	Sandy Silt to Clayey Silt	31.868	0.587	4.046	1.976	2.07	2.79	0.67278	0.60	0.529							0.86	1	
70.046	6	Sandy Silt to Clayey Silt	46.451	1.085	4.084	1.997	2.087	2.69	0.6693	0.59	0.527							0.86	1	
70.702	6	Sandy Silt to Clayey Silt	35.199	0.823	4.121	2.017	2.104	2.82	0.66586	0.59	0.524							0.86	1	
71.358	6	Sandy Silt to Clayey Silt	25.568	0.497	4.159	2.038	2.121	2.9	0.66245	0.58	0.522							0.86	1	
72.014	6	Sandy Silt to Clayey Silt	27.01	0.431	4.197	2.058	2.138	2.82	0.65908	0.58	0.519							0.86	1	
72.671	7	Silty Sand to Sandy Silt	29.857	0.477	4.235	2.079	2.157	2.77	0.65535	0.58	0.517							0.86	1	
73.327	7	Silty Sand to Sandy Silt	44.123	0.661	4.274	2.099	2.175	2.62	0.65185	0.58	0.514							0.86	1	
73.983	6	Sandy Silt to Clayey Silt	34.377	0.706	4.312	2.12	2.192	2.81	0.64858	0.57	0.512							0.85	1	
74.639	7	Silty Sand to Sandy Silt	36.511	0.63	4.35	2.14	2.21	2.74	0.64516	0.57	0.510							0.85	1	
75.295	6	Sandy Silt to Clayey Silt	27.37	0.6	4.388	2.161	2.227	2.93	0.64196	0.57	0.508							0.85	1	
75.951	6	Sandy Silt to Clayey Silt	25.078	0.634	4.425	2.181	2.244	2.99	0.63879	0.56	0.506							0.85	1	
76.608	6	Sandy Silt to Clayey Silt	26.722	0.702	4.463	2.202	2.261	2.97	0.63565	0.56	0.504							0.85	1	
77.264	6	Sandy Silt to Clayey Silt	31.169	0.77	4.501	2.222	2.278	2.88	0.63255	0.56	0.502							0.85	1	
77.92	6	Sandy Silt to Clayey Silt	32.589	0.695	4.538	2.243	2.296	2.83	0.62929	0.56	0.500							0.85	1	
78.576	6	Sandy Silt to Clayey Silt	29.771	0.737	4.576	2.263	2.313	2.91	0.62625	0.55	0.498							0.85	1	
79.232	6	Sandy Silt to Clayey Silt	26.318	0.577	4.613	2.283	2.33	2.94	0.62323	0.55	0.496							0.84	1	
79.888	6	Sandy Silt to Clayey Silt	32.899	0.799	4.651	2.304	2.347	2.87	0.62024	0.55	0.495							0.84	1	
80.545	6	Sandy Silt to Clayey Silt	37.051	0.945	4.689	2.324	2.364	2.84	0.61728	0.55	0.493							0.84	1	
81.201	6	Sandy Silt to Clayey Silt	38.608	1.051	4.726	2.345	2.381	2.84	0.61435	0.54	0.491							0.84	1	
81.857	6	Sandy Silt to Clayey Silt	35.696	0.796	4.764	2.365	2.398	2.83	0.61145	0.54	0.490							0.84	1	
82.513	7	Silty Sand to Sandy Silt	42.803	0.811	4.802	2.386	2.417	2.72	0.60824	0.54	0.488							0.84	1	
83.169	7	Silty Sand to Sandy Silt	65.294	1.48	4.841	2.406	2.435	2.61	0.60523	0.54	0.486							0.84	1	
83.825	6	Sandy Silt to Clayey Silt	41.585	1.171	4.879	2.427	2.452	2.86	0.60241	0.54	0.485							0.84	1	
84.482	6	Sandy Silt to Clayey Silt	42.753	1.136	4.916	2.447	2.469	2.82	0.59962	0.53	0.484							0.83	1	
85.138	7	Silty Sand to Sandy Silt	61.43	1.443	4.955	2.468	2.487	2.63	0.59669	0.53	0.482							0.83	1	
85.794	6	Sandy Silt to Clayey Silt	57.408	1.414	4.992	2.488	2.504	2.67	0.59395	0.53	0.481							0.83	1	
86.45	6	Sandy Silt to Clayey Silt	46.711	1.31	5.03	2.509	2.521	2.8	0.59124	0.53	0.480							0.83	1	
87.106	7	Silty Sand to Sandy Silt	88.03	2.222	5.069	2.529	2.539	2.55	0.58839	0.53	0.478	2.550	0.59	51.80	3.034	157.162	0.44	0.83	1	0.92
87.762	6	Sandy Silt to Clayey Silt	81.304	2.472	5.106	2.55	2.557	2.64	0.58557	0.52	0.477							0.83	1	
88.419	6	Sandy Silt to Clayey Silt	39.538	1.133	5.144	2.57	2.574	2.92	0.58294	0.52	0.476							0.83	1	
89.075	6	Sandy Silt to Clayey Silt	30.607	0.698	5.181	2.591	2.591	2.98	0.58032	0.52	0.474							0.83	1	
89.731	6	Sandy Silt to Clayey Silt	40.98	0.909	5.219	2.611	2.608	2.84	0.57773	0.52	0.473							0.83	1	
90.387	6	Sandy Silt to Clayey Silt	45.348	1.064	5.257	2.632	2.625	2.81	0.57516	0.52	0.472							0.82	1	
91.043	6	Sandy Silt to Clayey Silt	48.433	1.319	5.294	2.652	2.642	2.82	0.57262	0.52	0.471							0.82	1	
91.699	6	Sandy Silt to Clayey Silt	47.114	1.438	5.332	2.672	2.659	2.86	0.5701	0.52	0.470							0.82	1	
92.356	6	Sandy Silt to Clayey Silt	45.824	1.337	5.369	2.693	2.676	2.87	0.5676	0.51	0.469							0.82	1	
93.012	5	Clayey Silt to Silty Clay	35.703	1.184	5.407	2.713	2.694	3.01	0.56497	0.51	0.468							0.82	1	
93.668	5	Clayey Silt to Silty Clay	30.052	0.911	5.445	2.734	2.711	3.07	0.56252	0.51	0.467							0.82	1	
94.324	6	Sandy Silt to Clayey Silt	46.848	1.18	5.482	2.754	2.728	2.83	0.56008	0.51	0.466							0.82	1	
94.98	6	Sandy Silt to Clayey Silt	34.219	0.748	5.52	2.775	2.745	2.94	0.55767	0.51	0.465							0.82	1	
95.636	6	Sandy Silt to Clayey Silt	35.184	0.636	5.557	2.795	2.762	2.88	0.55528	0.51	0.464							0.82	1	
96.293	6	Sandy Silt to Clayey Silt	51.757	1.124	5.595	2.816	2.779	2.75	0.5529	0.51	0.463							0.82	1	
96.949	6	Sandy Silt to Clayey Silt	98.77	2.777	5.633	2.836	2.796	2.58	0.55055	0.50	0.462	2.580	0.55	54.38	3.206	174.360		0.81	1	
97.605	6	Sandy Silt to Clayey Silt	81.578	2.497	5.67	2.857	2.813	2.68	0.54822	0.50	0.461							0.81	1	
98.261	6	Sandy Silt to Clayey Silt	40.295	0.989	5.708	2.877	2.831	2.9	0.54577	0.50	0.460							0.81	1	
98.917	6	Sandy Silt to Clayey Silt	32.805	0.716	5.745	2.898	2.848	2.95	0.54348	0.50	0.459							0.81	1	

CPT DATA CORRELATION

CPT-2



Reference: CPT data and correlation provided by Gregg Drilling and Testing, Inc.

PARIKH

Practicing in the Geosciences

SAN LEANDRO CREEK & OVERHEAD AT RTE 880
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10

PLATE NO.:

LIQUEFACTION POTENTIAL ANALYSIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge & Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-2***

FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} *(g)=* 0.7

FAULT M_w = 7.5
MSF = 1.00

Depth (ft)		Soil Behavior Type	CPT RESULT INPUT qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	CSR γ_d	CSR	$CRR_{7.5}$ Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	F.S.=($CRR_{7.5}$/CSR)*MSF*K_σ*K_α Kσ	Kα	F.S.
0.492									1.7	1.00									1	
1.148									1.7	1.00									1	
1.804									1.7	1.00									1	
2.461									1.7	1.00									1	
3.117									1.7	0.99									1	
3.773									1.7	0.99									1	
4.429									1.7	0.99									1	
5.085	3	Clay	7.497	0.559	0.283		0.283	2.95	1.48348	0.99	0.450							1.00	1	
5.741	3	Clay	11.966	0.758	0.32		0.32	2.79	1.44737	0.99	0.450							1.00	1	
6.398	3	Clay	11.339	0.631	0.356	0.011	0.345	2.79	1.42395	0.99	0.463							1.00	1	
7.054	3	Clay	11.916	0.522	0.393	0.032	0.361	2.72	1.40935	0.99	0.488							1.00	1	
7.71	3	Clay	10.661	0.419	0.429	0.052	0.377	2.74	1.39505	0.98	0.510							1.00	1	
8.366	3	Clay	7.252	0.339	0.466	0.072	0.394	2.94	1.38018	0.98	0.529							1.00	1	
9.022	3	Clay	7.475	0.404	0.503	0.093	0.41	2.99	1.36646	0.98	0.548							1.00	1	
9.678	3	Clay	7.648	0.454	0.539	0.113	0.426	3.02	1.35301	0.98	0.564							1.00	1	
10.335	3	Clay	7.094	0.437	0.576	0.134	0.442	3.08	1.33983	0.98	0.580							1.00	1	
10.991	3	Clay	5.421	0.42	0.612	0.154	0.458	3.27	1.3269	0.98	0.594							1.00	1	
11.647	3	Clay	5.897	0.355	0.649	0.175	0.474	3.18	1.31422	0.98	0.608							1.00	1	
12.303	3	Clay	10.222	0.466	0.685	0.195	0.49	2.9	1.30178	0.97	0.620							1.00	1	
12.959	3	Clay	9.414	0.514	0.722	0.216	0.506	3	1.28957	0.97	0.632							1.00	1	
13.615	3	Clay	9.327	0.599	0.758	0.236	0.522	3.06	1.27758	0.97	0.642							1.00	1	
14.272	3	Clay	7.461	0.488	0.795	0.257	0.538	3.17	1.26582	0.97	0.652							1.00	1	
14.928	2	Organic	3.767	0.318	0.821	0.277	0.544	3.55	1.26147	0.97	0.665							1.00	1	
15.584	3	Clay	2.386	0.124	0.858	0.298	0.56	3.73	1.25	0.97	0.674							1.00	1	
16.24	1	Sensitive Fines	3.619	0.065	0.894	0.318	0.576	3.23	1.23874	0.97	0.682							1.00	1	
16.896	1	Sensitive Fines	3.556	0.051	0.931	0.339	0.592	3.2	1.22768	0.96	0.690							1.00	1	
17.552	1	Sensitive Fines	5.176	0.048	0.967	0.359	0.608	2.92	1.21681	0.96	0.697							1.00	1	
18.209	5	Clayey Silt to Silty Clay	9.097	0.13	1.005	0.38	0.625	2.75	1.20548	0.96	0.703							1.00	1	
18.865	5	Clayey Silt to Silty Clay	7.584	0.145	1.042	0.4	0.642	2.9	1.19435	0.96	0.709							1.00	1	
19.521	5	Clayey Silt to Silty Clay	9.587	0.193	1.08	0.42	0.66	2.81	1.1828	0.96	0.713							1.00	1	
20.177	7	Silty Sand to Sandy Silt	36.244	0.437	1.119	0.441	0.678	2.19	1.17146	0.96	0.718	2.190	1.17	42.46	1.643	69.743	0.11	1.00	1	0.16
20.833	6	Sandy Silt to Clayey Silt	21.162	0.298	1.156	0.461	0.695	2.45	1.16095	0.95	0.723	2.450	1.16	24.57	2.528	62.113	0.10	1.00	1	0.14
21.49	8	Sand to Silty Sand	54.013	0.471	1.196	0.482	0.714	1.98	1.14943	0.95	0.726	1.980	1.15	62.08	1.275	79.141	0.13	1.00	1	0.17
22.146	9	Sand	108.624	0.812	1.237	0.502	0.734	1.71	1.13754	0.95	0.729	1.710	1.14	123.56	1.045	129.075	0.28	1.00	1	0.38
22.802	9	Sand	132.167	1.05	1.277	0.523	0.755	1.67	1.12532	0.95	0.730	1.670	1.13	148.73	1.017	151.314	0.40	1.00	1	0.55
23.458	9	Sand	171.057	0.805	1.318	0.543	0.775	1.44	1.11392	0.95	0.733	1.440	1.11	190.54	1.000	190.545		1.00	1	
24.114	9	Sand	203.502	0.598	1.359	0.564	0.795	1.27	1.10276	0.94	0.735	1.270	1.10	224.41	1.000	224.413		1.00	1	
24.77	9	Sand	209.564	0.684	1.4	0.584	0.815	1.29	1.09181	0.94	0.737	1.290	1.09	228.80	1.000	228.804		1.00	1	
25.427	9	Sand	231.175	1.136	1.44	0.605	0.836	1.38	1.08055	0.94	0.737	1.380	1.08	249.80	1.000	249.796		1.00	1	
26.083	9	Sand	228.147	0.961	1.481	0.625	0.856	1.35	1.07004	0.94	0.738	1.350	1.07	244.13	1.000	244.126		1.00	1	
26.739	9	Sand	190.779	0.566	1.522	0.646	0.876	1.33	1.05973	0.94	0.739	1.330	1.06	202.17	1.000	202.174		1.00	1	
27.395	9	Sand	112.776	0.519	1.562	0.666	0.896	1.64	1.04962	0.93	0.740	1.640	1.05	118.37	1.000	118.372	0.23	1.00	1	0.32
28.051	5	Clayey Silt to Silty Clay	24.581	0.725	1.6	0.687	0.913	2.69	1.04117	0.93	0.741							1.00	1	
28.707	5	Clayey Silt to Silty Clay	8.434	0.156	1.638	0.707	0.931	3.06	1.03238	0.93	0.742							1.00	1	
29.364	4	Silty Clay to Clay	7.605	0.169	1.675	0.728	0.948	3.16	1.02421	0.92	0.743							1.00	1	
30.02	4	Silty Clay to Clay	7.54	0.211	1.713	0.748	0.965	3.23	1.01617	0.92	0.743							1.00	1	
30.676	5	Clayey Silt to Silty Clay	15.397	0.436	1.75	0.769	0.982	2.9	1.00825	0.92	0.744							1.00	1	
31.332	5	Clayey Silt to Silty Clay	31.753	1.019	1.788	0.789	0.999	2.65	1.00045	0.91	0.744							1.00	1	
31.988	6	Sandy Silt to Clayey Silt	55.188	1.574	1.826	0.809	1.016	2.43	0.99278	0.91	0.744	2.430	0.99	54.79	2.439	133.633	0.30	1.00	1	0.41
32.644	7	Silty Sand to Sandy Silt	69.079	1.613	1.864	0.83	1.034	2.3	0.98478	0.91	0.743	2.300	0.98	68.03	1.949	132.568	0.30	0.99	1	0.40
33.301	7	Silty Sand to Sandy Silt	114.55	2.077	1.903	0.85	1.053	2.07	0.97648	0.90	0.742	2.070	0.98	111.86	1.403	156.924	0.44	0.99	1	0.59
33.957	9	Sand	182.886	1.477	1.944	0.871	1.073	1.68	0.96788	0.90	0.740	1.680	0.97	177.01	1.024	181.307		0.98	1	
34.613	10	Gravelly Sand to Sand	252.137	1.127	1.985	0.891	1.094	1.41	0.95902	0.89	0.737	1.410	0.96	241.81	1.000	241.805		0.96	1	
35.269	9	Sand	253.817	1.907	2.026	0.912	1.114	1.57	0.95073	0.89	0.735	1.570	0.95	241.31	1.000	241.313		0.96	1	
35.925	9	Sand	276.646	2.257	2.067	0.932	1.135	1.57	0.94218	0.88	0.733	1.570	0.94	260.65	1.000	260.651		0.95	1	
36.581	10	Gravelly Sand to Sand	310.223	1.73	2.109	0.953	1.156	1.43	0.93379	0.88	0.730	1.430	0.93	289.68	1.000	289.682		0.94	1	
37.238	10	Gravelly Sand to Sand	495.732	2.446	2.15	0.973	1.177	1.25	0.92554	0.87	0.726	1.250	0.93	458.82	1.000	458.818		0.94	1	
37.894	10	Gravelly Sand to Sand	528.149	4.302	2.192	0.994	1.198	1.4	0.91743	0.87	0.723	1.400	0.92	484.54	1.000	484.540		0.93	1	
38.55	10	Gravelly Sand to Sand	438.995	4.017	2.234	1.014	1.22	1.5	0.90909	0.86	0.719	1.500	0.91	399.09	1.000	399.086		0.92	1	
39.206	10	Gravelly Sand to Sand	351.383	1.793	2.276	1.035	1.241	1.38	0.90127	0.86	0.716	1.380	0.90	316.69	1.000	316.691		0.92	1	
39.862	10	Gravelly Sand to Sand	279.327	0.751	2.318	1.055	1.262	1.3	0.89358	0.85	0.712	1.300	0.89	249.60	1.000	249.602		0.91	1	
40.518	9	Sand	141.92	1.521	2.358	1.076	1.283	1.91	0.88602	0.85	0.708	1.910	0.89	125.74	1.198	150.693	0.40	0.93	1	0.56
41.175	5	Clayey Silt to Silty Clay	46.228	1.594	2.396	1.096	1.3	2.64	0.88	0.84	0.705							0.95	1	
41.831	7	Silty Sand to Sandy Silt	117.484	2.257	2.434	1.117	1.318	2.15	0.87371	0.83	0.701	2.150	0.87	102.65	1.553	159.389	0.46	0.93	1	0.65
42.487	7	Silty Sand to Sandy Silt	55.159	0.951	2.473	1.137	1.336	2.39	0.86751	0.83	0.698	2.390	0.87	47.85	2.272	108.718	0.20	0.94	1	0.29
43.143	4	Silty Clay to Clay	15.037	0.498	2.511	1.158	1.353	3.09	0.86173	0.82	0.694							0.94	1	
43.799	5	Clayey Silt to Silty Clay	16.637	0.556	2.548	1.178	1.37	3.05	0.85603	0.82	0.690							0.94	1	
44.455	4	Silty Clay to Clay	17.567	0.685	2.586	1.198	1.387	3.07	0.85041	0.81	0.686							0.94	1	
45.112	4	Silty Clay to Clay	19.564	0.75	2.623	1.219	1.405	3.02	0.84453	0.80	0.682							0.93	1	
45.768	4	Silty Clay to Clay	20.955	0.806	2.661	1.239	1.422	2.99	0.83905	0.80	0.678							0.93	1	
46.424	4	Silty Clay to Clay	15.239	0.629	2.699	1.26	1.439	3.15	0.83365	0.79	0.674							0.93	1	
47.08	5	Clayey Silt to Silty Clay	14.403	0.376	2.736	1.28	1.456	3.06	0.82831	0.78	0.669							0.93	1	
47.736	5	Clayey Silt to Silty Clay	15.311	0.382	2.774	1.301	1.473	3.02	0.82305	0.78	0.665							0.93	1	
48.392	5	Clayey Silt to Silty Clay	20.97	0.583	2.811	1.321	1.49	2.91	0.81784	0.77	0.660							0.92	1	
49.049	6	Sandy Silt to Clayey Silt	27.436	0.765	2.849	1.342	1.507	2.81	0.81271	0.76	0.656							0.92	1	
49.705	5	Clayey Silt to Silty Clay	22.368	0.606	2.887	1.362	1.524	2.89	0.80764	0.76	0.651							0.92	1	
50.361	5	Clayey Silt to Silty Clay	12.536	0.398	2.924	1.383	1.542	3.17	0.80233	0.75	0.646							0.92	1	
51.017	5	Clayey Silt to Silty Clay	11.771	0.356	2.962	1.403	1.559	3.18	0.79739	0.74	0.642							0.92	1	
51.673	4	Silty Clay to Clay	11.101	0.42	2.999	1.424	1.576	3.27	0.79251	0.74	0.637							0.91	1	
52.329	4	Silty Clay to Clay	10.301	0.399	3.037	1.444	1.593	3.3	0.78768	0.73	0.633							0.91	1	
52.986	5	Clayey Silt to Silty Clay	14.165	0.458	3.075	1.465	1.61	3.12	0.78292	0.72	0.628							0.91	1	
53.642	5	Clayey Silt to Silty Clay	17.517	0.503	3.112	1.485	1.627	3.01	0.77821	0.72	0.623							0.91	1	
54.298	6	Sandy Silt to Clayey Silt	23.514	0.63	3.15	1.506	1.644	2.88	0.77356	0.71	0.619							0.91	1	
54.954	5	Clayey Silt to Silty Clay	20.523	0.571	3.187	1.526	1.661	2.95	0.76896	0.70	0.614							0.90	1	
55.61	5	Clayey Silt to Silty Clay	13.098	0.404	3.225	1.546	1.679	3.16	0.76415	0.70	0.610							0.90	1	
56.266	5	Clayey Silt to Silty Clay	17.625	0.524	3.263	1.567	1.696	3.04	0.75967	0.69	0.605							0.90	1	
56.923	5	Clayey Silt to Silty Clay	24.307	0.753	3.3	1.587	1.713	2.91	0.75524	0.69	0.601							0.90	1	
57.579	6	Sandy Silt to Clayey Silt	30.196	0.811	3.338	1.608	1.73	2.79	0.75085	0.68	0.597							0.90	1	
58.235	5	Clayey Silt to Silty Clay	25.914	0.814	3.375	1.628	1.747	2.91	0.74652	0.67	0.592							0.89	1	
58.891	4	Silty Clay to Clay	15.585	0.65	3.413	1.649	1.764	3.22	0.74224	0.67	0.588							0.89	1	
59.547	5	Clayey Silt to Silty Clay	14.215	0.489	3.451	1.669	1.781	3.19	0.73801	0.66	0.584							0.89	1	
60.203	6	Sandy Silt to Clayey Silt	19.067	0.422	3.488	1.69	1.798	2.95	0.73382	0.66	0.580							0.89	1	
60.86	6	Sandy Silt to Clayey Silt	19.456	0.48	3.526	1.71	1.815	2.96	0.72968	0.65	0.577							0.89	1	

LIQUEFACTION POTENTIAL ANALYSIS (per Youd & Idriss, 2001)

PROJECT NAME	***San Leandro Creek Bridge & Overhead (Widen)***	*FAULT INFO*	
PROJECT NO.	***206139.UPR***	*COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)*	
CPT NO.	***CPT-2***	*a_{max} (g)=* 0.7	*FAULT M_w =* 7.5
			MSF = 1.00

		CPT RESULT INPUT								*CSR*		*$CRR_{7.5}$*						*F.S.=($CRR_{7.5}$/CSR)*MSF*K_σ*K_α*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	Kσ	Kα	F.S.
61.516	6	Sandy Silt to Clayey Silt	20.227	0.464	3.563	1.731	1.833	2.93	0.72535	0.65	0.572							0.89	1	
62.172	6	Sandy Silt to Clayey Silt	23.276	0.557	3.601	1.751	1.85	2.9	0.72131	0.64	0.569							0.88	1	
62.828	6	Sandy Silt to Clayey Silt	28.56	0.682	3.639	1.772	1.867	2.83	0.71731	0.64	0.565							0.88	1	
63.484	6	Sandy Silt to Clayey Silt	34.615	0.963	3.676	1.792	1.884	2.8	0.71336	0.63	0.562							0.88	1	
64.14	6	Sandy Silt to Clayey Silt	39.741	1.253	3.714	1.813	1.901	2.79	0.70945	0.63	0.558							0.88	1	
64.797	5	Clayey Silt to Silty Clay	44.491	1.735	3.751	1.833	1.918	2.81	0.70558	0.62	0.555							0.88	1	
65.453	9	Sand	194.225	2.013	3.792	1.854	1.938	1.93	0.70108	0.62	0.551	1.930	0.70	136.17	1.218	165.916		0.82	1	
66.109	8	Sand to Silty Sand	122.306	1.778	3.832	1.874	1.958	2.19	0.69664	0.61	0.547	2.190	0.70	85.20	1.643	139.958	0.33	0.86	1	0.61
66.765	4	Silty Clay to Clay	19.636	0.766	3.869	1.895	1.975	3.2	0.69291	0.61	0.544							0.87	1	
67.421	4	Silty Clay to Clay	15.412	0.522	3.907	1.915	1.992	3.3	0.68922	0.61	0.541							0.87	1	
68.077	5	Clayey Silt to Silty Clay	17.567	0.497	3.944	1.935	2.009	3.18	0.68557	0.60	0.538							0.87	1	
68.734	5	Clayey Silt to Silty Clay	19.312	0.515	3.982	1.956	2.026	3.12	0.68196	0.60	0.536							0.87	1	
69.39	5	Clayey Silt to Silty Clay	19.513	0.516	4.02	1.976	2.043	3.11	0.67838	0.60	0.533							0.87	1	
70.046	5	Clayey Silt to Silty Clay	20.141	0.57	4.057	1.997	2.06	3.11	0.67485	0.59	0.530							0.87	1	
70.702	5	Clayey Silt to Silty Clay	19.521	0.633	4.095	2.017	2.078	3.14	0.67114	0.59	0.527							0.86	1	
71.358	5	Clayey Silt to Silty Clay	20.869	0.75	4.132	2.038	2.095	3.14	0.66768	0.58	0.525							0.86	1	
72.014	5	Clayey Silt to Silty Clay	17.848	0.634	4.17	2.058	2.112	3.2	0.66425	0.58	0.522							0.86	1	
72.671	6	Sandy Silt to Clayey Silt	18.958	0.474	4.208	2.079	2.129	3.08	0.66086	0.58	0.520							0.86	1	
73.327	5	Clayey Silt to Silty Clay	16.162	0.429	4.245	2.099	2.146	3.16	0.6575	0.58	0.518							0.86	1	
73.983	5	Clayey Silt to Silty Clay	15.909	0.524	4.283	2.12	2.163	3.21	0.65418	0.57	0.515							0.86	1	
74.639	5	Clayey Silt to Silty Clay	15.527	0.518	4.32	2.14	2.18	3.24	0.65089	0.57	0.513							0.86	1	
75.295	6	Sandy Silt to Clayey Silt	18.252	0.427	4.358	2.161	2.197	3.07	0.64763	0.57	0.511							0.85	1	
75.951	6	Sandy Silt to Clayey Silt	22.347	0.425	4.396	2.181	2.214	2.92	0.64441	0.56	0.509							0.85	1	
76.608	6	Sandy Silt to Clayey Silt	31.011	0.654	4.433	2.202	2.232	2.82	0.64103	0.56	0.507							0.85	1	
77.264	6	Sandy Silt to Clayey Silt	34.896	0.932	4.471	2.222	2.249	2.83	0.63787	0.56	0.505							0.85	1	
77.92	6	Sandy Silt to Clayey Silt	38.161	1.106	4.508	2.243	2.266	2.86	0.63474	0.56	0.503							0.85	1	
78.576	5	Clayey Silt to Silty Clay	35.826	1.175	4.546	2.263	2.283	2.92	0.63164	0.55	0.501							0.85	1	
79.232	5	Clayey Silt to Silty Clay	36.122	1.172	4.584	2.283	2.3	2.91	0.62857	0.55	0.500							0.85	1	
79.888	5	Clayey Silt to Silty Clay	33.7	1.275	4.621	2.304	2.317	2.98	0.62553	0.55	0.498							0.85	1	
80.545	5	Clayey Silt to Silty Clay	29.569	1.002	4.659	2.324	2.334	3	0.62252	0.55	0.496							0.84	1	
81.201	5	Clayey Silt to Silty Clay	29.31	0.967	4.696	2.345	2.351	3.01	0.61954	0.54	0.495							0.84	1	
81.857	5	Clayey Silt to Silty Clay	28.127	0.862	4.734	2.365	2.369	3.03	0.61642	0.54	0.493							0.84	1	
82.513	5	Clayey Silt to Silty Clay	31.004	0.927	4.772	2.386	2.386	2.98	0.6135	0.54	0.491							0.84	1	
83.169	5	Clayey Silt to Silty Clay	36.014	1.38	4.809	2.406	2.403	2.99	0.6106	0.54	0.490							0.84	1	
83.825	6	Sandy Silt to Clayey Silt	29.836	0.801	4.847	2.427	2.42	2.97	0.60773	0.54	0.488							0.84	1	
84.482	5	Clayey Silt to Silty Clay	22.577	0.693	4.884	2.447	2.437	3.15	0.60489	0.53	0.487							0.84	1	
85.138	5	Clayey Silt to Silty Clay	19.759	0.514	4.922	2.468	2.454	3.16	0.60208	0.53	0.485							0.84	1	
85.794	5	Clayey Silt to Silty Clay	20.278	0.569	4.96	2.488	2.471	3.16	0.59929	0.53	0.484							0.83	1	
86.45	6	Sandy Silt to Clayey Silt	32.748	0.873	4.997	2.509	2.488	2.95	0.59653	0.53	0.483							0.83	1	
87.106	6	Sandy Silt to Clayey Silt	28.855	0.844	5.035	2.529	2.506	3.02	0.59363	0.53	0.481							0.83	1	
87.762	6	Sandy Silt to Clayey Silt	37.989	0.987	5.072	2.55	2.523	2.85	0.59092	0.52	0.480							0.83	1	
88.419	6	Sandy Silt to Clayey Silt	46.055	1.357	5.11	2.57	2.54	2.81	0.58824	0.52	0.479							0.83	1	
89.075	6	Sandy Silt to Clayey Silt	39.719	1.146	5.147	2.591	2.557	2.87	0.58557	0.52	0.478							0.83	1	
89.731	6	Sandy Silt to Clayey Silt	28.25	0.826	5.185	2.611	2.574	3.02	0.58294	0.52	0.477							0.83	1	
90.387	6	Sandy Silt to Clayey Silt	28.827	0.782	5.223	2.632	2.591	2.99	0.58032	0.52	0.475							0.83	1	
91.043	6	Sandy Silt to Clayey Silt	44.274	0.965	5.26	2.652	2.608	2.78	0.57773	0.52	0.474							0.83	1	
91.699	6	Sandy Silt to Clayey Silt	31.314	0.654	5.298	2.672	2.625	2.95	0.57516	0.52	0.473							0.82	1	
92.356	6	Sandy Silt to Clayey Silt	34.507	0.856	5.335	2.693	2.643	2.93	0.57247	0.51	0.472							0.82	1	
93.012	6	Sandy Silt to Clayey Silt	28.733	0.874	5.373	2.713	2.66	3.05	0.56995	0.51	0.471							0.82	1	
93.668	6	Sandy Silt to Clayey Silt	32.381	0.972	5.411	2.734	2.677	2.99	0.56745	0.51	0.470							0.82	1	
94.324	5	Clayey Silt to Silty Clay	29.613	0.946	5.448	2.754	2.694	3.06	0.56497	0.51	0.469							0.82	1	
94.98	6	Sandy Silt to Clayey Silt	29.065	0.812	5.486	2.775	2.711	3.05	0.56252	0.51	0.468							0.82	1	
95.636	6	Sandy Silt to Clayey Silt	25.266	0.691	5.523	2.795	2.728	3.1	0.56008	0.51	0.467							0.82	1	
96.293	6	Sandy Silt to Clayey Silt	26.225	0.721	5.561	2.816	2.745	3.07	0.55767	0.51	0.466							0.82	1	
96.949	6	Sandy Silt to Clayey Silt	35.733	1.044	5.599	2.836	2.762	2.96	0.55528	0.50	0.465							0.82	1	
97.605	6	Sandy Silt to Clayey Silt	56.723	1.749	5.636	2.857	2.779	2.8	0.5529	0.50	0.464							0.82	1	
98.261	7	Silty Sand to Sandy Silt	115.162	2.865	5.675	2.877	2.798	2.49	0.55028	0.50	0.463	2.490	0.55	63.37	2.718	172.266		0.81	1	
98.917	8	Sand to Silty Sand	139.83	2.576	5.715	2.898	2.817	2.34	0.54767	0.50	0.462	2.340	0.55	76.58	2.084	159.577	0.46	0.80	1	0.99

San Leandro Creek Bridge & Overhead (widen)
North Abutment.

Liquefaction Potential
Reference Boring (CPT-2)

Thin Sand Layer at depths 20.2 to 20.8 feet.

Average $N_{1,60} \approx 15.8$ → Volumetric Strain = 1.8% (Tokimatsu & Seed)

$$\Delta H = 1.8\% \left(2.6' \times \frac{\text{lin}}{\text{ft}} \right) = 0.56''$$

Since the volumetric strain < 0.6", the liquefiable layer was neglected when calculating vertical capacity.

SETTLEMENT ANALYSES

PILE GROUP SETTLEMENT ANALYSIS

PROJECT NAME	**SAN LEANDRO CREEK BOH (WIDEN)**				
PROJECT NO.	**2006-139-010**	*Footing Depth (ft) =*	7.5		***GROUPS***
BORING	**CPT-1 & CPT-2**	*Pile Length (ft)=*	80		1. GRAVELS AND SANDS
					2. CLAYS AND SILTS
		Permanent Load (kips)=	270		
Finish Grade Elev. (ft) =	18	*Width of Pile Group, B (ft)=*	12		
Pile Cut-off Elev. (ft) =	10.5	*Length of Pile Group, L (ft)=*	10	*Cr/Cc=* 20%	*GW Level (ft)=* 8

Soil Type	Depth from FG From	Depth from FG To	γ_T (pcf)	γ' (pcf)	ω	σ_v' (psf)	$\Delta\sigma_v'$ (psf)	Su (psf)	Pp (psf)	$Cr/1+e_0$	$Cc/1+e_0$	C' (Hough Method)	Settlements (in) OC	Settlements (in) NC	Settlements (in) SAND	Settlements (in) Sum
2	0	0.5	125.0	125.0	25.0%	31		1250								
2	0.5	9.5	125.0	62.6	25.0%	344		1250								
2	9.5	17.5	125.0	62.6	25.0%	876		1000								
1	17.5	20.5	125.0	62.6	10.0%	1221										
2	20.5	53.5	125.0	62.6	25.0%	2347		1500								
2	53.5	60	125.0	62.6	25.0%	3584		2500								
2	60	70	125.0	62.6	25.0%	4100	154.4	2500	10000	0.0275	0.1376		0.053			0.053
2	70	80	125.0	62.6	25.0%	4726	100.5	2500	10000	0.0275	0.1376		0.030			0.030
2	80	90	125.0	62.6	25.0%	5352	70.6	2500	10000	0.0275	0.1376		0.019			0.019
2	90	100	125.0	62.6	25.0%	5978	52.3	2500	10000	0.0275	0.1376		0.013			0.013
2	100	110	125.0	62.6	25.0%	6604	40.3	2500	10000	0.0275	0.1376		0.009			0.009
2	110	120	125.0	62.6	25.0%	7230	32.0	2500	10000	0.0275	0.1376		0.006			0.006
2	120	130	125.0	62.6	25.0%	7856	26.0	2500	10000	0.0275	0.1376		0.005			0.005
2	130	140	125.0	62.6	25.0%	8482	21.6	2500	10000	0.0275	0.1376		0.004			0.004
2	140	150	125.0	62.6	25.0%	9108	18.2	2500	10000	0.0275	0.1376		0.003			0.003
2	150	160	125.0	62.6	25.0%	9734	15.5	2500	10000	0.0275	0.1376		0.002			0.002
2	160	170	125.0	62.6	25.0%	10360	13.4	2500	10360	0.0275	0.1376			0.009		0.009
2	170	180	125.0	62.6	25.0%	10986	11.7	2500	10986	0.0275	0.1376			0.008		0.008
2	180	190	125.0	62.6	25.0%	11612	10.3	2500	11612	0.0275	0.1376			0.006		0.006
2	190	200	126.0	63.6	25.0%	12243	9.1	2500	12243	0.0275	0.1376			0.005		0.005
												Estimated Settlement (in)=	*0.14*	*0.03*		***0.2***

EMBANKMENT SETTLEMENT ANALYSIS

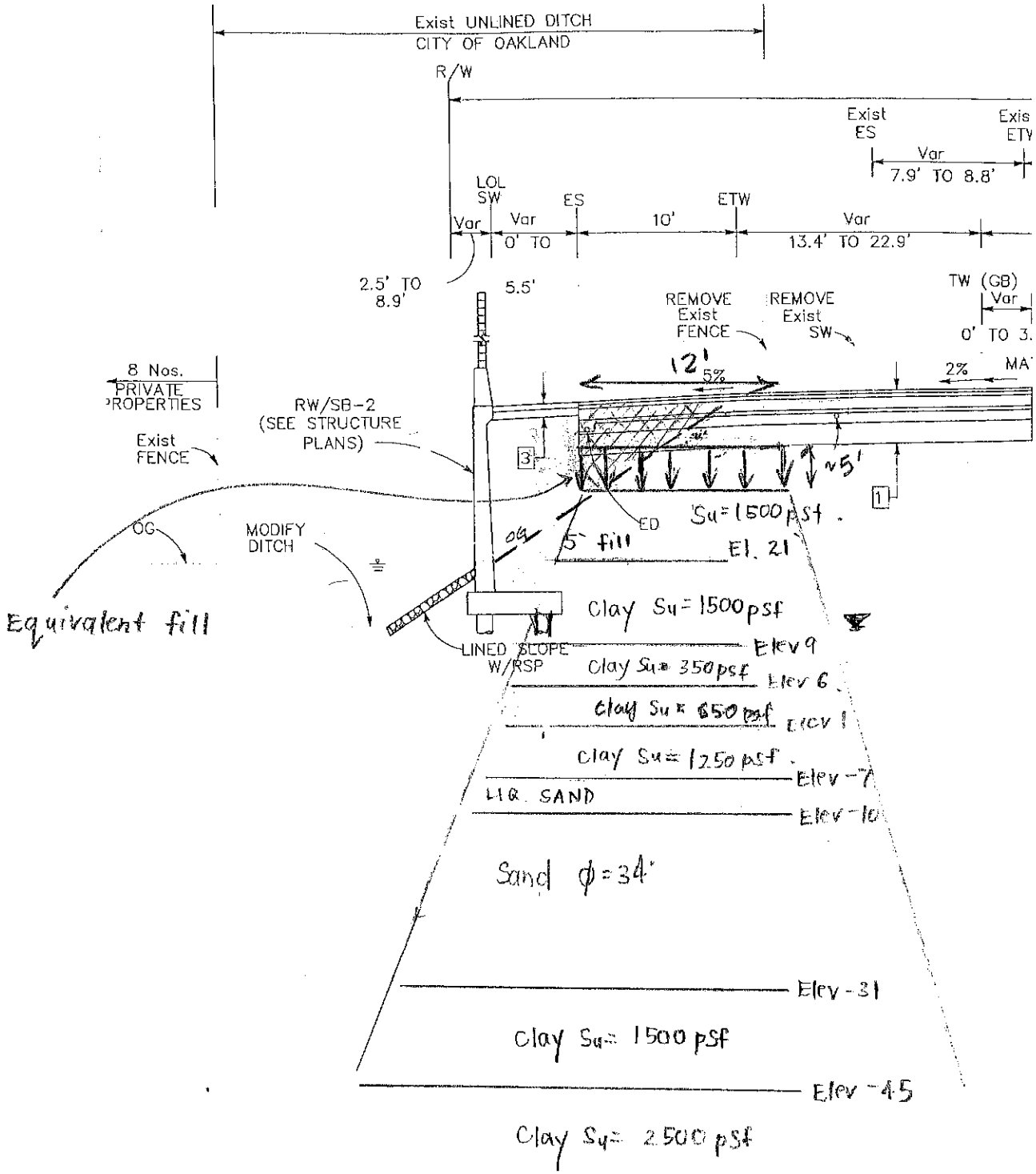
PROJECT NAME **SAN LEANDRO CREEK BOH (WIDEN)**
PROJECT NO. **2006-139-010**
BORING NO. **CPT-1 & CPT-2**

Embankment H (ft)=	5	*Contact Pressure (psf)=*	625	*Contact Area, B (ft)=*	12	*Cr/Cc=*	20.0%
Unit Weight (pcf)=	125	*GW Level (ft)=*	16	*Contact Area, L (ft)=*	-		
				Plain Strain? (Y/N)=	y		

GROUPS
1. GRAVELS AND SANDS
2. CLAYS AND SILTS

Soil Type	Depth From	Depth To	γ_T (pcf)	γ' (pcf)	ω	σ_v' (psf)	$\Delta\sigma_v'$ (psf)	Su (psf)	Pp (psf)	$Cr/1+e_0$	$Cc/1+e_0$	C' (Hough Method)	Settlements (in) OC	NC	SAND	Sum
1	0	5	125.0	125.0	10.0%	313	517.2					69			0.370	
2	5	17	125.0	62.6	25.0%	1001	326.1	1500	6000	0.0275	0.1376		0.123			0.123
2	17	20	125.0	62.6	25.0%	1470	245.9	350	1470	0.0275	0.1376			0.333		0.333
2	20	25	125.0	62.6	25.0%	1721	217.4	650	2600	0.0275	0.1376		0.052			0.052
2	25	33	125.0	62.6	25.0%	2127	182.9	1250	5000	0.0275	0.1376		0.036			0.036
1	33	36	125.0	62.6	10.0%	2472	161.3					34			0.029	
1	36	57	125.0	62.6	10.0%	3223	128.2					52			0.082	
2	57	78	125.0	62.6	25.0%	4538	94.3	2500	10000	0.0275	0.1376		0.009			0.009
2	78	100	125.0	62.6	25.0%	5883	74.3	2500	10000	0.0275	0.1376		0.005			0.005
												Estimated Settlement (in)=	*0.2*	*0.3*	*0.5*	***1.0***

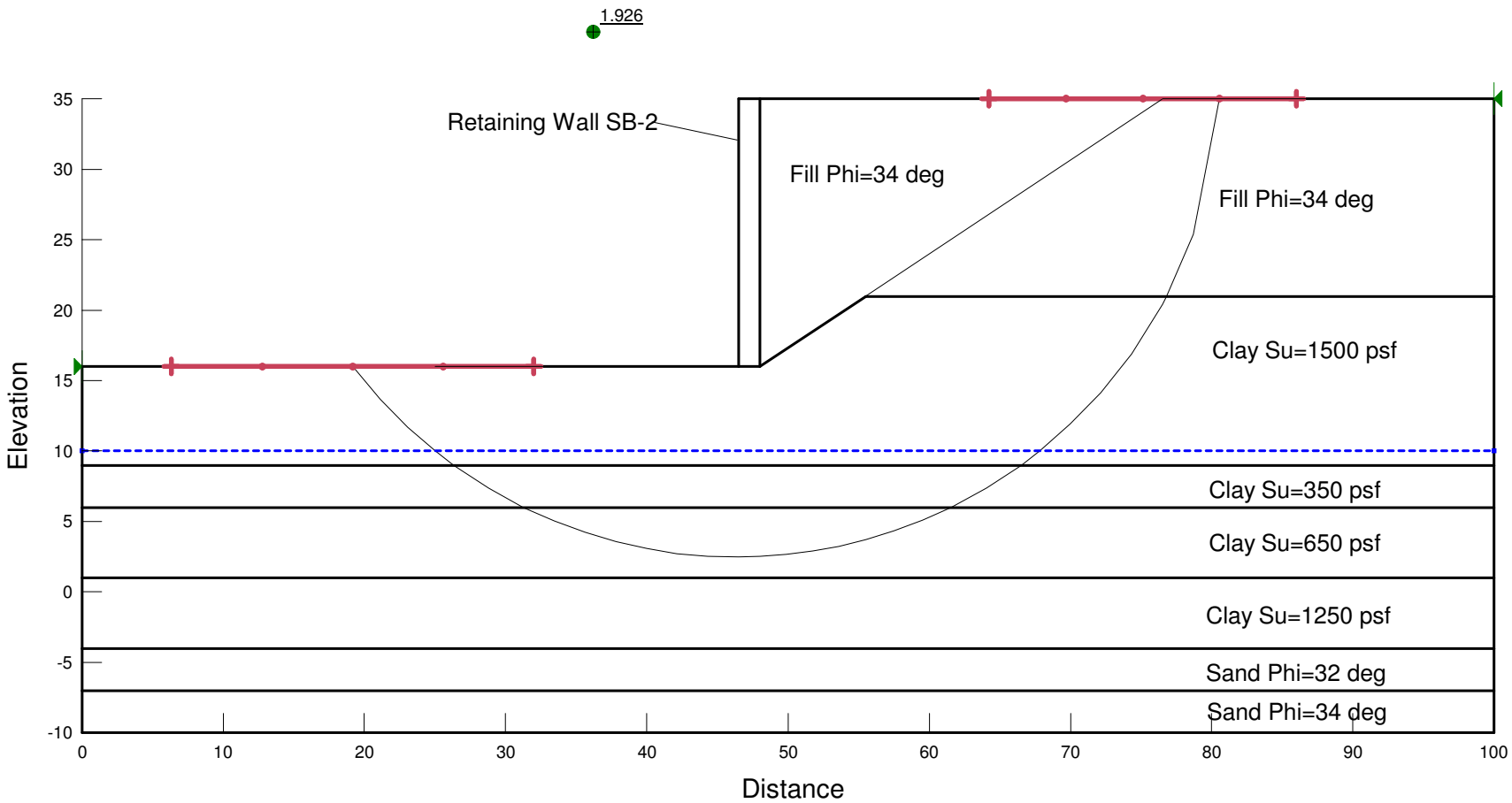
SEE FOLLOWING PAGE FOR SCHEMATIC


Exist UNLINED DITCH
CITY OF OAKLAND
R/W
Exist ES
Exis ETW
Var
7.9' TO 8.8'
LOL SW
ES
ETW
Var
Var
0' TO
10'
Var
13.4' TO 22.9'
2.5' TO 8.9'
5.5'
TW (GB)
Var
0' TO 3.
REMOVE Exist FENCE
REMOVE Exist SW
12'
5%
2%
MA
8 Nos. PRIVATE PROPERTIES
RW/SB-2 (SEE STRUCTURE PLANS)
Exist FENCE
3
1
~5'
Su=1500 psf.
ED
OG
MODIFY DITCH
5' fill
El. 21
Equivalent fill
Clay Su=1500psf
Elev 9
LINED SLOPE W/RSP
Clay Su=350psf
Elev 6
Clay Su=650psf
Elev 1
Clay Su=1250psf.
Elev -7
LIQ. SAND
Elev -10
Sand φ=34°
Elev -31
Clay Su=1500 psf
Elev -45
Clay Su=2500 psf

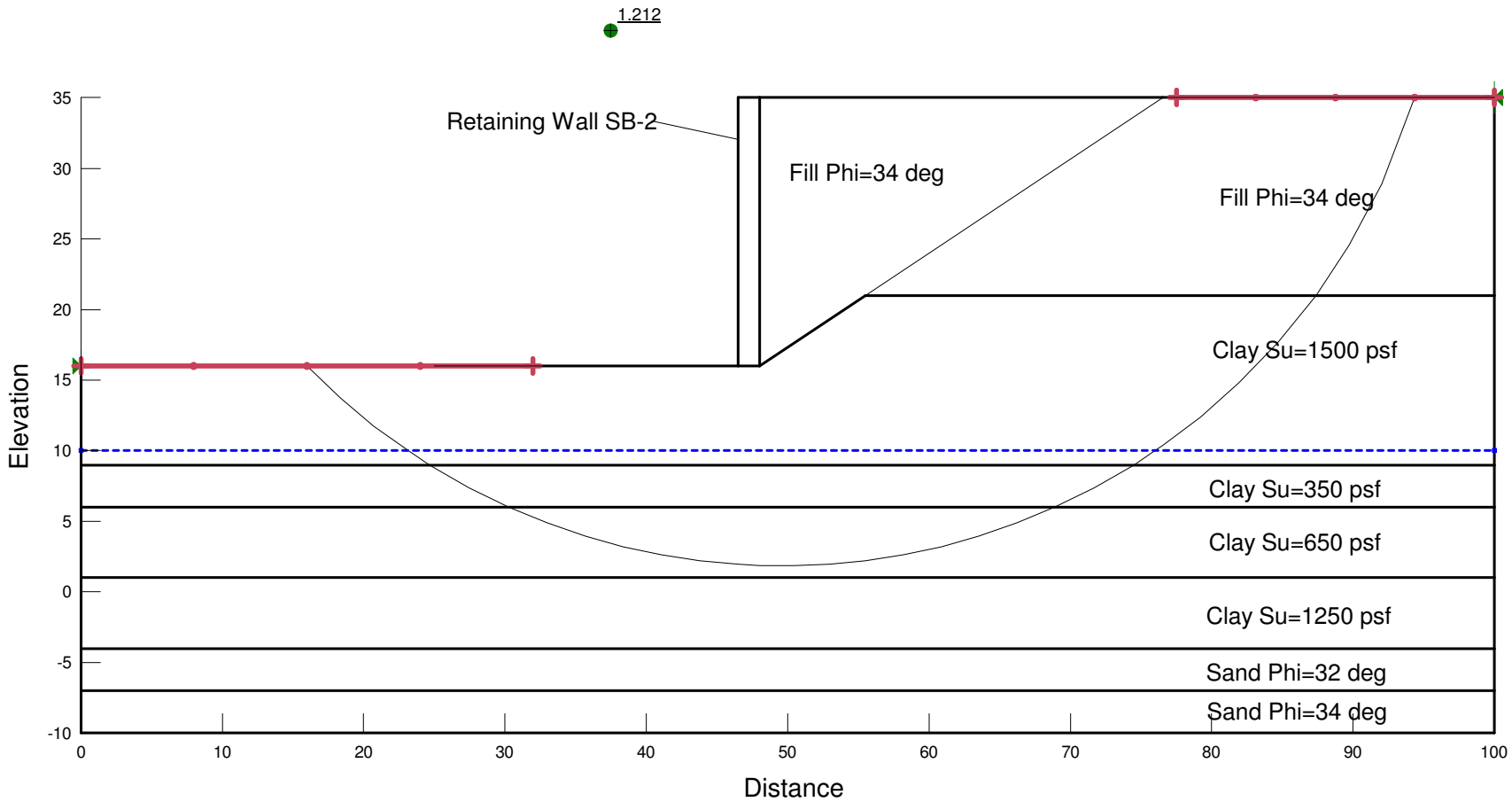
N. ABUT

SLOPE STABILITY

SAN LEANDRO CREEK BOH (WIDEN)
ALAMEDA COUNTY, CALIFORNIA
NORTH ABUTMENT
STATIC CONDITION



SAN LEANDRO CREEK BOH (WIDEN)
ALAMEDA COUNTY, CALIFORNIA
NORTH ABUTMENT
PSUEDO-STATIC CONDITION (0.2g)



SOIL STRENGTH PROFILES

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	ALA	880	23.8/25.5		

REGISTERED CIVIL ENGINEER

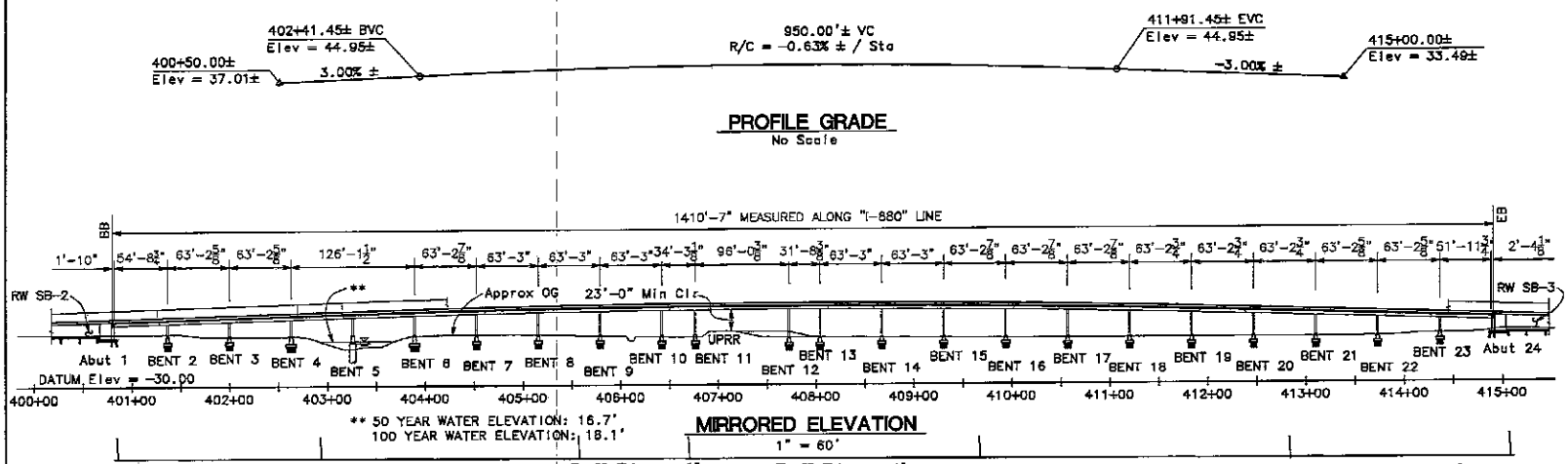
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KANDISH HARIPRASAD No. C39591 Exp. 12/31/09 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.

RAJAPPAN & MEYER CONSULTING ENGINEERS, INC.
1038 LEIGH AVE, SUITE 100
SAN JOSE, CA 95126

ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612



NOTE:

For 'Typical Setion', see "GENERAL PLAN No. 2" sheet.

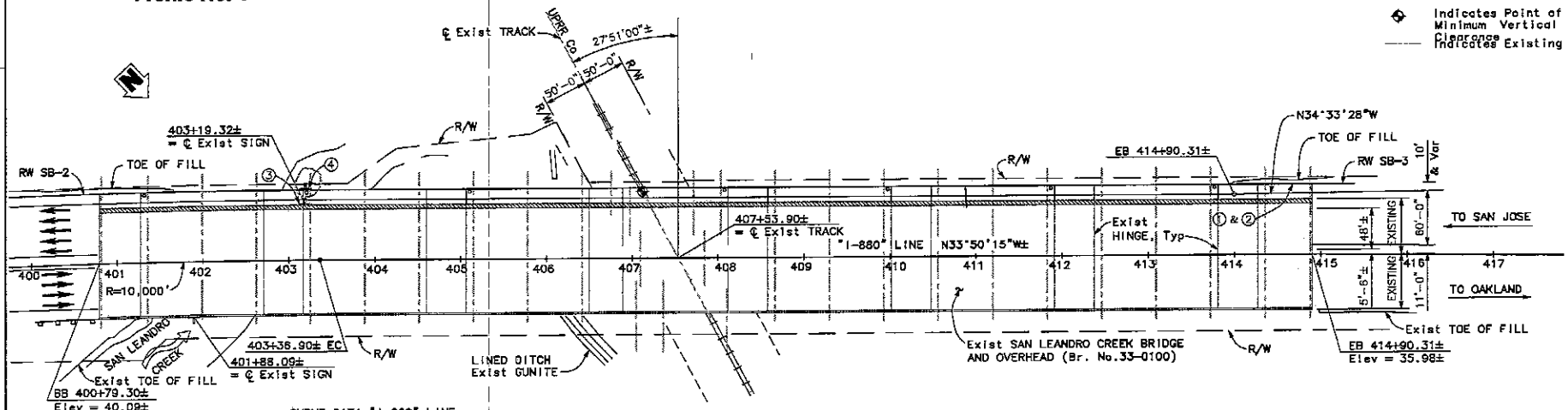
LEGEND:

1. Paint Bridge Name "San Leandro Creek Br & Overhead"
2. Paint "Br. No. 33-0100"

Bridge Removal (Portion)

Indicates Point of Minimum Vertical Clearance

Indicates Existing Structure



CURVE DATA "I-880" LINE

R	Δ	T	L
10,000'	3°59'45"	348.84'	697.40'

PLAN
1" = 60'

THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

DESIGN OVERSIGHT	DESIGN	BY P. SHINN	CHECKED	LOAD FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY", PERMIT DESIGN VEHICLE		
	DETAILS	BY P. SHINN	CHECKED	LAYOUT	BY P. SHINN	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.2/25/05)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

P. SHINN
PROJECT ENGINEER

CU
EA 3A9201

BRIDGE No. 33-0100
POST MILES 24.18

DISREGARD PRINTS BEARING EARLIER REVISION DATES

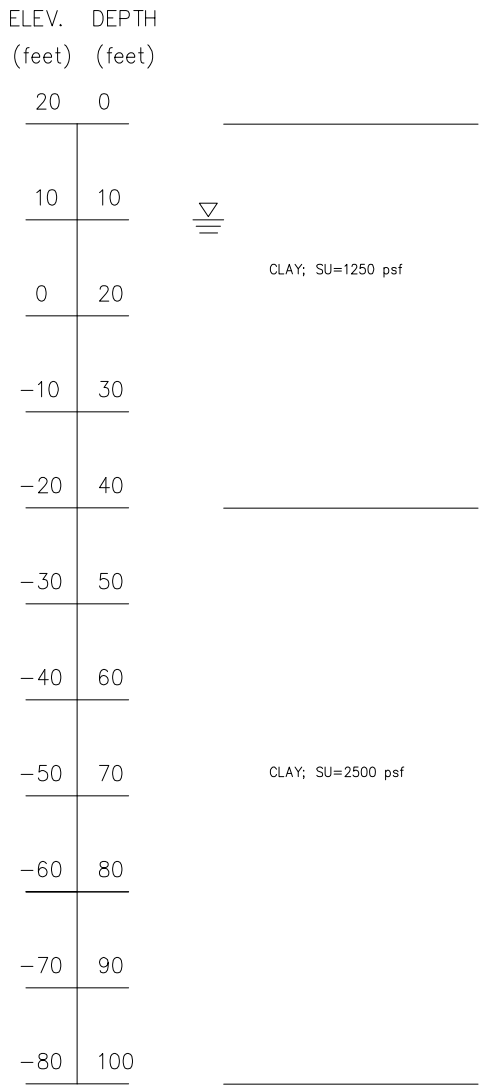
REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 1 OF 40

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)

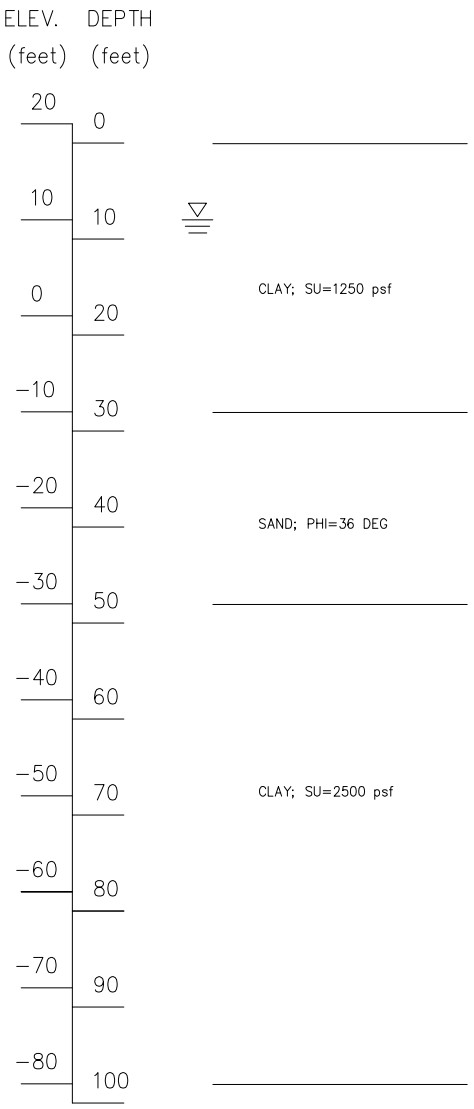
GENERAL PLAN No. 1

FILE => @@A@@@Z - I-880 Alameda\Bridges\Plans\01SL_GP1.dwg

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME 10:09:46 AM



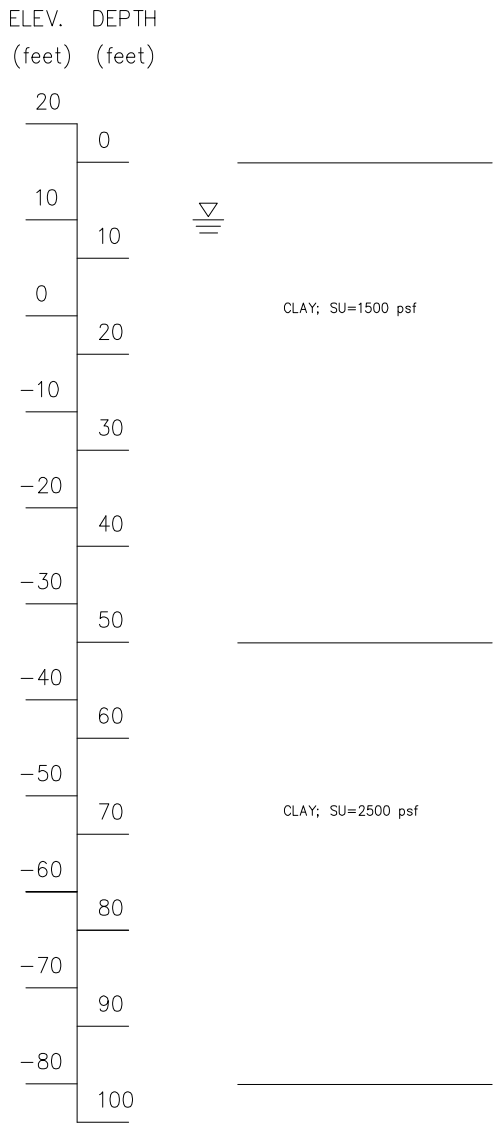
SOIL STRENGTH PROFILE NO. 1
REFERENCE BORINGS: TH-1, TH-4, B-5, CPT-1
ABUTMENT 1 THRU BENT 4



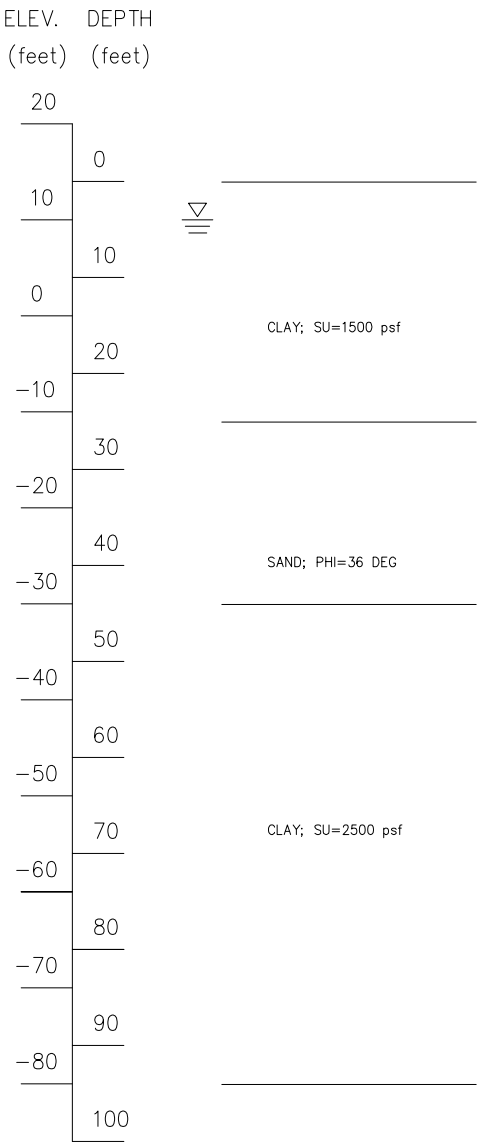
SOIL STRENGTH PROFILE NO. 2
REFERENCE BORINGS: TH-3, CPT-1
BENT 5 THRU BENT 8

SCALE
1"=20'

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING



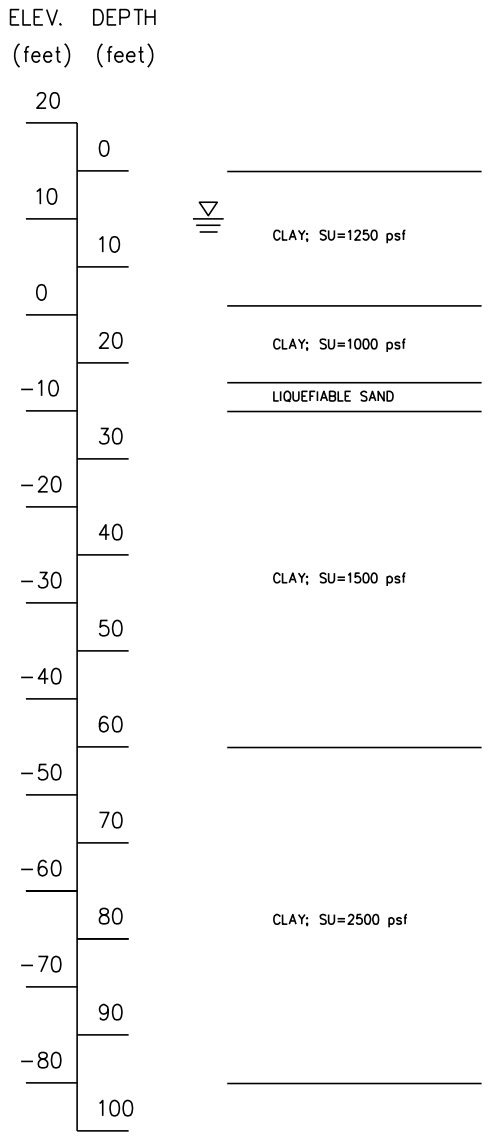
SOIL STRENGTH PROFILE NO. 3
REFERENCE BORINGS: TH-7, B-5, CPT-1
BENTS 9 & 10



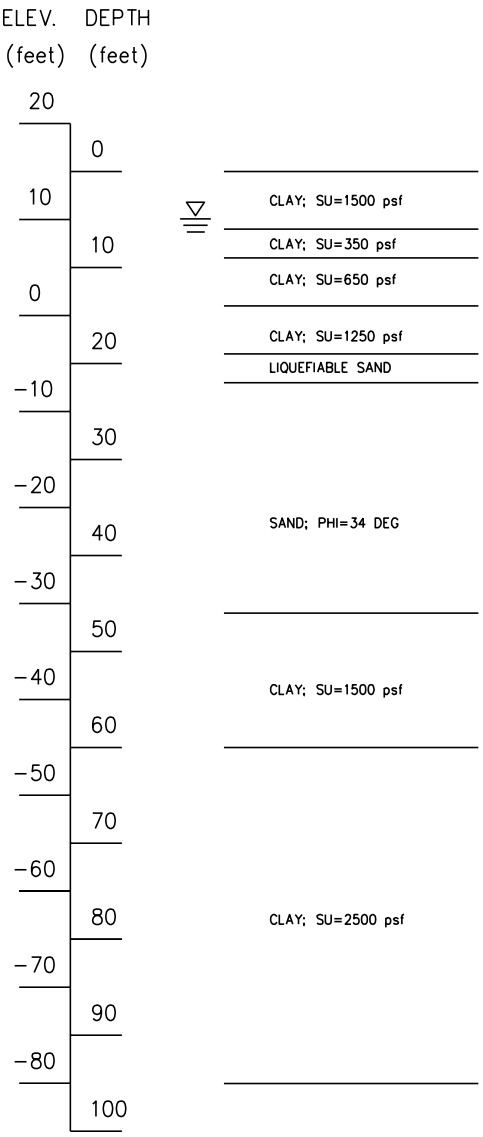
SOIL STRENGTH PROFILE NO. 4
REFERENCE BORINGS: TH-2, CPT-1
BENT 11 THRU 15

SCALE
1"=20'

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING



SOIL STRENGTH PROFILE NO. 5
REFERENCE BORINGS: TH-6, CPT-1, CPT -2
BENTS 16 THRU 20

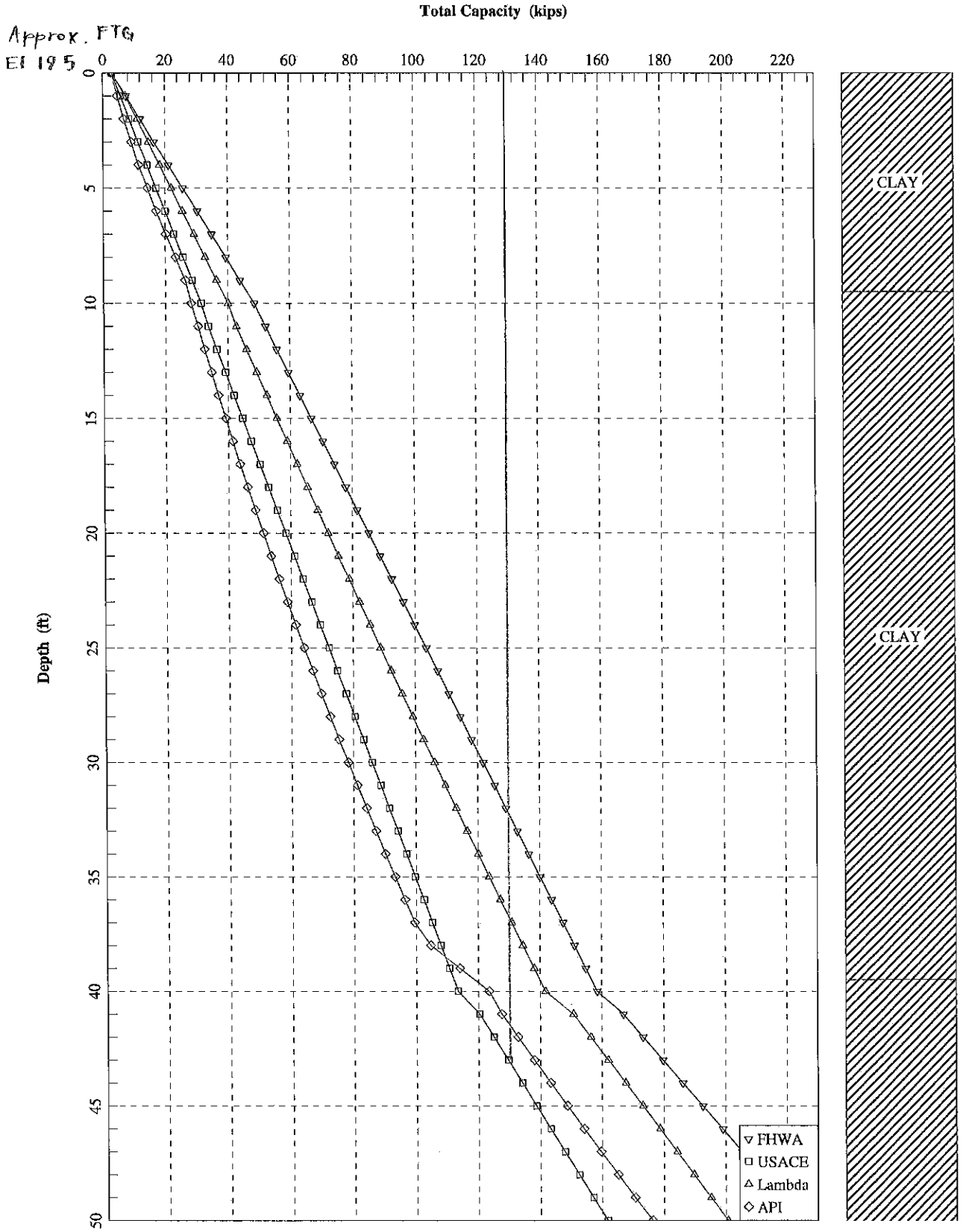


SOIL STRENGTH PROFILE NO. 6
REFERENCE BORINGS: CPT-2, RW-32, TH-5
BENT 21 THRU ABUTMENT 24

SCALE
1"=20'

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

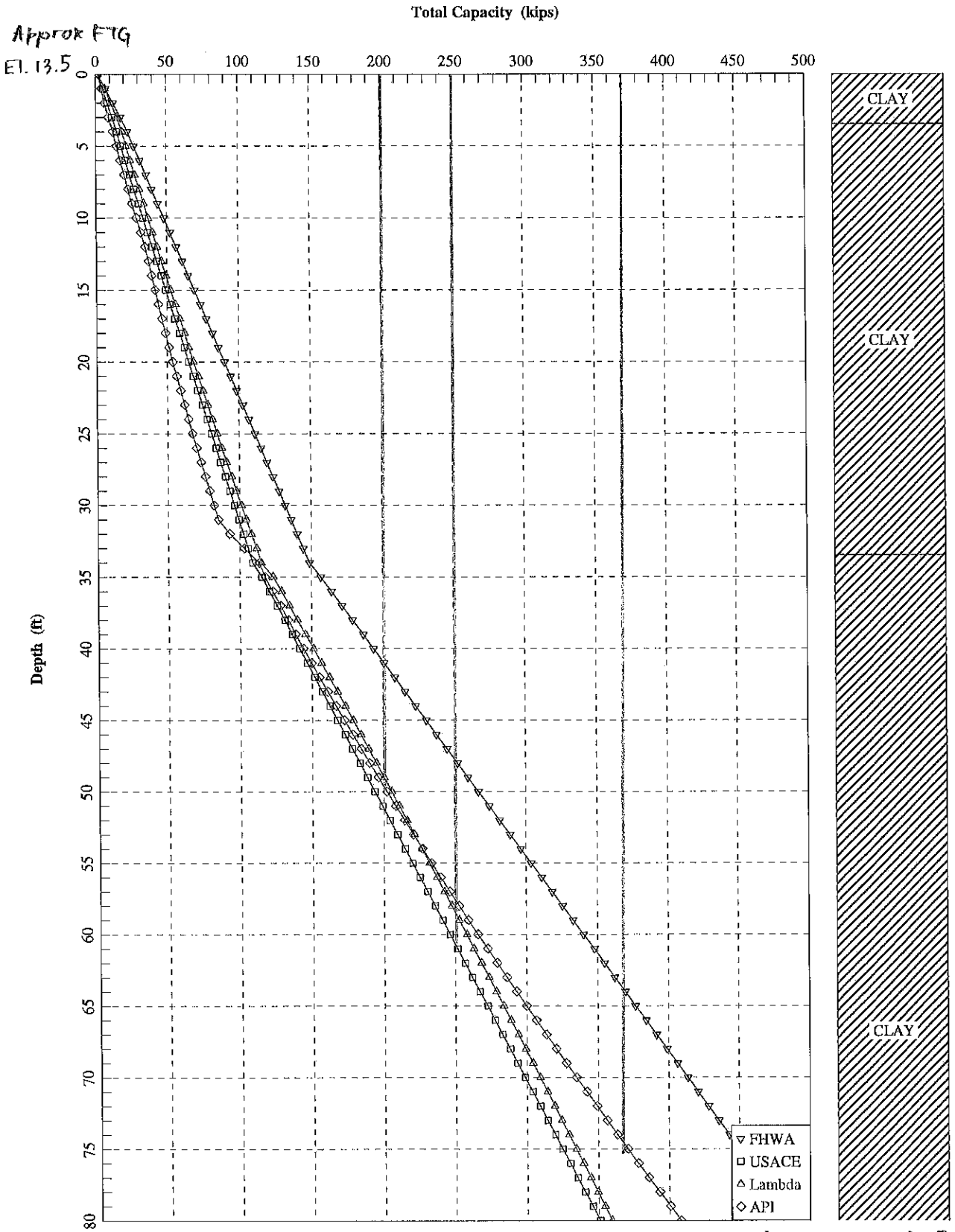
VERTICAL CAPACITY ANALYSES



Compression: 19.5 - 45 = -25.5

SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1

Approx FTG
El. 13.5



(a-I) 13.5 - 60 = -46.5

(b-I) n/a

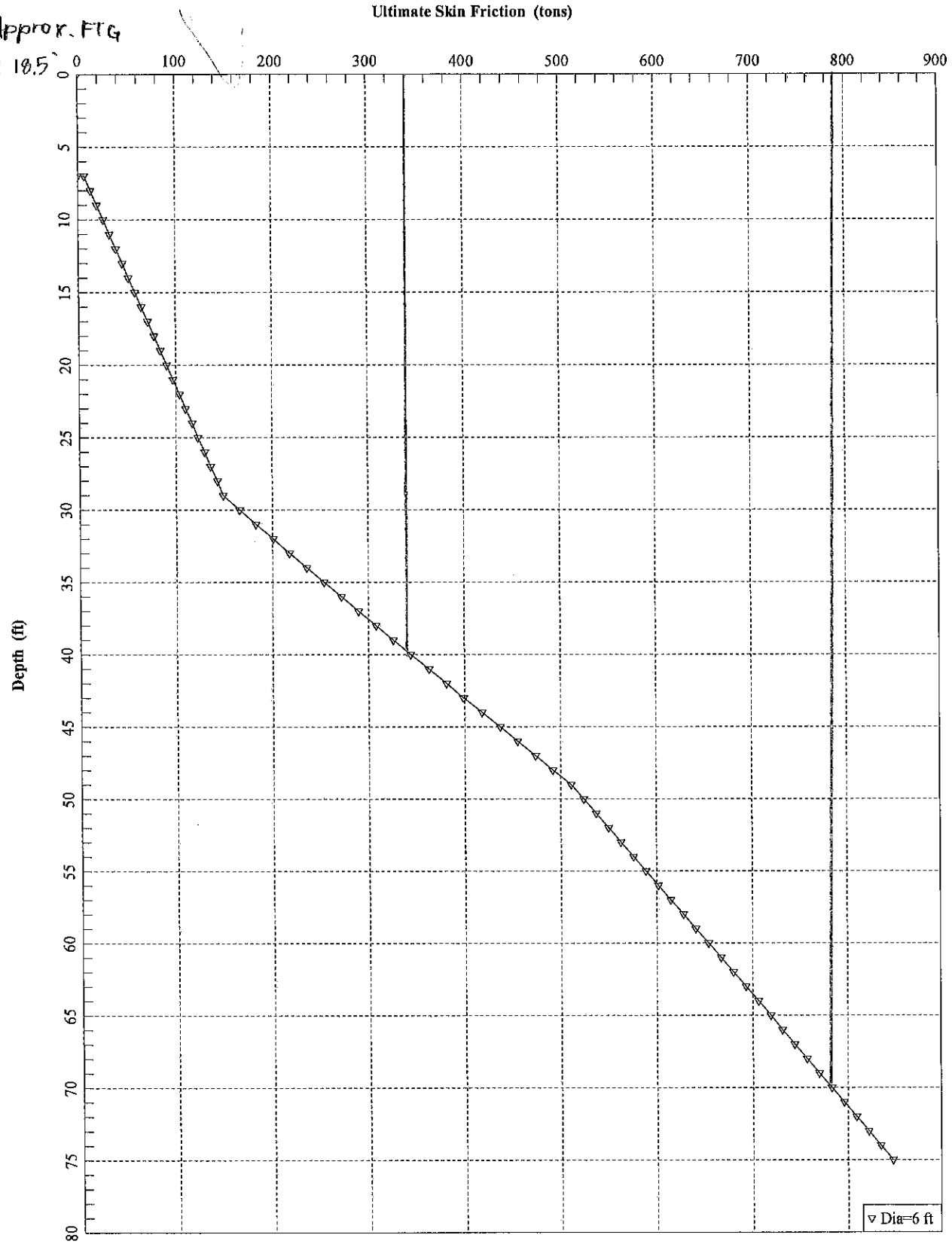
(a-II) 13.5 - 77 = -63.5

(b-II) 13.5 - 53 = -39.5

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4

Approx. FTG

El 18.5'



(a-I) 18.5 - 73 = -54.5

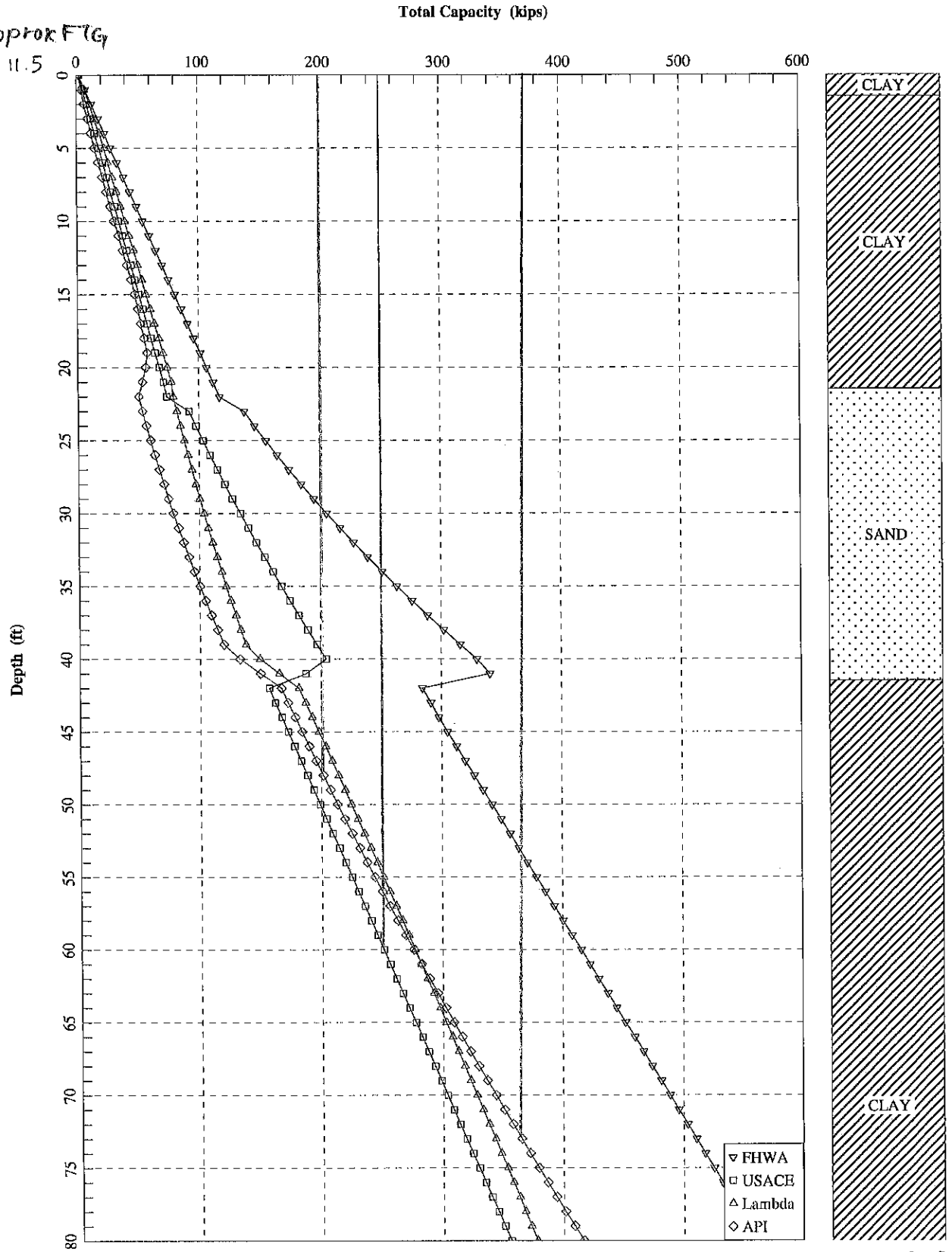
(b-I) n/a

(a-II) 18.5 - 43 = -24.5

(b-II) n/a

SAN LEANDRO CREEK BOH (WIDEN) - BENT 5

Approx FTG
El. 11.5



(a-I) 11.5 - 59 = -47.5

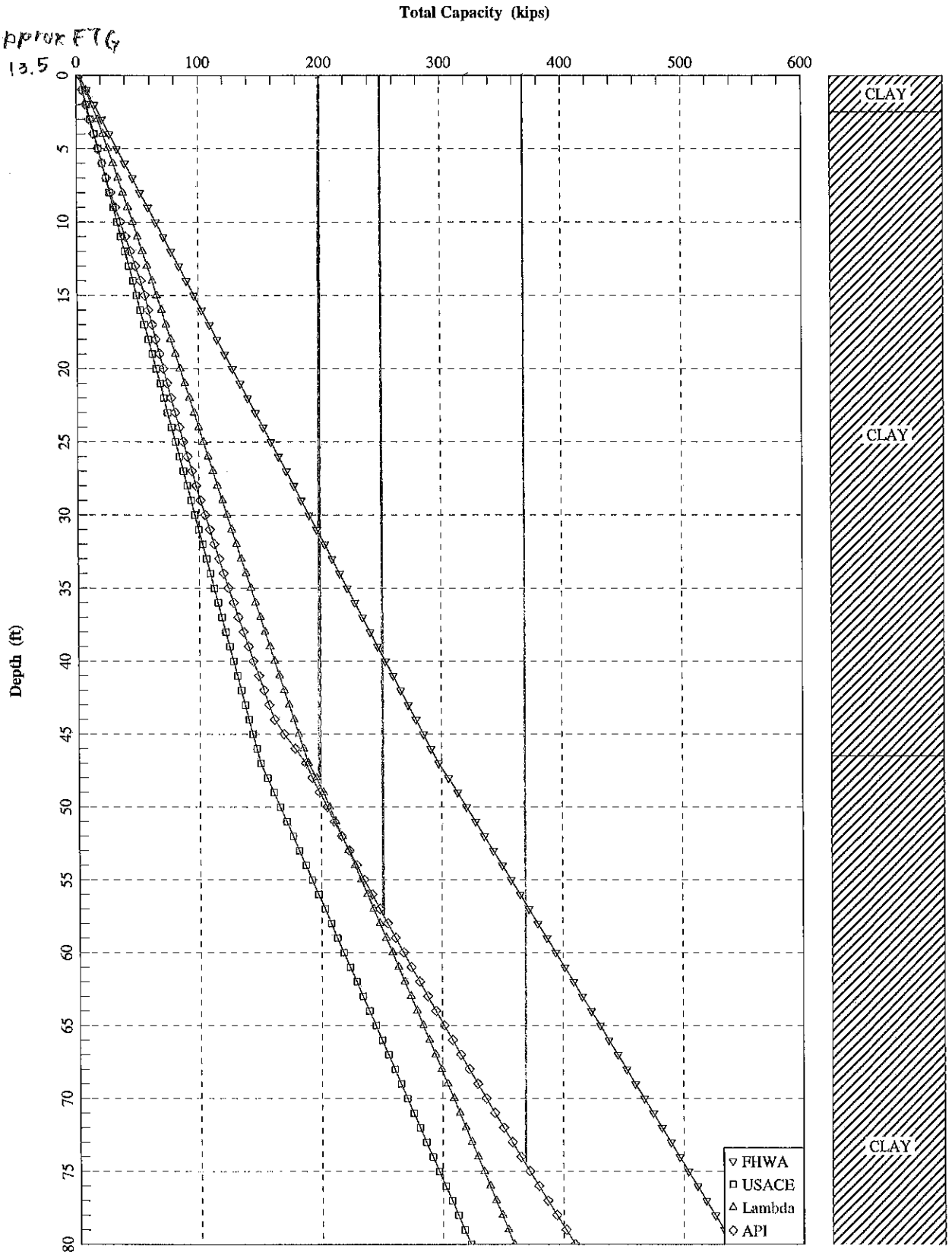
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 6 THRU 8

(b-I) n/a

(a-II) 11.5 - 75 = -63.5

(b-II) 11.5 - 50 = -38.5

Approx FTG
El 13.5



(a-I) 13.5 - 60 = -46.5

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 9 & 10

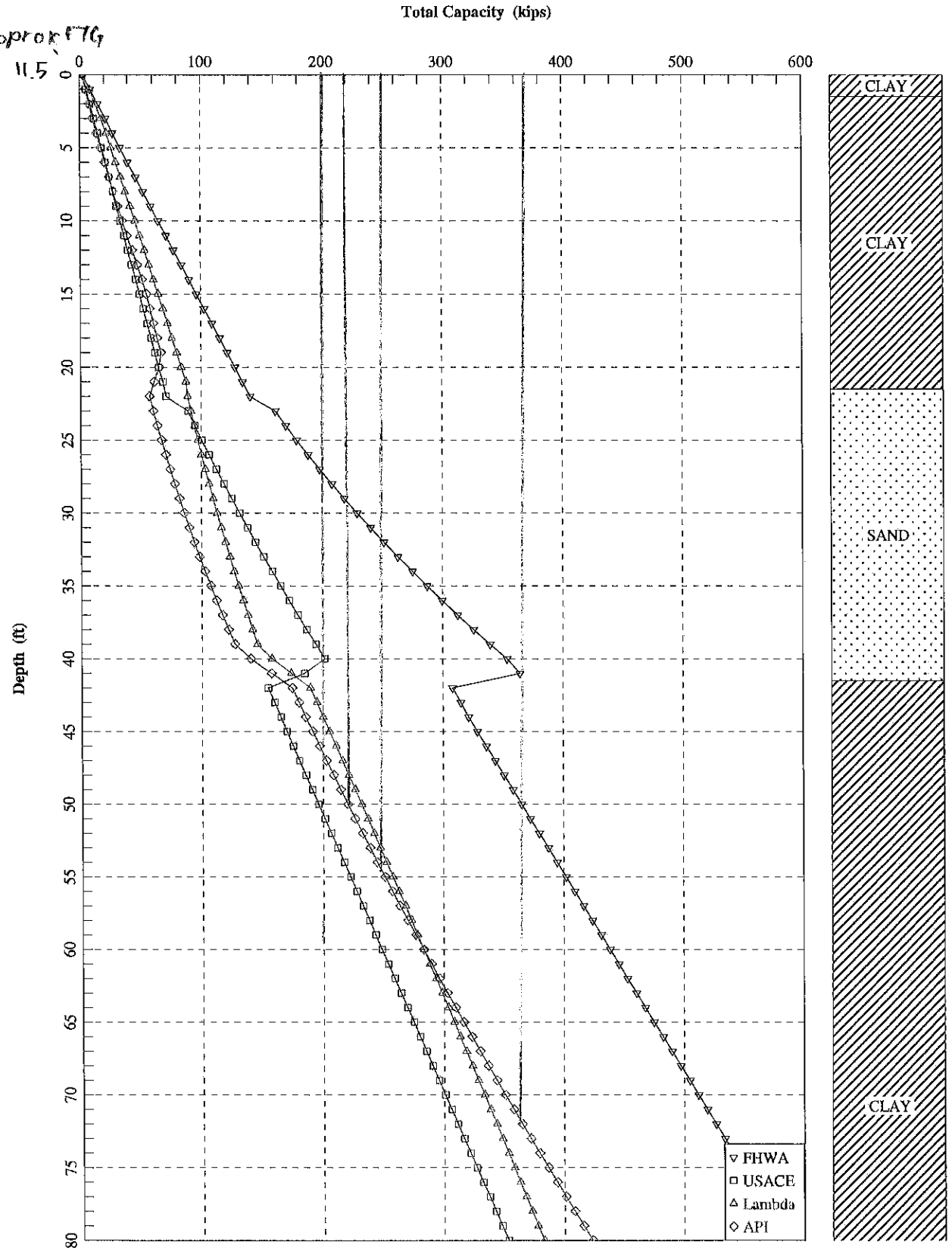
(b-I) n/a

(a-II) 13.5 - 77 = -63.5

(b-II) 13.5 - 52 = -38.5

Approx FTG

El 11.5



(a-I) 11.5 − 57 = −45.5

(b-I) n/a

(a-II) 11.5 − 75 = −63.5

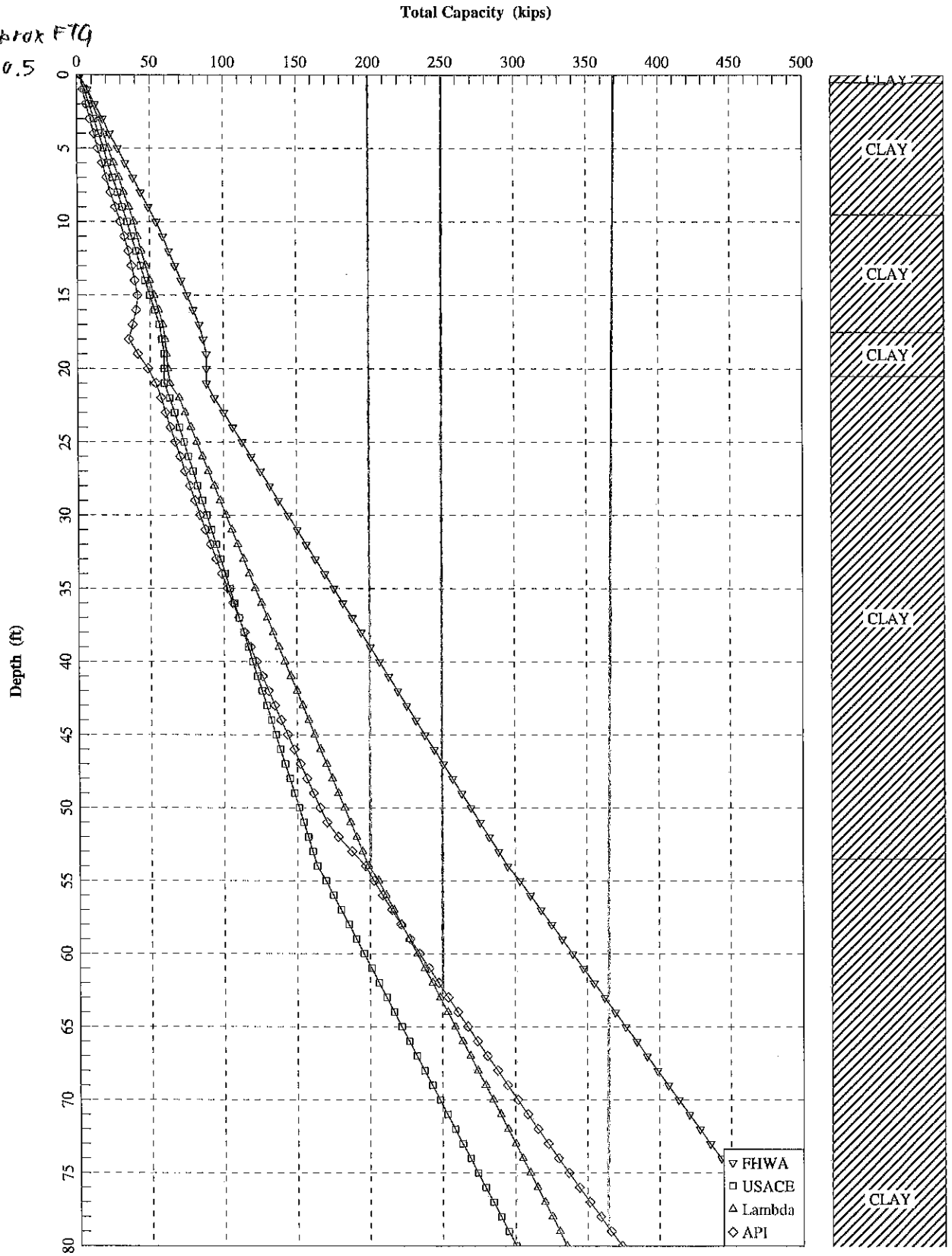
(b-II) 11.5 − 49 = −37.5

(a-I) 11.5 − 53 = −41.5

Bent 13

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 11 THRU 15

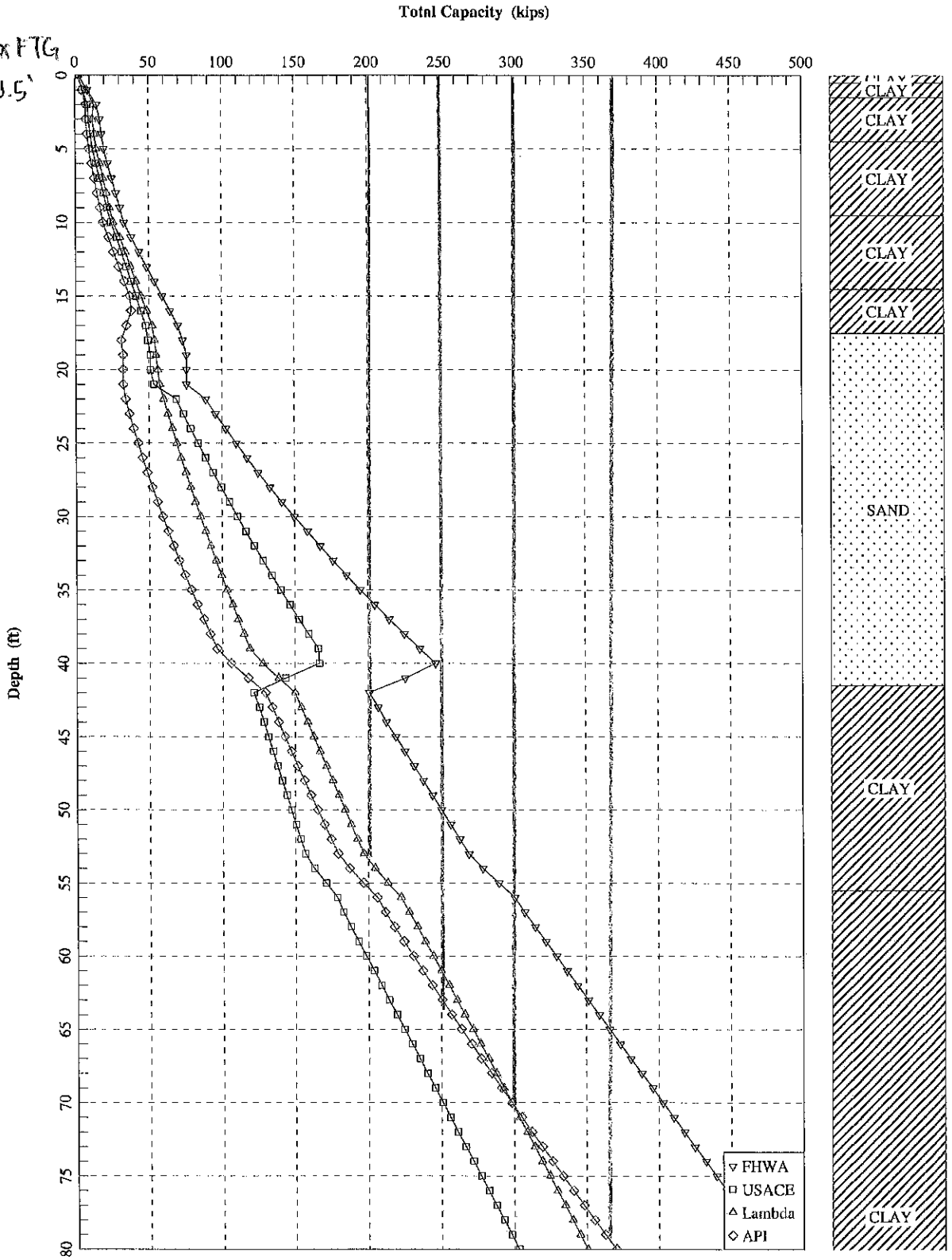
Approx FTG
El 10.5



(a-I) 10.5 - 65 = -54.5'
(b-I) n/a
(a-II) 10.5 - 81 = -70.5'
(b-II) 10.5 - 57 = -46.5'

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 16 THRU 20

Approx FTG
El. 10.5'



(a-1) 10.5-65 = -54.5'

(b-1) n/a

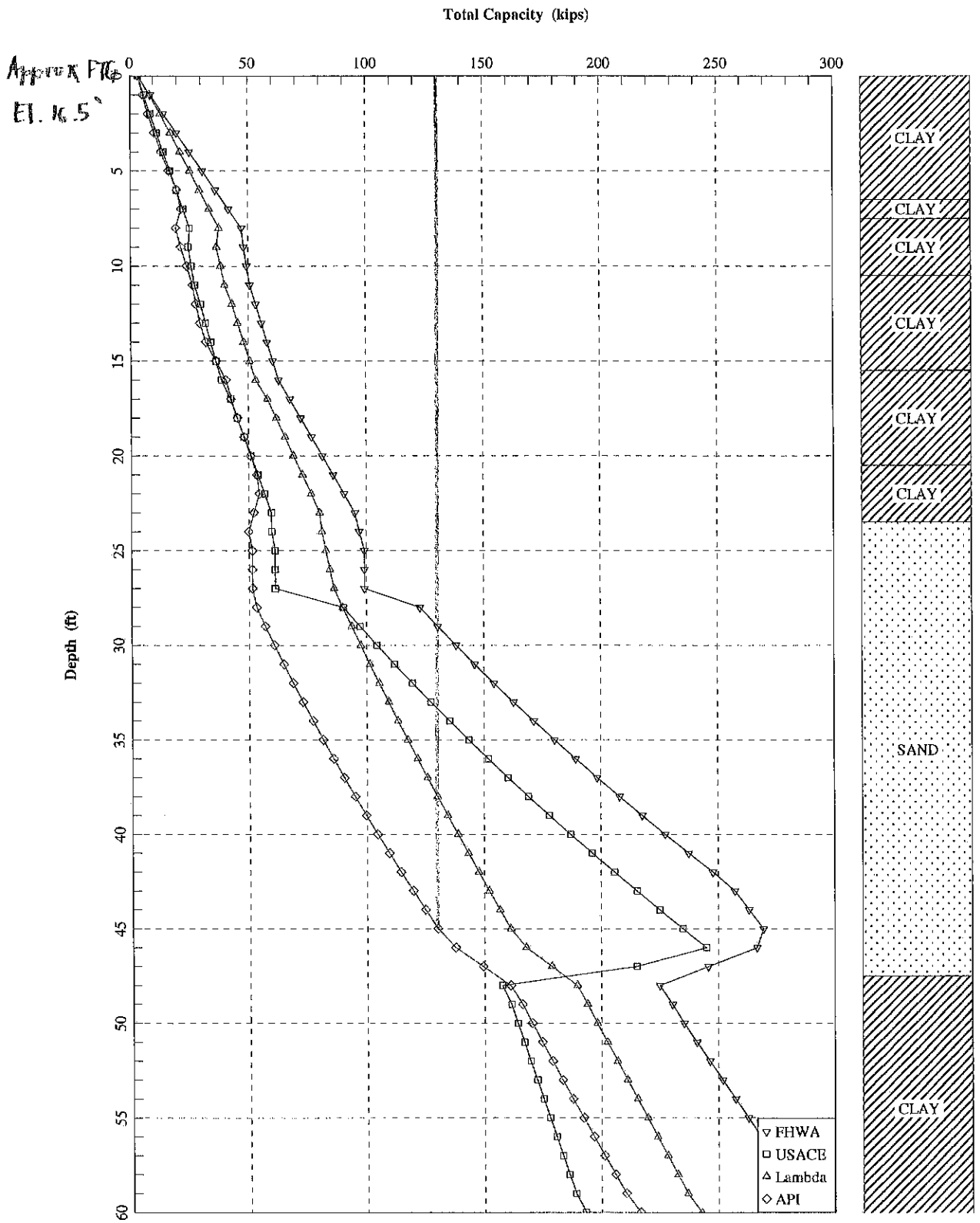
(a-11) 10.5-82 = -71.5'

(b-11) 10.5-58 = -47.5'

(a-1) 10.5-73 = -62.5

Bent 23.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 21 THRU 23



Approx FTG El. 16.5'

SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24

16.5 - 48 = -31.5

```
SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1
LT
11/11/11
1 1 6
0 0 14 12.264 29000000 50
0 12.264
0 1 1 0 4 0
65 18.66
0.0 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
9.5 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
9.5 2 0.0 62.6 0.0 0.0
0 0 1000 0 0 0 0 0 0
39.5 2 0.0 62.6 0.0 0.0
0 0 1000 0 0 0 0 0 0
39.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
65 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

1

AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 14.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 12.26 IN.
PILE LENGTH = 50.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
9.50	CLAY	0.00	125.00	0.00	0.00
9.50	CLAY	0.00	62.60	0.00	0.00
39.50	CLAY	0.00	62.60	0.00	0.00
39.50	CLAY	0.00	62.60	0.00	0.00
65.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.00	0.00	0.00	0.00	0.00
9999.00	99999.00	1.00	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

1

****
* COMPUTATION RESULT *
****

PILE PENETRATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP
	********** FED. HWY. METHOD **********			********** ARMY CORPS METHOD **********			********** LAMBDA 2 METHOD **********		
0.0	0.0	2.8*	2.8	0.0	2.8*	2.8	0.0	2.8*	2.8
1.0	4.6	2.8*	7.4	2.9	2.8*	5.7	4.4	2.8*	7.2
2.0	9.2	2.8*	12.0	5.7	2.8*	8.5	8.3	2.8*	11.1
3.0	13.7	2.8*	16.5	8.6	2.8*	11.4	11.9	2.8*	14.7
4.0	18.3	2.8*	21.1	11.5	2.8*	14.3	15.5	2.8*	18.3
5.0	22.9	2.8*	25.7	14.3	2.8*	17.1	19.1	2.8*	21.9
6.0	27.5	2.8*	30.3	17.2	2.8*	20.0	22.7	2.8*	25.5
7.0	32.1	2.8*	34.9	20.0	2.8*	22.8	26.3	2.8*	29.1
8.0	36.7	2.8*	39.4	22.9	2.8*	25.7	29.9	2.8*	32.7
9.0	41.2	2.8*	44.0	25.8	2.8*	28.6	33.6	2.8*	36.4
10.0	45.8	2.8*	48.6	28.6	2.8*	31.4	37.3	2.8*	40.1
11.0	49.9	2.2*	52.2	31.4	2.2*	33.7	40.6	2.2*	42.8
12.0	53.6	2.2*	55.8	34.2	2.2*	36.4	43.8	2.2*	46.0
13.0	57.3	2.2*	59.5	36.9	2.2*	39.2	47.0	2.2*	49.3
14.0	60.9	2.2*	63.2	39.7	2.2*	41.9	50.3	2.2*	52.5
15.0	64.6	2.2*	66.8	42.4	2.2*	44.7	53.5	2.2*	55.7
16.0	68.3	2.2*	70.5	45.2	2.2*	47.4	56.7	2.2*	59.0
17.0	71.9	2.2*	74.2	47.9	2.2*	50.2	60.0	2.2*	62.2
18.0	75.6	2.2*	77.8	50.7	2.2*	52.9	63.3	2.2*	65.5
19.0	79.3	2.2*	81.5	53.4	2.2*	55.7	66.6	2.2*	68.8
20.0	82.9	2.2*	85.2	56.2	2.2*	58.4	69.9	2.2*	72.1
21.0	86.6	2.2*	88.8	58.9	2.2*	61.2	73.2	2.2*	75.4
22.0	90.3	2.2*	92.5	61.7	2.2*	63.9	76.5	2.2*	78.8
23.0	93.9	2.2*	96.2	64.4	2.2*	66.7	79.9	2.2*	82.1
24.0	97.6	2.2*	99.8	67.2	2.2*	69.4	83.2	2.2*	85.5
25.0	101.3	2.2*	103.5	69.9	2.2*	72.2	86.6	2.2*	88.8
26.0	104.9	2.2*	107.2	72.7	2.2*	74.9	90.0	2.2*	92.2
27.0	108.6	2.2*	110.8	75.4	2.2*	77.7	93.4	2.2*	95.7
28.0	112.2	2.2*	114.5	78.2	2.2*	80.4	96.9	2.2*	99.1
29.0	115.9	2.2*	118.1	80.9	2.2*	83.2	100.3	2.2*	102.5
30.0	119.6	2.2*	121.8	83.7	2.2*	85.9	103.8	2.2*	106.0
31.0	123.2	2.2*	125.5	86.4	2.2*	88.7	107.3	2.2*	109.5
32.0	126.9	2.2*	129.1	89.2	2.2*	91.4	110.8	2.2*	113.0
33.0	130.6	2.2*	132.8	91.9	2.2*	94.2	114.3	2.2*	116.5
34.0	134.2	2.2*	136.5	94.7	2.2*	96.9	117.8	2.2*	120.1
35.0	137.9	2.2*	140.1	97.4	2.2*	99.7	121.4	2.2*	123.6
36.0	141.6	2.2*	143.8	100.2	2.2*	102.4	125.0	2.2*	127.2
37.0	145.2	2.2*	147.5	102.9	2.2*	105.1	128.6	2.2*	130.8
38.0	148.9	2.2*	151.1	105.7	2.2*	107.9	132.2	2.2*	134.4
39.0	152.6	2.2*	154.8	108.4	2.2*	110.6	135.8	2.2*	138.1
40.0	156.2	2.2*	158.5	111.2	2.2*	113.4	139.5	2.2*	141.7
41.0	161.3	5.6*	166.9	114.8	5.6*	120.4	145.1	5.6*	150.7
42.0	167.7	5.6*	173.3	119.4	5.6*	125.0	150.8	5.6*	156.4
43.0	174.1	5.6*	179.7	124.0	5.6*	129.6	156.4	5.6*	162.0
44.0	180.5	5.6*	186.1	128.6	5.6*	134.2	162.0	5.6*	167.6
45.0	187.0	5.6*	192.6	133.1	5.6*	138.7	167.6	5.6*	173.2

46.0	193.4	5.6*	199.0	137.7	5.6*	143.3	173.1	5.6*	178.7
47.0	199.8	5.6*	205.4	142.3	5.6*	147.9	178.6	5.6*	184.2
48.0	206.2	5.6*	211.8	146.9	5.6*	152.5	184.1	5.6*	189.7
49.0	212.7	5.6*	218.3	151.5	5.6*	157.1	189.6	5.6*	195.2
50.0	219.1	5.6*	224.7	156.1	5.6*	161.7	195.1	5.6*	200.7

****
* API RP-2A (1994) *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	2.8*	2.8
1.00	1.3	3.4*	4.7
2.00	2.7	4.0*	6.7
3.00	4.3	4.8*	9.1
4.00	6.1	5.6*	11.6
5.00	7.9	6.4*	14.4
6.00	9.9	7.3*	17.2
7.00	12.0	8.2*	20.2
8.00	14.1	9.2*	23.3
9.00	16.3	10.1*	26.4
10.00	18.6	9.6	28.2
11.00	20.8	9.6	30.4
12.00	22.9	9.6	32.5
13.00	25.1	9.6	34.7
14.00	27.3	9.6	36.9
15.00	29.5	9.6	39.2
16.00	31.9	9.6	41.5
17.00	34.2	9.6	43.8
18.00	36.6	9.6	46.2
19.00	39.1	9.6	48.7
20.00	41.6	9.6	51.2
21.00	44.1	9.6	53.7
22.00	46.7	9.6	56.3
23.00	49.3	9.6	58.9
24.00	51.9	9.6	61.5
25.00	54.6	9.6	64.2
26.00	57.3	9.6	67.0
27.00	60.1	9.6	69.7
28.00	62.9	9.6	72.5
29.00	65.8	9.6	75.4
30.00	68.6	9.6	78.3
31.00	71.6	9.6	81.2
32.00	74.5	9.6	84.1
33.00	77.5	9.6	87.1
34.00	80.5	9.6	90.1
35.00	83.6	9.6	93.2
36.00	86.7	9.6	96.3
37.00	89.8	9.6	99.4
38.00	93.0	11.7	104.6
39.00	96.2	17.9	114.0
40.00	99.4	24.1	123.4
41.00	103.6	24.1	127.6
42.00	108.8	24.1	132.8
43.00	114.0	24.1	138.1
44.00	119.3	24.1	143.4
45.00	124.7	24.1	148.7
46.00	130.1	24.1	154.1
47.00	135.5	24.1	159.6

48.00	141.0	24.1	165.1
49.00	146.6	24.1	170.6
50.00	152.2	24.1	176.2

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

****
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING *
****

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2240E-01
			0.1220E+01	0.4340E-01
			0.1831E+01	0.7980E-01
			0.2197E+01	0.1120E+00
			0.2441E+01	0.1400E+00
			0.2197E+01	0.2800E+00
			0.2197E+01	0.4200E+00
			0.2197E+01	0.7000E+00
			0.2197E+01	0.2800E+01
2	10	0.4775E+01		
			0.0000E+00	0.0000E+00
			0.1065E+01	0.2240E-01
			0.1775E+01	0.4340E-01
			0.2663E+01	0.7980E-01
			0.3196E+01	0.1120E+00
			0.3551E+01	0.1400E+00
			0.3196E+01	0.2800E+00
			0.3196E+01	0.4200E+00
			0.3196E+01	0.7000E+00
			0.3196E+01	0.2800E+01
3	10	0.9458E+01		
			0.0000E+00	0.0000E+00
			0.1285E+01	0.2240E-01
			0.2142E+01	0.4340E-01
			0.3213E+01	0.7980E-01
			0.3855E+01	0.1120E+00
			0.4284E+01	0.1400E+00
			0.3855E+01	0.2800E+00
			0.3855E+01	0.4200E+00
			0.3855E+01	0.7000E+00
			0.3855E+01	0.2800E+01
4	10	0.9500E+01		
			0.0000E+00	0.0000E+00
			0.1285E+01	0.2240E-01
			0.2142E+01	0.4340E-01
			0.3213E+01	0.7980E-01
			0.3855E+01	0.1120E+00
			0.4284E+01	0.1400E+00
			0.3855E+01	0.2800E+00
			0.3855E+01	0.4200E+00
			0.3855E+01	0.7000E+00

			0.3855E+01	0.2800E+01
5	10	0.2452E+02		
			0.0000E+00	0.0000E+00
			0.1530E+01	0.2240E-01
			0.2550E+01	0.4340E-01
			0.3825E+01	0.7980E-01
			0.4590E+01	0.1120E+00
			0.5100E+01	0.1400E+00
			0.4590E+01	0.2800E+00
			0.4590E+01	0.4200E+00
			0.4590E+01	0.7000E+00
			0.4590E+01	0.2800E+01
6	10	0.3946E+02		
			0.0000E+00	0.0000E+00
			0.1833E+01	0.2240E-01
			0.3055E+01	0.4340E-01
			0.4583E+01	0.7980E-01
			0.5499E+01	0.1120E+00
			0.6110E+01	0.1400E+00
			0.5499E+01	0.2800E+00
			0.5499E+01	0.4200E+00
			0.5499E+01	0.7000E+00
			0.5499E+01	0.2800E+01
7	10	0.3950E+02		
			0.0000E+00	0.0000E+00
			0.1833E+01	0.2240E-01
			0.3055E+01	0.4340E-01
			0.4583E+01	0.7980E-01
			0.5499E+01	0.1120E+00
			0.6110E+01	0.1400E+00
			0.5499E+01	0.2800E+00
			0.5499E+01	0.4200E+00
			0.5499E+01	0.7000E+00
			0.5499E+01	0.2800E+01
8	10	0.5227E+02		
			0.0000E+00	0.0000E+00
			0.3178E+01	0.2240E-01
			0.5296E+01	0.4340E-01
			0.7944E+01	0.7980E-01
			0.9533E+01	0.1120E+00
			0.1059E+02	0.1400E+00
			0.9533E+01	0.2800E+00
			0.9533E+01	0.4200E+00
			0.9533E+01	0.7000E+00
			0.9533E+01	0.2800E+01
9	10	0.6496E+02		
			0.0000E+00	0.0000E+00
			0.3178E+01	0.2240E-01
			0.5296E+01	0.4340E-01
			0.7944E+01	0.7980E-01
			0.9533E+01	0.1120E+00
			0.1059E+02	0.1400E+00
			0.9533E+01	0.2800E+00
			0.9533E+01	0.4200E+00
			0.9533E+01	0.7000E+00
			0.9533E+01	0.2800E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00

0.1503E+01	0.7000E-02
0.3007E+01	0.1400E-01
0.6013E+01	0.2800E-01
0.1203E+02	0.1820E+00
0.1804E+02	0.5880E+00
0.2165E+02	0.1022E+01
0.2405E+02	0.1400E+01
0.2405E+02	0.2100E+01
0.2405E+02	0.2800E+01

LOAD VERSUS SETTLEMENT CURVE

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.3055E+00	0.2788E-03	0.2148E-01	0.1000E-03
0.3055E+01	0.2788E-02	0.2148E+00	0.1000E-02
0.1535E+02	0.1396E-01	0.1074E+01	0.5000E-02
0.3068E+02	0.2797E-01	0.2148E+01	0.1000E-01
0.1017E+03	0.1139E+00	0.6872E+01	0.5000E-01
0.1407E+03	0.1923E+00	0.8825E+01	0.1000E+00
0.1454E+03	0.6014E+00	0.1674E+02	0.5000E+00
0.1501E+03	0.1107E+01	0.2146E+02	0.1000E+01
0.1527E+03	0.2109E+01	0.2405E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4
LT
11/11/11
1 1 6
0 0 16 15 29000000 80
0 15
0 1 1 0 4 0
100 24.35
0.0 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
3.5 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
3.5 2 0.0 62.6 0.0 0.0
0 0 1000 0 0 0 0 0 0
33.5 2 0.0 62.6 0.0 0.0
0 0 1000 0 0 0 0 0 0
33.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
100 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 16.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 15.00 IN.
PILE LENGTH = 80.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
3.50	CLAY	0.00	125.00	0.00	0.00
3.50	CLAY	0.00	62.60	0.00	0.00
33.50	CLAY	0.00	62.60	0.00	0.00
33.50	CLAY	0.00	62.60	0.00	0.00
100.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.00	0.00	0.00	0.00	0.00
9999.00	99999.00	1.00	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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****
* COMPUTATION RESULT *
****

PILE PENETR- ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC- ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC- ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC- ITY KIP
	********** FED. HWY. METHOD **********			********** ARMY CORPS METHOD **********			********** LAMBDA 2 METHOD **********		
0.0	0.0	1.9*	1.9	0.0	1.9*	1.9	0.0	1.9*	1.9
1.0	5.2	1.9*	7.1	3.3	1.9*	5.2	4.9	1.9*	6.8
2.0	10.5	1.9*	12.4	6.5	1.9*	8.4	9.1	1.9*	11.0
3.0	15.7	1.9*	17.6	9.8	1.9*	11.7	13.1	1.9*	15.0
4.0	20.9	1.9*	22.8	13.1	1.9*	15.0	17.0	1.9*	18.9
5.0	25.7	1.5*	27.2	16.3	1.5*	17.8	20.1	1.5*	21.6
6.0	29.8	1.5*	31.4	19.4	1.5*	21.0	23.3	1.5*	24.8
7.0	34.0	1.5*	35.6	22.6	1.5*	24.1	26.4	1.5*	27.9
8.0	38.2	1.5*	39.7	25.7	1.5*	27.2	29.5	1.5*	31.0
9.0	42.4	1.5*	43.9	28.9	1.5*	30.4	32.5	1.5*	34.1
10.0	46.6	1.5*	48.1	32.0	1.5*	33.5	35.6	1.5*	37.1
11.0	50.8	1.5*	52.3	35.1	1.5*	36.7	38.7	1.5*	40.2
12.0	55.0	1.5*	56.5	38.3	1.5*	39.8	41.8	1.5*	43.3
13.0	59.2	1.5*	60.7	41.4	1.5*	43.0	44.9	1.5*	46.4
14.0	63.4	1.5*	64.9	44.6	1.5*	46.1	48.0	1.5*	49.5
15.0	67.5	1.5*	69.1	47.7	1.5*	49.2	51.1	1.5*	52.6
16.0	71.7	1.5*	73.3	50.9	1.5*	52.4	54.2	1.5*	55.8
17.0	75.9	1.5*	77.4	54.0	1.5*	55.5	57.4	1.5*	58.9
18.0	80.1	1.5*	81.6	57.1	1.5*	58.7	60.5	1.5*	62.1
19.0	84.3	1.5*	85.8	60.3	1.5*	61.8	63.7	1.5*	65.2
20.0	88.5	1.5*	90.0	63.4	1.5*	64.9	66.9	1.5*	68.4
21.0	92.7	1.5*	94.2	66.6	1.5*	68.1	70.1	1.5*	71.6
22.0	96.9	1.5*	98.4	69.7	1.5*	71.2	73.3	1.5*	74.8
23.0	101.1	1.5*	102.6	72.8	1.5*	74.4	76.6	1.5*	78.1
24.0	105.2	1.5*	106.8	76.0	1.5*	77.5	79.8	1.5*	81.4
25.0	109.4	1.5*	111.0	79.1	1.5*	80.7	83.1	1.5*	84.6
26.0	113.6	1.5*	115.1	82.3	1.5*	83.8	86.4	1.5*	87.9
27.0	117.8	1.5*	119.3	85.4	1.5*	86.9	89.7	1.5*	91.2
28.0	122.0	1.5*	123.5	88.6	1.5*	90.1	93.1	1.5*	94.6
29.0	126.2	1.5*	127.7	91.7	1.5*	93.2	96.4	1.5*	97.9
30.0	130.4	1.5*	131.9	94.8	1.5*	96.4	99.8	1.5*	101.3
31.0	134.6	1.5*	136.1	98.0	1.5*	99.5	103.2	1.5*	104.7
32.0	138.8	1.5*	140.3	101.1	1.5*	102.6	106.6	1.5*	108.1
33.0	142.9	1.5*	144.5	104.3	1.5*	105.8	110.0	1.5*	111.6
34.0	147.1	1.5*	148.7	107.4	1.5*	108.9	113.5	1.5*	115.0
35.0	152.9	3.8*	156.7	111.6	3.8*	115.4	119.3	3.8*	123.1
36.0	160.2	3.8*	164.0	116.8	3.8*	120.6	125.0	3.8*	128.8
37.0	167.6	3.8*	171.4	122.1	3.8*	125.9	130.7	3.8*	134.5
38.0	174.9	3.8*	178.7	127.3	3.8*	131.1	136.3	3.8*	140.1
39.0	182.3	3.8*	186.1	132.5	3.8*	136.3	141.9	3.8*	145.7
40.0	189.6	3.8*	193.4	137.8	3.8*	141.6	147.5	3.8*	151.3
41.0	196.9	3.8*	200.7	143.0	3.8*	146.8	153.1	3.8*	156.9
42.0	204.3	3.8*	208.1	148.2	3.8*	152.0	158.6	3.8*	162.4
43.0	211.6	3.8*	215.4	153.5	3.8*	157.3	164.1	3.8*	167.9
44.0	219.0	3.8*	222.8	158.7	3.8*	162.5	169.5	3.8*	173.3
45.0	226.3	3.8*	230.1	164.0	3.8*	167.8	175.0	3.8*	178.8

46.0	233.6	3.8*	237.4	169.2	3.8*	173.0	180.4	3.8*	184.2
47.0	241.0	3.8*	244.8	174.4	3.8*	178.2	185.8	3.8*	189.6
48.0	248.3	3.8*	252.1	179.7	3.8*	183.5	191.2	3.8*	195.0
49.0	255.7	3.8*	259.5	184.9	3.8*	188.7	196.5	3.8*	200.3
50.0	263.0	3.8*	266.8	190.1	3.8*	193.9	201.8	3.8*	205.6
51.0	270.3	3.8*	274.2	195.4	3.8*	199.2	207.2	3.8*	211.0
52.0	277.7	3.8*	281.5	200.6	3.8*	204.4	212.4	3.8*	216.3
53.0	285.0	3.8*	288.8	205.8	3.8*	209.6	217.7	3.8*	221.5
54.0	292.4	3.8*	296.2	211.1	3.8*	214.9	223.0	3.8*	226.8
55.0	299.7	3.8*	303.5	216.3	3.8*	220.1	228.2	3.8*	232.0
56.0	307.1	3.8*	310.9	221.5	3.8*	225.4	233.5	3.8*	237.3
57.0	314.4	3.8*	318.2	226.8	3.8*	230.6	238.7	3.8*	242.5
58.0	321.7	3.8*	325.5	232.0	3.8*	235.8	243.9	3.8*	247.7
59.0	329.1	3.8*	332.9	237.3	3.8*	241.1	249.1	3.8*	252.9
60.0	336.4	3.8*	340.2	242.5	3.8*	246.3	254.3	3.8*	258.1
61.0	343.8	3.8*	347.6	247.7	3.8*	251.5	259.4	3.8*	263.2
62.0	351.1	3.8*	354.9	253.0	3.8*	256.8	264.6	3.8*	268.4
63.0	358.4	3.8*	362.2	258.2	3.8*	262.0	269.7	3.8*	273.5
64.0	365.8	3.8*	369.6	263.4	3.8*	267.2	274.9	3.8*	278.7
65.0	373.1	3.8*	376.9	268.7	3.8*	272.5	280.0	3.8*	283.8
66.0	380.5	3.8*	384.3	273.9	3.8*	277.7	285.1	3.8*	288.9
67.0	387.8	3.8*	391.6	279.1	3.8*	282.9	290.2	3.8*	294.0
68.0	395.1	3.8*	398.9	284.4	3.8*	288.2	295.3	3.8*	299.1
69.0	402.5	3.8*	406.3	289.6	3.8*	293.4	300.4	3.8*	304.2
70.0	409.8	3.8*	413.6	294.9	3.8*	298.7	305.4	3.8*	309.2
71.0	417.2	3.8*	421.0	300.1	3.8*	303.9	310.5	3.8*	314.3
72.0	424.5	3.8*	428.3	305.3	3.8*	309.1	315.5	3.8*	319.3
73.0	431.8	3.8*	435.7	310.6	3.8*	314.4	320.6	3.8*	324.4
74.0	439.2	3.8*	443.0	315.8	3.8*	319.6	325.6	3.8*	329.4
75.0	446.5	3.8*	450.3	321.0	3.8*	324.8	330.6	3.8*	334.5
76.0	453.9	3.8*	457.7	326.3	3.8*	330.1	335.7	3.8*	339.5
77.0	461.2	3.8*	465.0	331.5	3.8*	335.3	340.7	3.8*	344.5
78.0	468.6	3.8*	472.4	336.7	3.8*	340.5	345.7	3.8*	349.5
79.0	475.9	3.8*	479.7	342.0	3.8*	345.8	350.7	3.8*	354.5
80.0	483.2	3.8*	487.0	347.2	3.8*	351.0	355.7	3.8*	359.5

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* API RP-2A (1994) *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	1.9*	1.9
1.00	1.5	2.6*	4.1
2.00	3.1	3.4*	6.5
3.00	4.9	4.3*	9.2
4.00	6.9	5.3*	12.2
5.00	8.9	5.8*	14.7
6.00	10.7	6.6*	17.4
7.00	12.6	7.5*	20.1
8.00	14.5	8.4*	23.0
9.00	16.5	9.4*	25.9
10.00	18.5	10.3*	28.8
11.00	20.6	11.3*	31.9
12.00	22.6	12.3*	34.9
13.00	24.8	12.6	37.3
14.00	27.0	12.6	39.5
15.00	29.2	12.6	41.8
16.00	31.5	12.6	44.1
17.00	33.9	12.6	46.5

18.00	36.3	12.6	48.9
19.00	38.8	12.6	51.4
20.00	41.3	12.6	53.9
21.00	43.9	12.6	56.5
22.00	46.6	12.6	59.1
23.00	49.3	12.6	61.8
24.00	52.0	12.6	64.6
25.00	54.8	12.6	67.4
26.00	57.7	12.6	70.2
27.00	60.6	12.6	73.1
28.00	63.5	12.6	76.1
29.00	66.5	12.6	79.1
30.00	69.5	12.6	82.1
31.00	72.6	12.6	85.2
32.00	75.7	17.3	93.0
33.00	78.9	24.3	103.2
34.00	82.1	31.4	113.5
35.00	86.3	31.4	117.7
36.00	91.5	31.4	122.9
37.00	96.8	31.4	128.2
38.00	102.1	31.4	133.6
39.00	107.5	31.4	139.0
40.00	113.0	31.4	144.4
41.00	118.5	31.4	149.9
42.00	124.1	31.4	155.5
43.00	129.8	31.4	161.2
44.00	135.5	31.4	166.9
45.00	141.2	31.4	172.7
46.00	147.1	31.4	178.5
47.00	153.0	31.4	184.4
48.00	158.9	31.4	190.3
49.00	164.9	31.4	196.3
50.00	171.0	31.4	202.4
51.00	177.1	31.4	208.5
52.00	183.3	31.4	214.7
53.00	189.5	31.4	220.9
54.00	195.8	31.4	227.2
55.00	202.1	31.4	233.5
56.00	208.5	31.4	239.9
57.00	214.9	31.4	246.4
58.00	221.4	31.4	252.9
59.00	228.0	31.4	259.4
60.00	234.6	31.4	266.0
61.00	241.2	31.4	272.7
62.00	247.9	31.4	279.4
63.00	254.7	31.4	286.1
64.00	261.5	31.4	292.9
65.00	268.4	31.4	299.8
66.00	275.3	31.4	306.7
67.00	282.2	31.4	313.6
68.00	289.2	31.4	320.6
69.00	296.3	31.4	327.7
70.00	303.4	31.4	334.8
71.00	310.5	31.4	342.0
72.00	317.7	31.4	349.2
73.00	325.0	31.4	356.4
74.00	332.3	31.4	363.7
75.00	339.6	31.4	371.0
76.00	347.0	31.4	378.4
77.00	354.4	31.4	385.9
78.00	361.9	31.4	393.3
79.00	369.4	31.4	400.9
80.00	377.0	31.4	408.4

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2560E-01
			0.1220E+01	0.4960E-01
			0.1831E+01	0.9120E-01
			0.2197E+01	0.1280E+00
			0.2441E+01	0.1600E+00
			0.2197E+01	0.3200E+00
			0.2197E+01	0.4800E+00
			0.2197E+01	0.8000E+00
			0.2197E+01	0.3200E+01
2	10	0.1775E+01		
			0.0000E+00	0.0000E+00
			0.8015E+00	0.2560E-01
			0.1336E+01	0.4960E-01
			0.2004E+01	0.9120E-01
			0.2404E+01	0.1280E+00
			0.2672E+01	0.1600E+00
			0.2404E+01	0.3200E+00
			0.2404E+01	0.4800E+00
			0.2404E+01	0.8000E+00
			0.2404E+01	0.3200E+01
3	10	0.3458E+01		
			0.0000E+00	0.0000E+00
			0.9996E+00	0.2560E-01
			0.1666E+01	0.4960E-01
			0.2499E+01	0.9120E-01
			0.2999E+01	0.1280E+00
			0.3332E+01	0.1600E+00
			0.2999E+01	0.3200E+00
			0.2999E+01	0.4800E+00
			0.2999E+01	0.8000E+00
			0.2999E+01	0.3200E+01
4	10	0.3500E+01		
			0.0000E+00	0.0000E+00
			0.9996E+00	0.2560E-01
			0.1666E+01	0.4960E-01
			0.2499E+01	0.9120E-01
			0.2999E+01	0.1280E+00
			0.3332E+01	0.1600E+00
			0.2999E+01	0.3200E+00
			0.2999E+01	0.4800E+00
			0.2999E+01	0.8000E+00
			0.2999E+01	0.3200E+01
5	10	0.1852E+02		
			0.0000E+00	0.0000E+00

			0.1236E+01	0.2560E-01
			0.2060E+01	0.4960E-01
			0.3090E+01	0.9120E-01
			0.3707E+01	0.1280E+00
			0.4119E+01	0.1600E+00
			0.3707E+01	0.3200E+00
			0.3707E+01	0.4800E+00
			0.3707E+01	0.8000E+00
			0.3707E+01	0.3200E+01
6	10	0.3346E+02		
			0.0000E+00	0.0000E+00
			0.1596E+01	0.2560E-01
			0.2659E+01	0.4960E-01
			0.3989E+01	0.9120E-01
			0.4787E+01	0.1280E+00
			0.5319E+01	0.1600E+00
			0.4787E+01	0.3200E+00
			0.4787E+01	0.4800E+00
			0.4787E+01	0.8000E+00
			0.4787E+01	0.3200E+01
7	10	0.3350E+02		
			0.0000E+00	0.0000E+00
			0.1596E+01	0.2560E-01
			0.2659E+01	0.4960E-01
			0.3989E+01	0.9120E-01
			0.4787E+01	0.1280E+00
			0.5319E+01	0.1600E+00
			0.4787E+01	0.3200E+00
			0.4787E+01	0.4800E+00
			0.4787E+01	0.8000E+00
			0.4787E+01	0.3200E+01
8	10	0.6678E+02		
			0.0000E+00	0.0000E+00
			0.3460E+01	0.2560E-01
			0.5766E+01	0.4960E-01
			0.8649E+01	0.9120E-01
			0.1038E+02	0.1280E+00
			0.1153E+02	0.1600E+00
			0.1038E+02	0.3200E+00
			0.1038E+02	0.4800E+00
			0.1038E+02	0.8000E+00
			0.1038E+02	0.3200E+01
9	10	0.9996E+02		
			0.0000E+00	0.0000E+00
			0.3765E+01	0.2560E-01
			0.6275E+01	0.4960E-01
			0.9413E+01	0.9120E-01
			0.1130E+02	0.1280E+00
			0.1255E+02	0.1600E+00
			0.1130E+02	0.3200E+00
			0.1130E+02	0.4800E+00
			0.1130E+02	0.8000E+00
			0.1130E+02	0.3200E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1963E+01	0.8000E-02
0.3927E+01	0.1600E-01
0.7854E+01	0.3200E-01

0.1571E+02	0.2080E+00
0.2356E+02	0.6720E+00
0.2827E+02	0.1168E+01
0.3142E+02	0.1600E+01
0.3142E+02	0.2400E+01
0.3142E+02	0.3200E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.9222E+00	0.6916E-03	0.2454E-01	0.1000E-03
0.9222E+01	0.6916E-02	0.2454E+00	0.1000E-02
0.4631E+02	0.3480E-01	0.1227E+01	0.5000E-02
0.8720E+02	0.6849E-01	0.2454E+01	0.1000E-01
0.2514E+03	0.2462E+00	0.8657E+01	0.5000E-01
0.3195E+03	0.3705E+00	0.1089E+02	0.1000E+00
0.3312E+03	0.7913E+00	0.2065E+02	0.5000E+00
0.3372E+03	0.1300E+01	0.2668E+02	0.1000E+01
0.3419E+03	0.2306E+01	0.3142E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENT 5
1
2 1 1 1 1
6 6 0 0 6 0 3000000
4 8.5 75 2.5 3
2 8.5
0 125 0.0 1250 0 0 0
0 125 0.0 1250 0 0 0
0 0
2 28.5
0 125 0.0 1250 0 0 0
0 125 0.0 1250 0 0 0
0 0
1 48.5
0.0 125 36 0.0 0 0 0
0.0 125 36 0.0 0 0 0
2
0 0
2 100
0 125 0.0 2500 0 0 0
0 125 0.0 2500 0 0 0
0 0
```

VERTICALLY LOADED DRILLED SHAFT ANALYSIS PROGRAM SHAFT
VERSION 6 (C)COPYRIGHT ENSOFT,INC.1989,1995,1998,2001,2003,2007

SAN LEANDRO CREEK BOH (WIDEN) - BENT 5

PROPOSED DEPTH = 75.0 FT

NUMBER OF LAYERS = 4

WATER TABLE DEPTH = 8.5 FT.

FACTOR OF SAFETY APPLIED TO THE TOTAL ULTIMATE CAPACITY = 2.50
FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00

SOIL INFORMATION

LAYER NO 1----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.600E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.125E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.000E+00

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.770E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.125E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.850E+01

LAYER NO 2----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.770E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.125E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00

BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.850E+01

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.125E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.285E+02

LAYER NO 3----SAND

AT THE TOP

SKIN FRICTION COEFFICIENT- BETA = 0.779E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.000E+00
INTERNAL FRICTION ANGLE, DEG. = 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.285E+02

AT THE BOTTOM

SKIN FRICTION COEFFICIENT- BETA = 0.560E+00
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.000E+00
INTERNAL FRICTION ANGLE, DEG. = 0.360E+02
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.485E+02

LAYER NO 4----CLAY

AT THE TOP

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.250E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00
SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.485E+02

AT THE BOTTOM

STRENGTH REDUCTION FACTOR-ALPHA = 0.550E+00
END BEARING COEFFICIENT-Nc = 0.900E+01
UNDRAINED SHEAR STRENGTH, LB/SQ FT = 0.250E+04
INTERNAL FRICTION ANGLE, DEG. = 0.000E+00
BLOWS PER FOOT FROM STANDARD PENETRATION TEST = 0.000E+00

SOIL UNIT WEIGHT, LB/CU FT = 0.125E+03
MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT = 0.100E+11
DEPTH, FT = 0.100E+03

DRILLED SHAFT INFORMATION

DIAMETER OF STEM = 6.000 FT.
DIAMETER OF BASE = 6.000 FT.
END OF STEM TO BASE = 0.000 FT.
ANGLE OF BELL = 0.000 DEG.
IGNORED TOP PORTION = 6.000 FT.
IGNORED BOTTOM PORTION = 0.000 FT.
AREA OF ONE PERCENT STEEL = 40.720 SQ.IN.
ELASTIC MODULUS, Ec = 0.300E+07 LB/SQ IN
VOLUME OF UNDERREAM = 0.000 CU.YDS.

PREDICTED RESULTS

QS = ULTIMATE SIDE RESISTANCE;
QB = ULTIMATE BASE RESISTANCE;
WT = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU = TOTAL ULTIMATE RESISTANCE;
QBD = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY APPLIED TO THE ULTIMATE SIDE RESISTANCE AND THE ULTIMATE BASE RESISTANCE.

LENGTH (FEET)	VOLUME (CU.YDS)	QS (TONS)	QB (TONS)	QU (TONS)	QBD (TONS)	QDN (TONS)	QU/VOLUME (TONS/CU.YDS)
7.0	7.33	6.48	142.75	149.23	54.06	50.17	19.99
8.0	8.38	12.96	143.90	156.86	60.93	53.15	18.72
9.0	9.43	19.44	145.05	164.49	67.79	56.12	17.45
10.0	10.47	25.92	146.19	172.12	74.65	59.10	16.43
11.0	11.52	32.40	147.34	179.74	81.52	62.07	15.60
12.0	12.57	38.88	148.49	187.37	88.38	65.05	14.91
13.0	13.62	45.36	149.64	195.00	95.24	68.03	14.32
14.0	14.66	51.84	150.79	202.63	102.11	71.00	13.82
15.0	15.71	58.32	151.94	210.26	108.97	73.98	13.38
16.0	16.76	64.80	153.09	217.89	115.83	76.95	13.00
17.0	17.80	71.28	154.24	225.52	122.70	79.93	12.67
18.0	18.85	77.76	155.09	232.86	129.46	82.80	12.35
19.0	19.90	84.24	156.31	240.56	136.35	85.80	12.09
20.0	20.95	90.73	157.93	248.65	143.37	88.93	11.87
21.0	21.99	97.21	159.96	257.17	150.53	92.20	11.69
22.0	23.04	103.69	162.45	266.13	157.83	95.62	11.55
23.0	24.09	110.17	165.41	275.58	165.30	99.20	11.44
24.0	25.14	116.65	168.98	285.63	172.97	102.99	11.36
25.0	26.18	123.13	173.06	296.19	180.81	106.94	11.31
26.0	27.23	129.61	177.56	307.17	188.80	111.03	11.28
27.0	28.28	136.09	182.40	318.49	196.89	115.24	11.26
28.0	29.33	142.57	187.48	330.05	205.06	119.52	11.25
29.0	30.37	149.05	192.72	341.77	213.29	123.86	11.25
30.0	31.42	166.09	197.96	364.05	232.08	132.42	11.59
31.0	32.47	183.30	203.19	386.49	251.03	141.05	11.90

32.0	33.51	200.67	208.43	409.10	270.15	149.74	12.21
33.0	34.56	218.19	213.67	431.85	289.41	158.50	12.50
34.0	35.61	235.84	218.90	454.75	308.81	167.30	12.77
35.0	36.66	253.63	224.14	477.77	328.34	176.16	13.03
36.0	37.70	271.53	229.38	500.91	347.99	185.07	13.29
37.0	38.75	289.54	234.62	524.16	367.75	194.02	13.53
38.0	39.80	307.66	245.15	552.81	389.38	204.78	13.89
39.0	40.85	325.87	255.61	581.47	411.07	215.55	14.24
40.0	41.89	344.16	265.93	610.09	432.81	226.31	14.56
41.0	42.94	362.53	276.10	638.63	454.56	237.04	14.87
42.0	43.99	380.96	286.07	667.03	476.32	247.74	15.16
43.0	45.04	399.45	295.80	695.25	498.05	258.38	15.44
44.0	46.08	417.99	303.62	721.61	519.20	268.40	15.66
45.0	47.13	436.57	309.65	746.22	539.79	277.85	15.83
46.0	48.18	455.18	314.00	769.19	559.85	286.74	15.97
47.0	49.22	473.82	316.79	790.61	579.42	295.12	16.06
48.0	50.27	492.47	318.13	810.60	598.51	303.03	16.12
49.0	51.32	511.13	318.13	829.26	617.17	310.49	16.16
50.0	52.37	524.09	318.13	842.22	630.13	315.68	16.08
51.0	53.41	537.05	318.13	855.18	643.09	320.86	16.01
52.0	54.46	550.01	318.13	868.14	656.05	326.05	15.94
53.0	55.51	562.97	318.13	881.10	669.01	331.23	15.87
54.0	56.56	575.93	318.13	894.06	681.97	336.42	15.81
55.0	57.60	588.89	318.13	907.02	694.94	341.60	15.75
56.0	58.65	601.85	318.13	919.98	707.90	346.78	15.69
57.0	59.70	614.81	318.13	932.94	720.86	351.97	15.63
58.0	60.75	627.77	318.13	945.90	733.82	357.15	15.57
59.0	61.79	640.74	318.13	958.86	746.78	362.34	15.52
60.0	62.84	653.70	318.13	971.82	759.74	367.52	15.47
61.0	63.89	666.66	318.13	984.78	772.70	372.71	15.41
62.0	64.93	679.62	318.13	997.75	785.66	377.89	15.37
63.0	65.98	692.58	318.13	1010.71	798.62	383.07	15.32
64.0	67.03	705.54	318.13	1023.67	811.58	388.26	15.27
65.0	68.08	718.50	318.13	1036.63	824.54	393.44	15.23
66.0	69.12	731.46	318.13	1049.59	837.50	398.63	15.18
67.0	70.17	744.42	318.13	1062.55	850.46	403.81	15.14
68.0	71.22	757.38	318.13	1075.51	863.42	409.00	15.10
69.0	72.27	770.34	318.13	1088.47	876.39	414.18	15.06
70.0	73.31	783.30	318.13	1101.43	889.35	419.36	15.02
71.0	74.36	796.26	318.13	1114.39	902.31	424.55	14.99
72.0	75.41	809.23	318.13	1127.35	915.27	429.73	14.95
73.0	76.46	822.19	318.13	1140.31	928.23	434.92	14.91
74.0	77.50	835.15	318.13	1153.27	941.19	440.10	14.88
75.0	78.55	848.11	318.13	1166.24	954.15	445.29	14.85

RESULT FROM TREND (AVERAGED) LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.6282E-01	0.1544E-04	0.3491E-02	0.1000E-04
0.3141E+00	0.7719E-04	0.1745E-01	0.5000E-04
0.6282E+00	0.1544E-03	0.3491E-01	0.1000E-03
0.3141E+02	0.7719E-02	0.1745E+01	0.5000E-02
0.4712E+02	0.1158E-01	0.2618E+01	0.7500E-02
0.6282E+02	0.1544E-01	0.3491E+01	0.1000E-01
0.1573E+03	0.3861E-01	0.8726E+01	0.2500E-01
0.3147E+03	0.7724E-01	0.1745E+02	0.5000E-01
0.4374E+03	0.1139E+00	0.2618E+02	0.7500E-01
0.5185E+03	0.1462E+00	0.3491E+02	0.1000E+00
0.8212E+03	0.3263E+00	0.8726E+02	0.2500E+00
0.9598E+03	0.5915E+00	0.1461E+03	0.5000E+00

0.9931E+03	0.8163E+00	0.1782E+03	0.7200E+00
0.1039E+04	0.1906E+01	0.2752E+03	0.1800E+01
0.1071E+04	0.3711E+01	0.3086E+03	0.3600E+01

RESULT FROM UPPER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.9392E-01	0.1799E-04	0.5214E-02	0.1000E-04
0.4696E+00	0.8994E-04	0.2607E-01	0.5000E-04
0.9392E+00	0.1799E-03	0.5214E-01	0.1000E-03
0.4696E+02	0.8994E-02	0.2607E+01	0.5000E-02
0.7044E+02	0.1349E-01	0.3910E+01	0.7500E-02
0.9392E+02	0.1799E-01	0.5214E+01	0.1000E-01
0.2355E+03	0.4501E-01	0.1303E+02	0.2500E-01
0.4649E+03	0.8994E-01	0.2607E+02	0.5000E-01
0.6210E+03	0.1306E+00	0.3910E+02	0.7500E-01
0.7092E+03	0.1637E+00	0.5214E+02	0.1000E+00
0.9604E+03	0.3406E+00	0.1303E+03	0.2500E+00
0.1079E+04	0.6056E+00	0.2075E+03	0.5000E+00
0.1104E+04	0.8296E+00	0.2386E+03	0.7200E+00
0.1127E+04	0.1915E+01	0.3054E+03	0.1800E+01
0.1138E+04	0.3717E+01	0.3165E+03	0.3600E+01

RESULT FROM LOWER-BOUND LINE

TOP LOAD ton	TOP MOVEMENT IN.	TIP LOAD ton	TIP MOVEMENT IN.
0.3533E-01	0.1309E-04	0.1767E-02	0.1000E-04
0.1767E+00	0.6547E-04	0.8837E-02	0.5000E-04
0.3533E+00	0.1309E-03	0.1767E-01	0.1000E-03
0.1767E+02	0.6547E-02	0.8837E+00	0.5000E-02
0.2650E+02	0.9820E-02	0.1326E+01	0.7500E-02
0.3533E+02	0.1309E-01	0.1767E+01	0.1000E-01
0.8834E+02	0.3273E-01	0.4418E+01	0.2500E-01
0.1769E+03	0.6548E-01	0.8837E+01	0.5000E-01
0.2597E+03	0.9787E-01	0.1326E+02	0.7500E-01
0.3307E+03	0.1292E+00	0.1767E+02	0.1000E+00
0.6375E+03	0.3076E+00	0.4418E+02	0.2500E+00
0.8397E+03	0.5774E+00	0.8466E+02	0.5000E+00
0.8825E+03	0.8030E+00	0.1177E+03	0.7200E+00
0.9516E+03	0.1896E+01	0.2450E+03	0.1800E+01
0.1004E+04	0.3704E+01	0.2990E+03	0.3600E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 6 THRU 8
LT
11/11/11
1 1 8
0 0 16 15 29000000 80
0 15
0 1 1 0 4 0
100 24.35
0.0 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
1.5 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
1.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
21.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
21.5 1 0.8 62.6 36 0
0 0 0.0 0 0.0 0.0 0 0 0
41.5 1 0.8 62.6 36 0
0 0 0.0 0 0.0 0.0 0 0 0
41.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
100 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 6 THRU 8

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 16.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 15.00 IN.
PILE LENGTH = 80.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
1.50	CLAY	0.00	125.00	0.00	0.00
1.50	CLAY	0.00	62.60	0.00	0.00
21.50	CLAY	0.00	62.60	0.00	0.00
21.50	SAND	0.80	62.60	36.00	0.00
41.50	SAND	0.80	62.60	36.00	0.00
41.50	CLAY	0.00	62.60	0.00	0.00
100.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00

9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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* COMPUTATION RESULT *
****

PILE PENETR-ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP
	********** FED. HWY. METHOD *			********** ARMY CORPS METHOD *			********** LAMBDA 2 METHOD *		
0.0	0.0	1.9*	1.9	0.0	1.9*	1.9	0.0	1.9*	1.9
1.0	5.2	1.9*	7.1	3.3	1.9*	5.2	4.9	1.9*	6.8
2.0	10.5	1.9*	12.4	6.5	1.9*	8.4	9.1	1.9*	11.0
3.0	15.7	1.9*	17.6	9.8	1.9*	11.7	13.0	1.9*	14.9
4.0	20.9	1.9*	22.8	13.1	1.9*	15.0	16.8	1.9*	18.7
5.0	26.2	1.9*	28.1	16.4	1.9*	18.3	20.4	1.9*	22.3
6.0	31.4	1.9*	33.3	19.6	1.9*	21.5	24.0	1.9*	25.9
7.0	36.7	1.9*	38.6	22.9	1.9*	24.8	27.5	1.9*	29.4
8.0	41.9	1.9*	43.8	26.2	1.9*	28.1	31.0	1.9*	32.9
9.0	47.1	1.9*	49.0	29.5	1.9*	31.4	34.5	1.9*	36.4
10.0	52.4	1.9*	54.3	32.7	1.9*	34.6	37.9	1.9*	39.8
11.0	57.6	1.9*	59.5	36.0	1.9*	37.9	41.3	1.9*	43.2
12.0	62.8	1.9*	64.7	39.3	1.9*	41.2	44.7	1.9*	46.7
13.0	68.1	1.9*	70.0	42.5	1.9*	44.4	48.2	1.9*	50.1
14.0	73.3	1.9*	75.2	45.8	1.9*	47.7	51.6	1.9*	53.5
15.0	78.5	1.9*	80.4	49.1	1.9*	51.0	55.0	1.9*	56.9
16.0	83.8	1.9*	85.7	52.4	1.9*	54.3	58.4	1.9*	60.3
17.0	89.0	1.9*	90.9	55.6	1.9*	57.5	61.8	1.9*	63.7
18.0	94.2	1.9*	96.1	58.9	1.9*	60.8	65.2	1.9*	67.1
19.0	99.5	1.9*	101.4	62.2	1.9*	64.1	68.6	1.9*	70.5
20.0	104.7	1.9*	106.6	65.4	1.9*	67.4	72.0	1.9*	73.9
21.0	110.0	1.9*	111.9	68.7	1.9*	70.6	75.5	1.9*	77.4
22.0	115.2	1.9	117.1	71.4	1.9	73.3	78.9	0.0	78.9
23.0	120.3	17.1	137.5	74.1	17.7	91.8	81.8	0.0	81.8
24.0	125.5	20.7	146.2	76.7	20.7	97.5	84.7	0.0	84.7
25.0	130.8	24.4	155.3	79.4	23.9	103.3	87.7	0.0	87.7
26.0	136.4	28.2	164.6	82.1	27.1	109.2	90.8	0.0	90.8
27.0	142.2	32.2	174.3	84.8	30.5	115.2	93.9	0.0	93.9
28.0	148.1	36.2	184.3	87.4	34.0	121.4	97.2	0.0	97.2
29.0	154.3	40.4	194.7	90.1	37.6	127.7	100.5	0.0	100.5
30.0	160.7	44.7	205.3	92.8	41.3	134.0	103.9	0.0	103.9
31.0	167.2	49.1	216.3	95.4	45.1	140.6	107.4	0.0	107.4
32.0	174.0	53.6	227.6	98.1	49.1	147.2	111.0	0.0	111.0
33.0	181.0	58.3	239.2	100.8	53.2	153.9	114.6	0.0	114.6
34.0	188.1	63.0	251.2	103.5	57.3	160.8	118.4	0.0	118.4
35.0	195.5	67.9	263.4	106.1	61.7	167.8	122.1	0.0	122.1
36.0	203.1	72.9	276.0	108.8	66.1	174.9	126.0	0.0	126.0
37.0	210.9	78.0	288.9	111.5	70.6	182.1	129.9	0.0	129.9
38.0	218.9	83.3	302.1	114.1	75.3	189.4	133.8	0.0	133.8
39.0	227.1	88.6	315.7	116.8	80.1	196.9	137.9	0.0	137.9
40.0	235.4	94.1	329.5	119.5	85.0	204.5	142.0	7.9	149.8
41.0	244.0	96.3	340.4	122.2	65.5	187.7	146.1	19.6	165.7

42.0	252.8	31.4	284.2	125.8	31.4	157.3	150.3	31.4	181.7
43.0	259.9	31.4	291.3	130.8	31.4	162.2	155.8	31.4	187.2
44.0	266.2	31.4	297.6	136.0	31.4	167.5	161.2	31.4	192.6
45.0	273.5	31.4	304.9	141.3	31.4	172.7	166.7	31.4	198.1
46.0	280.9	31.4	312.3	146.5	31.4	177.9	172.0	31.4	203.5
47.0	288.2	31.4	319.6	151.8	31.4	183.2	177.4	31.4	208.8
48.0	295.5	31.4	327.0	157.0	31.4	188.4	182.8	31.4	214.2
49.0	302.9	31.4	334.3	162.2	31.4	193.6	188.1	31.4	219.5
50.0	310.2	31.4	341.6	167.5	31.4	198.9	193.4	31.4	224.8
51.0	317.6	31.4	349.0	172.7	31.4	204.1	198.7	31.4	230.1
52.0	324.9	31.4	356.3	177.9	31.4	209.3	204.0	31.4	235.4
53.0	332.3	31.4	363.7	183.2	31.4	214.6	209.2	31.4	240.7
54.0	339.6	31.4	371.0	188.4	31.4	219.8	214.5	31.4	245.9
55.0	346.9	31.4	378.3	193.6	31.4	225.1	219.7	31.4	251.1
56.0	354.3	31.4	385.7	198.9	31.4	230.3	224.9	31.4	256.3
57.0	361.6	31.4	393.0	204.1	31.4	235.5	230.1	31.4	261.5
58.0	369.0	31.4	400.4	209.3	31.4	240.8	235.3	31.4	266.7
59.0	376.3	31.4	407.7	214.6	31.4	246.0	240.5	31.4	271.9
60.0	383.6	31.4	415.1	219.8	31.4	251.2	245.6	31.4	277.0
61.0	391.0	31.4	422.4	225.1	31.4	256.5	250.8	31.4	282.2
62.0	398.3	31.4	429.7	230.3	31.4	261.7	255.9	31.4	287.3
63.0	405.7	31.4	437.1	235.5	31.4	266.9	261.0	31.4	292.4
64.0	413.0	31.4	444.4	240.8	31.4	272.2	266.1	31.4	297.5
65.0	420.3	31.4	451.8	246.0	31.4	277.4	271.2	31.4	302.6
66.0	427.7	31.4	459.1	251.2	31.4	282.7	276.3	31.4	307.7
67.0	435.0	31.4	466.4	256.5	31.4	287.9	281.4	31.4	312.8
68.0	442.4	31.4	473.8	261.7	31.4	293.1	286.4	31.4	317.9
69.0	449.7	31.4	481.1	266.9	31.4	298.4	291.5	31.4	322.9
70.0	457.0	31.4	488.5	272.2	31.4	303.6	296.6	31.4	328.0
71.0	464.4	31.4	495.8	277.4	31.4	308.8	301.6	31.4	333.0
72.0	471.7	31.4	503.1	282.7	31.4	314.1	306.6	31.4	338.0
73.0	479.1	31.4	510.5	287.9	31.4	319.3	311.6	31.4	343.1
74.0	486.4	31.4	517.8	293.1	31.4	324.5	316.7	31.4	348.1
75.0	493.8	31.4	525.2	298.4	31.4	329.8	321.7	31.4	353.1
76.0	501.1	31.4	532.5	303.6	31.4	335.0	326.7	31.4	358.1
77.0	508.4	31.4	539.8	308.8	31.4	340.2	331.6	31.4	363.1
78.0	515.8	31.4	547.2	314.1	31.4	345.5	336.6	31.4	368.0
79.0	523.1	31.4	554.5	319.3	31.4	350.7	341.6	31.4	373.0
80.0	530.5	31.4	561.9	324.5	31.4	356.0	346.6	31.4	378.0

****
* API RP-2A (1994) *
****

PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	1.9*	1.9
1.00	1.5	2.6*	4.1
2.00	3.1	3.4*	6.5
3.00	4.9	4.3*	9.2
4.00	6.8	5.2*	12.0
5.00	8.8	6.1*	14.9
6.00	10.8	7.1*	17.9
7.00	12.9	8.1*	21.0
8.00	15.1	9.1*	24.2
9.00	17.3	10.2*	27.5
10.00	19.6	11.3*	30.9
11.00	21.9	12.4*	34.3
12.00	24.3	13.5*	37.8
13.00	26.7	14.7*	41.4

14.00	29.2	15.7	44.9
15.00	31.7	15.7	47.4
16.00	34.2	15.7	49.9
17.00	36.8	15.7	52.5
18.00	39.4	15.7	55.1
19.00	42.0	15.7	57.7
20.00	44.7	11.8	56.5
21.00	47.5	5.9	53.4
22.00	50.4	0.0	50.4
23.00	53.4	0.0	53.4
24.00	56.6	0.0	56.6
25.00	59.9	0.0	59.9
26.00	63.4	0.0	63.4
27.00	67.0	0.0	67.0
28.00	70.7	0.0	70.7
29.00	74.5	0.0	74.5
30.00	78.5	0.0	78.5
31.00	82.6	0.0	82.6
32.00	86.8	0.0	86.8
33.00	91.2	0.0	91.2
34.00	95.6	0.0	95.6
35.00	100.2	0.0	100.2
36.00	105.0	0.0	105.0
37.00	109.8	0.0	109.8
38.00	114.8	0.0	114.8
39.00	119.9	0.0	119.9
40.00	125.1	7.9	133.0
41.00	130.5	19.6	150.1
42.00	136.0	31.4	167.4
43.00	141.5	31.4	172.9
44.00	147.1	31.4	178.5
45.00	152.8	31.4	184.2
46.00	158.5	31.4	189.9
47.00	164.2	31.4	195.7
48.00	170.1	31.4	201.5
49.00	176.0	31.4	207.4
50.00	181.9	31.4	213.3
51.00	187.9	31.4	219.3
52.00	194.0	31.4	225.4
53.00	200.1	31.4	231.5
54.00	206.3	31.4	237.7
55.00	212.5	31.4	243.9
56.00	218.8	31.4	250.2
57.00	225.1	31.4	256.5
58.00	231.5	31.4	262.9
59.00	237.9	31.4	269.4
60.00	244.4	31.4	275.9
61.00	251.0	31.4	282.4
62.00	257.6	31.4	289.0
63.00	264.2	31.4	295.7
64.00	270.9	31.4	302.4
65.00	277.7	31.4	309.1
66.00	284.5	31.4	315.9
67.00	291.4	31.4	322.8
68.00	298.3	31.4	329.7
69.00	305.2	31.4	336.6
70.00	312.2	31.4	343.7
71.00	319.3	31.4	350.7
72.00	326.4	31.4	357.8
73.00	333.5	31.4	365.0
74.00	340.7	31.4	372.2
75.00	348.0	31.4	379.4
76.00	355.3	31.4	386.7

77.00	362.6	31.4	394.0
78.00	370.0	31.4	401.4
79.00	377.4	31.4	408.9
80.00	384.9	31.4	416.3

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2560E-01
			0.1220E+01	0.4960E-01
			0.1831E+01	0.9120E-01
			0.2197E+01	0.1280E+00
			0.2441E+01	0.1600E+00
			0.2197E+01	0.3200E+00
			0.2197E+01	0.4800E+00
			0.2197E+01	0.8000E+00
			0.2197E+01	0.3200E+01
2	10	0.7750E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2560E-01
			0.1220E+01	0.4960E-01
			0.1831E+01	0.9120E-01
			0.2197E+01	0.1280E+00
			0.2441E+01	0.1600E+00
			0.2197E+01	0.3200E+00
			0.2197E+01	0.4800E+00
			0.2197E+01	0.8000E+00
			0.2197E+01	0.3200E+01
3	10	0.1458E+01		
			0.0000E+00	0.0000E+00
			0.8015E+00	0.2560E-01
			0.1336E+01	0.4960E-01
			0.2004E+01	0.9120E-01
			0.2404E+01	0.1280E+00
			0.2672E+01	0.1600E+00
			0.2404E+01	0.3200E+00
			0.2404E+01	0.4800E+00
			0.2404E+01	0.8000E+00
			0.2404E+01	0.3200E+01
4	10	0.1500E+01		
			0.0000E+00	0.0000E+00
			0.8015E+00	0.2560E-01
			0.1336E+01	0.4960E-01
			0.2004E+01	0.9120E-01
			0.2404E+01	0.1280E+00
			0.2672E+01	0.1600E+00
			0.2404E+01	0.3200E+00
			0.2404E+01	0.4800E+00

			0.2404E+01	0.8000E+00
			0.2404E+01	0.3200E+01
5	10	0.1153E+02		
			0.0000E+00	0.0000E+00
			0.1180E+01	0.2560E-01
			0.1967E+01	0.4960E-01
			0.2951E+01	0.9120E-01
			0.3541E+01	0.1280E+00
			0.3935E+01	0.1600E+00
			0.3541E+01	0.3200E+00
			0.3541E+01	0.4800E+00
			0.3541E+01	0.8000E+00
			0.3541E+01	0.3200E+01
6	10	0.2146E+02		
			0.0000E+00	0.0000E+00
			0.1412E+01	0.2560E-01
			0.2354E+01	0.4960E-01
			0.3531E+01	0.9120E-01
			0.4237E+01	0.1280E+00
			0.4708E+01	0.1600E+00
			0.4237E+01	0.3200E+00
			0.4237E+01	0.4800E+00
			0.4237E+01	0.8000E+00
			0.4237E+01	0.3200E+01
7	10	0.2150E+02		
			0.0000E+00	0.0000E+00
			0.4708E+00	0.1600E-01
			0.9415E+00	0.3200E-01
			0.1883E+01	0.6400E-01
			0.2825E+01	0.9600E-01
			0.3766E+01	0.1280E+00
			0.4237E+01	0.1440E+00
			0.4708E+01	0.1600E+00
			0.4708E+01	0.8000E+00
			0.4708E+01	0.1600E+01
8	10	0.3152E+02		
			0.0000E+00	0.0000E+00
			0.6999E+00	0.1600E-01
			0.1400E+01	0.3200E-01
			0.2800E+01	0.6400E-01
			0.4199E+01	0.9600E-01
			0.5599E+01	0.1280E+00
			0.6299E+01	0.1440E+00
			0.6999E+01	0.1600E+00
			0.6999E+01	0.8000E+00
			0.6999E+01	0.1600E+01
9	10	0.4146E+02		
			0.0000E+00	0.0000E+00
			0.9089E+00	0.1600E-01
			0.1818E+01	0.3200E-01
			0.3635E+01	0.6400E-01
			0.5453E+01	0.9600E-01
			0.7271E+01	0.1280E+00
			0.8180E+01	0.1440E+00
			0.9089E+01	0.1600E+00
			0.9089E+01	0.8000E+00
			0.9089E+01	0.1600E+01
10	10	0.4150E+02		
			0.0000E+00	0.0000E+00
			0.2727E+01	0.2560E-01
			0.4544E+01	0.4960E-01
			0.6816E+01	0.9120E-01
			0.8180E+01	0.1280E+00

			0.9089E+01	0.1600E+00
			0.8180E+01	0.3200E+00
			0.8180E+01	0.4800E+00
			0.8180E+01	0.8000E+00
			0.8180E+01	0.3200E+01
11	10	0.7078E+02		
			0.0000E+00	0.0000E+00
			0.3509E+01	0.2560E-01
			0.5848E+01	0.4960E-01
			0.8771E+01	0.9120E-01
			0.1053E+02	0.1280E+00
			0.1170E+02	0.1600E+00
			0.1053E+02	0.3200E+00
			0.1053E+02	0.4800E+00
			0.1053E+02	0.8000E+00
			0.1053E+02	0.3200E+01
12	10	0.9996E+02		
			0.0000E+00	0.0000E+00
			0.3720E+01	0.2560E-01
			0.6200E+01	0.4960E-01
			0.9300E+01	0.9120E-01
			0.1116E+02	0.1280E+00
			0.1240E+02	0.1600E+00
			0.1116E+02	0.3200E+00
			0.1116E+02	0.4800E+00
			0.1116E+02	0.8000E+00
			0.1116E+02	0.3200E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1963E+01	0.8000E-02
0.3927E+01	0.1600E-01
0.7854E+01	0.3200E-01
0.1571E+02	0.2080E+00
0.2356E+02	0.6720E+00
0.2827E+02	0.1168E+01
0.3142E+02	0.1600E+01
0.3142E+02	0.2400E+01
0.3142E+02	0.3200E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.8967E+00	0.6892E-03	0.2454E-01	0.1000E-03
0.8967E+01	0.6892E-02	0.2454E+00	0.1000E-02
0.4504E+02	0.3468E-01	0.1227E+01	0.5000E-02
0.8586E+02	0.6878E-01	0.2454E+01	0.1000E-01
0.2743E+03	0.2619E+00	0.8657E+01	0.5000E-01
0.3571E+03	0.3958E+00	0.1089E+02	0.1000E+00
0.3721E+03	0.8182E+00	0.2065E+02	0.5000E+00
0.3781E+03	0.1326E+01	0.2668E+02	0.1000E+01
0.3829E+03	0.2333E+01	0.3142E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 9 & 10
LT
11/11/11
1 1 6
0 0 16 15 29000000 80
0 15
0 1 1 0 4 0
100 24.35
0.0 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
2.5 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
2.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
46.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
46.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
100 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 9 & 10

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 16.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 15.00 IN.
PILE LENGTH = 80.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
2.50	CLAY	0.00	125.00	0.00	0.00
2.50	CLAY	0.00	62.60	0.00	0.00
46.50	CLAY	0.00	62.60	0.00	0.00
46.50	CLAY	0.00	62.60	0.00	0.00
100.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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****
* COMPUTATION RESULT *
****

PILE PENETR- ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC- ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC- ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC- ITY KIP
	********** FED. HWY. METHOD *			********** ARMY CORPS METHOD *			********** LAMBDA 2 METHOD *		
0.0	0.0	2.3*	2.3	0.0	2.3*	2.3	0.0	2.3*	2.3
1.0	6.3	2.3*	8.6	3.1	2.3*	5.4	5.8	2.3*	8.1
2.0	12.6	2.3*	14.8	6.3	2.3*	8.6	10.6	2.3*	12.9
3.0	18.8	2.3*	21.1	9.4	2.3*	11.7	15.2	2.3*	17.5
4.0	25.1	2.3*	27.4	12.6	2.3*	14.8	19.7	2.3*	22.0
5.0	31.4	2.3*	33.7	15.7	2.3*	18.0	24.0	2.3*	26.2
6.0	37.7	2.3*	40.0	18.8	2.3*	21.1	28.1	2.3*	30.4
7.0	44.0	2.3*	46.3	22.0	2.3*	24.3	32.2	2.3*	34.5
8.0	50.3	2.3*	52.5	25.1	2.3*	27.4	36.2	2.3*	38.5
9.0	56.5	2.3*	58.8	28.3	2.3*	30.6	40.2	2.3*	42.5
10.0	62.8	2.3*	65.1	31.4	2.3*	33.7	44.2	2.3*	46.4
11.0	69.1	2.3*	71.4	34.6	2.3*	36.8	48.1	2.3*	50.3
12.0	75.4	2.3*	77.7	37.7	2.3*	40.0	51.9	2.3*	54.2
13.0	81.7	2.3*	84.0	40.8	2.3*	43.1	55.8	2.3*	58.1
14.0	88.0	2.3*	90.2	44.0	2.3*	46.3	59.6	2.3*	61.9
15.0	94.2	2.3*	96.5	47.1	2.3*	49.4	63.5	2.3*	65.7
16.0	100.5	2.3*	102.8	50.3	2.3*	52.5	67.3	2.3*	69.6
17.0	106.8	2.3*	109.1	53.4	2.3*	55.7	71.1	2.3*	73.4
18.0	113.1	2.3*	115.4	56.5	2.3*	58.8	74.9	2.3*	77.2
19.0	119.4	2.3*	121.7	59.7	2.3*	62.0	78.7	2.3*	81.0
20.0	125.7	2.3*	127.9	62.8	2.3*	65.1	82.5	2.3*	84.8
21.0	131.9	2.3*	134.2	66.0	2.3*	68.3	86.3	2.3*	88.6
22.0	138.2	2.3*	140.5	69.1	2.3*	71.4	90.1	2.3*	92.4
23.0	144.5	2.3*	146.8	72.3	2.3*	74.5	93.9	2.3*	96.2
24.0	150.8	2.3*	153.1	75.4	2.3*	77.7	97.7	2.3*	100.0
25.0	157.1	2.3*	159.4	78.5	2.3*	80.8	101.5	2.3*	103.8
26.0	163.4	2.3*	165.6	81.7	2.3*	84.0	105.4	2.3*	107.6
27.0	169.6	2.3*	171.9	84.8	2.3*	87.1	109.2	2.3*	111.5
28.0	175.9	2.3*	178.2	88.0	2.3*	90.2	113.0	2.3*	115.3
29.0	182.2	2.3*	184.5	91.1	2.3*	93.4	116.8	2.3*	119.1
30.0	188.5	2.3*	190.8	94.2	2.3*	96.5	120.7	2.3*	123.0
31.0	194.8	2.3*	197.1	97.4	2.3*	99.7	124.5	2.3*	126.8
32.0	201.1	2.3*	203.3	100.5	2.3*	102.8	128.4	2.3*	130.7
33.0	207.3	2.3*	209.6	103.7	2.3*	106.0	132.3	2.3*	134.5
34.0	213.6	2.3*	215.9	106.8	2.3*	109.1	136.1	2.3*	138.4
35.0	219.9	2.3*	222.2	110.0	2.3*	112.2	140.0	2.3*	142.3
36.0	226.2	2.3*	228.5	113.1	2.3*	115.4	143.9	2.3*	146.2
37.0	232.5	2.3*	234.8	116.2	2.3*	118.5	147.8	2.3*	150.1
38.0	238.8	2.3*	241.0	119.4	2.3*	121.7	151.7	2.3*	154.0
39.0	245.0	2.3*	247.3	122.5	2.3*	124.8	155.6	2.3*	157.9
40.0	251.3	2.3*	253.6	125.7	2.3*	127.9	159.6	2.3*	161.8
41.0	257.6	2.3*	259.9	128.8	2.3*	131.1	163.5	2.3*	165.8
42.0	263.9	2.3*	266.2	131.9	2.3*	134.2	167.4	2.3*	169.7
43.0	270.2	2.3*	272.5	135.1	2.3*	137.4	171.4	2.3*	173.7
44.0	276.5	2.3*	278.7	138.2	2.3*	140.5	175.4	2.3*	177.7
45.0	282.7	2.3*	285.0	141.4	2.3*	143.7	179.4	2.3*	181.6

46.0	289.0	2.3*	291.3	144.5	2.3*	146.8	183.3	2.3*	185.6
47.0	295.3	2.3*	297.6	147.7	2.3*	149.9	187.3	2.3*	189.6
48.0	302.1	3.8*	305.9	151.8	3.8*	155.6	192.6	3.8*	196.4
49.0	309.5	3.8*	313.3	157.1	3.8*	160.9	197.9	3.8*	201.7
50.0	316.8	3.8*	320.6	162.3	3.8*	166.1	203.2	3.8*	207.0
51.0	324.1	3.8*	327.9	167.6	3.8*	171.4	208.4	3.8*	212.2
52.0	331.5	3.8*	335.3	172.8	3.8*	176.6	213.6	3.8*	217.4
53.0	338.8	3.8*	342.6	178.0	3.8*	181.8	218.8	3.8*	222.6
54.0	346.2	3.8*	350.0	183.3	3.8*	187.1	224.0	3.8*	227.8
55.0	353.5	3.8*	357.3	188.5	3.8*	192.3	229.2	3.8*	233.0
56.0	360.8	3.8*	364.7	193.7	3.8*	197.5	234.4	3.8*	238.2
57.0	368.2	3.8*	372.0	199.0	3.8*	202.8	239.5	3.8*	243.3
58.0	375.5	3.8*	379.3	204.2	3.8*	208.0	244.6	3.8*	248.4
59.0	382.9	3.8*	386.7	209.4	3.8*	213.2	249.8	3.8*	253.6
60.0	390.2	3.8*	394.0	214.7	3.8*	218.5	254.9	3.8*	258.7
61.0	397.6	3.8*	401.4	219.9	3.8*	223.7	260.0	3.8*	263.8
62.0	404.9	3.8*	408.7	225.1	3.8*	229.0	265.1	3.8*	268.9
63.0	412.2	3.8*	416.0	230.4	3.8*	234.2	270.1	3.8*	273.9
64.0	419.6	3.8*	423.4	235.6	3.8*	239.4	275.2	3.8*	279.0
65.0	426.9	3.8*	430.7	240.9	3.8*	244.7	280.3	3.8*	284.1
66.0	434.3	3.8*	438.1	246.1	3.8*	249.9	285.3	3.8*	289.1
67.0	441.6	3.8*	445.4	251.3	3.8*	255.1	290.4	3.8*	294.2
68.0	448.9	3.8*	452.7	256.6	3.8*	260.4	295.4	3.8*	299.2
69.0	456.3	3.8*	460.1	261.8	3.8*	265.6	300.4	3.8*	304.2
70.0	463.6	3.8*	467.4	267.0	3.8*	270.8	305.4	3.8*	309.2
71.0	471.0	3.8*	474.8	272.3	3.8*	276.1	310.4	3.8*	314.2
72.0	478.3	3.8*	482.1	277.5	3.8*	281.3	315.4	3.8*	319.2
73.0	485.6	3.8*	489.4	282.7	3.8*	286.5	320.4	3.8*	324.2
74.0	493.0	3.8*	496.8	288.0	3.8*	291.8	325.4	3.8*	329.2
75.0	500.3	3.8*	504.1	293.2	3.8*	297.0	330.4	3.8*	334.2
76.0	507.7	3.8*	511.5	298.5	3.8*	302.3	335.3	3.8*	339.1
77.0	515.0	3.8*	518.8	303.7	3.8*	307.5	340.3	3.8*	344.1
78.0	522.3	3.8*	526.2	308.9	3.8*	312.7	345.2	3.8*	349.1
79.0	529.7	3.8*	533.5	314.2	3.8*	318.0	350.2	3.8*	354.0
80.0	537.0	3.8*	540.8	319.4	3.8*	323.2	355.1	3.8*	358.9

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* API RP-2A (1994) *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	2.3*	2.3
1.00	1.7	3.1*	4.8
2.00	3.5	4.0*	7.6
3.00	5.6	5.1*	10.7
4.00	7.9	6.1*	14.1
5.00	10.3	7.3*	17.5
6.00	12.7	8.4*	21.1
7.00	15.2	9.6*	24.8
8.00	17.7	10.8*	28.5
9.00	20.3	12.0*	32.4
10.00	23.0	13.3*	36.3
11.00	25.7	14.6*	40.3
12.00	28.5	15.9*	44.4
13.00	31.3	17.2*	48.6
14.00	34.2	18.6*	52.8
15.00	37.1	18.8	55.9
16.00	40.0	18.8	58.9
17.00	43.0	18.8	61.9

18.00	46.0	18.8	64.9
19.00	49.1	18.8	67.9
20.00	52.2	18.8	71.0
21.00	55.3	18.8	74.2
22.00	58.5	18.8	77.3
23.00	61.7	18.8	80.6
24.00	65.0	18.8	83.9
25.00	68.4	18.8	87.2
26.00	71.8	18.8	90.7
27.00	75.3	18.8	94.2
28.00	78.9	18.8	97.7
29.00	82.5	18.8	101.3
30.00	86.1	18.8	105.0
31.00	89.8	18.8	108.7
32.00	93.6	18.8	112.4
33.00	97.4	18.8	116.3
34.00	101.3	18.8	120.1
35.00	105.2	18.8	124.1
36.00	109.2	18.8	128.1
37.00	113.2	18.8	132.1
38.00	117.3	18.8	136.2
39.00	121.5	18.8	140.3
40.00	125.6	18.8	144.5
41.00	129.9	18.8	148.7
42.00	134.2	18.8	153.0
43.00	138.5	18.8	157.3
44.00	142.9	18.8	161.7
45.00	147.3	22.0	169.3
46.00	151.7	26.7	178.5
47.00	156.3	31.4	187.7
48.00	161.5	31.4	192.9
49.00	167.4	31.4	198.9
50.00	173.4	31.4	204.9
51.00	179.5	31.4	210.9
52.00	185.6	31.4	217.0
53.00	191.8	31.4	223.2
54.00	198.0	31.4	229.4
55.00	204.3	31.4	235.7
56.00	210.6	31.4	242.0
57.00	217.0	31.4	248.4
58.00	223.5	31.4	254.9
59.00	230.0	31.4	261.4
60.00	236.5	31.4	267.9
61.00	243.1	31.4	274.5
62.00	249.8	31.4	281.2
63.00	256.5	31.4	287.9
64.00	263.2	31.4	294.6
65.00	270.0	31.4	301.5
66.00	276.9	31.4	308.3
67.00	283.8	31.4	315.2
68.00	290.8	31.4	322.2
69.00	297.8	31.4	329.2
70.00	304.8	31.4	336.2
71.00	311.9	31.4	343.3
72.00	319.1	31.4	350.5
73.00	326.3	31.4	357.7
74.00	333.5	31.4	364.9
75.00	340.8	31.4	372.2
76.00	348.1	31.4	379.6
77.00	355.5	31.4	387.0
78.00	363.0	31.4	394.4
79.00	370.4	31.4	401.9
80.00	378.0	31.4	409.4

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2560E-01
			0.1399E+01	0.4960E-01
			0.2099E+01	0.9120E-01
			0.2519E+01	0.1280E+00
			0.2798E+01	0.1600E+00
			0.2519E+01	0.3200E+00
			0.2519E+01	0.4800E+00
			0.2519E+01	0.8000E+00
			0.2519E+01	0.3200E+01
2	10	0.1275E+01		
			0.0000E+00	0.0000E+00
			0.9189E+00	0.2560E-01
			0.1532E+01	0.4960E-01
			0.2297E+01	0.9120E-01
			0.2757E+01	0.1280E+00
			0.3063E+01	0.1600E+00
			0.2757E+01	0.3200E+00
			0.2757E+01	0.4800E+00
			0.2757E+01	0.8000E+00
			0.2757E+01	0.3200E+01
3	10	0.2458E+01		
			0.0000E+00	0.0000E+00
			0.1052E+01	0.2560E-01
			0.1753E+01	0.4960E-01
			0.2629E+01	0.9120E-01
			0.3155E+01	0.1280E+00
			0.3505E+01	0.1600E+00
			0.3155E+01	0.3200E+00
			0.3155E+01	0.4800E+00
			0.3155E+01	0.8000E+00
			0.3155E+01	0.3200E+01
4	10	0.2500E+01		
			0.0000E+00	0.0000E+00
			0.1052E+01	0.2560E-01
			0.1753E+01	0.4960E-01
			0.2629E+01	0.9120E-01
			0.3155E+01	0.1280E+00
			0.3505E+01	0.1600E+00
			0.3155E+01	0.3200E+00
			0.3155E+01	0.4800E+00
			0.3155E+01	0.8000E+00
			0.3155E+01	0.3200E+01
5	10	0.2452E+02		
			0.0000E+00	0.0000E+00

			0.1674E+01	0.2560E-01
			0.2789E+01	0.4960E-01
			0.4184E+01	0.9120E-01
			0.5021E+01	0.1280E+00
			0.5578E+01	0.1600E+00
			0.5021E+01	0.3200E+00
			0.5021E+01	0.4800E+00
			0.5021E+01	0.8000E+00
			0.5021E+01	0.3200E+01
6	10	0.4646E+02		
			0.0000E+00	0.0000E+00
			0.2246E+01	0.2560E-01
			0.3743E+01	0.4960E-01
			0.5614E+01	0.9120E-01
			0.6737E+01	0.1280E+00
			0.7485E+01	0.1600E+00
			0.6737E+01	0.3200E+00
			0.6737E+01	0.4800E+00
			0.6737E+01	0.8000E+00
			0.6737E+01	0.3200E+01
7	10	0.4650E+02		
			0.0000E+00	0.0000E+00
			0.2246E+01	0.2560E-01
			0.3743E+01	0.4960E-01
			0.5614E+01	0.9120E-01
			0.6737E+01	0.1280E+00
			0.7485E+01	0.1600E+00
			0.6737E+01	0.3200E+00
			0.6737E+01	0.4800E+00
			0.6737E+01	0.8000E+00
			0.6737E+01	0.3200E+01
8	10	0.7328E+02		
			0.0000E+00	0.0000E+00
			0.3604E+01	0.2560E-01
			0.6007E+01	0.4960E-01
			0.9010E+01	0.9120E-01
			0.1081E+02	0.1280E+00
			0.1201E+02	0.1600E+00
			0.1081E+02	0.3200E+00
			0.1081E+02	0.4800E+00
			0.1081E+02	0.8000E+00
			0.1081E+02	0.3200E+01
9	10	0.9996E+02		
			0.0000E+00	0.0000E+00
			0.3743E+01	0.2560E-01
			0.6238E+01	0.4960E-01
			0.9357E+01	0.9120E-01
			0.1123E+02	0.1280E+00
			0.1248E+02	0.1600E+00
			0.1123E+02	0.3200E+00
			0.1123E+02	0.4800E+00
			0.1123E+02	0.8000E+00
			0.1123E+02	0.3200E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1963E+01	0.8000E-02
0.3927E+01	0.1600E-01
0.7854E+01	0.3200E-01

0.1571E+02	0.2080E+00
0.2356E+02	0.6720E+00
0.2827E+02	0.1168E+01
0.3142E+02	0.1600E+01
0.3142E+02	0.2400E+01
0.3142E+02	0.3200E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.9999E+00	0.7105E-03	0.2454E-01	0.1000E-03
0.9999E+01	0.7105E-02	0.2454E+00	0.1000E-02
0.5018E+02	0.3575E-01	0.1227E+01	0.5000E-02
0.9391E+02	0.7017E-01	0.2454E+01	0.1000E-01
0.2648E+03	0.2494E+00	0.8657E+01	0.5000E-01
0.3320E+03	0.3728E+00	0.1089E+02	0.1000E+00
0.3429E+03	0.7933E+00	0.2065E+02	0.5000E+00
0.3489E+03	0.1301E+01	0.2668E+02	0.1000E+01
0.3537E+03	0.2308E+01	0.3142E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 11 THRU 15
LT
11/11/11
1 1 8
0 0 16 15 29000000 80
0 15
0 1 1 0 4 0
100 24.35
0.0 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
1.5 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
1.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
21.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
21.5 1 0.8 62.6 36 0
0 0 0.0 0 0.0 0.0 0 0 0
41.5 1 0.8 62.6 36 0
0 0 0.0 0 0.0 0.0 0 0 0
41.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
100 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 11 THRU 15

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 16.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 15.00 IN.
PILE LENGTH = 80.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
1.50	CLAY	0.00	125.00	0.00	0.00
1.50	CLAY	0.00	62.60	0.00	0.00
21.50	CLAY	0.00	62.60	0.00	0.00
21.50	SAND	0.80	62.60	36.00	0.00
41.50	SAND	0.80	62.60	36.00	0.00
41.50	CLAY	0.00	62.60	0.00	0.00
100.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00

9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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****
* COMPUTATION RESULT *
****

PILE PENETR-ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP
	********** FED. HWY. METHOD **********			********** ARMY CORPS METHOD **********			********** LAMBDA 2 METHOD **********		
0.0	0.0	2.3*	2.3	0.0	2.3*	2.3	0.0	2.3*	2.3
1.0	6.3	2.3*	8.6	3.1	2.3*	5.4	5.8	2.3*	8.1
2.0	12.6	2.3*	14.8	6.3	2.3*	8.6	10.6	2.3*	12.9
3.0	18.8	2.3*	21.1	9.4	2.3*	11.7	15.2	2.3*	17.5
4.0	25.1	2.3*	27.4	12.6	2.3*	14.8	19.5	2.3*	21.8
5.0	31.4	2.3*	33.7	15.7	2.3*	18.0	23.7	2.3*	26.0
6.0	37.7	2.3*	40.0	18.8	2.3*	21.1	27.8	2.3*	30.1
7.0	44.0	2.3*	46.3	22.0	2.3*	24.3	31.8	2.3*	34.1
8.0	50.3	2.3*	52.5	25.1	2.3*	27.4	35.8	2.3*	38.1
9.0	56.5	2.3*	58.8	28.3	2.3*	30.6	39.7	2.3*	42.0
10.0	62.8	2.3*	65.1	31.4	2.3*	33.7	43.6	2.3*	45.8
11.0	69.1	2.3*	71.4	34.6	2.3*	36.8	47.4	2.3*	49.7
12.0	75.4	2.3*	77.7	37.7	2.3*	40.0	51.2	2.3*	53.5
13.0	81.7	2.3*	84.0	40.8	2.3*	43.1	55.0	2.3*	57.3
14.0	88.0	2.3*	90.2	44.0	2.3*	46.3	58.8	2.3*	61.1
15.0	94.2	2.3*	96.5	47.1	2.3*	49.4	62.6	2.3*	64.8
16.0	100.5	2.3*	102.8	50.3	2.3*	52.5	66.3	2.3*	68.6
17.0	106.8	2.3*	109.1	53.4	2.3*	55.7	70.1	2.3*	72.4
18.0	113.1	2.3*	115.4	56.5	2.3*	58.8	73.8	2.3*	76.1
19.0	119.4	2.3*	121.7	59.7	2.3*	62.0	77.6	2.3*	79.9
20.0	125.7	2.3*	127.9	62.8	2.3*	65.1	81.3	2.3*	83.6
21.0	131.9	2.3*	134.2	66.0	2.3*	68.3	85.1	2.3*	87.4
22.0	138.2	2.3	140.5	68.6	2.3	70.9	88.8	0.0	88.8
23.0	143.9	17.1	161.0	71.3	17.7	89.0	91.5	0.0	91.5
24.0	149.1	20.7	169.8	74.0	20.7	94.7	94.3	0.0	94.3
25.0	154.4	24.4	178.8	76.7	23.9	100.5	97.2	0.0	97.2
26.0	160.0	28.2	188.2	79.3	27.1	106.4	100.1	0.0	100.1
27.0	165.7	32.2	197.9	82.0	30.5	112.5	103.2	0.0	103.2
28.0	171.7	36.2	207.9	84.7	34.0	118.6	106.3	0.0	106.3
29.0	177.9	40.4	218.2	87.3	37.6	124.9	109.5	0.0	109.5
30.0	184.2	44.7	228.9	90.0	41.3	131.3	112.8	0.0	112.8
31.0	190.8	49.1	239.9	92.7	45.1	137.8	116.2	0.0	116.2
32.0	197.6	53.6	251.2	95.4	49.1	144.4	119.7	0.0	119.7
33.0	204.5	58.3	262.8	98.0	53.2	151.2	123.2	0.0	123.2
34.0	211.7	63.0	274.7	100.7	57.3	158.0	126.8	0.0	126.8
35.0	219.1	67.9	287.0	103.4	61.7	165.0	130.5	0.0	130.5
36.0	226.7	72.9	299.6	106.0	66.1	172.1	134.2	0.0	134.2
37.0	234.4	78.0	312.5	108.7	70.6	179.4	138.0	0.0	138.0
38.0	242.4	83.3	325.7	111.4	75.3	186.7	141.9	0.0	141.9
39.0	250.6	88.6	339.2	114.1	80.1	194.1	145.8	0.0	145.8
40.0	259.0	94.1	353.1	116.7	85.0	201.7	149.8	7.9	157.7
41.0	267.6	96.3	363.9	119.4	65.5	184.9	153.9	19.6	173.5

42.0	276.4	31.4	307.8	123.1	31.4	154.5	158.0	31.4	189.4
43.0	283.5	31.4	314.9	128.1	31.4	159.5	163.4	31.4	194.8
44.0	289.7	31.4	321.2	133.3	31.4	164.7	168.7	31.4	200.1
45.0	297.1	31.4	328.5	138.5	31.4	169.9	174.0	31.4	205.4
46.0	304.4	31.4	335.8	143.8	31.4	175.2	179.3	31.4	210.8
47.0	311.8	31.4	343.2	149.0	31.4	180.4	184.6	31.4	216.0
48.0	319.1	31.4	350.5	154.2	31.4	185.7	189.9	31.4	221.3
49.0	326.4	31.4	357.9	159.5	31.4	190.9	195.1	31.4	226.5
50.0	333.8	31.4	365.2	164.7	31.4	196.1	200.4	31.4	231.8
51.0	341.1	31.4	372.5	169.9	31.4	201.4	205.6	31.4	237.0
52.0	348.5	31.4	379.9	175.2	31.4	206.6	210.8	31.4	242.2
53.0	355.8	31.4	387.2	180.4	31.4	211.8	215.9	31.4	247.4
54.0	363.2	31.4	394.6	185.7	31.4	217.1	221.1	31.4	252.5
55.0	370.5	31.4	401.9	190.9	31.4	222.3	226.3	31.4	257.7
56.0	377.8	31.4	409.3	196.1	31.4	227.5	231.4	31.4	262.8
57.0	385.2	31.4	416.6	201.4	31.4	232.8	236.5	31.4	267.9
58.0	392.5	31.4	423.9	206.6	31.4	238.0	241.6	31.4	273.0
59.0	399.9	31.4	431.3	211.8	31.4	243.3	246.7	31.4	278.1
60.0	407.2	31.4	438.6	217.1	31.4	248.5	251.8	31.4	283.2
61.0	414.5	31.4	446.0	222.3	31.4	253.7	256.9	31.4	288.3
62.0	421.9	31.4	453.3	227.5	31.4	259.0	261.9	31.4	293.4
63.0	429.2	31.4	460.6	232.8	31.4	264.2	267.0	31.4	298.4
64.0	436.6	31.4	468.0	238.0	31.4	269.4	272.0	31.4	303.5
65.0	443.9	31.4	475.3	243.2	31.4	274.7	277.1	31.4	308.5
66.0	451.2	31.4	482.7	248.5	31.4	279.9	282.1	31.4	313.5
67.0	458.6	31.4	490.0	253.7	31.4	285.1	287.1	31.4	318.5
68.0	465.9	31.4	497.3	259.0	31.4	290.4	292.1	31.4	323.5
69.0	473.3	31.4	504.7	264.2	31.4	295.6	297.1	31.4	328.5
70.0	480.6	31.4	512.0	269.4	31.4	300.8	302.1	31.4	333.5
71.0	487.9	31.4	519.4	274.7	31.4	306.1	307.1	31.4	338.5
72.0	495.3	31.4	526.7	279.9	31.4	311.3	312.1	31.4	343.5
73.0	502.6	31.4	534.0	285.1	31.4	316.6	317.0	31.4	348.5
74.0	510.0	31.4	541.4	290.4	31.4	321.8	322.0	31.4	353.4
75.0	517.3	31.4	548.7	295.6	31.4	327.0	326.9	31.4	358.4
76.0	524.7	31.4	556.1	300.8	31.4	332.3	331.9	31.4	363.3
77.0	532.0	31.4	563.4	306.1	31.4	337.5	336.8	31.4	368.2
78.0	539.3	31.4	570.8	311.3	31.4	342.7	341.8	31.4	373.2
79.0	546.7	31.4	578.1	316.6	31.4	348.0	346.7	31.4	378.1
80.0	554.0	31.4	585.4	321.8	31.4	353.2	351.6	31.4	383.0

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* API RP-2A (1994) *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	2.3*	2.3
1.00	1.7	3.1*	4.8
2.00	3.5	4.0*	7.6
3.00	5.6	5.0*	10.6
4.00	7.8	6.1*	13.8
5.00	10.0	7.1*	17.2
6.00	12.4	8.3*	20.6
7.00	14.8	9.4*	24.2
8.00	17.3	10.6*	27.9
9.00	19.9	11.8*	31.7
10.00	22.5	13.0*	35.5
11.00	25.1	14.3*	39.4
12.00	27.9	15.6*	43.5
13.00	30.6	16.9*	47.5

14.00	33.4	18.2*	51.7
15.00	36.3	18.8	55.2
16.00	39.2	18.8	58.1
17.00	42.2	18.8	61.0
18.00	45.1	18.8	64.0
19.00	48.2	18.8	67.0
20.00	51.2	14.1	65.4
21.00	54.3	7.1	61.4
22.00	57.4	0.0	57.4
23.00	60.6	0.0	60.6
24.00	63.8	0.0	63.8
25.00	67.1	0.0	67.1
26.00	70.6	0.0	70.6
27.00	74.2	0.0	74.2
28.00	77.9	0.0	77.9
29.00	81.8	0.0	81.8
30.00	85.7	0.0	85.7
31.00	89.8	0.0	89.8
32.00	94.0	0.0	94.0
33.00	98.4	0.0	98.4
34.00	102.9	0.0	102.9
35.00	107.5	0.0	107.5
36.00	112.2	0.0	112.2
37.00	117.0	0.0	117.0
38.00	122.0	0.0	122.0
39.00	127.1	0.0	127.1
40.00	132.4	7.9	140.2
41.00	137.7	19.6	157.3
42.00	143.2	31.4	174.6
43.00	148.7	31.4	180.2
44.00	154.3	31.4	185.7
45.00	160.0	31.4	191.4
46.00	165.7	31.4	197.1
47.00	171.5	31.4	202.9
48.00	177.3	31.4	208.7
49.00	183.2	31.4	214.6
50.00	189.1	31.4	220.5
51.00	195.1	31.4	226.5
52.00	201.2	31.4	232.6
53.00	207.3	31.4	238.7
54.00	213.5	31.4	244.9
55.00	219.7	31.4	251.1
56.00	226.0	31.4	257.4
57.00	232.3	31.4	263.7
58.00	238.7	31.4	270.1
59.00	245.2	31.4	276.6
60.00	251.7	31.4	283.1
61.00	258.2	31.4	289.6
62.00	264.8	31.4	296.2
63.00	271.5	31.4	302.9
64.00	278.2	31.4	309.6
65.00	284.9	31.4	316.3
66.00	291.7	31.4	323.1
67.00	298.6	31.4	330.0
68.00	305.5	31.4	336.9
69.00	312.4	31.4	343.9
70.00	319.5	31.4	350.9
71.00	326.5	31.4	357.9
72.00	333.6	31.4	365.0
73.00	340.8	31.4	372.2
74.00	348.0	31.4	379.4
75.00	355.2	31.4	386.6
76.00	362.5	31.4	393.9

77.00	369.8	31.4	401.3
78.00	377.2	31.4	408.6
79.00	384.7	31.4	416.1
80.00	392.1	31.4	423.6

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2560E-01
			0.1399E+01	0.4960E-01
			0.2099E+01	0.9120E-01
			0.2519E+01	0.1280E+00
			0.2798E+01	0.1600E+00
			0.2519E+01	0.3200E+00
			0.2519E+01	0.4800E+00
			0.2519E+01	0.8000E+00
			0.2519E+01	0.3200E+01
2	10	0.7750E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2560E-01
			0.1399E+01	0.4960E-01
			0.2099E+01	0.9120E-01
			0.2519E+01	0.1280E+00
			0.2798E+01	0.1600E+00
			0.2519E+01	0.3200E+00
			0.2519E+01	0.4800E+00
			0.2519E+01	0.8000E+00
			0.2519E+01	0.3200E+01
3	10	0.1458E+01		
			0.0000E+00	0.0000E+00
			0.9189E+00	0.2560E-01
			0.1532E+01	0.4960E-01
			0.2297E+01	0.9120E-01
			0.2757E+01	0.1280E+00
			0.3063E+01	0.1600E+00
			0.2757E+01	0.3200E+00
			0.2757E+01	0.4800E+00
			0.2757E+01	0.8000E+00
			0.2757E+01	0.3200E+01
4	10	0.1500E+01		
			0.0000E+00	0.0000E+00
			0.9189E+00	0.2560E-01
			0.1532E+01	0.4960E-01
			0.2297E+01	0.9120E-01
			0.2757E+01	0.1280E+00
			0.3063E+01	0.1600E+00
			0.2757E+01	0.3200E+00
			0.2757E+01	0.4800E+00

			0.2757E+01	0.8000E+00
			0.2757E+01	0.3200E+01
5	10	0.1153E+02		
			0.0000E+00	0.0000E+00
			0.1353E+01	0.2560E-01
			0.2256E+01	0.4960E-01
			0.3383E+01	0.9120E-01
			0.4060E+01	0.1280E+00
			0.4511E+01	0.1600E+00
			0.4060E+01	0.3200E+00
			0.4060E+01	0.4800E+00
			0.4060E+01	0.8000E+00
			0.4060E+01	0.3200E+01
6	10	0.2146E+02		
			0.0000E+00	0.0000E+00
			0.1555E+01	0.2560E-01
			0.2592E+01	0.4960E-01
			0.3888E+01	0.9120E-01
			0.4665E+01	0.1280E+00
			0.5183E+01	0.1600E+00
			0.4665E+01	0.3200E+00
			0.4665E+01	0.4800E+00
			0.4665E+01	0.8000E+00
			0.4665E+01	0.3200E+01
7	10	0.2150E+02		
			0.0000E+00	0.0000E+00
			0.5183E+00	0.1600E-01
			0.1037E+01	0.3200E-01
			0.2073E+01	0.6400E-01
			0.3110E+01	0.9600E-01
			0.4147E+01	0.1280E+00
			0.4665E+01	0.1440E+00
			0.5183E+01	0.1600E+00
			0.5183E+01	0.8000E+00
			0.5183E+01	0.1600E+01
8	10	0.3152E+02		
			0.0000E+00	0.0000E+00
			0.6999E+00	0.1600E-01
			0.1400E+01	0.3200E-01
			0.2800E+01	0.6400E-01
			0.4199E+01	0.9600E-01
			0.5599E+01	0.1280E+00
			0.6299E+01	0.1440E+00
			0.6999E+01	0.1600E+00
			0.6999E+01	0.8000E+00
			0.6999E+01	0.1600E+01
9	10	0.4146E+02		
			0.0000E+00	0.0000E+00
			0.9089E+00	0.1600E-01
			0.1818E+01	0.3200E-01
			0.3635E+01	0.6400E-01
			0.5453E+01	0.9600E-01
			0.7271E+01	0.1280E+00
			0.8180E+01	0.1440E+00
			0.9089E+01	0.1600E+00
			0.9089E+01	0.8000E+00
			0.9089E+01	0.1600E+01
10	10	0.4150E+02		
			0.0000E+00	0.0000E+00
			0.2727E+01	0.2560E-01
			0.4544E+01	0.4960E-01
			0.6816E+01	0.9120E-01
			0.8180E+01	0.1280E+00

			0.9089E+01	0.1600E+00
			0.8180E+01	0.3200E+00
			0.8180E+01	0.4800E+00
			0.8180E+01	0.8000E+00
			0.8180E+01	0.3200E+01
11	10	0.7078E+02		
			0.0000E+00	0.0000E+00
			0.3509E+01	0.2560E-01
			0.5848E+01	0.4960E-01
			0.8771E+01	0.9120E-01
			0.1053E+02	0.1280E+00
			0.1170E+02	0.1600E+00
			0.1053E+02	0.3200E+00
			0.1053E+02	0.4800E+00
			0.1053E+02	0.8000E+00
			0.1053E+02	0.3200E+01
12	10	0.9996E+02		
			0.0000E+00	0.0000E+00
			0.3720E+01	0.2560E-01
			0.6200E+01	0.4960E-01
			0.9300E+01	0.9120E-01
			0.1116E+02	0.1280E+00
			0.1240E+02	0.1600E+00
			0.1116E+02	0.3200E+00
			0.1116E+02	0.4800E+00
			0.1116E+02	0.8000E+00
			0.1116E+02	0.3200E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1963E+01	0.8000E-02
0.3927E+01	0.1600E-01
0.7854E+01	0.3200E-01
0.1571E+02	0.2080E+00
0.2356E+02	0.6720E+00
0.2827E+02	0.1168E+01
0.3142E+02	0.1600E+01
0.3142E+02	0.2400E+01
0.3142E+02	0.3200E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.9417E+00	0.6979E-03	0.2454E-01	0.1000E-03
0.9417E+01	0.6979E-02	0.2454E+00	0.1000E-02
0.4726E+02	0.3512E-01	0.1227E+01	0.5000E-02
0.8966E+02	0.6955E-01	0.2454E+01	0.1000E-01
0.2819E+03	0.2636E+00	0.8657E+01	0.5000E-01
0.3644E+03	0.3975E+00	0.1089E+02	0.1000E+00
0.3793E+03	0.8199E+00	0.2065E+02	0.5000E+00
0.3853E+03	0.1328E+01	0.2668E+02	0.1000E+01
0.3901E+03	0.2335E+01	0.3142E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 16 THRU 20
LT
11/11/11
1 1 12
0 0 16 15 29000000 80
0 15
0 1 1 0 4 0
100 24.35
0.0 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
0.5 2 0.0 125 0.0 0.0
0 0 1250 0 0 0 0 0 0
0.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
9.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
9.5 2 0.0 62.6 0.0 0.0
0 0 1000 0 0 0 0 0 0
17.5 2 0.0 62.6 0.0 0.0
0 0 1000 0 0 0 0 0 0
17.5 2 0.0 62.6 0.0 0.0
0 0 0.001 0 0 0 0 0 0
20.5 2 0.0 62.6 0.0 0.0
0 0 0.001 0 0 0 0 0 0
20.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
53.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
53.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
100 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 16 THRU 20

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 16.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 15.00 IN.
PILE LENGTH = 80.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
0.50	CLAY	0.00	125.00	0.00	0.00
0.50	CLAY	0.00	62.60	0.00	0.00
9.50	CLAY	0.00	62.60	0.00	0.00
9.50	CLAY	0.00	62.60	0.00	0.00
17.50	CLAY	0.00	62.60	0.00	0.00
17.50	CLAY	0.00	62.60	0.00	0.00
20.50	CLAY	0.00	62.60	0.00	0.00
20.50	CLAY	0.00	62.60	0.00	0.00
53.50	CLAY	0.00	62.60	0.00	0.00
53.50	CLAY	0.00	62.60	0.00	0.00
100.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00

9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.00	0.00	0.00	0.00	0.00
9999.00	99999.00	1.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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****
* COMPUTATION RESULT *
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PILE PENETRATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP
	********** FED. HWY. METHOD **********			********** ARMY CORPS METHOD **********			********** LAMBDA 2 METHOD **********		
0.0	0.0	1.9*	1.9	0.0	1.9*	1.9	0.0	1.9*	1.9
1.0	5.2	1.9*	7.1	3.3	1.9*	5.2	4.9	1.9*	6.8
2.0	10.5	1.9*	12.4	6.5	1.9*	8.4	9.0	1.9*	10.9
3.0	15.7	1.9*	17.6	9.8	1.9*	11.7	12.8	1.9*	14.8
4.0	20.9	1.9*	22.8	13.1	1.9*	15.0	16.5	1.9*	18.4
5.0	26.2	1.9*	28.1	16.4	1.9*	18.3	20.1	1.9*	22.0
6.0	31.4	1.9*	33.3	19.6	1.9*	21.5	23.6	1.9*	25.5
7.0	36.7	1.9*	38.6	22.9	1.9*	24.8	27.1	1.9*	29.0
8.0	41.9	1.9*	43.8	26.2	1.9*	28.1	30.5	1.9*	32.4
9.0	47.1	1.9*	49.0	29.5	1.9*	31.4	33.9	1.9*	35.8
10.0	52.4	1.9*	54.3	32.7	1.9*	34.6	37.2	1.9*	39.1
11.0	57.1	1.5*	58.6	35.9	1.5*	37.5	40.0	1.5*	41.5
12.0	61.3	1.5*	62.8	39.1	1.5*	40.6	42.8	1.5*	44.4
13.0	65.4	1.5*	67.0	42.2	1.5*	43.7	45.7	1.5*	47.2
14.0	69.6	1.5*	71.2	45.4	1.5*	46.9	48.5	1.5*	50.0
15.0	73.8	1.5*	75.3	48.5	1.5*	50.0	51.4	1.5*	52.9
16.0	78.0	1.5*	79.5	51.6	1.5*	53.2	54.3	1.5*	55.8
17.0	82.2	1.5*	83.7	54.8	1.5*	56.3	57.2	1.5*	58.7
18.0	86.4	0.0	86.4	57.9	0.0	57.9	60.1	0.0	60.1
19.0	88.5	0.0*	88.5	59.5	0.0*	59.5	61.1	0.0*	61.1
20.0	88.5	0.0*	88.5	59.5	0.0*	59.5	62.2	0.0*	62.2
21.0	88.5	0.0*	88.5	59.5	0.0*	59.5	63.4	0.0*	63.4
22.0	91.6	2.3*	93.9	61.1	2.3*	63.3	67.4	2.3*	69.7
23.0	97.9	2.3*	100.2	64.2	2.3*	66.5	71.4	2.3*	73.7
24.0	104.2	2.3*	106.5	67.3	2.3*	69.6	75.5	2.3*	77.7
25.0	110.5	2.3*	112.8	70.5	2.3*	72.8	79.5	2.3*	81.7
26.0	116.8	2.3*	119.0	73.6	2.3*	75.9	83.5	2.3*	85.7
27.0	123.0	2.3*	125.3	76.8	2.3*	79.1	87.5	2.3*	89.7
28.0	129.3	2.3*	131.6	79.9	2.3*	82.2	91.5	2.3*	93.7
29.0	135.6	2.3*	137.9	83.1	2.3*	85.3	95.5	2.3*	97.7
30.0	141.9	2.3*	144.2	86.2	2.3*	88.5	99.5	2.3*	101.7
31.0	148.2	2.3*	150.5	89.3	2.3*	91.6	103.4	2.3*	105.7
32.0	154.5	2.3*	156.7	92.5	2.3*	94.8	107.4	2.3*	109.7
33.0	160.7	2.3*	163.0	95.6	2.3*	97.9	111.4	2.3*	113.7

34.0	167.0	2.3*	169.3	98.8	2.3*	101.0	115.5	2.3*	117.7
35.0	173.3	2.3*	175.6	101.9	2.3*	104.2	119.5	2.3*	121.7
36.0	179.6	2.3*	181.9	105.0	2.3*	107.3	123.5	2.3*	125.8
37.0	185.9	2.3*	188.2	108.2	2.3*	110.5	127.5	2.3*	129.8
38.0	192.2	2.3*	194.4	111.3	2.3*	113.6	131.5	2.3*	133.8
39.0	198.4	2.3*	200.7	114.5	2.3*	116.8	135.5	2.3*	137.8
40.0	204.7	2.3*	207.0	117.6	2.3*	119.9	139.6	2.3*	141.9
41.0	211.0	2.3*	213.3	120.8	2.3*	123.0	143.6	2.3*	145.9
42.0	217.3	2.3*	219.6	123.9	2.3*	126.2	147.7	2.3*	150.0
43.0	223.6	2.3*	225.9	127.0	2.3*	129.3	151.7	2.3*	154.0
44.0	229.9	2.3*	232.1	130.2	2.3*	132.5	155.8	2.3*	158.1
45.0	236.1	2.3*	238.4	133.3	2.3*	135.6	159.9	2.3*	162.1
46.0	242.4	2.3*	244.7	136.5	2.3*	138.7	163.9	2.3*	166.2
47.0	248.7	2.3*	251.0	139.6	2.3*	141.9	168.0	2.3*	170.3
48.0	255.0	2.3*	257.3	142.7	2.3*	145.0	172.1	2.3*	174.4
49.0	261.3	2.3*	263.6	145.9	2.3*	148.2	176.2	2.3*	178.5
50.0	267.6	2.3*	269.8	149.0	2.3*	151.3	180.3	2.3*	182.6
51.0	273.8	2.3*	276.1	152.2	2.3*	154.5	184.5	2.3*	186.7
52.0	280.1	2.3*	282.4	155.3	2.3*	157.6	188.6	2.3*	190.9
53.0	286.4	2.3*	288.7	158.5	2.3*	160.7	192.7	2.3*	195.0
54.0	292.7	2.3*	295.0	161.6	2.3*	163.9	196.9	2.3*	199.1
55.0	299.5	3.8*	303.3	165.8	3.8*	169.6	202.2	3.8*	206.0
56.0	306.8	3.8*	310.6	171.0	3.8*	174.8	207.6	3.8*	211.4
57.0	314.2	3.8*	318.0	176.3	3.8*	180.1	212.9	3.8*	216.7
58.0	321.5	3.8*	325.3	181.5	3.8*	185.3	218.2	3.8*	222.0
59.0	328.9	3.8*	332.7	186.7	3.8*	190.5	223.5	3.8*	227.3
60.0	336.2	3.8*	340.0	192.0	3.8*	195.8	228.8	3.8*	232.6
61.0	343.5	3.8*	347.4	197.2	3.8*	201.0	234.1	3.8*	237.9
62.0	350.9	3.8*	354.7	202.4	3.8*	206.2	239.3	3.8*	243.1
63.0	358.2	3.8*	362.0	207.7	3.8*	211.5	244.6	3.8*	248.4
64.0	365.6	3.8*	369.4	212.9	3.8*	216.7	249.8	3.8*	253.6
65.0	372.9	3.8*	376.7	218.1	3.8*	221.9	255.0	3.8*	258.8
66.0	380.3	3.8*	384.1	223.4	3.8*	227.2	260.2	3.8*	264.0
67.0	387.6	3.8*	391.4	228.6	3.8*	232.4	265.4	3.8*	269.2
68.0	394.9	3.8*	398.7	233.9	3.8*	237.7	270.6	3.8*	274.4
69.0	402.3	3.8*	406.1	239.1	3.8*	242.9	275.8	3.8*	279.6
70.0	409.6	3.8*	413.4	244.3	3.8*	248.1	280.9	3.8*	284.7
71.0	417.0	3.8*	420.8	249.6	3.8*	253.4	286.1	3.8*	289.9
72.0	424.3	3.8*	428.1	254.8	3.8*	258.6	291.2	3.8*	295.0
73.0	431.6	3.8*	435.4	260.0	3.8*	263.8	296.3	3.8*	300.1
74.0	439.0	3.8*	442.8	265.3	3.8*	269.1	301.4	3.8*	305.2
75.0	446.3	3.8*	450.1	270.5	3.8*	274.3	306.5	3.8*	310.3
76.0	453.7	3.8*	457.5	275.7	3.8*	279.5	311.6	3.8*	315.4
77.0	461.0	3.8*	464.8	281.0	3.8*	284.8	316.7	3.8*	320.5
78.0	468.3	3.8*	472.1	286.2	3.8*	290.0	321.8	3.8*	325.6
79.0	475.7	3.8*	479.5	291.4	3.8*	295.3	326.9	3.8*	330.7
80.0	483.0	3.8*	486.8	296.7	3.8*	300.5	331.9	3.8*	335.7

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* API RP-2A (1994) *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	1.9*	1.9
1.00	1.5	2.6*	4.1
2.00	3.0	3.4*	6.4
3.00	4.7	4.2*	8.9
4.00	6.5	5.0*	11.6
5.00	8.4	6.0*	14.4

6.00	10.4	6.9*	17.3
7.00	12.4	7.9*	20.3
8.00	14.5	8.9*	23.4
9.00	16.7	9.9*	26.6
10.00	19.0	11.0*	29.9
11.00	21.1	11.5*	32.6
12.00	23.0	12.4*	35.5
13.00	25.0	12.6	37.6
14.00	27.1	12.6	39.6
15.00	29.2	12.6	41.7
16.00	31.3	9.4	40.7
17.00	33.5	4.7	38.2
18.00	35.7	0.0	35.7
19.00	36.9	4.7	41.6
20.00	36.9	11.8	48.6
21.00	36.9	16.9*	53.8
22.00	38.4	18.8	57.3
23.00	41.5	18.8	60.4
24.00	44.7	18.8	63.6
25.00	48.0	18.8	66.8
26.00	51.3	18.8	70.1
27.00	54.6	18.8	73.5
28.00	58.1	18.8	76.9
29.00	61.5	18.8	80.4
30.00	65.1	18.8	83.9
31.00	68.7	18.8	87.5
32.00	72.4	18.8	91.2
33.00	76.1	18.8	94.9
34.00	79.8	18.8	98.7
35.00	83.7	18.8	102.5
36.00	87.5	18.8	106.4
37.00	91.5	18.8	110.3
38.00	95.4	18.8	114.3
39.00	99.5	18.8	118.3
40.00	103.6	18.8	122.4
41.00	107.7	18.8	126.5
42.00	111.9	18.8	130.7
43.00	116.1	18.8	135.0
44.00	120.4	18.8	139.2
45.00	124.7	18.8	143.6
46.00	129.1	18.8	148.0
47.00	133.5	18.8	152.4
48.00	138.0	18.8	156.8
49.00	142.5	18.8	161.4
50.00	147.1	18.8	165.9
51.00	151.7	18.8	170.5
52.00	156.3	22.0	178.3
53.00	161.0	26.7	187.7
54.00	165.8	31.4	197.2
55.00	171.2	31.4	202.7
56.00	177.5	31.4	208.9
57.00	183.7	31.4	215.2
58.00	190.1	31.4	221.5
59.00	196.5	31.4	227.9
60.00	202.9	31.4	234.3
61.00	209.4	31.4	240.8
62.00	216.0	31.4	247.4
63.00	222.6	31.4	254.0
64.00	229.2	31.4	260.6
65.00	235.9	31.4	267.3
66.00	242.7	31.4	274.1
67.00	249.5	31.4	280.9
68.00	256.3	31.4	287.8

69.00	263.3	31.4	294.7
70.00	270.2	31.4	301.6
71.00	277.2	31.4	308.6
72.00	284.3	31.4	315.7
73.00	291.4	31.4	322.8
74.00	298.5	31.4	329.9
75.00	305.7	31.4	337.1
76.00	313.0	31.4	344.4
77.00	320.3	31.4	351.7
78.00	327.6	31.4	359.0
79.00	335.0	31.4	366.4
80.00	342.4	31.4	373.8

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
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T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2560E-01
			0.1220E+01	0.4960E-01
			0.1831E+01	0.9120E-01
			0.2197E+01	0.1280E+00
			0.2441E+01	0.1600E+00
			0.2197E+01	0.3200E+00
			0.2197E+01	0.4800E+00
			0.2197E+01	0.8000E+00
			0.2197E+01	0.3200E+01
2	10	0.5250E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2560E-01
			0.1220E+01	0.4960E-01
			0.1831E+01	0.9120E-01
			0.2197E+01	0.1280E+00
			0.2441E+01	0.1600E+00
			0.2197E+01	0.3200E+00
			0.2197E+01	0.4800E+00
			0.2197E+01	0.8000E+00
			0.2197E+01	0.3200E+01
3	10	0.9583E+00		
			0.0000E+00	0.0000E+00
			0.7322E+00	0.2560E-01
			0.1220E+01	0.4960E-01
			0.1831E+01	0.9120E-01
			0.2197E+01	0.1280E+00
			0.2441E+01	0.1600E+00
			0.2197E+01	0.3200E+00
			0.2197E+01	0.4800E+00
			0.2197E+01	0.8000E+00
			0.2197E+01	0.3200E+01
4	10	0.1000E+01		

			0.0000E+00	0.0000E+00
			0.7713E+00	0.2560E-01
			0.1286E+01	0.4960E-01
			0.1928E+01	0.9120E-01
			0.2314E+01	0.1280E+00
			0.2571E+01	0.1600E+00
			0.2314E+01	0.3200E+00
			0.2314E+01	0.4800E+00
			0.2314E+01	0.8000E+00
			0.2314E+01	0.3200E+01
5	10	0.5275E+01		
			0.0000E+00	0.0000E+00
			0.9828E+00	0.2560E-01
			0.1638E+01	0.4960E-01
			0.2457E+01	0.9120E-01
			0.2949E+01	0.1280E+00
			0.3276E+01	0.1600E+00
			0.2949E+01	0.3200E+00
			0.2949E+01	0.4800E+00
			0.2949E+01	0.8000E+00
			0.2949E+01	0.3200E+01
6	10	0.9458E+01		
			0.0000E+00	0.0000E+00
			0.1108E+01	0.2560E-01
			0.1847E+01	0.4960E-01
			0.2771E+01	0.9120E-01
			0.3325E+01	0.1280E+00
			0.3695E+01	0.1600E+00
			0.3325E+01	0.3200E+00
			0.3325E+01	0.4800E+00
			0.3325E+01	0.8000E+00
			0.3325E+01	0.3200E+01
7	10	0.9500E+01		
			0.0000E+00	0.0000E+00
			0.1108E+01	0.2560E-01
			0.1847E+01	0.4960E-01
			0.2771E+01	0.9120E-01
			0.3325E+01	0.1280E+00
			0.3695E+01	0.1600E+00
			0.3325E+01	0.3200E+00
			0.3325E+01	0.4800E+00
			0.3325E+01	0.8000E+00
			0.3325E+01	0.3200E+01
8	10	0.1353E+02		
			0.0000E+00	0.0000E+00
			0.1017E+01	0.2560E-01
			0.1694E+01	0.4960E-01
			0.2541E+01	0.9120E-01
			0.3050E+01	0.1280E+00
			0.3389E+01	0.1600E+00
			0.3050E+01	0.3200E+00
			0.3050E+01	0.4800E+00
			0.3050E+01	0.8000E+00
			0.3050E+01	0.3200E+01
9	10	0.1746E+02		
			0.0000E+00	0.0000E+00
			0.1121E+01	0.2560E-01
			0.1868E+01	0.4960E-01
			0.2802E+01	0.9120E-01
			0.3362E+01	0.1280E+00
			0.3736E+01	0.1600E+00
			0.3362E+01	0.3200E+00
			0.3362E+01	0.4800E+00

			0.3362E+01	0.8000E+00
			0.3362E+01	0.3200E+01
10	10	0.1750E+02		
			0.0000E+00	0.0000E+00
			0.1121E+01	0.2560E-01
			0.1868E+01	0.4960E-01
			0.2802E+01	0.9120E-01
			0.3362E+01	0.1280E+00
			0.3736E+01	0.1600E+00
			0.3362E+01	0.3200E+00
			0.3362E+01	0.4800E+00
			0.3362E+01	0.8000E+00
			0.3362E+01	0.3200E+01
11	10	0.1902E+02		
			0.0000E+00	0.0000E+00
			0.1897E-05	0.2560E-01
			0.3162E-05	0.4960E-01
			0.4743E-05	0.9120E-01
			0.5692E-05	0.1280E+00
			0.6324E-05	0.1600E+00
			0.5692E-05	0.3200E+00
			0.5692E-05	0.4800E+00
			0.5692E-05	0.8000E+00
			0.5692E-05	0.3200E+01
12	10	0.2046E+02		
			0.0000E+00	0.0000E+00
			0.1897E-05	0.2560E-01
			0.3162E-05	0.4960E-01
			0.4743E-05	0.9120E-01
			0.5692E-05	0.1280E+00
			0.6324E-05	0.1600E+00
			0.5692E-05	0.3200E+00
			0.5692E-05	0.4800E+00
			0.5692E-05	0.8000E+00
			0.5692E-05	0.3200E+01
13	10	0.2050E+02		
			0.0000E+00	0.0000E+00
			0.1897E-05	0.2560E-01
			0.3162E-05	0.4960E-01
			0.4743E-05	0.9120E-01
			0.5692E-05	0.1280E+00
			0.6324E-05	0.1600E+00
			0.5692E-05	0.3200E+00
			0.5692E-05	0.4800E+00
			0.5692E-05	0.8000E+00
			0.5692E-05	0.3200E+01
14	10	0.3702E+02		
			0.0000E+00	0.0000E+00
			0.1980E+01	0.2560E-01
			0.3301E+01	0.4960E-01
			0.4951E+01	0.9120E-01
			0.5941E+01	0.1280E+00
			0.6601E+01	0.1600E+00
			0.5941E+01	0.3200E+00
			0.5941E+01	0.4800E+00
			0.5941E+01	0.8000E+00
			0.5941E+01	0.3200E+01
15	10	0.5346E+02		
			0.0000E+00	0.0000E+00
			0.2356E+01	0.2560E-01
			0.3927E+01	0.4960E-01
			0.5891E+01	0.9120E-01
			0.7069E+01	0.1280E+00

			0.7855E+01	0.1600E+00
			0.7069E+01	0.3200E+00
			0.7069E+01	0.4800E+00
			0.7069E+01	0.8000E+00
			0.7069E+01	0.3200E+01
16	10	0.5350E+02		
			0.0000E+00	0.0000E+00
			0.2356E+01	0.2560E-01
			0.3927E+01	0.4960E-01
			0.5891E+01	0.9120E-01
			0.7069E+01	0.1280E+00
			0.7855E+01	0.1600E+00
			0.7069E+01	0.3200E+00
			0.7069E+01	0.4800E+00
			0.7069E+01	0.8000E+00
			0.7069E+01	0.3200E+01
17	10	0.7678E+02		
			0.0000E+00	0.0000E+00
			0.3628E+01	0.2560E-01
			0.6046E+01	0.4960E-01
			0.9069E+01	0.9120E-01
			0.1088E+02	0.1280E+00
			0.1209E+02	0.1600E+00
			0.1088E+02	0.3200E+00
			0.1088E+02	0.4800E+00
			0.1088E+02	0.8000E+00
			0.1088E+02	0.3200E+01
18	10	0.9996E+02		
			0.0000E+00	0.0000E+00
			0.3697E+01	0.2560E-01
			0.6162E+01	0.4960E-01
			0.9243E+01	0.9120E-01
			0.1109E+02	0.1280E+00
			0.1232E+02	0.1600E+00
			0.1109E+02	0.3200E+00
			0.1109E+02	0.4800E+00
			0.1109E+02	0.8000E+00
			0.1109E+02	0.3200E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1963E+01	0.8000E-02
0.3927E+01	0.1600E-01
0.7854E+01	0.3200E-01
0.1571E+02	0.2080E+00
0.2356E+02	0.6720E+00
0.2827E+02	0.1168E+01
0.3142E+02	0.1600E+01
0.3142E+02	0.2400E+01
0.3142E+02	0.3200E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD	TOP MOVEMENT	TIP LOAD	TIP MOVEMENT

KIP	IN.	KIP	IN.
0.7506E+00	0.6143E-03	0.2454E-01	0.1000E-03
0.7506E+01	0.6143E-02	0.2454E+00	0.1000E-02
0.3778E+02	0.3088E-01	0.1227E+01	0.5000E-02
0.7215E+02	0.6126E-01	0.2454E+01	0.1000E-01
0.2170E+03	0.2268E+00	0.8657E+01	0.5000E-01
0.2830E+03	0.3478E+00	0.1089E+02	0.1000E+00
0.2953E+03	0.7688E+00	0.2065E+02	0.5000E+00
0.3013E+03	0.1277E+01	0.2668E+02	0.1000E+01
0.3060E+03	0.2283E+01	0.3142E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - BENTS 21 THRU 23
LT
11/11/11
1 1 18
0 0 16 15 29000000 80
0 15
0 1 1 0 4 0
100 24.35
0.0 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
0.5 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
0.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
1.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
1.5 2 0.0 62.6 0.0 0.0
0 0 350 0 0 0 0 0 0
4.5 2 0.0 62.6 0.0 0.0
0 0 350 0 0 0 0 0 0
4.5 2 0.0 62.6 0.0 0.0
0 0 650 0 0 0 0 0 0
9.5 2 0.0 62.6 0.0 0.0
0 0 650 0 0 0 0 0 0
9.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
14.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
14.5 2 0.0 62.6 0.0 0.0
0 0 0.001 0 0 0 0 0 0
17.5 2 0.0 62.6 0.0 0.0
0 0 0.001 0 0 0 0 0 0
17.5 1 0.8 62.6 34 0
0 0 0.0 0 0.0 0.0 0 0 0
41.5 1 0.8 62.6 34 0
0 0 0.0 0 0.0 0.0 0 0 0
41.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
55.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
55.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
100 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - BENTS 21 THRU 23

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 16.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 15.00 IN.
PILE LENGTH = 80.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
0.50	CLAY	0.00	125.00	0.00	0.00
0.50	CLAY	0.00	62.60	0.00	0.00
1.50	CLAY	0.00	62.60	0.00	0.00
1.50	CLAY	0.00	62.60	0.00	0.00
4.50	CLAY	0.00	62.60	0.00	0.00
4.50	CLAY	0.00	62.60	0.00	0.00
9.50	CLAY	0.00	62.60	0.00	0.00
9.50	CLAY	0.00	62.60	0.00	0.00
17.50	CLAY	0.00	62.60	0.00	0.00
17.50	CLAY	0.00	62.60	0.00	0.00
20.50	CLAY	0.00	62.60	0.00	0.00
20.50	SAND	0.80	62.60	34.00	0.00
41.50	SAND	0.80	62.60	34.00	0.00
41.50	CLAY	0.00	62.60	0.00	0.00
55.50	CLAY	0.00	62.60	0.00	0.00
55.50	CLAY	0.00	62.60	0.00	0.00
100.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00

9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	0.35	0.00	0.00	0.00	0.00
9999.00	99999.00	0.35	0.00	0.00	0.00	0.00
9999.00	99999.00	0.65	0.00	0.00	0.00	0.00
9999.00	99999.00	0.65	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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* COMPUTATION RESULT *
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PILE PENETRATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPACITY KIP
	* FED. HWY. METHOD *			* ARMY CORPS METHOD *			* LAMBDA 2 METHOD *		
0.0	0.0	2.3*	2.3	0.0	2.3*	2.3	0.0	2.3*	2.3
1.0	6.3	2.3*	8.6	3.1	2.3*	5.4	5.8	2.3*	8.1
2.0	12.6	2.3*	14.8	6.3	2.3*	8.6	10.6	2.3*	12.9
3.0	16.4	0.5*	17.0	8.6	0.5*	9.1	11.7	0.5*	12.2
4.0	17.9	0.5*	18.4	10.1	0.5*	10.6	12.8	0.5*	13.4
5.0	19.4	0.5*	19.9	11.5	0.5*	12.1	14.1	0.5*	14.6
6.0	21.5	1.0*	22.5	13.5	1.0*	14.5	16.3	1.0*	17.2
7.0	24.2	1.0*	25.2	16.0	1.0*	17.0	18.4	1.0*	19.4
8.0	26.9	1.0*	27.9	18.5	1.0*	19.5	20.6	1.0*	21.6
9.0	29.6	1.0*	30.6	21.1	1.0*	22.1	22.8	1.0*	23.8
10.0	32.4	1.0*	33.3	23.6	1.0*	24.6	25.1	1.0*	26.1
11.0	36.3	1.9*	38.2	26.5	1.9*	28.4	28.7	1.9*	30.6
12.0	41.6	1.9*	43.5	29.8	1.9*	31.7	32.4	1.9*	34.3
13.0	46.8	1.9*	48.7	33.0	1.9*	34.9	36.0	1.9*	37.9
14.0	52.0	1.9*	53.9	36.3	1.9*	38.2	39.6	1.9*	41.5
15.0	57.3	1.9*	59.2	39.6	1.9*	41.5	43.1	1.9*	45.0
16.0	62.5	1.9*	64.4	42.8	1.9*	44.7	46.7	1.9*	48.6
17.0	67.8	1.9*	69.7	46.1	1.9*	48.0	50.2	1.9*	52.2
18.0	73.0	0.0	73.0	49.4	0.0	49.4	53.8	0.0	53.8
19.0	75.6	0.0*	75.6	51.0	0.0*	51.0	54.9	0.0*	54.9
20.0	75.6	0.0*	75.6	51.0	0.0*	51.0	56.1	0.0*	56.1
21.0	75.6	0.0	75.6	53.3	0.0	53.3	57.3	0.0	57.3
22.0	77.4	11.4	88.9	55.6	12.9	68.5	60.0	0.0	60.0
23.0	81.2	14.4	95.5	57.9	15.5	73.4	62.9	0.0	62.9
24.0	85.0	17.4	102.5	60.2	18.2	78.4	65.8	0.0	65.8
25.0	89.1	20.6	109.7	62.5	20.9	83.5	68.8	0.0	68.8
26.0	93.3	23.9	117.2	64.8	23.8	88.6	71.9	0.0	71.9
27.0	97.7	27.3	124.9	67.1	26.8	93.9	75.1	0.0	75.1
28.0	102.2	30.8	133.0	69.4	29.9	99.4	78.3	0.0	78.3
29.0	106.9	34.4	141.2	71.7	33.1	104.9	81.7	0.0	81.7
30.0	111.7	38.1	149.8	74.0	36.5	110.5	85.1	0.0	85.1
31.0	116.7	41.9	158.6	76.3	39.9	116.2	88.6	0.0	88.6
32.0	121.9	45.4	167.3	78.6	43.4	122.1	92.1	0.0	92.1
33.0	127.2	49.1	176.2	80.9	47.1	128.0	95.7	0.0	95.7
34.0	132.7	52.8	185.5	83.2	50.9	134.1	99.4	0.0	99.4
35.0	138.3	56.7	195.0	85.5	54.7	140.3	103.2	0.0	103.2
36.0	144.1	60.7	204.7	87.8	58.7	146.5	107.0	0.0	107.0

37.0	150.0	64.8	214.8	90.1	62.8	152.9	110.9	0.0	110.9
38.0	156.1	68.9	225.1	92.4	67.0	159.4	114.8	0.0	114.8
39.0	162.4	73.3	235.7	94.7	71.3	166.0	118.8	0.0	118.8
40.0	168.8	77.7	246.5	97.0	69.5	166.6	122.8	4.7	127.6
41.0	175.4	50.3	225.7	99.3	44.2	143.5	127.0	11.8	138.7
42.0	182.2	18.8	201.0	102.6	18.8	121.5	131.1	18.8	150.0
43.0	188.1	18.8	207.0	106.4	18.8	125.2	135.4	18.8	154.2
44.0	193.8	18.8	212.7	109.5	18.8	128.4	139.6	18.8	158.5
45.0	200.1	18.8	219.0	112.7	18.8	131.5	143.9	18.8	162.7
46.0	206.4	18.8	225.3	115.8	18.8	134.6	148.2	18.8	167.0
47.0	212.7	18.8	231.5	118.9	18.8	137.8	152.4	18.8	171.3
48.0	219.0	18.8	237.8	122.1	18.8	140.9	156.7	18.8	175.6
49.0	225.3	18.8	244.1	125.2	18.8	144.1	161.0	18.8	179.8
50.0	231.5	18.8	250.4	128.4	18.8	147.2	165.3	18.8	184.1
51.0	237.8	18.8	256.7	131.5	18.8	150.4	169.6	18.8	188.4
52.0	244.1	18.8	263.0	134.6	18.8	153.5	173.9	18.8	192.7
53.0	250.4	18.8	269.2	137.8	18.8	156.6	178.2	18.8	197.0
54.0	256.7	22.0	278.7	140.9	22.0	162.9	182.5	22.0	204.5
55.0	263.0	26.7	289.7	144.1	26.7	170.8	186.8	26.7	213.5
56.0	269.2	31.4	300.7	147.2	31.4	178.6	191.1	31.4	222.5
57.0	276.1	31.4	307.5	151.4	31.4	182.8	196.6	31.4	228.0
58.0	283.4	31.4	314.8	156.6	31.4	188.1	202.1	31.4	233.6
59.0	290.7	31.4	322.1	161.9	31.4	193.3	207.6	31.4	239.0
60.0	298.1	31.4	329.5	167.1	31.4	198.5	213.1	31.4	244.5
61.0	305.4	31.4	336.8	172.3	31.4	203.8	218.5	31.4	250.0
62.0	312.8	31.4	344.2	177.6	31.4	209.0	224.0	31.4	255.4
63.0	320.1	31.4	351.5	182.8	31.4	214.2	229.4	31.4	260.8
64.0	327.4	31.4	358.9	188.1	31.4	219.5	234.8	31.4	266.2
65.0	334.8	31.4	366.2	193.3	31.4	224.7	240.2	31.4	271.6
66.0	342.1	31.4	373.5	198.5	31.4	229.9	245.5	31.4	276.9
67.0	349.5	31.4	380.9	203.8	31.4	235.2	250.9	31.4	282.3
68.0	356.8	31.4	388.2	209.0	31.4	240.4	256.2	31.4	287.6
69.0	364.1	31.4	395.6	214.2	31.4	245.6	261.5	31.4	292.9
70.0	371.5	31.4	402.9	219.5	31.4	250.9	266.8	31.4	298.3
71.0	378.8	31.4	410.2	224.7	31.4	256.1	272.1	31.4	303.5
72.0	386.2	31.4	417.6	229.9	31.4	261.4	277.4	31.4	308.8
73.0	393.5	31.4	424.9	235.2	31.4	266.6	282.7	31.4	314.1
74.0	400.8	31.4	432.3	240.4	31.4	271.8	287.9	31.4	319.4
75.0	408.2	31.4	439.6	245.6	31.4	277.1	293.2	31.4	324.6
76.0	415.5	31.4	446.9	250.9	31.4	282.3	298.4	31.4	329.8
77.0	422.9	31.4	454.3	256.1	31.4	287.5	303.7	31.4	335.1
78.0	430.2	31.4	461.6	261.4	31.4	292.8	308.9	31.4	340.3
79.0	437.5	31.4	468.0	266.6	31.4	298.0	314.1	31.4	345.5
80.0	444.9	31.4	476.3	271.8	31.4	303.2	319.3	31.4	350.7

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* API RP-2A (1994) *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	2.3*	2.3
1.00	1.7	3.1*	4.8
2.00	3.5	3.9*	7.4
3.00	4.7	2.5*	7.3
4.00	5.4	2.8*	8.3
5.00	6.2	3.2*	9.4
6.00	7.2	4.2*	11.4
7.00	8.4	4.8*	13.3
8.00	9.7	5.5*	15.2
9.00	11.0	6.1*	17.1
10.00	12.4	6.7*	19.2
11.00	14.3	8.7*	23.0
12.00	16.6	9.8*	26.4
13.00	19.0	11.0*	29.9
14.00	21.4	12.1*	33.5
15.00	23.8	13.3*	37.1

16.00	26.3	11.8	38.1
17.00	28.9	5.9	34.8
18.00	31.4	0.0	31.4
19.00	32.7	0.0	32.7
20.00	32.7	0.0	32.7
21.00	32.7	0.0	32.7
22.00	34.1	0.0	34.1
23.00	36.8	0.0	36.8
24.00	39.7	0.0	39.7
25.00	42.6	0.0	42.6
26.00	45.7	0.0	45.7
27.00	48.9	0.0	48.9
28.00	52.2	0.0	52.2
29.00	55.6	0.0	55.6
30.00	59.2	0.0	59.2
31.00	62.8	0.0	62.8
32.00	66.6	0.0	66.6
33.00	70.5	0.0	70.5
34.00	74.5	0.0	74.5
35.00	78.7	0.0	78.7
36.00	82.9	0.0	82.9
37.00	87.3	0.0	87.3
38.00	91.7	0.0	91.7
39.00	96.3	0.0	96.3
40.00	101.0	4.7	105.8
41.00	105.9	11.8	117.6
42.00	110.8	18.8	129.7
43.00	115.4	18.8	134.3
44.00	119.7	18.8	138.6
45.00	124.0	18.8	142.9
46.00	128.4	18.8	147.3
47.00	132.8	18.8	151.7
48.00	137.3	18.8	156.2
49.00	141.8	18.8	160.7
50.00	146.4	18.8	165.2
51.00	151.0	18.8	169.8
52.00	155.6	18.8	174.5
53.00	160.3	18.8	179.2
54.00	165.1	22.0	187.1
55.00	169.9	26.7	196.6
56.00	174.7	31.4	206.1
57.00	180.3	31.4	211.7
58.00	186.6	31.4	218.0
59.00	193.0	31.4	224.4
60.00	199.4	31.4	230.8
61.00	205.9	31.4	237.3
62.00	212.5	31.4	243.9
63.00	219.1	31.4	250.5
64.00	225.7	31.4	257.2
65.00	232.4	31.4	263.9
66.00	239.2	31.4	270.6
67.00	246.0	31.4	277.4
68.00	252.9	31.4	284.3
69.00	259.8	31.4	291.2
70.00	266.7	31.4	298.1
71.00	273.7	31.4	305.1
72.00	280.8	31.4	312.2
73.00	287.9	31.4	319.3
74.00	295.0	31.4	326.5
75.00	302.2	31.4	333.7
76.00	309.5	31.4	340.9
77.00	316.8	31.4	348.2
78.00	324.1	31.4	355.5
79.00	331.5	31.4	362.9
80.00	338.9	31.4	370.4

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

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**************************************************
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING                      *
**************************************************
```

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2560E-01
			0.1399E+01	0.4960E-01
			0.2099E+01	0.9120E-01
			0.2519E+01	0.1280E+00
			0.2798E+01	0.1600E+00
			0.2519E+01	0.3200E+00
			0.2519E+01	0.4800E+00
			0.2519E+01	0.8000E+00
			0.2519E+01	0.3200E+01
2	10	0.5250E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2560E-01
			0.1399E+01	0.4960E-01
			0.2099E+01	0.9120E-01
			0.2519E+01	0.1280E+00
			0.2798E+01	0.1600E+00
			0.2519E+01	0.3200E+00
			0.2519E+01	0.4800E+00
			0.2519E+01	0.8000E+00
			0.2519E+01	0.3200E+01
3	10	0.9583E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2560E-01
			0.1399E+01	0.4960E-01
			0.2099E+01	0.9120E-01
			0.2519E+01	0.1280E+00
			0.2798E+01	0.1600E+00
			0.2519E+01	0.3200E+00
			0.2519E+01	0.4800E+00
			0.2519E+01	0.8000E+00
			0.2519E+01	0.3200E+01
4	10	0.1000E+01		
			0.0000E+00	0.0000E+00
			0.8843E+00	0.2560E-01
			0.1474E+01	0.4960E-01
			0.2211E+01	0.9120E-01
			0.2653E+01	0.1280E+00
			0.2948E+01	0.1600E+00
			0.2653E+01	0.3200E+00
			0.2653E+01	0.4800E+00
			0.2653E+01	0.8000E+00
			0.2653E+01	0.3200E+01
5	10	0.1525E+01		
			0.0000E+00	0.0000E+00
			0.8843E+00	0.2560E-01
			0.1474E+01	0.4960E-01
			0.2211E+01	0.9120E-01
			0.2653E+01	0.1280E+00
			0.2948E+01	0.1600E+00
			0.2653E+01	0.3200E+00
			0.2653E+01	0.4800E+00
			0.2653E+01	0.8000E+00
			0.2653E+01	0.3200E+01
6	10	0.1958E+01		
			0.0000E+00	0.0000E+00
			0.8843E+00	0.2560E-01

			0.1474E+01	0.4960E-01
			0.2211E+01	0.9120E-01
			0.2653E+01	0.1280E+00
			0.2948E+01	0.1600E+00
			0.2653E+01	0.3200E+00
			0.2653E+01	0.4800E+00
			0.2653E+01	0.8000E+00
			0.2653E+01	0.3200E+01
7	10	0.2000E+01		
			0.0000E+00	0.0000E+00
			0.6322E+00	0.2560E-01
			0.1054E+01	0.4960E-01
			0.1581E+01	0.9120E-01
			0.1897E+01	0.1280E+00
			0.2107E+01	0.1600E+00
			0.1897E+01	0.3200E+00
			0.1897E+01	0.4800E+00
			0.1897E+01	0.8000E+00
			0.1897E+01	0.3200E+01
8	10	0.3275E+01		
			0.0000E+00	0.0000E+00
			0.3449E+00	0.2560E-01
			0.5748E+00	0.4960E-01
			0.8621E+00	0.9120E-01
			0.1035E+01	0.1280E+00
			0.1150E+01	0.1600E+00
			0.1035E+01	0.3200E+00
			0.1035E+01	0.4800E+00
			0.1035E+01	0.8000E+00
			0.1035E+01	0.3200E+01
9	10	0.4458E+01		
			0.0000E+00	0.0000E+00
			0.3660E+00	0.2560E-01
			0.6101E+00	0.4960E-01
			0.9151E+00	0.9120E-01
			0.1098E+01	0.1280E+00
			0.1220E+01	0.1600E+00
			0.1098E+01	0.3200E+00
			0.1098E+01	0.4800E+00
			0.1098E+01	0.8000E+00
			0.1098E+01	0.3200E+01
10	10	0.4500E+01		
			0.0000E+00	0.0000E+00
			0.3660E+00	0.2560E-01
			0.6101E+00	0.4960E-01
			0.9151E+00	0.9120E-01
			0.1098E+01	0.1280E+00
			0.1220E+01	0.1600E+00
			0.1098E+01	0.3200E+00
			0.1098E+01	0.4800E+00
			0.1098E+01	0.8000E+00
			0.1098E+01	0.3200E+01
11	10	0.7025E+01		
			0.0000E+00	0.0000E+00
			0.6438E+00	0.2560E-01
			0.1073E+01	0.4960E-01
			0.1609E+01	0.9120E-01
			0.1931E+01	0.1280E+00
			0.2146E+01	0.1600E+00
			0.1931E+01	0.3200E+00
			0.1931E+01	0.4800E+00
			0.1931E+01	0.8000E+00
			0.1931E+01	0.3200E+01
12	10	0.9458E+01		
			0.0000E+00	0.0000E+00
			0.6837E+00	0.2560E-01
			0.1140E+01	0.4960E-01
			0.1709E+01	0.9120E-01
			0.2051E+01	0.1280E+00
			0.2279E+01	0.1600E+00

			0.2051E+01	0.3200E+00
			0.2051E+01	0.4800E+00
			0.2051E+01	0.8000E+00
			0.2051E+01	0.3200E+01
13	10	0.9500E+01		
			0.0000E+00	0.0000E+00
			0.6837E+00	0.2560E-01
			0.1140E+01	0.4960E-01
			0.1709E+01	0.9120E-01
			0.2051E+01	0.1280E+00
			0.2279E+01	0.1600E+00
			0.2051E+01	0.3200E+00
			0.2051E+01	0.4800E+00
			0.2051E+01	0.8000E+00
			0.2051E+01	0.3200E+01
14	10	0.1353E+02		
			0.0000E+00	0.0000E+00
			0.1202E+01	0.2560E-01
			0.2003E+01	0.4960E-01
			0.3004E+01	0.9120E-01
			0.3605E+01	0.1280E+00
			0.4006E+01	0.1600E+00
			0.3605E+01	0.3200E+00
			0.3605E+01	0.4800E+00
			0.3605E+01	0.8000E+00
			0.3605E+01	0.3200E+01
15	10	0.1746E+02		
			0.0000E+00	0.0000E+00
			0.1277E+01	0.2560E-01
			0.2129E+01	0.4960E-01
			0.3193E+01	0.9120E-01
			0.3832E+01	0.1280E+00
			0.4258E+01	0.1600E+00
			0.3832E+01	0.3200E+00
			0.3832E+01	0.4800E+00
			0.3832E+01	0.8000E+00
			0.3832E+01	0.3200E+01
16	10	0.1750E+02		
			0.0000E+00	0.0000E+00
			0.1277E+01	0.2560E-01
			0.2129E+01	0.4960E-01
			0.3193E+01	0.9120E-01
			0.3832E+01	0.1280E+00
			0.4258E+01	0.1600E+00
			0.3832E+01	0.3200E+00
			0.3832E+01	0.4800E+00
			0.3832E+01	0.8000E+00
			0.3832E+01	0.3200E+01
17	10	0.1902E+02		
			0.0000E+00	0.0000E+00
			0.1897E-05	0.2560E-01
			0.3162E-05	0.4960E-01
			0.4743E-05	0.9120E-01
			0.5692E-05	0.1280E+00
			0.6324E-05	0.1600E+00
			0.5692E-05	0.3200E+00
			0.5692E-05	0.4800E+00
			0.5692E-05	0.8000E+00
			0.5692E-05	0.3200E+01
18	10	0.2046E+02		
			0.0000E+00	0.0000E+00
			0.1897E-05	0.2560E-01
			0.3162E-05	0.4960E-01
			0.4743E-05	0.9120E-01
			0.5692E-05	0.1280E+00
			0.6324E-05	0.1600E+00
			0.5692E-05	0.3200E+00
			0.5692E-05	0.4800E+00
			0.5692E-05	0.8000E+00
			0.5692E-05	0.3200E+01

19	10	0.2050E+02		
			0.0000E+00	0.0000E+00
			0.6324E-06	0.1600E-01
			0.1265E-05	0.3200E-01
			0.2530E-05	0.6400E-01
			0.3795E-05	0.9600E-01
			0.5059E-05	0.1280E+00
			0.5692E-05	0.1440E+00
			0.6324E-05	0.1600E+00
			0.6324E-05	0.8000E+00
			0.6324E-05	0.1600E+01
20	10	0.3102E+02		
			0.0000E+00	0.0000E+00
			0.6265E+00	0.1600E-01
			0.1253E+01	0.3200E-01
			0.2506E+01	0.6400E-01
			0.3759E+01	0.9600E-01
			0.5012E+01	0.1280E+00
			0.5638E+01	0.1440E+00
			0.6265E+01	0.1600E+00
			0.6265E+01	0.8000E+00
			0.6265E+01	0.1600E+01
21	10	0.4146E+02		
			0.0000E+00	0.0000E+00
			0.8192E+00	0.1600E-01
			0.1638E+01	0.3200E-01
			0.3277E+01	0.6400E-01
			0.4915E+01	0.9600E-01
			0.6554E+01	0.1280E+00
			0.7373E+01	0.1440E+00
			0.8192E+01	0.1600E+00
			0.8192E+01	0.8000E+00
			0.8192E+01	0.1600E+01
22	10	0.4150E+02		
			0.0000E+00	0.0000E+00
			0.2458E+01	0.2560E-01
			0.4096E+01	0.4960E-01
			0.6144E+01	0.9120E-01
			0.7373E+01	0.1280E+00
			0.8192E+01	0.1600E+00
			0.7373E+01	0.3200E+00
			0.7373E+01	0.4800E+00
			0.7373E+01	0.8000E+00
			0.7373E+01	0.3200E+01
23	10	0.4852E+02		
			0.0000E+00	0.0000E+00
			0.2246E+01	0.2560E-01
			0.3743E+01	0.4960E-01
			0.5614E+01	0.9120E-01
			0.6737E+01	0.1280E+00
			0.7486E+01	0.1600E+00
			0.6737E+01	0.3200E+00
			0.6737E+01	0.4800E+00
			0.6737E+01	0.8000E+00
			0.6737E+01	0.3200E+01
24	10	0.5546E+02		
			0.0000E+00	0.0000E+00
			0.2399E+01	0.2560E-01
			0.3999E+01	0.4960E-01
			0.5998E+01	0.9120E-01
			0.7198E+01	0.1280E+00
			0.7997E+01	0.1600E+00
			0.7198E+01	0.3200E+00
			0.7198E+01	0.4800E+00
			0.7198E+01	0.8000E+00
			0.7198E+01	0.3200E+01
25	10	0.5550E+02		
			0.0000E+00	0.0000E+00
			0.2399E+01	0.2560E-01
			0.3999E+01	0.4960E-01

			0.5998E+01	0.9120E-01
			0.7198E+01	0.1280E+00
			0.7997E+01	0.1600E+00
			0.7198E+01	0.3200E+00
			0.7198E+01	0.4800E+00
			0.7198E+01	0.8000E+00
			0.7198E+01	0.3200E+01
26	10	0.7778E+02		
			0.0000E+00	0.0000E+00
			0.3651E+01	0.2560E-01
			0.6085E+01	0.4960E-01
			0.9127E+01	0.9120E-01
			0.1095E+02	0.1280E+00
			0.1217E+02	0.1600E+00
			0.1095E+02	0.3200E+00
			0.1095E+02	0.4800E+00
			0.1095E+02	0.8000E+00
			0.1095E+02	0.3200E+01
27	10	0.9996E+02		
			0.0000E+00	0.0000E+00
			0.3697E+01	0.2560E-01
			0.6162E+01	0.4960E-01
			0.9243E+01	0.9120E-01
			0.1109E+02	0.1280E+00
			0.1232E+02	0.1600E+00
			0.1109E+02	0.3200E+00
			0.1109E+02	0.4800E+00
			0.1109E+02	0.8000E+00
			0.1109E+02	0.3200E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.1963E+01	0.8000E-02
0.3927E+01	0.1600E-01
0.7854E+01	0.3200E-01
0.1571E+02	0.2080E+00
0.2356E+02	0.6720E+00
0.2827E+02	0.1168E+01
0.3142E+02	0.1600E+01
0.3142E+02	0.2400E+01
0.3142E+02	0.3200E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.6556E+00	0.5805E-03	0.2454E-01	0.1000E-03
0.6556E+01	0.5805E-02	0.2454E+00	0.1000E-02
0.3302E+02	0.2916E-01	0.1227E+01	0.5000E-02
0.6397E+02	0.5814E-01	0.2454E+01	0.1000E-01
0.2168E+03	0.2286E+00	0.8657E+01	0.5000E-01
0.2940E+03	0.3558E+00	0.1089E+02	0.1000E+00
0.3099E+03	0.7789E+00	0.2065E+02	0.5000E+00
0.3159E+03	0.1287E+01	0.2668E+02	0.1000E+01
0.3207E+03	0.2294E+01	0.3142E+02	0.2000E+01

```
SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24
LT
11/11/11
1 1 18
0 0 14 12.264 29000000 60
0 12.264
0 1 1 0 4 0
75 18.66
0.0 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
6.5 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
6.5 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
7.5 2 0.0 125 0.0 0.0
0 0 1500 0 0 0 0 0 0
7.5 2 0.0 62.6 0.0 0.0
0 0 350 0 0 0 0 0 0
10.5 2 0.0 62.6 0.0 0.0
0 0 350 0 0 0 0 0 0
10.5 2 0.0 62.6 0.0 0.0
0 0 650 0 0 0 0 0 0
15.5 2 0.0 62.6 0.0 0.0
0 0 650 0 0 0 0 0 0
15.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
20.5 2 0.0 62.6 0.0 0.0
0 0 1250 0 0 0 0 0 0
20.5 2 0.0 62.6 0.0 0.0
0 0 0.001 0 0 0 0 0 0
23.5 2 0.0 62.6 0.0 0.0
0 0 0.001 0 0 0 0 0 0
23.5 1 0.8 62.6 34 0
0 0 0.0 0 0.0 0.0 0 0 0
47.5 1 0.8 62.6 34 0
0 0 0.0 0 0.0 0.0 0 0 0
47.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
61.5 2 0.0 62.6 0.0 0.0
0 0 1500 0 0 0 0 0 0
61.5 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
75 2 0.0 62.6 0.0 0.0
0 0 2500 0 0 0 0 0 0
0
0 1
0 1
0
1 0
```

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AXIALLY LOADING PILE ANALYSIS PROGRAM - APILEplus
VERSION 5.0 - (C) COPYRIGHT ENSOFT,INC.,1987-2008.

SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24

DESIGNER : LT

DATE : 11/11/11

PILE PROPERTIES :

PERIMETER OF PILE WITH NONCIRCULAR SECTION= 0.00 IN.
TIP AREA OF PILE WITH NONCIRCULAR SECTION = 0.00 SQF
OUTSIDE DIAMETER OF CIRCULAR PILE = 14.00 IN.
INTERNAL DIAMETER OF CIRCULAR PILE = 12.26 IN.
PILE LENGTH = 60.00 FT.
MODULUS OF ELASTICITY = 0.290E+08 PSI

LENGTH OF SURFACE SECTION WITH ZERO SKIN FRICTION = 0.00 FT.
INCREMENT OF PILE LENGTH USED IN COMPUTATION = 1.00 FT.

SOIL INFORMATIONS :

DEPTH FT.	SOIL TYPE	LATERAL EARTH PRESSURE	EFFECTIVE UNIT WEIGHT LB/CF	FRICTION ANGLE DEGREES	BEARING CAPACITY FACTOR
0.00	CLAY	0.00	125.00	0.00	0.00
6.50	CLAY	0.00	125.00	0.00	0.00
6.50	CLAY	0.00	125.00	0.00	0.00
7.50	CLAY	0.00	125.00	0.00	0.00
7.50	CLAY	0.00	62.60	0.00	0.00
10.50	CLAY	0.00	62.60	0.00	0.00
10.50	CLAY	0.00	62.60	0.00	0.00
15.50	CLAY	0.00	62.60	0.00	0.00
15.50	CLAY	0.00	62.60	0.00	0.00
23.50	CLAY	0.00	62.60	0.00	0.00
23.50	CLAY	0.00	62.60	0.00	0.00
26.50	CLAY	0.00	62.60	0.00	0.00
26.50	SAND	0.80	62.60	34.00	0.00
47.50	SAND	0.80	62.60	34.00	0.00
47.50	CLAY	0.00	62.60	0.00	0.00
61.50	CLAY	0.00	62.60	0.00	0.00
61.50	CLAY	0.00	62.60	0.00	0.00
75.00	CLAY	0.00	62.60	0.00	0.00

MAXIMUM UNIT FRICTION KSF	MAXIMUM UNIT BEARING KSF	UNDISTURB SHEAR STRENGTH KSF	REMOLDED SHEAR STRENGTH KSF	BLOW COUNT	UNIT SKIN FRICTION KSF	UNIT END BEARING KSF
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00

9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	0.35	0.00	0.00	0.00	0.00
9999.00	99999.00	0.35	0.00	0.00	0.00	0.00
9999.00	99999.00	0.65	0.00	0.00	0.00	0.00
9999.00	99999.00	0.65	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	1.25	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	0.00	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	1.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00
9999.00	99999.00	2.50	0.00	0.00	0.00	0.00

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****
* COMPUTATION RESULT *
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PILE PENETR-ATION FT.	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP	TOTAL SKIN FRIC KIP	END BEARING KIP	ULTIM CAPAC-ITY KIP
	********** FED. HWY. METHOD *			********** ARMY CORPS METHOD *			********** LAMBDA 2 METHOD *		
0.0	0.0	3.4*	3.4	0.0	3.4*	3.4	0.0	3.4*	3.4
1.0	5.5	3.4*	8.9	2.7	3.4*	6.1	5.2	3.4*	8.6
2.0	11.0	3.4*	14.4	5.5	3.4*	8.9	9.7	3.4*	13.1
3.0	16.5	3.4*	19.9	8.2	3.4*	11.6	13.9	3.4*	17.3
4.0	22.0	3.4*	25.3	11.0	3.4*	14.4	18.1	3.4*	21.4
5.0	27.5	3.4*	30.8	13.7	3.4*	17.1	22.1	3.4*	25.5
6.0	33.0	3.4*	36.3	16.5	3.4*	19.9	26.2	3.4*	29.5
7.0	38.5	3.4*	41.8	19.2	3.4*	22.6	30.3	3.4*	33.6
8.0	44.0	3.4*	47.3	22.0	3.4*	25.3	34.3	3.4*	37.7
9.0	47.4	0.8*	48.2	24.0	0.8*	24.8	35.9	0.8*	36.7
10.0	48.7	0.8*	49.4	25.3	0.8*	26.1	37.6	0.8*	38.4
11.0	49.9	0.8*	50.7	26.6	0.8*	27.4	39.3	0.8*	40.1
12.0	51.8	1.5*	53.2	28.3	1.5*	29.8	41.7	1.5*	43.2
13.0	54.2	1.5*	55.6	30.5	1.5*	32.0	44.2	1.5*	45.6
14.0	56.5	1.5*	58.0	32.7	1.5*	34.2	46.6	1.5*	48.1
15.0	58.9	1.5*	60.4	34.9	1.5*	36.4	49.1	1.5*	50.6
16.0	61.3	1.5*	62.8	37.1	1.5*	38.6	51.7	1.5*	53.1
17.0	64.8	2.8*	67.6	39.7	2.8*	42.5	55.3	2.8*	58.1
18.0	69.4	2.8*	72.2	42.5	2.8*	45.3	59.0	2.8*	61.8
19.0	73.9	2.8*	76.7	45.4	2.8*	48.2	62.7	2.8*	65.5
20.0	78.5	2.8*	81.3	48.3	2.8*	51.1	66.3	2.8*	69.1
21.0	83.1	2.8*	85.9	51.1	2.8*	53.9	70.0	2.8*	72.8
22.0	87.7	2.8*	90.5	54.0	2.8*	56.8	73.7	2.8*	76.5
23.0	92.3	2.8*	95.1	56.8	2.8*	59.6	77.3	2.8*	80.1
24.0	96.9	0.0	96.9	59.7	0.0	59.7	81.0	0.0	81.0
25.0	99.1	0.0*	99.1	61.1	0.0*	61.1	82.7	0.0*	82.7
26.0	99.1	0.0*	99.1	61.1	0.0*	61.1	84.4	0.0*	84.4
27.0	99.1	0.0	99.1	61.1	0.0	61.1	86.1	0.0	86.1
28.0	101.3	21.4	122.7	62.7	27.2	90.0	89.8	0.0	89.8
29.0	105.6	24.7	130.3	65.9	31.2	97.1	93.6	0.0	93.6
30.0	110.1	28.0	138.1	69.2	35.2	104.4	97.4	0.0	97.4
31.0	114.6	31.5	146.1	72.6	39.3	111.8	101.3	0.0	101.3
32.0	119.3	35.0	154.3	76.0	43.5	119.5	105.3	0.0	105.3
33.0	124.1	38.6	162.7	79.6	47.7	127.3	109.3	0.0	109.3
34.0	129.0	42.3	171.3	83.2	52.1	135.3	113.3	0.0	113.3
35.0	134.1	46.1	180.2	86.9	56.6	143.5	117.4	0.0	117.4
36.0	139.2	49.9	189.2	90.7	61.1	151.8	121.6	0.0	121.6

37.0	144.5	53.9	198.4	94.6	65.7	160.3	125.8	0.0	125.8
38.0	149.9	58.0	207.9	98.6	70.5	169.0	130.1	0.0	130.1
39.0	155.4	62.1	217.5	102.7	75.3	177.9	134.4	0.0	134.4
40.0	161.1	66.3	227.4	106.8	80.2	187.0	138.8	0.0	138.8
41.0	166.8	70.7	237.5	111.1	85.2	196.2	143.2	0.0	143.2
42.0	172.7	75.1	247.8	115.4	90.2	205.6	147.6	0.0	147.6
43.0	178.7	78.6	257.3	119.8	95.4	215.2	152.1	0.0	152.1
44.0	184.8	78.6	263.4	124.3	100.7	225.0	156.7	0.0	156.7
45.0	191.0	78.6	269.6	128.9	106.0	234.9	161.3	0.0	161.3
46.0	197.4	69.4	266.8	133.6	111.4	245.0	165.9	2.1	167.9
47.0	203.9	41.9	245.8	138.4	76.7	215.0	170.6	8.2	178.8
48.0	210.4	14.4	224.9	143.2	14.4	157.6	175.3	14.4	189.7
49.0	216.0	14.4	230.4	147.0	14.4	161.5	179.5	14.4	193.9
50.0	221.0	14.4	235.4	149.8	14.4	164.2	183.8	14.4	198.2
51.0	226.5	14.4	240.9	152.5	14.4	167.0	188.0	14.4	202.5
52.0	232.0	14.4	246.4	155.3	14.4	169.7	192.3	14.4	206.8
53.0	237.5	14.4	251.9	158.0	14.4	172.5	196.6	14.4	211.0
54.0	243.0	14.4	257.4	160.8	14.4	175.2	200.9	14.4	215.3
55.0	248.5	14.4	262.9	163.5	14.4	178.0	205.2	14.4	219.6
56.0	254.0	14.4	268.4	166.3	14.4	180.7	209.5	14.4	223.9
57.0	259.5	14.4	273.9	169.0	14.4	183.5	213.8	14.4	228.3
58.0	265.0	14.4	279.4	171.8	14.4	186.2	218.2	14.4	232.6
59.0	270.5	14.4	284.9	174.5	14.4	189.0	222.5	14.4	236.9
60.0	276.0	15.8	291.8	177.3	15.8	193.1	226.9	15.8	242.7

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* API RP-2A (1994) *
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PILE PENETRATION FT.	TOTAL SKIN FRICTION KIP	END BEARING KIP	ULTIMATE CAPACITY KIP
0.00	0.0	3.4*	3.4
1.00	1.5	4.0*	5.5
2.00	3.1	4.8*	7.9
3.00	4.9	5.6*	10.6
4.00	7.0	6.5*	13.5
5.00	9.1	7.5*	16.6
6.00	11.4	8.5*	19.9
7.00	13.7	8.1	21.8
8.00	16.2	3.4	19.5
9.00	18.0	3.8	21.7
10.00	19.1	5.0	24.1
11.00	20.3	6.3	26.5
12.00	21.7	6.3	27.9
13.00	23.4	6.3	29.6
14.00	25.1	7.1	32.1
15.00	26.8	9.6	36.4
16.00	28.6	12.0	40.6
17.00	30.8	12.0	42.8
18.00	33.4	12.0	45.4
19.00	36.0	12.0	48.1
20.00	38.7	12.0	50.7
21.00	41.4	12.0	53.5
22.00	44.2	10.3	54.5
23.00	47.1	5.2	52.2
24.00	49.9	0.0	49.9
25.00	51.4	0.0	51.4
26.00	51.4	0.0	51.4
27.00	51.4	0.0	51.4
28.00	53.2	0.0	53.2
29.00	56.9	0.0	56.9
30.00	60.7	0.0	60.7
31.00	64.7	0.0	64.7
32.00	68.7	0.0	68.7
33.00	72.8	0.0	72.8
34.00	77.0	0.0	77.0
35.00	81.3	0.0	81.3

36.00	85.8	0.0	85.8
37.00	90.3	0.0	90.3
38.00	94.9	0.0	94.9
39.00	99.6	0.0	99.6
40.00	104.5	0.0	104.5
41.00	109.4	0.0	109.4
42.00	114.4	0.0	114.4
43.00	119.6	0.0	119.6
44.00	124.8	0.0	124.8
45.00	130.1	0.0	130.1
46.00	135.6	2.1	137.6
47.00	141.1	8.2	149.4
48.00	146.8	14.4	161.2
49.00	151.7	14.4	166.2
50.00	156.0	14.4	170.4
51.00	160.3	14.4	174.7
52.00	164.6	14.4	179.1
53.00	169.0	14.4	183.4
54.00	173.4	14.4	187.8
55.00	177.8	14.4	192.3
56.00	182.3	14.4	196.7
57.00	186.8	14.4	201.2
58.00	191.4	14.4	205.8
59.00	195.9	14.4	210.4
60.00	200.5	15.8	216.4

AN ASTERISK WILL BE PLACED IN THE END-BEARING COLUMN
IF THE TIP RESISTANCE IS CONTROLLED BY THE FRICTION
OF SOIL PLUG INSIDE AN OPEN-ENDED PIPE PILE.

****
* COMPUTE LOAD-DISTRIBUTION AND LOAD-SETTLEMENT *
* CURVES FOR AXIAL LOADING *
****

T-Z CURVE NO.	NO. OF POINTS	DEPTH TO CURVE FT.	LOAD TRANSFER PSI	PILE MOVEMENT IN.
1	10	0.0000E+00		
			0.0000E+00	0.0000E+00
			0.8395E+00	0.2240E-01
			0.1399E+01	0.4340E-01
			0.2099E+01	0.7980E-01
			0.2519E+01	0.1120E+00
			0.2798E+01	0.1400E+00
			0.2519E+01	0.2800E+00
			0.2519E+01	0.4200E+00
			0.2519E+01	0.7000E+00
			0.2519E+01	0.2800E+01
2	10	0.3275E+01		
			0.0000E+00	0.0000E+00
			0.1146E+01	0.2240E-01
			0.1910E+01	0.4340E-01
			0.2865E+01	0.7980E-01
			0.3438E+01	0.1120E+00
			0.3820E+01	0.1400E+00
			0.3438E+01	0.2800E+00
			0.3438E+01	0.4200E+00
			0.3438E+01	0.7000E+00
			0.3438E+01	0.2800E+01
3	10	0.6458E+01		
			0.0000E+00	0.0000E+00
			0.1340E+01	0.2240E-01
			0.2233E+01	0.4340E-01
			0.3349E+01	0.7980E-01
			0.4019E+01	0.1120E+00

			0.4466E+01	0.1400E+00
			0.4019E+01	0.2800E+00
			0.4019E+01	0.4200E+00
			0.4019E+01	0.7000E+00
			0.4019E+01	0.2800E+01
4	10	0.6500E+01		
			0.0000E+00	0.0000E+00
			0.1340E+01	0.2240E-01
			0.2233E+01	0.4340E-01
			0.3349E+01	0.7980E-01
			0.4019E+01	0.1120E+00
			0.4466E+01	0.1400E+00
			0.4019E+01	0.2800E+00
			0.4019E+01	0.4200E+00
			0.4019E+01	0.7000E+00
			0.4019E+01	0.2800E+01
5	10	0.7025E+01		
			0.0000E+00	0.0000E+00
			0.1389E+01	0.2240E-01
			0.2314E+01	0.4340E-01
			0.3472E+01	0.7980E-01
			0.4166E+01	0.1120E+00
			0.4629E+01	0.1400E+00
			0.4166E+01	0.2800E+00
			0.4166E+01	0.4200E+00
			0.4166E+01	0.7000E+00
			0.4166E+01	0.2800E+01
6	10	0.7458E+01		
			0.0000E+00	0.0000E+00
			0.1389E+01	0.2240E-01
			0.2314E+01	0.4340E-01
			0.3472E+01	0.7980E-01
			0.4166E+01	0.1120E+00
			0.4629E+01	0.1400E+00
			0.4166E+01	0.2800E+00
			0.4166E+01	0.4200E+00
			0.4166E+01	0.7000E+00
			0.4166E+01	0.2800E+01
7	10	0.7500E+01		
			0.0000E+00	0.0000E+00
			0.1389E+01	0.2240E-01
			0.2314E+01	0.4340E-01
			0.3472E+01	0.7980E-01
			0.4166E+01	0.1120E+00
			0.4629E+01	0.1400E+00
			0.4166E+01	0.2800E+00
			0.4166E+01	0.4200E+00
			0.4166E+01	0.7000E+00
			0.4166E+01	0.2800E+01
8	10	0.9025E+01		
			0.0000E+00	0.0000E+00
			0.6445E+00	0.2240E-01
			0.1074E+01	0.4340E-01
			0.1611E+01	0.7980E-01
			0.1933E+01	0.1120E+00
			0.2148E+01	0.1400E+00
			0.1933E+01	0.2800E+00
			0.1933E+01	0.4200E+00
			0.1933E+01	0.7000E+00
			0.1933E+01	0.2800E+01
9	10	0.1046E+02		
			0.0000E+00	0.0000E+00
			0.6627E+00	0.2240E-01
			0.1104E+01	0.4340E-01
			0.1657E+01	0.7980E-01
			0.1988E+01	0.1120E+00
			0.2209E+01	0.1400E+00
			0.1988E+01	0.2800E+00
			0.1988E+01	0.4200E+00
			0.1988E+01	0.7000E+00

			0.1988E+01	0.2800E+01
10	10	0.1050E+02		
			0.0000E+00	0.0000E+00
			0.6627E+00	0.2240E-01
			0.1104E+01	0.4340E-01
			0.1657E+01	0.7980E-01
			0.1988E+01	0.1120E+00
			0.2209E+01	0.1400E+00
			0.1988E+01	0.2800E+00
			0.1988E+01	0.4200E+00
			0.1988E+01	0.7000E+00
			0.1988E+01	0.2800E+01
11	10	0.1303E+02		
			0.0000E+00	0.0000E+00
			0.9736E+00	0.2240E-01
			0.1623E+01	0.4340E-01
			0.2434E+01	0.7980E-01
			0.2921E+01	0.1120E+00
			0.3245E+01	0.1400E+00
			0.2921E+01	0.2800E+00
			0.2921E+01	0.4200E+00
			0.2921E+01	0.7000E+00
			0.2921E+01	0.2800E+01
12	10	0.1546E+02		
			0.0000E+00	0.0000E+00
			0.1018E+01	0.2240E-01
			0.1697E+01	0.4340E-01
			0.2545E+01	0.7980E-01
			0.3054E+01	0.1120E+00
			0.3393E+01	0.1400E+00
			0.3054E+01	0.2800E+00
			0.3054E+01	0.4200E+00
			0.3054E+01	0.7000E+00
			0.3054E+01	0.2800E+01
13	10	0.1550E+02		
			0.0000E+00	0.0000E+00
			0.1018E+01	0.2240E-01
			0.1697E+01	0.4340E-01
			0.2545E+01	0.7980E-01
			0.3054E+01	0.1120E+00
			0.3393E+01	0.1400E+00
			0.3054E+01	0.2800E+00
			0.3054E+01	0.4200E+00
			0.3054E+01	0.7000E+00
			0.3054E+01	0.2800E+01
14	10	0.1952E+02		
			0.0000E+00	0.0000E+00
			0.1527E+01	0.2240E-01
			0.2545E+01	0.4340E-01
			0.3818E+01	0.7980E-01
			0.4582E+01	0.1120E+00
			0.5091E+01	0.1400E+00
			0.4582E+01	0.2800E+00
			0.4582E+01	0.4200E+00
			0.4582E+01	0.7000E+00
			0.4582E+01	0.2800E+01
15	10	0.2346E+02		
			0.0000E+00	0.0000E+00
			0.1635E+01	0.2240E-01
			0.2724E+01	0.4340E-01
			0.4087E+01	0.7980E-01
			0.4904E+01	0.1120E+00
			0.5449E+01	0.1400E+00
			0.4904E+01	0.2800E+00
			0.4904E+01	0.4200E+00
			0.4904E+01	0.7000E+00
			0.4904E+01	0.2800E+01
16	10	0.2350E+02		
			0.0000E+00	0.0000E+00
			0.1635E+01	0.2240E-01

			0.2724E+01	0.4340E-01
			0.4087E+01	0.7980E-01
			0.4904E+01	0.1120E+00
			0.5449E+01	0.1400E+00
			0.4904E+01	0.2800E+00
			0.4904E+01	0.4200E+00
			0.4904E+01	0.7000E+00
			0.4904E+01	0.2800E+01
17	10	0.2502E+02		
			0.0000E+00	0.0000E+00
			0.2168E-05	0.2240E-01
			0.3614E-05	0.4340E-01
			0.5421E-05	0.7980E-01
			0.6505E-05	0.1120E+00
			0.7228E-05	0.1400E+00
			0.6505E-05	0.2800E+00
			0.6505E-05	0.4200E+00
			0.6505E-05	0.7000E+00
			0.6505E-05	0.2800E+01
18	10	0.2646E+02		
			0.0000E+00	0.0000E+00
			0.2168E-05	0.2240E-01
			0.3614E-05	0.4340E-01
			0.5421E-05	0.7980E-01
			0.6505E-05	0.1120E+00
			0.7228E-05	0.1400E+00
			0.6505E-05	0.2800E+00
			0.6505E-05	0.4200E+00
			0.6505E-05	0.7000E+00
			0.6505E-05	0.2800E+01
19	10	0.2650E+02		
			0.0000E+00	0.0000E+00
			0.7228E-06	0.1400E-01
			0.1446E-05	0.2800E-01
			0.2891E-05	0.5600E-01
			0.4337E-05	0.8400E-01
			0.5782E-05	0.1120E+00
			0.6505E-05	0.1260E+00
			0.7228E-05	0.1400E+00
			0.7228E-05	0.7000E+00
			0.7228E-05	0.1400E+01
20	10	0.3702E+02		
			0.0000E+00	0.0000E+00
			0.8766E+00	0.1400E-01
			0.1753E+01	0.2800E-01
			0.3507E+01	0.5600E-01
			0.5260E+01	0.8400E-01
			0.7013E+01	0.1120E+00
			0.7890E+01	0.1260E+00
			0.8766E+01	0.1400E+00
			0.8766E+01	0.7000E+00
			0.8766E+01	0.1400E+01
21	10	0.4746E+02		
			0.0000E+00	0.0000E+00
			0.1069E+01	0.1400E-01
			0.2139E+01	0.2800E-01
			0.4278E+01	0.5600E-01
			0.6416E+01	0.8400E-01
			0.8555E+01	0.1120E+00
			0.9625E+01	0.1260E+00
			0.1069E+02	0.1400E+00
			0.1069E+02	0.7000E+00
			0.1069E+02	0.1400E+01
22	10	0.4750E+02		
			0.0000E+00	0.0000E+00
			0.3208E+01	0.2240E-01
			0.5347E+01	0.4340E-01
			0.8021E+01	0.7980E-01
			0.9625E+01	0.1120E+00
			0.1069E+02	0.1400E+00

			0.9625E+01	0.2800E+00
			0.9625E+01	0.4200E+00
			0.9625E+01	0.7000E+00
			0.9625E+01	0.2800E+01
23	10	0.5452E+02		
			0.0000E+00	0.0000E+00
			0.2523E+01	0.2240E-01
			0.4205E+01	0.4340E-01
			0.6307E+01	0.7980E-01
			0.7569E+01	0.1120E+00
			0.8410E+01	0.1400E+00
			0.7569E+01	0.2800E+00
			0.7569E+01	0.4200E+00
			0.7569E+01	0.7000E+00
			0.7569E+01	0.2800E+01
24	10	0.6146E+02		
			0.0000E+00	0.0000E+00
			0.2622E+01	0.2240E-01
			0.4370E+01	0.4340E-01
			0.6555E+01	0.7980E-01
			0.7866E+01	0.1120E+00
			0.8740E+01	0.1400E+00
			0.7866E+01	0.2800E+00
			0.7866E+01	0.4200E+00
			0.7866E+01	0.7000E+00
			0.7866E+01	0.2800E+01
25	10	0.6150E+02		
			0.0000E+00	0.0000E+00
			0.2622E+01	0.2240E-01
			0.4370E+01	0.4340E-01
			0.6555E+01	0.7980E-01
			0.7866E+01	0.1120E+00
			0.8740E+01	0.1400E+00
			0.7866E+01	0.2800E+00
			0.7866E+01	0.4200E+00
			0.7866E+01	0.7000E+00
			0.7866E+01	0.2800E+01
26	10	0.6828E+02		
			0.0000E+00	0.0000E+00
			0.2622E+01	0.2240E-01
			0.4370E+01	0.4340E-01
			0.6555E+01	0.7980E-01
			0.7866E+01	0.1120E+00
			0.8740E+01	0.1400E+00
			0.7866E+01	0.2800E+00
			0.7866E+01	0.4200E+00
			0.7866E+01	0.7000E+00
			0.7866E+01	0.2800E+01
27	10	0.7496E+02		
			0.0000E+00	0.0000E+00
			0.2622E+01	0.2240E-01
			0.4370E+01	0.4340E-01
			0.6555E+01	0.7980E-01
			0.7866E+01	0.1120E+00
			0.8740E+01	0.1400E+00
			0.7866E+01	0.2800E+00
			0.7866E+01	0.4200E+00
			0.7866E+01	0.7000E+00
			0.7866E+01	0.2800E+01

TIP LOAD KIP	TIP MOVEMENT IN.
0.0000E+00	0.0000E+00
0.9879E+00	0.7000E-02
0.1976E+01	0.1400E-01
0.3952E+01	0.2800E-01
0.7903E+01	0.1820E+00

0.1185E+02	0.5880E+00
0.1423E+02	0.1022E+01
0.1581E+02	0.1400E+01
0.1581E+02	0.2100E+01
0.1581E+02	0.2800E+01

LOAD VERSUS SETTLEMENT CURVE
****

TOP LOAD KIP	TOP MOVEMENT IN.	TIP LOAD KIP	TIP MOVEMENT IN.
0.3389E+00	0.3288E-03	0.1411E-01	0.1000E-03
0.3389E+01	0.3288E-02	0.1411E+00	0.1000E-02
0.1703E+02	0.1646E-01	0.7056E+00	0.5000E-02
0.3360E+02	0.3294E-01	0.1411E+01	0.1000E-01
0.1184E+03	0.1397E+00	0.4516E+01	0.5000E-01
0.1735E+03	0.2425E+00	0.5799E+01	0.1000E+00
0.1879E+03	0.6604E+00	0.1100E+02	0.5000E+00
0.1910E+03	0.1165E+01	0.1411E+02	0.1000E+01
0.1927E+03	0.2167E+01	0.1581E+02	0.2000E+01

LPILE ANALYSES

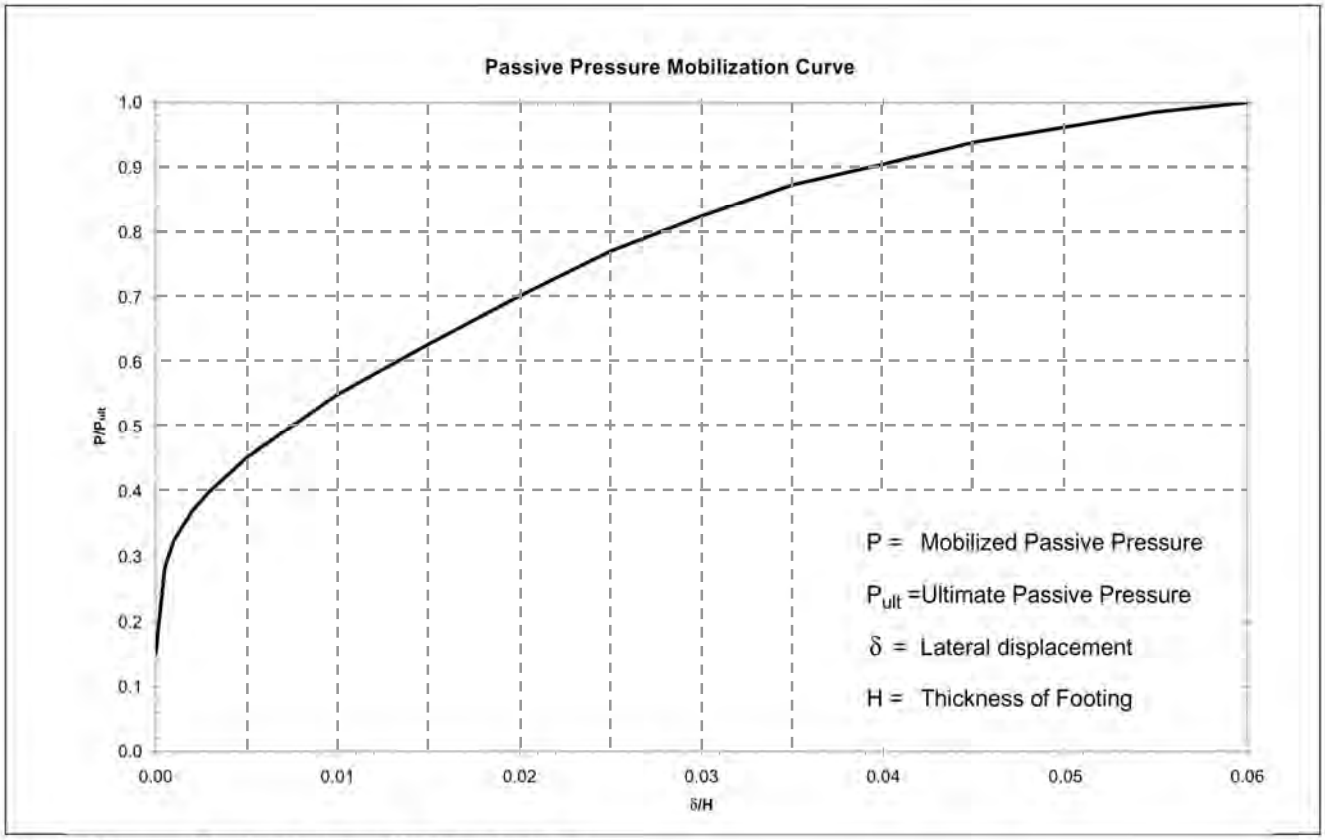
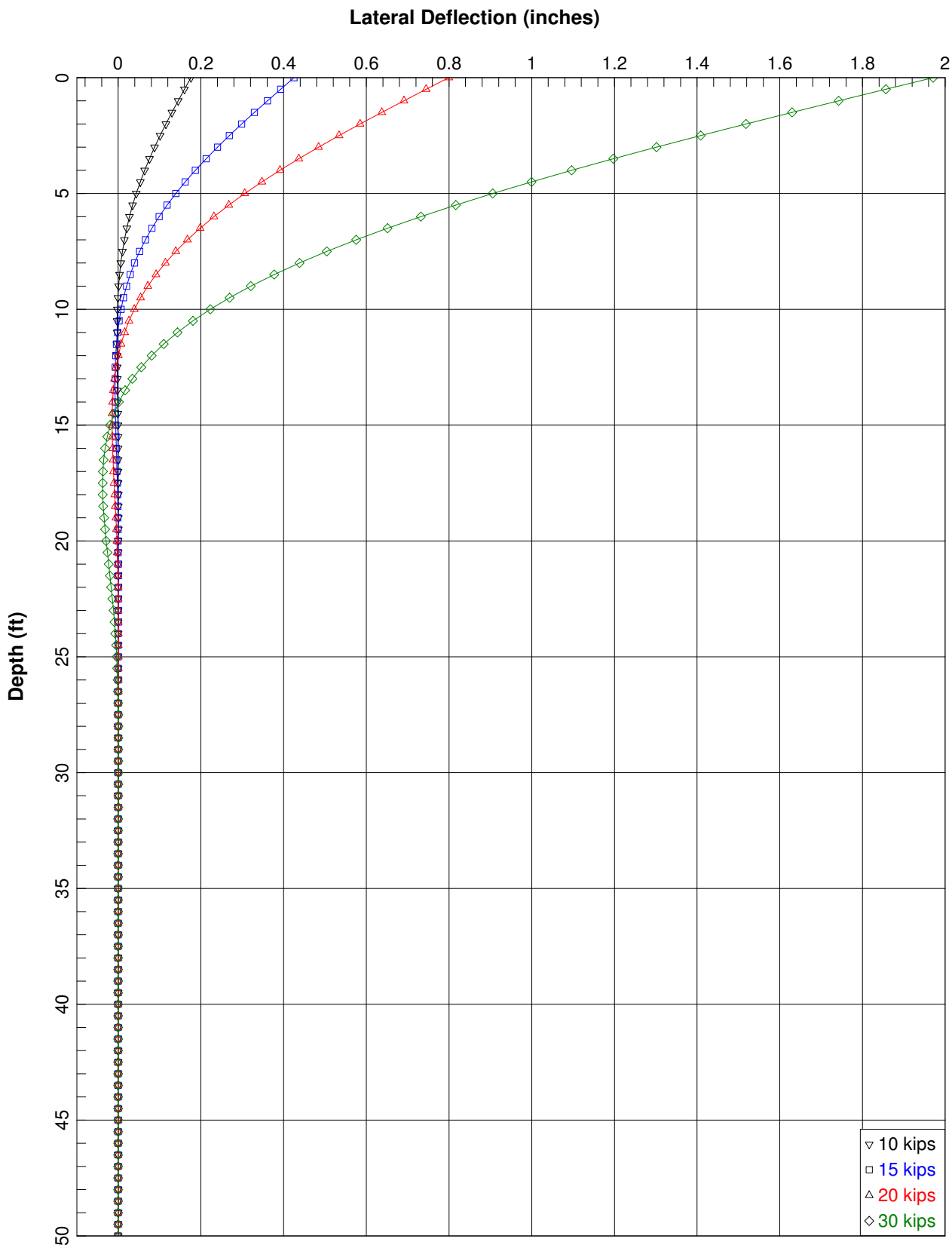


Figure 4-6 Passive Pressure Mobilization Curve

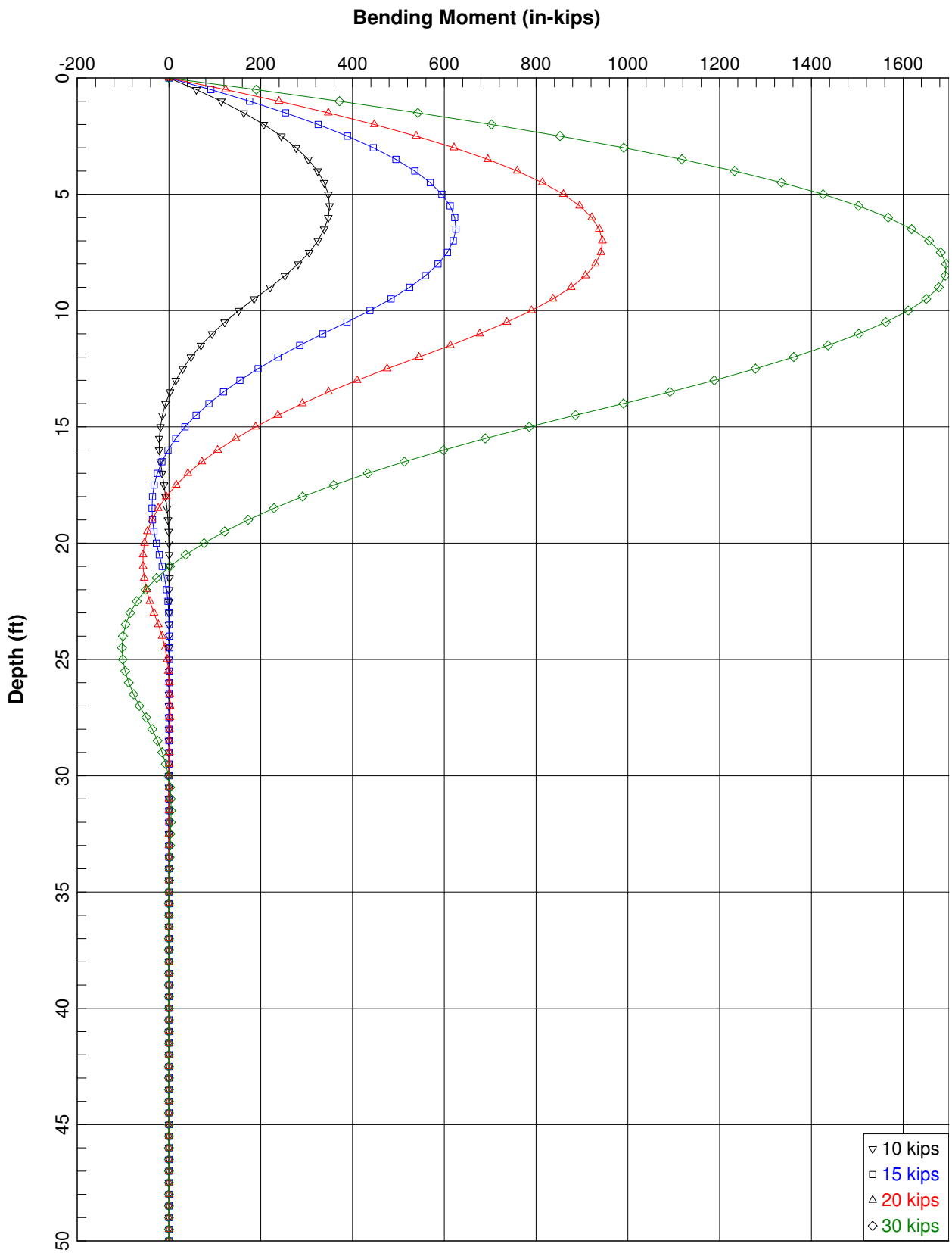
Reference: Chapter 4, Foundation and Geologic Site Hazards, FEMA 356, November 2000

For San Leandro Creek Bridge and Overhead (Widen), the recommened passive resistance against the vertical side of the pile caps is 3.5 ksf. This is a uniformly distributed resistance for seismic & ultimate condition.

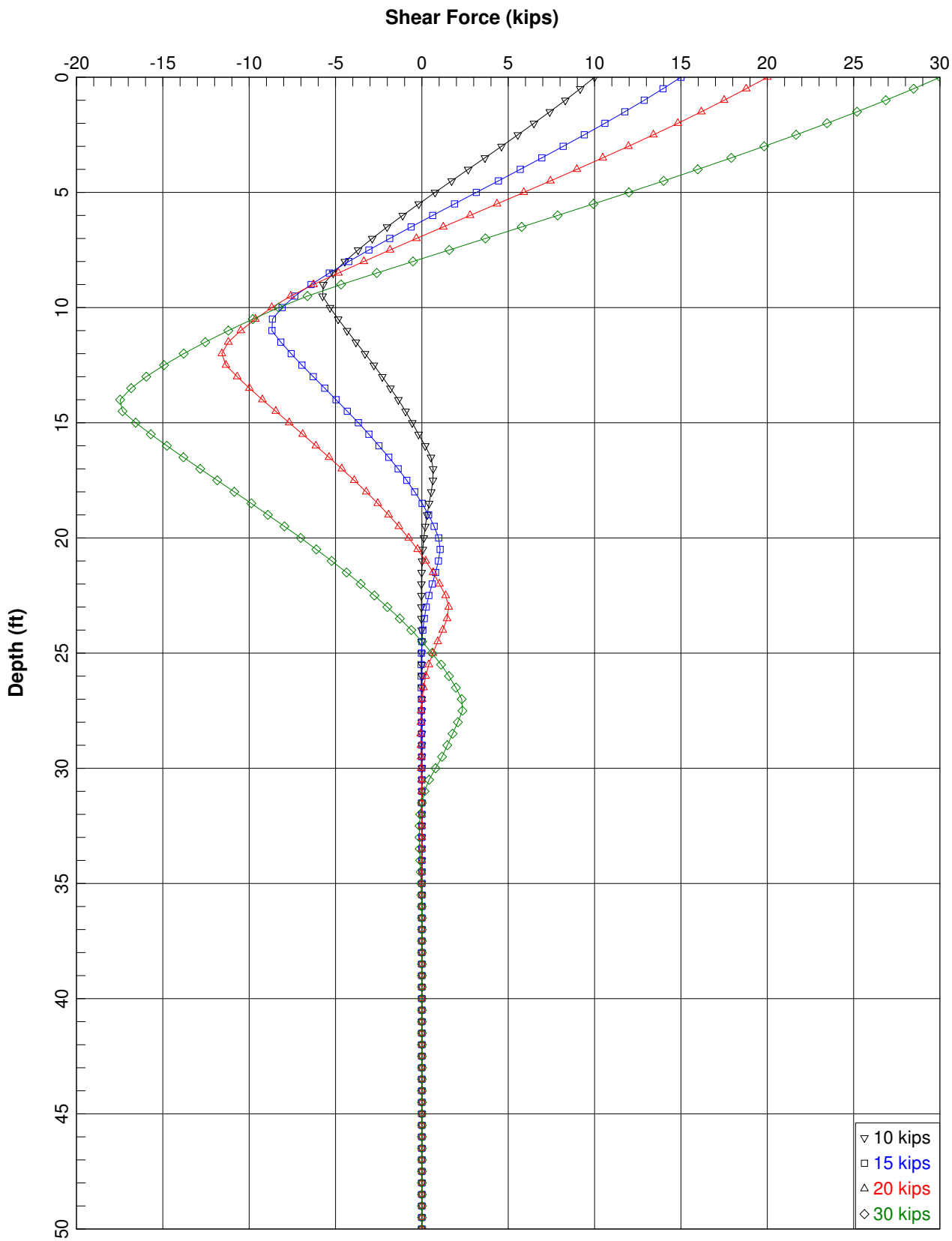
PASSIVE PRESSURE MOBILIZATION AGAINST PILE CAPS



SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1



SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1



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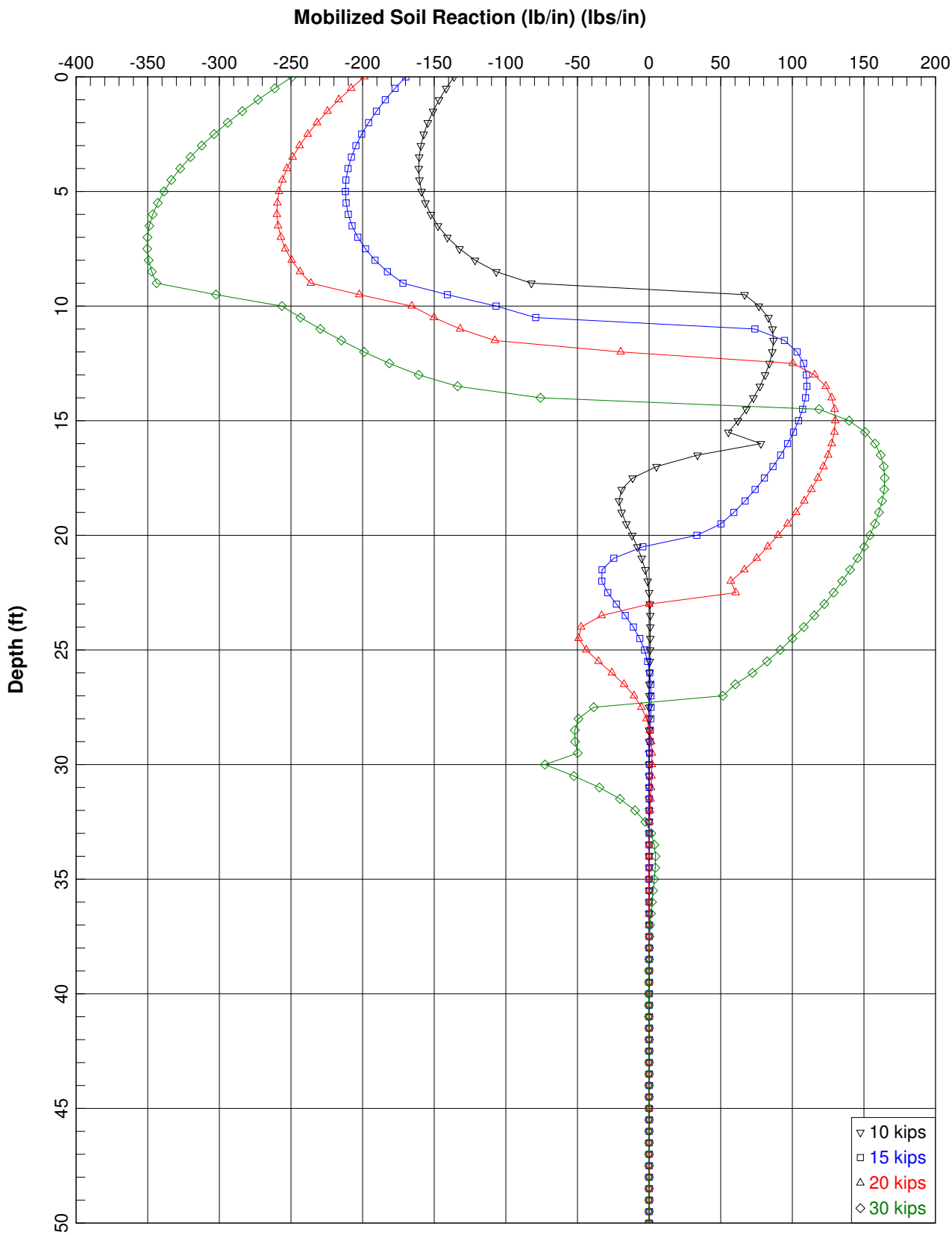

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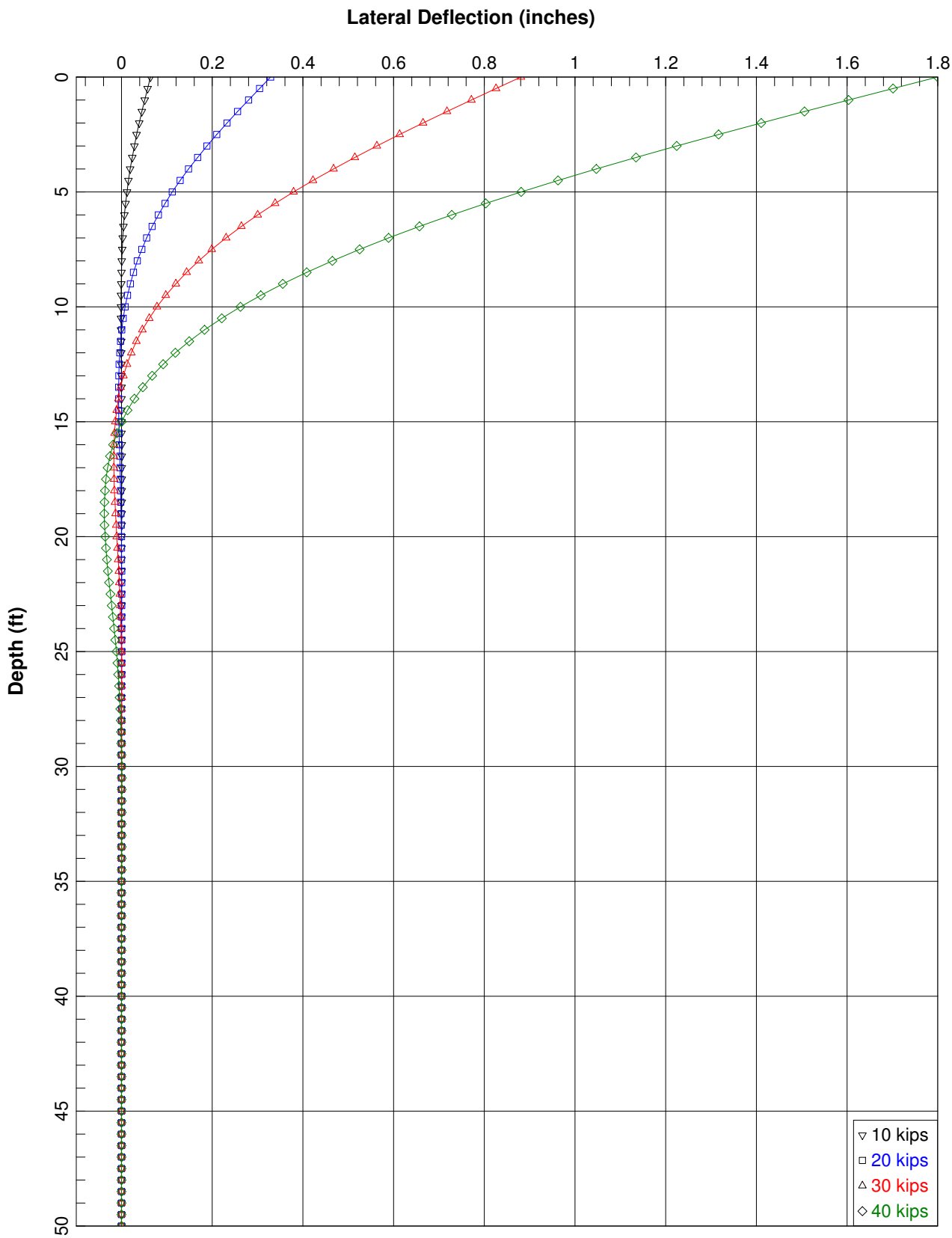
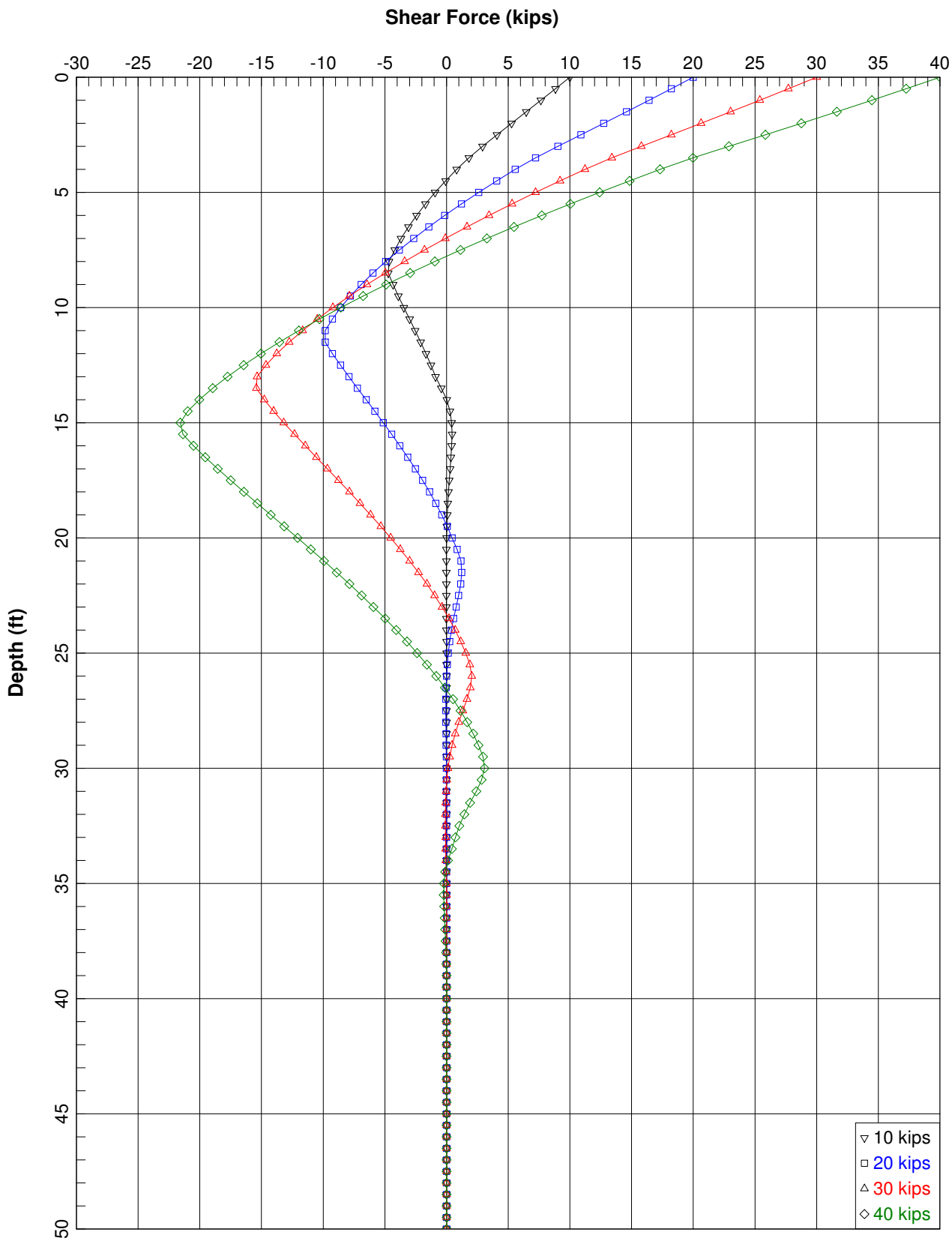


SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4



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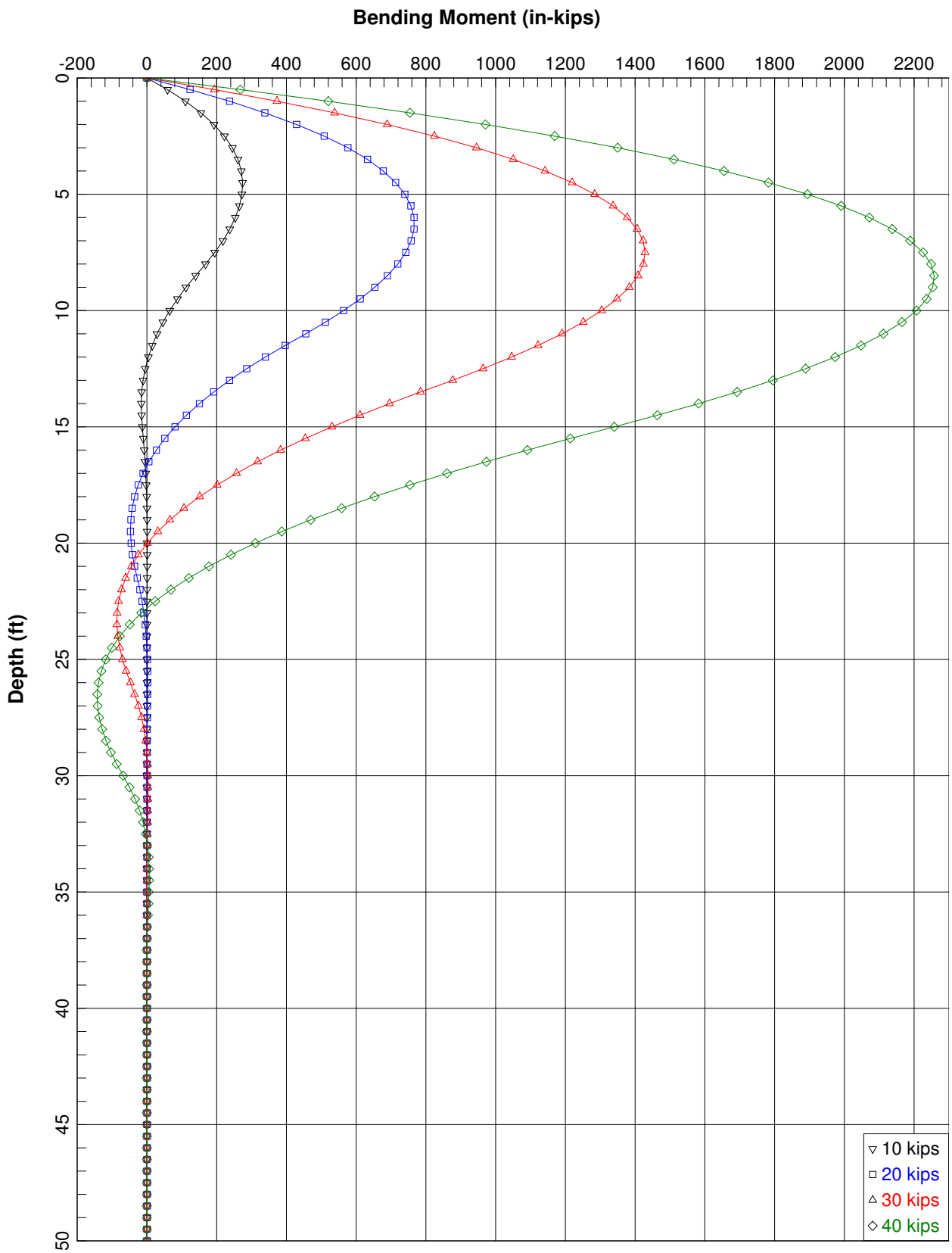

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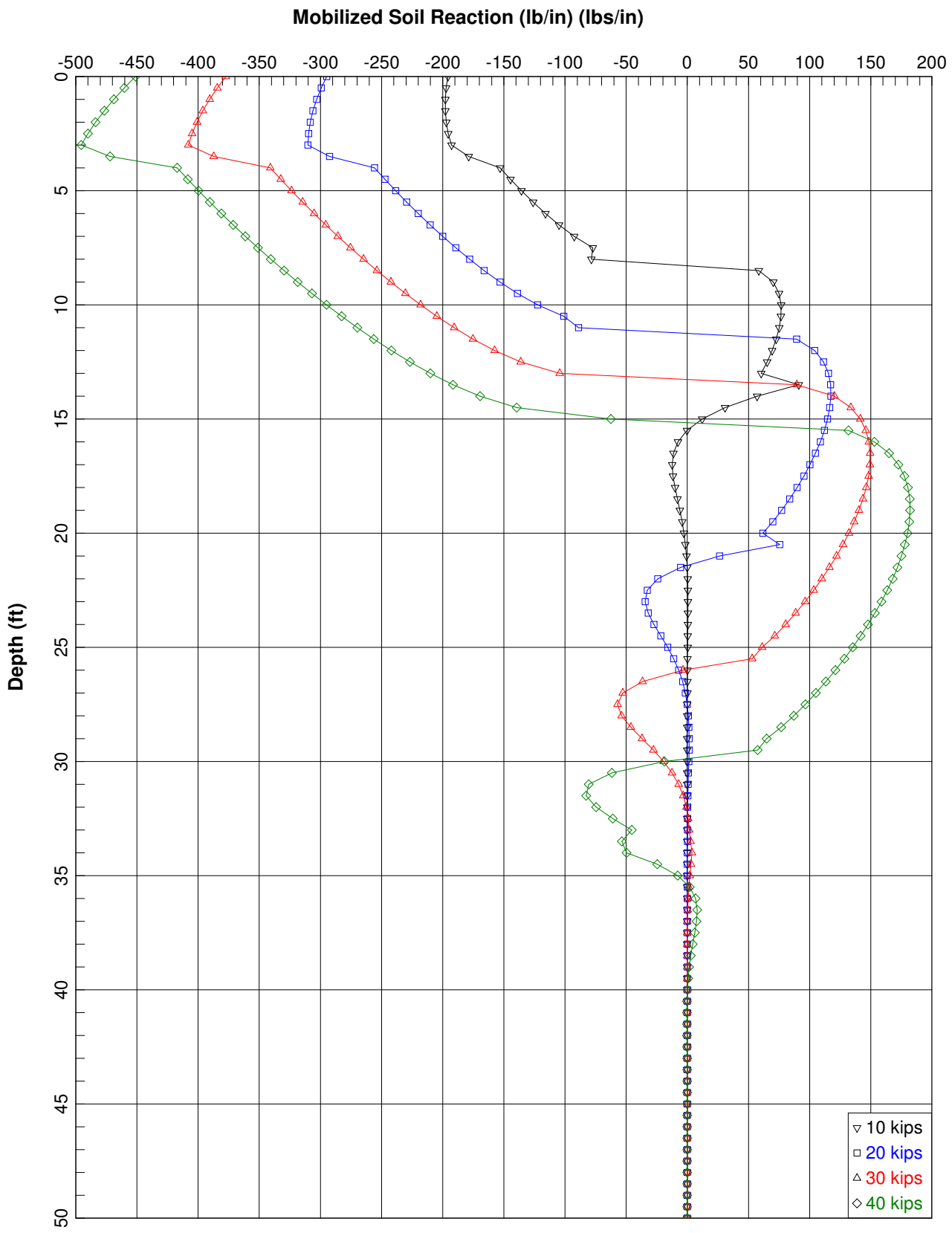
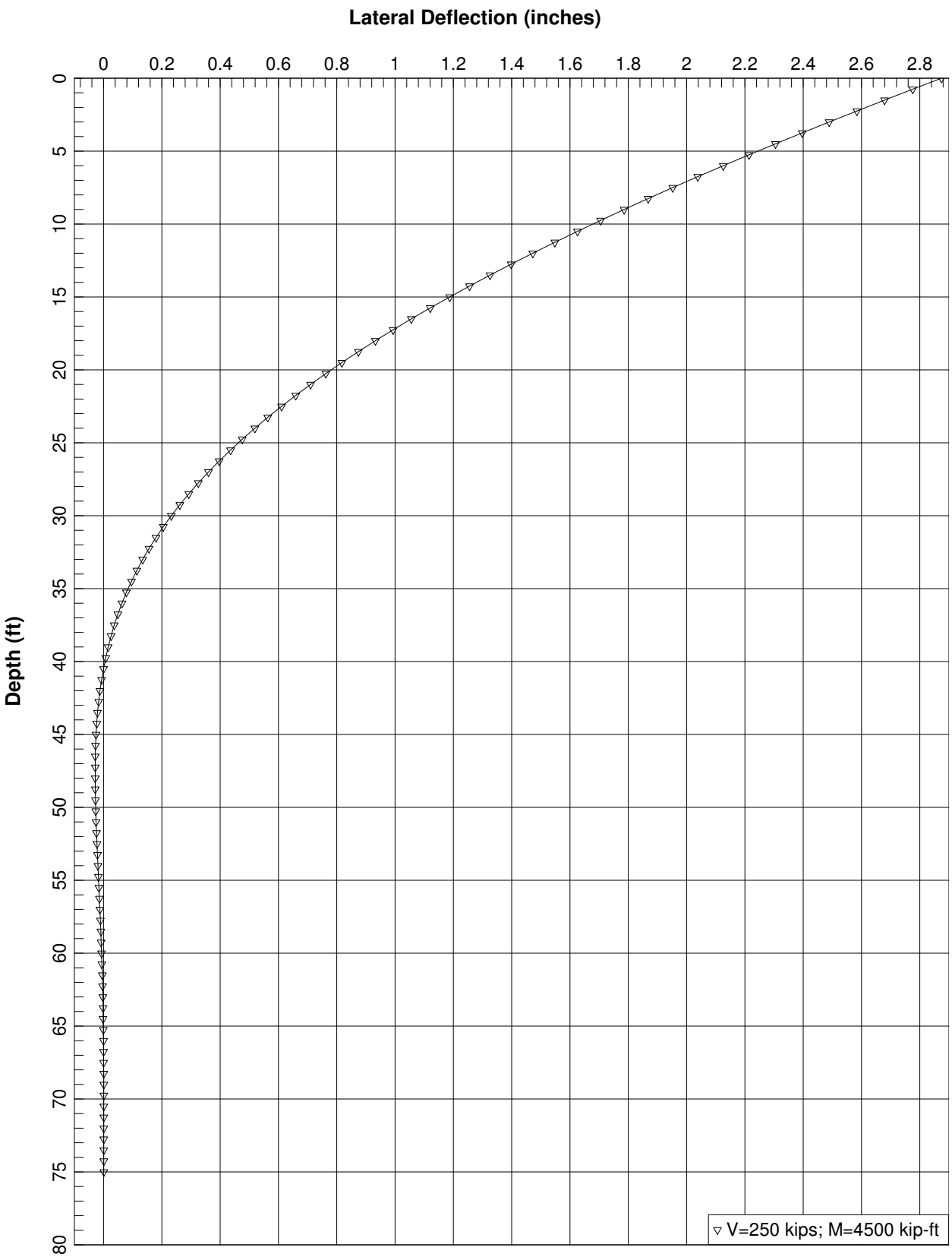
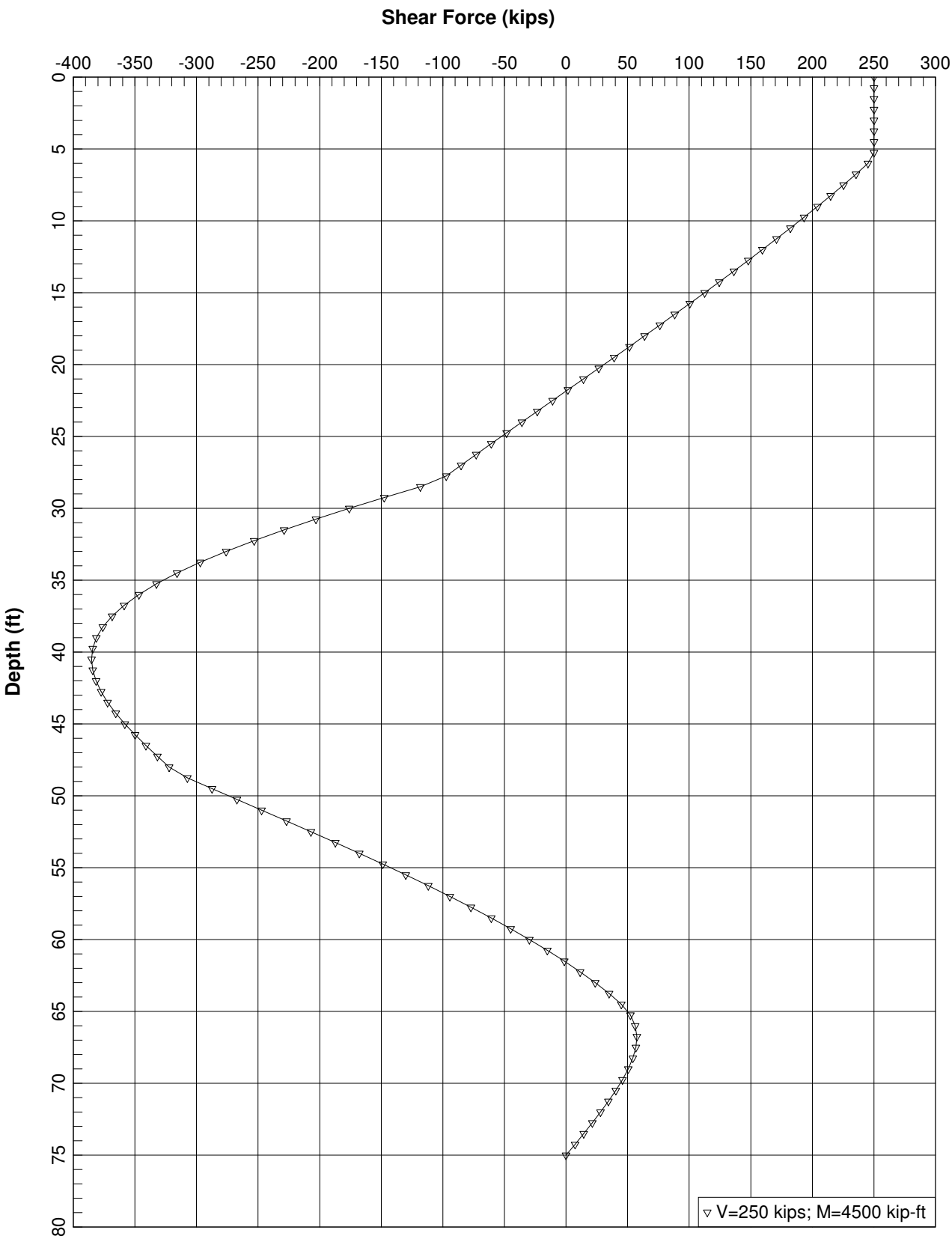


SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4



SAN LEANDRO CREEK BOH (WIDEN) - BENT 5



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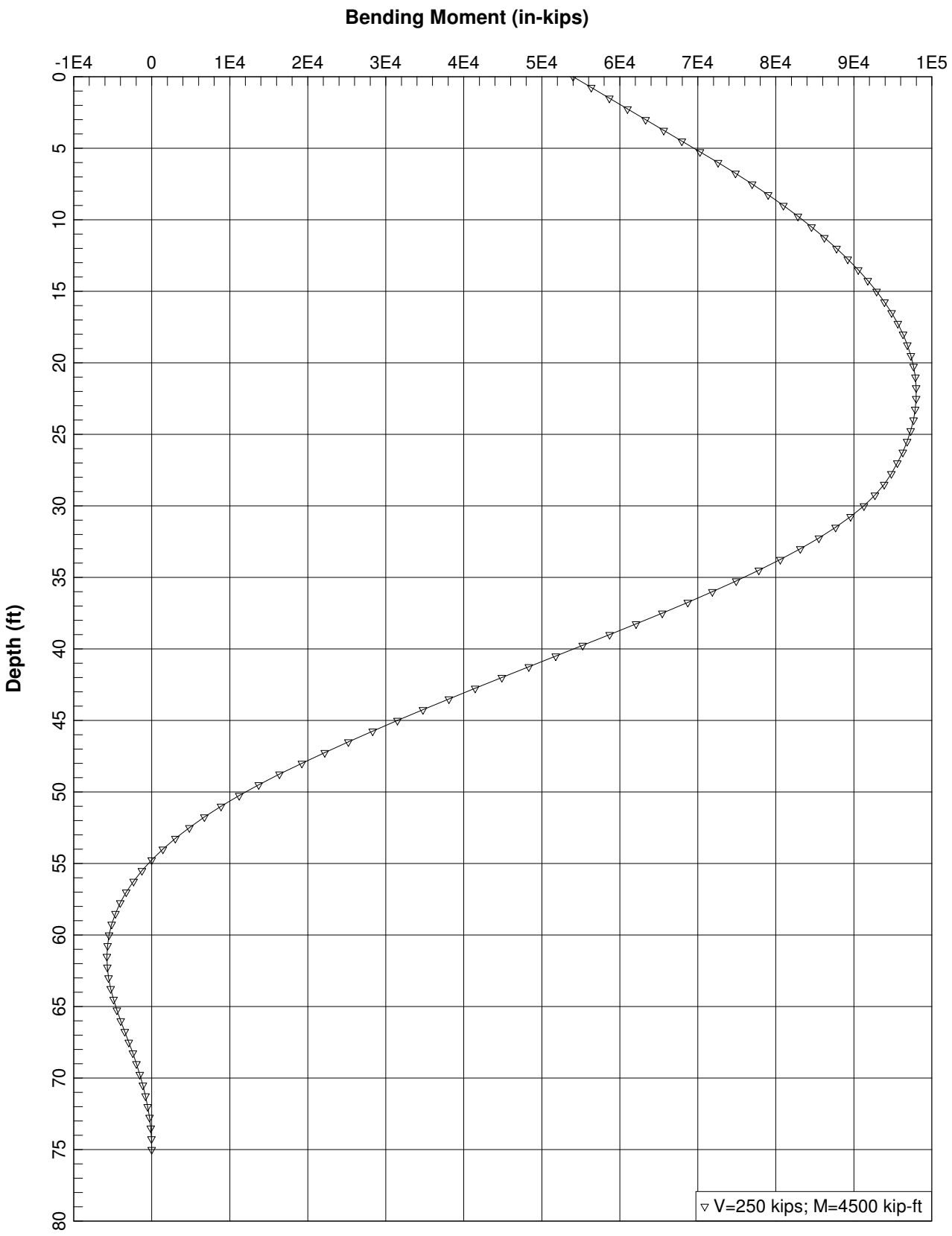

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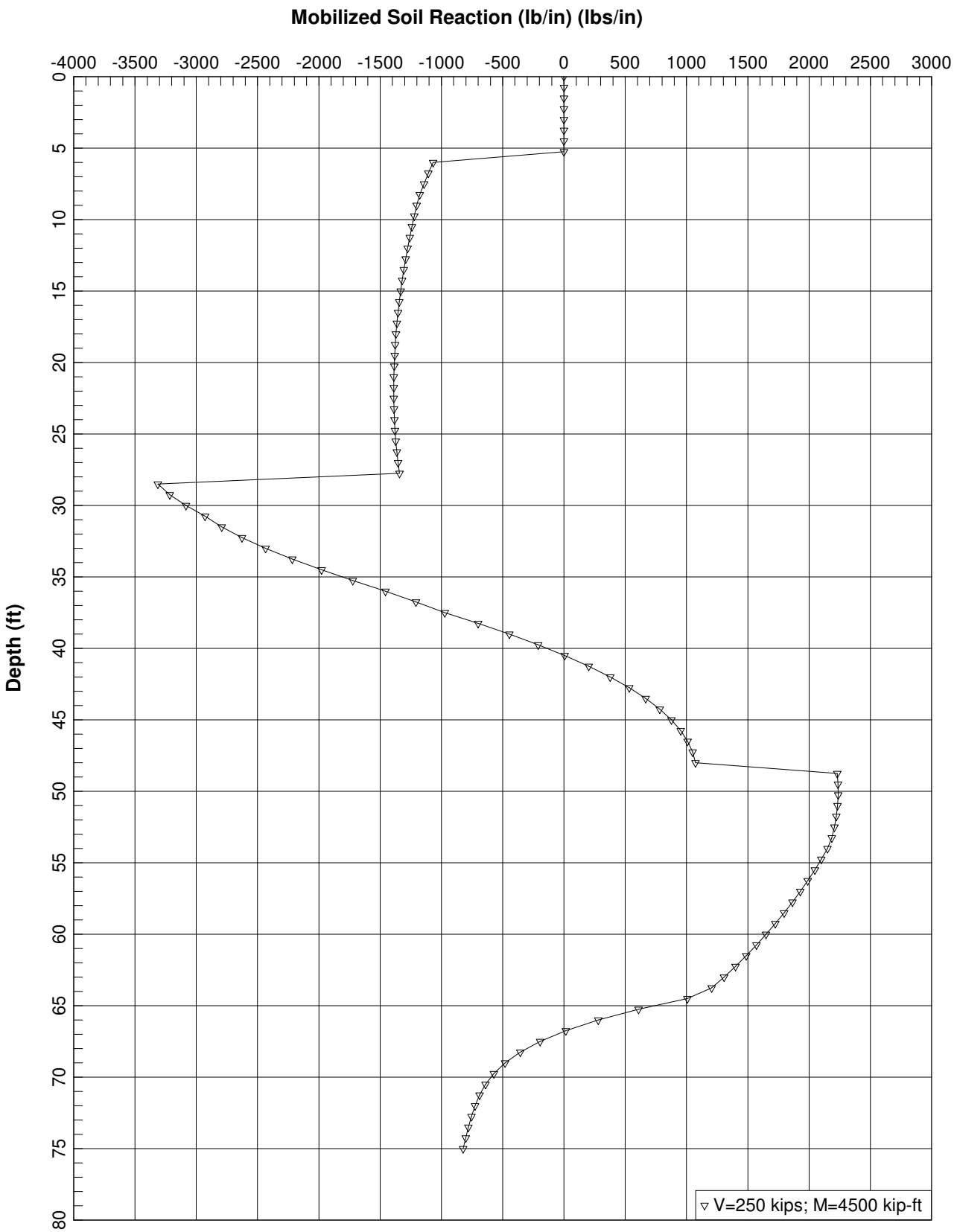

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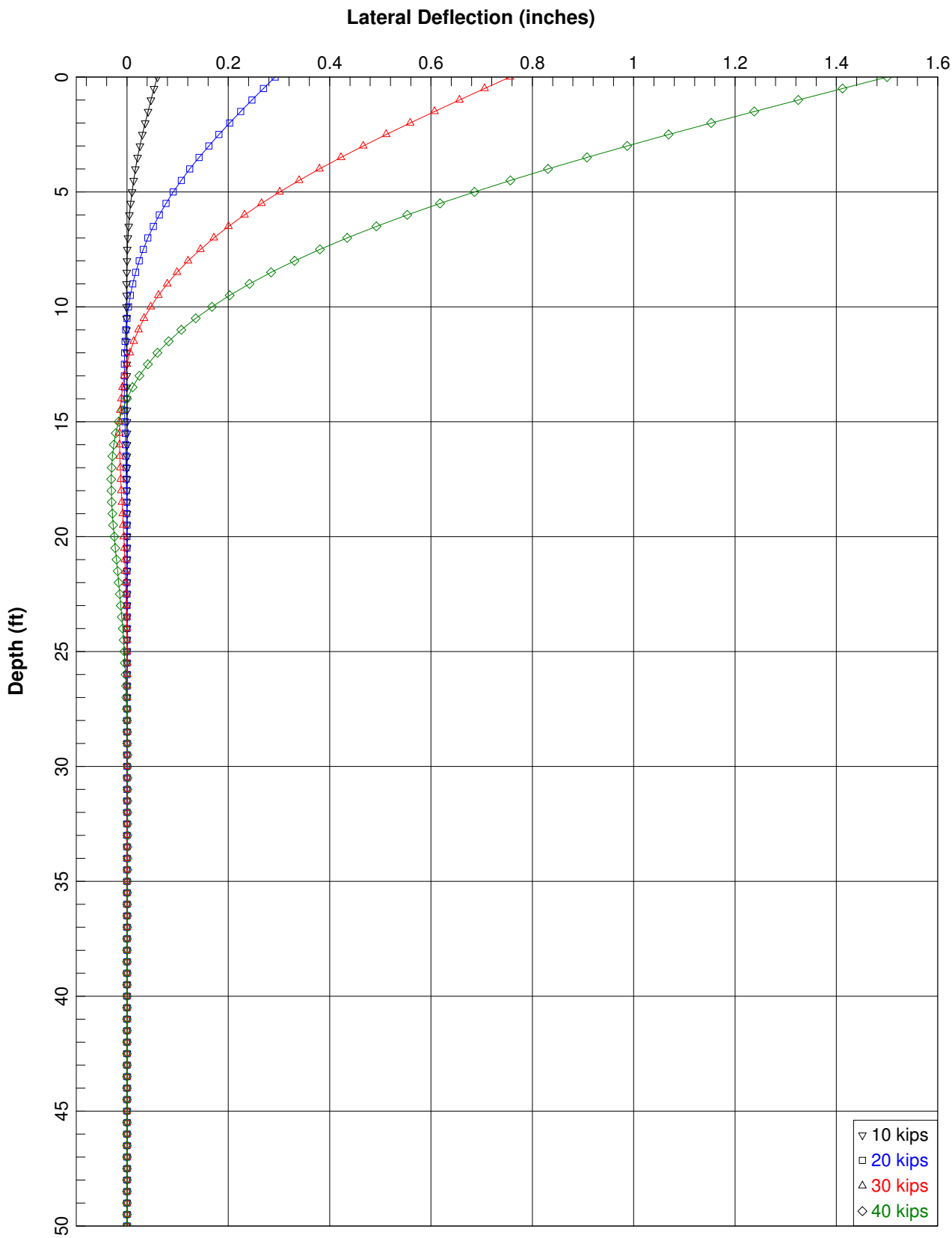
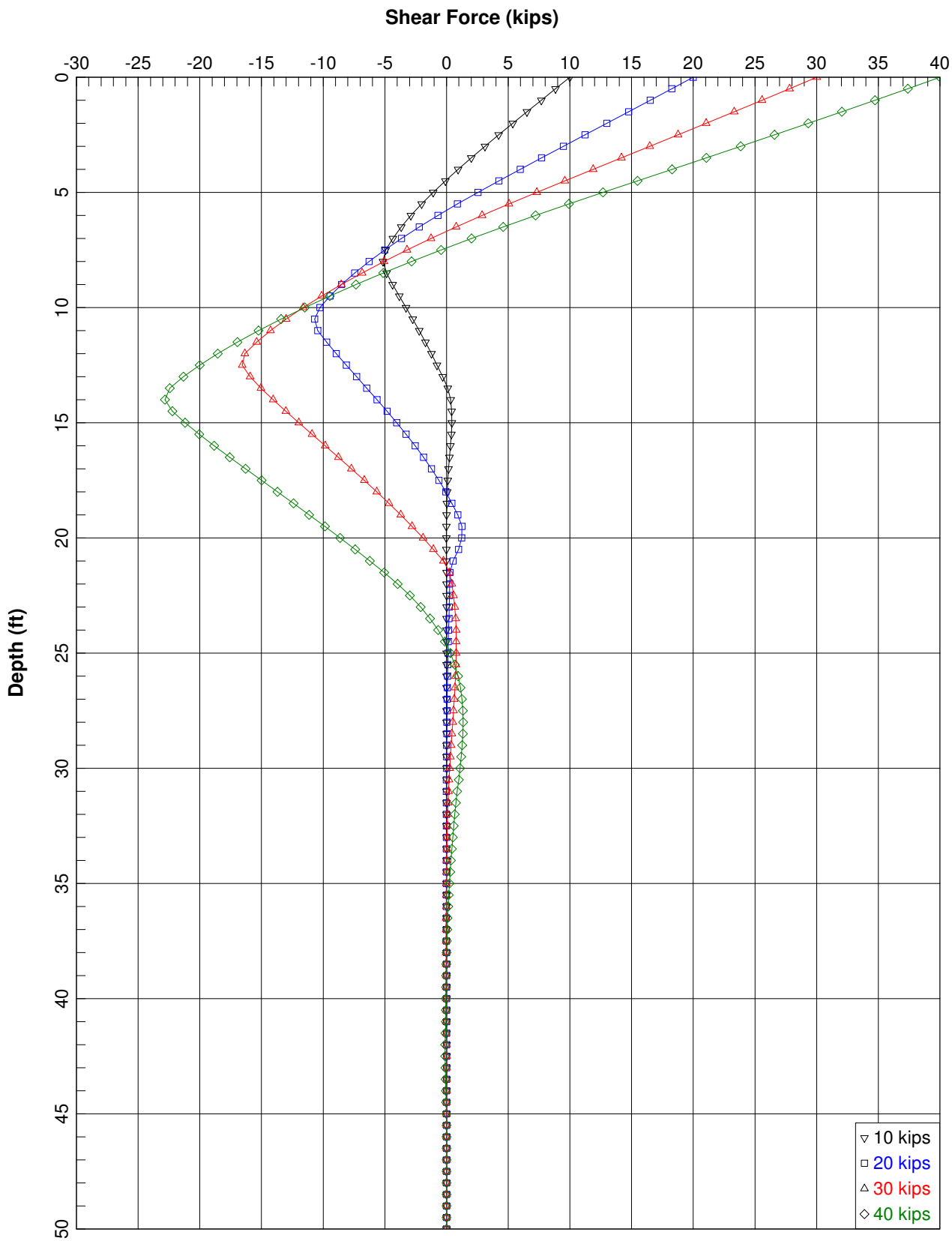


SAN LEANDRO CREEK BOH (WIDEN) - BENTS 6 THRU 8



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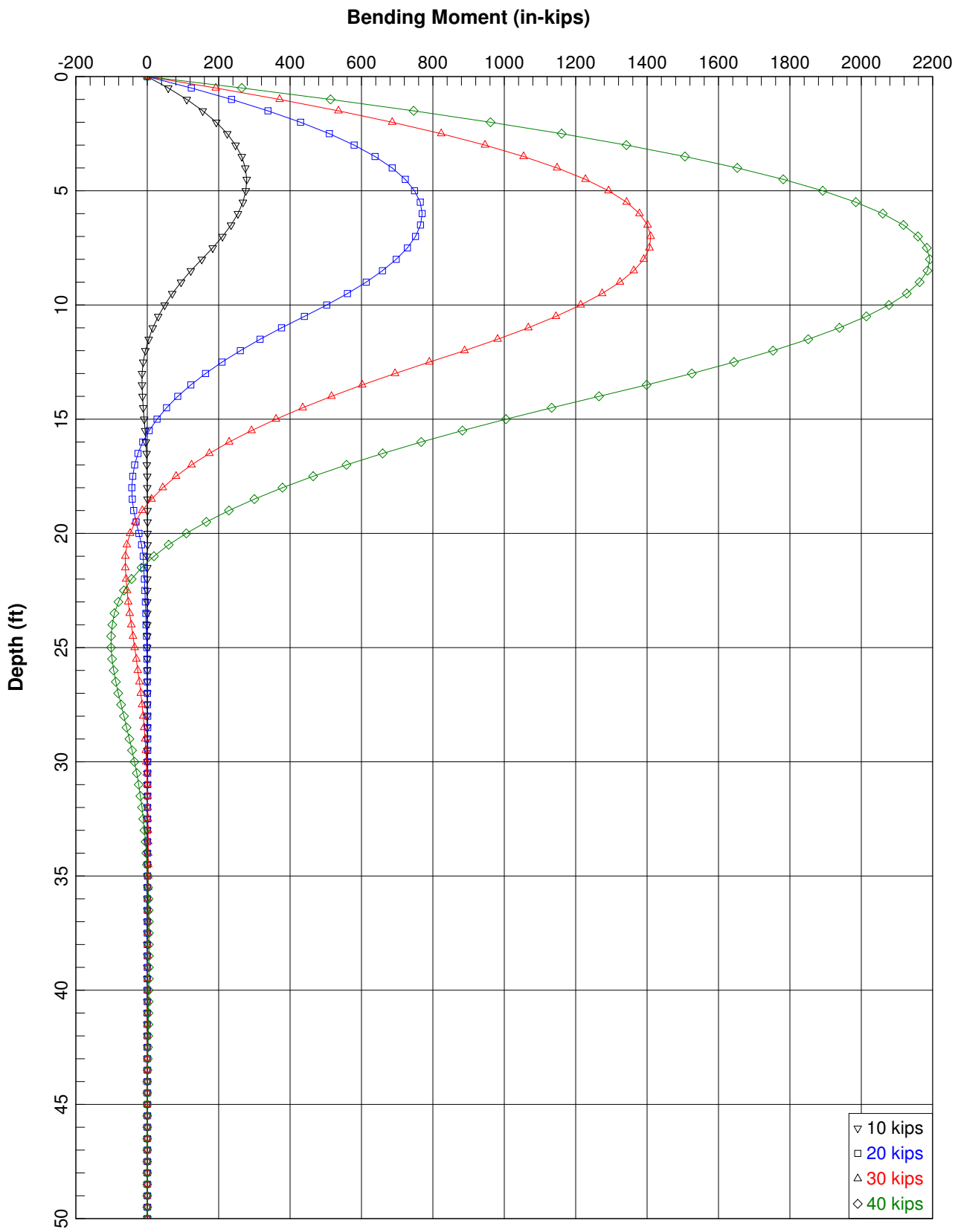

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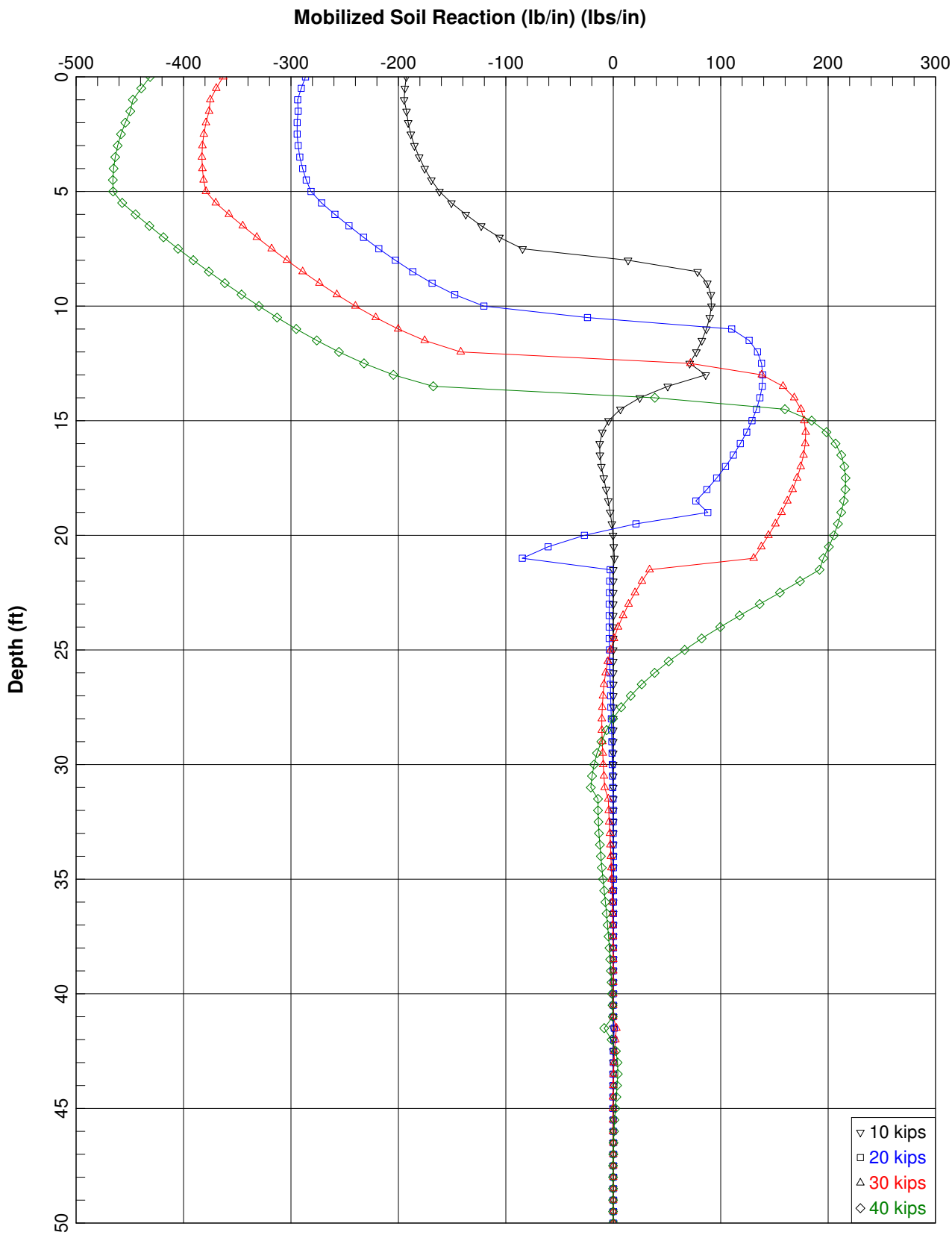

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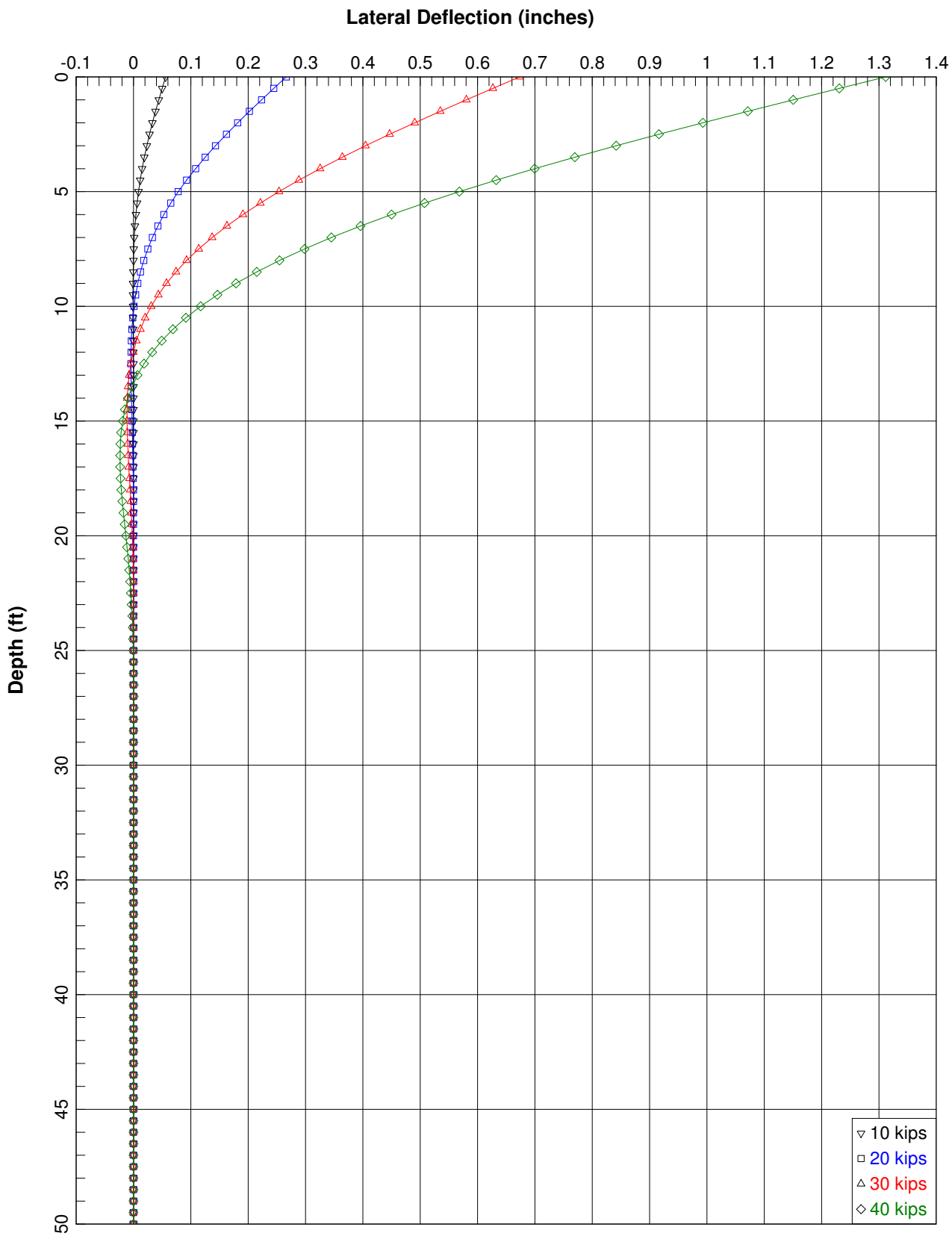
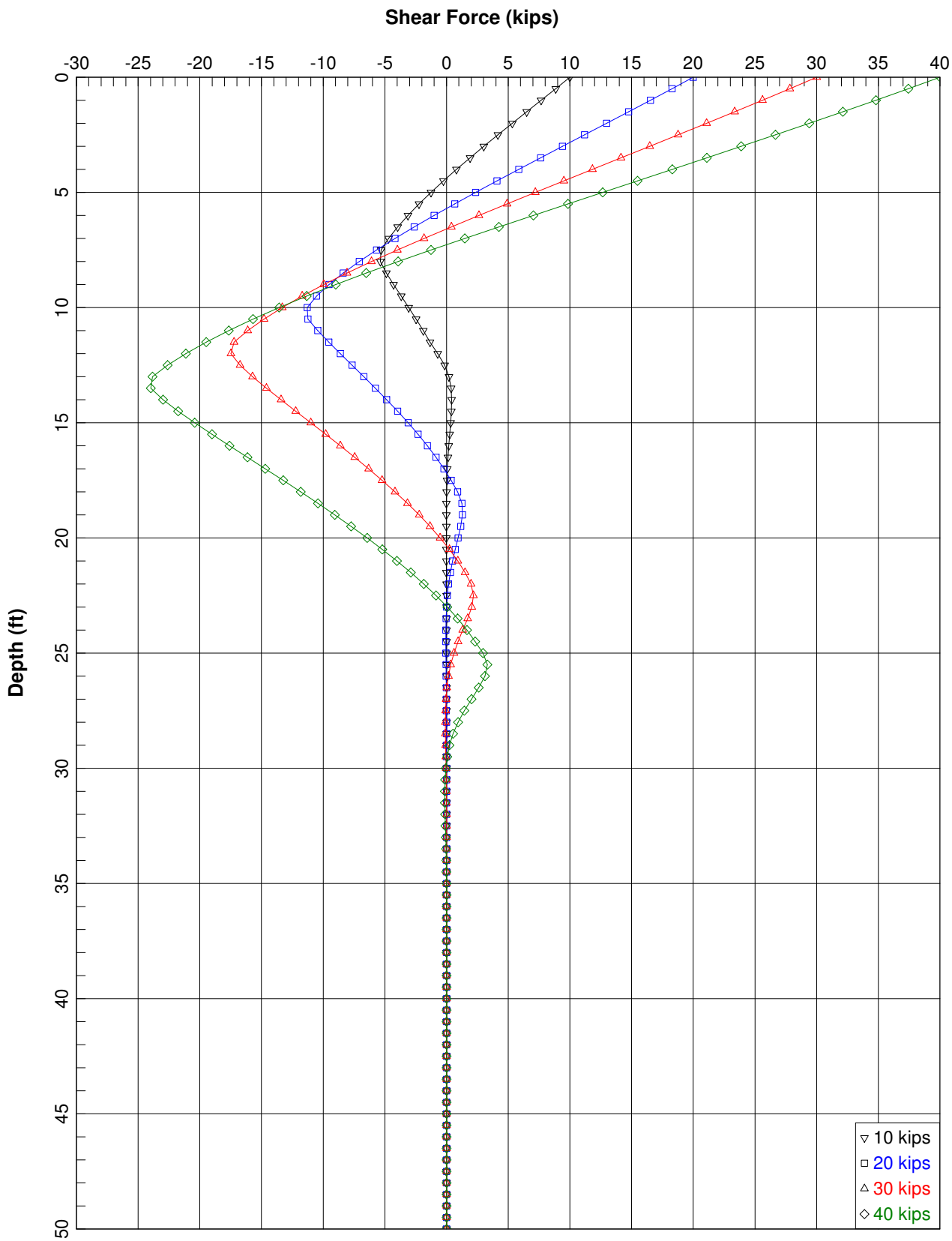


SAN LEANDRO CREEK BOH (WIDEN) - BENTS 9 & 10



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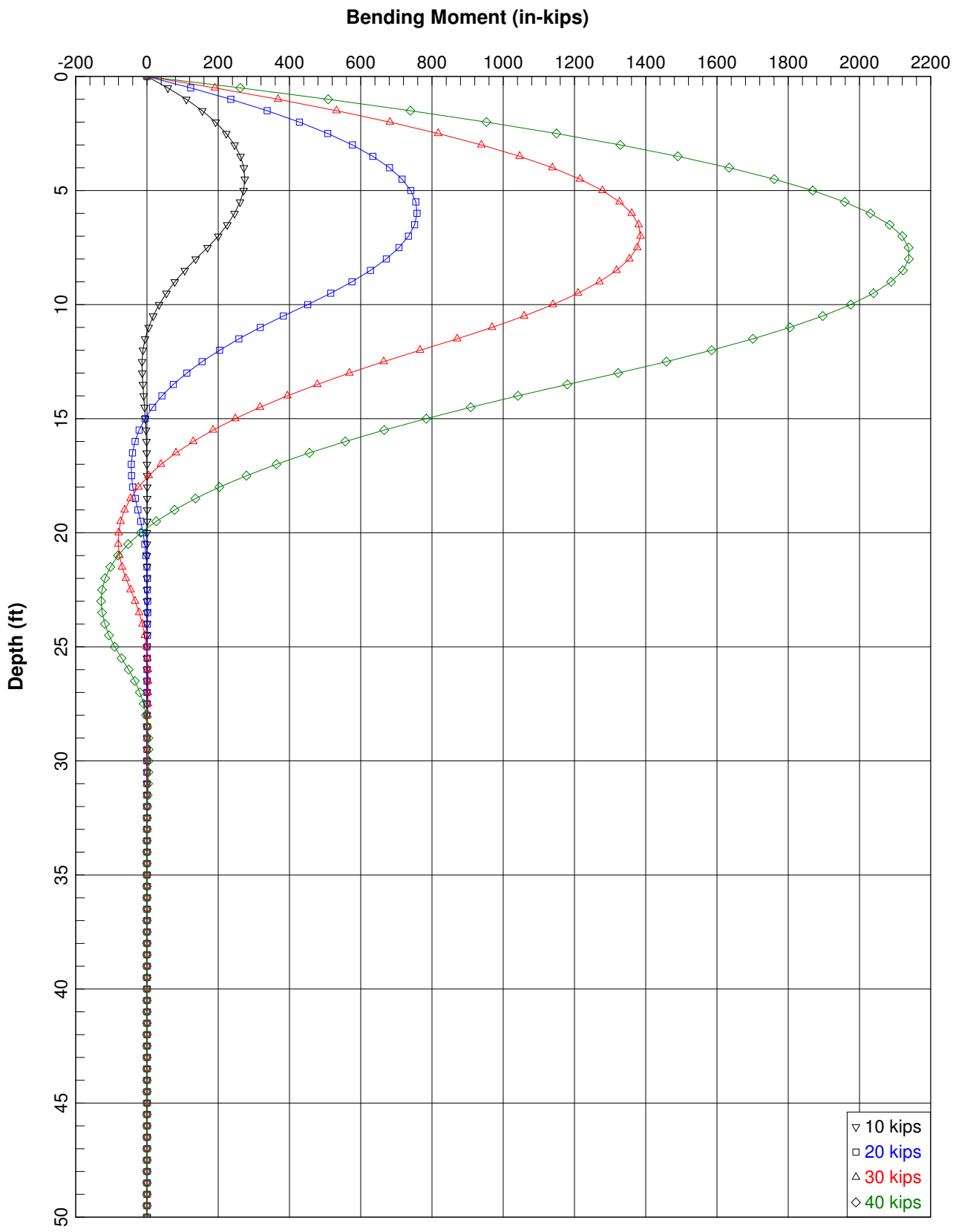

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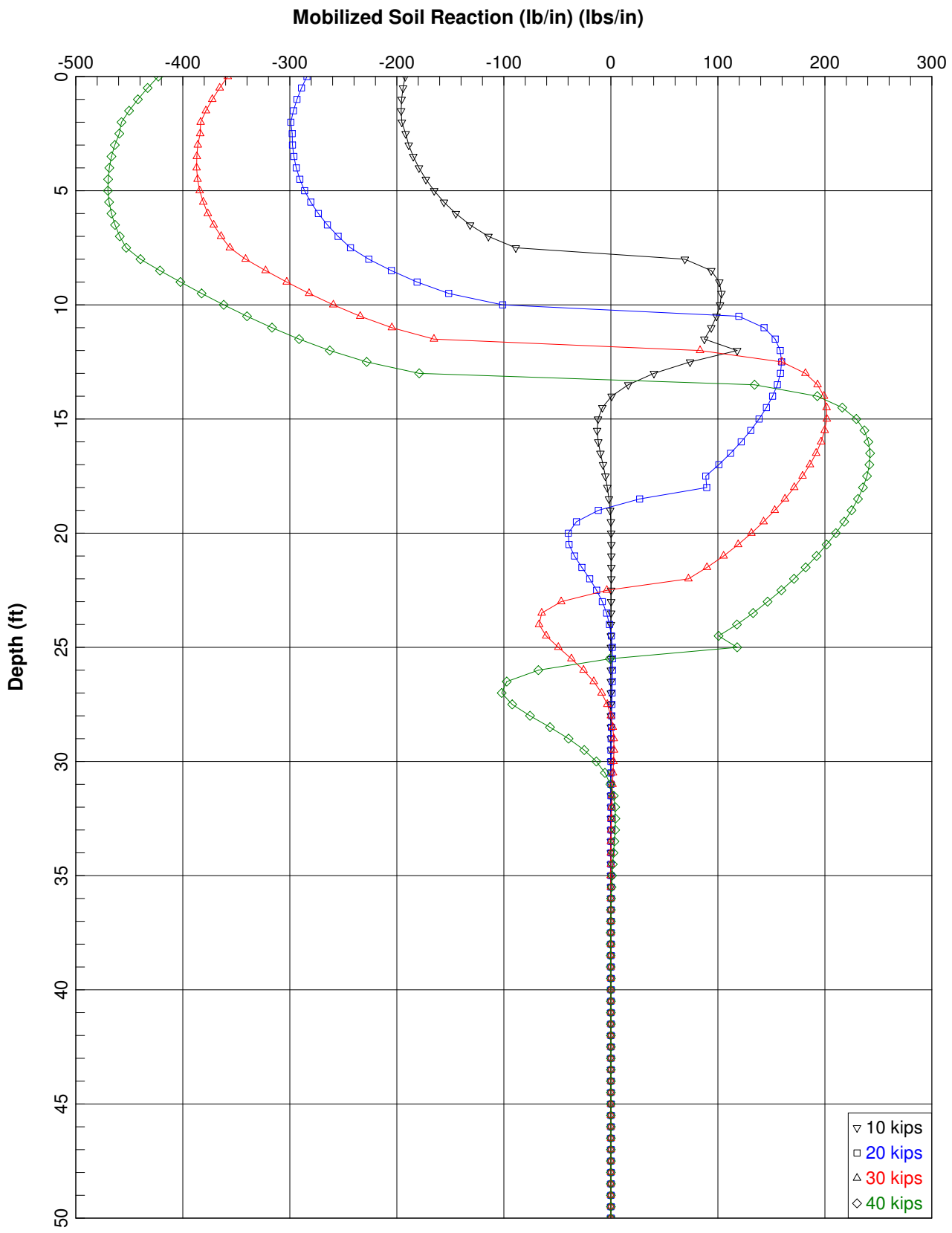

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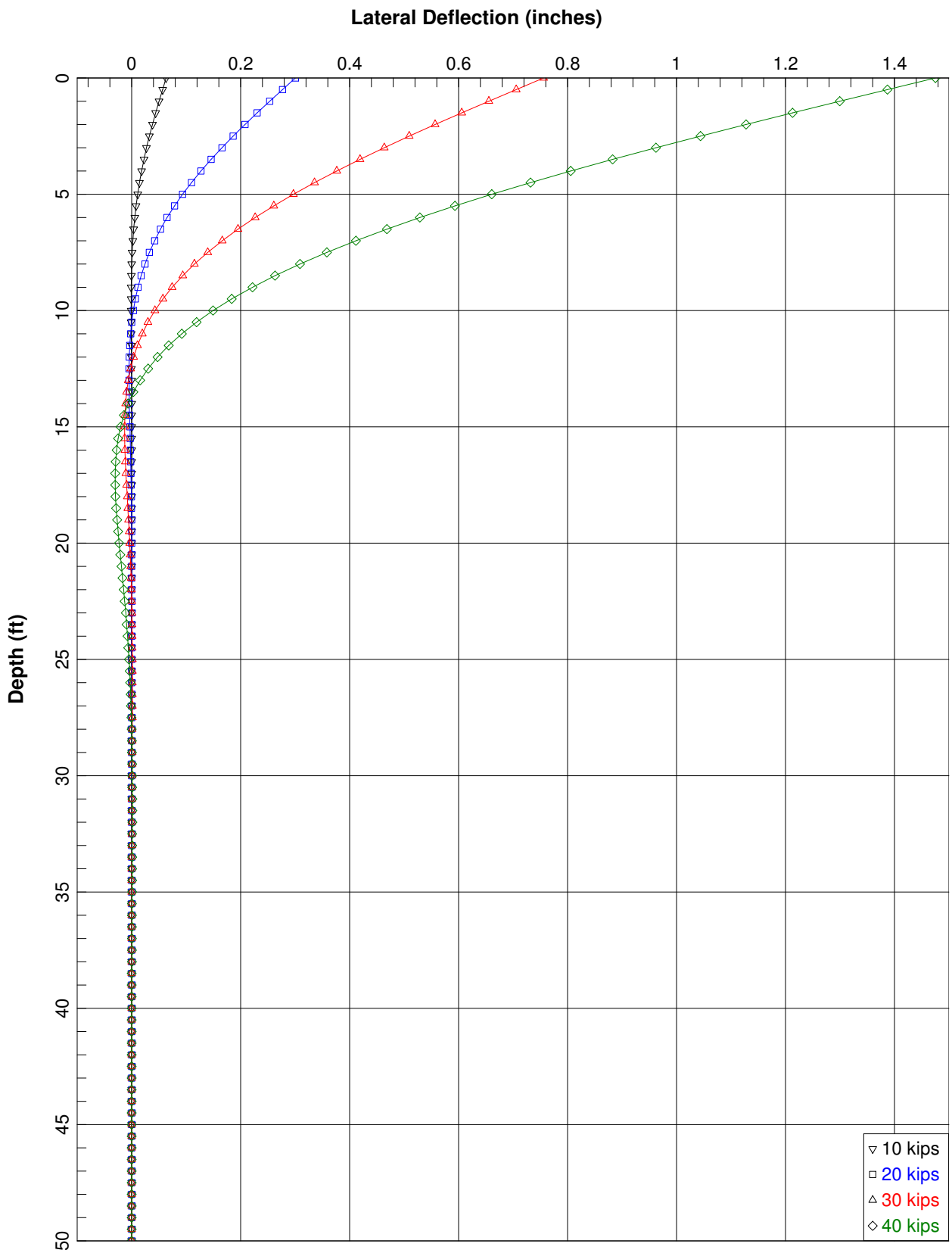
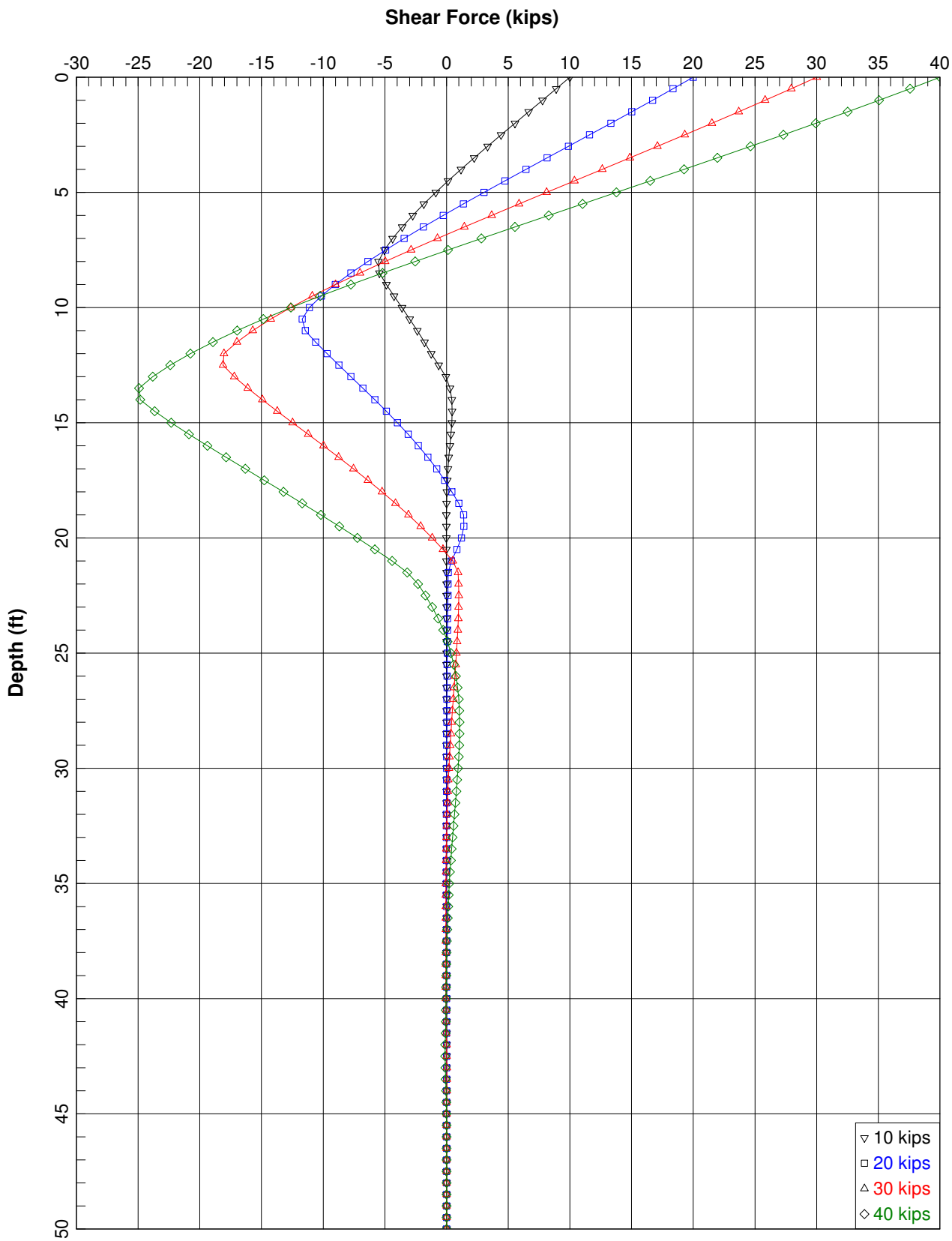


SAN LEANDRO CREEK BOH (WIDEN) - BENTS 11 THRU 15



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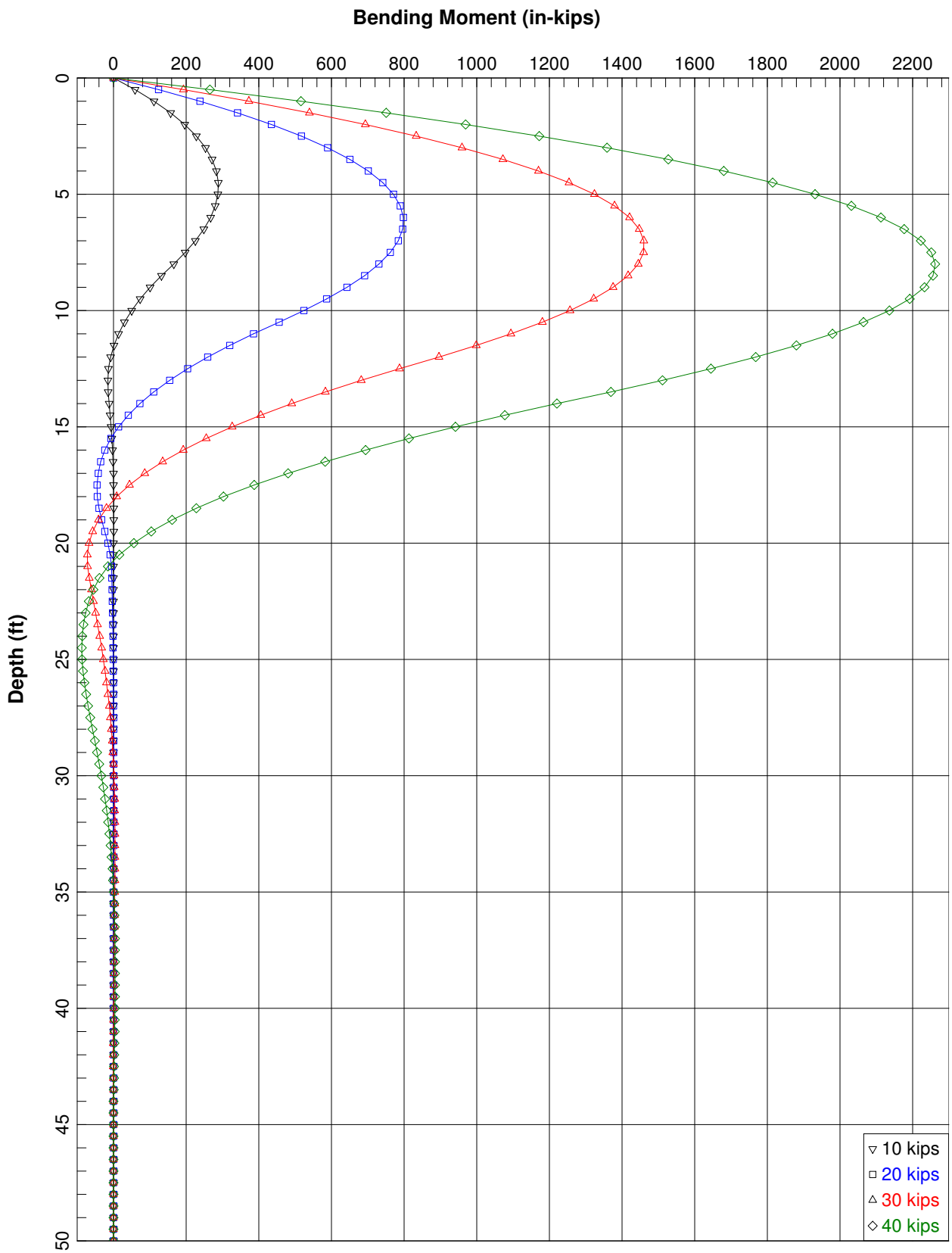

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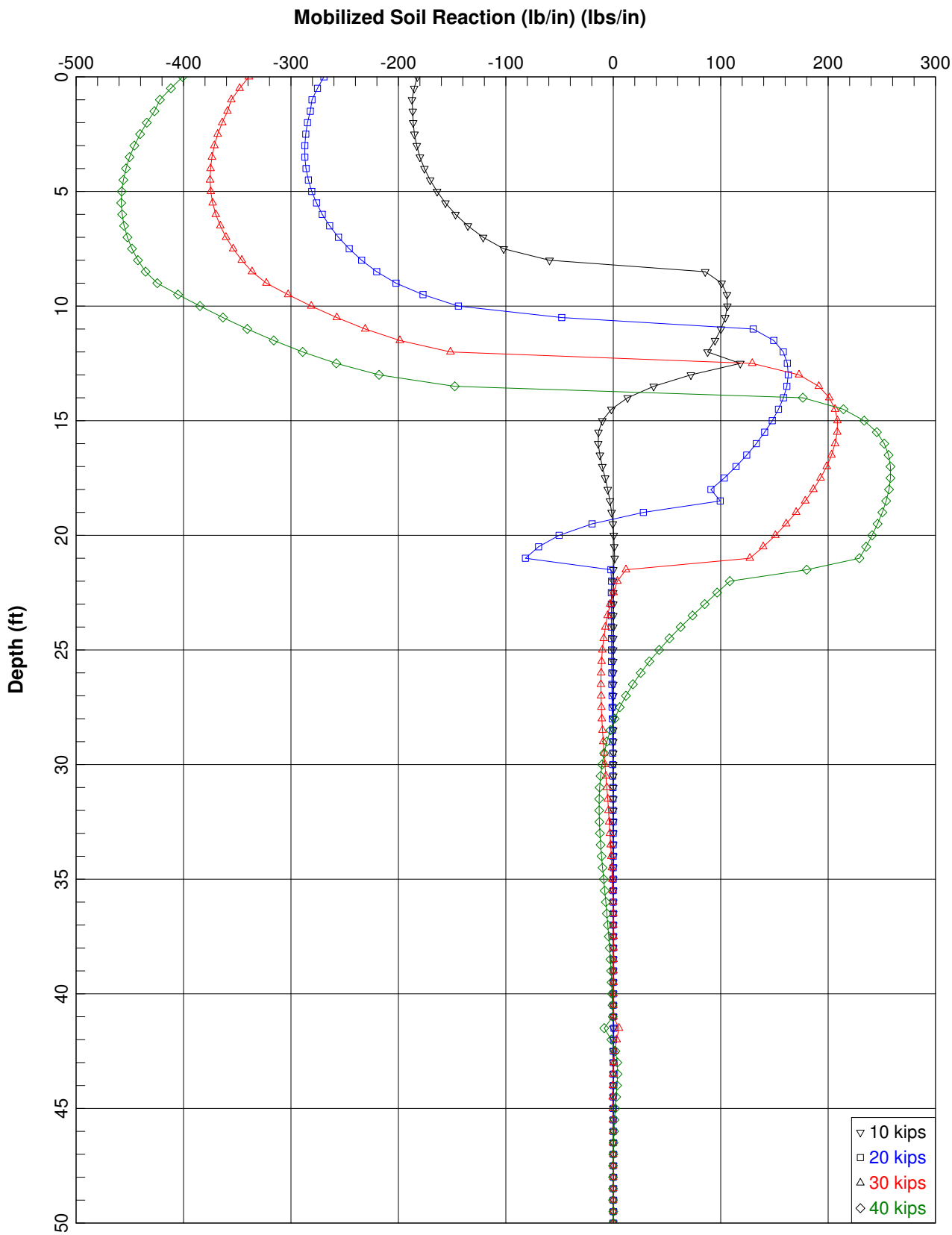

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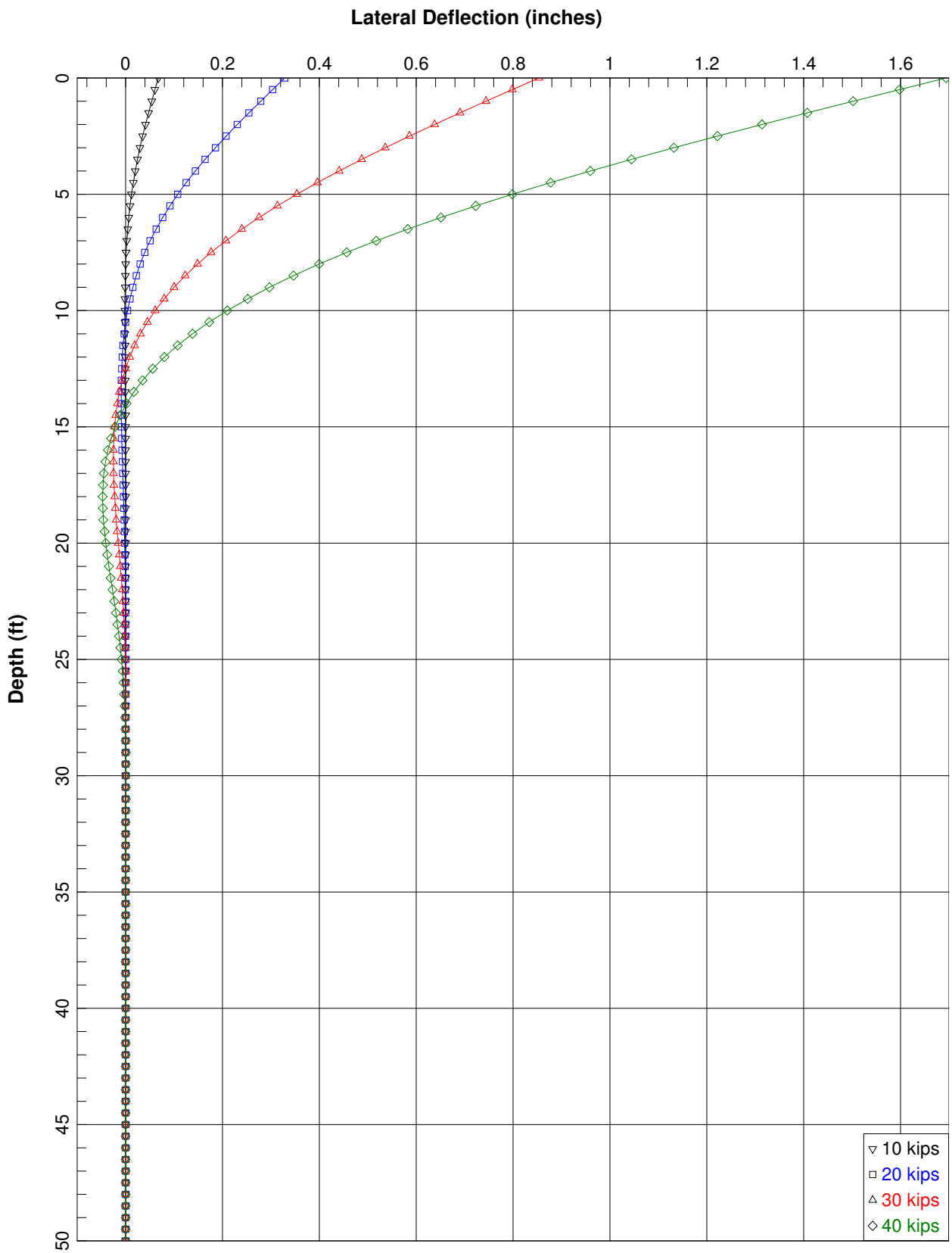
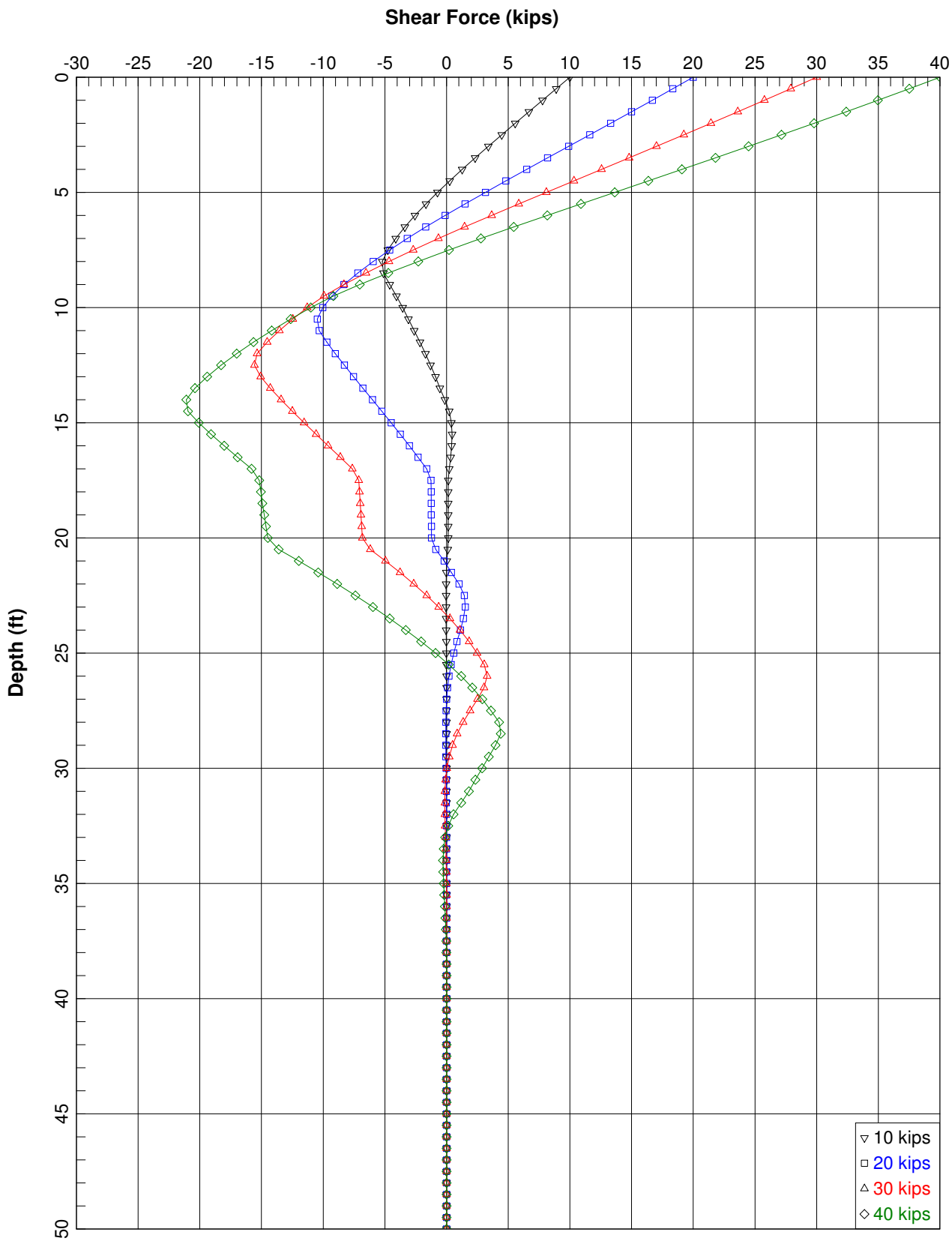


SAN LEANDRO CREEK BOH (WIDEN) - BENTS 16 THRU 20



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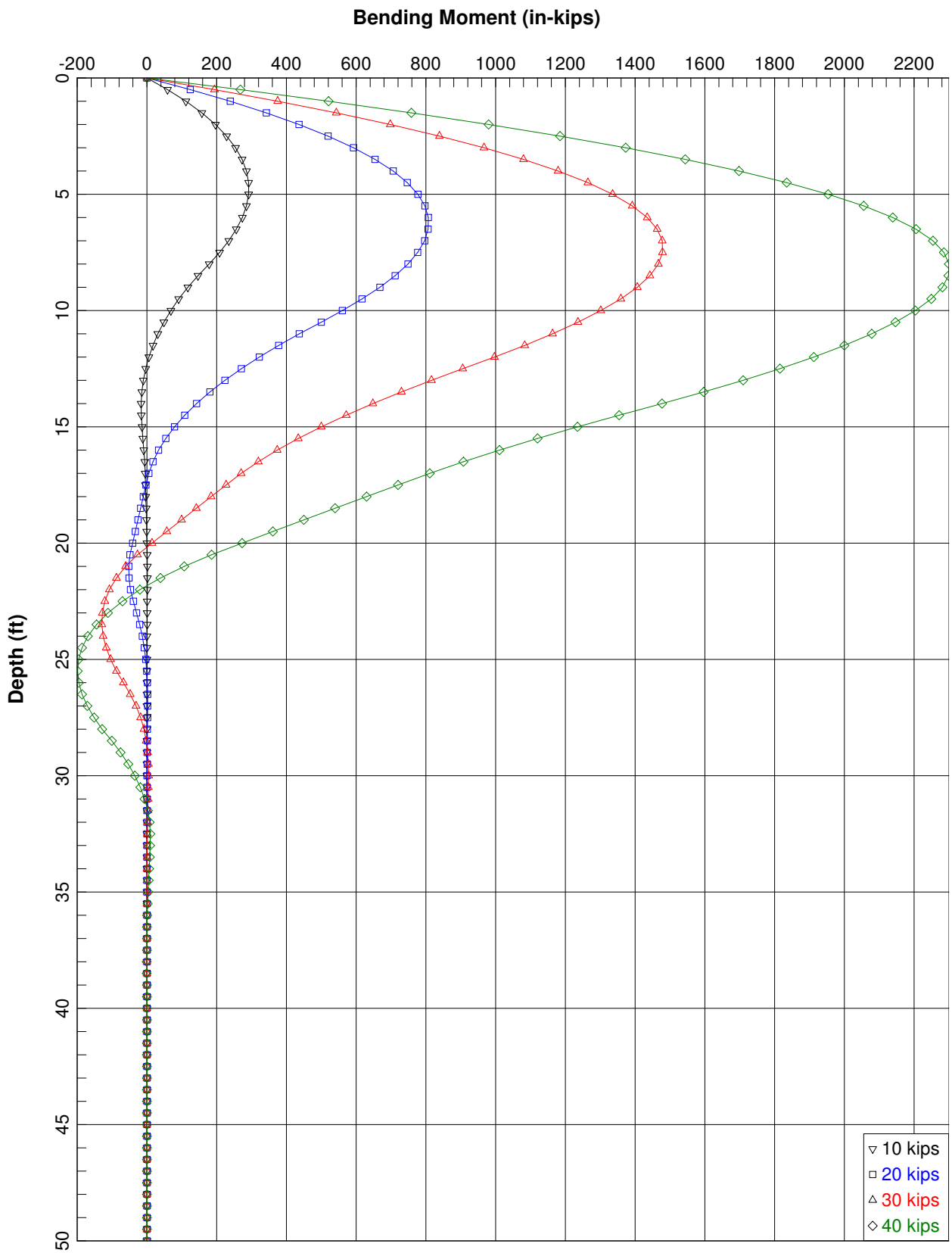

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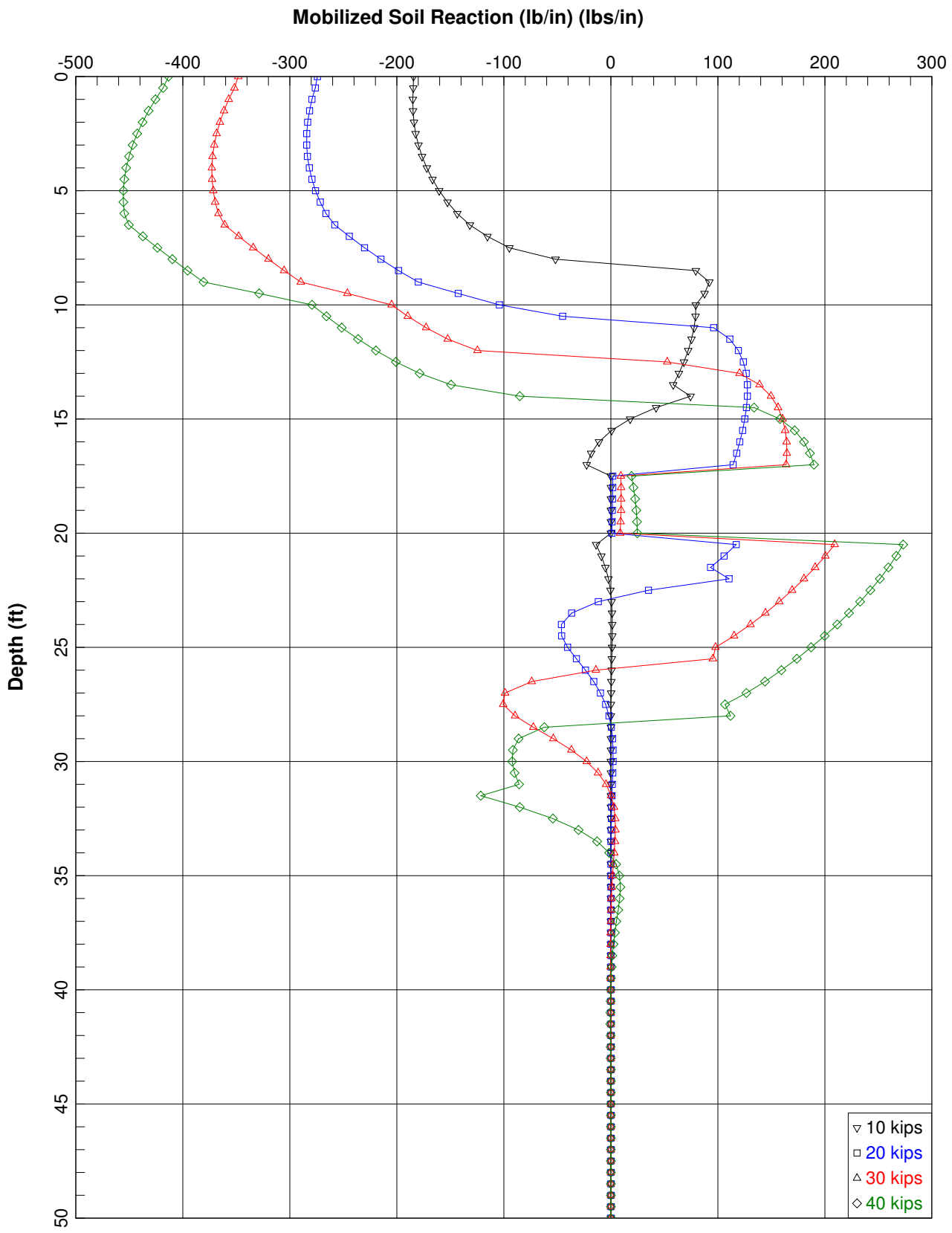

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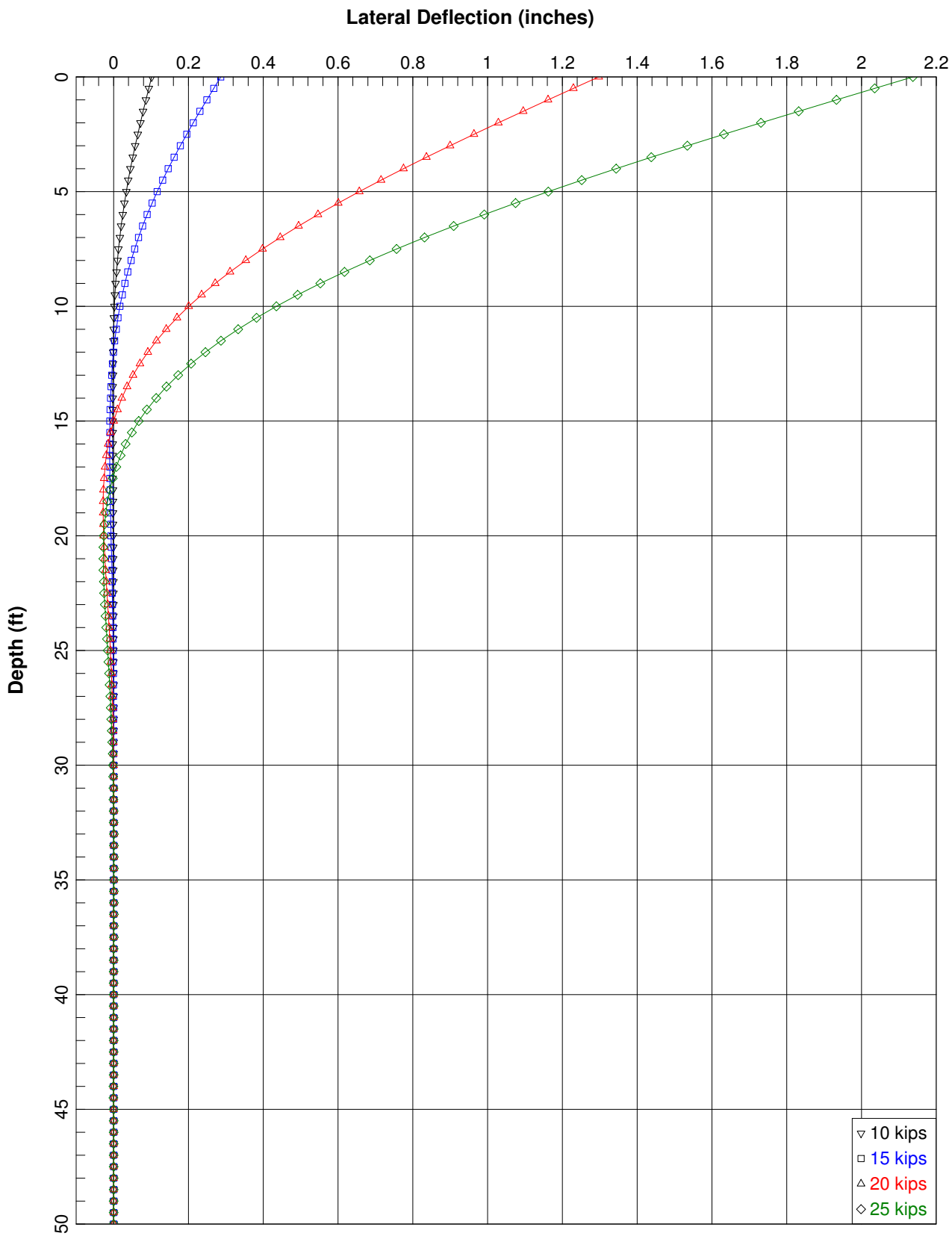

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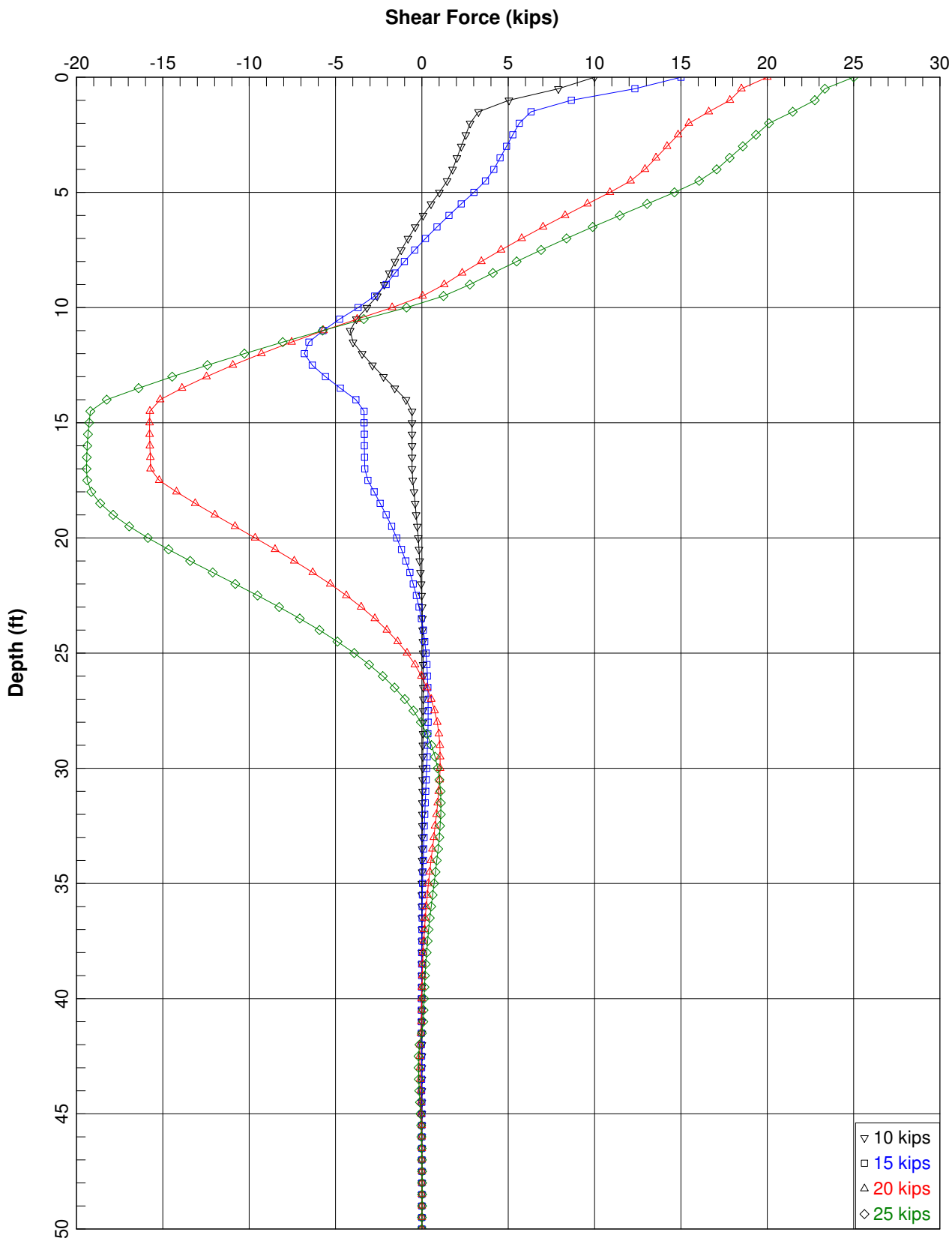

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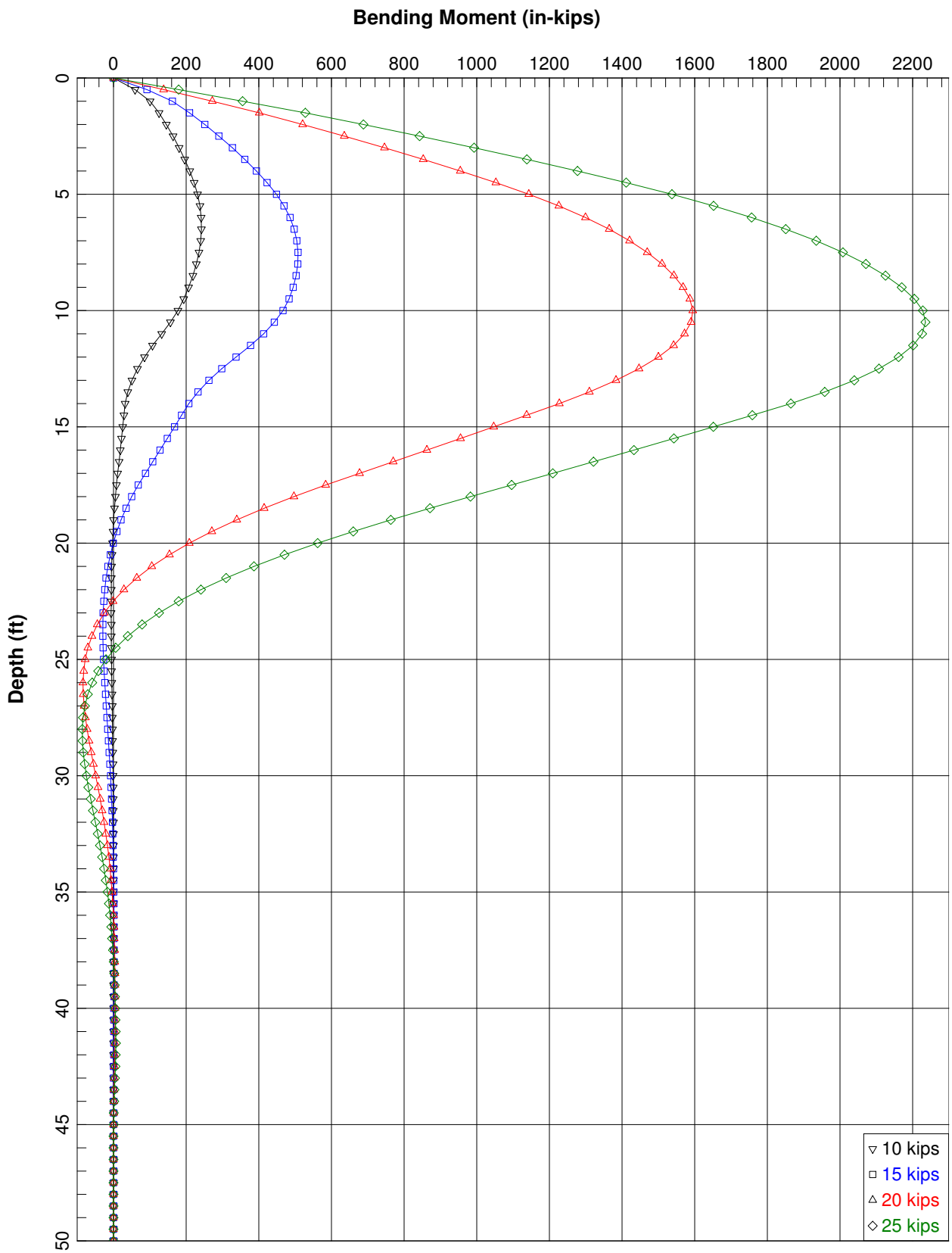

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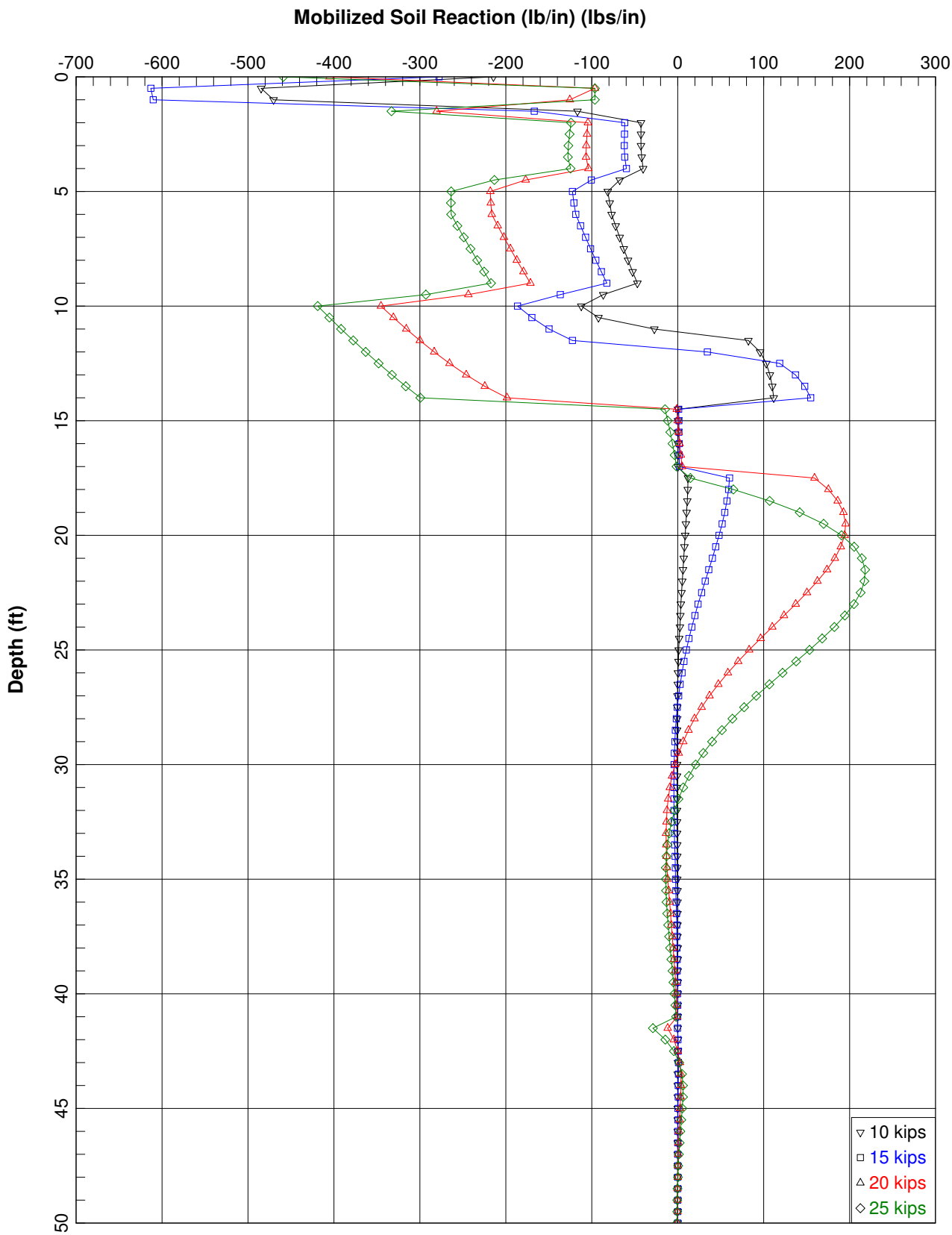

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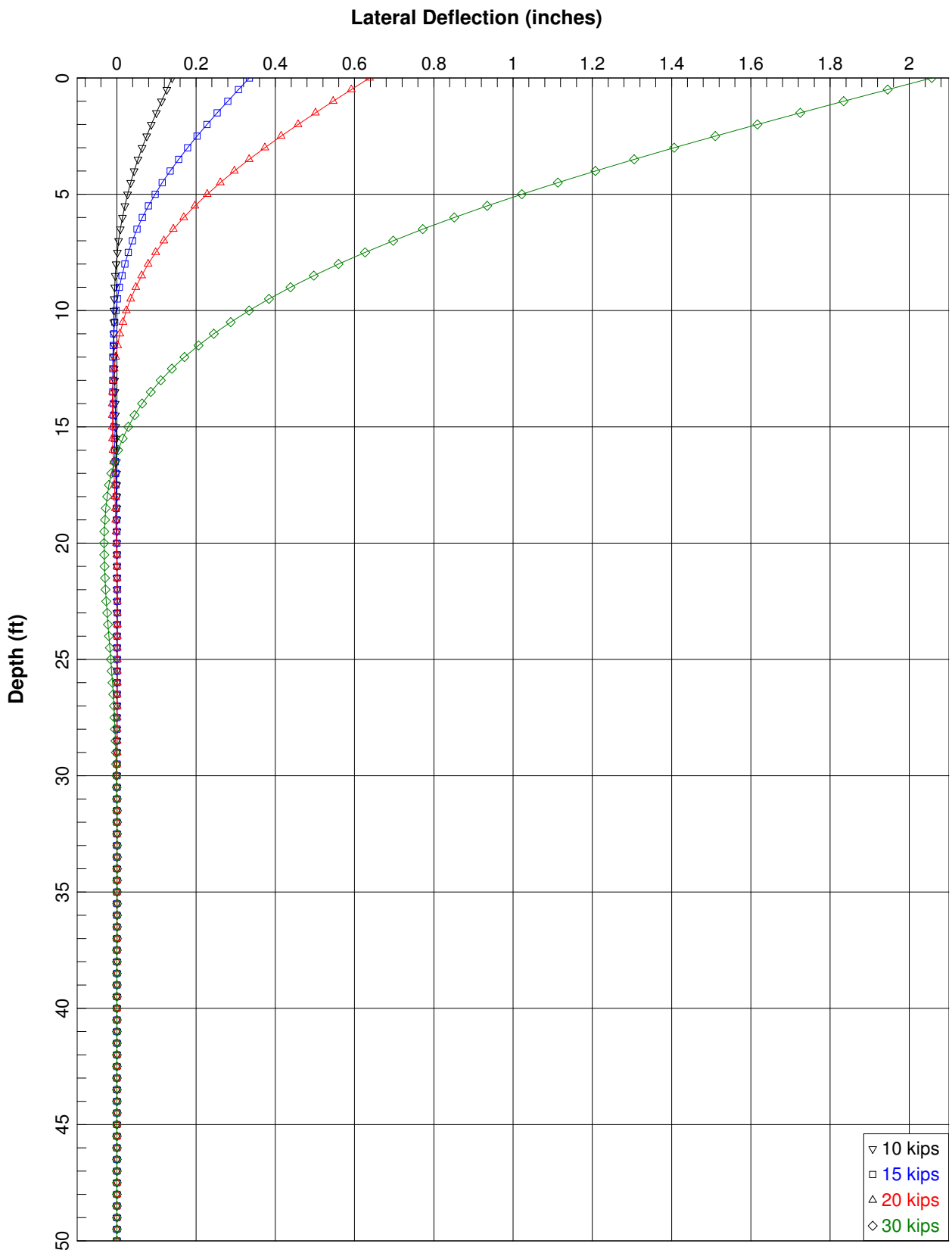
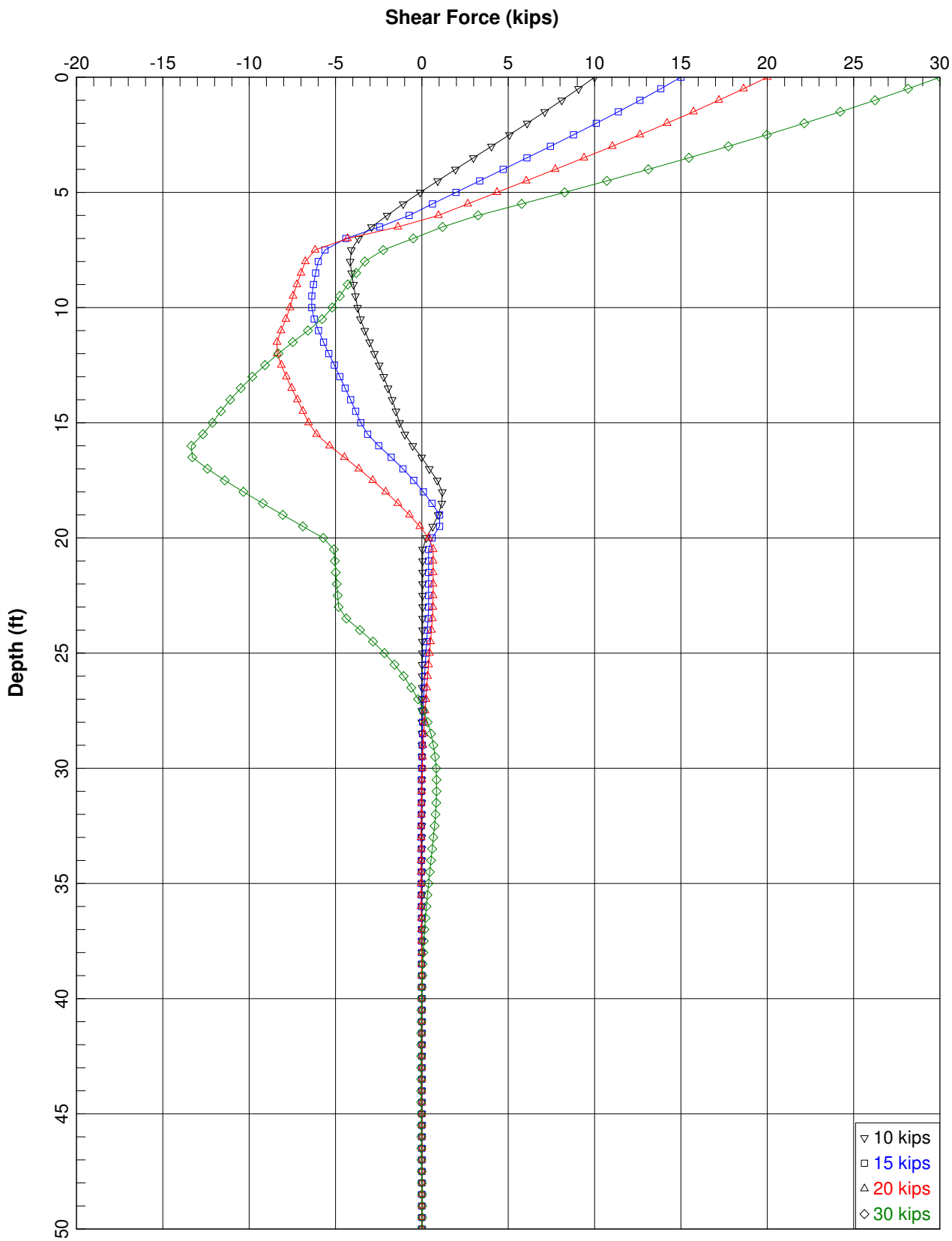


SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24



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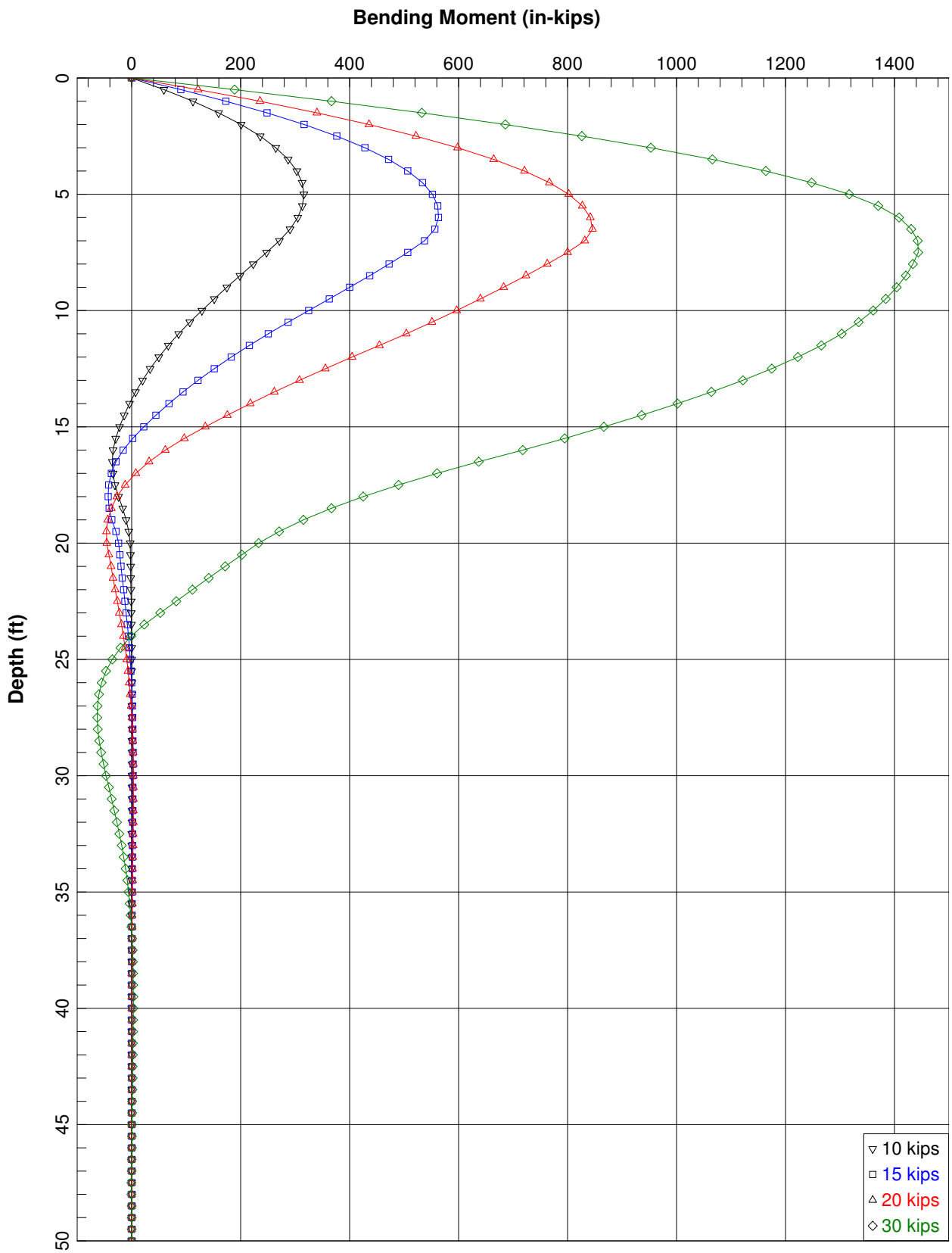

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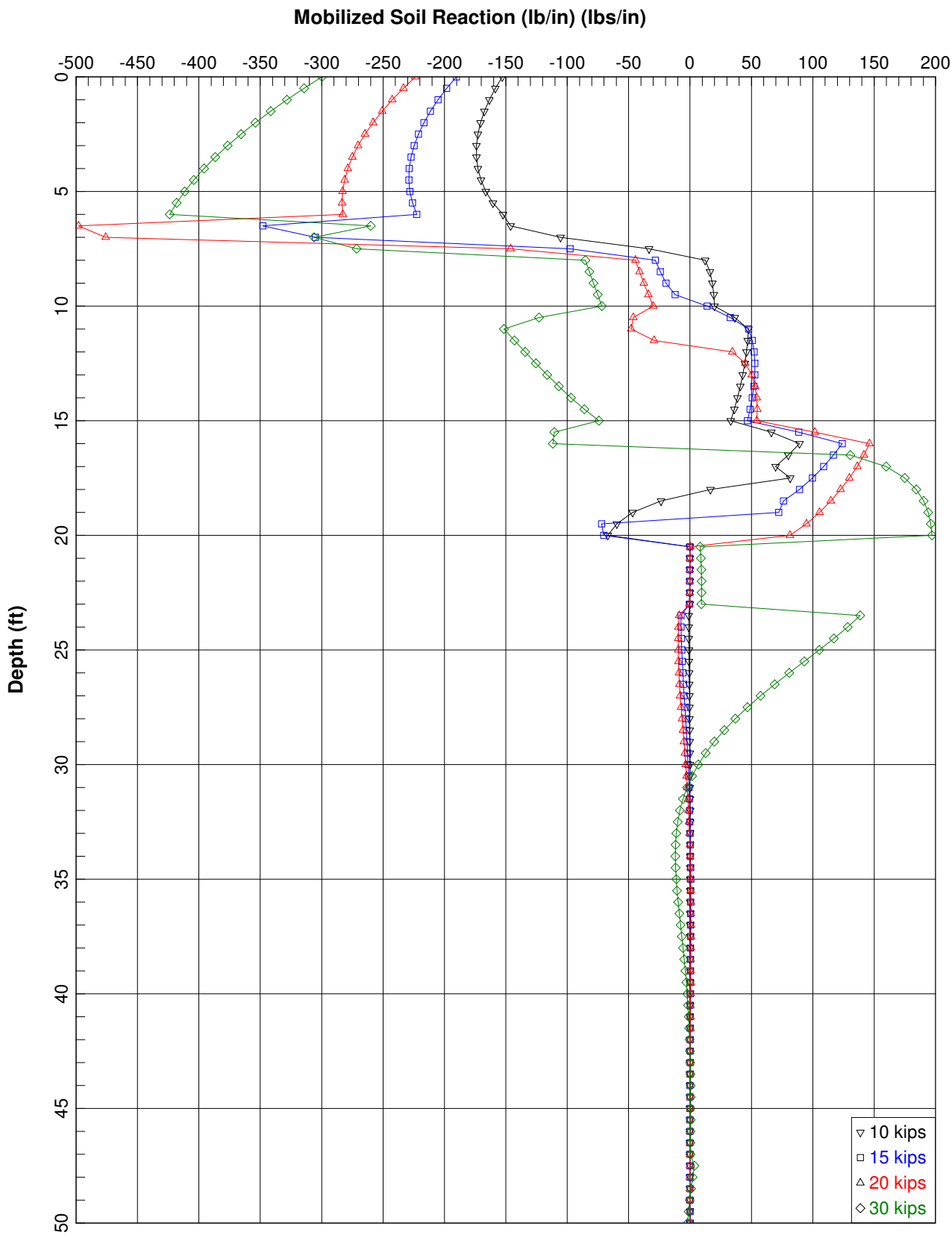

SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24

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Project Name: SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1
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Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.40000000000000E+0001 = Pipe pile diameter (in)
 4.38000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
3 = number of soil layers
3       -2.00000000000000E+0000  9.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        9.50000000000000E+0000  3.95000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.00000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.00000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.95000000000000E+0001  6.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
```

```
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
1.30000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        1.50000000000000E+0004  0.00000000000000E+0000
1.30000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        2.00000000000000E+0004  0.00000000000000E+0000
1.30000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        3.00000000000000E+0004  0.00000000000000E+0000
1.30000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

==========

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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==========

This program is licensed to:

L. Tran
PARIKH

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT\Analyses\
Name of input data file: San Leandro Creek BOH (A1).lp6d
Name of output file: San Leandro Creek BOH (A1).lp6o
Name of plot output file: San Leandro Creek BOH (A1).lp6p
Name of runtime file: San Leandro Creek BOH (A1).lp6r

Date and Time of Analysis

Date: November 17, 2011 Time: 16:26:03

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 1

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -2.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	14.0000000
2	50.000000	14.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 14.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -2.000 ft
Distance from top of pile to bottom of layer = 9.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 9.500 ft
Distance from top of pile to bottom of layer = 39.500 ft

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 39.500 ft
Distance from top of pile to bottom of layer = 65.000 ft

(Depth of lowest layer extends 15.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-2.00	125.00000
2	9.50	125.00000
3	9.50	62.60000
4	39.50	62.60000
5	39.50	62.60000
6	65.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	qu psi	RQD percent	Epsilon 50	Depth ft	Eff. Unit Wt., pcf	kpy pci	Cohesion psf	Friction Ang., deg.	Test Type	Test Prop.	Elas. Subgr. pci	Rock Emass	krm
1	Stiff Clay w/o Free Water	--	--	0.00	-2.000	125.000	--	1250.000	--	--	--	--	--	--
					9.500	125.000	--	1250.000	--	--	--	--	--	--
2	Stiff Clay w/o Free Water	--	--	0.00	9.500	62.600	--	1000.000	--	--	--	--	--	--
					39.500	62.600	--	1000.000	--	--	--	--	--	--
3	Stiff Clay w/o Free Water	--	--	0.00	39.500	62.600	--	2500.000	--	--	--	--	--	--
					65.000	62.600	--	2500.000	--	--	--	--	--	--

---

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

---

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load	Load	Condition 1	Condition 2	Axial Thrust

No.	Type					Force, lbs
1	1	V =	10000.000 lbs	M =	0.000 in-lbs	130000.000
2	1	V =	15000.000 lbs	M =	0.000 in-lbs	130000.000
3	1	V =	20000.000 lbs	M =	0.000 in-lbs	130000.000
4	1	V =	30000.000 lbs	M =	0.000 in-lbs	130000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	600.00000000	in
Outer Diameter of Pipe	=	14.00000000	in
Pipe Wall Thickness	=	0.43800000	in
Yield Stress of Pipe	=	45.00000000	ksi
Elastic Modulus	=	29000.	ksi
Cross-sectional Area	=	18.66155045	sq. in.
Moment of Inertia	=	429.49485582	in^4
Elastic Bending Stiffness	=	12455351.	lb-in^2
Plastic Modulus, Z	=	80.58840490	in^3
Plastic Moment Capacity = Fy Z	=	3626.47822032	in-kip
Nom. Axial Structural Capacity = Fy As	=	839.770	kips
Nominal Axial Tensile Capacity	=	-839.770	kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	130.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 130.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000004282	53.3291754	12455320.	63.1032019	7.8266759	
0.000008563	106.6583508	12455320.	35.0516009	8.6871569	
0.0000128	159.9875262	12455320.	25.7010673	9.5476376	
0.0000171	213.3167017	12455320.	21.0258005	10.4081185	
0.0000214	266.6458771	12455320.	18.2206404	11.2685994	
0.0000257	319.9750525	12455320.	16.3505336	12.1290803	
0.0000300	373.3042279	12455320.	15.0147431	12.9895612	

0.0000343	426.6334033	12455320.	14.0129002	13.8500421	
0.0000385	479.9625787	12455320.	13.2336891	14.7105229	
0.0000428	533.2917541	12455320.	12.6103202	15.5710038	
0.0000471	586.6209296	12455320.	12.1002911	16.4314847	
0.0000514	639.9501050	12455320.	11.6752668	17.2919655	
0.0000557	693.2792804	12455320.	11.3156309	18.1524464	
0.0000599	746.6084558	12455320.	11.0073716	19.0129273	
0.0000642	799.9376312	12455320.	10.7402135	19.8734082	
0.0000685	853.2668066	12455320.	10.5064501	20.7338890	
0.0000728	906.5959820	12455320.	10.3001883	21.5943699	
0.0000771	959.9251575	12455320.	10.1168445	22.4548508	
0.0000814	1013.2543329	12455320.	9.9528001	23.3153317	
0.0000856	1066.5835083	12455320.	9.8051601	24.1758125	
0.0000899	1119.9126837	12455320.	9.6715810	25.0362934	
0.0000942	1173.2418591	12455320.	9.5501455	25.8967743	
0.0000985	1226.5710345	12455320.	9.4392696	26.7572552	
0.0001028	1279.9002099	12455320.	9.3376334	27.6177360	
0.0001070	1333.2293854	12455320.	9.2441281	28.4782169	
0.0001113	1386.5585608	12455320.	9.1578155	29.3386978	
0.0001156	1439.8877362	12455320.	9.0778964	30.1991787	
0.0001199	1493.2169116	12455320.	9.0036858	31.0596595	
0.0001242	1546.5460870	12455320.	8.9345932	31.9201404	
0.0001284	1599.8752624	12455320.	8.8701067	32.7806213	
0.0001327	1653.2044378	12455320.	8.8097807	33.6411022	
0.0001370	1706.5336133	12455320.	8.7532251	34.5015830	
0.0001413	1759.8627887	12455320.	8.7000970	35.3620639	
0.0001456	1813.1919641	12455320.	8.6500942	36.2225448	
0.0001499	1866.5211395	12455320.	8.6029486	37.0830257	
0.0001541	1919.8503149	12455320.	8.5584223	37.9435065	
0.0001584	1973.1794903	12455320.	8.5163028	38.8039874	
0.0001627	2026.5086657	12455320.	8.4764000	39.6644683	
0.0001670	2079.8378412	12455320.	8.4385436	40.5249492	
0.0001755	2186.4961920	12455320.	8.3683708	42.2459109	
0.0001841	2293.1545428	12455320.	8.3047256	43.9668727	
0.0001927	2398.5533564	12448783.	8.2484809	45.0000000	Y
0.0002012	2492.6335455	12386557.	8.2123891	45.0000000	Y
0.0002098	2573.1551161	12264784.	8.1975189	45.0000000	Y
0.0002184	2645.2506201	12113975.	8.1952036	45.0000000	Y
0.0002269	2710.8515616	11945928.	8.2018557	45.0000000	Y
0.0002355	2771.1308318	11767504.	8.2152373	45.0000000	Y
0.0002441	2826.8065901	11582739.	8.2339287	45.0000000	Y
0.0002526	2878.4498186	11394537.	8.2568430	45.0000000	Y
0.0002612	2926.7752425	11205973.	8.2827756	45.0000000	Y
0.0002697	2971.9959298	11017871.	8.3112908	45.0000000	Y
0.0002783	3014.3496213	10831043.	8.3415466	45.0000000	Y
0.0002869	3052.8451214	10641920.	8.3705049	45.0000000	Y
0.0002954	3087.1705036	10449645.	8.3959829	45.0000000	Y
0.0003040	3116.6691276	10252325.	8.4165591	45.0000000	Y
0.0003126	3142.4841662	10054032.	8.4332828	45.0000000	Y
0.0003211	3165.5511749	9857757.	8.4475710	45.0000000	Y
0.0003297	3186.3756776	9664876.	8.4601168	45.0000000	Y
0.0003382	3205.3294356	9476230.	8.4713585	45.0000000	Y
0.0003468	3222.6502865	9292192.	8.4814476	45.0000000	Y
0.0003554	3238.2676337	9112230.	8.4899237	45.0000000	Y
0.0003639	3252.6384952	8937311.	8.4981372	45.0000000	Y
0.0003725	3266.0477652	8767854.	8.5059347	45.0000000	Y
0.0003811	3278.2185760	8602762.	8.5121018	45.0000000	Y
0.0003896	3289.6733579	8443090.	8.5182846	45.0000000	Y
0.0003982	3300.1544437	8287840.	8.5240899	45.0000000	Y
0.0004068	3309.9970810	8137557.	8.5290823	45.0000000	Y
0.0004153	3319.1907352	7991908.	8.5341179	45.0000000	Y
0.0004239	3327.6633425	7850444.	8.5384485	45.0000000	Y
0.0004324	3335.7731945	7713743.	8.5426357	45.0000000	Y

0.0004410	3343.1623717	7580717.	8.5465264	45.0000000	Y
0.0004496	3350.2913545	7452179.	8.5499975	45.0000000	Y
0.0004581	3356.8448804	7327191.	8.5536261	45.0000000	Y
0.0004667	3363.0869406	7206122.	8.5564874	45.0000000	Y
0.0004753	3369.0188247	7088763.	8.5600000	45.0000000	Y
0.0004838	3374.4600741	6974545.	8.5623382	45.0000000	Y
0.0004924	3379.7604642	6864013.	8.5650839	45.0000000	Y
0.0005010	3384.6739900	6756488.	8.5677444	45.0000000	Y
0.0005095	3389.3936102	6652196.	8.5695666	45.0000000	Y
0.0005438	3405.8491449	6263422.	8.5783020	45.0000000	Y
0.0005780	3419.4232848	5915740.	8.5852348	45.0000000	Y
0.0006123	3430.6422188	5603113.	8.5905794	45.0000000	Y
0.0006465	3440.0604202	5320827.	8.5951744	45.0000000	Y
0.0006808	3447.9785548	5064743.	8.5988318	45.0000000	Y
0.0007150	3454.7769765	4831629.	8.6019458	45.0000000	Y
0.0007493	3460.7518906	4618728.	8.6047064	45.0000000	Y
0.0007835	3465.9112449	4423402.	8.6073516	45.0000000	Y
0.0008178	3470.2953843	4243489.	8.6093701	45.0000000	Y
0.0008520	3474.4383395	4077759.	8.6113022	45.0000000	Y
0.0008863	3477.7284460	3923877.	8.6129091	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	130.000	3477.7

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	10000.000	lbs
Applied moment at pile head	=	0.000	in-lbs
Axial thrust load on pile head	=	130000.000	lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Soil Spr. Es*h	Distrib. Lat. Load p
inches	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/in	lb/inch

0.00	0.1759	0.000	10000.0000	-0.002592	0.000	1.246E+10	
-136.1713	2321.8694	0.000					
6.000	0.1604	59571.	9166.3125	-0.002578	0.000	1.246E+10	
-141.7246	5301.7687	0.000					
12.000	0.1450	114017.	8301.1900	-0.002536	0.000	1.246E+10	
-146.6496	6067.8755	0.000					
18.000	0.1300	163141.	7408.5097	-0.002469	0.000	1.246E+10	
-150.9105	6967.3210	0.000					
24.000	0.1154	206771.	6492.3672	-0.002380	0.000	1.246E+10	
-154.4704	8032.8206	0.000					
30.000	0.1014	244762.	5557.0825	-0.002271	0.000	1.246E+10	
-157.2912	9307.3581	0.000					
36.000	0.0881	276999.	4607.2108	-0.002146	0.000	1.246E+10	
-159.3327	10848.	0.000					
42.000	0.0757	303396.	3647.5564	-0.002006	0.000	1.246E+10	
-160.5521	12734.	0.000					
48.000	0.0641	323899.	2683.1943	-0.001855	0.000	1.246E+10	
-160.9020	15072.	0.000					
54.000	0.0534	338488.	1719.5004	-0.001695	0.000	1.246E+10	
-160.3293	18017.	0.000					
60.000	0.0437	347177.	762.1966	-0.001530	0.000	1.246E+10	
-158.7720	21794.	0.000					
66.000	0.0350	350021.	-182.5821	-0.001362	0.000	1.246E+10	
-156.1542	26744.	0.000					
72.000	0.0274	347111.	-1108.1810	-0.001194	0.000	1.246E+10	
-152.3787	33409.	0.000					
78.000	0.0207	338586.	-2007.2520	-0.001029	0.000	1.246E+10	
-147.3116	42693.	0.000					
84.000	0.0150	324630.	-2871.4457	-0.000869	0.000	1.246E+10	
-140.7530	56235.	0.000					
90.000	0.0103	305484.	-3690.8202	-0.000718	0.000	1.246E+10	
-132.3718	77327.	0.000					
96.000	0.006407	281459.	-4452.5429	-0.000576	0.000	1.246E+10	
-121.5357	113808.	0.000					
102.000	0.003357	252953.	-5137.3592	-0.000447	0.000	1.246E+10	
-106.7363	190761.	0.000					
108.000	0.001038	220509.	-5704.1131	-0.000333	0.000	1.246E+10	
-82.1816	475001.	0.000					
114.000	-0.000644	185024.	-5750.7690	-0.000236	0.000	1.246E+10	
66.6296	621095.	0.000					
120.000	-0.001791	151867.	-5320.8787	-0.000155	0.000	1.246E+10	
76.6671	256894.	0.000					
126.000	-0.002499	121414.	-4840.7968	-8.876E-05	0.000	1.246E+10	
83.3602	200172.	0.000					
132.000	-0.002856	93916.	-4332.1013	-3.689E-05	0.000	1.246E+10	
86.2050	181119.	0.000					
138.000	-0.002941	69486.	-3812.9314	2.462E-06	0.000	1.246E+10	
86.8516	177164.	0.000					
144.000	-0.002826	48157.	-3294.3982	3.080E-05	0.000	1.246E+10	
85.9928	182562.	0.000					
150.000	-0.002572	29906.	-2784.4459	4.960E-05	0.000	1.246E+10	
83.9913	195950.	0.000					
156.000	-0.002231	14667.	-2289.2914	6.034E-05	0.000	1.246E+10	
81.0601	218002.	0.000					
162.000	-0.001848	2340.0349	-1814.1199	6.443E-05	0.000	1.246E+10	
77.3304	251102.	0.000					
168.000	-0.001458	-7203.4353	-1363.4859	6.326E-05	0.000	1.246E+10	
72.8810	299961.	0.000					
174.000	-0.001089	-14120.	-941.5920	5.812E-05	0.000	1.246E+10	
67.7503	373399.	0.000					
180.000	-0.000760	-18593.	-552.5365	5.025E-05	0.000	1.246E+10	
61.9348	488759.	0.000					
186.000	-0.000486	-20829.	-200.6207	4.075E-05	0.000	1.246E+10	

```
55.3704    683994.      0.000
   192.000  -0.000271    -21064.   199.3243  3.066E-05      0.000  1.246E+10
77.9446   1723730.      0.000
   198.000  -0.000118    -18485.   534.6817  2.113E-05      0.000  1.246E+10
33.8413   1723730.      0.000
   204.000 -1.771E-05    -14681.   651.4675  1.315E-05      0.000  1.246E+10
5.0873   1723730.     0.000
   210.000  3.995E-05    -10688.   632.3012  7.035E-06      0.000  1.246E+10
-11.4761   1723730.      0.000
   216.000  6.671E-05 -7104.3795   540.3795  2.749E-06      0.000  1.246E+10
-19.1645   1723730.      0.000
   222.000  7.294E-05 -4207.8732   420.0248  2.449E-08      0.000  1.246E+10
-20.9537   1723730.      0.000
   228.000  6.700E-05 -2064.1207   299.4167 -1.486E-06      0.000  1.246E+10
-19.2489   1723730.      0.000
   234.000  5.510E-05  -612.5546   194.1793 -2.131E-06      0.000  1.246E+10
-15.8302   1723730.      0.000
   240.000  4.143E-05   269.3549   110.9804 -2.214E-06      0.000  1.246E+10
-11.9028   1723730.      0.000
   246.000  2.854E-05   722.6630    50.6749 -1.975E-06      0.000  1.246E+10
-8.1990   1723730.      0.000
   252.000  1.774E-05   880.5338    10.7916 -1.588E-06      0.000  1.246E+10
-5.0954   1723730.      0.000
   258.000  9.478E-06   854.6402   -12.6631 -1.171E-06      0.000  1.246E+10
-2.7229   1723730.      0.000
   264.000  3.690E-06   730.4024   -24.0118 -7.888E-07      0.000  1.246E+10
-1.0600   1723730.      0.000
   270.000  1.272E-08   567.7296   -27.2028 -4.761E-07      0.000  1.246E+10
-0.003656   1723730.      0.000
   276.000 -2.023E-06   404.7119   -25.4699 -2.419E-07      0.000  1.246E+10
0.5813   1723730.     0.000
   282.000 -2.890E-06   262.4683   -21.2355 -8.117E-08      0.000  1.246E+10
0.8302   1723730.     0.000
   288.000 -2.997E-06   150.0120   -16.1617  1.818E-08      0.000  1.246E+10
0.8611   1723730.     0.000
   294.000 -2.671E-06    68.4992   -11.2760  7.081E-08      0.000  1.246E+10
0.7675   1723730.     0.000
   300.000 -2.148E-06    14.5898    -7.1226  9.083E-08      0.000  1.246E+10
0.6170   1723730.     0.000
   306.000 -1.582E-06   -17.1138    -3.9086  9.022E-08      0.000  1.246E+10
0.4544   1723730.     0.000
   312.000 -1.065E-06   -32.4541    -1.6277  7.828E-08      0.000  1.246E+10
0.3060   1723730.     0.000
   318.000 -6.422E-07   -36.7678    -0.1563  6.161E-08      0.000  1.246E+10
0.1845   1723730.     0.000
   324.000 -3.257E-07   -34.4261     0.6778  4.446E-08      0.000  1.246E+10
0.0936   1723730.     0.000
   330.000 -1.087E-07   -28.7030     1.0522  2.925E-08      0.000  1.246E+10
0.0312   1723730.     0.000
   336.000  2.536E-08   -21.8452     1.1240  1.708E-08      0.000  1.246E+10
-0.007286   1723730.      0.000
   342.000  9.626E-08   -15.2414     1.0192  8.146E-09      0.000  1.246E+10
-0.0277   1723730.     0.000
   348.000  1.231E-07    -9.6275     0.8301  2.156E-09      0.000  1.246E+10
-0.0354   1723730.     0.000
   354.000  1.221E-07    -5.2833     0.6188 -1.435E-09      0.000  1.246E+10
-0.0351   1723730.     0.000
   360.000  1.059E-07    -2.2002     0.4222 -3.238E-09      0.000  1.246E+10
-0.0304   1723730.     0.000
   366.000  8.328E-08    -0.2114     0.2592 -3.819E-09      0.000  1.246E+10
-0.0239   1723730.     0.000
   372.000  6.006E-08     0.9162     0.1357 -3.649E-09      0.000  1.246E+10
-0.0173   1723730.     0.000
```



```
   378.000  3.949E-08     1.4222     0.0499 -3.086E-09      0.000  1.246E+10
-0.0113   1723730.     0.000
   384.000  2.303E-08     1.5193  -0.004024 -2.377E-09      0.000  1.246E+10
-0.006616   1723730.     0.000
   390.000  1.096E-08     1.3776    -0.0333 -1.680E-09      0.000  1.246E+10
-0.003149   1723730.     0.000
   396.000  2.876E-09     1.1221    -0.0452 -1.077E-09      0.000  1.246E+10
-0.000826   1723730.     0.000
   402.000 -1.968E-09     0.8364    -0.0460 -6.058E-10      0.000  1.246E+10
0.000565   1723730.     0.000
   408.000 -4.394E-09     0.5707    -0.0405 -2.669E-10      0.000  1.246E+10
0.001262   1723730.     0.000
   414.000 -5.171E-09     0.3502    -0.0323 -4.508E-11      0.000  1.246E+10
0.001485   1723730.     0.000
   420.000 -4.935E-09     0.1831    -0.0236  8.337E-11      0.000  1.246E+10
0.001418   1723730.     0.000
   426.000 -4.170E-09     0.0670    -0.0157  1.436E-10      0.000  1.246E+10
0.001198   1723730.     0.000
   432.000 -3.212E-09  -0.006057  -0.009383  1.583E-10      0.000  1.246E+10
0.000923   1723730.     0.000
   438.000 -2.271E-09    -0.0459  -0.004658  1.458E-10      0.000  1.246E+10
0.000652   1723730.     0.000
   444.000 -1.462E-09    -0.0622  -0.001441  1.197E-10      0.000  1.246E+10
0.000420   1723730.     0.000
   450.000 -8.337E-10    -0.0633   0.000538  8.951E-11      0.000  1.246E+10
0.000240   1723730.     0.000
   456.000 -3.882E-10    -0.0559   0.001591  6.080E-11      0.000  1.246E+10
0.000112   1723730.     0.000
   462.000 -1.041E-10    -0.0443   0.002016  3.666E-11      0.000  1.246E+10
2.992E-05   1723730.     0.000
   468.000  5.172E-11    -0.0317   0.002061  1.833E-11      0.000  1.246E+10
-1.486E-05   1723730.     0.000
   474.000  1.159E-10    -0.0197   0.001841  5.956E-12      0.000  1.246E+10
-5.824E-05   3016528.     0.000
   480.000  1.232E-10  -0.009651   0.001378 -1.102E-12      0.000  1.246E+10
-9.624E-05   4687500.     0.000
   486.000  1.026E-10  -0.003113   0.000849 -4.176E-12      0.000  1.246E+10
-8.018E-05   4687500.     0.000
   492.000  7.308E-11   0.000539   0.000437 -4.796E-12      0.000  1.246E+10
-5.709E-05   4687500.     0.000
   498.000  4.508E-11   0.002137   0.000160 -4.151E-12      0.000  1.246E+10
-3.522E-05   4687500.     0.000
   504.000  2.326E-11   0.002465 -2.568E-07 -3.043E-12      0.000  1.246E+10
-1.817E-05   4687500.     0.000
   510.000  8.565E-12   0.002138 -7.485E-05 -1.934E-12      0.000  1.246E+10
-6.692E-06   4687500.     0.000
   516.000      0.000   0.001570 -9.504E-05 -1.041E-12      0.000  1.246E+10
-3.898E-08   4687500.     0.000
   522.000 -3.928E-12   0.000999 -8.595E-05      0.000      0.000  1.246E+10
3.069E-06   4687500.     0.000
   528.000 -5.017E-12   0.000539 -6.499E-05      0.000      0.000  1.246E+10
3.920E-06   4687500.     0.000
   534.000 -4.549E-12   0.000220 -4.257E-05      0.000      0.000  1.246E+10
3.554E-06   4687500.     0.000
   540.000 -3.445E-12  2.810E-05 -2.383E-05      0.000      0.000  1.246E+10
2.691E-06   4687500.     0.000
   546.000 -2.260E-12 -6.660E-05 -1.046E-05      0.000      0.000  1.246E+10
1.766E-06   4687500.     0.000
   552.000 -1.267E-12 -9.771E-05 -2.194E-06      0.000      0.000  1.246E+10
9.902E-07   4687500.     0.000
   558.000      0.000 -9.315E-05  2.083E-06      0.000      0.000  1.246E+10
4.355E-07   4687500.     0.000
   564.000      0.000 -7.287E-05  3.663E-06      0.000      0.000  1.246E+10
```



```
9.109E-08   4687500.     0.000
   570.000      0.000 -4.928E-05  3.670E-06      0.000      0.000  1.246E+10
-8.874E-08   4687500.     0.000
   576.000      0.000 -2.887E-05  2.932E-06      0.000      0.000  1.246E+10
-1.573E-07   4687500.     0.000
   582.000      0.000 -1.411E-05  1.978E-06      0.000      0.000  1.246E+10
-1.607E-07   4687500.     0.000
   588.000      0.000 -5.130E-06  1.099E-06      0.000      0.000  1.246E+10
-1.322E-07   4687500.     0.000
   594.000      0.000 -9.070E-07  4.263E-07      0.000      0.000  1.246E+10
-9.212E-08   4687500.     0.000
   600.000      0.000      0.000      0.000      0.000      0.000  1.246E+10
-5.000E-08   2343750.     0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      0.1759418 inches
Computed slope at pile head      =     -0.0025921 radians
Maximum bending moment           =        350021. inch-lbs
Maximum shear force              =  10000.0000000 lbs
Depth of maximum bending moment  =     66.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             28
Number of zero deflection points =              8
```

```
--------------------------------------------------------------------------------
                 Computed Values of Pile Loading and Deflection
                   for Lateral Loading for Load Case Number 2
--------------------------------------------------------------------------------
```

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                  =       15000.000 lbs
Applied moment at pile head                          =           0.000 in-lbs
Axial thrust load on pile head                       =      130000.000 lbs
```

```
   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
     Es*h    Lat. Load
   inches    inches     in-lbs       lbs      radians      psi*     lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.4252  3.073E-07     15000.  -0.005384      0.000  1.246E+10
-169.7751  1197.9312      0.000
     6.000     0.3929     91143.     13959.  -0.005362      0.000  1.246E+10
-177.2974  2707.7327      0.000
    12.000     0.3608    175870.     12874.  -0.005297      0.000  1.246E+10
-184.1817  3062.6252      0.000
```



```
    18.000     0.3293    253899.     11751.  -0.005194      0.000  1.246E+10
-190.3944  3469.0610      0.000
    24.000     0.2985    324979.     10592.  -0.005054      0.000  1.246E+10
-195.9014  3937.6462      0.000
    30.000     0.2686    388885.  9402.0209  -0.004882      0.000  1.246E+10
-200.6681  4481.7206      0.000
    36.000     0.2399    445420.  8186.0409  -0.004681      0.000  1.246E+10
-204.6585  5118.2520      0.000
    42.000     0.2125    494420.  6948.5596  -0.004455      0.000  1.246E+10
-207.8353  5869.0921      0.000
    48.000     0.1865    535753.  5694.5782  -0.004207      0.000  1.246E+10
-210.1585  6762.7717      0.000
    54.000     0.1620    569318.  4429.3459  -0.003941      0.000  1.246E+10
-211.5856  7837.1259      0.000
    60.000     0.1392    595053.  3158.3809  -0.003660      0.000  1.246E+10
-212.0694  9143.2228      0.000
    66.000     0.1181    612929.  1887.5016  -0.003369      0.000  1.246E+10
-211.5570     10751.      0.000
    72.000     0.0987    622959.   622.8701  -0.003072      0.000  1.246E+10
-209.9868     12761.      0.000
    78.000     0.0812    625195.  -628.9443  -0.002771      0.000  1.246E+10
-207.2846     15316.      0.000
    84.000     0.0655    619735. -1860.8692  -0.002471      0.000  1.246E+10
-203.3570     18634.      0.000
    90.000     0.0515    606720. -3065.1791  -0.002176      0.000  1.246E+10
-198.0797     23056.      0.000
    96.000     0.0394    586347. -4233.2491  -0.001888      0.000  1.246E+10
-191.2770     29152.      0.000
   102.000     0.0289    558867. -5355.1201  -0.001613      0.000  1.246E+10
-182.6800     37946.      0.000
   108.000     0.0200    524601. -6418.6642  -0.001352      0.000  1.246E+10
-171.8347     51506.      0.000
   114.000     0.0127    483952. -7356.7054  -0.001109      0.000  1.246E+10
-140.8457     66724.      0.000
   120.000   0.006712    438050. -8099.7577  -0.000887      0.000  1.246E+10
-106.8384     95504.      0.000
   126.000   0.002025    388138. -8658.0148  -0.000688      0.000  1.246E+10
-79.2473    234803.     0.000
   132.000  -0.001540    335227. -8674.3457  -0.000513      0.000  1.246E+10
73.8036    287520.     0.000
   138.000  -0.004136    284847. -8169.2128  -0.000364      0.000  1.246E+10
94.5740    137183.     0.000
   144.000  -0.005909    237764. -7575.2471  -0.000238      0.000  1.246E+10
103.4146    105001.     0.000
   150.000  -0.006995    194315. -6941.3727  -0.000134      0.000  1.246E+10
107.8769     92531.     0.000
   156.000  -0.007519    154677. -6288.1992 -5.010E-05      0.000  1.246E+10
109.8476     87654.     0.000
   162.000  -0.007596    118935. -5628.2645  1.581E-05      0.000  1.246E+10
110.1306     86988.     0.000
   168.000  -0.007330     87113. -4970.4151  6.544E-05      0.000  1.246E+10
109.1525     89353.     0.000
   174.000  -0.006811     59188. -4321.4482   0.000101      0.000  1.246E+10
107.1697     94409.     0.000
   180.000  -0.006121     35099. -3686.8945   0.000123      0.000  1.246E+10
104.3482    102278.     0.000
   186.000  -0.005330     14753. -3071.4482   0.000135      0.000  1.246E+10
100.8006    113463.     0.000
   192.000  -0.004497 -1969.8319 -2479.2330   0.000138      0.000  1.246E+10
96.6045    128900.     0.000
   198.000  -0.003669    -15214. -1913.9820   0.000134      0.000  1.246E+10
91.8125    150153.     0.000
   204.000  -0.002885    -25147. -1379.1751   0.000125      0.000  1.246E+10
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86.4564    179821.      0.000
   210.000  -0.002173    -31958.  -878.1624   0.000111      0.000  1.246E+10
80.5478    222361.      0.000
   216.000  -0.001554    -35858.  -414.3005  9.452E-05      0.000  1.246E+10
74.0728    285906.      0.000
   222.000  -0.001039    -37078.     8.8500  7.695E-05      0.000  1.246E+10
66.9773    386713.      0.000
   228.000  -0.000631    -35872.   387.1516  5.938E-05      0.000  1.246E+10
59.1232    562151.      0.000
   234.000  -0.000327    -32524.   714.9538  4.291E-05      0.000  1.246E+10
50.1442    921261.      0.000
   240.000  -0.000116    -27359.   965.4720  2.849E-05      0.000  1.246E+10
33.3619   1723730.      0.000
   246.000  1.525E-05    -20983.  1052.4154  1.684E-05      0.000  1.246E+10
-4.3807   1723730.      0.000
   252.000  8.598E-05    -14757.   965.1737  8.234E-06      0.000  1.246E+10
-24.6998   1723730.      0.000
   258.000   0.000114 -9413.8903   792.7776  2.412E-06      0.000  1.246E+10
-32.7656   1723730.      0.000
   264.000   0.000115 -5247.1173   595.4377 -1.119E-06      0.000  1.246E+10
-33.0144   1723730.      0.000
   270.000   0.000101 -2266.8912   409.6758 -2.929E-06      0.000  1.246E+10
-28.9063   1723730.      0.000
   276.000  7.977E-05  -326.4383   254.2097 -3.554E-06      0.000  1.246E+10
-22.9158   1723730.      0.000
   282.000  5.797E-05   789.1696   135.4997 -3.442E-06      0.000  1.246E+10
-16.6542   1723730.      0.000
   288.000  3.846E-05  1304.9288    52.3931 -2.938E-06      0.000  1.246E+10
-11.0480   1723730.      0.000
   294.000  2.271E-05  1422.4705    -0.3267 -2.281E-06      0.000  1.246E+10
-6.5253   1723730.      0.000
   300.000  1.108E-05  1304.5674   -29.4538 -1.624E-06      0.000  1.246E+10
-3.1838   1723730.      0.000
   306.000  3.221E-06  1071.5589   -41.7815 -1.052E-06      0.000  1.246E+10
-0.9255   1723730.      0.000
   312.000 -1.542E-06   804.8302   -43.2290 -6.001E-07      0.000  1.246E+10
0.4430   1723730.      0.000
   318.000 -3.979E-06   553.7474   -38.4703 -2.728E-07      0.000  1.246E+10
1.1432   1723730.      0.000
   324.000 -4.816E-06   343.6118   -30.8900 -5.669E-08      0.000  1.246E+10
1.3836   1723730.      0.000
   330.000 -4.660E-06   183.1564   -22.7232  7.018E-08      0.000  1.246E+10
1.3387   1723730.      0.000
   336.000 -3.974E-06    70.8236   -15.2824  1.314E-07      0.000  1.246E+10
1.1416   1723730.      0.000
   342.000 -3.083E-06    -0.4369    -9.2000  1.483E-07      0.000  1.246E+10
0.8858   1723730.      0.000
   348.000 -2.194E-06   -39.8082    -4.6516  1.386E-07      0.000  1.246E+10
0.6303   1723730.      0.000
   354.000 -1.420E-06   -56.4723    -1.5368  1.154E-07      0.000  1.246E+10
0.4079   1723730.      0.000
   360.000 -8.090E-07   -58.4298     0.3842  8.775E-08      0.000  1.246E+10
0.2324   1723730.      0.000
   366.000 -3.669E-07   -51.9985     1.3977  6.115E-08      0.000  1.246E+10
0.1054   1723730.      0.000
   372.000 -7.514E-08   -41.7530     1.7787  3.857E-08      0.000  1.246E+10
0.0216   1723730.      0.000
   378.000  9.596E-08   -30.7147     1.7607  2.112E-08      0.000  1.246E+10
-0.0276   1723730.      0.000
   384.000  1.783E-07   -20.6573     1.5244  8.744E-09      0.000  1.246E+10
-0.0512   1723730.      0.000
   390.000  2.009E-07   -12.4360     1.1976  7.735E-10      0.000  1.246E+10
-0.0577   1723730.      0.000
```



```
   396.000  1.876E-07    -6.2877     0.8628 -3.736E-09      0.000  1.246E+10
-0.0539   1723730.      0.000
   402.000  1.561E-07    -2.0769     0.5666 -5.751E-09      0.000  1.246E+10
-0.0448   1723730.      0.000
   408.000  1.185E-07     0.5206     0.3299 -6.126E-09      0.000  1.246E+10
-0.0341   1723730.      0.000
   414.000  8.255E-08     1.8919     0.1566 -5.545E-09      0.000  1.246E+10
-0.0237   1723730.      0.000
   420.000  5.201E-08     2.4088     0.0407 -4.509E-09      0.000  1.246E+10
-0.0149   1723730.      0.000
   426.000  2.844E-08     2.3868    -0.0287 -3.354E-09      0.000  1.246E+10
-0.008170   1723730.      0.000
   432.000  1.177E-08     2.0698    -0.0633 -2.280E-09      0.000  1.246E+10
-0.003380   1723730.      0.000
   438.000  1.074E-09     1.6304    -0.0744 -1.389E-09      0.000  1.246E+10
-0.000308   1723730.      0.000
   444.000 -4.905E-09     1.1792    -0.0711 -7.125E-10      0.000  1.246E+10
0.001409   1723730.      0.000
   450.000 -7.476E-09     0.7783    -0.0604 -2.410E-10      0.000  1.246E+10
0.002148   1723730.      0.000
   456.000 -7.797E-09     0.4545    -0.0473  5.592E-11      0.000  1.246E+10
0.002240   1723730.      0.000
   462.000 -6.805E-09     0.2111    -0.0347  2.162E-10      0.000  1.246E+10
0.001955   1723730.      0.000
   468.000 -5.203E-09     0.0380    -0.0243  2.762E-10      0.000  1.246E+10
0.001495   1723730.      0.000
   474.000 -3.491E-09    -0.0813    -0.0146  2.658E-10      0.000  1.246E+10
0.001755   3016528.      0.000
   480.000 -2.013E-09    -0.1374  -0.004595  2.131E-10      0.000  1.246E+10
0.001573   4687500.      0.000
   486.000 -9.331E-10    -0.1368   0.002311  1.471E-10      0.000  1.246E+10
0.000729   4687500.      0.000
   492.000 -2.481E-10    -0.1099   0.005079  8.771E-11      0.000  1.246E+10
0.000194   4687500.      0.000
   498.000  1.194E-10    -0.0759   0.005381  4.296E-11      0.000  1.246E+10
-9.331E-05   4687500.      0.000
   504.000  2.674E-10    -0.0454   0.004474  1.374E-11      0.000  1.246E+10
-0.000209   4687500.      0.000
   510.000  2.844E-10    -0.0223   0.003180 -2.545E-12      0.000  1.246E+10
-0.000222   4687500.      0.000
   516.000  2.369E-10  -0.007185   0.001959 -9.640E-12      0.000  1.246E+10
-0.000185   4687500.      0.000
   522.000  1.687E-10   0.001245   0.001008 -1.107E-11      0.000  1.246E+10
-0.000132   4687500.      0.000
   528.000  1.041E-10   0.004930   0.000369 -9.584E-12      0.000  1.246E+10
-8.130E-05   4687500.      0.000
   534.000  5.368E-11   0.005686 -8.370E-07 -7.027E-12      0.000  1.246E+10
-4.194E-05   4687500.      0.000
   540.000  1.974E-11   0.004931  -0.000173 -4.470E-12      0.000  1.246E+10
-1.542E-05   4687500.      0.000
   546.000      0.000   0.003618  -0.000219 -2.410E-12      0.000  1.246E+10
-3.537E-08   4687500.      0.000
   552.000 -9.188E-12   0.002303  -0.000198      0.000      0.000  1.246E+10
7.178E-06   4687500.      0.000
   558.000 -1.176E-11   0.001246  -0.000149      0.000      0.000  1.246E+10
9.191E-06   4687500.      0.000
   564.000 -1.074E-11   0.000519 -9.599E-05      0.000      0.000  1.246E+10
8.391E-06   4687500.      0.000
   570.000 -8.218E-12  9.340E-05 -5.155E-05      0.000      0.000  1.246E+10
6.420E-06   4687500.      0.000
   576.000 -5.425E-12  -0.000101 -1.957E-05      0.000      0.000  1.246E+10
4.239E-06   4687500.      0.000
   582.000 -2.924E-12  -0.000142 -6.945E-09      0.000      0.000  1.246E+10
```



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2.284E-06   4687500.      0.000
   588.000      0.000  -0.000101  8.797E-06      0.000      0.000  1.246E+10
6.505E-07   4687500.      0.000
   594.000      0.000 -3.713E-05  8.486E-06      0.000      0.000  1.246E+10
-7.540E-07   4687500.      0.000
   600.000  2.656E-12      0.000      0.000      0.000      0.000  1.246E+10
-2.075E-06   2343750.      0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 2:

Pile-head deflection              =      0.4251707 inches
Computed slope at pile head       =     -0.0053836 radians
Maximum bending moment            =        625195. inch-lbs
Maximum shear force               =         15000. lbs
Depth of maximum bending moment   =     78.0000000 inches below pile head
Depth of maximum shear force      =       0.000000 inches below pile head
Number of iterations              =             31
Number of zero deflection points  =              8


--------------------------------------------------------------------------------
                    Computed Values of Pile Loading and Deflection
                      for Lateral Loading for Load Case Number 3
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                     =       20000.000 lbs
Applied moment at pile head                             =           0.000 in-lbs
Axial thrust load on pile head                          =      130000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
      X         y        Moment     Force         S       Stress   Stiffness      p
       Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00    0.7994 -3.841E-07     20000.  -0.009073      0.000  1.246E+10
-198.7984   746.0988      0.000
      6.000    0.7449    123498.     18779.  -0.009043      0.000  1.246E+10
-208.0474  1675.7419      0.000
    12.000    0.6908    239461.     17505.  -0.008956      0.000  1.246E+10
-216.6500  1881.6393      0.000
    18.000    0.6374    347534.     16182.  -0.008814      0.000  1.246E+10
-224.5748  2113.8253      0.000
    24.000    0.5851    447392.     14813.  -0.008623      0.000  1.246E+10
-231.7896  2377.0784      0.000
    30.000    0.5340    538737.     13402.  -0.008385      0.000  1.246E+10
-238.2621  2677.2478      0.000
```



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    36.000      0.4844    621302.     11956.  -0.008106      0.000  1.246E+10
-243.9592  3021.5570      0.000
    42.000      0.4367    694851.     10477.  -0.007789      0.000  1.246E+10
-248.8468  3419.0111      0.000
    48.000      0.3910    759181.  8972.1571  -0.007439      0.000  1.246E+10
-252.8894  3880.9523      0.000
    54.000      0.3474    814122.  7445.3397  -0.007060      0.000  1.246E+10
-256.0497  4421.8304      0.000
    60.000      0.3063    859539.  5902.3266  -0.006657      0.000  1.246E+10
-258.2880  5060.2891      0.000
    66.000      0.2676    895334.  4348.7796  -0.006234      0.000  1.246E+10
-259.5610  5820.7305      0.000
    72.000      0.2314    921449.  2790.6335  -0.005796      0.000  1.246E+10
-259.8210  6735.6183      0.000
    78.000      0.1980    937864.  1234.1290  -0.005349      0.000  1.246E+10
-259.0138  7848.9638      0.000
    84.000      0.1673    944602.  -314.1409  -0.004895      0.000  1.246E+10
-257.0761  9221.7694      0.000
    90.000      0.1393    941731. -1847.1637  -0.004441      0.000  1.246E+10
-253.9314    10941.      0.000
    96.000      0.1140    929364. -3357.4080  -0.003990      0.000  1.246E+10
-249.4833    13134.      0.000
   102.000      0.0914    907666. -4836.6706  -0.003548      0.000  1.246E+10
-243.6043    15996.      0.000
   108.000      0.0714    876858. -6275.8314  -0.003118      0.000  1.246E+10
-236.1160    19841.      0.000
   114.000      0.0540    837220. -7591.1110  -0.002705      0.000  1.246E+10
-202.3105    22495.      0.000
   120.000      0.0389    789985. -8695.2874  -0.002313      0.000  1.246E+10
-165.7483    25538.      0.000
   126.000      0.0262    736485. -9642.8963  -0.001945      0.000  1.246E+10
-150.1214    34372.      0.000
   132.000      0.0156    677305.    -10489.  -0.001605      0.000  1.246E+10
-131.8587    50724.      0.000
   138.000    0.006947    613123.    -11208.  -0.001294      0.000  1.246E+10
-107.7203    93037.      0.000
   144.000   6.877E-05    544832.    -11590.  -0.001015      0.000  1.246E+10
-19.7564  1723730.      0.000
   150.000  -0.005235    475626.    -11348.  -0.000769      0.000  1.246E+10
100.3610   115035.      0.000
   156.000  -0.009163    409854.    -10701.  -0.000556      0.000  1.246E+10
115.4408    75589.      0.000
   162.000    -0.0119    348084. -9984.6992  -0.000374      0.000  1.246E+10
123.2542    62107.      0.000
   168.000    -0.0136    290621. -9232.3620  -0.000220      0.000  1.246E+10
127.5249    56074.      0.000
   174.000    -0.0145    237639. -8461.0669 -9.243E-05      0.000  1.246E+10
129.5735    53457.      0.000
   180.000    -0.0148    189232. -7682.2218  1.039E-05      0.000  1.246E+10
130.0416    52882.      0.000
   186.000    -0.0144    145436. -6904.2101  9.100E-05      0.000  1.246E+10
129.2957    53803.      0.000
   192.000    -0.0137    106240. -6133.6235   0.000152      0.000  1.246E+10
127.5665    56022.      0.000
   198.000    -0.0126     71596. -5375.8960   0.000194      0.000  1.246E+10
125.0093    59532.      0.000
   204.000    -0.0113     41425. -4635.6704   0.000222      0.000  1.246E+10
121.7326    64471.      0.000
   210.000  -0.009939     15622. -3917.0298   0.000235      0.000  1.246E+10
117.8143    71121.      0.000
   216.000  -0.008504 -5946.1707 -3223.6551   0.000238      0.000  1.246E+10
113.3106    79945.      0.000
   222.000  -0.007086    -23433. -2558.9415   0.000231      0.000  1.246E+10
```

							108.2606	91665.	0.000
228.000	-0.005736	-37013.	-1926.0922	0.000216	0.000	1.246E+10	102.6892	107413.	0.000
234.000	-0.004493	-46883.	-1328.2042	0.000196	0.000	1.246E+10	96.6068	129010.	0.000
240.000	-0.003385	-53257.	-768.3603	0.000172	0.000	1.246E+10	90.0078	159525.	0.000
246.000	-0.002432	-56371.	-249.7478	0.000145	0.000	1.246E+10	82.8630	204463.	0.000
252.000	-0.001641	-56481.	224.1531	0.000118	0.000	1.246E+10	75.1039	274629.	0.000
258.000	-0.001013	-53866.	649.2055	9.162E-05	0.000	1.246E+10	66.5802	394235.	0.000
264.000	-0.000541	-48834.	1019.7302	6.688E-05	0.000	1.246E+10	56.9280	630827.	0.000
270.000	-0.000211	-41733.	1372.1608	4.506E-05	0.000	1.246E+10	60.5489	1723730.	0.000
276.000	-6.830E-07	-32438.	1554.3961	2.720E-05	0.000	1.246E+10	0.1962	1723730.	0.000
282.000	0.000116	-23123.	1455.3207	1.382E-05	0.000	1.246E+10	-33.2213	1723730.	0.000
288.000	0.000165	-14996.	1213.3416	4.636E-06	0.000	1.246E+10	-47.4384	1723730.	0.000
294.000	0.000171	-8570.2938	923.4157	-1.040E-06	0.000	1.246E+10	-49.2036	1723730.	0.000
300.000	0.000153	-3913.0436	644.2474	-4.047E-06	0.000	1.246E+10	-43.8525	1723730.	0.000
306.000	0.000123	-833.0122	406.9337	-5.190E-06	0.000	1.246E+10	-35.2521	1723730.	0.000
312.000	9.036E-05	978.2572	223.2974	-5.155E-06	0.000	1.246E+10	-25.9600	1723730.	0.000
318.000	6.085E-05	1854.5987	92.9767	-4.473E-06	0.000	1.246E+10	-17.4802	1723730.	0.000
324.000	3.669E-05	2100.9553	8.9147	-3.520E-06	0.000	1.246E+10	-10.5404	1723730.	0.000
330.000	1.861E-05	1967.0669	-38.7421	-2.540E-06	0.000	1.246E+10	-5.3452	1723730.	0.000
336.000	6.207E-06	1640.0129	-60.1275	-1.671E-06	0.000	1.246E+10	-1.7833	1723730.	0.000
342.000	-1.451E-06	1248.1439	-64.2271	-9.757E-07	0.000	1.246E+10	0.4168	1723730.	0.000
348.000	-5.501E-06	870.8100	-58.2354	-4.653E-07	0.000	1.246E+10	1.5805	1723730.	0.000
354.000	-7.035E-06	550.0453	-47.4309	-1.231E-07	0.000	1.246E+10	2.0210	1723730.	0.000
360.000	-6.979E-06	301.8315	-35.3530	8.207E-08	0.000	1.246E+10	2.0049	1723730.	0.000
366.000	-6.050E-06	125.6807	-24.1240	1.850E-07	0.000	1.246E+10	1.7381	1723730.	0.000
372.000	-4.758E-06	12.0553	-14.8086	2.182E-07	0.000	1.246E+10	1.3670	1723730.	0.000
378.000	-3.432E-06	-52.3630	-7.7501	2.085E-07	0.000	1.246E+10	0.9858	1723730.	0.000
384.000	-2.256E-06	-81.2711	-2.8480	1.763E-07	0.000	1.246E+10	0.6482	1723730.	0.000
390.000	-1.316E-06	-86.8139	0.2306	1.358E-07	0.000	1.246E+10	0.3780	1723730.	0.000
396.000	-6.262E-07	-78.7159	1.9043	9.596E-08	0.000	1.246E+10	0.1799	1723730.	0.000
402.000	-1.642E-07	-64.1115	2.5856	6.156E-08	0.000	1.246E+10	0.0472	1723730.	0.000
408.000	1.125E-07	-47.7844	2.6302	3.461E-08	0.000	1.246E+10	-0.0323	1723730.	0.000

414.000	2.511E-07	-32.6025	2.3169	1.525E-08	0.000	1.246E+10	-0.0721	1723730.	0.000
420.000	2.954E-07	-20.0051	1.8459	2.575E-09	0.000	1.246E+10	-0.0849	1723730.	0.000
426.000	2.820E-07	-10.4556	1.3483	-4.761E-09	0.000	1.246E+10	-0.0810	1723730.	0.000
432.000	2.383E-07	-3.8185	0.8999	-8.199E-09	0.000	1.246E+10	-0.0685	1723730.	0.000
438.000	1.836E-07	0.3556	0.5363	-9.034E-09	0.000	1.246E+10	-0.0527	1723730.	0.000
444.000	1.299E-07	2.6308	0.2661	-8.314E-09	0.000	1.246E+10	-0.0373	1723730.	0.000
450.000	8.381E-08	3.5617	0.0819	-6.823E-09	0.000	1.246E+10	-0.0241	1723730.	0.000
456.000	4.802E-08	3.6245	-0.0317	-5.092E-09	0.000	1.246E+10	-0.0138	1723730.	0.000
462.000	2.271E-08	3.1893	-0.0927	-3.451E-09	0.000	1.246E+10	-0.006523	1723730.	0.000
468.000	6.612E-09	2.5180	-0.1179	-2.076E-09	0.000	1.246E+10	-0.001900	1723730.	0.000
474.000	-2.205E-09	1.7774	-0.1203	-1.041E-09	0.000	1.246E+10	0.001108	3016528.	0.000
480.000	-5.884E-09	1.0761	-0.1032	-3.541E-10	0.000	1.246E+10	0.004597	4687500.	0.000
486.000	-6.454E-09	0.5398	-0.0743	3.511E-11	0.000	1.246E+10	0.005042	4687500.	0.000
492.000	-5.463E-09	0.1848	-0.0463	2.096E-10	0.000	1.246E+10	0.004268	4687500.	0.000
498.000	-3.938E-09	-0.0166	-0.0243	2.502E-10	0.000	1.246E+10	0.003077	4687500.	0.000
504.000	-2.461E-09	-0.1072	-0.009304	2.204E-10	0.000	1.246E+10	0.001923	4687500.	0.000
510.000	-1.294E-09	-0.1286	-0.000504	1.636E-10	0.000	1.246E+10	0.001011	4687500.	0.000
516.000	-4.979E-10	-0.1135	0.003695	1.053E-10	0.000	1.246E+10	0.000389	4687500.	0.000
522.000	-3.016E-11	-0.0844	0.004932	5.763E-11	0.000	1.246E+10	2.356E-05	4687500.	0.000
528.000	1.937E-10	-0.0544	0.004549	2.421E-11	0.000	1.246E+10	-0.000151	4687500.	0.000
534.000	2.603E-10	-0.0298	0.003485	3.922E-12	0.000	1.246E+10	-0.000203	4687500.	0.000
540.000	2.408E-10	-0.0126	0.002311	-6.291E-12	0.000	1.246E+10	-0.000188	4687500.	0.000
546.000	1.848E-10	-0.002092	0.001313	-9.824E-12	0.000	1.246E+10	-0.000144	4687500.	0.000
552.000	1.229E-10	0.003196	0.000592	-9.558E-12	0.000	1.246E+10	-9.599E-05	4687500.	0.000
558.000	7.013E-11	0.005026	0.000140	-7.578E-12	0.000	1.246E+10	-5.479E-05	4687500.	0.000
564.000	3.193E-11	0.004882	-9.967E-05	-5.192E-12	0.000	1.246E+10	-2.494E-05	4687500.	0.000
570.000	7.834E-12	0.003838	-0.000193	-3.091E-12	0.000	1.246E+10	-6.120E-06	4687500.	0.000
576.000	-5.169E-12	0.002572	-0.000199	-1.548E-12	0.000	1.246E+10	4.038E-06	4687500.	0.000
582.000	-1.074E-11	0.001451	-0.000162	0.000	0.000	1.246E+10	8.388E-06	4687500.	0.000
588.000	-1.211E-11	0.000631	-0.000108	0.000	0.000	1.246E+10	9.461E-06	4687500.	0.000
594.000	-1.166E-11	0.000152	-5.258E-05	0.000	0.000	1.246E+10	9.110E-06	4687500.	0.000
600.000	-1.077E-11	0.000	0.000	0.000	0.000	1.246E+10	8.416E-06	2343750.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection	=	0.7993517 inches
Computed slope at pile head	=	-0.0090729 radians
Maximum bending moment	=	944602. inch-lbs
Maximum shear force	=	20000. lbs
Depth of maximum bending moment	=	84.0000000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	29
Number of zero deflection points	=	7

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 4

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	30000.000 lbs
Applied moment at pile head	=	0.000 in-lbs
Axial thrust load on pile head	=	130000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.9710	1.383E-06	30000.	-0.0191	0.000	1.246E+10	-249.1155	379.1631	0.000
6.000	1.8564	190418.	28468.	-0.0191	0.000	1.246E+10	-261.3982	844.8490	0.000
12.000	1.7423	371353.	26865.	-0.0189	0.000	1.246E+10	-273.0213	940.1911	0.000
18.000	1.6293	542321.	25194.	-0.0187	0.000	1.246E+10	-283.9557	1045.6659	0.000
24.000	1.5179	702862.	23460.	-0.0184	0.000	1.246E+10	-294.1724	1162.8196	0.000
30.000	1.4085	852549.	21666.	-0.0180	0.000	1.246E+10	-303.6420	1293.4829	0.000
36.000	1.3015	990985.	19819.	-0.0176	0.000	1.246E+10	-312.3349	1439.8365	0.000
42.000	1.1975	1117804.	17921.	-0.0171	0.000	1.246E+10	-320.2213	1604.4952	0.000
48.000	1.0966	1232675.	15978.	-0.0165	0.000	1.246E+10	-327.2703	1790.6155	0.000

54.000	0.9993	1335302.	13996.	-0.0159	0.000	1.246E+10	-333.4507	2002.0369	0.000
60.000	0.9059	1425422.	11980.	-0.0152	0.000	1.246E+10	-338.7297	2243.4672	0.000
66.000	0.8166	1502812.	9934.2544	-0.0145	0.000	1.246E+10	-343.0733	2520.7301	0.000
72.000	0.7316	1567288.	7865.6978	-0.0138	0.000	1.246E+10	-346.4455	2841.1010	0.000
78.000	0.6512	1618702.	5779.9386	-0.0130	0.000	1.246E+10	-348.8076	3213.7680	0.000
84.000	0.5755	1656951.	3683.1642	-0.0122	0.000	1.246E+10	-350.1173	3650.4790	0.000
90.000	0.5045	1681973.	1581.8293	-0.0114	0.000	1.246E+10	-350.3277	4166.4656	0.000
96.000	0.4384	1693751.	-517.3100	-0.0106	0.000	1.246E+10	-349.3854	4781.7975	0.000
102.000	0.3772	1692315.	-2607.1495	-0.009793	0.000	1.246E+10	-347.2278	5523.4217	0.000
108.000	0.3209	1677743.	-4680.1706	-0.008982	0.000	1.246E+10	-343.7793	6428.3337	0.000
114.000	0.2694	1650165.	-6618.7404	-0.008180	0.000	1.246E+10	-302.4107	6735.0391	0.000
120.000	0.2227	1611079.	-8294.9249	-0.007395	0.000	1.246E+10	-256.3175	6905.4096	0.000
126.000	0.1807	1562161.	-9793.6494	-0.006630	0.000	1.246E+10	-243.2573	8078.4928	0.000
132.000	0.1431	1503899.	-11212.	-0.005892	0.000	1.246E+10	-229.5039	9619.7366	0.000
138.000	0.1100	1436809.	-12545.	-0.005184	0.000	1.246E+10	-214.8640	11723.	0.000
144.000	0.0809	1361445.	-13787.	-0.004510	0.000	1.246E+10	-199.0190	14753.	0.000
150.000	0.0559	1278404.	-14928.	-0.003874	0.000	1.246E+10	-181.3909	19486.	0.000
156.000	0.0345	1188353.	-15954.	-0.003280	0.000	1.246E+10	-160.7625	27993.	0.000
162.000	0.0165	1092068.	-16838.	-0.002730	0.000	1.246E+10	-133.7340	48639.	0.000
168.000	0.001693	990558.	-17466.	-0.002229	0.000	1.246E+10	-75.7697	268465.	0.000
174.000	-0.0102	885948.	-17338.	-0.001777	0.000	1.246E+10	118.6913	69495.	0.000
180.000	-0.0196	785278.	-16563.	-0.001374	0.000	1.246E+10	139.6429	42688.	0.000
186.000	-0.0267	689341.	-15691.	-0.001019	0.000	1.246E+10	150.8675	33855.	0.000
192.000	-0.0319	598575.	-14766.	-0.000709	0.000	1.246E+10	157.6219	29688.	0.000
198.000	-0.0352	513259.	-13808.	-0.000441	0.000	1.246E+10	161.6564	27521.	0.000
204.000	-0.0371	433570.	-12831.	-0.000213	0.000	1.246E+10	163.7981	26456.	0.000
210.000	-0.0378	359614.	-11846.	-2.193E-05	0.000	1.246E+10	164.5118	26113.	0.000
216.000	-0.0374	291446.	-10861.	0.000135	0.000	1.246E+10	164.0882	26316.	0.000
222.000	-0.0362	229076.	-9880.2498	0.000260	0.000	1.246E+10	162.7222	26985.	0.000
228.000	-0.0343	172477.	-8910.4290	0.000357	0.000	1.246E+10	160.5514	28094.	0.000
234.000	-0.0319	121594.	-7955.7466	0.000428	0.000	1.246E+10	157.6761	29660.	0.000
240.000	-0.0292	76341.	-7020.2031	0.000475	0.000	1.246E+10			

```
154.1718     31728.      0.000
   246.000     -0.0262     36610. -6107.4013   0.000503      0.000  1.246E+10
150.0955     34384.      0.000
   252.000     -0.0231  2267.9269 -5220.6418   0.000512      0.000  1.246E+10
145.4910     37753.      0.000
   258.000     -0.0200    -26837. -4362.9961   0.000506      0.000  1.246E+10
140.3909     42019.      0.000
   264.000     -0.0170    -50878. -3537.3666   0.000487      0.000  1.246E+10
134.8189     47447.      0.000
   270.000     -0.0142    -70046. -2746.5395   0.000458      0.000  1.246E+10
128.7901     54427.      0.000
   276.000     -0.0115    -84551. -1993.2362   0.000421      0.000  1.246E+10
122.3110     63543.      0.000
   282.000  -0.009145    -94621. -1280.1687   0.000378      0.000  1.246E+10
115.3782     75699.      0.000
   288.000  -0.007014   -100503.  -610.1084   0.000331      0.000  1.246E+10
107.9753     92360.      0.000
   294.000  -0.005174   -102459.    14.0160   0.000282      0.000  1.246E+10
100.0662    116036.      0.000
   300.000  -0.003630   -100774.   588.9591   0.000233      0.000  1.246E+10
91.5815    151365.      0.000
   306.000  -0.002377    -95755.  1110.8604   0.000186      0.000  1.246E+10
82.3856    207917.      0.000
   312.000  -0.001401    -87734.  1574.5819   0.000142      0.000  1.246E+10
72.1882    309056.      0.000
   318.000  -0.000679    -77081.  1971.8276   0.000102      0.000  1.246E+10
60.2270    532162.      0.000
   324.000  -0.000179    -64231.  2307.1428  6.780E-05      0.000  1.246E+10
51.5447   1723730.      0.000
   330.000   0.000135    -49501.  2345.8038  4.041E-05      0.000  1.246E+10
-38.6577   1723730.      0.000
   336.000   0.000305    -36144.  2081.8531  1.978E-05      0.000  1.246E+10
-49.3258    968864.      0.000
   342.000   0.000372    -24549.  1778.4376  5.160E-06      0.000  1.246E+10
-51.8127    835907.      0.000
   348.000   0.000367    -14811.  1468.0366 -4.321E-06      0.000  1.246E+10
-51.6543    843603.      0.000
   354.000   0.000320 -6926.2506  1163.3630 -9.556E-06      0.000  1.246E+10
-49.9036    935527.      0.000
   360.000   0.000253   -835.5820   795.8505 -1.143E-05      0.000  1.246E+10
-72.6006   1723730.      0.000
   366.000   0.000183  2641.7799   420.3722 -1.099E-05      0.000  1.246E+10
-52.5589   1723730.      0.000
   372.000   0.000121  4226.0296   158.5632 -9.336E-06      0.000  1.246E+10
-34.7108   1723730.      0.000
   378.000  7.091E-05  4559.1028    -6.6847 -7.220E-06      0.000  1.246E+10
-20.3718   1723730.      0.000
   384.000  3.418E-05  4157.0769   -97.2559 -5.121E-06      0.000  1.246E+10
-9.8186   1723730.      0.000
   390.000  9.458E-06  3400.0205  -134.8631 -3.301E-06      0.000  1.246E+10
-2.7172   1723730.      0.000
   396.000 -5.434E-06  2543.8688  -138.3316 -1.869E-06      0.000  1.246E+10
1.5610   1723730.      0.000
   402.000 -1.297E-05  1742.9575  -122.4680 -8.367E-07      0.000  1.246E+10
3.7269   1723730.      0.000
   408.000 -1.547E-05  1075.5581   -97.9512 -1.578E-07      0.000  1.246E+10
4.4454   1723730.      0.000
   414.000 -1.487E-05   567.7898   -71.8022  2.380E-07      0.000  1.246E+10
4.2709   1723730.      0.000
   420.000 -1.262E-05   213.5601   -48.1149  4.262E-07      0.000  1.246E+10
3.6249   1723730.      0.000
   426.000 -9.752E-06   -10.2538   -28.8356  4.752E-07      0.000  1.246E+10
2.8016   1723730.      0.000
```



```
   432.000 -6.915E-06  -133.2078   -14.4707  4.406E-07      0.000  1.246E+10
1.9867   1723730.      0.000
   438.000 -4.464E-06  -184.5892    -4.6629  3.641E-07      0.000  1.246E+10
1.2825   1723730.      0.000
   444.000 -2.547E-06  -189.7302     1.3795  2.739E-07      0.000  1.246E+10
0.7316   1723730.      0.000
   450.000 -1.177E-06  -168.4623     4.5889  1.876E-07      0.000  1.246E+10
0.3382   1723730.      0.000
   456.000 -2.948E-07  -134.9556     5.8577  1.146E-07      0.000  1.246E+10
0.0847   1723730.      0.000
   462.000  1.975E-07   -98.3488     5.9416  5.837E-08      0.000  1.246E+10
-0.0567   1723730.      0.000
   468.000  4.056E-07   -63.7476     5.4218  1.933E-08      0.000  1.246E+10
-0.1165   1723730.      0.000
   474.000  4.294E-07   -33.3170     4.4246 -4.054E-09      0.000  1.246E+10
-0.2159   3016528.      0.000
   480.000  3.569E-07   -10.6456     2.9404 -1.464E-08      0.000  1.246E+10
-0.2788   4687500.      0.000
   486.000  2.537E-07     1.9912     1.5093 -1.673E-08      0.000  1.246E+10
-0.1982   4687500.      0.000
   492.000  1.562E-07     7.4925     0.5487 -1.444E-08      0.000  1.246E+10
-0.1220   4687500.      0.000
   498.000  8.037E-08     8.5978  -0.005793 -1.057E-08      0.000  1.246E+10
-0.0628   4687500.      0.000
   504.000  2.939E-08     7.4394    -0.2630 -6.705E-09      0.000  1.246E+10
-0.0230   4687500.      0.000
   510.000 -8.673E-11     5.4517    -0.3317 -3.600E-09      0.000  1.246E+10
6.776E-05   4687500.      0.000
   516.000 -1.381E-08     3.4644    -0.2992 -1.452E-09      0.000  1.246E+10
0.0108   4687500.      0.000
   522.000 -1.751E-08     1.8641    -0.2258 -1.688E-10      0.000  1.246E+10
0.0137   4687500.      0.000
   528.000 -1.583E-08     0.7556    -0.1476  4.622E-10      0.000  1.246E+10
0.0124   4687500.      0.000
   534.000 -1.197E-08     0.0921    -0.0825  6.664E-10      0.000  1.246E+10
0.009349   4687500.      0.000
   540.000 -7.835E-09    -0.2349    -0.0360  6.320E-10      0.000  1.246E+10
0.006121   4687500.      0.000
   546.000 -4.383E-09    -0.3414  -0.007407  4.932E-10      0.000  1.246E+10
0.003424   4687500.      0.000
   552.000 -1.917E-09    -0.3246   0.007359  3.327E-10      0.000  1.246E+10
0.001498   4687500.      0.000
   558.000 -3.899E-10    -0.2536     0.0128  1.935E-10      0.000  1.246E+10
0.000305   4687500.      0.000
   564.000  4.043E-10    -0.1717     0.0127  9.103E-11      0.000  1.246E+10
-0.000316   4687500.      0.000
   570.000  7.024E-10    -0.1010     0.0101  2.536E-11      0.000  1.246E+10
-0.000549   4687500.      0.000
   576.000  7.086E-10    -0.0500   0.006831 -1.102E-11      0.000  1.246E+10
-0.000554   4687500.      0.000
   582.000  5.702E-10    -0.0190   0.003834 -2.765E-11      0.000  1.246E+10
-0.000445   4687500.      0.000
   588.000  3.768E-10  -0.003993   0.001614 -3.319E-11      0.000  1.246E+10
-0.000294   4687500.      0.000
   594.000  1.719E-10   0.000421   0.000328 -3.405E-11      0.000  1.246E+10
-0.000134   4687500.      0.000
   600.000 -3.180E-11     0.000      0.000 -3.395E-11      0.000  1.246E+10
2.485E-05   2343750.      0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
```



```
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 4:

Pile-head deflection             =      1.9710425 inches
Computed slope at pile head      =     -0.0191048 radians
Maximum bending moment           =       1693751. inch-lbs
Maximum shear force              =         30000. lbs
Depth of maximum bending moment  =     96.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             37
Number of zero deflection points =              7



--------------------------------------------------------------------------------
                            Summary of Pile Response(s)
--------------------------------------------------------------------------------


Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians


Load  Load    Condition 1    Condition 2        Axial        Pile-Head       Maximum
       Maximum       Pile-Head
Case  Type    V(lbs) or     in-lb, rad.,        Load        Deflection       Moment
        Shear        Rotation
 No.   No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
        lbs           radians
----  ----  --------------  --------------  -------------  -------------
------------  ------------  -------------
  1     1   V = 10000.0000  M =      0.000        130000.     0.17594175
350021.     10000.0000     0.00000000
  2     1   V =     15000.  M =      0.000        130000.     0.42517066
625195.         15000.     0.00000000
  3     1   V =     20000.  M =      0.000        130000.     0.79935172
944602.         20000.     0.00000000
  4     1   V =     30000.  M =      0.000        130000.     1.97104253
1693751.         30000.     0.00000000

The analysis ended normally.
```

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.60000000000000E+0001 = Pipe pile diameter (in)
 5.00000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
3 = number of soil layers
3       -8.00000000000000E+0000  3.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.50000000000000E+0000  3.35000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.00000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.00000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.35000000000000E+0001  1.00000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
```

```
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

==========

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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==========

This program is licensed to:

L. Tran
PARIKH

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT\Analyses\
Name of input data file: San Leandro Creek BOH (B2 - B4).lp6d
Name of output file: San Leandro Creek BOH (B2 - B4).lp6o
Name of plot output file: San Leandro Creek BOH (B2 - B4).lp6p
Name of runtime file: San Leandro Creek BOH (B2 - B4).lp6r

Date and Time of Analysis

Date: November 17, 2011 Time: 16:03:44

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 2 THRU 4

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -8.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points. p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	16.0000000
2	50.000000	16.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 16.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -8.000 ft
Distance from top of pile to bottom of layer = 3.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 3.500 ft
Distance from top of pile to bottom of layer = 33.500 ft

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 33.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 50.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-8.00	125.00000
2	3.50	125.00000
3	3.50	62.60000
4	33.50	62.60000
5	33.50	62.60000
6	100.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type Test Type	Depth (p-y Curve Criteria) ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50 pci	kpy pci	Rock Emass psi	krm
1	Stiff Clay w/o Free Water	-8.000	125.000	1250.000	0.00	--	--	--	--	--	--
		3.500	125.000	1250.000	0.00	--	--	--	--	--	--
2	Stiff Clay w/o Free Water	3.500	62.600	1000.000	0.00	--	--	--	--	--	--
		33.500	62.600	1000.000	0.00	--	--	--	--	--	--
3	Stiff Clay w/o Free Water	33.500	62.600	2500.000	0.00	--	--	--	--	--	--
		100.000	62.600	2500.000	0.00	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load	Load	Condition 1	Condition 2	Axial Thrust

No.	Type				Force, lbs
1	1	V =	10000.000 lbs	M = 0.000 in-lbs	370000.000
2	1	V =	20000.000 lbs	M = 0.000 in-lbs	370000.000
3	1	V =	30000.000 lbs	M = 0.000 in-lbs	370000.000
4	1	V =	40000.000 lbs	M = 0.000 in-lbs	370000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	600.00000000	in
Outer Diameter of Pipe	=	16.00000000	in
Pipe Wall Thickness	=	0.50000000	in
Yield Stress of Pipe	=	45.00000000	ksi
Elastic Modulus	=	29000.	ksi
Cross-sectional Area	=	24.34734307	sq. in.
Moment of Inertia	=	731.94200090	in^4
Elastic Bending Stiffness	=	21226318.	lb-in^2
Plastic Modulus, Z	=	120.16666667	in^3
Plastic Moment Capacity = Fy Z	=	5407.50000000	in-kip
Nom. Axial Structural Capacity = Fy As	=	1095.630	kips
Nominal Axial Tensile Capacity	=	-1095.630	kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	370.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 370.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000003303	70.1099804	21226293.	166.6523345	15.9553581	
0.000006606	140.2199607	21226293.	87.3261673	16.7139861	
0.000009909	210.3299411	21226293.	60.8841115	17.4726140	
0.0000132	280.4399215	21226293.	47.6630836	18.2312422	
0.0000165	350.5499018	21226293.	39.7304669	18.9898699	
0.0000198	420.6598822	21226293.	34.4420558	19.7484980	
0.0000231	490.7698625	21226293.	30.6646192	20.5071261	

0.0000264	560.8798429	21226293.	27.8315418	21.2657540	
0.0000297	630.9898233	21226293.	25.6280372	22.0243821	
0.0000330	701.0998036	21226293.	23.8652335	22.7830101	
0.0000363	771.2097840	21226293.	22.4229395	23.5416380	
0.0000396	841.3197644	21226293.	21.2210279	24.3002661	
0.0000429	911.4297447	21226293.	20.2040257	25.0588941	
0.0000462	981.5397251	21226293.	19.3323096	25.8175220	
0.0000495	1051.6497054	21226293.	18.5768223	26.5761501	
0.0000528	1121.7596858	21226293.	17.9157709	27.3347781	
0.0000562	1191.8696662	21226293.	17.3324903	28.0934060	
0.0000595	1261.9796465	21226293.	16.8140186	28.8520341	
0.0000628	1332.0896269	21226293.	16.3501229	29.6106621	
0.0000661	1402.1996073	21226293.	15.9326167	30.3692901	
0.0000694	1472.3095876	21226293.	15.5548731	31.1279181	
0.0000727	1542.4195680	21226293.	15.2114698	31.8865461	
0.0000760	1612.5295484	21226293.	14.8979276	32.6451741	
0.0000793	1682.6395287	21226293.	14.6105139	33.4038021	
0.0000826	1752.7495091	21226293.	14.3460934	34.1624301	
0.0000859	1822.8594894	21226293.	14.1020129	34.9210581	
0.0000892	1892.9694698	21226293.	13.8760124	35.6796861	
0.0000925	1963.0794502	21226293.	13.6661548	36.4383141	
0.0000958	2033.1894305	21226293.	13.4707702	37.1969421	
0.0000991	2103.2994109	21226293.	13.2884112	37.9555701	
0.0001024	2173.4093913	21226293.	13.1178172	38.7141981	
0.0001057	2243.5193716	21226293.	12.9578855	39.4728261	
0.0001090	2313.6293520	21226293.	12.8076465	40.2314541	
0.0001123	2383.7393323	21226293.	12.6662451	40.9900821	
0.0001156	2453.8493127	21226293.	12.5329238	41.7487101	
0.0001189	2523.9592931	21226293.	12.4070093	42.5073381	
0.0001222	2594.0692734	21226293.	12.2879009	43.2659661	
0.0001255	2664.1792538	21226293.	12.1750614	44.0245941	
0.0001288	2734.2892342	21226293.	12.0680086	44.7832221	Y
0.0001354	2866.9718816	21170635.	11.8796433	45.0000000	Y
0.0001420	2978.5544808	20971592.	11.7365397	45.0000000	Y
0.0001486	3076.0201010	20695264.	11.6246759	45.0000000	Y
0.0001552	3163.1850276	20376100.	11.5358909	45.0000000	Y
0.0001618	3242.2891707	20033184.	11.4649973	45.0000000	Y
0.0001685	3314.7848579	19677933.	11.4084067	45.0000000	Y
0.0001751	3381.6515354	19317339.	11.3635416	45.0000000	Y
0.0001817	3443.5713722	18955739.	11.3284988	45.0000000	Y
0.0001883	3501.0544404	18595948.	11.3018159	45.0000000	Y
0.0001949	3554.8734049	18241748.	11.2818213	45.0000000	Y
0.0002015	3605.2703438	17893789.	11.2676920	45.0000000	Y
0.0002081	3652.5943181	17553156.	11.2585606	45.0000000	Y
0.0002147	3697.1623313	17220648.	11.2536696	45.0000000	Y
0.0002213	3739.4075994	16897495.	11.2521708	45.0000000	Y
0.0002279	3779.1051660	16581897.	11.2541663	45.0000000	Y
0.0002345	3816.8312719	16275672.	11.2586937	45.0000000	Y
0.0002411	3852.7103826	15978567.	11.2654480	45.0000000	Y
0.0002477	3886.8609526	15690329.	11.2741579	45.0000000	Y
0.0002543	3919.3959158	15410713.	11.2845805	45.0000000	Y
0.0002609	3950.4231141	15139476.	11.2964980	45.0000000	Y
0.0002675	3980.0456725	14876383.	11.3097133	45.0000000	Y
0.0002741	4008.3623300	14621206.	11.3240481	45.0000000	Y
0.0002808	4035.4677320	14373723.	11.3393396	45.0000000	Y
0.0002874	4061.4526904	14133719.	11.3554387	45.0000000	Y
0.0002940	4086.4044152	13900988.	11.3722083	45.0000000	Y
0.0003006	4110.4067215	13675327.	11.3895213	45.0000000	Y
0.0003072	4133.5402156	13456544.	11.4072594	45.0000000	Y
0.0003138	4155.8824619	13244451.	11.4253116	45.0000000	Y
0.0003204	4177.1669597	13037803.	11.4440471	45.0000000	Y
0.0003270	4197.7709713	12837423.	11.4629507	45.0000000	Y
0.0003336	4217.7661739	12643154.	11.4819272	45.0000000	Y

0.0003402	4237.0431956	12454319.	11.5011321	45.0000000	Y
0.0003468	4255.5468719	12270447.	11.5206545	45.0000000	Y
0.0003534	4273.6096598	12092202.	11.5400445	45.0000000	Y
0.0003600	4290.4097650	11916990.	11.5582468	45.0000000	Y
0.0003666	4306.5112932	11746187.	11.5763296	45.0000000	Y
0.0003732	4322.1427406	11580171.	11.5937314	45.0000000	Y
0.0003798	4335.9628653	11415161.	11.6092082	45.0000000	Y
0.0003864	4349.6713089	11255503.	11.6243286	45.0000000	Y
0.0003931	4362.3530681	11098599.	11.6390555	45.0000000	Y
0.0004195	4404.4318093	10499787.	11.6831503	45.0000000	Y
0.0004459	4437.6151732	9951996.	11.7157650	45.0000000	Y
0.0004723	4464.2614757	9451656.	11.7419536	45.0000000	Y
0.0004987	4486.3513288	8995196.	11.7628724	45.0000000	Y
0.0005252	4504.8959103	8577919.	11.7801068	45.0000000	Y
0.0005516	4520.6772185	8195611.	11.7948415	45.0000000	Y
0.0005780	4534.1895089	7844331.	11.8074250	45.0000000	Y
0.0006044	4545.6603898	7520387.	11.8172202	45.0000000	Y
0.0006309	4555.9460064	7221701.	11.8261639	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	370.000	4555.9

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	10000.000	lbs
Applied moment at pile head	=	0.000	in-lbs
Axial thrust load on pile head	=	370000.000	lbs

Depth x inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. Distrib. p lb/in	Soil Spr. Es*h lb/inch	Lat. Load lb/inch
0.00	0.0637	-5.728E-08	10000.	-0.001074	0.000	2.123E+10	-195.6689	9219.7642	0.000

6.000	0.0572	58862.	8821.4747	-0.001066	0.000	2.123E+10	-197.1729	20674.	0.000
12.000	0.0509	110589.	7636.1745	-0.001042	0.000	2.123E+10	-197.9272	23340.	0.000
18.000	0.0447	155121.	6448.6785	-0.001004	0.000	2.123E+10	-197.9048	26550.	0.000
24.000	0.0388	192432.	5263.7359	-0.000955	0.000	2.123E+10	-197.0761	30452.	0.000
30.000	0.0333	222527.	4086.2806	-0.000896	0.000	2.123E+10	-195.4090	35247.	0.000
36.000	0.0281	245447.	2921.4550	-0.000830	0.000	2.123E+10	-192.8662	41220.	0.000
42.000	0.0233	261270.	1806.6832	-0.000759	0.000	2.123E+10	-178.7244	46022.	0.000
48.000	0.0190	270496.	811.2854	-0.000683	0.000	2.123E+10	-153.0749	48415.	0.000
54.000	0.0151	274040.	-81.6980	-0.000607	0.000	2.123E+10	-144.5862	57455.	0.000
60.000	0.0117	272208.	-922.3614	-0.000529	0.000	2.123E+10	-135.6349	69602.	0.000
66.000	0.008747	265322.	-1707.7043	-0.000453	0.000	2.123E+10	-126.1460	86527.	0.000
72.000	0.006252	253728.	-2434.1169	-0.000380	0.000	2.123E+10	-115.9915	111311.	0.000
78.000	0.004188	237800.	-3096.8998	-0.000311	0.000	2.123E+10	-104.9361	150352.	0.000
84.000	0.002526	217944.	-3689.1694	-0.000246	0.000	2.123E+10	-92.4871	219663.	0.000
90.000	0.001235	194622.	-4198.6502	-0.000188	0.000	2.123E+10	-77.3398	375889.	0.000
96.000	0.000273	168394.	-4665.8332	-0.000136	0.000	2.123E+10	-78.3878	1723730.	0.000
102.000	-0.000403	139238.	-4725.7855	-9.300E-05	0.000	2.123E+10	58.4037	869094.	0.000
108.000	-0.000843	112098.	-4339.7835	-5.747E-05	0.000	2.123E+10	70.2636	500030.	0.000
114.000	-0.001093	87416.	-3904.0472	-2.928E-05	0.000	2.123E+10	74.9818	411648.	0.000
120.000	-0.001194	65379.	-3449.0912	-7.681E-06	0.000	2.123E+10	76.6702	385138.	0.000
126.000	-0.001185	46061.	-2989.5126	8.069E-06	0.000	2.123E+10	76.5227	387430.	0.000
132.000	-0.001098	29469.	-2534.7287	1.874E-05	0.000	2.123E+10	75.0720	410377.	0.000
138.000	-0.000960	15561.	-2091.6995	2.511E-05	0.000	2.123E+10	72.6044	453705.	0.000
144.000	-0.000796	4257.3434	-1666.0220	2.791E-05	0.000	2.123E+10	69.2881	522071.	0.000
150.000	-0.000625	-4554.8967	-1262.4838	2.787E-05	0.000	2.123E+10	65.2246	625915.	0.000
156.000	-0.000462	-11016.	-885.3964	2.567E-05	0.000	2.123E+10	60.4712	785510.	0.000
162.000	-0.000317	-15294.	-430.5621	2.195E-05	0.000	2.123E+10	91.1402	1723730.	0.000
168.000	-0.000199	-16280.	13.9592	1.749E-05	0.000	2.123E+10	57.0336	1723730.	0.000
174.000	-0.000107	-15204.	277.6382	1.304E-05	0.000	2.123E+10	30.8594	1723730.	0.000
180.000	-4.209E-05	-13007.	406.4963	9.049E-06	0.000	2.123E+10	12.0932	1723730.	0.000
186.000	1.168E-06	-10366.	441.7694	5.745E-06	0.000	2.123E+10	-0.3356	1723730.	0.000
192.000	2.685E-05	-7730.8841	417.6218	3.188E-06	0.000	2.123E+10			

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-7.7136   1723730.      0.000
   198.000  3.942E-05 -5368.6493   360.5064  1.336E-06      0.000  2.123E+10
-11.3249   1723730.      0.000
   204.000  4.288E-05 -3410.7403   289.5711  9.541E-08      0.000  2.123E+10
-12.3202   1723730.      0.000
   210.000  4.056E-05 -1894.2199   217.6490 -6.544E-07      0.000  2.123E+10
-11.6538   1723730.      0.000
   216.000  3.503E-05  -796.0469   152.4946 -1.035E-06      0.000  2.123E+10
-10.0644   1723730.      0.000
   222.000  2.815E-05   -59.6915    98.0402 -1.156E-06      0.000  2.123E+10
-8.0871    1723730.      0.000
   228.000  2.117E-05   385.5666    55.5369 -1.109E-06      0.000  2.123E+10
-6.0807    1723730.      0.000
   234.000  1.484E-05   611.6772    24.5081 -9.685E-07      0.000  2.123E+10
-4.2622    1723730.      0.000
   240.000  9.543E-06   683.9646     3.4963 -7.854E-07      0.000  2.123E+10
-2.7417    1723730.      0.000
   246.000  5.411E-06   657.1204    -9.3925 -5.959E-07      0.000  2.123E+10
-1.5545    1723730.      0.000
   252.000  2.393E-06   573.9009   -16.1185 -4.219E-07      0.000  2.123E+10
-0.6875    1723730.      0.000
   258.000  3.484E-07   465.5716   -18.4812 -2.750E-07      0.000  2.123E+10
-0.1001    1723730.      0.000
   264.000 -9.066E-07   353.3469   -18.0001 -1.592E-07      0.000  2.123E+10
0.2605    1723730.      0.000
   270.000 -1.562E-06   250.2775   -15.8721 -7.392E-08      0.000  2.123E+10
0.4489    1723730.      0.000
   276.000 -1.794E-06   163.2099   -12.9796 -1.548E-08      0.000  2.123E+10
0.5153    1723730.      0.000
   282.000 -1.748E-06    94.5908    -9.9270  2.096E-08      0.000  2.123E+10
0.5022    1723730.      0.000
   288.000 -1.542E-06    43.9925    -7.0912  4.054E-08      0.000  2.123E+10
0.4431    1723730.      0.000
   294.000 -1.262E-06     9.3167    -4.6746  4.808E-08      0.000  2.123E+10
0.3625    1723730.      0.000
   300.000 -9.653E-07   -12.3166    -2.7553  4.765E-08      0.000  2.123E+10
0.2773    1723730.      0.000
   306.000 -6.898E-07   -23.9588    -1.3289  4.253E-08      0.000  2.123E+10
0.1982    1723730.      0.000
   312.000 -4.550E-07   -28.4518    -0.3422  3.512E-08      0.000  2.123E+10
0.1307    1723730.      0.000
   318.000 -2.684E-07   -28.2215     0.2812  2.711E-08      0.000  2.123E+10
0.0771    1723730.      0.000
   324.000 -1.297E-07   -25.1978     0.6242  1.956E-08      0.000  2.123E+10
0.0372    1723730.      0.000
   330.000 -3.367E-08   -20.8174     0.7650  1.306E-08      0.000  2.123E+10
0.009673   1723730.      0.000
   336.000  2.701E-08   -16.0756     0.7708  7.841E-09      0.000  2.123E+10
-0.007760   1723730.      0.000
   342.000  6.043E-08   -11.6032     0.6954  3.929E-09      0.000  2.123E+10
-0.0174    1723730.      0.000
   348.000  7.416E-08    -7.7483     0.5794  1.194E-09      0.000  2.123E+10
-0.0213    1723730.      0.000
   354.000  7.476E-08    -4.6557     0.4511 -5.588E-10      0.000  2.123E+10
-0.0215    1723730.      0.000
   360.000  6.746E-08    -2.3332     0.3285 -1.547E-09      0.000  2.123E+10
-0.0194    1723730.      0.000
   366.000  5.620E-08    -0.7070     0.2219 -1.976E-09      0.000  2.123E+10
-0.0161    1723730.      0.000
   372.000  4.374E-08     0.3385     0.1358 -2.028E-09      0.000  2.123E+10
-0.0126    1723730.      0.000
   378.000  3.186E-08     0.9314     0.0706 -1.849E-09      0.000  2.123E+10
-0.009152   1723730.      0.000
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   384.000  2.155E-08     1.1942     0.0246 -1.548E-09      0.000  2.123E+10
-0.006192   1723730.      0.000
   390.000  1.328E-08     1.2333  -0.005429 -1.205E-09      0.000  2.123E+10
-0.003814   1723730.      0.000
   396.000  7.090E-09     1.1344    -0.0230 -8.707E-10      0.000  2.123E+10
-0.002037   1723730.      0.000
   402.000  2.828E-09     0.9614    -0.0334 -5.745E-10      0.000  2.123E+10
-0.001422   3016528.      0.000
   408.000  1.961E-10     0.7367    -0.0381 -3.345E-10      0.000  2.123E+10
-0.000153   4687500.      0.000
   414.000 -1.186E-09     0.5059    -0.0358 -1.589E-10      0.000  2.123E+10
0.000927   4687500.      0.000
   420.000 -1.711E-09     0.3082    -0.0290 -4.382E-11      0.000  2.123E+10
0.001336   4687500.      0.000
   426.000 -1.712E-09     0.1584    -0.0210  2.214E-11      0.000  2.123E+10
0.001338   4687500.      0.000
   432.000 -1.445E-09     0.0567    -0.0136  5.255E-11      0.000  2.123E+10
0.001129   4687500.      0.000
   438.000 -1.082E-09  -0.004405  -0.007630  5.994E-11      0.000  2.123E+10
0.000845   4687500.      0.000
   444.000 -7.256E-10    -0.0351  -0.003395  5.436E-11      0.000  2.123E+10
0.000567   4687500.      0.000
   450.000 -4.292E-10    -0.0454  -0.000688  4.298E-11      0.000  2.123E+10
0.000335   4687500.      0.000
   456.000 -2.098E-10    -0.0436   0.000810  3.041E-11      0.000  2.123E+10
0.000164   4687500.      0.000
   462.000 -6.431E-11    -0.0358   0.001452  1.919E-11      0.000  2.123E+10
5.024E-05   4687500.      0.000
   468.000  2.050E-11    -0.0262   0.001555  1.043E-11      0.000  2.123E+10
-1.601E-05   4687500.      0.000
   474.000  6.085E-11    -0.0172   0.001364  4.296E-12      0.000  2.123E+10
-4.754E-05   4687500.      0.000
   480.000  7.205E-11  -0.0009861   0.001053      0.000      0.000  2.123E+10
-5.629E-05   4687500.      0.000
   486.000  6.652E-11  -0.004555   0.000728 -1.564E-12      0.000  2.123E+10
-5.197E-05   4687500.      0.000
   492.000  5.327E-11  -0.001116   0.000447 -2.366E-12      0.000  2.123E+10
-4.162E-05   4687500.      0.000
   498.000  3.813E-11   0.000824   0.000233 -2.407E-12      0.000  2.123E+10
-2.979E-05   4687500.      0.000
   504.000  2.438E-11   0.001692  8.661E-05 -2.052E-12      0.000  2.123E+10
-1.905E-05   4687500.      0.000
   510.000  1.351E-11   0.001872 -2.204E-06 -1.548E-12      0.000  2.123E+10
-1.055E-05   4687500.      0.000
   516.000  5.807E-12   0.001672 -4.747E-05 -1.047E-12      0.000  2.123E+10
-4.537E-06   4687500.      0.000
   522.000      0.000   0.001307 -6.330E-05      0.000      0.000  2.123E+10
-7.366E-07   4687500.      0.000
   528.000 -1.704E-12   0.000915 -6.151E-05      0.000      0.000  2.123E+10
1.332E-06   4687500.      0.000
   534.000 -2.799E-12   0.000571 -5.095E-05      0.000      0.000  2.123E+10
2.187E-06   4687500.      0.000
   540.000 -2.927E-12   0.000304 -3.753E-05      0.000      0.000  2.123E+10
2.286E-06   4687500.      0.000
   546.000 -2.538E-12   0.000120 -2.473E-05      0.000      0.000  2.123E+10
1.983E-06   4687500.      0.000
   552.000 -1.945E-12  7.201E-06 -1.422E-05      0.000      0.000  2.123E+10
1.520E-06   4687500.      0.000
   558.000 -1.340E-12 -5.100E-05 -6.521E-06      0.000      0.000  2.123E+10
1.047E-06   4687500.      0.000
   564.000      0.000 -7.147E-05 -1.453E-06      0.000      0.000  2.123E+10
6.422E-07   4687500.      0.000
   570.000      0.000 -6.878E-05  1.469E-06      0.000      0.000  2.123E+10
```



```
3.319E-07   4687500.      0.000
   576.000      0.000 -5.409E-05  2.803E-06      0.000      0.000  2.123E+10
1.128E-07   4687500.      0.000
   582.000      0.000 -3.531E-05  3.038E-06      0.000      0.000  2.123E+10
-3.461E-08   4687500.      0.000
   588.000      0.000 -1.776E-05  2.528E-06      0.000      0.000  2.123E+10
-1.352E-07   4687500.      0.000
   594.000      0.000 -5.057E-06  1.485E-06      0.000      0.000  2.123E+10
-2.124E-07   4687500.      0.000
   600.000      0.000      0.000      0.000      0.000      0.000  2.123E+10
-2.828E-07   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =      0.0636683 inches
Computed slope at pile head       =     -0.0010740 radians
Maximum bending moment            =        274040. inch-lbs
Maximum shear force               =         10000. lbs
Depth of maximum bending moment   =     54.000000 inches below pile head
Depth of maximum shear force      =      0.000000 inches below pile head
Number of iterations              =             22
Number of zero deflection points  =              8
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                    =       20000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      370000.000 lbs
```

```
   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y         Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches      in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ---------
---------- ---------- ----------
      0.00     0.3286 -6.546E-08     20000.  -0.004086      0.000  2.123E+10
-294.9084  2692.2667      0.000
     6.000     0.3041    123764.     18217.  -0.004069      0.000  2.123E+10
-299.3490  5906.2874      0.000
    12.000     0.2798    236673.     16410.  -0.004018      0.000  2.123E+10
-303.0728  6499.2922      0.000
    18.000     0.2559    338523.     14583.  -0.003937      0.000  2.123E+10
-306.0560  7176.4742      0.000
```



```
    24.000     0.2325    429143.     12740.  -0.003828      0.000  2.123E+10
-308.2741  7953.7615      0.000
    30.000     0.2099    508395.     10886.  -0.003696      0.000  2.123E+10
-309.7017  8850.9639      0.000
    36.000     0.1882    576179.  9025.6168  -0.003542      0.000  2.123E+10
-310.3120  9892.9776      0.000
    42.000     0.1674    632431.  7216.9037  -0.003372      0.000  2.123E+10
-292.5924     10485.      0.000
    48.000     0.1477    677752.  5572.0519  -0.003186      0.000  2.123E+10
-255.6915     10384.      0.000
    54.000     0.1292    713443.  4063.1955  -0.002990      0.000  2.123E+10
-247.2606     11483.      0.000
    60.000     0.1119    739785.  2605.8708  -0.002784      0.000  2.123E+10
-238.5143     12793.      0.000
    66.000     0.0958    757076.  1202.0118  -0.002573      0.000  2.123E+10
-229.4387     14372.      0.000
    72.000     0.0810    765633.  -146.3472  -0.002358      0.000  2.123E+10
-220.0143     16299.      0.000
    78.000     0.0675    765788. -1437.0287  -0.002141      0.000  2.123E+10
-210.2129     18687.      0.000
    84.000     0.0553    757895. -2667.6503  -0.001926      0.000  2.123E+10
-199.9944     21701.      0.000
    90.000     0.0444    742327. -3835.5341  -0.001714      0.000  2.123E+10
-189.3002     25590.      0.000
    96.000     0.0347    719478. -4937.5625  -0.001507      0.000  2.123E+10
-178.0426     30758.      0.000
   102.000     0.0263    689768. -5969.9398  -0.001308      0.000  2.123E+10
-166.0832     37893.      0.000
   108.000     0.0190    653646. -6927.7619  -0.001118      0.000  2.123E+10
-153.1968     48289.      0.000
   114.000     0.0129    611600. -7804.1539  -0.000939      0.000  2.123E+10
-138.9398     64725.      0.000
   120.000   0.007762    564167. -8588.2330  -0.000773      0.000  2.123E+10
-122.4198     94625.      0.000
   126.000   0.003602    511974. -9258.6111  -0.000621      0.000  2.123E+10
-101.0395    168312.      0.000
   132.000   0.000310    455821. -9828.5795  -0.000484      0.000  2.123E+10
-88.9499   1723730.      0.000
   138.000  -0.002210    396181. -9827.1855  -0.000364      0.000  2.123E+10
89.4146    242805.      0.000
   144.000  -0.004057    339511. -9246.6870  -0.000260      0.000  2.123E+10
104.0849    153942.      0.000
   150.000  -0.005328    286375. -8600.1505  -0.000171      0.000  2.123E+10
111.4273    125477.      0.000
   156.000  -0.006114    237070. -7919.8892 -9.745E-05      0.000  2.123E+10
115.3265    113178.      0.000
   162.000  -0.006498    191769. -7222.6238 -3.684E-05      0.000  2.123E+10
117.0953    108128.      0.000
   168.000  -0.006556    150562. -6519.2634  1.154E-05      0.000  2.123E+10
117.3582    107406.      0.000
   174.000  -0.006359    113486. -5817.7867  4.886E-05      0.000  2.123E+10
116.4674    109892.      0.000
   180.000  -0.005970     80532. -5124.4571  7.629E-05      0.000  2.123E+10
114.6425    115226.      0.000
   186.000  -0.005444     51654. -4444.4400  9.497E-05      0.000  2.123E+10
112.0299    123480.      0.000
   192.000  -0.004830     26777. -3782.1583   0.000106      0.000  2.123E+10
108.7307    135069.      0.000
   198.000  -0.004171  5797.2493 -3141.5175   0.000111      0.000  2.123E+10
104.8162    150779.      0.000
   204.000  -0.003502    -11413. -2526.0611   0.000110      0.000  2.123E+10
100.3359    171900.      0.000
   210.000  -0.002853    -25003. -1939.0897   0.000105      0.000  2.123E+10
```

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95.3212    200491.      0.000
   216.000  -0.002246    -35147. -1383.7644  9.621E-05      0.000  2.123E+10
89.7872    239908.      0.000
   222.000  -0.001698    -42036.  -863.2136  8.531E-05      0.000  2.123E+10
83.7297    295855.      0.000
   228.000  -0.001222    -45884.  -380.6700  7.288E-05      0.000  2.123E+10
77.1182    378690.      0.000
   234.000  -0.000823    -46927.    60.3127  5.976E-05      0.000  2.123E+10
69.8761    509118.      0.000
   240.000  -0.000505    -45426.   455.4284  4.671E-05      0.000  2.123E+10
61.8291    735019.      0.000
   246.000  -0.000263    -41670.   867.5656  3.440E-05      0.000  2.123E+10
75.5499   1723730.      0.000
   252.000 -9.191E-05    -35168.  1173.4285  2.354E-05      0.000  2.123E+10
26.4044   1723730.      0.000
   258.000  1.951E-05    -27693.  1235.8237  1.466E-05      0.000  2.123E+10
-5.6060   1723730.      0.000
   264.000  8.397E-05    -20403.  1146.6361  7.859E-06      0.000  2.123E+10
-24.1232   1723730.      0.000
   270.000   0.000114    -13968.   976.1686  3.001E-06      0.000  2.123E+10
-32.6993   1723730.      0.000
   276.000   0.000120 -8702.0126   774.6622 -2.029E-07      0.000  2.123E+10
-34.4695   1723730.      0.000
   282.000   0.000111 -4671.3096   575.2546 -2.093E-06      0.000  2.123E+10
-31.9997   1723730.      0.000
   288.000  9.487E-05 -1789.6644   397.4940 -3.006E-06      0.000  2.123E+10
-27.2538   1723730.      0.000
   294.000  7.531E-05   111.9659   250.8246 -3.243E-06      0.000  2.123E+10
-21.6360   1723730.      0.000
   300.000  5.595E-05  1234.6311   137.6988 -3.053E-06      0.000  2.123E+10
-16.0726   1723730.      0.000
   306.000  3.868E-05  1777.9063    56.1481 -2.627E-06      0.000  2.123E+10
-11.1109   1723730.      0.000
   312.000  2.442E-05  1920.0733     1.7691 -2.105E-06      0.000  2.123E+10
-7.0154   1723730.      0.000
   318.000  1.342E-05  1808.4801   -30.8436 -1.578E-06      0.000  2.123E+10
-3.8555   1723730.      0.000
   324.000  5.488E-06  1556.9543   -47.1403 -1.102E-06      0.000  2.123E+10
-1.5767   1723730.      0.000
   330.000  1.970E-07  1247.6889   -52.0403 -7.056E-07      0.000  2.123E+10
-0.0566   1723730.      0.000
   336.000 -2.978E-06   935.6033   -49.6432 -3.970E-07      0.000  2.123E+10
0.8556   1723730.      0.000
   342.000 -4.567E-06   653.7331   -43.1404 -1.723E-07      0.000  2.123E+10
1.3120   1723730.      0.000
   348.000 -5.046E-06   418.6835   -34.8551 -2.078E-08      0.000  2.123E+10
1.4498   1723730.      0.000
   354.000 -4.816E-06   235.5637   -26.3549  7.169E-08      0.000  2.123E+10
1.3836   1723730.      0.000
   360.000 -4.186E-06   102.1062   -18.5961  1.194E-07      0.000  2.123E+10
1.2027   1723730.      0.000
   366.000 -3.383E-06    11.8801   -12.0723  1.355E-07      0.000  2.123E+10
0.9719   1723730.      0.000
   372.000 -2.560E-06   -43.3634    -6.9501  1.311E-07      0.000  2.123E+10
0.7354   1723730.      0.000
   378.000 -1.810E-06   -72.1036    -3.1835  1.148E-07      0.000  2.123E+10
0.5201   1723730.      0.000
   384.000 -1.183E-06   -82.0755    -0.6038  9.296E-08      0.000  2.123E+10
0.3398   1723730.      0.000
   390.000 -6.948E-07   -79.7615     1.0146  7.009E-08      0.000  2.123E+10
0.1996   1723730.      0.000
   396.000 -3.419E-07   -70.2118     1.9080  4.889E-08      0.000  2.123E+10
0.0982   1723730.      0.000
```



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   402.000 -1.081E-07   -57.0821     2.3657  3.090E-08      0.000  2.123E+10
0.0543   3016528.      0.000
   408.000  2.893E-08   -41.9607     2.4609  1.690E-08      0.000  2.123E+10
-0.0226   4687500.      0.000
   414.000  9.477E-08   -27.6267     2.1710  7.068E-09      0.000  2.123E+10
-0.0740   4687500.      0.000
   420.000  1.137E-07   -15.9406     1.6823  9.103E-10      0.000  2.123E+10
-0.0889   4687500.      0.000
   426.000  1.057E-07    -7.4436     1.1680 -2.395E-09      0.000  2.123E+10
-0.0826   4687500.      0.000
   432.000  8.501E-08    -1.9145     0.7210 -3.717E-09      0.000  2.123E+10
-0.0664   4687500.      0.000
   438.000  6.108E-08     1.2249     0.3786 -3.815E-09      0.000  2.123E+10
-0.0477   4687500.      0.000
   444.000  3.923E-08     2.6456     0.1435 -3.268E-09      0.000  2.123E+10
-0.0307   4687500.      0.000
   450.000  2.187E-08     2.9611   0.000264 -2.475E-09      0.000  2.123E+10
-0.0171   4687500.      0.000
   456.000  9.530E-09     2.6597    -0.0733 -1.681E-09      0.000  2.123E+10
-0.007445   4687500.      0.000
   462.000  1.700E-09     2.0886    -0.0997 -1.010E-09      0.000  2.123E+10
-0.001328   4687500.      0.000
   468.000 -2.587E-09     1.4684    -0.0976 -5.070E-10      0.000  2.123E+10
0.002021   4687500.      0.000
   474.000 -4.384E-09     0.9200    -0.0812 -1.695E-10      0.000  2.123E+10
0.003425   4687500.      0.000
   480.000 -4.621E-09     0.4944    -0.0601  3.042E-11      0.000  2.123E+10
0.003610   4687500.      0.000
   486.000 -4.019E-09     0.1984    -0.0399  1.283E-10      0.000  2.123E+10
0.003140   4687500.      0.000
   492.000 -3.081E-09     0.0153    -0.0232  1.585E-10      0.000  2.123E+10
0.002407   4687500.      0.000
   498.000 -2.117E-09    -0.0811    -0.0110  1.492E-10      0.000  2.123E+10
0.001654   4687500.      0.000
   504.000 -1.291E-09    -0.1179  -0.003061  1.211E-10      0.000  2.123E+10
0.001008   4687500.      0.000
   510.000 -6.641E-10    -0.1184   0.001520  8.769E-11      0.000  2.123E+10
0.000519   4687500.      0.000
   516.000 -2.384E-10    -0.1001   0.003636  5.681E-11      0.000  2.123E+10
0.000186   4687500.      0.000
   522.000  1.764E-11    -0.0750   0.004153  3.207E-11      0.000  2.123E+10
-1.378E-05   4687500.      0.000
   528.000  1.464E-10    -0.0504   0.003768  1.434E-11      0.000  2.123E+10
-0.000114   4687500.      0.000
   534.000  1.898E-10    -0.0299   0.002980  3.004E-12      0.000  2.123E+10
-0.000148   4687500.      0.000
   540.000  1.825E-10    -0.0146   0.002108 -3.283E-12      0.000  2.123E+10
-0.000143   4687500.      0.000
   546.000  1.504E-10  -0.004540   0.001328 -5.993E-12      0.000  2.123E+10
-0.000117   4687500.      0.000
   552.000  1.106E-10   0.001328   0.000716 -6.447E-12      0.000  2.123E+10
-8.637E-05   4687500.      0.000
   558.000  7.300E-11   0.004085   0.000286 -5.682E-12      0.000  2.123E+10
-5.703E-05   4687500.      0.000
   564.000  4.238E-11   0.004787  1.571E-05 -4.428E-12      0.000  2.123E+10
-3.311E-05   4687500.      0.000
   570.000  1.987E-11   0.004293  -0.000130 -3.145E-12      0.000  2.123E+10
-1.552E-05   4687500.      0.000
   576.000  4.639E-12   0.003239  -0.000188 -2.080E-12      0.000  2.123E+10
-3.624E-06   4687500.      0.000
   582.000 -5.097E-12   0.002051  -0.000187 -1.333E-12      0.000  2.123E+10
3.982E-06   4687500.      0.000
   588.000 -1.135E-11   0.001006  -0.000148      0.000      0.000  2.123E+10
```



```
8.870E-06   4687500.      0.000
   594.000 -1.590E-11   0.000279 -8.410E-05      0.000      0.000  2.123E+10
1.242E-05   4687500.      0.000
   600.000 -1.998E-11      0.000      0.000      0.000      0.000  2.123E+10
1.561E-05   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection             =      0.3286172 inches
Computed slope at pile head      =     -0.0040864 radians
Maximum bending moment           =        765788. inch-lbs
Maximum shear force              =         20000. lbs
Depth of maximum bending moment  =     78.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             28
Number of zero deflection points =              7
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                  =       30000.000 lbs
Applied moment at pile head                          =           0.000 in-lbs
Axial thrust load on pile head                       =      370000.000 lbs
```

```
   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y       Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches    in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.8806  5.237E-07     30000.  -0.009124      0.000  2.123E+10
-377.3216  1285.3821      0.000
     6.000     0.8259    193463.     27715.  -0.009097      0.000  2.123E+10
-384.2847  2791.7499      0.000
    12.000     0.7715    372971.     25391.  -0.009017      0.000  2.123E+10
-390.5420  3037.3272      0.000
    18.000     0.7177    538186.     23031.  -0.008888      0.000  2.123E+10
-396.0714  3311.1654      0.000
    24.000     0.6648    688804.     20640.  -0.008714      0.000  2.123E+10
-400.8508  3617.6182      0.000
    30.000     0.6131    824559.     18223.  -0.008501      0.000  2.123E+10
-404.8575  3961.8847      0.000
    36.000     0.5628    945222.     15784.  -0.008250      0.000  2.123E+10
-408.0683  4350.2167      0.000
```



```
    42.000     0.5141   1050601.     13398.  -0.007968      0.000  2.123E+10
-387.3153  4520.1003      0.000
    48.000     0.4672   1141377.     11213.  -0.007659      0.000  2.123E+10
-340.9680  4378.8218      0.000
    54.000     0.4222   1219163.  9192.9468  -0.007325      0.000  2.123E+10
-332.4468  4724.2480      0.000
    60.000     0.3793   1284215.  7224.6354  -0.006971      0.000  2.123E+10
-323.6570  5119.7170      0.000
    66.000     0.3386   1336810.  5309.8842  -0.006601      0.000  2.123E+10
-314.5934  5575.1123      0.000
    72.000     0.3001   1377241.  3450.3566  -0.006217      0.000  2.123E+10
-305.2491  6102.9705      0.000
    78.000     0.2640   1405818.  1647.7665  -0.005824      0.000  2.123E+10
-295.6142  6719.4072      0.000
    84.000     0.2302   1422871.   -96.1023  -0.005424      0.000  2.123E+10
-285.6754  7445.4575      0.000
    90.000     0.1989   1428747. -1779.3723  -0.005021      0.000  2.123E+10
-275.4146  8309.0673      0.000
    96.000     0.1700   1423811. -3400.0395  -0.004618      0.000  2.123E+10
-264.8078  9348.1392      0.000
   102.000     0.1435   1408449. -4955.9289  -0.004217      0.000  2.123E+10
-253.8220     10615.      0.000
   108.000     0.1194   1383065. -6444.6316  -0.003823      0.000  2.123E+10
-242.4122     12186.      0.000
   114.000     0.0976   1348087. -7863.4118  -0.003437      0.000  2.123E+10
-230.5145     14172.      0.000
   120.000     0.0781   1303964. -9209.0647  -0.003062      0.000  2.123E+10
-218.0365     16748.      0.000
   126.000     0.0608   1251174.    -10478.  -0.002701      0.000  2.123E+10
-204.8380     20199.      0.000
   132.000     0.0457   1190224.    -11664.  -0.002356      0.000  2.123E+10
-190.6955     25036.      0.000
   138.000     0.0326   1121662.    -12762.  -0.002029      0.000  2.123E+10
-175.2223     32274.      0.000
   144.000     0.0214   1046089.    -13761.  -0.001723      0.000  2.123E+10
-157.6670     44306.      0.000
   150.000     0.0119    964183.    -14642.  -0.001439      0.000  2.123E+10
-136.2466     68682.      0.000
   156.000   0.004088    876767.    -15364.  -0.001178      0.000  2.123E+10
-104.3395    153131.      0.000
   162.000  -0.002239    785045.    -15408.  -0.000944      0.000  2.123E+10
89.6278    240194.      0.000
   168.000  -0.007235    696056.    -14779.  -0.000734      0.000  2.123E+10
120.2459     99726.      0.000
   174.000    -0.0110    610960.    -14017.  -0.000550      0.000  2.123E+10
133.6904     72594.      0.000
   180.000    -0.0138    530293.    -13192.  -0.000388      0.000  2.123E+10
141.4085     61354.      0.000
   186.000    -0.0157    454384.    -12329.  -0.000249      0.000  2.123E+10
145.9897     55763.      0.000
   192.000    -0.0168    383446.    -11446.  -0.000131      0.000  2.123E+10
148.5028     52982.      0.000
   198.000    -0.0173    317613.    -10552. -3.155E-05      0.000  2.123E+10
149.5064     51924.      0.000
   204.000    -0.0172    256963. -9655.3974  4.966E-05      0.000  2.123E+10
149.3338     52106.      0.000
   210.000    -0.0167    201528. -8762.7910   0.000114      0.000  2.123E+10
148.2017     53310.      0.000
   216.000    -0.0158    151301. -7879.4084   0.000164      0.000  2.123E+10
146.2592     55463.      0.000
   222.000    -0.0147    106245. -7009.7904   0.000201      0.000  2.123E+10
143.6135     58586.      0.000
   228.000    -0.0134     66292. -6157.9183   0.000225      0.000  2.123E+10
```

```
140.3438     62777.      0.000
   234.000    -0.0120     31351. -5327.3579   0.000239      0.000  2.123E+10
136.5096     68217.      0.000
   240.000    -0.0105   1303.3639 -4521.3619   0.000244      0.000  2.123E+10
132.1557     75184.      0.000
   246.000  -0.009084    -23987. -3742.9487   0.000240      0.000  2.123E+10
127.3154     84089.      0.000
   252.000  -0.007663    -44679. -2994.9662   0.000231      0.000  2.123E+10
122.0122     95537.      0.000
   258.000  -0.006317    -60951. -2280.1478   0.000216      0.000  2.123E+10
116.2607    110429.      0.000
   264.000  -0.005074    -72998. -1601.1678   0.000197      0.000  2.123E+10
110.0660    130142.      0.000
   270.000  -0.003956    -81038.  -960.7033   0.000175      0.000  2.123E+10
103.4222    156867.      0.000
   276.000  -0.002975    -85304.  -361.5141   0.000151      0.000  2.123E+10
96.3076    194261.      0.000
   282.000  -0.002138    -86049.   193.4374   0.000127      0.000  2.123E+10
88.6762    248850.      0.000
   288.000  -0.001447    -83548.   700.7752   0.000103      0.000  2.123E+10
80.4364    333418.      0.000
   294.000  -0.000899    -78098.  1156.2784  8.044E-05      0.000  2.123E+10
71.3980    476727.      0.000
   300.000  -0.000482    -70029.  1553.7919  5.951E-05      0.000  2.123E+10
61.1064    760386.      0.000
   306.000  -0.000185    -59717.  1896.1397  4.117E-05      0.000  2.123E+10
53.0095   1723730.      0.000
   312.000  1.186E-05    -47459.  2044.9460  2.602E-05      0.000  2.123E+10
-3.4074   1723730.      0.000
   318.000   0.000128    -35293.  1924.6226  1.433E-05      0.000  2.123E+10
-36.7004   1723730.      0.000
   324.000   0.000184    -24427.  1656.1303  5.886E-06      0.000  2.123E+10
-52.7970   1723730.      0.000
   330.000   0.000198    -15446.  1326.7634  2.506E-07      0.000  2.123E+10
-56.9919   1723730.      0.000
   336.000   0.000187 -8506.6723   994.8047 -3.135E-06      0.000  2.123E+10
-53.6610   1723730.      0.000
   342.000   0.000161 -3494.1139   695.2661 -4.831E-06      0.000  2.123E+10
-46.1852   1723730.      0.000
   348.000   0.000129  -142.0309   445.6895 -5.345E-06      0.000  2.123E+10
-37.0070   1723730.      0.000
   354.000  9.663E-05  1877.8902   251.3900 -5.099E-06      0.000  2.123E+10
-27.7595   1723730.      0.000
   360.000  6.762E-05  2897.2900   109.8302 -4.424E-06      0.000  2.123E+10
-19.4271   1723730.      0.000
   366.000  4.353E-05  3215.4976    14.0302 -3.561E-06      0.000  2.123E+10
-12.5063   1723730.      0.000
   372.000  2.490E-05  3081.4610   -44.9454 -2.671E-06      0.000  2.123E+10
-7.1522   1723730.      0.000
   378.000  1.149E-05  2688.0099   -76.3010 -1.855E-06      0.000  2.123E+10
-3.2996   1723730.      0.000
   384.000  2.634E-06  2174.0856   -88.4700 -1.168E-06      0.000  2.123E+10
-0.7567   1723730.      0.000
   390.000 -2.530E-06  1631.5551   -88.5596 -6.301E-07      0.000  2.123E+10
0.7269   1723730.      0.000
   396.000 -4.927E-06  1114.1683   -82.1324 -2.420E-07      0.000  2.123E+10
1.4155   1723730.      0.000
   402.000 -5.434E-06   647.0404   -69.6893  6.890E-09      0.000  2.123E+10
2.7322   3016528.      0.000
   408.000 -4.844E-06   277.8659   -50.1385  1.376E-07      0.000  2.123E+10
3.7847   4687500.      0.000
   414.000 -3.783E-06    44.7669   -29.9176  1.832E-07      0.000  2.123E+10
2.9556   4687500.      0.000
```



```
   420.000 -2.646E-06   -81.9592   -14.8495  1.780E-07      0.000  2.123E+10
2.0671   4687500.      0.000
   426.000 -1.648E-06  -134.2170    -4.7863  1.474E-07      0.000  2.123E+10
1.2873   4687500.      0.000
   432.000 -8.771E-07  -140.0488     1.1313  1.086E-07      0.000  2.123E+10
0.6853   4687500.      0.000
   438.000 -3.441E-07  -121.1235     3.9935  7.172E-08      0.000  2.123E+10
0.2688   4687500.      0.000
   444.000 -1.644E-08   -92.4451     4.8385  4.154E-08      0.000  2.123E+10
0.0128   4687500.      0.000
   450.000  1.544E-07   -63.2464     4.5151  1.954E-08      0.000  2.123E+10
-0.1206   4687500.      0.000
   456.000  2.180E-07   -38.3506     3.6423  5.176E-09      0.000  2.123E+10
-0.1703   4687500.      0.000
   462.000  2.165E-07   -19.5615     2.6240 -3.009E-09      0.000  2.123E+10
-0.1692   4687500.      0.000
   468.000  1.819E-07    -6.8497     1.6902 -6.742E-09      0.000  2.123E+10
-0.1421   4687500.      0.000
   474.000  1.356E-07     0.7511     0.9461 -7.604E-09      0.000  2.123E+10
-0.1059   4687500.      0.000
   480.000  9.063E-08     4.5374     0.4158 -6.856E-09      0.000  2.123E+10
-0.0708   4687500.      0.000
   486.000  5.334E-08     5.7718     0.0784 -5.399E-09      0.000  2.123E+10
-0.0417   4687500.      0.000
   492.000  2.584E-08     5.5023    -0.1072 -3.806E-09      0.000  2.123E+10
-0.0202   4687500.      0.000
   498.000  7.670E-09     4.5027    -0.1857 -2.392E-09      0.000  2.123E+10
-0.005993   4687500.      0.000
   504.000 -2.862E-09     3.2846    -0.1970 -1.291E-09      0.000  2.123E+10
0.002236   4687500.      0.000
   510.000 -7.823E-09     2.1449    -0.1719 -5.238E-10      0.000  2.123E+10
0.006112   4687500.      0.000
   516.000 -9.147E-09     1.2238    -0.1322 -4.767E-11      0.000  2.123E+10
0.007146   4687500.      0.000
   522.000 -8.395E-09     0.5593    -0.0910  2.043E-10      0.000  2.123E+10
0.006559   4687500.      0.000
   528.000 -6.695E-09     0.1305    -0.0557  3.018E-10      0.000  2.123E+10
0.005231   4687500.      0.000
   534.000 -4.774E-09    -0.1101    -0.0288  3.047E-10      0.000  2.123E+10
0.003729   4687500.      0.000
   540.000 -3.039E-09    -0.2163    -0.0105  2.586E-10      0.000  2.123E+10
0.002374   4687500.      0.000
   546.000 -1.671E-09    -0.2370   0.000561  1.945E-10      0.000  2.123E+10
0.001305   4687500.      0.000
   552.000 -7.049E-10    -0.2105   0.006129  1.313E-10      0.000  2.123E+10
0.000551   4687500.      0.000
   558.000 -9.581E-11    -0.1640   0.008006  7.833E-11      0.000  2.123E+10
7.485E-05   4687500.      0.000
   564.000  2.351E-10    -0.1147   0.007679  3.893E-11      0.000  2.123E+10
-0.000184   4687500.      0.000
   570.000  3.714E-10    -0.0720   0.006258  1.254E-11      0.000  2.123E+10
-0.000290   4687500.      0.000
   576.000  3.855E-10    -0.0397   0.004484 -3.253E-12      0.000  2.123E+10
-0.000301   4687500.      0.000
   582.000  3.324E-10    -0.0182   0.002801 -1.144E-11      0.000  2.123E+10
-0.000260   4687500.      0.000
   588.000  2.483E-10  -0.006039   0.001440 -1.486E-11      0.000  2.123E+10
-0.000194   4687500.      0.000
   594.000  1.540E-10  -0.000854   0.000497 -1.584E-11      0.000  2.123E+10
-0.000120   4687500.      0.000
   600.000  5.824E-11     0.000      0.000 -1.596E-11      0.000  2.123E+10
-4.550E-05   2343750.      0.000
```



```
* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 3:

Pile-head deflection             =      0.8806447 inches
Computed slope at pile head      =     -0.0091240 radians
Maximum bending moment           =       1428747. inch-lbs
Maximum shear force              =         30000. lbs
Depth of maximum bending moment  =     90.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             35
Number of zero deflection points =              7


--------------------------------------------------------------------------------
                  Computed Values of Pile Loading and Deflection
                    for Lateral Loading for Load Case Number 4
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                     =       40000.000 lbs
Applied moment at pile head                             =           0.000 in-lbs
Axial thrust load on pile head                          =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians      psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
       0.00     1.7996  2.226E-06     40000.    -0.0164      0.000  2.123E+10
-451.1349   752.0416      0.000
      6.000     1.7013    268282.     37265.    -0.0164      0.000  2.123E+10
-460.3750  1623.6552      0.000
     12.000     1.6033    519823.     34478.    -0.0162      0.000  2.123E+10
-468.9098  1754.7675      0.000
     18.000     1.5063    754157.     31641.    -0.0161      0.000  2.123E+10
-476.7180  1898.9303      0.000
     24.000     1.4105    970855.     28759.    -0.0158      0.000  2.123E+10
-483.7783  2057.8971      0.000
     30.000     1.3164   1169529.     25838.    -0.0155      0.000  2.123E+10
-490.0691  2233.7145      0.000
     36.000     1.2242   1349826.     22881.    -0.0152      0.000  2.123E+10
-495.5685  2428.7841      0.000
     42.000     1.1344   1511435.     19978.    -0.0148      0.000  2.123E+10
-472.0473  2496.7519      0.000
     48.000     1.0471   1655102.     17310.    -0.0143      0.000  2.123E+10
-417.1871  2390.5295      0.000
     54.000     0.9626   1782712.     14833.    -0.0138      0.000  2.123E+10
-408.5051  2546.2108      0.000
```



```
     60.000     0.8812   1894497.     12409.    -0.0133      0.000  2.123E+10
-399.5746  2720.7803      0.000
     66.000     0.8029   1990709.     10039.    -0.0128      0.000  2.123E+10
-390.3928  2917.3061      0.000
     72.000     0.7280   2071617.  7724.9746    -0.0122      0.000  2.123E+10
-380.9556  3139.5289      0.000
     78.000     0.6567   2137511.  5468.3352    -0.0116      0.000  2.123E+10
-371.2575  3392.0508      0.000
     84.000     0.5890   2188698.  3270.6903    -0.0110      0.000  2.123E+10
-361.2908  3680.5909      0.000
     90.000     0.5249   2225505.  1133.6804    -0.0104      0.000  2.123E+10
-351.0458  4012.3374      0.000
     96.000     0.4647   2248278.  -940.9855  -0.009723      0.000  2.123E+10
-340.5095  4396.4416      0.000
    102.000     0.4083   2257382. -2951.5105  -0.009086      0.000  2.123E+10
-329.6655  4844.7258      0.000
    108.000     0.3557   2253201. -4895.9828  -0.008448      0.000  2.123E+10
-318.4920  5372.7227      0.000
    114.000     0.3069   2236141. -6772.3415  -0.007814      0.000  2.123E+10
-306.9609  6001.2453      0.000
    120.000     0.2619   2206626. -8578.3282  -0.007186      0.000  2.123E+10
-295.0347  6758.8346      0.000
    126.000     0.2207   2165106.    -10311.  -0.006568      0.000  2.123E+10
-282.6629  7685.7296      0.000
    132.000     0.1831   2112052.    -11969.  -0.005964      0.000  2.123E+10
-269.7761  8840.6071      0.000
    138.000     0.1491   2047960.    -13547.  -0.005376      0.000  2.123E+10
-256.2755    10313.      0.000
    144.000     0.1186   1973357.    -15042.  -0.004807      0.000  2.123E+10
-242.0159    12245.      0.000
    150.000     0.0914   1888803.    -16448.  -0.004261      0.000  2.123E+10
-226.7729    14884.      0.000
    156.000     0.0674   1794900.    -17759.  -0.003741      0.000  2.123E+10
-210.1745    18696.      0.000
    162.000     0.0465   1692304.    -18964.  -0.003248      0.000  2.123E+10
-191.5408    24701.      0.000
    168.000     0.0285   1581751.    -20047.  -0.002785      0.000  2.123E+10
-169.4139    35699.      0.000
    174.000     0.0131   1464106.    -20974.  -0.002355      0.000  2.123E+10
-139.5375    63890.      0.000
    180.000   0.000218   1340520.    -21580.  -0.001958      0.000  2.123E+10
-62.5225  1723730.      0.000
    186.000    -0.0104   1213841.    -21373.  -0.001597      0.000  2.123E+10
131.6880    76007.      0.000
    192.000    -0.0189   1091142.    -20518.  -0.001272      0.000  2.123E+10
153.0163    48449.      0.000
    198.000    -0.0257    973266.    -19564.  -0.000980      0.000  2.123E+10
165.0533    38603.      0.000
    204.000    -0.0307    860721.    -18551.  -0.000721      0.000  2.123E+10
172.6418    33734.      0.000
    210.000    -0.0343    753852.    -17501.  -0.000492      0.000  2.123E+10
177.4851    31047.      0.000
    216.000    -0.0366    652898.    -16427.  -0.000294      0.000  2.123E+10
180.4068    29563.      0.000
    222.000    -0.0378    558030.    -15340.  -0.000122      0.000  2.123E+10
181.8763    28852.      0.000
    228.000    -0.0381    469359.    -14248.  2.283E-05      0.000  2.123E+10
182.1895    28704.      0.000
    234.000    -0.0375    386953.    -13157.   0.000144      0.000  2.123E+10
181.5465    29010.      0.000
    240.000    -0.0364    310839.    -12072.   0.000242      0.000  2.123E+10
180.0894    29720.      0.000
    246.000    -0.0346    241013.    -10998.   0.000320      0.000  2.123E+10
```

```
177.9229     30819.      0.000
   252.000    -0.0325    177442. -9938.7131   0.000380      0.000  2.123E+10
175.1263     32319.      0.000
   258.000    -0.0301    120063. -8898.0513   0.000422      0.000  2.123E+10
171.7610     34257.      0.000
   264.000    -0.0275     68793. -7879.1436   0.000448      0.000  2.123E+10
167.8749     36692.      0.000
   270.000    -0.0247     23523. -6885.0017   0.000461      0.000  2.123E+10
163.5057     39713.      0.000
   276.000    -0.0219    -15876. -5918.4353   0.000462      0.000  2.123E+10
158.6831     43445.      0.000
   282.000    -0.0192    -49552. -4982.0976   0.000453      0.000  2.123E+10
153.4295     48063.      0.000
   288.000    -0.0165    -77673. -4078.5235   0.000435      0.000  2.123E+10
147.7618     53809.      0.000
   294.000    -0.0139   -100427. -3210.1655   0.000410      0.000  2.123E+10
141.6909     61027.      0.000
   300.000    -0.0116   -118016. -2379.4277   0.000379      0.000  2.123E+10
135.2217     70213.      0.000
   306.000  -0.009380   -130663. -1588.7038   0.000344      0.000  2.123E+10
128.3529     82101.      0.000
   312.000  -0.007427   -138608.  -840.4207   0.000306      0.000  2.123E+10
121.0748     97817.      0.000
   318.000  -0.005708   -142107.  -137.0984   0.000266      0.000  2.123E+10
113.3660    119163.      0.000
   324.000  -0.004231   -141436.   518.5637   0.000226      0.000  2.123E+10
105.1880    149179.      0.000
   330.000  -0.002993   -136889.  1123.5427   0.000187      0.000  2.123E+10
96.4717    193387.      0.000
   336.000  -0.001988   -128783.  1674.2255   0.000149      0.000  2.123E+10
87.0893    262883.      0.000
   342.000  -0.001201   -117461.  2165.8338   0.000115      0.000  2.123E+10
76.7801    383671.      0.000
   348.000  -0.000613   -103302.  2590.8845  8.336E-05      0.000  2.123E+10
64.9034    635327.      0.000
   354.000  -0.000200    -86741.  2958.2879  5.650E-05      0.000  2.123E+10
57.5644   1723730.      0.000
   360.000  6.509E-05    -68053.  3074.8832  3.463E-05      0.000  2.123E+10
-18.6992   1723730.      0.000
   366.000   0.000215    -49996.  2833.3725  1.794E-05      0.000  2.123E+10
-61.8043   1723730.      0.000
   372.000   0.000280    -34132.  2406.3121  6.050E-06      0.000  2.123E+10
-80.5491   1723730.      0.000
   378.000   0.000288    -21147.  1916.6752 -1.762E-06      0.000  2.123E+10
-82.6631   1723730.      0.000
   384.000   0.000259    -11125.  1445.2658 -6.323E-06      0.000  2.123E+10
-74.4733   1723730.      0.000
   390.000   0.000212 -3775.8995  1039.2563 -8.429E-06      0.000  2.123E+10
-60.8632   1723730.      0.000
   396.000   0.000158  1383.9996   720.4272 -8.767E-06      0.000  2.123E+10
-45.4132   1723730.      0.000
   402.000   0.000107  4908.1548   423.3402 -7.878E-06      0.000  2.123E+10
-53.6158   3016528.      0.000
   408.000  6.354E-05  6499.0612   113.5778 -6.266E-06      0.000  2.123E+10
-49.6383   4687500.      0.000
   414.000  3.145E-05  6298.9090  -109.0541 -4.457E-06      0.000  2.123E+10
-24.5723   4687500.      0.000
   420.000  1.005E-05  5210.2012  -206.3282 -2.831E-06      0.000  2.123E+10
-7.8524   4687500.      0.000
   426.000 -2.514E-06  3835.5387  -223.9932 -1.552E-06      0.000  2.123E+10
1.9640   4687500.      0.000
   432.000 -8.574E-06  2529.1737  -198.0064 -6.525E-07      0.000  2.123E+10
6.6983   4687500.      0.000
```



```
   438.000 -1.034E-05  1462.3594  -153.6675 -8.838E-08      0.000  2.123E+10
8.0814   4687500.      0.000
   444.000 -9.634E-06   685.5564  -106.8430  2.152E-07      0.000  2.123E+10
7.5268   4687500.      0.000
   450.000 -7.762E-06   179.2884   -66.0709  3.374E-07      0.000  2.123E+10
6.0639   4687500.      0.000
   456.000 -5.585E-06  -108.7920   -34.7889  3.474E-07      0.000  2.123E+10
4.3634   4687500.      0.000
   462.000 -3.593E-06  -239.7211   -13.2774  2.981E-07      0.000  2.123E+10
2.8071   4687500.      0.000
   468.000 -2.008E-06  -269.4446    -0.1510  2.262E-07      0.000  2.123E+10
1.5684   4687500.      0.000
   474.000 -8.790E-07  -242.5367     6.6144  1.538E-07      0.000  2.123E+10
0.6867   4687500.      0.000
   480.000 -1.618E-07  -190.7548     9.0538  9.257E-08      0.000  2.123E+10
0.1264   4687500.      0.000
   486.000  2.319E-07  -134.3027     8.8895  4.663E-08      0.000  2.123E+10
-0.1812   4687500.      0.000
   492.000  3.978E-07   -84.2880     7.4137  1.574E-08      0.000  2.123E+10
-0.3108   4687500.      0.000
   498.000  4.207E-07   -45.4082     5.4953 -2.593E-09      0.000  2.123E+10
-0.3287   4687500.      0.000
   504.000  3.667E-07   -18.3331     3.6498 -1.160E-08      0.000  2.123E+10
-0.2865   4687500.      0.000
   510.000  2.815E-07    -1.5590     2.1306 -1.441E-08      0.000  2.123E+10
-0.2199   4687500.      0.000
   516.000  1.937E-07     7.2984     1.0168 -1.360E-08      0.000  2.123E+10
-0.1513   4687500.      0.000
   522.000  1.183E-07    10.7031     0.2856 -1.106E-08      0.000  2.123E+10
-0.0924   4687500.      0.000
   528.000  6.102E-08    10.7742    -0.1347 -8.022E-09      0.000  2.123E+10
-0.0477   4687500.      0.000
   534.000  2.202E-08     9.1224    -0.3293 -5.210E-09      0.000  2.123E+10
-0.0172   4687500.      0.000
   540.000 -1.505E-09     6.8456    -0.3774 -2.953E-09      0.000  2.123E+10
0.001176   4687500.      0.000
   546.000 -1.342E-08     4.6068    -0.3424 -1.335E-09      0.000  2.123E+10
0.0105   4687500.      0.000
   552.000 -1.752E-08     2.7425    -0.2699 -2.961E-10      0.000  2.123E+10
0.0137   4687500.      0.000
   558.000 -1.697E-08     1.3693    -0.1890  2.850E-10      0.000  2.123E+10
0.0133   4687500.      0.000
   564.000 -1.410E-08     0.4726    -0.1162  5.453E-10      0.000  2.123E+10
0.0110   4687500.      0.000
   570.000 -1.043E-08    -0.0277    -0.0587  6.082E-10      0.000  2.123E+10
0.008148   4687500.      0.000
   576.000 -6.804E-09    -0.2347    -0.0183  5.711E-10      0.000  2.123E+10
0.005315   4687500.      0.000
   582.000 -3.576E-09    -0.2502   0.006000  5.026E-10      0.000  2.123E+10
0.002794   4687500.      0.000
   588.000 -7.723E-10    -0.1649     0.0162  4.439E-10      0.000  2.123E+10
0.000603   4687500.      0.000
   594.000  1.752E-09    -0.0578     0.0139  4.125E-10      0.000  2.123E+10
-0.001368   4687500.      0.000
   600.000  4.177E-09      0.000      0.000  4.043E-10      0.000  2.123E+10
-0.003263   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection             =      1.7996405 inches
Computed slope at pile head      =     -0.0163977 radians
Maximum bending moment           =       2257382. inch-lbs
Maximum shear force              =         40000. lbs
Depth of maximum bending moment  =    102.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             34
Number of zero deflection points =              6
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

```
Load  Load    Condition 1    Condition 2        Axial        Pile-Head       Maximum
       Maximum       Pile-Head
Case  Type    V(lbs) or     in-lb, rad.,        Load        Deflection       Moment
        Shear        Rotation
 No.   No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
         lbs           radians
----  ----  -------------  -------------  -------------  -------------
-------------  -------------  -------------
  1     1   V = 10000.0000  M =      0.000        370000.     0.06366830
274040.         10000.     0.00000000
  2     1   V =     20000.  M =      0.000        370000.     0.32861720
765788.         20000.     0.00000000
  3     1   V =     30000.  M =      0.000        370000.     0.88064473
1428747.         30000.     0.00000000
  4     1   V =     40000.  M =      0.000        370000.     1.79964045
2257382.         40000.     0.00000000
```

The analysis ended normally.

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENT 5
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers NO
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 7.50000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.00000000000000E+0006 = Elastic modulus (psi)
 7.20000000000000E+0001 = Section circular pile width at top (in)
 7.20000000000000E+0001 = Section circular pile width at bottom (in)
 4.07150407905237E+0003 = Section area at top (sq in)
 4.07150407905237E+0003 = Section area at bottom (sq in)
 1.31916732161297E+0006 = Section MOI at top (in^4)
 1.31916732161297E+0006 = Section MOI at bottom (in^4)
SOIL LAYERS
4 = number of soil layers
3        6.00000000000000E+0000  8.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        8.50000000000000E+0000  2.85000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
5        2.85000000000000E+0001  4.85000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
3        4.85000000000000E+0001  1.00000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
```

```
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
LOADING
1 = Number of load cases
1       1        2.50000000000000E+0005  5.40000000000000E+0007
8.00000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

LPile Plus for Windows, Version 6 (6.0.27)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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PCI
PCI

Serial Number of Security Device: 157693800
Company Name Stored in Security Device: Parikh Consultants

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT_Nov 2011\Analyses\
Name of input data file: San Leandro Creek BOH (B5).lp6d
Name of output report file: San Leandro Creek BOH (B5).lp6o
Name of plot output file: San Leandro Creek BOH (B5).lp6p
Name of runtime messeage file: San Leandro Creek BOH (B5).lp6r

Date and Time of Analysis

Date: January 6, 2012 Time: 12:54:18

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENT 5

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for selected section types.

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 75.00 ft

Depth of ground surface below top of pile = 6.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points. p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	72.0000000
2	75.000000	72.0000000

Input Structural Properties:

Pile Section No. 1:

Section Type = Elastic Pile

Cross-sectional Shape	=	Circular
Section Length	=	75.000 ft
Top Width	=	72.000 in
Bottom Width	=	72.000 in
Top Area	=	4071.504079 sq. in
Bottom Area	=	4071.504079 sq. in
Moment of Inertia at Top	=	1319167.322 in^4
Moment of Inertia at Bottom	=	1319167.322 in^4
Elastic Modulus	=	3000000. lbs/in^2

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = 6.000 ft
Distance from top of pile to bottom of layer = 8.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 8.500 ft
Distance from top of pile to bottom of layer = 28.500 ft

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 28.500 ft
Distance from top of pile to bottom of layer = 48.500 ft
NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is stiff clay without free water

Distance from top of pile to top of layer = 48.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 25.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	6.00	125.00000
2	8.50	125.00000
3	8.50	62.60000
4	28.50	62.60000
5	28.50	62.60000
6	48.50	62.60000
7	48.50	62.60000
8	100.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	J	kpy pci	Rock Emass	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Stiff Clay w/o Free Water	6.000	125.000	1250.000	--	--	--	--	0.00	--	--	--	--	--	--
		8.500	125.000	1250.000	--	--	--	--	0.00	--	--	--	--	--	--
2	Stiff Clay w/o Free Water	8.500	62.600	1250.000	--	--	--	--	0.00	--	--	--	--	--	--
		28.500	62.600	1250.000	--	--	--	--	0.00	--	--	--	--	--	--
3	Sand (Reese, et al.)	28.500	62.600	--	36.000	--	--	--	--	--	--	--	--	default	--
		48.500	62.600	--	36.000	--	--	--	--	--	--	--	--	default	--
4	Stiff Clay w/o Free Water	48.500	62.600	2500.000	--	--	--	--	0.00	--	--	--	--	--	--
		100.000	62.600	2500.000	--	--	--	--	0.00	--	--	--	--	--	--

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 250000. lbs	M = 54000000. in-lbs	800000.

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head = 250000.000 lbs
Applied moment at pile head = 54000000.000 in-lbs
Axial thrust load on pile head = 800000.000 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Soil Spr. Es*h	Distrib. Lat. Load p
inches	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch
0.00	2.8740	54000000.	250000.	-0.0109	1670.1445	3.958E+12	0.000	0.000
9.000	2.7761	56328320.	250000.	-0.0108	1733.6842	3.958E+12	0.000	0.000
18.000	2.6793	58655717.	250000.	-0.0107	1797.1987	3.958E+12	0.000	0.000
27.000	2.5838	60982154.	250000.	-0.0105	1860.6870	3.958E+12	0.000	0.000
36.000	2.4895	63307593.	250000.	-0.0104	1924.1481	3.958E+12	0.000	0.000

45.000	2.3965	65631995.	250000.	-0.0103	1987.5809	3.958E+12	0.000	0.000
54.000	2.3048	67955322.	250000.	-0.0101	2050.9844	3.958E+12	0.000	0.000
63.000	2.2145	70277536.	250000.	-0.009950	2114.3575	3.958E+12	0.000	0.000
72.000	2.1257	72598600.	245192.	-0.009787	2177.6992	3.958E+12	-1068.4547	4523.6873
81.000	2.0384	74831930.	235408.	-0.009620	2238.6466	3.958E+12	-1105.7658	4882.2652
90.000	1.9526	76974468.	225294.	-0.009447	2297.1164	3.958E+12	-1141.8814	5263.3017
99.000	1.8683	79023253.	214860.	-0.009270	2353.0276	3.958E+12	-1176.7773	5668.7054
108.000	1.7857	80975426.	204154.	-0.009088	2406.3023	3.958E+12	-1202.2704	6059.4654
117.000	1.7047	82828888.	193244.	-0.008902	2456.8832	3.958E+12	-1222.1121	6451.9942
126.000	1.6255	84582003.	182160.	-0.008711	2504.7256	3.958E+12	-1240.9649	6871.0109
135.000	1.5479	86233215.	170911.	-0.008517	2549.7871	3.958E+12	-1258.8062	7318.9081
144.000	1.4722	87781052.	159506.	-0.008319	2592.0274	3.958E+12	-1275.6145	7798.3573
153.000	1.3982	89224127.	147955.	-0.008118	2631.4089	3.958E+12	-1291.3679	8312.3435
162.000	1.3261	90561140.	136267.	-0.007913	2667.8959	3.958E+12	-1306.0441	8864.2095
171.000	1.2558	91790880.	124451.	-0.007706	2701.4554	3.958E+12	-1319.6204	9457.7068
180.000	1.1873	92912229.	112519.	-0.007496	2732.0569	3.958E+12	-1332.0731	10097.
189.000	1.1208	93924158.	100479.	-0.007284	2759.6724	3.958E+12	-1343.3778	10787.
198.000	1.0562	94825735.	88343.	-0.007069	2784.2764	3.958E+12	-1353.5092	11533.
207.000	0.9936	95616126.	76121.	-0.006852	2805.8461	3.958E+12	-1362.4405	12341.
216.000	0.9329	96294593.	63825.	-0.006634	2824.3615	3.958E+12	-1370.1441	13218.
225.000	0.8742	96860502.	51464.	-0.006415	2839.8051	3.958E+12	-1376.5908	14173.
234.000	0.8174	97313321.	39052.	-0.006194	2852.1625	3.958E+12	-1381.7499	15213.
243.000	0.7627	97652625.	26599.	-0.005972	2861.4221	3.958E+12	-1385.5890	16351.
252.000	0.7099	97878097.	14117.	-0.005750	2867.5752	3.958E+12	-1388.0736	17597.
261.000	0.6592	97989533.	1619.6963	-0.005527	2870.6163	3.958E+12	-1389.1673	18967.
270.000	0.6104	97986841.	-10881.	-0.005304	2870.5428	3.958E+12	-1388.8309	20476.
279.000	0.5637	97870050.	-23373.	-0.005082	2867.3556	3.958E+12	-1387.0226	22145.
288.000	0.5190	97639308.	-35841.	-0.004859	2861.0586	3.958E+12	-1383.6973	23996.
297.000	0.4762	97294887.	-48272.	-0.004638	2851.6594	3.958E+12	-1378.8062	26057.
306.000	0.4355	96837190.	-60652.	-0.004417	2839.1689	3.958E+12	-1372.2964	28360.
315.000	0.3967	96266751.	-72966.	-0.004197	2823.6017	3.958E+12	-1364.1101	30945.
324.000	0.3600	95584243.	-85198.	-0.003979	2804.9761	3.958E+12		

-1354.1835	33859.	0.000						
333.000	0.3251	94790481.	-97333.	-0.003763	2783.3143	3.958E+12	-1342.4465	37162.
342.000	0.2922	93886429.	-118283.	-0.003548	2758.6428	3.958E+12	-3313.0160	102035.
351.000	0.2613	92712485.	-147663.	-0.003336	2726.6060	3.958E+12	-3216.0399	110791.
360.000	0.2322	91276524.	-176014.	-0.003127	2687.4187	3.958E+12	-3084.1184	119550.
369.000	0.2050	89589255.	-203071.	-0.002921	2641.3732	3.958E+12	-2928.4429	128583.
378.000	0.1796	87663315.	-228815.	-0.002719	2588.8144	3.958E+12	-2792.5103	139936.
387.000	0.1560	85509746.	-253203.	-0.002523	2530.0436	3.958E+12	-2627.1491	151545.
396.000	0.1342	83141978.	-275980.	-0.002331	2465.4274	3.958E+12	-2434.2906	163260.
405.000	0.1141	80575671.	-296909.	-0.002145	2395.3930	3.958E+12	-2216.6971	174898.
414.000	0.0956	77828493.	-315786.	-0.001965	2320.4227	3.958E+12	-1978.0292	186233.
423.000	0.0787	74919819.	-332440.	-0.001791	2241.0451	3.958E+12	-1722.8910	197009.
432.000	0.0634	71870365.	-346749.	-0.001624	2157.8257	3.958E+12	-1456.8407	206949.
441.000	0.0495	68701730.	-358739.	-0.001464	2071.3538	3.958E+12	-1207.6343	219673.
450.000	0.0370	65434151.	-368553.	-0.001312	1982.1818	3.958E+12	-973.3205	236733.
459.000	0.0259	62086663.	-376087.	-0.001167	1890.8290	3.958E+12	-700.9641	243870.
468.000	0.0160	58681379.	-381250.	-0.001029	1797.8990	3.958E+12	-446.3894	251007.
477.000	0.007343	55238977.	-384207.	-0.000900	1703.9561	3.958E+12	-210.6204	258144.
486.000	-0.000189	51778610.	-385130.	-0.000778	1609.5229	3.958E+12	5.5621	265281.
495.000	-0.006661	48317846.	-384197.	-0.000664	1515.0788	3.958E+12	201.6123	272418.
504.000	-0.0121	44872622.	-381593.	-0.000558	1421.0588	3.958E+12	377.2091	279555.
513.000	-0.0167	41457217.	-377500.	-0.000460	1327.8526	3.958E+12	532.2460	286693.
522.000	-0.0204	38084244.	-372104.	-0.000370	1235.8044	3.958E+12	666.8202	293830.
531.000	-0.0234	34764661.	-365588.	-0.000287	1145.2132	3.958E+12	781.2216	300967.
540.000	-0.0256	31507787.	-358131.	-0.000211	1056.3333	3.958E+12	875.9219	308104.
549.000	-0.0272	28321347.	-349907.	-0.000143	969.3755	3.958E+12	951.5631	315241.
558.000	-0.0282	25211520.	-341085.	-8.251E-05	884.5085	3.958E+12	1008.9470	322378.
567.000	-0.0287	22183005.	-331824.	-2.862E-05	801.8605	3.958E+12	1049.0251	329515.
576.000	-0.0287	19239098.	-322276.	1.848E-05	721.5215	3.958E+12	1072.8884	336652.
585.000	-0.0283	16381779.	-307416.	5.899E-05	643.5454	3.958E+12	2229.2528	708471.
594.000	-0.0276	13704762.	-287320.	9.320E-05	570.4898	3.958E+12	2236.5958	728781.
603.000	-0.0266	11208685.	-267186.	0.000122	502.3720	3.958E+12	2237.5374	755881.

612.000	-0.0254	8893665.	-247071.	0.000144	439.1952	3.958E+12	2232.5098	790017.
621.000	-0.0240	6759332.	-227026.	0.000162	380.9494	3.958E+12	2221.8503	831717.
630.000	-0.0225	4804859.	-207102.	0.000175	327.6119	3.958E+12	2205.8229	881789.
639.000	-0.0209	3028978.	-187345.	0.000184	279.1482	3.958E+12	2184.6339	941355.
648.000	-0.0192	1430004.	-167840.	0.000189	235.5123	3.958E+12	2149.7239	1007818.
657.000	-0.0175	5133.1273	-148717.	0.000191	196.6277	3.958E+12	2099.9163	1081255.
666.000	-0.0158	-1249644.	-130059.	0.000190	230.5903	3.958E+12	2046.2850	1168531.
675.000	-0.0141	-2338652.	-111900.	0.000185	260.3093	3.958E+12	1988.9749	1272494.
684.000	-0.0124	-3266515.	-94273.	0.000179	285.6306	3.958E+12	1928.0923	1396901.
693.000	-0.0108	-4038148.	-77210.	0.000171	306.6884	3.958E+12	1863.7040	1546766.
702.000	-0.009349	-4658755.	-60742.	0.000161	323.6248	3.958E+12	1795.8331	1728880.
711.000	-0.007948	-5133824.	-44901.	0.000150	336.5893	3.958E+12	1724.4503	1952626.
720.000	-0.006653	-5469128.	-29718.	0.000138	345.7398	3.958E+12	1649.4577	2231298.
729.000	-0.005470	-5670737.	-15228.	0.000125	351.2417	3.958E+12	1570.6614	2584314.
738.000	-0.004403	-5745029.	-1465.0627	0.000112	353.2691	3.958E+12	1487.7231	3041172.
747.000	-0.003453	-5698721.	11530.	9.903E-05	352.0054	3.958E+12	1400.0717	3649006.
756.000	-0.002620	-5538915.	23711.	8.625E-05	347.6442	3.958E+12	1306.7328	4488372.
765.000	-0.001901	-5273172.	35018.	7.396E-05	340.3921	3.958E+12	1205.9703	5710483.
774.000	-0.001289	-4909659.	44976.	6.238E-05	330.4719	3.958E+12	1007.0535	7031250.
783.000	-0.000778	-4464495.	52243.	5.172E-05	318.3234	3.958E+12	607.7165	7031250.
792.000	-0.000358	-3970032.	56237.	4.213E-05	304.8295	3.958E+12	279.7676	7031250.
801.000	-1.958E-05	-3452844.	57564.	3.369E-05	290.7155	3.958E+12	15.3003	7031250.
810.000	0.000248	-2934359.	56760.	2.642E-05	276.5661	3.958E+12	-193.9553	7031250.
819.000	0.000456	-2431537.	54284.	2.032E-05	262.8441	3.958E+12	-356.2899	7031250.
828.000	0.000614	-1957534.	50522.	1.533E-05	249.9086	3.958E+12	-479.7438	7031250.
837.000	0.000732	-1522359.	45790.	1.138E-05	238.0327	3.958E+12	-571.8963	7031250.
846.000	0.000819	-1133482.	40338.	8.355E-06	227.4202	3.958E+12	-639.7059	7031250.
855.000	0.000882	-796403.	34357.	6.161E-06	218.2214	3.958E+12	-689.3910	7031250.
864.000	0.000930	-515152.	27986.	4.669E-06	210.5460	3.958E+12	-726.3414	7031250.
873.000	0.000966	-292725.	21320.	3.751E-06	204.4760	3.958E+12	-755.0545	7031250.
882.000	0.000997	-131454.	14416.	3.268E-06	200.0749	3.958E+12	-779.0868	7031250.
891.000	0.001025	-33286.	7305.4456	3.081E-06	197.3960	3.958E+12		

```
-801.0171   7031250.      0.000
   900.000   0.001053      0.000      0.000  3.043E-06   196.4876  3.958E+12
-822.4152   3515625.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      2.8739701 inches
Computed slope at pile head      =     -0.0109391 radians
Maximum bending moment           =      97989533. inch-lbs
Maximum shear force              =       -385130. lbs
Depth of maximum bending moment  =    261.0000000 inches below pile head
Depth of maximum shear force     =    486.0000000 inches below pile head
Number of iterations             =             22
Number of zero deflection points =              2
```

Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

```
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians
```

Load Case No.	Load Type No.	Pile-head Condition 1 V(lbs) or y(inches)	Pile-head Condition 2 in-lb, rad., or in-lb/rad.	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-head Rotation radians
1	1	V = 250000.	M = 54000000.	800000.	2.87397010	97989533.	-385130.	-0.01093915

The analysis ended normally.

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 6 THRU 8
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.60000000000000E+0001 = Pipe pile diameter (in)
 5.00000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
4 = number of soil layers
3       -8.00000000000000E+0000  1.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.50000000000000E+0000  2.15000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
5        2.15000000000000E+0001  4.15000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
3        4.15000000000000E+0001  1.00000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
```

```
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

==========

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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==========

This program is licensed to:

L. Tran
PARIKH

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT\Analyses\
Name of input data file: San Leandro Creek BOH (B6 - B8).lp6d
Name of output file: San Leandro Creek BOH (B6 - B8).lp6o
Name of plot output file: San Leandro Creek BOH (B6 - B8).lp6p
Name of runtime file: San Leandro Creek BOH (B6 - B8).lp6r

Date and Time of Analysis

Date: November 17, 2011 Time: 16:06:57

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 6 THRU 8

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -8.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points. p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point No.	Depth X ft	Pile Diameter in
1	0.00000	16.0000000
2	50.000000	16.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 16.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -8.000 ft
Distance from top of pile to bottom of layer = 1.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 1.500 ft
Distance from top of pile to bottom of layer = 21.500 ft

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 21.500 ft
Distance from top of pile to bottom of layer = 41.500 ft
p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is stiff clay without free water

Distance from top of pile to top of layer = 41.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 50.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-8.00	125.00000
2	1.50	125.00000
3	1.50	62.60000
4	21.50	62.60000
5	21.50	62.60000
6	41.50	62.60000
7	41.50	62.60000
8	100.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type Test Type	Depth Test Prop. ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm pci
			(p-y Curve Criteria)								
1	Stiff Clay w/o Free Water	-8.000	125.000	1250.000	--	--	--	0.00	--	--	--
		1.500	125.000	1250.000	--	--	--	0.00	--	--	--
2	Stiff Clay w/o Free Water	1.500	62.600	1250.000	--	--	--	0.00	--	--	--
		21.500	62.600	1250.000	--	--	--	0.00	--	--	--
3	Sand (Reese, et al.)	21.500	62.600	--	36.000	--	--	--	default	--	--
		41.500	62.600	--	36.000	--	--	--	default	--	--
4	Stiff Clay w/o Free Water	41.500	62.600	2500.000	--	--	--	0.00	--	--	--
		100.000	62.600	2500.000	--	--	--	0.00	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

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p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 10000.000 lbs	M = 0.000 in-lbs	370000.000
2	1	V = 20000.000 lbs	M = 0.000 in-lbs	370000.000
3	1	V = 30000.000 lbs	M = 0.000 in-lbs	370000.000
4	1	V = 40000.000 lbs	M = 0.000 in-lbs	370000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	600.00000000 in
Outer Diameter of Pipe	=	16.00000000 in
Pipe Wall Thickness	=	0.50000000 in
Yield Stress of Pipe	=	45.00000000 ksi
Elastic Modulus	=	29000. ksi
Cross-sectional Area	=	24.34734307 sq. in.
Moment of Inertia	=	731.94200090 in^4
Elastic Bending Stiffness	=	21226318. lb-in^2
Plastic Modulus, Z	=	120.16666667 in^3
Plastic Moment Capacity = Fy Z	=	5407.50000000 in-kip
Nom. Axial Structural Capacity = Fy As	=	1095.630 kips
Nominal Axial Tensile Capacity	=	-1095.630 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	370.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 370.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000003303	70.1099804	21226293.	166.6523345	15.9553581	
0.000006606	140.2199607	21226293.	87.3261673	16.7139861	
0.000009909	210.3299411	21226293.	60.8841115	17.4726140	
0.0000132	280.4399215	21226293.	47.6630836	18.2312422	
0.0000165	350.5499018	21226293.	39.7304669	18.9898699	
0.0000198	420.6598822	21226293.	34.4420558	19.7484980	
0.0000231	490.7698625	21226293.	30.6646192	20.5071261	
0.0000264	560.8798429	21226293.	27.8315418	21.2657540	
0.0000297	630.9898233	21226293.	25.6280372	22.0243821	
0.0000330	701.0998036	21226293.	23.8652335	22.7830101	
0.0000363	771.2097840	21226293.	22.4229395	23.5416380	
0.0000396	841.3197644	21226293.	21.2210279	24.3002661	
0.0000429	911.4297447	21226293.	20.2040257	25.0588941	
0.0000462	981.5397251	21226293.	19.3323096	25.8175220	
0.0000495	1051.6497054	21226293.	18.5768223	26.5761501	
0.0000528	1121.7596858	21226293.	17.9157709	27.3347781	
0.0000562	1191.8696662	21226293.	17.3324903	28.0934060	
0.0000595	1261.9796465	21226293.	16.8140186	28.8520341	
0.0000628	1332.0896269	21226293.	16.3501229	29.6106621	
0.0000661	1402.1996073	21226293.	15.9326167	30.3692901	
0.0000694	1472.3095876	21226293.	15.5548731	31.1279181	
0.0000727	1542.4195680	21226293.	15.2114698	31.8865461	
0.0000760	1612.5295484	21226293.	14.8979276	32.6451741	
0.0000793	1682.6395287	21226293.	14.6105139	33.4038021	
0.0000826	1752.7495091	21226293.	14.3460934	34.1624301	
0.0000859	1822.8594894	21226293.	14.1020129	34.9210581	
0.0000892	1892.9694698	21226293.	13.8760124	35.6796861	
0.0000925	1963.0794502	21226293.	13.6661548	36.4383141	
0.0000958	2033.1894305	21226293.	13.4707702	37.1969421	
0.0000991	2103.2994109	21226293.	13.2884112	37.9555701	
0.0001024	2173.4093913	21226293.	13.1178172	38.7141981	
0.0001057	2243.5193716	21226293.	12.9578855	39.4728261	
0.0001090	2313.6293520	21226293.	12.8076465	40.2314541	
0.0001123	2383.7393323	21226293.	12.6662451	40.9900821	
0.0001156	2453.8493127	21226293.	12.5329238	41.7487101	
0.0001189	2523.9592931	21226293.	12.4070093	42.5073381	
0.0001222	2594.0692734	21226293.	12.2879009	43.2659661	
0.0001255	2664.1792538	21226293.	12.1750614	44.0245941	
0.0001288	2734.2892342	21226293.	12.0680086	44.7832221	Y
0.0001354	2866.9718816	21170635.	11.8796433	45.0000000	Y
0.0001420	2978.5544808	20971592.	11.7365397	45.0000000	Y
0.0001486	3076.0201010	20695264.	11.6246759	45.0000000	Y
0.0001552	3163.1850276	20376100.	11.5358909	45.0000000	Y
0.0001618	3242.2891707	20033184.	11.4649973	45.0000000	Y
0.0001685	3314.7848579	19677933.	11.4084067	45.0000000	Y
0.0001751	3381.6515354	19317339.	11.3635416	45.0000000	Y
0.0001817	3443.5713722	18955739.	11.3284988	45.0000000	Y
0.0001883	3501.0544404	18595948.	11.3018159	45.0000000	Y
0.0001949	3554.8734049	18241748.	11.2818213	45.0000000	Y
0.0002015	3605.2703438	17893789.	11.2676920	45.0000000	Y
0.0002081	3652.5943181	17553156.	11.2585606	45.0000000	Y
0.0002147	3697.1623313	17220648.	11.2536696	45.0000000	Y

0.0002213	3739.4075994	16897495.	11.2521708	45.0000000	Y
0.0002279	3779.1051660	16581897.	11.2541663	45.0000000	Y
0.0002345	3816.8312719	16275672.	11.2586937	45.0000000	Y
0.0002411	3852.7103826	15978567.	11.2654480	45.0000000	Y
0.0002477	3886.8609526	15690329.	11.2741579	45.0000000	Y
0.0002543	3919.3959158	15410713.	11.2845805	45.0000000	Y
0.0002609	3950.4231141	15139476.	11.2964980	45.0000000	Y
0.0002675	3980.0456725	14876383.	11.3097133	45.0000000	Y
0.0002741	4008.3623300	14621206.	11.3240481	45.0000000	Y
0.0002808	4035.4677320	14373723.	11.3393396	45.0000000	Y
0.0002874	4061.4526904	14133719.	11.3554387	45.0000000	Y
0.0002940	4086.4044152	13900988.	11.3722083	45.0000000	Y
0.0003006	4110.4067215	13675327.	11.3895213	45.0000000	Y
0.0003072	4133.5402156	13456544.	11.4072594	45.0000000	Y
0.0003138	4155.8824619	13244451.	11.4253116	45.0000000	Y
0.0003204	4177.1669597	13037803.	11.4440471	45.0000000	Y
0.0003270	4197.7709713	12837423.	11.4629507	45.0000000	Y
0.0003336	4217.7661739	12643154.	11.4819272	45.0000000	Y
0.0003402	4237.0431956	12454319.	11.5011321	45.0000000	Y
0.0003468	4255.5468719	12270447.	11.5206545	45.0000000	Y
0.0003534	4273.6096598	12092202.	11.5400445	45.0000000	Y
0.0003600	4290.4097650	11916990.	11.5582468	45.0000000	Y
0.0003666	4306.5112932	11746187.	11.5763296	45.0000000	Y
0.0003732	4322.1427406	11580171.	11.5937314	45.0000000	Y
0.0003798	4335.9628653	11415161.	11.6092082	45.0000000	Y
0.0003864	4349.6713089	11255503.	11.6243286	45.0000000	Y
0.0003931	4362.3530681	11098599.	11.6390555	45.0000000	Y
0.0004195	4404.4318093	10499787.	11.6831503	45.0000000	Y
0.0004459	4437.6151732	9951996.	11.7157650	45.0000000	Y
0.0004723	4464.2614757	9451656.	11.7419536	45.0000000	Y
0.0004987	4486.3513288	8995196.	11.7628724	45.0000000	Y
0.0005252	4504.8959103	8577919.	11.7801068	45.0000000	Y
0.0005516	4520.6772185	8195611.	11.7948415	45.0000000	Y
0.0005780	4534.1895089	7844331.	11.8074250	45.0000000	Y
0.0006044	4545.6603898	7520387.	11.8172202	45.0000000	Y
0.0006309	4555.9460064	7221701.	11.8261639	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	370.000	4555.9

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	10000.000	lbs
Applied moment at pile head	=	0.000	in-lbs
Axial thrust load on pile head	=	370000.000	lbs

Depth x inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. Es*h lb/inch	Soil Spr. Lat. Load lb/inch	Distrib. p lb/in
0.00	0.0599	7.364E-08	10000.0000	-0.001041	0.000	2.123E+10	-192.7384	9647.4617	0.000
6.000	0.0537	58842.	8839.6122	-0.001033	0.000	2.123E+10	-194.0575	21687.	0.000
12.000	0.0475	110660.	7673.6343	-0.001009	0.000	2.123E+10	-194.6018	24559.	0.000
18.000	0.0416	155404.	6512.3718	-0.000971	0.000	2.123E+10	-192.4857	27773.	0.000
24.000	0.0359	193121.	5362.4033	-0.000922	0.000	2.123E+10	-190.8371	31905.	0.000
30.000	0.0305	223846.	4224.8075	-0.000863	0.000	2.123E+10	-188.3615	37029.	0.000
36.000	0.0255	247650.	3104.6641	-0.000796	0.000	2.123E+10	-185.0196	43477.	0.000
42.000	0.0210	264638.	2007.3099	-0.000724	0.000	2.123E+10	-180.7651	51732.	0.000
48.000	0.0168	274952.	938.3937	-0.000648	0.000	2.123E+10	-175.5403	62519.	0.000
54.000	0.0132	278774.	-96.0397	-0.000569	0.000	2.123E+10	-169.2708	76976.	0.000
60.000	0.0100	276327.	-1089.4145	-0.000491	0.000	2.123E+10	-161.8541	96975.	0.000
66.000	0.007303	267881.	-2027.1869	-0.000414	0.000	2.123E+10	-150.7367	123842.	0.000
72.000	0.005046	253839.	-2891.7074	-0.000340	0.000	2.123E+10	-137.4368	163416.	0.000
78.000	0.003220	234691.	-3672.5477	-0.000271	0.000	2.123E+10	-122.8433	228914.	0.000
84.000	0.001792	210973.	-4359.4080	-0.000208	0.000	2.123E+10	-106.1102	355378.	0.000
90.000	0.000721	183302.	-4931.3876	-0.000153	0.000	2.123E+10	-84.5497	703591.	0.000
96.000	-3.859E-05	152473.	-5143.4583	-0.000105	0.000	2.123E+10	13.8595	2154663.	0.000
102.000	-0.000540	122047.	-4866.2893	-6.625E-05	0.000	2.123E+10	78.5302	873197.	0.000
108.000	-0.000834	94372.	-4367.9589	-3.566E-05	0.000	2.123E+10	87.5800	630358.	0.000
114.000	-0.000968	69790.	-3832.4718	-1.246E-05	0.000	2.123E+10	90.9157	563770.	0.000
120.000	-0.000983	48438.	-3285.8652	4.247E-06	0.000	2.123E+10	91.2865	557090.	0.000
126.000	-0.000917	30341.	-2742.8895	1.538E-05	0.000	2.123E+10	89.7054	587190.	0.000
132.000	-0.000799	15455.	-2213.7602	2.185E-05	0.000	2.123E+10	86.6710	651163.	0.000
138.000	-0.000654	3678.8484	-1706.3541	2.456E-05	0.000	2.123E+10			

							82.4644	756107.	0.000
144.000	-0.000504	-5130.5893	-1227.2013	2.435E-05	0.000	2.123E+10	77.2532	919822.	0.000
150.000	-0.000362	-11156.	-782.0427	2.205E-05	0.000	2.123E+10	71.1330	1178476.	0.000
156.000	-0.000239	-14613.	-310.8186	1.841E-05	0.000	2.123E+10	85.9418	2154663.	0.000
162.000	-0.000141	-14967.	99.1906	1.423E-05	0.000	2.123E+10	50.7280	2154663.	0.000
168.000	-6.859E-05	-13486.	325.2649	1.021E-05	0.000	2.123E+10	24.6301	2154663.	0.000
174.000	-1.878E-05	-11109.	419.3926	6.730E-06	0.000	2.123E+10	6.7458	2154663.	0.000
180.000	1.218E-05	-8483.0583	426.5136	3.961E-06	0.000	2.123E+10	-4.3722	2154663.	0.000
186.000	2.875E-05	-6008.8082	382.4263	1.913E-06	0.000	2.123E+10	-10.3236	2154663.	0.000
192.000	3.513E-05	-3902.4360	313.6098	5.120E-07	0.000	2.123E+10	-12.6153	2154663.	0.000
198.000	3.489E-05	-2247.7642	238.1736	-3.572E-07	0.000	2.123E+10	-12.5301	2154663.	0.000
204.000	3.084E-05	-1042.7672	167.3551	-8.223E-07	0.000	2.123E+10	-11.0760	2154663.	0.000
210.000	2.503E-05	-235.8527	107.1666	-1.003E-06	0.000	2.123E+10	-8.9868	2154663.	0.000
216.000	1.881E-05	247.6850	59.9444	-1.001E-06	0.000	2.123E+10	-6.7539	2154663.	0.000
222.000	1.301E-05	487.9258	25.6669	-8.973E-07	0.000	2.123E+10	-4.6719	2154663.	0.000
228.000	8.039E-06	559.6716	2.9899	-7.493E-07	0.000	2.123E+10	-2.8871	2154663.	0.000
234.000	4.019E-06	527.1319	-10.0005	-5.957E-07	0.000	2.123E+10	-1.4431	2154663.	0.000
240.000	8.916E-07	442.3101	-15.2903	-4.586E-07	0.000	2.123E+10	-0.3202	2154663.	0.000
246.000	-1.485E-06	345.6845	-14.6507	-3.473E-07	0.000	2.123E+10	0.5334	2154663.	0.000
252.000	-3.276E-06	268.0430	-9.5216	-2.605E-07	0.000	2.123E+10	1.1763	2154663.	0.000
258.000	-4.612E-06	232.5819	-5.8486	-1.898E-07	0.000	2.123E+10	0.0480	62418.	0.000
264.000	-5.553E-06	198.7019	-5.5260	-1.288E-07	0.000	2.123E+10	0.0596	64362.	0.000
270.000	-6.158E-06	166.8417	-5.1432	-7.716E-08	0.000	2.123E+10	0.0680	66306.	0.000
276.000	-6.479E-06	137.3265	-4.7179	-3.417E-08	0.000	2.123E+10	0.0737	68250.	0.000
282.000	-6.568E-06	110.3782	-4.2663	8.386E-10	0.000	2.123E+10	0.0768	70194.	0.000
288.000	-6.469E-06	86.1267	-3.8025	2.861E-08	0.000	2.123E+10	0.0778	72138.	0.000
294.000	-6.224E-06	64.6211	-3.3386	4.992E-08	0.000	2.123E+10	0.0769	74082.	0.000
300.000	-5.870E-06	45.8416	-2.8849	6.553E-08	0.000	2.123E+10	0.0744	76026.	0.000
306.000	-5.438E-06	29.7109	-2.4498	7.621E-08	0.000	2.123E+10	0.0707	77970.	0.000
312.000	-4.955E-06	16.1055	-2.0398	8.268E-08	0.000	2.123E+10	0.0660	79914.	0.000
318.000	-4.446E-06	4.8661	-1.6598	8.565E-08	0.000	2.123E+10	0.0607	81858.	0.000
324.000	-3.928E-06	-4.1929	-1.3133	8.574E-08	0.000	2.123E+10	0.0549	83802.	0.000

330.000	-3.417E-06	-11.2744	-1.0023	8.356E-08	0.000	2.123E+10	0.0488	85746.	0.000
336.000	-2.925E-06	-16.5910	-0.7275	7.962E-08	0.000	2.123E+10	0.0427	87690.	0.000
342.000	-2.461E-06	-20.3582	-0.4890	7.440E-08	0.000	2.123E+10	0.0368	89634.	0.000
348.000	-2.032E-06	-22.7889	-0.2856	6.830E-08	0.000	2.123E+10	0.0310	91578.	0.000
354.000	-1.642E-06	-24.0887	-0.1158	6.167E-08	0.000	2.123E+10	0.0256	93522.	0.000
360.000	-1.292E-06	-24.4521	0.0227	5.481E-08	0.000	2.123E+10	0.0206	95466.	0.000
366.000	-9.840E-07	-24.0599	0.1323	4.796E-08	0.000	2.123E+10	0.0160	97410.	0.000
372.000	-7.167E-07	-23.0776	0.2158	4.129E-08	0.000	2.123E+10	0.0119	99354.	0.000
378.000	-4.885E-07	-21.6535	0.2679	3.497E-08	0.000	2.123E+10	0.005499	67532.	0.000
384.000	-2.971E-07	-20.0178	0.2946	2.908E-08	0.000	2.123E+10	0.003408	68828.	0.000
390.000	-1.396E-07	-18.2469	0.3098	2.367E-08	0.000	2.123E+10	0.001631	70124.	0.000
396.000	-1.299E-08	-16.4059	0.3151	1.878E-08	0.000	2.123E+10	0.000155	71420.	0.000
402.000	8.575E-08	-14.5490	0.3125	1.440E-08	0.000	2.123E+10	-0.001039	72716.	0.000
408.000	1.598E-07	-12.7203	0.3034	1.055E-08	0.000	2.123E+10	-0.001971	74012.	0.000
414.000	2.123E-07	-10.9547	0.2895	7.201E-09	0.000	2.123E+10	-0.002665	75308.	0.000
420.000	2.462E-07	-9.2781	0.2721	4.341E-09	0.000	2.123E+10	-0.003144	76604.	0.000
426.000	2.644E-07	-7.7089	0.2524	1.940E-09	0.000	2.123E+10	-0.003433	77900.	0.000
432.000	2.695E-07	-6.2584	0.2314	-3.399E-11	0.000	2.123E+10	-0.003557	79196.	0.000
438.000	2.640E-07	-4.9320	0.2101	-1.616E-09	0.000	2.123E+10	-0.003542	80492.	0.000
444.000	2.501E-07	-3.7301	0.1892	-2.840E-09	0.000	2.123E+10	-0.003409	81788.	0.000
450.000	2.299E-07	-2.6485	0.1695	-3.741E-09	0.000	2.123E+10	-0.003184	83084.	0.000
456.000	2.052E-07	-1.6799	0.1513	-4.353E-09	0.000	2.123E+10	-0.002886	84380.	0.000
462.000	1.777E-07	-0.8142	0.1350	-4.706E-09	0.000	2.123E+10	-0.002537	85676.	0.000
468.000	1.488E-07	-0.0392	0.1209	-4.826E-09	0.000	2.123E+10	-0.002156	86972.	0.000
474.000	1.198E-07	0.6581	0.1091	-4.739E-09	0.000	2.123E+10	-0.001762	88268.	0.000
480.000	9.189E-08	1.2916	0.0997	-4.463E-09	0.000	2.123E+10	-0.001372	89564.	0.000
486.000	6.621E-08	1.8749	0.0926	-4.016E-09	0.000	2.123E+10	-0.001003	90860.	0.000
492.000	4.370E-08	2.4209	0.0876	-3.409E-09	0.000	2.123E+10	-0.000671	92156.	0.000
498.000	2.530E-08	2.9413	0.0263	-2.651E-09	0.000	2.123E+10	-0.0198	4687500.	0.000
504.000	1.189E-08	2.7481	-0.0609	-1.847E-09	0.000	2.123E+10	-0.009292	4687500.	0.000
510.000	3.145E-09	2.2188	-0.0961	-1.145E-09	0.000	2.123E+10	-0.002457	4687500.	0.000
516.000	-1.841E-09	1.5996	-0.0992	-6.049E-10	0.000	2.123E+10			

							0.001438	4687500.	0.000
522.000	-4.114E-09	1.0311	-0.0852	-2.331E-10	0.000	2.123E+10	0.003214	4687500.	0.000
528.000	-4.638E-09	0.5778	-0.0647	-5.683E-12	0.000	2.123E+10	0.003624	4687500.	0.000
534.000	-4.182E-09	0.2545	-0.0440	1.119E-10	0.000	2.123E+10	0.003267	4687500.	0.000
540.000	-3.295E-09	0.0487	-0.0265	1.548E-10	0.000	2.123E+10	0.002574	4687500.	0.000
546.000	-2.325E-09	-0.0645	-0.0134	1.526E-10	0.000	2.123E+10	0.001816	4687500.	0.000
552.000	-1.464E-09	-0.1122	-0.004474	1.276E-10	0.000	2.123E+10	0.001144	4687500.	0.000
558.000	-7.935E-10	-0.1187	0.000817	9.496E-11	0.000	2.123E+10	0.000620	4687500.	0.000
564.000	-3.244E-10	-0.1028	0.003437	6.365E-11	0.000	2.123E+10	0.000253	4687500.	0.000
570.000	-2.971E-11	-0.0778	0.004267	3.812E-11	0.000	2.123E+10	2.321E-05	4687500.	0.000
576.000	1.331E-10	-0.0518	0.004024	1.981E-11	0.000	2.123E+10	-0.000104	4687500.	0.000
582.000	2.080E-10	-0.0296	0.003225	8.307E-12	0.000	2.123E+10	-0.000162	4687500.	0.000
588.000	2.327E-10	-0.0131	0.002192	2.271E-12	0.000	2.123E+10	-0.000182	4687500.	0.000
594.000	2.352E-10	-0.003266	0.001095	0.000	0.000	2.123E+10	-0.000184	4687500.	0.000
600.000	2.322E-10	0.000	0.000	0.000	0.000	2.123E+10	-0.000181	2343750.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.0599344 inches
Computed slope at pile head	=	-0.0010410 radians
Maximum bending moment	=	278774. inch-lbs
Maximum shear force	=	10000.0000000 lbs
Depth of maximum bending moment	=	54.0000000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	22
Number of zero deflection points	=	6

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 20000.000 lbs
Applied moment at pile head = 0.000 in-lbs

Axial thrust load on pile head = 370000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.2924	-1.964E-07	20000.	-0.003826	0.000	2.123E+10	-286.4320	2938.4466	0.000
6.000	0.2695	123338.	18269.	-0.003809	0.000	2.123E+10	-290.4387	6466.7699	0.000
12.000	0.2467	236144.	16517.	-0.003758	0.000	2.123E+10	-293.6932	7142.1416	0.000
18.000	0.2244	338228.	14756.	-0.003677	0.000	2.123E+10	-293.3420	7844.0802	0.000
24.000	0.2026	429539.	12993.	-0.003568	0.000	2.123E+10	-294.1334	8710.5099	0.000
30.000	0.1816	509992.	11229.	-0.003435	0.000	2.123E+10	-294.1383	9720.3344	0.000
36.000	0.1614	579536.	9466.2458	-0.003281	0.000	2.123E+10	-293.3282	10906.	0.000
42.000	0.1422	638157.	7711.2444	-0.003109	0.000	2.123E+10	-291.6723	12308.	0.000
48.000	0.1241	685877.	5968.8181	-0.002922	0.000	2.123E+10	-289.1365	13983.	0.000
54.000	0.1071	722757.	4244.3612	-0.002723	0.000	2.123E+10	-285.6825	16002.	0.000
60.000	0.0914	748900.	2543.5164	-0.002515	0.000	2.123E+10	-281.2658	18466.	0.000
66.000	0.0769	764447.	885.1950	-0.002301	0.000	2.123E+10	-271.5080	21175.	0.000
72.000	0.0638	769740.	-706.5366	-0.002084	0.000	2.123E+10	-259.0692	24374.	0.000
78.000	0.0519	765223.	-2222.0072	-0.001867	0.000	2.123E+10	-246.0877	28438.	0.000
84.000	0.0414	751368.	-3657.7541	-0.001653	0.000	2.123E+10	-232.4947	33724.	0.000
90.000	0.0321	728670.	-5009.7935	-0.001444	0.000	2.123E+10	-218.1852	40804.	0.000
96.000	0.0240	697661.	-6273.3239	-0.001242	0.000	2.123E+10	-202.9916	50670.	0.000
102.000	0.0172	658907.	-7442.1866	-0.001051	0.000	2.123E+10	-186.6293	65201.	0.000
108.000	0.0114	613020.	-8507.7674	-0.000871	0.000	2.123E+10	-168.5643	88492.	0.000
114.000	0.006724	560680.	-9456.3430	-0.000705	0.000	2.123E+10	-147.6276	131740.	0.000
120.000	0.002969	502674.	-10260.	-0.000555	0.000	2.123E+10	-120.3458	243201.	0.000
126.000	6.703E-05	440020.	-10694.	-0.000421	0.000	2.123E+10	-24.0696	2154663.	0.000
132.000	-0.002089	376223.	-10435.	-0.000306	0.000	2.123E+10	110.2080	316581.	0.000
138.000	-0.003606	316158.	-9725.4670	-0.000208	0.000	2.123E+10	126.3345	210185.	0.000
144.000	-0.004588	260442.	-8943.9482	-0.000127	0.000	2.123E+10	134.1718	175471.	0.000
150.000	-0.005128	209393.	-8127.5647	-6.036E-05	0.000	2.123E+10	137.9561	161428.	0.000
156.000	-0.005312	163180.	-7296.1494	-7.706E-06	0.000	2.123E+10			

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139.1824    157203.      0.000
   162.000  -0.005220    121874. -6462.8747  3.258E-05      0.000  2.123E+10
138.5759    159281.      0.000
   168.000  -0.004921     85480. -5637.4984  6.189E-05      0.000  2.123E+10
136.5495    166483.      0.000
   174.000  -0.004477     53949. -4827.7636  8.159E-05      0.000  2.123E+10
133.3621    178714.      0.000
   180.000  -0.003942     27185. -4040.1231  9.306E-05      0.000  2.123E+10
129.1848    196625.      0.000
   186.000  -0.003361  5054.3994 -3280.1667  9.762E-05      0.000  2.123E+10
124.1340    221625.      0.000
   192.000  -0.002771    -12610. -2552.9044  9.655E-05      0.000  2.123E+10
118.2868    256156.      0.000
   198.000  -0.002202    -26009. -1862.9822  9.109E-05      0.000  2.123E+10
111.6873    304318.      0.000
   204.000  -0.001678    -35371. -1214.8837  8.242E-05      0.000  2.123E+10
104.3456    373206.      0.000
   210.000  -0.001213    -40954.  -613.1745  7.163E-05      0.000  2.123E+10
96.2242   475946.      0.000
   216.000  -0.000818    -43047.   -62.9023  5.976E-05      0.000  2.123E+10
87.1999   639610.      0.000
   222.000  -0.000496    -41974.   429.5475  4.774E-05      0.000  2.123E+10
76.9500   930927.      0.000
   228.000  -0.000245    -38104.   924.4571  3.642E-05      0.000  2.123E+10
88.0198   2154663.     0.000
   234.000 -5.888E-05    -31042.  1251.9476  2.665E-05      0.000  2.123E+10
21.1437   2154663.     0.000
   240.000  7.470E-05    -23199.  1234.9002  1.898E-05      0.000  2.123E+10
-26.8261   2154663.    0.000
   246.000   0.000169    -16308.   972.4226  1.340E-05      0.000  2.123E+10
-60.6664   2154663.    0.000
   252.000   0.000236    -11590.   536.7002  9.458E-06      0.000  2.123E+10
-84.5744   2154663.    0.000
   258.000   0.000282 -9909.1356   274.1625  6.419E-06      0.000  2.123E+10
-2.9381     62418.     0.000
   264.000   0.000313 -8328.1892   255.2901  3.842E-06      0.000  2.123E+10
-3.3527     64362.     0.000
   270.000   0.000329 -6862.7126   234.3402  1.695E-06      0.000  2.123E+10
-3.6306     66306.     0.000
   276.000   0.000333 -5523.6320   212.0887 -5.572E-08      0.000  2.123E+10
-3.7865     68250.     0.000
   282.000   0.000328 -4317.4009   189.2220 -1.447E-06      0.000  2.123E+10
-3.8357     70194.     0.000
   288.000   0.000316 -3246.5453   166.3343 -2.516E-06      0.000  2.123E+10
-3.7935     72138.     0.000
   294.000   0.000298 -2310.2201   143.9274 -3.301E-06      0.000  2.123E+10
-3.6754     74082.     0.000
   300.000   0.000276 -1504.7603   122.4129 -3.840E-06      0.000  2.123E+10
-3.4961     76026.     0.000
   306.000   0.000252  -824.2150   102.1162 -4.169E-06      0.000  2.123E+10
-3.2695     77970.     0.000
   312.000   0.000226  -260.8536    83.2823 -4.323E-06      0.000  2.123E+10
-3.0085     79914.     0.000
   318.000   0.000200   194.3658    66.0824 -4.332E-06      0.000  2.123E+10
-2.7248     81858.     0.000
   324.000   0.000174   551.3701    50.6217 -4.227E-06      0.000  2.123E+10
-2.4288     83802.     0.000
   330.000   0.000149   820.5923    36.9472 -4.033E-06      0.000  2.123E+10
-2.1294     85746.     0.000
   336.000   0.000126  1012.6418    25.0564 -3.774E-06      0.000  2.123E+10
-1.8342     87690.     0.000
   342.000   0.000104  1138.0249    14.9056 -3.470E-06      0.000  2.123E+10
-1.5494     89634.     0.000
```



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   348.000  8.386E-05  1206.9145     6.4173 -3.138E-06      0.000  2.123E+10
-1.2800     91578.     0.000
   354.000  6.606E-05  1228.9662    -0.5117 -2.794E-06      0.000  2.123E+10
-1.0296     93522.     0.000
   360.000  5.034E-05  1213.1800    -6.0032 -2.449E-06      0.000  2.123E+10
-0.8009     95466.     0.000
   366.000  3.667E-05  1167.8007   -10.1919 -2.112E-06      0.000  2.123E+10
-0.5953     97410.     0.000
   372.000  2.499E-05  1100.2562   -13.2192 -1.792E-06      0.000  2.123E+10
-0.4138     99354.     0.000
   378.000  1.517E-05  1017.1262   -14.9726 -1.493E-06      0.000  2.123E+10
-0.1707     67532.     0.000
   384.000  7.076E-06   927.2117   -15.7283 -1.218E-06      0.000  2.123E+10
-0.0812     68828.     0.000
   390.000  5.554E-07   833.7934   -15.9913 -9.689E-07      0.000  2.123E+10
-0.006491     70124.     0.000
   396.000 -4.551E-06   739.6181   -15.8482 -7.465E-07      0.000  2.123E+10
0.0542     71420.     0.000
   402.000 -8.403E-06   646.9288   -15.3802 -5.505E-07      0.000  2.123E+10
0.1018     72716.     0.000
   408.000 -1.116E-05   557.4996   -14.6619 -3.803E-07      0.000  2.123E+10
0.1376     74012.     0.000
   414.000 -1.297E-05   472.6751   -13.7607 -2.347E-07      0.000  2.123E+10
0.1627     75308.     0.000
   420.000 -1.397E-05   393.4127   -12.7373 -1.123E-07      0.000  2.123E+10
0.1784     76604.     0.000
   426.000 -1.431E-05   320.3261   -11.6446 -1.142E-08      0.000  2.123E+10
0.1858     77900.     0.000
   432.000 -1.411E-05   253.7287   -10.5283  6.971E-08      0.000  2.123E+10
0.1863     79196.     0.000
   438.000 -1.348E-05   193.6772    -9.4271  1.329E-07      0.000  2.123E+10
0.1808     80492.     0.000
   444.000 -1.252E-05   140.0129    -8.3729  1.801E-07      0.000  2.123E+10
0.1706     81788.     0.000
   450.000 -1.132E-05    92.4024    -7.3910  2.130E-07      0.000  2.123E+10
0.1567     83084.     0.000
   456.000 -9.960E-06    50.3750    -6.5007  2.331E-07      0.000  2.123E+10
0.1401     84380.     0.000
   462.000 -8.518E-06    13.3584    -5.7156  2.421E-07      0.000  2.123E+10
0.1216     85676.     0.000
   468.000 -7.054E-06   -19.2877    -5.0440  2.413E-07      0.000  2.123E+10
0.1023     86972.     0.000
   474.000 -5.623E-06   -48.2406    -4.4891  2.318E-07      0.000  2.123E+10
0.0827     88268.     0.000
   480.000 -4.273E-06   -74.1855    -4.0496  2.145E-07      0.000  2.123E+10
0.0638     89564.     0.000
   486.000 -3.049E-06   -97.7875    -3.7197  1.902E-07      0.000  2.123E+10
0.0462     90860.     0.000
   492.000 -1.991E-06  -119.6660    -3.4894  1.594E-07      0.000  2.123E+10
0.0306     92156.     0.000
   498.000 -1.136E-06  -140.3683    -0.7349  1.227E-07      0.000  2.123E+10
0.8876   4687500.     0.000
   504.000 -5.191E-07  -129.0295     3.1446  8.459E-08      0.000  2.123E+10
0.4056   4687500.     0.000
   510.000 -1.210E-07  -103.0087     4.6450  5.180E-08      0.000  2.123E+10
0.0945   4687500.     0.000
   516.000  1.024E-07   -73.5200     4.6885  2.685E-08      0.000  2.123E+10
-0.0800   4687500.     0.000
   522.000  2.012E-07   -46.8658     3.9770  9.833E-09      0.000  2.123E+10
-0.1572   4687500.     0.000
   528.000  2.204E-07   -25.8398     2.9889 -4.428E-10      0.000  2.123E+10
-0.1722   4687500.     0.000
   534.000  1.958E-07   -10.9969     2.0133 -5.649E-09      0.000  2.123E+10
```



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-0.1530   4687500.     0.000
   540.000  1.526E-07    -1.6553     1.1965 -7.437E-09      0.000  2.123E+10
-0.1192   4687500.     0.000
   546.000  1.066E-07     3.3947     0.5890 -7.191E-09      0.000  2.123E+10
-0.0833   4687500.     0.000
   552.000  6.633E-08     5.4444     0.1837 -5.942E-09      0.000  2.123E+10
-0.0518   4687500.     0.000
   558.000  3.529E-08     5.6251    -0.0545 -4.378E-09      0.000  2.123E+10
-0.0276   4687500.     0.000
   564.000  1.380E-08     4.8097    -0.1696 -2.903E-09      0.000  2.123E+10
-0.0108   4687500.     0.000
   570.000  4.594E-10     3.6032    -0.2030 -1.714E-09      0.000  2.123E+10
-0.000359   4687500.     0.000
   576.000 -6.768E-09     2.3814    -0.1882 -8.681E-10      0.000  2.123E+10
0.005288   4687500.     0.000
   582.000 -9.957E-09     1.3486    -0.1490 -3.409E-10      0.000  2.123E+10
0.007779   4687500.     0.000
   588.000 -1.086E-08     0.5949    -0.1002 -6.619E-11      0.000  2.123E+10
0.008483   4687500.     0.000
   594.000 -1.075E-08     0.1463    -0.0496  3.858E-11      0.000  2.123E+10
0.008400   4687500.     0.000
   600.000 -1.040E-08      0.000      0.000  5.926E-11      0.000  2.123E+10
0.008122   2343750.     0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection            =      0.2924320 inches
Computed slope at pile head     =     -0.0038262 radians
Maximum bending moment          =        769740. inch-lbs
Maximum shear force             =         20000. lbs
Depth of maximum bending moment =     72.0000000 inches below pile head
Depth of maximum shear force    =       0.000000 inches below pile head
Number of iterations            =             27
Number of zero deflection points =             5
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                 =       30000.000 lbs
Applied moment at pile head                         =           0.000 in-lbs
Axial thrust load on pile head                      =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y        Moment     Force         S        Stress   Stiffness      p
      Es*h    Lat. Load
```



```
   inches    inches     in-lbs       lbs       radians      psi*      lb-in^2     lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.7555 -5.891E-07     30000.  -0.008334      0.000  2.123E+10
-363.1413  1441.9179      0.000
     6.000     0.7055    191965.     27802.  -0.008307      0.000  2.123E+10
-369.4457  3141.8399      0.000
    12.000     0.6559    370510.     25569.  -0.008227      0.000  2.123E+10
-375.0057  3430.6880      0.000
    18.000     0.6068    535321.     23315.  -0.008099      0.000  2.123E+10
-376.1721  3719.5370      0.000
    24.000     0.5587    686255.     21050.  -0.007927      0.000  2.123E+10
-379.0222  4070.6749      0.000
    30.000     0.5117    823113.     18769.  -0.007713      0.000  2.123E+10
-381.1030  4468.8100      0.000
    36.000     0.4661    945735.     16479.  -0.007463      0.000  2.123E+10
-382.3904  4922.4102      0.000
    42.000     0.4221   1053998.     14183.  -0.007181      0.000  2.123E+10
-382.8588  5441.9048      0.000
    48.000     0.3799   1147816.     11887.  -0.006870      0.000  2.123E+10
-382.4812  6040.2571      0.000
    54.000     0.3397   1227145.  9596.0161  -0.006534      0.000  2.123E+10
-381.2285  6733.7444      0.000
    60.000     0.3015   1291979.  7315.1235  -0.006178      0.000  2.123E+10
-379.0690  7543.0396      0.000
    66.000     0.2656   1342356.  5067.7011  -0.005806      0.000  2.123E+10
-370.0718  8361.5299      0.000
    72.000     0.2319   1378568.  2884.2987  -0.005421      0.000  2.123E+10
-357.7291  9257.2777      0.000
    78.000     0.2005   1401037.   776.2081  -0.005028      0.000  2.123E+10
-344.9678      10323.      0.000
    84.000     0.1715   1410207. -1253.9868  -0.004631      0.000  2.123E+10
-331.7638      11606.      0.000
    90.000     0.1449   1406550. -3203.5299  -0.004233      0.000  2.123E+10
-318.0839      13168.      0.000
    96.000     0.1207   1390558. -5069.4258  -0.003837      0.000  2.123E+10
-303.8814      15103.      0.000
   102.000     0.0989   1362755. -6848.3416  -0.003448      0.000  2.123E+10
-289.0905      17542.      0.000
   108.000     0.0793   1323689. -8536.4601  -0.003069      0.000  2.123E+10
-273.6156      20690.      0.000
   114.000     0.0621   1273942.     -10129.  -0.002701      0.000  2.123E+10
-257.3127      24877.      0.000
   120.000     0.0469   1214132.     -11621.  -0.002350      0.000  2.123E+10
-239.9544      30678.      0.000
   126.000     0.0339   1144922.     -13004.  -0.002016      0.000  2.123E+10
-221.1556      39187.      0.000
   132.000     0.0227   1067032.     -14268.  -0.001704      0.000  2.123E+10
-200.1947      52835.      0.000
   138.000     0.0134    981266.     -15395.  -0.001414      0.000  2.123E+10
-175.4754      78473.      0.000
   144.000   0.005763    888566.     -16348.  -0.001150      0.000  2.123E+10
-142.0840     147921.      0.000
   150.000  -0.000383    790194.     -16559.  -0.000913      0.000  2.123E+10
71.8115   1124479.     0.000
   156.000  -0.005189    693912.     -15929.  -0.000703      0.000  2.123E+10
138.3222     159928.     0.000
   162.000  -0.008819    602173.     -15040.  -0.000520      0.000  2.123E+10
157.9516     107465.     0.000
   168.000    -0.0114    515743.     -14060.  -0.000362      0.000  2.123E+10
168.5288      88491.     0.000
   174.000    -0.0132    435056.     -13031.  -0.000227      0.000  2.123E+10
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174.5897     79599.     0.000
   180.000    -0.0142    360382.    -11974.  -0.000115      0.000  2.123E+10
177.8042     75363.     0.000
   186.000    -0.0145    291882.    -10903. -2.280E-05      0.000  2.123E+10
179.0005     73865.     0.000
   192.000    -0.0144    229643. -9830.3385  5.091E-05      0.000  2.123E+10
178.6598     74290.     0.000
   198.000    -0.0139    173692. -8763.0837   0.000108      0.000  2.123E+10
177.0918     76283.     0.000
   204.000    -0.0131    124007. -7708.2778   0.000150      0.000  2.123E+10
174.5102     79720.     0.000
   210.000    -0.0121     80527. -6671.5321   0.000179      0.000  2.123E+10
171.0717     84625.     0.000
   216.000    -0.0110     43154. -5657.6291   0.000196      0.000  2.123E+10
166.8960     91138.     0.000
   222.000  -0.009773     11763. -4670.7066   0.000204      0.000  2.123E+10
162.0782     99509.     0.000
   228.000  -0.008538    -13801. -3714.3831   0.000204      0.000  2.123E+10
156.6963    110119.     0.000
   234.000  -0.007326    -33715. -2791.8485   0.000197      0.000  2.123E+10
150.8152    123511.     0.000
   240.000  -0.006172    -48178. -1905.9386   0.000186      0.000  2.123E+10
144.4881    140458.     0.000
   246.000  -0.005100    -57410. -1059.2089   0.000171      0.000  2.123E+10
137.7551    162077.     0.000
   252.000  -0.004124    -61646.  -254.0330   0.000154      0.000  2.123E+10
130.6368    190042.     0.000
   258.000  -0.003254    -61141.   239.4273   0.000136      0.000  2.123E+10
33.8500     62418.     0.000
   264.000  -0.002487    -59379.   421.0098   0.000119      0.000  2.123E+10
26.6775     64362.     0.000
   270.000  -0.001821    -56619.   561.4056   0.000103      0.000  2.123E+10
20.1211     66306.     0.000
   276.000  -0.001251    -53100.   664.4446  8.752E-05      0.000  2.123E+10
14.2252     68250.     0.000
   282.000  -0.000770    -49035.   734.1607  7.309E-05      0.000  2.123E+10
9.0135    70194.     0.000
   288.000  -0.000373    -44614.   774.6726  5.985E-05      0.000  2.123E+10
4.4905    72138.     0.000
   294.000 -5.220E-05    -40004.   790.0777  4.789E-05      0.000  2.123E+10
0.6445    74082.     0.000
   300.000   0.000201    -35346.   784.3614  3.724E-05      0.000  2.123E+10
-2.5499     76026.     0.000
   306.000   0.000395    -30757.   761.3227  2.790E-05      0.000  2.123E+10
-5.1296     77970.     0.000
   312.000   0.000536    -26334.   724.5140  1.983E-05      0.000  2.123E+10
-7.1399     79914.     0.000
   318.000   0.000633    -22151.   677.1967  1.298E-05      0.000  2.123E+10
-8.6325     81858.     0.000
   324.000   0.000692    -18265.   622.3105  7.269E-06      0.000  2.123E+10
-9.6629     83802.     0.000
   330.000   0.000720    -14716.   562.4547  2.607E-06      0.000  2.123E+10
-10.2890     85746.     0.000
   336.000   0.000723    -11527.   499.8822 -1.102E-06      0.000  2.123E+10
-10.5685     87690.     0.000
   342.000   0.000707 -8712.2132   436.5027 -3.962E-06      0.000  2.123E+10
-10.5580     89634.     0.000
   348.000   0.000676 -6271.7115   373.8945 -6.080E-06      0.000  2.123E+10
-10.3114     91578.     0.000
   354.000   0.000634 -4198.4834   313.3242 -7.560E-06      0.000  2.123E+10
-9.8787     93522.     0.000
   360.000   0.000585 -2478.2552   255.7708 -8.504E-06      0.000  2.123E+10
-9.3057     95466.     0.000
```



```
   366.000   0.000532 -1091.4780   201.9553 -9.008E-06      0.000  2.123E+10
-8.6328     97410.     0.000
   372.000   0.000477   -14.7956   152.3728 -9.164E-06      0.000  2.123E+10
-7.8947     99354.     0.000
   378.000   0.000422   777.6853   114.4472 -9.057E-06      0.000  2.123E+10
-4.7471     67532.     0.000
   384.000   0.000368  1398.7821    87.5386 -8.749E-06      0.000  2.123E+10
-4.2224     68828.     0.000
   390.000   0.000317  1866.9937    63.7644 -8.287E-06      0.000  2.123E+10
-3.7023     70124.     0.000
   396.000   0.000269  2200.7513    43.0645 -7.712E-06      0.000  2.123E+10
-3.1977     71420.     0.000
   402.000   0.000224  2418.0116    25.3190 -7.060E-06      0.000  2.123E+10
-2.7175     72716.     0.000
   408.000   0.000184  2535.9248    10.3604 -6.360E-06      0.000  2.123E+10
-2.2687     74012.     0.000
   414.000   0.000148  2570.5729    -2.0153 -5.638E-06      0.000  2.123E+10
-1.8565     75308.     0.000
   420.000   0.000116  2536.7734   -12.0380 -4.916E-06      0.000  2.123E+10
-1.4844     76604.     0.000
   426.000  8.892E-05  2447.9432   -19.9548 -4.211E-06      0.000  2.123E+10
-1.1545     77900.     0.000
   432.000  6.573E-05  2316.0148   -26.0210 -3.538E-06      0.000  2.123E+10
-0.8676     79196.     0.000
   438.000  4.646E-05  2151.4003   -30.4937 -2.907E-06      0.000  2.123E+10
-0.6233     80492.     0.000
   444.000  3.085E-05  1962.9958   -33.6252 -2.325E-06      0.000  2.123E+10
-0.4205     81788.     0.000
   450.000  1.856E-05  1758.2217   -35.6578 -1.799E-06      0.000  2.123E+10
-0.2570     83084.     0.000
   456.000  9.256E-06  1543.0915   -36.8193 -1.333E-06      0.000  2.123E+10
-0.1302     84380.     0.000
   462.000  2.568E-06  1322.3069   -37.3199 -9.277E-07      0.000  2.123E+10
-0.0367     85676.     0.000
   468.000 -1.877E-06  1099.3723   -37.3483 -5.855E-07      0.000  2.123E+10
0.0272     86972.     0.000
   474.000 -4.458E-06   876.7272   -37.0699 -3.062E-07      0.000  2.123E+10
0.0656     88268.     0.000
   480.000 -5.551E-06   655.8927   -36.6246 -8.958E-08      0.000  2.123E+10
0.0829     89564.     0.000
   486.000 -5.532E-06   437.6298   -36.1247  6.497E-08      0.000  2.123E+10
0.0838     90860.     0.000
   492.000 -4.772E-06   222.1084   -35.6535  1.582E-07      0.000  2.123E+10
0.0733     92156.     0.000
   498.000 -3.634E-06     9.0859   -26.9167  1.909E-07      0.000  2.123E+10
2.8390   4687500.     0.000
   504.000 -2.481E-06  -101.7390   -12.5853  1.778E-07      0.000  2.123E+10
1.9382   4687500.     0.000
   510.000 -1.500E-06  -142.7266    -3.2544  1.432E-07      0.000  2.123E+10
1.1721   4687500.     0.000
   516.000 -7.619E-07  -141.4278     2.0477  1.031E-07      0.000  2.123E+10
0.5952   4687500.     0.000
   522.000 -2.633E-07  -118.6124     4.4504  6.633E-08      0.000  2.123E+10
0.2057   4687500.     0.000
   528.000  3.411E-08   -88.3170     4.9876  3.709E-08      0.000  2.123E+10
-0.0266   4687500.     0.000
   534.000  1.817E-07   -58.9255     4.4818  1.628E-08      0.000  2.123E+10
-0.1420   4687500.     0.000
   540.000  2.294E-07   -34.6083     3.5181  3.057E-09      0.000  2.123E+10
-0.1792   4687500.     0.000
   546.000  2.184E-07   -16.7218     2.4685 -4.198E-09      0.000  2.123E+10
-0.1706   4687500.     0.000
   552.000  1.790E-07    -4.9675     1.5370 -7.264E-09      0.000  2.123E+10
```



```
-0.1399   4687500.     0.000
   558.000  1.312E-07     1.7543     0.8097 -7.718E-09      0.000  2.123E+10
-0.1025   4687500.     0.000
   564.000  8.643E-08     4.7836     0.2996 -6.794E-09      0.000  2.123E+10
-0.0675   4687500.     0.000
   570.000  4.972E-08     5.3792    -0.0195 -5.357E-09      0.000  2.123E+10
-0.0388   4687500.     0.000
   576.000  2.214E-08     4.5730    -0.1880 -3.951E-09      0.000  2.123E+10
-0.0173   4687500.     0.000
   582.000  2.313E-09     3.1412    -0.2453 -2.861E-09      0.000  2.123E+10
-0.001807   4687500.     0.000
   588.000 -1.219E-08     1.6423    -0.2221 -2.184E-09      0.000  2.123E+10
0.009521   4687500.     0.000
   594.000 -2.390E-08     0.4852    -0.1376 -1.884E-09      0.000  2.123E+10
0.0187   4687500.     0.000
   600.000 -3.479E-08      0.000      0.000 -1.815E-09      0.000  2.123E+10
0.0272   2343750.     0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

```
Pile-head deflection            =      0.7555380 inches
Computed slope at pile head     =     -0.0083340 radians
Maximum bending moment          =       1410207. inch-lbs
Maximum shear force             =         30000. lbs
Depth of maximum bending moment =     84.0000000 inches below pile head
Depth of maximum shear force    =       0.000000 inches below pile head
Number of iterations            =             34
Number of zero deflection points =             5
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 4

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                 =       40000.000 lbs
Applied moment at pile head                         =           0.000 in-lbs
Axial thrust load on pile head                      =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope       Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs       lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     1.5000      0.000     40000.    -0.0147      0.000  2.123E+10
-431.0578   862.0918      0.000
```



```
     6.000     1.4121    264776.     37389.    -0.0146      0.000  2.123E+10
-439.4264  1867.1087      0.000
    12.000     1.3246    513567.     34729.    -0.0145      0.000  2.123E+10
-447.0509  2024.9572      0.000
    18.000     1.2380    745942.     32039.    -0.0143      0.000  2.123E+10
-449.5761  2178.8659      0.000
    24.000     1.1527    961664.     29328.    -0.0141      0.000  2.123E+10
-454.2556  2364.5584      0.000
    30.000     1.0689   1160430.     26590.    -0.0138      0.000  2.123E+10
-458.1716  2571.7262      0.000
    36.000     0.9872   1341973.     23832.    -0.0134      0.000  2.123E+10
-461.3014  2803.7135      0.000
    42.000     0.9077   1506066.     21057.    -0.0130      0.000  2.123E+10
-463.6220  3064.5251      0.000
    48.000     0.8308   1652525.     18271.    -0.0126      0.000  2.123E+10
-465.1090  3358.9910      0.000
    54.000     0.7567   1781203.     15479.    -0.0121      0.000  2.123E+10
-465.7369  3692.9794      0.000
    60.000     0.6856   1891996.     12685.    -0.0116      0.000  2.123E+10
-465.4785  4073.6799      0.000
    66.000     0.6177   1984845.  9917.3852    -0.0110      0.000  2.123E+10
-457.0236  4439.2589      0.000
    72.000     0.5532   2059995.  7212.5406    -0.0105      0.000  2.123E+10
-444.5912  4822.1859      0.000
    78.000     0.4922   2117848.  4583.4059  -0.009872      0.000  2.123E+10
-431.7870  5264.0298      0.000
    84.000     0.4347   2158827.  2032.2524  -0.009267      0.000  2.123E+10
-418.5975  5777.4654      0.000
    90.000     0.3809   2183382.  -438.5553  -0.008654      0.000  2.123E+10
-405.0050  6378.9090      0.000
    96.000     0.3309   2191986. -2826.5277  -0.008035      0.000  2.123E+10
-390.9858  7089.9827      0.000
   102.000     0.2845   2185140. -5129.0093  -0.007417      0.000  2.123E+10
-376.5081  7939.7270      0.000
   108.000     0.2419   2163368. -7343.1216  -0.006802      0.000  2.123E+10
-361.5293  8968.0555      0.000
   114.000     0.2029   2127223. -9465.6840  -0.006196      0.000  2.123E+10
-345.9914     10231.      0.000
   120.000     0.1675   2077288.    -11493.  -0.005601      0.000  2.123E+10
-329.8135     11812.      0.000
   126.000     0.1357   2014176.    -13421.  -0.005023      0.000  2.123E+10
-312.8795     13836.      0.000
   132.000     0.1073   1938536.    -15245.  -0.004464      0.000  2.123E+10
-295.0177     16504.      0.000
   138.000     0.0821   1851060.    -16958.  -0.003929      0.000  2.123E+10
-275.9595     20165.      0.000
   144.000     0.0601   1752487.    -18551.  -0.003420      0.000  2.123E+10
-255.2569     25480.      0.000
   150.000     0.0411   1643625.    -20013.  -0.002940      0.000  2.123E+10
-232.0831     33900.      0.000
   156.000     0.0248   1525377.    -21324.  -0.002492      0.000  2.123E+10
-204.6456     49446.      0.000
   162.000     0.0112   1398804.    -22440.  -0.002078      0.000  2.123E+10
-167.6184     89987.      0.000
   168.000  -0.000108   1265320.    -22827.  -0.001702      0.000  2.123E+10
38.7401   2154663.     0.000
   174.000  -0.009246   1132435.    -22231.  -0.001363      0.000  2.123E+10
159.8569    103736.     0.000
   180.000    -0.0165   1004596.    -21198.  -0.001061      0.000  2.123E+10
184.6608     67298.     0.000
   186.000    -0.0220    882773.    -20048.  -0.000794      0.000  2.123E+10
198.4896     54190.     0.000
   192.000    -0.0260    767542.    -18832.  -0.000561      0.000  2.123E+10
```

```
206.9961     47780.      0.000
   198.000    -0.0287    659282.    -17574.  -0.000359      0.000  2.123E+10
212.2012     44350.      0.000
   204.000    -0.0303    558247.    -16292.  -0.000187      0.000  2.123E+10
215.0920     42585.      0.000
   210.000    -0.0310    464605.    -14998. -4.263E-05      0.000  2.123E+10
216.2359     41913.      0.000
   216.000    -0.0308    378455.    -13702.  7.652E-05      0.000  2.123E+10
215.9943     42054.      0.000
   222.000    -0.0300    299845.    -12410.   0.000172      0.000  2.123E+10
214.6144     42871.      0.000
   228.000    -0.0287    228772.    -11129.   0.000247      0.000  2.123E+10
212.2748     44304.      0.000
   234.000    -0.0271    165197. -9865.0378   0.000303      0.000  2.123E+10
209.1098     46346.      0.000
   240.000    -0.0251    109047. -8622.0358   0.000342      0.000  2.123E+10
205.2242     49029.      0.000
   246.000    -0.0230     60216. -7404.2578   0.000365      0.000  2.123E+10
200.7018     52419.      0.000
   252.000    -0.0207     18573. -6215.3206   0.000377      0.000  2.123E+10
195.6106     56619.      0.000
   258.000    -0.0185    -16040. -5052.5646   0.000377      0.000  2.123E+10
191.9747     62418.      0.000
   264.000    -0.0162    -43731. -3955.1262   0.000369      0.000  2.123E+10
173.8381     64362.      0.000
   270.000    -0.0140    -65137. -2968.4192   0.000353      0.000  2.123E+10
155.0643     66306.      0.000
   276.000    -0.0120    -80920. -2094.8113   0.000332      0.000  2.123E+10
136.1384     68250.      0.000
   282.000    -0.0100    -91751. -1333.9536   0.000308      0.000  2.123E+10
117.4809     70194.      0.000
   288.000  -0.008271    -98295.  -683.1724   0.000281      0.000  2.123E+10
99.4462     72138.      0.000
   294.000  -0.006667   -101198.  -137.8667   0.000253      0.000  2.123E+10
82.3224     74082.      0.000
   300.000  -0.005235   -101073.   308.1028   0.000224      0.000  2.123E+10
66.3341     76026.      0.000
   306.000  -0.003974    -98497.   662.0408   0.000196      0.000  2.123E+10
51.6452     77970.      0.000
   312.000  -0.002880    -94000.   932.0695   0.000169      0.000  2.123E+10
38.3643     79914.      0.000
   318.000  -0.001946    -88063.  1126.8115   0.000143      0.000  2.123E+10
26.5497     81858.      0.000
   324.000  -0.001161    -81114.  1255.1071   0.000119      0.000  2.123E+10
16.2156     83802.      0.000
   330.000  -0.000514    -73531.  1325.7701  9.752E-05      0.000  2.123E+10
7.3388     85746.      0.000
   336.000  9.233E-06    -65638.  1347.3816  7.785E-05      0.000  2.123E+10
-0.1349     87690.      0.000
   342.000   0.000421    -57709.  1328.1237  6.042E-05      0.000  2.123E+10
-6.2843     89634.      0.000
   348.000   0.000734    -49969.  1275.6512  4.520E-05      0.000  2.123E+10
-11.2065     91578.      0.000
   354.000   0.000963    -42601.  1196.9992  3.211E-05      0.000  2.123E+10
-15.0109     93522.      0.000
   360.000   0.001120    -35748.  1098.5249  2.104E-05      0.000  2.123E+10
-17.8139     95466.      0.000
   366.000   0.001216    -29513.   985.8809  1.182E-05      0.000  2.123E+10
-19.7341     97410.      0.000
   372.000   0.001261    -23969.   864.0158  4.259E-06      0.000  2.123E+10
-20.8876     99354.      0.000
   378.000   0.001267    -19163.   758.5839 -1.838E-06      0.000  2.123E+10
-14.2563     67532.      0.000
```



```
   384.000   0.001239    -14858.   673.1637 -6.646E-06      0.000  2.123E+10
-14.2170     68828.      0.000
   390.000   0.001187    -11056.   588.8983 -1.031E-05      0.000  2.123E+10
-13.8714     70124.      0.000
   396.000   0.001116 -7745.6883   507.4440 -1.297E-05      0.000  2.123E+10
-13.2800     71420.      0.000
   402.000   0.001031 -4908.8497   430.1084 -1.475E-05      0.000  2.123E+10
-12.4985     72716.      0.000
   408.000   0.000939 -2518.8779   357.8790 -1.580E-05      0.000  2.123E+10
-11.5780     74012.      0.000
   414.000   0.000842  -544.1316   291.4540 -1.624E-05      0.000  2.123E+10
-10.5637     75308.      0.000
   420.000   0.000744  1050.6628   231.2756 -1.617E-05      0.000  2.123E+10
-9.4958     76604.      0.000
   426.000   0.000648  2302.9495   177.5620 -1.569E-05      0.000  2.123E+10
-8.4087     77900.      0.000
   432.000   0.000555  3251.0772   130.3408 -1.491E-05      0.000  2.123E+10
-7.3317     79196.      0.000
   438.000   0.000469  3933.2239    89.4793 -1.389E-05      0.000  2.123E+10
-6.2888     80492.      0.000
   444.000   0.000389  4386.5055    54.7147 -1.272E-05      0.000  2.123E+10
-5.2994     81788.      0.000
   450.000   0.000316  4646.2559    25.6811 -1.144E-05      0.000  2.123E+10
-4.3785     83084.      0.000
   456.000   0.000252  4745.4662     1.9348 -1.011E-05      0.000  2.123E+10
-3.5370     84380.      0.000
   462.000   0.000195  4714.3675   -17.0235 -8.774E-06      0.000  2.123E+10
-2.7825     85676.      0.000
   468.000   0.000146  4580.1413   -31.7292 -7.461E-06      0.000  2.123E+10
-2.1194     86972.      0.000
   474.000   0.000105  4366.7423   -42.7362 -6.196E-06      0.000  2.123E+10
-1.5496     88268.      0.000
   480.000  7.186E-05  4094.8175   -50.6030 -5.000E-06      0.000  2.123E+10
-1.0727     89564.      0.000
   486.000  4.533E-05  3781.7066   -55.8805 -3.887E-06      0.000  2.123E+10
-0.6865     90860.      0.000
   492.000  2.522E-05  3441.5096   -59.1019 -2.866E-06      0.000  2.123E+10
-0.3873     92156.      0.000
   498.000  1.094E-05  3085.2096   -85.9022 -1.944E-06      0.000  2.123E+10
-8.5461   4687500.      0.000
   504.000  1.894E-06  2419.3128  -115.9790 -1.166E-06      0.000  2.123E+10
-1.4795   4687500.      0.000
   510.000 -3.048E-06  1698.6370  -113.2726 -5.836E-07      0.000  2.123E+10
2.3816   4687500.      0.000
   516.000 -5.110E-06  1062.6326   -94.1520 -1.934E-07      0.000  2.123E+10
3.9919   4687500.      0.000
   522.000 -5.369E-06   569.6714   -69.5933  3.734E-08      0.000  2.123E+10
4.1943   4687500.      0.000
   528.000 -4.662E-06   227.3476   -46.0848  1.500E-07      0.000  2.123E+10
3.6418   4687500.      0.000
   534.000 -3.569E-06    15.9873   -26.7949  1.844E-07      0.000  2.123E+10
2.7881   4687500.      0.000
   540.000 -2.449E-06   -95.0101   -12.6907  1.732E-07      0.000  2.123E+10
1.9133   4687500.      0.000
   546.000 -1.490E-06  -137.0707    -3.4582  1.404E-07      0.000  2.123E+10
1.1643   4687500.      0.000
   552.000 -7.640E-07  -137.1319     1.8252  1.017E-07      0.000  2.123E+10
0.5969   4687500.      0.000
   558.000 -2.703E-07  -115.6192     4.2495  6.594E-08      0.000  2.123E+10
0.2112   4687500.      0.000
   564.000  2.722E-08   -86.4304     4.8194  3.738E-08      0.000  2.123E+10
-0.0213   4687500.      0.000
   570.000  1.782E-07   -57.9530     4.3379  1.697E-08      0.000  2.123E+10
```



```
-0.1392   4687500.      0.000
   576.000  2.309E-07   -34.4512     3.3790  3.914E-09      0.000  2.123E+10
-0.1804   4687500.      0.000
   582.000  2.252E-07   -17.4220     2.3101 -3.418E-09      0.000  2.123E+10
-0.1759   4687500.      0.000
   588.000  1.899E-07    -6.7147     1.3373 -6.829E-09      0.000  2.123E+10
-0.1483   4687500.      0.000
   594.000  1.432E-07    -1.3438     0.5566 -7.968E-09      0.000  2.123E+10
-0.1119   4687500.      0.000
   600.000  9.427E-08     0.000      0.000 -8.158E-09      0.000  2.123E+10
-0.0736   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection             =      1.5000415 inches
Computed slope at pile head      =     -0.0146556 radians
Maximum bending moment           =       2191986. inch-lbs
Maximum shear force              =         40000. lbs
Depth of maximum bending moment  =     96.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =            33
Number of zero deflection points =             4
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

```
Load  Load    Condition 1    Condition 2        Axial        Pile-Head       Maximum
        Maximum       Pile-Head
Case  Type    V(lbs) or     in-lb, rad.,        Load        Deflection       Moment
        Shear         Rotation
 No.    No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
        lbs           radians
----  ----  --------------  --------------  -------------  -------------
-------------  -------------  -------------
   1     1   V = 10000.0000  M =      0.000        370000.     0.05993444
278774.     10000.0000     0.00000000
   2     1   V =     20000.  M =      0.000        370000.     0.29243204
769740.         20000.     0.00000000
```



```
   3     1   V =     30000.  M =      0.000        370000.     0.75553798
1410207.         30000.     0.00000000
   4     1   V =     40000.  M =      0.000        370000.     1.50004152
2191986.         40000.     0.00000000
```

The analysis ended normally.

```
 LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 9 & 10
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.60000000000000E+0001 = Pipe pile diameter (in)
 5.00000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
3 = number of soil layers
3       -6.00000000000000E+0000  2.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.50000000000000E+0000  4.65000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.65000000000000E+0001  1.00000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
```

```
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

==========

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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==========

This program is licensed to:

L. Tran
PARIKH

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT\Analyses\
Name of input data file: San Leandro Creek BOH (B9 - B10).lp6d
Name of output file: San Leandro Creek BOH (B9 - B10).lp6o
Name of plot output file: San Leandro Creek BOH (B9 - B10).lp6p
Name of runtime file: San Leandro Creek BOH (B9 - B10).lp6r

Date and Time of Analysis

Date: November 17, 2011 Time: 16:09:42

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 9 & 10

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -6.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points. p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	16.0000000
2	50.000000	16.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 16.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -6.000 ft
Distance from top of pile to bottom of layer = 2.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 2.500 ft
Distance from top of pile to bottom of layer = 46.500 ft

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 46.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 50.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-6.00	125.00000
2	2.50	125.00000
3	2.50	62.60000
4	46.50	62.60000
5	46.50	62.60000
6	100.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type Test Type	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50 pci	kpy pci	Rock Emass psi	krm
1	Stiff Clay w/o Free Water (p-y Curve Criteria)	-6.000	125.000	1500.000	0.00	--	--	--	--	--	--
		2.500	125.000	1500.000	0.00	--	--	--	--	--	--
2	Stiff Clay w/o Free Water	2.500	62.600	1500.000	0.00	--	--	--	--	--	--
		46.500	62.600	1500.000	0.00	--	--	--	--	--	--
3	Stiff Clay w/o Free Water	46.500	62.600	2500.000	0.00	--	--	--	--	--	--
		100.000	62.600	2500.000	0.00	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load	Load	Condition 1	Condition 2	Axial Thrust

No.	Type					Force, lbs
1	1	V =	10000.000 lbs	M =	0.000 in-lbs	370000.000
2	1	V =	20000.000 lbs	M =	0.000 in-lbs	370000.000
3	1	V =	30000.000 lbs	M =	0.000 in-lbs	370000.000
4	1	V =	40000.000 lbs	M =	0.000 in-lbs	370000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	600.00000000	in
Outer Diameter of Pipe	=	16.00000000	in
Pipe Wall Thickness	=	0.50000000	in
Yield Stress of Pipe	=	45.00000000	ksi
Elastic Modulus	=	29000.	ksi
Cross-sectional Area	=	24.34734307	sq. in.
Moment of Inertia	=	731.94200090	in^4
Elastic Bending Stiffness	=	21226318.	lb-in^2
Plastic Modulus, Z	=	120.16666667	in^3
Plastic Moment Capacity = Fy Z	=	5407.50000000	in-kip
Nom. Axial Structural Capacity = Fy As	=	1095.630	kips
Nominal Axial Tensile Capacity	=	-1095.630	kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	370.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 370.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000003303	70.1099804	21226293.	166.6523345	15.9553581	
0.000006606	140.2199607	21226293.	87.3261673	16.7139861	
0.000009909	210.3299411	21226293.	60.8841115	17.4726140	
0.0000132	280.4399215	21226293.	47.6630836	18.2312422	
0.0000165	350.5499018	21226293.	39.7304669	18.9898699	
0.0000198	420.6598822	21226293.	34.4420558	19.7484980	
0.0000231	490.7698625	21226293.	30.6646192	20.5071261	

0.0000264	560.8798429	21226293.	27.8315418	21.2657540	
0.0000297	630.9898233	21226293.	25.6280372	22.0243821	
0.0000330	701.0998036	21226293.	23.8652335	22.7830101	
0.0000363	771.2097840	21226293.	22.4229395	23.5416380	
0.0000396	841.3197644	21226293.	21.2210279	24.3002661	
0.0000429	911.4297447	21226293.	20.2040257	25.0588941	
0.0000462	981.5397251	21226293.	19.3323096	25.8175220	
0.0000495	1051.6497054	21226293.	18.5768223	26.5761501	
0.0000528	1121.7596858	21226293.	17.9157709	27.3347781	
0.0000562	1191.8696662	21226293.	17.3324903	28.0934060	
0.0000595	1261.9796465	21226293.	16.8140186	28.8520341	
0.0000628	1332.0896269	21226293.	16.3501229	29.6106621	
0.0000661	1402.1996073	21226293.	15.9326167	30.3692901	
0.0000694	1472.3095876	21226293.	15.5548731	31.1279181	
0.0000727	1542.4195680	21226293.	15.2114698	31.8865461	
0.0000760	1612.5295484	21226293.	14.8979276	32.6451741	
0.0000793	1682.6395287	21226293.	14.6105139	33.4038021	
0.0000826	1752.7495091	21226293.	14.3460934	34.1624301	
0.0000859	1822.8594894	21226293.	14.1020129	34.9210581	
0.0000892	1892.9694698	21226293.	13.8760124	35.6796861	
0.0000925	1963.0794502	21226293.	13.6661548	36.4383141	
0.0000958	2033.1894305	21226293.	13.4707702	37.1969421	
0.0000991	2103.2994109	21226293.	13.2884112	37.9555701	
0.0001024	2173.4093913	21226293.	13.1178172	38.7141981	
0.0001057	2243.5193716	21226293.	12.9578855	39.4728261	
0.0001090	2313.6293520	21226293.	12.8076465	40.2314541	
0.0001123	2383.7393323	21226293.	12.6662451	40.9900821	
0.0001156	2453.8493127	21226293.	12.5329238	41.7487101	
0.0001189	2523.9592931	21226293.	12.4070093	42.5073381	
0.0001222	2594.0692734	21226293.	12.2879009	43.2659661	
0.0001255	2664.1792538	21226293.	12.1750614	44.0245941	
0.0001288	2734.2892342	21226293.	12.0680086	44.7832221	Y
0.0001354	2866.9718816	21170635.	11.8796433	45.0000000	Y
0.0001420	2978.5544808	20971592.	11.7365397	45.0000000	Y
0.0001486	3076.0201010	20695264.	11.6246759	45.0000000	Y
0.0001552	3163.1850276	20376100.	11.5358909	45.0000000	Y
0.0001618	3242.2891707	20033184.	11.4649973	45.0000000	Y
0.0001685	3314.7848579	19677933.	11.4084067	45.0000000	Y
0.0001751	3381.6515354	19317339.	11.3635416	45.0000000	Y
0.0001817	3443.5713722	18955739.	11.3284988	45.0000000	Y
0.0001883	3501.0544404	18595948.	11.3018159	45.0000000	Y
0.0001949	3554.8734049	18241748.	11.2818213	45.0000000	Y
0.0002015	3605.2703438	17893789.	11.2676920	45.0000000	Y
0.0002081	3652.5943181	17553156.	11.2585606	45.0000000	Y
0.0002147	3697.1623313	17220648.	11.2536696	45.0000000	Y
0.0002213	3739.4075994	16897495.	11.2521708	45.0000000	Y
0.0002279	3779.1051660	16581897.	11.2541663	45.0000000	Y
0.0002345	3816.8312719	16275672.	11.2586937	45.0000000	Y
0.0002411	3852.7103826	15978567.	11.2654480	45.0000000	Y
0.0002477	3886.8609526	15690329.	11.2741579	45.0000000	Y
0.0002543	3919.3959158	15410713.	11.2845805	45.0000000	Y
0.0002609	3950.4231141	15139476.	11.2964980	45.0000000	Y
0.0002675	3980.0456725	14876383.	11.3097133	45.0000000	Y
0.0002741	4008.3623300	14621206.	11.3240481	45.0000000	Y
0.0002808	4035.4677320	14373723.	11.3393396	45.0000000	Y
0.0002874	4061.4526904	14133719.	11.3554387	45.0000000	Y
0.0002940	4086.4044152	13900988.	11.3722083	45.0000000	Y
0.0003006	4110.4067215	13675327.	11.3895213	45.0000000	Y
0.0003072	4133.5402156	13456544.	11.4072594	45.0000000	Y
0.0003138	4155.8824619	13244451.	11.4253116	45.0000000	Y
0.0003204	4177.1669597	13037803.	11.4440471	45.0000000	Y
0.0003270	4197.7709713	12837423.	11.4629507	45.0000000	Y
0.0003336	4217.7661739	12643154.	11.4819272	45.0000000	Y

0.0003402	4237.0431956	12454319.	11.5011321	45.0000000	Y
0.0003468	4255.5468719	12270447.	11.5206545	45.0000000	Y
0.0003534	4273.6096598	12092202.	11.5400445	45.0000000	Y
0.0003600	4290.4097650	11916990.	11.5582468	45.0000000	Y
0.0003666	4306.5112932	11746187.	11.5763296	45.0000000	Y
0.0003732	4322.1427406	11580171.	11.5937314	45.0000000	Y
0.0003798	4335.9628653	11415161.	11.6092082	45.0000000	Y
0.0003864	4349.6713089	11255503.	11.6243286	45.0000000	Y
0.0003931	4362.3530681	11098599.	11.6390555	45.0000000	Y
0.0004195	4404.4318093	10499787.	11.6831503	45.0000000	Y
0.0004459	4437.6151732	9951996.	11.7157650	45.0000000	Y
0.0004723	4464.2614757	9451656.	11.7419536	45.0000000	Y
0.0004987	4486.3513288	8995196.	11.7628724	45.0000000	Y
0.0005252	4504.8959103	8577919.	11.7801068	45.0000000	Y
0.0005516	4520.6772185	8195611.	11.7948415	45.0000000	Y
0.0005780	4534.1895089	7844331.	11.8074250	45.0000000	Y
0.0006044	4545.6603898	7520387.	11.8172202	45.0000000	Y
0.0006309	4555.9460064	7221701.	11.8261639	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	370.000	4555.9

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	10000.000	lbs
Applied moment at pile head	=	0.000	in-lbs
Axial thrust load on pile head	=	370000.000	lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. p	Soil Spr. Es*h inches	Distrib. Lat. Load inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/in lb/inch	lb/inch
0.00	0.0559	-1.064E-07	10000.	-0.000996	0.000	2.123E+10	-192.2338	10310.	0.000							

6.000	0.0500	58751.	8840.3079	-0.000988	0.000	2.123E+10	-194.3302	23337.	0.000
12.000	0.0441	110468.	7670.6180	-0.000964	0.000	2.123E+10	-195.5665	26615.	0.000
18.000	0.0384	155077.	6496.2079	-0.000926	0.000	2.123E+10	-195.9036	30610.	0.000
24.000	0.0330	192535.	5322.5990	-0.000877	0.000	2.123E+10	-195.2994	35537.	0.000
30.000	0.0279	222842.	4161.0591	-0.000818	0.000	2.123E+10	-191.8806	41301.	0.000
36.000	0.0232	246101.	3019.0691	-0.000752	0.000	2.123E+10	-188.7827	48918.	0.000
42.000	0.0189	262409.	1898.7920	-0.000680	0.000	2.123E+10	-184.6430	58768.	0.000
48.000	0.0150	271906.	806.6850	-0.000605	0.000	2.123E+10	-179.3927	71789.	0.000
54.000	0.0116	274774.	-250.3250	-0.000527	0.000	2.123E+10	-172.9439	89483.	0.000
60.000	0.008665	271244.	-1264.6851	-0.000450	0.000	2.123E+10	-165.1761	114373.	0.000
66.000	0.006194	261597.	-2227.9455	-0.000375	0.000	2.123E+10	-155.9107	151026.	0.000
72.000	0.004167	246173.	-3130.2387	-0.000303	0.000	2.123E+10	-144.8537	208588.	0.000
78.000	0.002557	225379.	-3959.1459	-0.000236	0.000	2.123E+10	-131.4487	308464.	0.000
84.000	0.001329	199713.	-4696.6581	-0.000176	0.000	2.123E+10	-114.3887	516341.	0.000
90.000	0.000440	169803.	-5306.6996	-0.000124	0.000	2.123E+10	-88.9584	1212177.	0.000
96.000	-0.000161	136584.	-5365.9672	-8.085E-05	0.000	2.123E+10	69.2026	2585595.	0.000
102.000	-0.000530	105770.	-4877.0245	-4.660E-05	0.000	2.123E+10	93.7783	1061937.	0.000
108.000	-0.000720	78266.	-4291.8375	-2.058E-05	0.000	2.123E+10	101.2840	844349.	0.000
114.000	-0.000777	54359.	-3678.2205	-1.840E-06	0.000	2.123E+10	103.2550	797471.	0.000
120.000	-0.000742	34136.	-3062.2151	1.067E-05	0.000	2.123E+10	102.0801	825655.	0.000
126.000	-0.000649	17565.	-2459.7937	1.797E-05	0.000	2.123E+10	98.7270	912926.	0.000
132.000	-0.000526	4538.3373	-1882.5423	2.110E-05	0.000	2.123E+10	93.6901	1068466.	0.000
138.000	-0.000396	-5118.7572	-1339.7122	2.102E-05	0.000	2.123E+10	87.2533	1323088.	0.000
144.000	-0.000274	-11632.	-723.8260	1.865E-05	0.000	2.123E+10	118.0422	2585595.	0.000
150.000	-0.000172	-13887.	-147.4776	1.504E-05	0.000	2.123E+10	74.0740	2585595.	0.000
156.000	-9.342E-05	-13468.	195.5112	1.118E-05	0.000	2.123E+10	40.2556	2585595.	0.000
162.000	-3.778E-05	-11591.	365.1201	7.634E-06	0.000	2.123E+10	16.2807	2585595.	0.000
168.000	-1.803E-06	-9120.4970	416.2934	4.707E-06	0.000	2.123E+10	0.7771	2585595.	0.000
174.000	1.870E-05	-6616.3369	394.4429	2.483E-06	0.000	2.123E+10	-8.0606	2585595.	0.000
180.000	2.799E-05	-4398.2063	334.0732	9.262E-07	0.000	2.123E+10	-12.0626	2585595.	0.000
186.000	2.982E-05	-2611.5704	259.3348	-6.452E-08	0.000	2.123E+10	-12.8502	2585595.	0.000
192.000	2.722E-05	-1285.9022	185.5972	-6.154E-07	0.000	2.123E+10			

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-11.7290   2585595.      0.000
   198.000  2.244E-05  -381.6714   121.4061 -8.510E-07      0.000  2.123E+10
-9.6680   2585595.      0.000
   204.000  1.701E-05   174.7499    70.4178 -8.803E-07      0.000  2.123E+10
-7.3281   2585595.      0.000
   210.000  1.187E-05   467.2504    33.0859 -7.896E-07      0.000  2.123E+10
-5.1159   2585595.      0.000
   216.000  7.531E-06   575.2862     8.0028 -6.422E-07      0.000  2.123E+10
-3.2452   2585595.      0.000
   222.000  4.165E-06   566.1357    -7.1173 -4.809E-07      0.000  2.123E+10
-1.7949   2585595.      0.000
   228.000  1.760E-06   492.0139   -14.7771 -3.313E-07      0.000  2.123E+10
-0.7584   2585595.      0.000
   234.000  1.891E-07   390.2813   -17.2968 -2.066E-07      0.000  2.123E+10
-0.0815   2585595.      0.000
   240.000 -7.197E-07   285.3700   -16.6108 -1.111E-07      0.000  2.123E+10
0.3102   2585595.      0.000
   246.000 -1.145E-06   191.4455   -14.2005 -4.375E-08      0.000  2.123E+10
0.4932   2585595.      0.000
   252.000 -1.245E-06   115.1578   -11.1115 -4.195E-10      0.000  2.123E+10
0.5364   2585595.      0.000
   258.000 -1.150E-06    58.1089    -8.0160  2.407E-08      0.000  2.123E+10
0.4954   2585595.      0.000
   264.000 -9.560E-07    18.8585    -5.2939  3.495E-08      0.000  2.123E+10
0.4120   2585595.      0.000
   270.000 -7.303E-07    -5.5734    -3.1140  3.682E-08      0.000  2.123E+10
0.3147   2585595.      0.000
   276.000 -5.141E-07   -18.6725    -1.5053  3.340E-08      0.000  2.123E+10
0.2215   2585595.      0.000
   282.000 -3.295E-07   -23.7851    -0.4147  2.740E-08      0.000  2.123E+10
0.1420   2585595.      0.000
   288.000 -1.853E-07   -23.7710     0.2508  2.068E-08      0.000  2.123E+10
0.0798   2585595.      0.000
   294.000 -8.139E-08   -20.8675     0.5955  1.437E-08      0.000  2.123E+10
0.0351   2585595.      0.000
   300.000 -1.289E-08   -16.6882     0.7174  9.059E-09      0.000  2.123E+10
0.005553   2585595.      0.000
   306.000  2.732E-08   -12.2986     0.6988  4.962E-09      0.000  2.123E+10
-0.0118   2585595.      0.000
   312.000  4.666E-08    -8.3250     0.6031  2.047E-09      0.000  2.123E+10
-0.0201   2585595.      0.000
   318.000  5.189E-08    -5.0700     0.4757  1.543E-10      0.000  2.123E+10
-0.0224   2585595.      0.000
   324.000  4.851E-08    -2.6169     0.3459 -9.321E-10      0.000  2.123E+10
-0.0209   2585595.      0.000
   330.000  4.070E-08    -0.9147     0.2306 -1.431E-09      0.000  2.123E+10
-0.0175   2585595.      0.000
   336.000  3.134E-08     0.1567     0.1375 -1.538E-09      0.000  2.123E+10
-0.0135   2585595.      0.000
   342.000  2.224E-08     0.7418     0.0682 -1.411E-09      0.000  2.123E+10
-0.009584   2585595.      0.000
   348.000  1.440E-08     0.9814     0.0208 -1.168E-09      0.000  2.123E+10
-0.006206   2585595.      0.000
   354.000  8.225E-09     0.9969  -0.008418 -8.883E-10      0.000  2.123E+10
-0.003545   2585595.      0.000
   360.000  3.741E-09     0.8843    -0.0239 -6.224E-10      0.000  2.123E+10
-0.001612   2585595.      0.000
   366.000  7.565E-10     0.7130    -0.0297 -3.967E-10      0.000  2.123E+10
-0.000326   2585595.      0.000
   372.000 -1.019E-09     0.5296    -0.0294 -2.210E-10      0.000  2.123E+10
0.000439   2585595.      0.000
   378.000 -1.896E-09     0.3617    -0.0256 -9.506E-11      0.000  2.123E+10
0.000817   2585595.      0.000
```



```
   384.000 -2.160E-09     0.2229    -0.0204 -1.244E-11      0.000  2.123E+10
0.000931   2585595.      0.000
   390.000 -2.045E-09     0.1175    -0.0149  3.566E-11      0.000  2.123E+10
0.000881   2585595.      0.000
   396.000 -1.732E-09     0.0437    -0.0100  5.845E-11      0.000  2.123E+10
0.000746   2585595.      0.000
   402.000 -1.344E-09  -0.003191  -0.006059  6.418E-11      0.000  2.123E+10
0.000579   2585595.      0.000
   408.000 -9.614E-10    -0.0293  -0.003079  5.959E-11      0.000  2.123E+10
0.000414   2585595.      0.000
   414.000 -6.287E-10    -0.0404  -0.001023  4.975E-11      0.000  2.123E+10
0.000271   2585595.      0.000
   420.000 -3.644E-10    -0.0418   0.000261  3.813E-11      0.000  2.123E+10
0.000157   2585595.      0.000
   426.000 -1.710E-10    -0.0374   0.000953  2.694E-11      0.000  2.123E+10
7.370E-05   2585595.      0.000
   432.000 -4.114E-11    -0.0304   0.001227  1.735E-11      0.000  2.123E+10
1.773E-05   2585595.      0.000
   438.000  3.713E-11    -0.0228   0.001232  9.823E-12      0.000  2.123E+10
-1.600E-05   2585595.      0.000
   444.000  7.674E-11    -0.0157   0.001085  4.384E-12      0.000  2.123E+10
-3.307E-05   2585595.      0.000
   450.000  8.973E-11  -0.009785   0.000870      0.000      0.000  2.123E+10
-3.867E-05   2585595.      0.000
   456.000  8.613E-11  -0.005259   0.000643 -1.344E-12      0.000  2.123E+10
-3.712E-05   2585595.      0.000
   462.000  7.360E-11  -0.002067   0.000436 -2.379E-12      0.000  2.123E+10
-3.172E-05   2585595.      0.000
   468.000  5.758E-11 -1.419E-05   0.000267 -2.673E-12      0.000  2.123E+10
-2.481E-05   2585595.      0.000
   474.000  4.152E-11   0.001145   0.000139 -2.514E-12      0.000  2.123E+10
-1.789E-05   2585595.      0.000
   480.000  2.741E-11   0.001659  4.940E-05 -2.117E-12      0.000  2.123E+10
-1.181E-05   2585595.      0.000
   486.000  1.612E-11   0.001747 -6.879E-06 -1.636E-12      0.000  2.123E+10
-6.945E-06   2585595.      0.000
   492.000  7.782E-12   0.001584 -3.777E-05 -1.165E-12      0.000  2.123E+10
-3.354E-06   2585595.      0.000
   498.000  2.135E-12   0.001299 -5.060E-05      0.000      0.000  2.123E+10
-9.200E-07   2585595.      0.000
   504.000 -1.309E-12   0.000980 -5.166E-05      0.000      0.000  2.123E+10
5.643E-07   2585595.      0.000
   510.000 -3.092E-12   0.000681 -4.597E-05      0.000      0.000  2.123E+10
1.332E-06   2585595.      0.000
   516.000 -3.719E-12   0.000429 -3.717E-05      0.000      0.000  2.123E+10
1.603E-06   2585595.      0.000
   522.000 -3.618E-12   0.000235 -2.768E-05      0.000      0.000  2.123E+10
1.559E-06   2585595.      0.000
   528.000 -3.119E-12  9.686E-05 -1.898E-05      0.000      0.000  2.123E+10
1.344E-06   2585595.      0.000
   534.000 -2.455E-12  6.950E-06 -1.177E-05      0.000      0.000  2.123E+10
1.058E-06   2585595.      0.000
   540.000 -1.779E-12 -4.488E-05 -6.296E-06      0.000      0.000  2.123E+10
7.667E-07   2585595.      0.000
   546.000 -1.180E-12 -6.908E-05 -2.471E-06      0.000      0.000  2.123E+10
5.084E-07   2585595.      0.000
   552.000      0.000 -7.493E-05 -4.365E-08      0.000      0.000  2.123E+10
3.006E-07   2585595.      0.000
   558.000      0.000 -6.991E-05  1.500E-06      0.000      0.000  2.123E+10
2.140E-07   3750000.      0.000
   564.000      0.000 -5.715E-05  2.390E-06      0.000      0.000  2.123E+10
8.259E-08   4687500.      0.000
   570.000      0.000 -4.137E-05  2.558E-06      0.000      0.000  2.123E+10
```



```
-2.656E-08   4687500.      0.000
   576.000      0.000 -2.653E-05  2.235E-06      0.000      0.000  2.123E+10
-8.089E-08   4687500.      0.000
   582.000      0.000 -1.458E-05  1.693E-06      0.000      0.000  2.123E+10
-1.001E-07   4687500.      0.000
   588.000      0.000 -6.227E-06  1.093E-06      0.000      0.000  2.123E+10
-9.993E-08   4687500.      0.000
   594.000      0.000 -1.466E-06  5.182E-07      0.000      0.000  2.123E+10
-9.154E-08   4687500.      0.000
   600.000      0.000      0.000      0.000      0.000      0.000  2.123E+10
-8.120E-08   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =      0.0559382 inches
Computed slope at pile head       =     -0.0009959 radians
Maximum bending moment            =        274774. inch-lbs
Maximum shear force               =         10000. lbs
Depth of maximum bending moment   =     54.0000000 inches below pile head
Depth of maximum shear force      =      0.000000 inches below pile head
Number of iterations              =             23
Number of zero deflection points  =              8
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                    =       20000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      370000.000 lbs
```

```
   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y         Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.2663  3.928E-07     20000.  -0.003610      0.000  2.123E+10
-283.9354  3198.1456      0.000
     6.000     0.2447    122904.     18281.  -0.003593      0.000  2.123E+10
-289.0564  7088.1436      0.000
    12.000     0.2232    235325.     16534.  -0.003542      0.000  2.123E+10
-293.3286  7884.1915      0.000
    18.000     0.2022    337039.     14764.  -0.003461      0.000  2.123E+10
-296.7162  8805.7965      0.000
```



```
    24.000     0.1817    427859.     12976.  -0.003353      0.000  2.123E+10
-299.1821  9879.9568      0.000
    30.000     0.1619    507640.     11185.  -0.003221      0.000  2.123E+10
-297.8515    11036.      0.000
    36.000     0.1430    576380.  9398.6540  -0.003068      0.000  2.123E+10
-297.5767    12483.      0.000
    42.000     0.1251    634046.  7616.9772  -0.002897      0.000  2.123E+10
-296.3155    14210.      0.000
    48.000     0.1083    680646.  5845.9602  -0.002711      0.000  2.123E+10
-294.0235    16293.      0.000
    54.000     0.0926    716234.  4091.9386  -0.002514      0.000  2.123E+10
-290.6504    18836.      0.000
    60.000     0.0781    740910.  2361.5730  -0.002308      0.000  2.123E+10
-286.1382    21979.      0.000
    66.000     0.0649    754819.   661.9067  -0.002096      0.000  2.123E+10
-280.4173    25927.      0.000
    72.000     0.0530    758160.  -999.5498  -0.001882      0.000  2.123E+10
-273.4016    30977.      0.000
    78.000     0.0423    751183. -2614.6922  -0.001669      0.000  2.123E+10
-264.9792    37582.      0.000
    84.000     0.0329    734195. -4174.6221  -0.001459      0.000  2.123E+10
-254.9974    46467.      0.000
    90.000     0.0248    707566. -5669.3139  -0.001255      0.000  2.123E+10
-243.2332    58862.      0.000
    96.000     0.0179    671737. -7077.5826  -0.001060      0.000  2.123E+10
-226.1897    75983.      0.000
   102.000     0.0121    627343. -8371.4028  -0.000877      0.000  2.123E+10
-205.0837   101966.      0.000
   108.000   0.007339    575173. -9530.0312  -0.000707      0.000  2.123E+10
-181.1258   148089.      0.000
   114.000   0.003585    516122.    -10528.  -0.000553      0.000  2.123E+10
-151.4720   253523.      0.000
   120.000   0.000706    451293.    -11286.  -0.000416      0.000  2.123E+10
-101.1715   859308.      0.000
   126.000  -0.001407    382539.    -11230.  -0.000298      0.000  2.123E+10
119.6290   510299.      0.000
   132.000  -0.002871    317852.    -10442.  -0.000199      0.000  2.123E+10
143.1012   299085.      0.000
   138.000  -0.003796    258117. -9552.4386  -0.000118      0.000  2.123E+10
153.4832   242604.      0.000
   144.000  -0.004283    203746. -8617.3797 -5.243E-05      0.000  2.123E+10
158.2031   221612.      0.000
   150.000  -0.004425    154941. -7664.2575 -1.734E-06      0.000  2.123E+10
159.5043   216275.      0.000
   156.000  -0.004304    111782. -6710.5226  3.596E-05      0.000  2.123E+10
158.4073   220825.      0.000
   162.000  -0.003993     74256. -5768.8855  6.226E-05      0.000  2.123E+10
155.4717   233588.      0.000
   168.000  -0.003557     42279. -4849.3543  7.873E-05      0.000  2.123E+10
151.0386   254775.      0.000
   174.000  -0.003049     15714. -3960.2529  8.692E-05      0.000  2.123E+10
145.3285   286007.      0.000
   180.000  -0.002514 -5629.7985 -3108.8086  8.835E-05      0.000  2.123E+10
138.4863   330528.      0.000
   186.000  -0.001989    -21984. -2301.5398  8.445E-05      0.000  2.123E+10
130.6033   394057.      0.000
   192.000  -0.001501    -33623. -1544.5567  7.659E-05      0.000  2.123E+10
121.7244   486713.      0.000
   198.000  -0.001070    -40859.  -843.8539  6.606E-05      0.000  2.123E+10
111.8432   627414.      0.000
   204.000  -0.000708    -44043.  -205.6979  5.406E-05      0.000  2.123E+10
100.8755   855051.      0.000
   210.000  -0.000421    -43567.   362.6570  4.168E-05      0.000  2.123E+10
```

```
88.5761   1262829.      0.000
   216.000  -0.000208    -39876.   896.9343  2.988E-05      0.000  2.123E+10
89.5163   2585595.      0.000
   222.000 -6.224E-05    -32937.  1245.9437  1.959E-05      0.000  2.123E+10
26.8202   2585595.      0.000
   228.000  2.739E-05    -25012.  1290.9939  1.140E-05      0.000  2.123E+10
-11.8035   2585595.      0.000
   234.000  7.460E-05    -17496.  1159.1425  5.395E-06      0.000  2.123E+10
-32.1470   2585595.      0.000
   240.000  9.213E-05    -11126.   943.5906  1.350E-06      0.000  2.123E+10
-39.7036   2585595.      0.000
   246.000  9.080E-05 -6178.4693   707.0933 -1.096E-06      0.000  2.123E+10
-39.1288   2585595.      0.000
   252.000  7.899E-05 -2635.8572   487.5920 -2.341E-06      0.000  2.123E+10
-34.0383   2585595.      0.000
   258.000  6.270E-05  -316.9696   304.4131 -2.759E-06      0.000  2.123E+10
-27.0213   2585595.      0.000
   264.000  4.588E-05  1029.3484   164.0308 -2.658E-06      0.000  2.123E+10
-19.7727   2585595.      0.000
   270.000  3.081E-05  1663.2020    64.8833 -2.277E-06      0.000  2.123E+10
-13.2764   2585595.      0.000
   276.000  1.855E-05  1818.0599     1.0668 -1.785E-06      0.000  2.123E+10
-7.9957   2585595.      0.000
   282.000  9.384E-06  1683.9309   -35.0517 -1.290E-06      0.000  2.123E+10
-4.0438   2585595.      0.000
   288.000  3.069E-06  1403.1697   -51.1505 -8.541E-07      0.000  2.123E+10
-1.3225   2585595.      0.000
   294.000 -8.660E-07  1073.9168   -53.9986 -5.040E-07      0.000  2.123E+10
0.3732   2585595.      0.000
   300.000 -2.980E-06   757.4241   -49.0272 -2.452E-07      0.000  2.123E+10
1.2840   2585595.      0.000
   306.000 -3.809E-06   486.6796   -40.2515 -6.938E-08      0.000  2.123E+10
1.6412   2585595.      0.000
   312.000 -3.812E-06   274.7139   -30.3995  3.823E-08      0.000  2.123E+10
1.6428   2585595.      0.000
   318.000 -3.350E-06   121.7153   -21.1407  9.426E-08      0.000  2.123E+10
1.4435   2585595.      0.000
   324.000 -2.681E-06    20.6075   -13.3441  1.144E-07      0.000  2.123E+10
1.1553   2585595.      0.000
   330.000 -1.977E-06   -38.9212    -7.3218  1.118E-07      0.000  2.123E+10
0.8521   2585595.      0.000
   336.000 -1.340E-06   -67.7507    -3.0338  9.671E-08      0.000  2.123E+10
0.5773   2585595.      0.000
   342.000 -8.168E-07   -75.7560    -0.2460  7.643E-08      0.000  2.123E+10
0.3520   2585595.      0.000
   348.000 -4.225E-07   -71.0425     1.3560  5.568E-08      0.000  2.123E+10
0.1821   2585595.      0.000
   354.000 -1.486E-07   -59.7307     2.0943  3.720E-08      0.000  2.123E+10
0.0640   2585595.      0.000
   360.000  2.390E-08   -46.0757     2.2556  2.224E-08      0.000  2.123E+10
-0.0103   2585595.      0.000
   366.000  1.183E-07   -32.7626     2.0717  1.110E-08      0.000  2.123E+10
-0.0510   2585595.      0.000
   372.000  1.571E-07   -21.2640     1.7157  3.464E-09      0.000  2.123E+10
-0.0677   2585595.      0.000
   378.000  1.599E-07   -12.1894     1.3060 -1.264E-09      0.000  2.123E+10
-0.0689   2585595.      0.000
   384.000  1.419E-07    -5.5870     0.9158 -3.776E-09      0.000  2.123E+10
-0.0612   2585595.      0.000
   390.000  1.145E-07    -1.1832     0.5842 -4.733E-09      0.000  2.123E+10
-0.0494   2585595.      0.000
   396.000  8.514E-08     1.4445     0.3261 -4.696E-09      0.000  2.123E+10
-0.0367   2585595.      0.000
```



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   402.000  5.819E-08     2.7503     0.1408 -4.103E-09      0.000  2.123E+10
-0.0251   2585595.      0.000
   408.000  3.590E-08     3.1517     0.0191 -3.269E-09      0.000  2.123E+10
-0.0155   2585595.      0.000
   414.000  1.896E-08     2.9942    -0.0518 -2.400E-09      0.000  2.123E+10
-0.008171   2585595.      0.000
   420.000  7.097E-09     2.5406    -0.0855 -1.618E-09      0.000  2.123E+10
-0.003058   2585595.      0.000
   426.000 -4.582E-10     1.9754    -0.0941 -9.800E-10      0.000  2.123E+10
0.000197   2585595.      0.000
   432.000 -4.663E-09     1.4160    -0.0875 -5.007E-10      0.000  2.123E+10
0.002009   2585595.      0.000
   438.000 -6.466E-09     0.9280    -0.0731 -1.694E-10      0.000  2.123E+10
0.002786   2585595.      0.000
   444.000 -6.695E-09     0.5398    -0.0561  3.809E-11      0.000  2.123E+10
0.002885   2585595.      0.000
   450.000 -6.009E-09     0.2551    -0.0396  1.504E-10      0.000  2.123E+10
0.002589   2585595.      0.000
   456.000 -4.890E-09     0.0635    -0.0255  1.955E-10      0.000  2.123E+10
0.002107   2585595.      0.000
   462.000 -3.663E-09    -0.0523    -0.0145  1.971E-10      0.000  2.123E+10
0.001579   2585595.      0.000
   468.000 -2.525E-09    -0.1112  -0.006487  1.739E-10      0.000  2.123E+10
0.001088   2585595.      0.000
   474.000 -1.576E-09    -0.1309  -0.001185  1.397E-10      0.000  2.123E+10
0.000679   2585595.      0.000
   480.000 -8.486E-10    -0.1261   0.001949  1.034E-10      0.000  2.123E+10
0.000366   2585595.      0.000
   486.000 -3.351E-10    -0.1080   0.003480  7.033E-11      0.000  2.123E+10
0.000144   2585595.      0.000
   492.000 -4.695E-12    -0.0846   0.003919  4.311E-11      0.000  2.123E+10
2.023E-06   2585595.      0.000
   498.000  1.822E-10    -0.0611   0.003689  2.250E-11      0.000  2.123E+10
-7.851E-05   2585595.      0.000
   504.000  2.654E-10    -0.0405   0.003111  8.145E-12      0.000  2.123E+10
-0.000114   2585595.      0.000
   510.000  2.799E-10    -0.0239   0.002406      0.000      0.000  2.123E+10
-0.000121   2585595.      0.000
   516.000  2.540E-10    -0.0116   0.001716 -5.950E-12      0.000  2.123E+10
-0.000109   2585595.      0.000
   522.000  2.085E-10  -0.003236   0.001118 -8.043E-12      0.000  2.123E+10
-8.986E-05   2585595.      0.000
   528.000  1.575E-10   0.001871   0.000644 -8.236E-12      0.000  2.123E+10
-6.788E-05   2585595.      0.000
   534.000  1.097E-10   0.004534   0.000299 -7.331E-12      0.000  2.123E+10
-4.727E-05   2585595.      0.000
   540.000  6.954E-11   0.005492  6.731E-05 -5.914E-12      0.000  2.123E+10
-2.997E-05   2585595.      0.000
   546.000  3.871E-11   0.005368 -7.264E-05 -4.379E-12      0.000  2.123E+10
-1.668E-05   2585595.      0.000
   552.000  1.699E-11   0.004640  -0.000145 -2.965E-12      0.000  2.123E+10
-7.321E-06   2585595.      0.000
   558.000  3.134E-12   0.003645  -0.000172 -1.794E-12      0.000  2.123E+10
-1.959E-06   3750000.      0.000
   564.000 -4.539E-12   0.002578  -0.000168      0.000      0.000  2.123E+10
3.546E-06   4687500.      0.000
   570.000 -7.840E-12   0.001636  -0.000139      0.000      0.000  2.123E+10
6.125E-06   4687500.      0.000
   576.000 -8.366E-12   0.000914  -0.000101      0.000      0.000  2.123E+10
6.536E-06   4687500.      0.000
   582.000 -7.342E-12   0.000427 -6.392E-05      0.000      0.000  2.123E+10
5.736E-06   4687500.      0.000
   588.000 -5.592E-12   0.000146 -3.361E-05      0.000      0.000  2.123E+10
```



```
4.369E-06   4687500.      0.000
   594.000 -3.594E-12  2.266E-05 -1.208E-05      0.000      0.000  2.123E+10
2.808E-06   4687500.      0.000
   600.000 -1.558E-12      0.000      0.000      0.000      0.000  2.123E+10
1.217E-06   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection             =      0.2663438 inches
Computed slope at pile head      =     -0.0036104 radians
Maximum bending moment           =        758160. inch-lbs
Maximum shear force              =         20000. lbs
Depth of maximum bending moment  =     72.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             31
Number of zero deflection points =              8
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                  =       30000.000 lbs
Applied moment at pile head                          =           0.000 in-lbs
Axial thrust load on pile head                       =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total     Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.6732  1.309E-07     30000.  -0.007753      0.000  2.123E+10
-358.0000  1595.4409      0.000
     6.000     0.6267    190767.     27829.  -0.007726      0.000  2.123E+10
-365.6637  3501.1138      0.000
    12.000     0.5805    368250.     25615.  -0.007647      0.000  2.123E+10
-372.4799  3850.1829      0.000
    18.000     0.5349    532093.     23362.  -0.007519      0.000  2.123E+10
-378.4154  4244.7593      0.000
    24.000     0.4902    681979.     21076.  -0.007348      0.000  2.123E+10
-383.4364  4692.9553      0.000
    30.000     0.4467    817633.     18774.  -0.007136      0.000  2.123E+10
-383.8532  5155.6251      0.000
    36.000     0.4046    938955.     16465.  -0.006888      0.000  2.123E+10
-385.9069  5722.8199      0.000
```



```
    42.000     0.3641   1045796.     14146.  -0.006607      0.000  2.123E+10
-386.9981  6377.8841      0.000
    48.000     0.3253   1138048.     11824.  -0.006298      0.000  2.123E+10
-387.0909  7139.4128      0.000
    54.000     0.2885   1215651.  9504.4921  -0.005966      0.000  2.123E+10
-386.1469  8031.1233      0.000
    60.000     0.2537   1278590.  7193.6792  -0.005613      0.000  2.123E+10
-384.1240  9083.6579      0.000
    66.000     0.2211   1326898.  4898.3808  -0.005245      0.000  2.123E+10
-380.9754     10337.      0.000
    72.000     0.1908   1360659.  2625.5105  -0.004865      0.000  2.123E+10
-376.6480     11845.      0.000
    78.000     0.1627   1380006.   382.3265  -0.004478      0.000  2.123E+10
-371.0800     13681.      0.000
    84.000     0.1371   1385128. -1823.5051  -0.004087      0.000  2.123E+10
-364.1972     15944.      0.000
    90.000     0.1137   1376270. -3983.8200  -0.003697      0.000  2.123E+10
-355.9078     18781.      0.000
    96.000     0.0927   1353735. -6075.5831  -0.003311      0.000  2.123E+10
-341.3466     22096.      0.000
   102.000     0.0740   1318063. -8067.5202  -0.002933      0.000  2.123E+10
-322.6324     26169.      0.000
   108.000     0.0575   1269949. -9944.2103  -0.002567      0.000  2.123E+10
-302.9310     31615.      0.000
   114.000     0.0432   1210132.    -11699.  -0.002217      0.000  2.123E+10
-281.9857     39198.      0.000
   120.000     0.0309   1139405.    -13323.  -0.001885      0.000  2.123E+10
-259.3600     50381.      0.000
   126.000     0.0205   1058625.    -14804.  -0.001574      0.000  2.123E+10
-234.2312     68405.      0.000
   132.000     0.0120    968749.    -16121.  -0.001288      0.000  2.123E+10
-204.7700    102407.      0.000
   138.000   0.005093    870893.    -17231.  -0.001028      0.000  2.123E+10
-165.3171    194767.      0.000
   144.000  -0.000335    766539.    -17477.  -0.000796      0.000  2.123E+10
83.2608   1492114.      0.000
   150.000  -0.004462    664702.    -16748.  -0.000594      0.000  2.123E+10
159.8316    214908.      0.000
   156.000  -0.007463    568201.    -15723.  -0.000420      0.000  2.123E+10
181.7866    146160.      0.000
   162.000  -0.009499    477889.    -14598.  -0.000272      0.000  2.123E+10
193.1007    121971.      0.000
   168.000    -0.0107    394228.    -13422.  -0.000149      0.000  2.123E+10
199.0561    111360.      0.000
   174.000    -0.0113    317485.    -12220. -4.803E-05      0.000  2.123E+10
201.5966    107210.      0.000
   180.000    -0.0113    247801.    -11010.  3.187E-05      0.000  2.123E+10
201.6831    107076.      0.000
   186.000    -0.0109    185222. -9805.4845  9.307E-05      0.000  2.123E+10
199.8695    110020.      0.000
   192.000    -0.0102    129722. -8616.3562   0.000138      0.000  2.123E+10
196.5065    115768.      0.000
   198.000  -0.009249     81215. -7451.3458   0.000167      0.000  2.123E+10
191.8303    124444.      0.000
   204.000  -0.008176     39563. -6317.8377   0.000184      0.000  2.123E+10
186.0057    136505.      0.000
   210.000  -0.007035  4581.8343 -5222.3700   0.000191      0.000  2.123E+10
179.1502    152784.      0.000
   216.000  -0.005887    -23952. -4170.8813   0.000188      0.000  2.123E+10
171.3460    174625.      0.000
   222.000  -0.004780    -46303. -3168.9004   0.000178      0.000  2.123E+10
162.6476    204167.      0.000
   228.000  -0.003751    -62770. -2221.7085   0.000163      0.000  2.123E+10
```

```
153.0830    244875.      0.000
   234.000  -0.002828   -73686. -1334.5039   0.000143      0.000  2.123E+10
142.6518    302613.      0.000
   240.000  -0.002031   -79420.  -512.6060   0.000122      0.000  2.123E+10
131.3141    387953.      0.000
   246.000  -0.001368   -80377.   238.2268  9.911E-05      0.000  2.123E+10
118.9635    521749.      0.000
   252.000  -0.000842   -77002.   911.1815  7.687E-05      0.000  2.123E+10
105.3547    751145.      0.000
   258.000  -0.000446   -69785.  1496.8614  5.612E-05      0.000  2.123E+10
89.8719   1209996.      0.000
   264.000  -0.000168   -59288.  1983.7914  3.788E-05      0.000  2.123E+10
72.4381   2585595.      0.000
   270.000  8.901E-06   -46147.  2189.5982  2.298E-05      0.000  2.123E+10
-3.8358   2585595.      0.000
   276.000   0.000108   -33115.  2038.9438  1.177E-05      0.000  2.123E+10
-46.3823   2585595.      0.000
   282.000   0.000150   -21732.  1705.6189  4.023E-06      0.000  2.123E+10
-64.7260   2585595.      0.000
   288.000   0.000156   -12666.  1309.8818 -8.385E-07      0.000  2.123E+10
-67.1864   2585595.      0.000
   294.000   0.000140 -6009.8904   927.1532 -3.478E-06      0.000  2.123E+10
-60.3898   2585595.      0.000
   300.000   0.000114 -1524.3818   598.3809 -4.543E-06      0.000  2.123E+10
-49.2009   2585595.      0.000
   306.000  8.562E-05  1190.8508   340.0847 -4.590E-06      0.000  2.123E+10
-36.8978   2585595.      0.000
   312.000  5.909E-05  2577.0139   152.9958 -4.057E-06      0.000  2.123E+10
-25.4651   2585595.      0.000
   318.000  3.693E-05  3044.8154    28.8528 -3.263E-06      0.000  2.123E+10
-15.9159   2585595.      0.000
   324.000  1.994E-05  2937.7350   -44.6707 -2.417E-06      0.000  2.123E+10
-8.5920   2585595.      0.000
   330.000  7.925E-06  2519.5007   -80.6919 -1.646E-06      0.000  2.123E+10
-3.4151   2585595.      0.000
   336.000  1.850E-07  1976.7405   -91.1765 -1.011E-06      0.000  2.123E+10
-0.0797   2585595.      0.000
   342.000 -4.202E-06  1429.8694   -85.9829 -5.291E-07      0.000  2.123E+10
1.8109   2585595.      0.000
   348.000 -6.165E-06   947.2949   -72.5804 -1.932E-07      0.000  2.123E+10
2.6566   2585595.      0.000
   354.000 -6.520E-06   559.7623   -56.1811  1.983E-08      0.000  2.123E+10
2.8099   2585595.      0.000
   360.000 -5.927E-06   273.0331   -40.0895  1.375E-07      0.000  2.123E+10
2.5540   2585595.      0.000
   366.000 -4.870E-06    78.0774   -26.1315  1.872E-07      0.000  2.123E+10
2.0986   2585595.      0.000
   372.000 -3.681E-06   -41.3761   -15.0770  1.923E-07      0.000  2.123E+10
1.5862   2585595.      0.000
   378.000 -2.562E-06  -103.7004    -7.0064  1.718E-07      0.000  2.123E+10
1.1040   2585595.      0.000
   384.000 -1.619E-06  -126.2156    -1.6016  1.393E-07      0.000  2.123E+10
0.6976   2585595.      0.000
   390.000 -8.898E-07  -123.5383     1.6414  1.040E-07      0.000  2.123E+10
0.3834   2585595.      0.000
   396.000 -3.702E-07  -106.9802     3.2704  7.147E-08      0.000  2.123E+10
0.1596   2585595.      0.000
   402.000 -3.217E-08   -84.6111     3.7906  4.439E-08      0.000  2.123E+10
0.0139   2585595.      0.000
   408.000  1.624E-07   -61.6898     3.6223  2.371E-08      0.000  2.123E+10
-0.0700   2585595.      0.000
   414.000  2.523E-07   -41.2492     3.0861  9.161E-09      0.000  2.123E+10
-0.1087   2585595.      0.000
```



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   420.000  2.723E-07   -24.6973     2.4078 -1.597E-10      0.000  2.123E+10
-0.1174   2585595.      0.000
   426.000  2.504E-07   -12.3547     1.7320 -5.396E-09      0.000  2.123E+10
-0.1079   2585595.      0.000
   432.000  2.076E-07    -3.8893     1.1399 -7.692E-09      0.000  2.123E+10
-0.0894   2585595.      0.000
   438.000  1.581E-07     1.3584     0.6672 -8.050E-09      0.000  2.123E+10
-0.0681   2585595.      0.000
   444.000  1.110E-07     4.1523     0.3193 -7.271E-09      0.000  2.123E+10
-0.0478   2585595.      0.000
   450.000  7.086E-08     5.2222     0.0842 -5.946E-09      0.000  2.123E+10
-0.0305   2585595.      0.000
   456.000  3.961E-08     5.1894    -0.0586 -4.475E-09      0.000  2.123E+10
-0.0171   2585595.      0.000
   462.000  1.717E-08     4.5388    -0.1320 -3.100E-09      0.000  2.123E+10
-0.007398   2585595.      0.000
   468.000  2.417E-09     3.6190    -0.1573 -1.947E-09      0.000  2.123E+10
-0.001041   2585595.      0.000
   474.000 -6.195E-09     2.6595    -0.1524 -1.059E-09      0.000  2.123E+10
0.002670   2585595.      0.000
   480.000 -1.030E-08     1.7944    -0.1311 -4.300E-10      0.000  2.123E+10
0.004437   2585595.      0.000
   486.000 -1.135E-08     1.0879    -0.1031 -2.260E-11      0.000  2.123E+10
0.004893   2585595.      0.000
   492.000 -1.057E-08     0.5569    -0.0748  2.099E-10      0.000  2.123E+10
0.004554   2585595.      0.000
   498.000 -8.837E-09     0.1895    -0.0497  3.154E-10      0.000  2.123E+10
0.003808   2585595.      0.000
   504.000 -6.784E-09    -0.0409    -0.0295  3.364E-10      0.000  2.123E+10
0.002923   2585595.      0.000
   510.000 -4.800E-09    -0.1661    -0.0145  3.071E-10      0.000  2.123E+10
0.002069   2585595.      0.000
   516.000 -3.099E-09    -0.2167  -0.004322  2.530E-10      0.000  2.123E+10
0.001335   2585595.      0.000
   522.000 -1.764E-09    -0.2191   0.001965  1.914E-10      0.000  2.123E+10
0.000760   2585595.      0.000
   528.000 -8.018E-10    -0.1940   0.005282  1.330E-10      0.000  2.123E+10
0.000346   2585595.      0.000
   534.000 -1.682E-10    -0.1563   0.006536  8.351E-11      0.000  2.123E+10
7.247E-05   2585595.      0.000
   540.000  2.004E-10    -0.1159   0.006495  4.504E-11      0.000  2.123E+10
-8.635E-05   2585595.      0.000
   546.000  3.723E-10    -0.0786   0.005754  1.756E-11      0.000  2.123E+10
-0.000160   2585595.      0.000
   552.000  4.110E-10    -0.0469   0.004741      0.000      0.000  2.123E+10
-0.000177   2585595.      0.000
   558.000  3.701E-10    -0.0217   0.003516 -9.878E-12      0.000  2.123E+10
-0.000231   3750000.      0.000
   564.000  2.925E-10  -0.004702   0.002136 -1.360E-11      0.000  2.123E+10
-0.000229   4687500.      0.000
   570.000  2.069E-10   0.004035   0.000966 -1.370E-11      0.000  2.123E+10
-0.000162   4687500.      0.000
   576.000  1.281E-10   0.006950   0.000181 -1.215E-11      0.000  2.123E+10
-0.000100   4687500.      0.000
   582.000  6.115E-11   0.006257  -0.000263 -1.028E-11      0.000  2.123E+10
-4.777E-05   4687500.      0.000
   588.000  4.782E-12   0.003840  -0.000417 -8.852E-12      0.000  2.123E+10
-3.736E-06   4687500.      0.000
   594.000 -4.507E-11   0.001287  -0.000323 -8.128E-12      0.000  2.123E+10
3.521E-05   4687500.      0.000
   600.000 -9.275E-11      0.000      0.000 -7.946E-12      0.000  2.123E+10
7.246E-05   2343750.      0.000
```



```
* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 3:

Pile-head deflection             =      0.6731682 inches
Computed slope at pile head      =     -0.0077526 radians
Maximum bending moment           =       1385128. inch-lbs
Maximum shear force              =         30000. lbs
Depth of maximum bending moment  =     84.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             33
Number of zero deflection points =              7


--------------------------------------------------------------------------------
                  Computed Values of Pile Loading and Deflection
                    for Lateral Loading for Load Case Number 4
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                        =       40000.000 lbs
Applied moment at pile head                                =           0.000 in-lbs
Axial thrust load on pile head                             =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches     inches     in-lbs      lbs       radians      psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     1.3116 -9.165E-07     40000.    -0.0135      0.000  2.123E+10
-422.9613   967.4315      0.000
     6.000     1.2309    262262.     37432.    -0.0134      0.000  2.123E+10
-432.8875  2110.1755      0.000
    12.000     1.1506    508775.     34808.    -0.0133      0.000  2.123E+10
-441.9619  2304.7680      0.000
    18.000     1.0711    739058.     32132.    -0.0131      0.000  2.123E+10
-450.1526  2521.5733      0.000
    24.000     0.9929    952672.     29409.    -0.0129      0.000  2.123E+10
-457.4276  2764.0775      0.000
    30.000     0.9164   1149221.     26658.    -0.0126      0.000  2.123E+10
-459.3801  3007.8108      0.000
    36.000     0.8418   1328511.     23890.    -0.0122      0.000  2.123E+10
-463.4690  3303.5831      0.000
    42.000     0.7694   1490283.     21100.    -0.0119      0.000  2.123E+10
-466.6025  3638.7346      0.000
    48.000     0.6996   1634321.     18294.    -0.0114      0.000  2.123E+10
-468.7487  4020.3971      0.000
    54.000     0.6325   1760459.     15478.    -0.0109      0.000  2.123E+10
-469.8735  4457.3619      0.000
```



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    60.000     0.5684   1868577.     12658.    -0.0104      0.000  2.123E+10
-469.9407  4960.5664      0.000
    66.000     0.5075   1958605.  9841.7182  -0.009875      0.000  2.123E+10
-468.9114  5543.7612      0.000
    72.000     0.4499   2030522.  7034.7558  -0.009311      0.000  2.123E+10
-466.7428  6224.4342      0.000
    78.000     0.3958   2084363.  4244.3652  -0.008729      0.000  2.123E+10
-463.3874  7025.1194      0.000
    84.000     0.3452   2120213.  1477.8291  -0.008135      0.000  2.123E+10
-458.7913  7975.2879      0.000
    90.000     0.2981   2138217. -1257.2196  -0.007533      0.000  2.123E+10
-452.8916  9114.1507      0.000
    96.000     0.2548   2138575. -3934.4009  -0.006929      0.000  2.123E+10
-439.5022    10351.      0.000
   102.000     0.2150   2121769. -6516.6533  -0.006327      0.000  2.123E+10
-421.2486    11756.      0.000
   108.000     0.1788   2088466. -8987.2854  -0.005732      0.000  2.123E+10
-402.2954    13497.      0.000
   114.000     0.1462   2039370.    -11342.  -0.005148      0.000  2.123E+10
-382.5445    15698.      0.000
   120.000     0.1171   1975223.    -13575.  -0.004581      0.000  2.123E+10
-361.8538    18547.      0.000
   126.000     0.0912   1896810.    -15681.  -0.004034      0.000  2.123E+10
-340.0087    22357.      0.000
   132.000     0.0687   1804965.    -17651.  -0.003510      0.000  2.123E+10
-316.6680    27675.      0.000
   138.000     0.0491   1700589.    -19474.  -0.003015      0.000  2.123E+10
-291.2465    35575.      0.000
   144.000     0.0325   1584660.    -21136.  -0.002551      0.000  2.123E+10
-262.6232    48524.      0.000
   150.000     0.0185   1458282.    -22608.  -0.002121      0.000  2.123E+10
-228.2117    73963.      0.000
   156.000   0.007026   1322774.    -23831.  -0.001728      0.000  2.123E+10
-179.1466   152995.      0.000
   162.000  -0.002218   1179986.    -23966.  -0.001374      0.000  2.123E+10
134.1482   362851.      0.000
   168.000  -0.009461   1041287.    -22984.  -0.001060      0.000  2.123E+10
192.8992   122336.      0.000
   174.000    -0.0149    908879.    -21757.  -0.000784      0.000  2.123E+10
216.2457    86861.      0.000
   180.000    -0.0189    783686.    -20420.  -0.000545      0.000  2.123E+10
229.2702    72891.      0.000
   186.000    -0.0215    666254.    -19022.  -0.000340      0.000  2.123E+10
236.8083    66153.      0.000
   192.000    -0.0230    556930.    -17589.  -0.000167      0.000  2.123E+10
240.7777    62937.      0.000
   198.000    -0.0235    455924.    -16141. -2.412E-05      0.000  2.123E+10
242.1606    61866.      0.000
   204.000    -0.0232    363350.    -14690.  9.167E-05      0.000  2.123E+10
241.5356    62349.      0.000
   210.000    -0.0224    279243.    -13247.   0.000182      0.000  2.123E+10
239.2754    64133.      0.000
   216.000    -0.0211    203574.    -11822.   0.000251      0.000  2.123E+10
235.6349    67152.      0.000
   222.000    -0.0194    136261.    -10423.   0.000299      0.000  2.123E+10
230.7959    71466.      0.000
   228.000    -0.0175     77171. -9056.0053   0.000329      0.000  2.123E+10
224.8916    77244.      0.000
   234.000    -0.0154     26129. -7727.2684   0.000344      0.000  2.123E+10
218.0207    84779.      0.000
   240.000    -0.0133    -17081. -6442.4364   0.000345      0.000  2.123E+10
210.2566    94522.      0.000
   246.000    -0.0113    -52711. -5206.7111   0.000335      0.000  2.123E+10
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201.6518    107146.      0.000
   252.000  -0.009327    -81049. -4025.0328   0.000316      0.000  2.123E+10
192.2410    123664.      0.000
   258.000  -0.007500   -102415. -2902.1868   0.000290      0.000  2.123E+10
182.0411    145637.      0.000
   264.000  -0.005846   -117163. -1842.9152   0.000259      0.000  2.123E+10
171.0495    175554.      0.000
   270.000  -0.004391   -125680.  -852.0535   0.000225      0.000  2.123E+10
159.2377    217588.      0.000
   276.000  -0.003149   -128386.    65.2742   0.000189      0.000  2.123E+10
146.5381    279200.      0.000
   282.000  -0.002125   -125735.   903.3266   0.000153      0.000  2.123E+10
132.8127    375009.      0.000
   288.000  -0.001314   -118225.  1655.0891   0.000118      0.000  2.123E+10
117.7748    537765.      0.000
   294.000  -0.000704   -106400.  2310.6567  8.669E-05      0.000  2.123E+10
100.7477    859064.      0.000
   300.000  -0.000274    -90882.  2966.7664  5.881E-05      0.000  2.123E+10
117.9555   2585595.      0.000
   306.000   2.077E-06   -71060.  3317.9472  3.592E-05      0.000  2.123E+10
-0.8953   2585595.      0.000
   312.000   0.000157    -51226.  3111.8296  1.864E-05      0.000  2.123E+10
-67.8106   2585595.      0.000
   318.000   0.000226    -33801.  2616.5380  6.623E-06      0.000  2.123E+10
-97.2866   2585595.      0.000
   324.000   0.000237    -19857.  2018.5020 -9.608E-07      0.000  2.123E+10
-102.0587   2585595.      0.000
   330.000   0.000214 -9574.6370  1435.3719 -5.121E-06      0.000  2.123E+10
-92.3180   2585595.      0.000
   336.000   0.000175 -2609.7580   931.6792 -6.843E-06      0.000  2.123E+10
-75.5795   2585595.      0.000
   342.000   0.000132  1635.8950   534.1395 -6.980E-06      0.000  2.123E+10
-56.9337   2585595.      0.000
   348.000  9.162E-05  3830.9085   244.8880 -6.208E-06      0.000  2.123E+10
-39.4835   2585595.      0.000
   354.000  5.763E-05  4602.1132    51.9383 -5.016E-06      0.000  2.123E+10
-24.8331   2585595.      0.000
   360.000  3.143E-05  4476.4377   -63.2000 -3.733E-06      0.000  2.123E+10
-13.5463   2585595.      0.000
   366.000  1.284E-05  3860.2864  -120.4323 -2.554E-06      0.000  2.123E+10
-5.5312   2585595.      0.000
   372.000  7.829E-07  3042.5913  -138.0378 -1.579E-06      0.000  2.123E+10
-0.3374   2585595.      0.000
   378.000 -6.109E-06  2210.8420  -131.1517 -8.362E-07      0.000  2.123E+10
2.6327   2585595.      0.000
   384.000 -9.252E-06  1472.4832  -111.2927 -3.157E-07      0.000  2.123E+10
3.9870   2585595.      0.000
   390.000 -9.897E-06   876.7306   -86.5369  1.637E-08      0.000  2.123E+10
4.2650   2585595.      0.000
   396.000 -9.055E-06   433.9682   -62.0350  2.016E-07      0.000  2.123E+10
3.9023   2585595.      0.000
   402.000 -7.478E-06   131.4159   -40.6609  2.815E-07      0.000  2.123E+10
3.2224   2585595.      0.000
   408.000 -5.677E-06   -55.2126   -23.6543  2.923E-07      0.000  2.123E+10
2.4465   2585595.      0.000
   414.000 -3.970E-06  -153.7339   -11.1823  2.628E-07      0.000  2.123E+10
1.7109   2585595.      0.000
   420.000 -2.524E-06  -190.5673    -2.7868  2.141E-07      0.000  2.123E+10
1.0876   2585595.      0.000
   426.000 -1.401E-06  -188.1260     2.2872  1.606E-07      0.000  2.123E+10
0.6037   2585595.      0.000
   432.000 -5.969E-07  -163.8334     4.8701  1.108E-07      0.000  2.123E+10
0.2572   2585595.      0.000
```



```
   438.000 -7.085E-08  -130.1773     5.7334  6.928E-08      0.000  2.123E+10
0.0305   2585595.      0.000
   444.000  2.345E-07   -95.3404     5.5219  3.741E-08      0.000  2.123E+10
-0.1010   2585595.      0.000
   450.000  3.781E-07   -64.0811     4.7300  1.488E-08      0.000  2.123E+10
-0.1629   2585595.      0.000
   456.000  4.130E-07   -38.6471     3.7072  3.606E-10      0.000  2.123E+10
-0.1780   2585595.      0.000
   462.000  3.824E-07   -19.5962     2.6789 -7.871E-09      0.000  2.123E+10
-0.1648   2585595.      0.000
   468.000  3.186E-07    -6.4657     1.7726 -1.155E-08      0.000  2.123E+10
-0.1373   2585595.      0.000
   474.000  2.438E-07     1.7268     1.0457 -1.222E-08      0.000  2.123E+10
-0.1050   2585595.      0.000
   480.000  1.719E-07     6.1366     0.5083 -1.111E-08      0.000  2.123E+10
-0.0741   2585595.      0.000
   486.000  1.104E-07     7.8762     0.1434 -9.133E-09      0.000  2.123E+10
-0.0476   2585595.      0.000
   492.000  6.228E-08     7.8982    -0.0798 -6.903E-09      0.000  2.123E+10
-0.0268   2585595.      0.000
   498.000  2.756E-08     6.9489    -0.1960 -4.805E-09      0.000  2.123E+10
-0.0119   2585595.      0.000
   504.000  4.629E-09     5.5676    -0.2376 -3.036E-09      0.000  2.123E+10
-0.001995   2585595.      0.000
   510.000 -8.864E-09     4.1111    -0.2321 -1.668E-09      0.000  2.123E+10
0.003820   2585595.      0.000
   516.000 -1.538E-08     2.7895    -0.2008 -6.924E-10      0.000  2.123E+10
0.006629   2585595.      0.000
   522.000 -1.717E-08     1.7047    -0.1587 -5.726E-11      0.000  2.123E+10
0.007401   2585595.      0.000
   528.000 -1.607E-08     0.8854    -0.1157  3.088E-10      0.000  2.123E+10
0.006926   2585595.      0.000
   534.000 -1.347E-08     0.3148    -0.0775  4.784E-10      0.000  2.123E+10
0.005804   2585595.      0.000
   540.000 -1.033E-08    -0.0471    -0.0468  5.163E-10      0.000  2.123E+10
0.004452   2585595.      0.000
   546.000 -7.272E-09    -0.2487    -0.0240  4.745E-10      0.000  2.123E+10
0.003134   2585595.      0.000
   552.000 -4.637E-09    -0.3373  -0.008612  3.916E-10      0.000  2.123E+10
0.001998   2585595.      0.000
   558.000 -2.573E-09    -0.3538   0.002206  2.940E-10      0.000  2.123E+10
0.001608   3750000.      0.000
   564.000 -1.109E-09    -0.3121   0.009629  1.999E-10      0.000  2.123E+10
0.000866   4687500.      0.000
   570.000 -1.745E-10    -0.2391     0.0126  1.219E-10      0.000  2.123E+10
0.000136   4687500.      0.000
   576.000  3.544E-10    -0.1610     0.0122  6.540E-11      0.000  2.123E+10
-0.000277   4687500.      0.000
   582.000  6.103E-10    -0.0928   0.009954  2.953E-11      0.000  2.123E+10
-0.000477   4687500.      0.000
   588.000  7.088E-10    -0.0417   0.006863  1.052E-11      0.000  2.123E+10
-0.000554   4687500.      0.000
   594.000  7.365E-10    -0.0105   0.003476  3.141E-12      0.000  2.123E+10
-0.000575   4687500.      0.000
   600.000  7.464E-10      0.000      0.000  1.658E-12      0.000  2.123E+10
-0.000583   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection             =      1.3116009 inches
Computed slope at pile head      =     -0.0134572 radians
Maximum bending moment           =       2138575. inch-lbs
Maximum shear force              =         40000. lbs
Depth of maximum bending moment  =     96.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             37
Number of zero deflection points =              6
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

```
Load  Load    Condition 1    Condition 2        Axial        Pile-Head       Maximum
       Maximum       Pile-Head
Case  Type    V(lbs) or     in-lb, rad.,        Load        Deflection       Moment
        Shear        Rotation
 No.   No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
         lbs           radians
----  ----  -------------  -------------  -------------  -------------
-------------  -------------  -------------
  1     1   V = 10000.0000  M =      0.000        370000.      0.05593818
274774.          10000.     0.00000000
  2     1   V =     20000.  M =      0.000        370000.      0.26634383
758160.          20000.     0.00000000
  3     1   V =     30000.  M =      0.000        370000.      0.67316819
1385128.          30000.     0.00000000
  4     1   V =     40000.  M =      0.000        370000.      1.31160087
2138575.          40000.     0.00000000
```

The analysis ended normally.

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 11 THRU 15
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.60000000000000E+0001 = Pipe pile diameter (in)
 5.00000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
4 = number of soil layers
3       -5.00000000000000E+0000  1.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.50000000000000E+0000  2.15000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
5        2.15000000000000E+0001  4.15000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
3        4.15000000000000E+0001  1.00000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
```

```
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

L. Tran
PARIKH

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT\Analyses\
Name of input data file: San Leandro Creek BOH (B11 - B15).lp6d
Name of output file: San Leandro Creek BOH (B11 - B15).lp6o
Name of plot output file: San Leandro Creek BOH (B11 - B15).lp6p
Name of runtime file: San Leandro Creek BOH (B11 - B15).lp6r

Date and Time of Analysis

Date: November 17, 2011 Time: 16:13:23

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 11 THRU 15

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -5.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	16.0000000
2	50.000000	16.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 16.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -5.000 ft
Distance from top of pile to bottom of layer = 1.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 1.500 ft
Distance from top of pile to bottom of layer = 21.500 ft

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 21.500 ft
Distance from top of pile to bottom of layer = 41.500 ft
p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is stiff clay without free water

Distance from top of pile to top of layer = 41.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 50.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-5.00	125.00000
2	1.50	125.00000
3	1.50	62.60000
4	21.50	62.60000
5	21.50	62.60000
6	41.50	62.60000
7	41.50	62.60000
8	100.00	62.60000

Summary of Soil Properties

```
Layer           Soil Type                    Depth     Eff. Unit     Cohesion
Friction        qu           RQD      Epsilon 50      kpy        Rock Emass      krm
     Test Type    Test Prop.   Elas. Subgr.
 Num.         (p-y Curve Criteria)            ft       Wt., pcf          psf
Ang., deg.       psi         percent                  pci            psi
                                    pci
-----  ---------------------------------  ----------  ----------  ----------
----------  ----------  ----------  ----------  ----------  ----------
----------  ----------  ----------  ------------
  1    Stiff Clay w/o Free Water               -5.000     125.000    1500.000
  --         --         --         0.00     --          --           --
       --         --         --
                                                1.500     125.000    1500.000
  --         --         --         0.00     --          --           --
       --         --         --
  2    Stiff Clay w/o Free Water                1.500      62.600    1500.000
  --         --         --         0.00     --          --           --
       --         --         --
                                               21.500      62.600    1500.000
  --         --         --         0.00     --          --           --
       --         --         --
  3    Sand (Reese, et al.)                    21.500      62.600      --
 36.000      --         --        --        default        --           --
       --         --         --
                                               41.500      62.600      --
 36.000      --         --        --        default        --           --
       --         --         --
  4    Stiff Clay w/o Free Water               41.500      62.600    2500.000
  --         --         --         0.00     --          --           --
       --         --         --
                                              100.000      62.600    2500.000
  --         --         --         0.00     --          --           --
       --         --         --
```

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

---

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 10000.000 lbs	M = 0.000 in-lbs	370000.000
2	1	V = 20000.000 lbs	M = 0.000 in-lbs	370000.000
3	1	V = 30000.000 lbs	M = 0.000 in-lbs	370000.000
4	1	V = 40000.000 lbs	M = 0.000 in-lbs	370000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	600.00000000 in
Outer Diameter of Pipe	=	16.00000000 in
Pipe Wall Thickness	=	0.50000000 in
Yield Stress of Pipe	=	45.00000000 ksi
Elastic Modulus	=	29000. ksi
Cross-sectional Area	=	24.34734307 sq. in.
Moment of Inertia	=	731.94200090 in^4
Elastic Bending Stiffness	=	21226318. lb-in^2
Plastic Modulus, Z	=	120.16666667 in^3
Plastic Moment Capacity = Fy Z	=	5407.50000000 in-kip
Nom. Axial Structural Capacity = Fy As	=	1095.630 kips
Nominal Axial Tensile Capacity	=	-1095.630 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	370.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 370.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000003303	70.1099804	21226293.	166.6523345	15.9553581	
0.000006606	140.2199607	21226293.	87.3261673	16.7139861	
0.000009909	210.3299411	21226293.	60.8841115	17.4726140	
0.0000132	280.4399215	21226293.	47.6630836	18.2312422	
0.0000165	350.5499018	21226293.	39.7304669	18.9898699	
0.0000198	420.6598822	21226293.	34.4420558	19.7484980	
0.0000231	490.7698625	21226293.	30.6646192	20.5071261	
0.0000264	560.8798429	21226293.	27.8315418	21.2657540	
0.0000297	630.9898233	21226293.	25.6280372	22.0243821	
0.0000330	701.0998036	21226293.	23.8652335	22.7830101	
0.0000363	771.2097840	21226293.	22.4229395	23.5416380	
0.0000396	841.3197644	21226293.	21.2210279	24.3002661	
0.0000429	911.4297447	21226293.	20.2040257	25.0588941	
0.0000462	981.5397251	21226293.	19.3323096	25.8175220	
0.0000495	1051.6497054	21226293.	18.5768223	26.5761501	
0.0000528	1121.7596858	21226293.	17.9157709	27.3347781	
0.0000562	1191.8696662	21226293.	17.3324903	28.0934060	
0.0000595	1261.9796465	21226293.	16.8140186	28.8520341	
0.0000628	1332.0896269	21226293.	16.3501229	29.6106621	
0.0000661	1402.1996073	21226293.	15.9326167	30.3692901	
0.0000694	1472.3095876	21226293.	15.5548731	31.1279181	
0.0000727	1542.4195680	21226293.	15.2114698	31.8865461	
0.0000760	1612.5295484	21226293.	14.8979276	32.6451741	
0.0000793	1682.6395287	21226293.	14.6105139	33.4038021	
0.0000826	1752.7495091	21226293.	14.3460934	34.1624301	
0.0000859	1822.8594894	21226293.	14.1020129	34.9210581	
0.0000892	1892.9694698	21226293.	13.8760124	35.6796861	
0.0000925	1963.0794502	21226293.	13.6661548	36.4383141	
0.0000958	2033.1894305	21226293.	13.4707702	37.1969421	
0.0000991	2103.2994109	21226293.	13.2884112	37.9555701	
0.0001024	2173.4093913	21226293.	13.1178172	38.7141981	
0.0001057	2243.5193716	21226293.	12.9578855	39.4728261	
0.0001090	2313.6293520	21226293.	12.8076465	40.2314541	
0.0001123	2383.7393323	21226293.	12.6662451	40.9900821	
0.0001156	2453.8493127	21226293.	12.5329238	41.7487101	
0.0001189	2523.9592931	21226293.	12.4070093	42.5073381	
0.0001222	2594.0692734	21226293.	12.2879009	43.2659661	
0.0001255	2664.1792538	21226293.	12.1750614	44.0245941	
0.0001288	2734.2892342	21226293.	12.0680086	44.7832221	Y
0.0001354	2866.9718816	21170635.	11.8796433	45.0000000	Y
0.0001420	2978.5544808	20971592.	11.7365397	45.0000000	Y
0.0001486	3076.0201010	20695264.	11.6246759	45.0000000	Y
0.0001552	3163.1850276	20376100.	11.5358909	45.0000000	Y
0.0001618	3242.2891707	20033184.	11.4649973	45.0000000	Y
0.0001685	3314.7848579	19677933.	11.4084067	45.0000000	Y
0.0001751	3381.6515354	19317339.	11.3635416	45.0000000	Y
0.0001817	3443.5713722	18955739.	11.3284988	45.0000000	Y
0.0001883	3501.0544404	18595948.	11.3018159	45.0000000	Y
0.0001949	3554.8734049	18241748.	11.2818213	45.0000000	Y
0.0002015	3605.2703438	17893789.	11.2676920	45.0000000	Y
0.0002081	3652.5943181	17553156.	11.2585606	45.0000000	Y
0.0002147	3697.1623313	17220648.	11.2536696	45.0000000	Y

0.0002213	3739.4075994	16897495.	11.2521708	45.0000000	Y
0.0002279	3779.1051660	16581897.	11.2541663	45.0000000	Y
0.0002345	3816.8312719	16275672.	11.2586937	45.0000000	Y
0.0002411	3852.7103826	15978567.	11.2654480	45.0000000	Y
0.0002477	3886.8609526	15690329.	11.2741579	45.0000000	Y
0.0002543	3919.3959158	15410713.	11.2845805	45.0000000	Y
0.0002609	3950.4231141	15139476.	11.2964980	45.0000000	Y
0.0002675	3980.0456725	14876383.	11.3097133	45.0000000	Y
0.0002741	4008.3623300	14621206.	11.3240481	45.0000000	Y
0.0002808	4035.4677320	14373723.	11.3393396	45.0000000	Y
0.0002874	4061.4526904	14133719.	11.3554387	45.0000000	Y
0.0002940	4086.4044152	13900988.	11.3722083	45.0000000	Y
0.0003006	4110.4067215	13675327.	11.3895213	45.0000000	Y
0.0003072	4133.5402156	13456544.	11.4072594	45.0000000	Y
0.0003138	4155.8824619	13244451.	11.4253116	45.0000000	Y
0.0003204	4177.1669597	13037803.	11.4440471	45.0000000	Y
0.0003270	4197.7709713	12837423.	11.4629507	45.0000000	Y
0.0003336	4217.7661739	12643154.	11.4819272	45.0000000	Y
0.0003402	4237.0431956	12454319.	11.5011321	45.0000000	Y
0.0003468	4255.5468719	12270447.	11.5206545	45.0000000	Y
0.0003534	4273.6096598	12092202.	11.5400445	45.0000000	Y
0.0003600	4290.4097650	11916990.	11.5582468	45.0000000	Y
0.0003666	4306.5112932	11746187.	11.5763296	45.0000000	Y
0.0003732	4322.1427406	11580171.	11.5937314	45.0000000	Y
0.0003798	4335.9628653	11415161.	11.6092082	45.0000000	Y
0.0003864	4349.6713089	11255503.	11.6243286	45.0000000	Y
0.0003931	4362.3530681	11098599.	11.6390555	45.0000000	Y
0.0004195	4404.4318093	10499787.	11.6831503	45.0000000	Y
0.0004459	4437.6151732	9951996.	11.7157650	45.0000000	Y
0.0004723	4464.2614757	9451656.	11.7419536	45.0000000	Y
0.0004987	4486.3513288	8995196.	11.7628724	45.0000000	Y
0.0005252	4504.8959103	8577919.	11.7801068	45.0000000	Y
0.0005516	4520.6772185	8195611.	11.7948415	45.0000000	Y
0.0005780	4534.1895089	7844331.	11.8074250	45.0000000	Y
0.0006044	4545.6603898	7520387.	11.8172202	45.0000000	Y
0.0006309	4555.9460064	7221701.	11.8261639	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	370.000	4555.9

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head	=	10000.000 lbs
Applied moment at pile head	=	0.000 in-lbs
Axial thrust load on pile head	=	370000.000 lbs

Depth x inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. Es*h lb/inch	Soil Spr. Lat. Load lb/inch	Distrib. p lb/in
0.00	0.0633	-2.455E-08	10000.0000	-0.001085	0.000	2.123E+10	-182.4308	8651.7532	0.000
6.000	0.0567	59125.	8897.0050	-0.001077	0.000	2.123E+10	-185.2342	19585.	0.000
12.000	0.0503	111544.	7779.6147	-0.001053	0.000	2.123E+10	-187.2292	22316.	0.000
18.000	0.0441	157153.	6658.2180	-0.001015	0.000	2.123E+10	-186.5697	25373.	0.000
24.000	0.0382	195947.	5539.6914	-0.000965	0.000	2.123E+10	-186.2725	29285.	0.000
30.000	0.0325	227913.	4425.5961	-0.000905	0.000	2.123E+10	-185.0926	34127.	0.000
36.000	0.0273	253072.	3321.3639	-0.000837	0.000	2.123E+10	-182.9848	40206.	0.000
42.000	0.0225	271484.	2232.7184	-0.000763	0.000	2.123E+10	-179.8970	47970.	0.000
48.000	0.0182	283250.	1165.7258	-0.000684	0.000	2.123E+10	-175.7672	58086.	0.000
54.000	0.0143	288511.	126.8706	-0.000603	0.000	2.123E+10	-170.5179	71592.	0.000
60.000	0.0109	287452.	-876.8239	-0.000522	0.000	2.123E+10	-164.0470	90176.	0.000
66.000	0.008027	280307.	-1837.5957	-0.000442	0.000	2.123E+10	-156.2103	116765.	0.000
72.000	0.005614	267362.	-2746.5804	-0.000364	0.000	2.123E+10	-146.7846	156874.	0.000
78.000	0.003655	248965.	-3593.0805	-0.000291	0.000	2.123E+10	-135.3821	222256.	0.000
84.000	0.002118	225539.	-4362.8441	-0.000224	0.000	2.123E+10	-121.2058	343414.	0.000
90.000	0.000963	197607.	-5032.7298	-0.000165	0.000	2.123E+10	-102.0894	636023.	0.000
96.000	0.000144	165876.	-5517.1138	-0.000113	0.000	2.123E+10	-59.3719	2480209.	0.000
102.000	-0.000394	131904.	-5438.4881	-7.104E-05	0.000	2.123E+10	85.5805	1301647.	0.000
108.000	-0.000709	100930.	-4878.9963	-3.814E-05	0.000	2.123E+10	100.9168	854150.	0.000
114.000	-0.000852	73525.	-4259.1890	-1.348E-05	0.000	2.123E+10	105.6856	744160.	0.000
120.000	-0.000871	49879.	-3623.3374	3.962E-06	0.000	2.123E+10	106.2649	732316.	0.000
126.000	-0.000805	30028.	-2991.9571	1.526E-05	0.000	2.123E+10	104.1952	777016.	0.000
132.000	-0.000688	13908.	-2378.8122	2.146E-05	0.000	2.123E+10	100.1864	874247.	0.000
138.000	-0.000547	1386.7435	-1794.3859	2.363E-05	0.000	2.123E+10			

```
94.6224   1037905.      0.000
   144.000  -0.000404 -7729.2557 -1247.3401  2.273E-05      0.000  2.123E+10
87.7262   1302659.      0.000
   150.000  -0.000274    -13682.  -629.6290  1.970E-05      0.000  2.123E+10
118.1775   2585595.      0.000
   156.000  -0.000168    -15372.   -58.4050  1.560E-05      0.000  2.123E+10
72.2305   2585595.      0.000
   162.000  -8.706E-05   -14452.   270.8428  1.138E-05      0.000  2.123E+10
37.5187   2585595.      0.000
   168.000  -3.102E-05   -12173.   423.5078  7.619E-06      0.000  2.123E+10
13.3696   2585595.      0.000
   174.000  4.369E-06 -9404.1102   457.9682  4.570E-06      0.000  2.123E+10
-1.8828   2585595.      0.000
   180.000  2.381E-05 -6697.3865   421.5332  2.294E-06      0.000  2.123E+10
-10.2622   2585595.      0.000
   186.000  3.190E-05 -4355.8976   349.5070  7.320E-07      0.000  2.123E+10
-13.7466   2585595.      0.000
   192.000  3.260E-05 -2506.5522   266.1250 -2.379E-07      0.000  2.123E+10
-14.0474   2585595.      0.000
   198.000  2.904E-05 -1161.3418   186.4336 -7.563E-07      0.000  2.123E+10
-12.5163   2585595.      0.000
   204.000  2.352E-05  -265.9909   118.4752 -9.580E-07      0.000  2.123E+10
-10.1365   2585595.      0.000
   210.000  1.755E-05   264.6145    65.3793 -9.582E-07      0.000  2.123E+10
-7.5622   2585595.      0.000
   216.000  1.202E-05   522.8157    27.1490 -8.469E-07      0.000  2.123E+10
-5.1813   2585595.      0.000
   222.000  7.385E-06   594.1627     2.0576 -6.891E-07      0.000  2.123E+10
-3.1825   2585595.      0.000
   228.000  3.755E-06   550.5669   -12.3438 -5.273E-07      0.000  2.123E+10
-1.6180   2585595.      0.000
   234.000  1.058E-06   448.3786   -18.5652 -3.861E-07      0.000  2.123E+10
-0.4558   2585595.      0.000
   240.000 -8.786E-07   329.4989   -18.7969 -2.762E-07      0.000  2.123E+10
0.3786   2585595.      0.000
   246.000 -2.256E-06   224.0419   -14.7445 -1.979E-07      0.000  2.123E+10
0.9722   2585595.      0.000
   252.000 -3.254E-06   153.4441    -7.6216 -1.446E-07      0.000  2.123E+10
1.4021   2585595.      0.000
   258.000 -3.991E-06   133.2249    -3.2861 -1.041E-07      0.000  2.123E+10
0.0431     64778.      0.000
   264.000 -4.502E-06   114.4732    -3.0567 -6.904E-08      0.000  2.123E+10
0.0334     44482.      0.000
   270.000 -4.819E-06    96.8513    -2.8462 -3.918E-08      0.000  2.123E+10
0.0368     45778.      0.000
   276.000 -4.972E-06    80.4924    -2.6189 -1.411E-08      0.000  2.123E+10
0.0390     47074.      0.000
   282.000 -4.989E-06    65.4873    -2.3812  6.520E-09      0.000  2.123E+10
0.0402     48370.      0.000
   288.000 -4.894E-06    51.8890    -2.1390  2.311E-08      0.000  2.123E+10
0.0405     49666.      0.000
   294.000 -4.711E-06    39.7165    -1.8974  3.606E-08      0.000  2.123E+10
0.0400     50962.      0.000
   300.000 -4.461E-06    28.9597    -1.6608  4.576E-08      0.000  2.123E+10
0.0389     52258.      0.000
   306.000 -4.162E-06    19.5836    -1.4328  5.262E-08      0.000  2.123E+10
0.0372     53554.      0.000
   312.000 -3.830E-06    11.5326    -1.2163  5.702E-08      0.000  2.123E+10
0.0350     54850.      0.000
   318.000 -3.478E-06     4.7349    -1.0136  5.932E-08      0.000  2.123E+10
0.0325     56146.      0.000
   324.000 -3.118E-06    -0.8942    -0.8264  5.986E-08      0.000  2.123E+10
0.0299     57442.      0.000
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   330.000 -2.760E-06    -5.4481    -0.6558  5.897E-08      0.000  2.123E+10
0.0270     58738.      0.000
   336.000 -2.411E-06    -9.0259    -0.5024  5.692E-08      0.000  2.123E+10
0.0241     60034.      0.000
   342.000 -2.077E-06   -11.7298    -0.3664  5.399E-08      0.000  2.123E+10
0.0212     61330.      0.000
   348.000 -1.763E-06   -13.6622    -0.2475  5.040E-08      0.000  2.123E+10
0.0184     62626.      0.000
   354.000 -1.472E-06   -14.9237    -0.1453  4.636E-08      0.000  2.123E+10
0.0157     63922.      0.000
   360.000 -1.206E-06   -15.6113    -0.0589  4.204E-08      0.000  2.123E+10
0.0131     65218.      0.000
   366.000 -9.674E-07   -15.8171     0.0126  3.760E-08      0.000  2.123E+10
0.0107     66514.      0.000
   372.000 -7.552E-07   -15.6269     0.0704  3.316E-08      0.000  2.123E+10
0.008534     67810.      0.000
   378.000 -5.695E-07   -15.1196     0.1157  2.881E-08      0.000  2.123E+10
0.006559     69106.      0.000
   384.000 -4.094E-07   -14.3667     0.1498  2.464E-08      0.000  2.123E+10
0.004804     70402.      0.000
   390.000 -2.737E-07   -13.4319     0.1740  2.071E-08      0.000  2.123E+10
0.003271     71698.      0.000
   396.000 -1.608E-07   -12.3709     0.1897  1.707E-08      0.000  2.123E+10
0.001957     72994.      0.000
   402.000 -6.893E-08   -11.2317     0.1981  1.373E-08      0.000  2.123E+10
0.000853     74290.      0.000
   408.000  3.943E-09   -10.0547     0.2005  1.072E-08      0.000  2.123E+10
-4.967E-05     75586.      0.000
   414.000  5.976E-08    -8.8732     0.1981  8.049E-09      0.000  2.123E+10
-0.000766     76882.      0.000
   420.000  1.005E-07    -7.7136     0.1918  5.704E-09      0.000  2.123E+10
-0.001310     78178.      0.000
   426.000  1.282E-07    -6.5964     0.1828  3.682E-09      0.000  2.123E+10
-0.001698     79474.      0.000
   432.000  1.447E-07    -5.5362     0.1719  1.967E-09      0.000  2.123E+10
-0.001948     80770.      0.000
   438.000  1.518E-07    -4.5427     0.1598  5.426E-10      0.000  2.123E+10
-0.002076     82066.      0.000
   444.000  1.512E-07    -3.6210     0.1473 -6.112E-10      0.000  2.123E+10
-0.002101     83362.      0.000
   450.000  1.445E-07    -2.7727     0.1348 -1.515E-09      0.000  2.123E+10
-0.002039     84658.      0.000
   456.000  1.330E-07    -1.9961     0.1230 -2.189E-09      0.000  2.123E+10
-0.001906     85954.      0.000
   462.000  1.182E-07    -1.2868     0.1121 -2.653E-09      0.000  2.123E+10
-0.001719     87250.      0.000
   468.000  1.012E-07    -0.6386     0.1025 -2.925E-09      0.000  2.123E+10
-0.001494     88546.      0.000
   474.000  8.312E-08    -0.0438     0.0943 -3.021E-09      0.000  2.123E+10
-0.001245     89842.      0.000
   480.000  6.495E-08     0.5063     0.0876 -2.956E-09      0.000  2.123E+10
-0.000987     91138.      0.000
   486.000  4.764E-08     1.0205     0.0824 -2.740E-09      0.000  2.123E+10
-0.000734     92434.      0.000
   492.000  3.207E-08     1.5076     0.0787 -2.383E-09      0.000  2.123E+10
-0.000501     93730.      0.000
   498.000  1.905E-08     1.9758     0.0326 -1.891E-09      0.000  2.123E+10
-0.0149   4687500.      0.000
   504.000  9.381E-09     1.9070    -0.0341 -1.342E-09      0.000  2.123E+10
-0.007329   4687500.      0.000
   510.000  2.947E-09     1.5731    -0.0629 -8.500E-10      0.000  2.123E+10
-0.002302   4687500.      0.000
   516.000 -8.189E-10     1.1554    -0.0679 -4.643E-10      0.000  2.123E+10
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0.000640   4687500.      0.000
   522.000 -2.625E-09     0.7600    -0.0599 -1.936E-10      0.000  2.123E+10
0.002051   4687500.      0.000
   528.000 -3.142E-09     0.4379    -0.0463 -2.433E-11      0.000  2.123E+10
0.002455   4687500.      0.000
   534.000 -2.917E-09     0.2040    -0.0321  6.640E-11      0.000  2.123E+10
0.002279   4687500.      0.000
   540.000 -2.346E-09     0.0519    -0.0198  1.026E-10      0.000  2.123E+10
0.001833   4687500.      0.000
   546.000 -1.686E-09    -0.0342    -0.0104  1.051E-10      0.000  2.123E+10
0.001317   4687500.      0.000
   552.000 -1.085E-09    -0.0728  -0.003863  8.995E-11      0.000  2.123E+10
0.000848   4687500.      0.000
   558.000 -6.069E-10    -0.0809   0.000102  6.822E-11      0.000  2.123E+10
0.000474   4687500.      0.000
   564.000 -2.662E-10    -0.0719   0.002149  4.662E-11      0.000  2.123E+10
0.000208   4687500.      0.000
   570.000 -4.749E-11    -0.0553   0.002884  2.863E-11      0.000  2.123E+10
3.710E-05   4687500.      0.000
   576.000  7.738E-11    -0.0374   0.002814  1.552E-11      0.000  2.123E+10
-6.045E-05   4687500.      0.000
   582.000  1.388E-10    -0.0216   0.002308  7.175E-12      0.000  2.123E+10
-0.000108   4687500.      0.000
   588.000  1.635E-10  -0.009760   0.001599  2.737E-12      0.000  2.123E+10
-0.000128   4687500.      0.000
   594.000  1.716E-10  -0.002468   0.000814  1.008E-12      0.000  2.123E+10
-0.000134   4687500.      0.000
   600.000  1.756E-10      0.000      0.000      0.000      0.000  2.123E+10
-0.000137   2343750.      0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 1:

Pile-head deflection              =      0.0632580 inches
Computed slope at pile head       =     -0.0010850 radians
Maximum bending moment            =        288511. inch-lbs
Maximum shear force               =  10000.0000000 lbs
Depth of maximum bending moment   =     54.0000000 inches below pile head
Depth of maximum shear force      =       0.000000 inches below pile head
Number of iterations              =             21
Number of zero deflection points  =              6


--------------------------------------------------------------------------------
                    Computed Values of Pile Loading and Deflection
                      for Lateral Loading for Load Case Number 2
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                    =       20000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
```



```
Axial thrust load on pile head                         =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X        y        Moment     Force          S       Stress   Stiffness      p
     Es*h     Lat. Load
   inches    inches    in-lbs      lbs        radians     psi*      lb-in^2    lb/in
     lb/inch     lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
----------
      0.00     0.3003 -3.273E-08     20000.  -0.003928      0.000  2.123E+10
-269.2543  2690.0229      0.000
     6.000     0.2767    123873.     18367.  -0.003910      0.000  2.123E+10
-275.2334  5967.8780      0.000
    12.000     0.2534    237760.     16700.  -0.003859      0.000  2.123E+10
-280.4080  6640.5771      0.000
    18.000     0.2304    341403.     15012.  -0.003777      0.000  2.123E+10
-282.0110  7343.8486      0.000
    24.000     0.2080    434679.     13313.  -0.003668      0.000  2.123E+10
-284.5905  8208.0773      0.000
    30.000     0.1864    517437.     11600.  -0.003533      0.000  2.123E+10
-286.3088  9216.1763      0.000
    36.000     0.1656    589564.  9879.5360  -0.003377      0.000  2.123E+10
-287.1305     10401.      0.000
    42.000     0.1459    650983.  8157.0920  -0.003201      0.000  2.123E+10
-287.0175     11805.      0.000
    48.000     0.1272    701662.  6438.2537  -0.003010      0.000  2.123E+10
-285.9286     13485.      0.000
    54.000     0.1098    741607.  4729.0151  -0.002806      0.000  2.123E+10
-283.8176     15515.      0.000
    60.000     0.0935    770869.  3035.6650  -0.002592      0.000  2.123E+10
-280.6324     17999.      0.000
    66.000     0.0786    789544.  1364.8310  -0.002372      0.000  2.123E+10
-276.3122     21079.      0.000
    72.000     0.0651    797777.  -276.4565  -0.002147      0.000  2.123E+10
-270.7836     24961.      0.000
    78.000     0.0529    795761. -1880.6717  -0.001922      0.000  2.123E+10
-263.9548     29949.      0.000
    84.000     0.0420    783744. -3439.6524  -0.001699      0.000  2.123E+10
-255.7054     36509.      0.000
    90.000     0.0325    762029. -4944.3744  -0.001480      0.000  2.123E+10
-245.8686     45399.      0.000
    96.000     0.0243    730984. -6384.5715  -0.001269      0.000  2.123E+10
-234.1971     57927.      0.000
   102.000     0.0173    691050. -7748.0403  -0.001068      0.000  2.123E+10
-220.2925     76575.      0.000
   108.000     0.0114    642752. -9015.8476  -0.000880      0.000  2.123E+10
-202.3099    106141.      0.000
   114.000   0.006702    586767.    -10154.  -0.000706      0.000  2.123E+10
-177.0094    158476.      0.000
   120.000   0.002962    524041.    -11118.  -0.000549      0.000  2.123E+10
-144.3330    292345.      0.000
   126.000   0.000112    455791.    -11695.  -0.000411      0.000  2.123E+10
-48.0858  2585595.      0.000
   132.000  -0.001966    385524.    -11449.  -0.000292      0.000  2.123E+10
130.2643    397541.      0.000
   138.000  -0.003390    319704.    -10610.  -0.000192      0.000  2.123E+10
149.2736    264214.      0.000
   144.000  -0.004271    259058. -9687.6505  -0.000110      0.000  2.123E+10
158.1563    222161.      0.000
   150.000  -0.004714    203942. -8726.8782 -4.488E-05      0.000  2.123E+10
162.1012    206341.      0.000
   156.000  -0.004810    154534. -7751.8016  5.789E-06      0.000  2.123E+10
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162.9244    203236.      0.000
   162.000  -0.004644   110895. -6778.5180  4.330E-05      0.000  2.123E+10
161.5035    208655.      0.000
   168.000  -0.004290    73000. -5818.9979  6.929E-05      0.000  2.123E+10
158.3366    221436.      0.000
   174.000  -0.003813    40759. -4882.7858  8.537E-05      0.000  2.123E+10
153.7341    241936.      0.000
   180.000  -0.003266    14027. -3977.8834  9.312E-05      0.000  2.123E+10
147.9000    271725.      0.000
   186.000  -0.002695 -7388.9134 -3111.2746  9.405E-05      0.000  2.123E+10
140.9696    313822.      0.000
   192.000  -0.002137   -23726. -2289.2807  8.966E-05      0.000  2.123E+10
133.0284    373473.      0.000
   198.000  -0.001619   -35258. -1517.8463  8.132E-05      0.000  2.123E+10
124.1164    459878.      0.000
   204.000  -0.001161   -42301.  -802.8347  7.036E-05      0.000  2.123E+10
114.2208    590124.      0.000
   210.000  -0.000775   -45205.  -150.4473  5.799E-05      0.000  2.123E+10
103.2417    799240.      0.000
   216.000  -0.000465   -44364.   431.9459  4.533E-05      0.000  2.123E+10
90.8894   1171654.      0.000
   222.000  -0.000231   -40223.  1003.3476  3.338E-05      0.000  2.123E+10
99.5779   2585595.      0.000
   228.000 -6.493E-05   -32472.  1386.0191  2.310E-05      0.000  2.123E+10
27.9793   2585595.      0.000
   234.000  4.615E-05   -23693.  1410.2962  1.516E-05      0.000  2.123E+10
-19.8869   2585595.      0.000
   240.000   0.000117   -15615.  1199.3257  9.608E-06      0.000  2.123E+10
-50.4366   2585595.      0.000
   246.000   0.000161 -9343.7739   839.2951  6.081E-06      0.000  2.123E+10
-69.5736   2585595.      0.000
   252.000   0.000190 -5570.8958   384.9298  3.973E-06      0.000  2.123E+10
-81.8815   2585595.      0.000
   258.000   0.000209 -4742.2559   132.5120  2.515E-06      0.000  2.123E+10
-2.2578     64778.      0.000
   264.000   0.000220 -3991.9198   120.8414  1.281E-06      0.000  2.123E+10
-1.6324     44482.      0.000
   270.000   0.000224 -3297.8457   110.8058  2.505E-07      0.000  2.123E+10
-1.7128     45778.      0.000
   276.000   0.000223 -2663.3624   100.4141 -5.920E-07      0.000  2.123E+10
-1.7511     47074.      0.000
   282.000   0.000217 -2090.2482    89.9032 -1.264E-06      0.000  2.123E+10
-1.7525     48370.      0.000
   288.000   0.000208 -1578.9122    79.4797 -1.782E-06      0.000  2.123E+10
-1.7220     49666.      0.000
   294.000   0.000196 -1128.5775    69.3195 -2.165E-06      0.000  2.123E+10
-1.6647     50962.      0.000
   300.000   0.000182  -737.4649    59.5686 -2.429E-06      0.000  2.123E+10
-1.5856     52258.      0.000
   306.000   0.000167  -402.9708    50.3440 -2.590E-06      0.000  2.123E+10
-1.4893     53554.      0.000
   312.000   0.000151  -121.8370    41.7359 -2.664E-06      0.000  2.123E+10
-1.3801     54850.      0.000
   318.000   0.000135   109.6892    33.8091 -2.666E-06      0.000  2.123E+10
-1.2622     56146.      0.000
   324.000   0.000119   295.7085    26.6054 -2.609E-06      0.000  2.123E+10
-1.1391     57442.      0.000
   330.000   0.000104   440.5360    20.1462 -2.505E-06      0.000  2.123E+10
-1.0140     58738.      0.000
   336.000  8.892E-05   548.5833    14.4350 -2.365E-06      0.000  2.123E+10
-0.8897     60034.      0.000
   342.000  7.520E-05   624.2556     9.4597 -2.199E-06      0.000  2.123E+10
-0.7687     61330.      0.000
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   348.000  6.254E-05   671.8637     5.1955 -2.016E-06      0.000  2.123E+10
-0.6527     62626.      0.000
   354.000  5.101E-05   695.5519     1.6069 -1.823E-06      0.000  2.123E+10
-0.5435     63922.      0.000
   360.000  4.067E-05   699.2392    -1.3495 -1.625E-06      0.000  2.123E+10
-0.4420     65218.      0.000
   366.000  3.151E-05   686.5749    -3.7234 -1.430E-06      0.000  2.123E+10
-0.3493     66514.      0.000
   372.000  2.351E-05   660.9062    -5.5683 -1.239E-06      0.000  2.123E+10
-0.2657     67810.      0.000
   378.000  1.664E-05   625.2571    -6.9403 -1.057E-06      0.000  2.123E+10
-0.1916     69106.      0.000
   384.000  1.082E-05   582.3173    -7.8961 -8.867E-07      0.000  2.123E+10
-0.1270     70402.      0.000
   390.000  5.997E-06   534.4403    -8.4921 -7.288E-07      0.000  2.123E+10
-0.0717     71698.      0.000
   396.000  2.077E-06   483.6482    -8.7829 -5.849E-07      0.000  2.123E+10
-0.0253     72994.      0.000
   402.000 -1.022E-06   431.6429    -8.8207 -4.556E-07      0.000  2.123E+10
0.0127     74290.      0.000
   408.000 -3.392E-06   379.8224    -8.6546 -3.409E-07      0.000  2.123E+10
0.0427     75586.      0.000
   414.000 -5.113E-06   329.3009    -8.3300 -2.407E-07      0.000  2.123E+10
0.0655     76882.      0.000
   420.000 -6.278E-06   280.9314    -7.8880 -1.544E-07      0.000  2.123E+10
0.0818     78178.      0.000
   426.000 -6.966E-06   235.3304    -7.3658 -8.146E-08      0.000  2.123E+10
0.0923     79474.      0.000
   432.000 -7.255E-06   192.9034    -6.7960 -2.093E-08      0.000  2.123E+10
0.0977     80770.      0.000
   438.000 -7.217E-06   153.8714    -6.2068  2.808E-08      0.000  2.123E+10
0.0987     82066.      0.000
   444.000 -6.918E-06   118.2967    -5.6223  6.654E-08      0.000  2.123E+10
0.0961     83362.      0.000
   450.000 -6.419E-06    86.1081    -5.0623  9.543E-08      0.000  2.123E+10
0.0906     84658.      0.000
   456.000 -5.773E-06    57.1259    -4.5424  1.157E-07      0.000  2.123E+10
0.0827     85954.      0.000
   462.000 -5.031E-06    31.0852    -4.0749  1.281E-07      0.000  2.123E+10
0.0732     87250.      0.000
   468.000 -4.235E-06     7.6586    -3.6679  1.336E-07      0.000  2.123E+10
0.0625     88546.      0.000
   474.000 -3.427E-06   -13.5227    -3.3264  1.328E-07      0.000  2.123E+10
0.0513     89842.      0.000
   480.000 -2.642E-06   -32.8480    -3.0521  1.262E-07      0.000  2.123E+10
0.0401     91138.      0.000
   486.000 -1.912E-06   -50.7079    -2.8433  1.144E-07      0.000  2.123E+10
0.0295     92434.      0.000
   492.000 -1.269E-06   -67.4755    -2.6954  9.773E-08      0.000  2.123E+10
0.0198     93730.      0.000
   498.000 -7.397E-07   -83.4871    -0.9023  7.639E-08      0.000  2.123E+10
0.5779   4687500.      0.000
   504.000 -3.522E-07   -78.6425     1.6567  5.347E-08      0.000  2.123E+10
0.2751   4687500.      0.000
   510.000 -9.799E-08   -63.8442     2.7117  3.334E-08      0.000  2.123E+10
0.0766   4687500.      0.000
   516.000  4.789E-08   -46.2498     2.8292  1.778E-08      0.000  2.123E+10
-0.0374   4687500.      0.000
   522.000  1.153E-07   -29.9732     2.4466  7.004E-09      0.000  2.123E+10
-0.0901   4687500.      0.000
   528.000  1.319E-07   -16.9214     1.8671  3.760E-10      0.000  2.123E+10
-0.1031   4687500.      0.000
   534.000  1.198E-07    -7.5696     1.2770 -3.085E-09      0.000  2.123E+10
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-0.0936   4687500.      0.000
   540.000  9.491E-08    -1.5835     0.7737 -4.379E-09      0.000  2.123E+10
-0.0741   4687500.      0.000
   546.000  6.729E-08     1.7344     0.3936 -4.358E-09      0.000  2.123E+10
-0.0526   4687500.      0.000
   552.000  4.261E-08     3.1585     0.1360 -3.666E-09      0.000  2.123E+10
-0.0333   4687500.      0.000
   558.000  2.330E-08     3.3822    -0.0185 -2.742E-09      0.000  2.123E+10
-0.0182   4687500.      0.000
   564.000  9.713E-09     2.9486    -0.0959 -1.847E-09      0.000  2.123E+10
-0.007589   4687500.      0.000
   570.000  1.132E-09     2.2399    -0.1213 -1.114E-09      0.000  2.123E+10
-0.000884   4687500.      0.000
   576.000 -3.651E-09     1.4980    -0.1154 -5.854E-10      0.000  2.123E+10
0.002853   4687500.      0.000
   582.000 -5.893E-09     0.8578    -0.0930 -2.525E-10      0.000  2.123E+10
0.004604   4687500.      0.000
   588.000 -6.681E-09     0.3829    -0.0635 -7.713E-11      0.000  2.123E+10
0.005219   4687500.      0.000
   594.000 -6.819E-09     0.0956    -0.0319 -9.511E-12      0.000  2.123E+10
0.005327   4687500.      0.000
   600.000 -6.795E-09     0.000      0.000  3.996E-12      0.000  2.123E+10
0.005309   2343750.      0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 2:

Pile-head deflection             =      0.3002811 inches
Computed slope at pile head      =     -0.0039277 radians
Maximum bending moment           =        797777. inch-lbs
Maximum shear force              =         20000. lbs
Depth of maximum bending moment  =     72.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             27
Number of zero deflection points =              5


--------------------------------------------------------------------------------
                  Computed Values of Pile Loading and Deflection
                    for Lateral Loading for Load Case Number 3
--------------------------------------------------------------------------------


Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                     =       30000.000 lbs
Applied moment at pile head                             =           0.000 in-lbs
Axial thrust load on pile head                          =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
```



```
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
     0.00     0.7562 -9.165E-07     30000.  -0.008429      0.000  2.123E+10
-339.1806  1345.6621      0.000
    6.000     0.7056     192607.     27939.  -0.008402      0.000  2.123E+10
-347.7982  2957.5106      0.000
   12.000     0.6553     372573.     25829.  -0.008322      0.000  2.123E+10
-355.6064  3255.7648      0.000
   18.000     0.6057     539503.     23685.  -0.008193      0.000  2.123E+10
-359.0936  3556.9929      0.000
   24.000     0.5570     693168.     21515.  -0.008019      0.000  2.123E+10
-364.0427  3921.2936      0.000
   30.000     0.5095     833291.     19319.  -0.007803      0.000  2.123E+10
-368.1354  4335.2642      0.000
   36.000     0.4634     959639.     17100.  -0.007550      0.000  2.123E+10
-371.3403  4808.1697      0.000
   42.000     0.4189    1072017.     14865.  -0.007263      0.000  2.123E+10
-373.6246  5351.4844      0.000
   48.000     0.3762    1170271.     12620.  -0.006946      0.000  2.123E+10
-374.9536  5979.5573      0.000
   54.000     0.3356    1254293.     10369.  -0.006603      0.000  2.123E+10
-375.2902  6710.5250      0.000
   60.000     0.2970    1324017.  8119.3641  -0.006239      0.000  2.123E+10
-374.5945  7567.5863      0.000
   66.000     0.2607    1379424.  5877.1131  -0.005857      0.000  2.123E+10
-372.8225  8580.8135      0.000
   72.000     0.2267    1420545.  3648.8712  -0.005461      0.000  2.123E+10
-369.9248  9789.7845      0.000
   78.000     0.1952    1447457.  1441.5614  -0.005055      0.000  2.123E+10
-365.8451    11248.      0.000
   84.000     0.1661    1460290.  -737.5261  -0.004644      0.000  2.123E+10
-360.5174    13026.      0.000
   90.000     0.1394    1459228. -2880.6625  -0.004232      0.000  2.123E+10
-353.8614    15228.      0.000
   96.000     0.1153    1444511. -4979.5782  -0.003821      0.000  2.123E+10
-345.7771    17998.      0.000
  102.000     0.0936    1416440. -7025.3107  -0.003417      0.000  2.123E+10
-336.1337    21554.      0.000
  108.000     0.0743    1375380. -9002.5764  -0.003023      0.000  2.123E+10
-322.9549    26091.      0.000
  114.000     0.0573    1321829.    -10879.  -0.002641      0.000  2.123E+10
-302.6791    31695.      0.000
  120.000     0.0426    1256553.    -12631.  -0.002277      0.000  2.123E+10
-281.0170    39606.      0.000
  126.000     0.0300    1180372.    -14246.  -0.001932      0.000  2.123E+10
-257.4274    51526.      0.000
  132.000     0.0194    1094183.    -15711.  -0.001611      0.000  2.123E+10
-230.8491    71462.      0.000
  138.000     0.0106     998996.    -17000.  -0.001315      0.000  2.123E+10
-198.7427   112031.      0.000
  144.000    0.003600    896028.    -18051.  -0.001047      0.000  2.123E+10
-151.6187   252694.      0.000
  150.000   -0.001924    787039.    -18117.  -0.000809      0.000  2.123E+10
129.4345   403602.      0.000
  156.000   -0.006114    682216.    -17210.  -0.000602      0.000  2.123E+10
172.9305   169717.      0.000
  162.000   -0.009146    583191.    -16117.  -0.000423      0.000  2.123E+10
191.2730   125480.      0.000
  168.000    -0.0112     490685.    -14940.  -0.000271      0.000  2.123E+10
201.1714   107874.      0.000
  174.000    -0.0124     405114.    -13717.  -0.000145      0.000  2.123E+10
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206.4118     99874.       0.000
   180.000    -0.0129    326719.    -12472. -4.116E-05      0.000  2.123E+10
208.5617     96823.       0.000
   186.000    -0.0129    255627.    -11221.  4.115E-05      0.000  2.123E+10
208.4421     96994.       0.000
   192.000    -0.0124    191879. -9976.4639   0.000104      0.000  2.123E+10
206.5437     99695.       0.000
   198.000    -0.0116    135446. -8747.2755   0.000151      0.000  2.123E+10
203.1857    104722.       0.000
   204.000    -0.0106     86243. -7541.9575   0.000182      0.000  2.123E+10
198.5870    112169.       0.000
   210.000  -0.009457     44135. -6367.4888   0.000200      0.000  2.123E+10
192.9026    122381.       0.000
   216.000  -0.008218  8943.2093 -5230.0518   0.000208      0.000  2.123E+10
186.2431    135985.       0.000
   222.000  -0.006962    -19549. -4135.2713   0.000206      0.000  2.123E+10
178.6838    153984.       0.000
   228.000  -0.005740    -41597. -3088.4176   0.000198      0.000  2.123E+10
170.2675    177965.       0.000
   234.000  -0.004589    -57488. -2094.6159   0.000184      0.000  2.123E+10
160.9998    210500.       0.000
   240.000  -0.003535    -67548. -1159.1183   0.000166      0.000  2.123E+10
150.8327    255999.       0.000
   246.000  -0.002596    -72135.  -287.7479   0.000146      0.000  2.123E+10
139.6241    322730.       0.000
   252.000  -0.001779    -71651.   512.2280   0.000126      0.000  2.123E+10
127.0346    428495.       0.000
   258.000  -0.001083    -66548.   928.4195   0.000107      0.000  2.123E+10
11.6959     64778.       0.000
   264.000  -0.000501    -60983.   974.6433  8.848E-05      0.000  2.123E+10
3.7120     44482.       0.000
   270.000 -2.151E-05    -55245.   986.2716  7.206E-05      0.000  2.123E+10
0.1641     45778.       0.000
   276.000   0.000364    -49467.   978.1971  5.726E-05      0.000  2.123E+10
-2.8557     47074.       0.000
   282.000   0.000666    -43761.   953.5333  4.408E-05      0.000  2.123E+10
-5.3656     48370.       0.000
   288.000   0.000893    -38221.   915.2618  3.249E-05      0.000  2.123E+10
-7.3915     49666.       0.000
   294.000   0.001056    -32922.   866.1920  2.244E-05      0.000  2.123E+10
-8.9651     50962.       0.000
   300.000   0.001162    -27926.   808.9292  1.384E-05      0.000  2.123E+10
-10.1225     52258.       0.000
   306.000   0.001222    -23277.   745.8514  6.603E-06      0.000  2.123E+10
-10.9034     53554.       0.000
   312.000   0.001241    -19005.   679.0945  6.271E-07      0.000  2.123E+10
-11.3490     54850.       0.000
   318.000   0.001229    -15130.   610.5430 -4.197E-06      0.000  2.123E+10
-11.5015     56146.       0.000
   324.000   0.001191    -11660.   541.8293 -7.984E-06      0.000  2.123E+10
-11.4031     57442.       0.000
   330.000   0.001133 -8592.7722   474.3364 -1.085E-05      0.000  2.123E+10
-11.0946     58738.       0.000
   336.000   0.001061 -5919.6822   409.2065 -1.290E-05      0.000  2.123E+10
-10.6154     60034.       0.000
   342.000   0.000979 -3625.0301   347.3538 -1.425E-05      0.000  2.123E+10
-10.0022     61330.       0.000
   348.000   0.000890 -1688.1832   289.4792 -1.500E-05      0.000  2.123E+10
-9.2893     62626.       0.000
   354.000   0.000799   -84.6924   236.0882 -1.525E-05      0.000  2.123E+10
-8.5077     63922.       0.000
   360.000   0.000707  1212.5756   187.5104 -1.509E-05      0.000  2.123E+10
-7.6850     65218.       0.000
```



```
   366.000   0.000618  2232.4243   143.9190 -1.460E-05      0.000  2.123E+10
-6.8455     66514.       0.000
   372.000   0.000532  3004.4345   105.3521 -1.386E-05      0.000  2.123E+10
-6.0102     67810.       0.000
   378.000   0.000451  3558.1938    71.7322 -1.293E-05      0.000  2.123E+10
-5.1965     69106.       0.000
   384.000   0.000377  3922.6472    42.8865 -1.188E-05      0.000  2.123E+10
-4.4188     70402.       0.000
   390.000   0.000309  4125.5632    18.5651 -1.074E-05      0.000  2.123E+10
-3.6884     71698.       0.000
   396.000   0.000248  4193.1095    -1.5411 -9.563E-06      0.000  2.123E+10
-3.0137     72994.       0.000
   402.000   0.000194  4149.5310   -17.7846 -8.384E-06      0.000  2.123E+10
-2.4008     74290.       0.000
   408.000   0.000147  4016.9201   -30.5468 -7.230E-06      0.000  2.123E+10
-1.8533     75586.       0.000
   414.000   0.000107  3815.0702   -40.2252 -6.123E-06      0.000  2.123E+10
-1.3729     76882.       0.000
   420.000  7.364E-05  3561.4034   -47.2222 -5.080E-06      0.000  2.123E+10
-0.9595     78178.       0.000
   426.000  4.617E-05  3270.9610   -51.9355 -4.115E-06      0.000  2.123E+10
-0.6116     79474.       0.000
   432.000  2.426E-05  2956.4479   -54.7500 -3.235E-06      0.000  2.123E+10
-0.3266     80770.       0.000
   438.000  7.358E-06  2628.3232   -56.0316 -2.445E-06      0.000  2.123E+10
-0.1006     82066.       0.000
   444.000 -5.085E-06  2294.9259   -56.1216 -1.750E-06      0.000  2.123E+10
0.0707     83362.       0.000
   450.000 -1.364E-05  1962.6320   -55.3324 -1.148E-06      0.000  2.123E+10
0.1924     84658.       0.000
   456.000 -1.886E-05  1636.0331   -53.9447 -6.392E-07      0.000  2.123E+10
0.2702     85954.       0.000
   462.000 -2.131E-05  1318.1336   -52.2047 -2.217E-07      0.000  2.123E+10
0.3098     87250.       0.000
   468.000 -2.152E-05  1010.5612   -50.3225  1.074E-07      0.000  2.123E+10
0.3176     88546.       0.000
   474.000 -2.002E-05   713.7872   -48.4705  3.511E-07      0.000  2.123E+10
0.2997     89842.       0.000
   480.000 -1.731E-05   427.3559   -46.7827  5.124E-07      0.000  2.123E+10
0.2629     91138.       0.000
   486.000 -1.387E-05   150.1195   -45.3532  5.940E-07      0.000  2.123E+10
0.2137     92434.       0.000
   492.000 -1.018E-05  -119.5195   -44.2352  5.984E-07      0.000  2.123E+10
0.1590     93730.       0.000
   498.000 -6.688E-06  -383.3602   -28.0830  5.273E-07      0.000  2.123E+10
5.2251   4687500.       0.000
   504.000 -3.849E-06  -458.8566    -3.3856  4.083E-07      0.000  2.123E+10
3.0074   4687500.       0.000
   510.000 -1.789E-06  -425.7998     9.8294  2.832E-07      0.000  2.123E+10
1.3976   4687500.       0.000
   516.000 -4.506E-07  -342.1613    15.0785  1.747E-07      0.000  2.123E+10
0.3521   4687500.       0.000
   522.000  3.074E-07  -245.6335    15.4143  9.162E-08      0.000  2.123E+10
-0.2401   4687500.       0.000
   528.000  6.488E-07  -157.5961    13.1734  3.463E-08      0.000  2.123E+10
-0.5068   4687500.       0.000
   534.000  7.229E-07   -87.7062     9.9586 -4.211E-11      0.000  2.123E+10
-0.5648   4687500.       0.000
   540.000  6.483E-07   -38.0925     6.7450 -1.782E-08      0.000  2.123E+10
-0.5065   4687500.       0.000
   546.000  5.090E-07    -6.6871     4.0326 -2.415E-08      0.000  2.123E+10
-0.3977   4687500.       0.000
   552.000  3.585E-07    10.4061     1.9995 -2.363E-08      0.000  2.123E+10
```



```
-0.2800   4687500.       0.000
   558.000  2.255E-07    17.4114     0.6308 -1.969E-08      0.000  2.123E+10
-0.1762   4687500.       0.000
   564.000  1.221E-07    18.0629    -0.1840 -1.468E-08      0.000  2.123E+10
-0.0954   4687500.       0.000
   570.000  4.937E-08    15.2681    -0.5860 -9.969E-09      0.000  2.123E+10
-0.0386   4687500.       0.000
   576.000  2.502E-09    11.0753    -0.7076 -6.246E-09      0.000  2.123E+10
-0.001954   4687500.       0.000
   582.000 -2.558E-08     6.8052    -0.6535 -3.719E-09      0.000  2.123E+10
0.0200   4687500.       0.000
   588.000 -4.212E-08     3.2503    -0.4948 -2.297E-09      0.000  2.123E+10
0.0329   4687500.       0.000
   594.000 -5.315E-08     0.8780    -0.2715 -1.714E-09      0.000  2.123E+10
0.0415   4687500.       0.000
   600.000 -6.269E-08      0.000      0.000 -1.590E-09      0.000  2.123E+10
0.0490   2343750.       0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

```
Pile-head deflection             =      0.7561645 inches
Computed slope at pile head      =     -0.0084291 radians
Maximum bending moment           =       1460290. inch-lbs
Maximum shear force              =         30000. lbs
Depth of maximum bending moment  =     84.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             34
Number of zero deflection points =              5
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 4

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                   =       40000.000 lbs
Applied moment at pile head                           =           0.000 in-lbs
Axial thrust load on pile head                        =      370000.000 lbs
```

```
   Depth    Deflect.    Bending    Shear       Slope       Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians      psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     1.4752  7.855E-07     40000.    -0.0147      0.000  2.123E+10
-400.8583   815.1694       0.000
```



```
     6.000     1.3873    265342.     37562.    -0.0146      0.000  2.123E+10
-411.8375  1781.2373       0.000
    12.000     1.2997    515692.     35060.    -0.0145      0.000  2.123E+10
-421.9994  1948.1264       0.000
    18.000     1.2130    750526.     32513.    -0.0143      0.000  2.123E+10
-427.1742  2112.9115       0.000
    24.000     1.1276    969510.     29929.    -0.0141      0.000  2.123E+10
-434.2344  2310.4876       0.000
    30.000     1.0439   1172254.     27305.    -0.0138      0.000  2.123E+10
-440.4361  2531.5045       0.000
    36.000     0.9621   1358407.     24646.    -0.0134      0.000  2.123E+10
-445.7502  2779.7763       0.000
    42.000     0.8827   1527660.     21958.    -0.0130      0.000  2.123E+10
-450.1462  3059.9001       0.000
    48.000     0.8058   1679749.     19247.    -0.0126      0.000  2.123E+10
-453.5926  3377.4592       0.000
    54.000     0.7318   1814455.     16518.    -0.0121      0.000  2.123E+10
-456.0560  3739.2890       0.000
    60.000     0.6608   1931604.     13778.    -0.0116      0.000  2.123E+10
-457.5012  4153.8326       0.000
    66.000     0.5932   2031071.     11031.    -0.0110      0.000  2.123E+10
-457.8902  4631.6203       0.000
    72.000     0.5289   2112779.  8286.1723    -0.0104      0.000  2.123E+10
-457.1819  5185.9299       0.000
    78.000     0.4683   2176703.  5548.6340  -0.009799      0.000  2.123E+10
-455.3308  5833.7071       0.000
    84.000     0.4114   2222869.  2825.7838  -0.009177      0.000  2.123E+10
-452.2859  6596.8795       0.000
    90.000     0.3582   2251358.   124.9612  -0.008545      0.000  2.123E+10
-447.9883  7504.2719       0.000
    96.000     0.3088   2262307. -2546.1115  -0.007907      0.000  2.123E+10
-442.3693  8594.4743       0.000
   102.000     0.2633   2255911. -5179.2555  -0.007268      0.000  2.123E+10
-435.3454  9920.2706       0.000
   108.000     0.2216   2232426. -7758.6433  -0.006634      0.000  2.123E+10
-424.4506     11492.       0.000
   114.000     0.1837   2192261.    -10247.  -0.006008      0.000  2.123E+10
-405.0032     13228.       0.000
   120.000     0.1495   2136139.    -12616.  -0.005397      0.000  2.123E+10
-384.6797     15438.       0.000
   126.000     0.1189   2064829.    -14860.  -0.004803      0.000  2.123E+10
-363.3013     18327.       0.000
   132.000     0.0919   1979144.    -16972.  -0.004231      0.000  2.123E+10
-340.5928     22243.       0.000
   138.000     0.0682   1879956.    -18942.  -0.003686      0.000  2.123E+10
-316.1045     27824.       0.000
   144.000     0.0476   1768209.    -20757.  -0.003170      0.000  2.123E+10
-289.0332     36399.       0.000
   150.000     0.0301   1644946.    -22397.  -0.002688      0.000  2.123E+10
-257.7368     51338.       0.000
   156.000     0.0154   1511373.    -23824.  -0.002242      0.000  2.123E+10
-217.9157     84958.       0.000
   162.000   0.003221   1369006.    -24921.  -0.001835      0.000  2.123E+10
-147.4558    274712.       0.000
   168.000  -0.006627   1220472.    -24834.  -0.001469      0.000  2.123E+10
176.4549    159765.       0.000
   174.000    -0.0144   1077525.    -23661.  -0.001144      0.000  2.123E+10
214.2874     89260.       0.000
   180.000    -0.0204    941615.    -22318.  -0.000859      0.000  2.123E+10
233.6439     68873.       0.000
   186.000    -0.0247    813526.    -20881.  -0.000611      0.000  2.123E+10
245.2475     59557.       0.000
   192.000    -0.0277    693756.    -19388.  -0.000397      0.000  2.123E+10
```

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252.3169     54692.      0.000
   198.000    -0.0295    582633.    -17862.  -0.000217      0.000  2.123E+10
256.3167     52173.      0.000
   204.000    -0.0303    480372.    -16319. -6.685E-05      0.000  2.123E+10
258.0576     51125.      0.000
   210.000    -0.0303    387100.    -14771.  5.575E-05      0.000  2.123E+10
258.0452     51133.      0.000
   216.000    -0.0296    302874.    -13227.   0.000153      0.000  2.123E+10
256.6221     51989.      0.000
   222.000    -0.0284    227697.    -11695.   0.000228      0.000  2.123E+10
254.0353     53594.      0.000
   228.000    -0.0269    161522.    -10181.   0.000283      0.000  2.123E+10
250.4719     55914.      0.000
   234.000    -0.0250    104263. -8691.6990   0.000321      0.000  2.123E+10
246.0793     58963.      0.000
   240.000    -0.0230     55798. -7230.5314   0.000343      0.000  2.123E+10
240.9766     62789.      0.000
   246.000    -0.0209     15972. -5801.8165   0.000354      0.000  2.123E+10
235.2617     67477.      0.000
   252.000    -0.0188    -15394. -4408.9877   0.000354      0.000  2.123E+10
229.0145     73151.      0.000
   258.000    -0.0167    -38506. -3181.8497   0.000346      0.000  2.123E+10
180.0315     64778.      0.000
   264.000    -0.0146    -55113. -2316.3408   0.000333      0.000  2.123E+10
108.4715     44482.      0.000
   270.000    -0.0127    -67780. -1700.6691   0.000315      0.000  2.123E+10
96.7524     45778.      0.000
   276.000    -0.0108    -76922. -1155.1344   0.000295      0.000  2.123E+10
85.0926     47074.      0.000
   282.000  -0.009141    -82952.  -678.7817   0.000272      0.000  2.123E+10
73.6917     48370.      0.000
   288.000  -0.007577    -86277.  -269.5504   0.000248      0.000  2.123E+10
62.7188     49666.      0.000
   294.000  -0.006159    -87290.    75.5452   0.000224      0.000  2.123E+10
52.3131     50962.      0.000
   300.000  -0.004889    -86364.   360.2371   0.000199      0.000  2.123E+10
42.5842     52258.      0.000
   306.000  -0.003766    -83852.   588.8325   0.000175      0.000  2.123E+10
33.6142     53554.      0.000
   312.000  -0.002785    -80077.   766.0523   0.000152      0.000  2.123E+10
25.4590     54850.      0.000
   318.000  -0.001940    -75335.   896.8820   0.000130      0.000  2.123E+10
18.1509     56146.      0.000
   324.000  -0.001222    -69893.   986.4369   0.000110      0.000  2.123E+10
11.7008     57442.      0.000
   330.000  -0.000623    -63985.  1039.8426  9.078E-05      0.000  2.123E+10
6.1011     58738.      0.000
   336.000  -0.000133    -57818.  1062.1317  7.357E-05      0.000  2.123E+10
1.3286     60034.      0.000
   342.000   0.000260    -51566.  1058.1567  5.811E-05      0.000  2.123E+10
-2.6536     61330.      0.000
   348.000   0.000565    -45378.  1032.5188  4.441E-05      0.000  2.123E+10
-5.8924     62626.      0.000
   354.000   0.000793    -39373.   989.5127  3.243E-05      0.000  2.123E+10
-8.4430     63922.      0.000
   360.000   0.000954    -33648.   933.0849  2.211E-05      0.000  2.123E+10
-10.3663     65218.      0.000
   366.000   0.001058    -28274.   866.8065  1.336E-05      0.000  2.123E+10
-11.7265     66514.      0.000
   372.000   0.001114    -23305.   793.8573  6.068E-06      0.000  2.123E+10
-12.5899     67810.      0.000
   378.000   0.001131    -18775.   717.0211  1.207E-07      0.000  2.123E+10
-13.0222     69106.      0.000
```



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   384.000   0.001115    -14702.   638.6902 -4.611E-06      0.000  2.123E+10
-13.0881     70402.      0.000
   390.000   0.001075    -11090.   560.8775 -8.256E-06      0.000  2.123E+10
-12.8495     71698.      0.000
   396.000   0.001016 -7934.3480   485.2349 -1.094E-05      0.000  2.123E+10
-12.3647     72994.      0.000
   402.000   0.000944 -5218.7163   413.0773 -1.280E-05      0.000  2.123E+10
-11.6879     74290.      0.000
   408.000   0.000863 -2920.5726   345.4090 -1.395E-05      0.000  2.123E+10
-10.8682     75586.      0.000
   414.000   0.000777 -1011.8524   282.9542 -1.451E-05      0.000  2.123E+10
-9.9500     76882.      0.000
   420.000   0.000689   539.3014   226.1874 -1.458E-05      0.000  2.123E+10
-8.9722     78178.      0.000
   426.000   0.000602  1767.1163   175.3649 -1.425E-05      0.000  2.123E+10
-7.9686     79474.      0.000
   432.000   0.000518  2706.9534   130.5561 -1.362E-05      0.000  2.123E+10
-6.9677     80770.      0.000
   438.000   0.000438  3394.2553    91.6733 -1.276E-05      0.000  2.123E+10
-5.9933     82066.      0.000
   444.000   0.000365  3863.6691    58.4997 -1.173E-05      0.000  2.123E+10
-5.0646     83362.      0.000
   450.000   0.000297  4148.3341    30.7166 -1.060E-05      0.000  2.123E+10
-4.1965     84658.      0.000
   456.000   0.000237  4279.3229     7.9266 -9.407E-06      0.000  2.123E+10
-3.4002     85954.      0.000
   462.000   0.000185  4285.2193   -10.3245 -8.196E-06      0.000  2.123E+10
-2.6835     87250.      0.000
   468.000   0.000139  4191.8209   -24.5287 -6.998E-06      0.000  2.123E+10
-2.0512     88546.      0.000
   474.000   0.000101  4021.9473   -35.1997 -5.837E-06      0.000  2.123E+10
-1.5058     89842.      0.000
   480.000  6.895E-05  3795.3423   -42.8589 -4.732E-06      0.000  2.123E+10
-1.0473     91138.      0.000
   486.000  4.377E-05  3528.6530   -48.0238 -3.697E-06      0.000  2.123E+10
-0.6743     92434.      0.000
   492.000  2.458E-05  3235.4733   -51.1987 -2.741E-06      0.000  2.123E+10
-0.3840     93730.      0.000
   498.000  1.088E-05  2926.4397   -77.8424 -1.870E-06      0.000  2.123E+10
-8.4972   4687500.      0.000
   504.000  2.136E-06  2309.6690  -108.3395 -1.130E-06      0.000  2.123E+10
-1.6684   4687500.      0.000
   510.000 -2.688E-06  1631.3848  -107.0448 -5.734E-07      0.000  2.123E+10
2.1000   4687500.      0.000
   516.000 -4.745E-06  1027.6773   -89.6241 -1.976E-07      0.000  2.123E+10
3.7069   4687500.      0.000
   522.000 -5.059E-06   556.7727   -66.6473  2.638E-08      0.000  2.123E+10
3.9521   4687500.      0.000
   528.000 -4.428E-06   227.7931   -44.4125  1.373E-07      0.000  2.123E+10
3.4595   4687500.      0.000
   534.000 -3.411E-06    23.2133   -26.0385  1.727E-07      0.000  2.123E+10
2.6652   4687500.      0.000
   540.000 -2.355E-06   -85.4354   -12.5229  1.640E-07      0.000  2.123E+10
1.8400   4687500.      0.000
   546.000 -1.444E-06  -127.7896    -3.6185  1.338E-07      0.000  2.123E+10
1.1281   4687500.      0.000
   552.000 -7.494E-07  -129.4520     1.5223  9.746E-08      0.000  2.123E+10
0.5855   4687500.      0.000
   558.000 -2.745E-07  -109.9552     3.9220  6.362E-08      0.000  2.123E+10
0.2144   4687500.      0.000
   564.000  1.404E-08   -82.6702     4.5324  3.640E-08      0.000  2.123E+10
-0.0110   4687500.      0.000
   570.000  1.623E-07   -55.7281     4.1191  1.684E-08      0.000  2.123E+10
```



```
-0.1268   4687500.      0.000
   576.000  2.161E-07   -33.3163     3.2322  4.253E-09      0.000  2.123E+10
-0.1688   4687500.      0.000
   582.000  2.134E-07   -16.9611     2.2256 -2.853E-09      0.000  2.123E+10
-0.1667   4687500.      0.000
   588.000  1.819E-07    -6.5960     1.2994 -6.182E-09      0.000  2.123E+10
-0.1421   4687500.      0.000
   594.000  1.392E-07    -1.3414     0.5470 -7.304E-09      0.000  2.123E+10
-0.1087   4687500.      0.000
   600.000  9.420E-08     0.000      0.000 -7.494E-09      0.000  2.123E+10
-0.0736   2343750.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection            =      1.4752455 inches
Computed slope at pile head     =     -0.0146656 radians
Maximum bending moment          =       2262307. inch-lbs
Maximum shear force             =         40000. lbs
Depth of maximum bending moment =     96.0000000 inches below pile head
Depth of maximum shear force    =      0.000000 inches below pile head
Number of iterations            =            37
Number of zero deflection points =            4
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

```
Load  Load    Condition 1    Condition 2        Axial        Pile-Head       Maximum
        Maximum        Pile-Head
Case  Type    V(lbs) or     in-lb, rad.,        Load        Deflection       Moment
        Shear        Rotation
 No.    No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
        lbs           radians
----  ----  --------------  --------------  -------------  -------------
-------------  -------------  -------------
   1     1   V = 10000.0000  M =      0.000        370000.     0.06325799
288511.     10000.0000     0.00000000
   2     1   V =     20000.  M =      0.000        370000.     0.30028106
797777.         20000.     0.00000000
```



```
   3     1   V =     30000.  M =      0.000        370000.     0.75616448
1460290.         30000.     0.00000000
   4     1   V =     40000.  M =      0.000        370000.     1.47524547
2262307.         40000.     0.00000000
```

The analysis ended normally.

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 16 THRU 20
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.60000000000000E+0001 = Pipe pile diameter (in)
 5.00000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
6 = number of soil layers
3       -7.00000000000000E+0000  5.00000000000000E-0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        5.00000000000000E-0001  9.50000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        9.50000000000000E+0000  1.75000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.00000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.00000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
7        1.75000000000000E+0001  2.05000000000000E+0001 = soil type index for liq.
sand, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001 = top gamma (pcf) for liquefied sand
 6.26000000000000E+0001 = bot gamma (pcf) for liquefied sand
3        2.05000000000000E+0001  5.35000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
```

```
3        5.35000000000000E+0001  1.00000000000000E+0002 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
3.70000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

L. Tran
PARIKH

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT\Analyses\
Name of input data file: San Leandro Creek BOH (B16 - B20).lp6d
Name of output file: San Leandro Creek BOH (B16 - B20).lp6o
Name of plot output file: San Leandro Creek BOH (B16 - B20).lp6p
Name of runtime file: San Leandro Creek BOH (B16 - B20).lp6r

Date and Time of Analysis

Date: November 17, 2011 Time: 16:15:31

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 16 THRU 20

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -7.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points. p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	16.0000000
2	50.000000	16.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 16.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 6 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -7.000 ft
Distance from top of pile to bottom of layer = 0.500 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 0.500 ft
Distance from top of pile to bottom of layer = 9.500 ft

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 9.500 ft
Distance from top of pile to bottom of layer = 17.500 ft

Layer 4 is liquefiable sand, by Rollins et al., 2004

Distance from top of pile to top of layer = 17.500 ft
Distance from top of pile to bottom of layer = 20.500 ft

Layer 5 is stiff clay without free water

Distance from top of pile to top of layer = 20.500 ft
Distance from top of pile to bottom of layer = 53.500 ft

Layer 6 is stiff clay without free water

Distance from top of pile to top of layer = 53.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 50.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 12 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-7.00	125.00000
2	0.50	125.00000
3	0.50	62.60000
4	9.50	62.60000
5	9.50	62.60000
6	17.50	62.60000
7	17.50	62.60000
8	20.50	62.60000
9	20.50	62.60000
10	53.50	62.60000
11	53.50	62.60000
12	100.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf pci	Cohesion psf psi
1	Stiff Clay w/o Free Water	-7.000	125.000	1250.000
		0.500	125.000	1250.000
2	Stiff Clay w/o Free Water	0.500	62.600	1250.000
		9.500	62.600	1250.000
3	Stiff Clay w/o Free Water	9.500	62.600	1000.000
		17.500	62.600	1000.000
4	Liquefied Sand	17.500	62.600	--
		20.500	62.600	--
5	Stiff Clay w/o Free Water	20.500	62.600	1500.000
		53.500	62.600	1500.000

6	Stiff Clay w/o Free Water		0.00	53.500	62.600	2500.000	--
--	--	--	--	--	--	--	--
			0.00	100.000	62.600	2500.000	--
--	--	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 10000.000 lbs	M = 0.000 in-lbs	370000.000
2	1	V = 20000.000 lbs	M = 0.000 in-lbs	370000.000
3	1	V = 30000.000 lbs	M = 0.000 in-lbs	370000.000
4	1	V = 40000.000 lbs	M = 0.000 in-lbs	370000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section = 600.00000000 in
Outer Diameter of Pipe = 16.00000000 in

Pipe Wall Thickness = 0.50000000 in
Yield Stress of Pipe = 45.00000000 ksi
Elastic Modulus = 29000. ksi
Cross-sectional Area = 24.34734307 sq. in.
Moment of Inertia = 731.94200090 in^4
Elastic Bending Stiffness = 21226318. lb-in^2
Plastic Modulus, Z = 120.16666667 in^3
Plastic Moment Capacity = Fy Z = 5407.50000000 in-kip
Nom. Axial Structural Capacity = Fy As = 1095.630 kips
Nominal Axial Tensile Capacity = -1095.630 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	370.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 370.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000003303	70.1099804	21226293.	166.6523345	15.9553581	
0.000006606	140.2199607	21226293.	87.3261673	16.7139861	
0.000009909	210.3299411	21226293.	60.8841115	17.4726140	
0.0000132	280.4399215	21226293.	47.6630836	18.2312422	
0.0000165	350.5499018	21226293.	39.7304669	18.9898699	
0.0000198	420.6598822	21226293.	34.4420558	19.7484980	
0.0000231	490.7698625	21226293.	30.6646192	20.5071261	
0.0000264	560.8798429	21226293.	27.8315418	21.2657540	
0.0000297	630.9898233	21226293.	25.6280372	22.0243821	
0.0000330	701.0998036	21226293.	23.8652335	22.7830101	
0.0000363	771.2097840	21226293.	22.4229395	23.5416380	
0.0000396	841.3197644	21226293.	21.2210279	24.3002661	
0.0000429	911.4297447	21226293.	20.2040257	25.0588941	
0.0000462	981.5397251	21226293.	19.3323096	25.8175220	
0.0000495	1051.6497054	21226293.	18.5768223	26.5761501	
0.0000528	1121.7596858	21226293.	17.9157709	27.3347781	
0.0000562	1191.8696662	21226293.	17.3324903	28.0934060	
0.0000595	1261.9796465	21226293.	16.8140186	28.8520341	
0.0000628	1332.0896269	21226293.	16.3501229	29.6106621	
0.0000661	1402.1996073	21226293.	15.9326167	30.3692901	
0.0000694	1472.3095876	21226293.	15.5548731	31.1279181	
0.0000727	1542.4195680	21226293.	15.2114698	31.8865461	
0.0000760	1612.5295484	21226293.	14.8979276	32.6451741	
0.0000793	1682.6395287	21226293.	14.6105139	33.4038021	
0.0000826	1752.7495091	21226293.	14.3460934	34.1624301	
0.0000859	1822.8594894	21226293.	14.1020129	34.9210581	
0.0000892	1892.9694698	21226293.	13.8760124	35.6796861	
0.0000925	1963.0794502	21226293.	13.6661548	36.4383141	
0.0000958	2033.1894305	21226293.	13.4707702	37.1969421	
0.0000991	2103.2994109	21226293.	13.2884112	37.9555701	
0.0001024	2173.4093913	21226293.	13.1178172	38.7141981	

0.0001057	2243.5193716	21226293.	12.9578855	39.4728261	
0.0001090	2313.6293520	21226293.	12.8076465	40.2314541	
0.0001123	2383.7393323	21226293.	12.6662451	40.9900821	
0.0001156	2453.8493127	21226293.	12.5329238	41.7487101	
0.0001189	2523.9592931	21226293.	12.4070093	42.5073381	
0.0001222	2594.0692734	21226293.	12.2879009	43.2659661	
0.0001255	2664.1792538	21226293.	12.1750614	44.0245941	
0.0001288	2734.2892342	21226293.	12.0680086	44.7832221	Y
0.0001354	2866.9718816	21170635.	11.8796433	45.0000000	Y
0.0001420	2978.5544808	20971592.	11.7365397	45.0000000	Y
0.0001486	3076.0201010	20695264.	11.6246759	45.0000000	Y
0.0001552	3163.1850276	20376100.	11.5358909	45.0000000	Y
0.0001618	3242.2891707	20033184.	11.4649973	45.0000000	Y
0.0001685	3314.7848579	19677933.	11.4084067	45.0000000	Y
0.0001751	3381.6515354	19317339.	11.3635416	45.0000000	Y
0.0001817	3443.5713722	18955739.	11.3284988	45.0000000	Y
0.0001883	3501.0544404	18595948.	11.3018159	45.0000000	Y
0.0001949	3554.8734049	18241748.	11.2818213	45.0000000	Y
0.0002015	3605.2703438	17893789.	11.2676920	45.0000000	Y
0.0002081	3652.5943181	17553156.	11.2585606	45.0000000	Y
0.0002147	3697.1623313	17220648.	11.2536696	45.0000000	Y
0.0002213	3739.4075994	16897495.	11.2521708	45.0000000	Y
0.0002279	3779.1051660	16581897.	11.2541663	45.0000000	Y
0.0002345	3816.8312719	16275672.	11.2586937	45.0000000	Y
0.0002411	3852.7103826	15978567.	11.2654480	45.0000000	Y
0.0002477	3886.8609526	15690329.	11.2741579	45.0000000	Y
0.0002543	3919.3959158	15410713.	11.2845805	45.0000000	Y
0.0002609	3950.4231141	15139476.	11.2964980	45.0000000	Y
0.0002675	3980.0456725	14876383.	11.3097133	45.0000000	Y
0.0002741	4008.3623300	14621206.	11.3240481	45.0000000	Y
0.0002808	4035.4677320	14373723.	11.3393396	45.0000000	Y
0.0002874	4061.4526904	14133719.	11.3554387	45.0000000	Y
0.0002940	4086.4044152	13900988.	11.3722083	45.0000000	Y
0.0003006	4110.4067215	13675327.	11.3895213	45.0000000	Y
0.0003072	4133.5402156	13456544.	11.4072594	45.0000000	Y
0.0003138	4155.8824619	13244451.	11.4253116	45.0000000	Y
0.0003204	4177.1669597	13037803.	11.4440471	45.0000000	Y
0.0003270	4197.7709713	12837423.	11.4629507	45.0000000	Y
0.0003336	4217.7661739	12643154.	11.4819272	45.0000000	Y
0.0003402	4237.0431956	12454319.	11.5011321	45.0000000	Y
0.0003468	4255.5468719	12270447.	11.5206545	45.0000000	Y
0.0003534	4273.6096598	12092202.	11.5400445	45.0000000	Y
0.0003600	4290.4097650	11916990.	11.5582468	45.0000000	Y
0.0003666	4306.5112932	11746187.	11.5763296	45.0000000	Y
0.0003732	4322.1427406	11580171.	11.5937314	45.0000000	Y
0.0003798	4335.9628653	11415161.	11.6092082	45.0000000	Y
0.0003864	4349.6713089	11255503.	11.6243286	45.0000000	Y
0.0003931	4362.3530681	11098599.	11.6390555	45.0000000	Y
0.0004195	4404.4318093	10499787.	11.6831503	45.0000000	Y
0.0004459	4437.6151732	9951996.	11.7157650	45.0000000	Y
0.0004723	4464.2614757	9451656.	11.7419536	45.0000000	Y
0.0004987	4486.3513288	8995196.	11.7628724	45.0000000	Y
0.0005252	4504.8959103	8577919.	11.7801068	45.0000000	Y
0.0005516	4520.6772185	8195611.	11.7948415	45.0000000	Y
0.0005780	4534.1895089	7844331.	11.8074250	45.0000000	Y
0.0006044	4545.6603898	7520387.	11.8172202	45.0000000	Y
0.0006309	4555.9460064	7221701.	11.8261639	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	370.000	4555.9

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 10000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 370000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.0673	8.183E-09	10000.0000	-0.001131	0.000	2.123E+10	-184.5370	8226.8105	0.000
6.000	0.0605	59189.	8892.5711	-0.001122	0.000	2.123E+10	-184.6059	18305.	0.000
12.000	0.0538	111695.	7783.2790	-0.001098	0.000	2.123E+10	-185.1581	20640.	0.000
18.000	0.0473	157465.	6672.8364	-0.001060	0.000	2.123E+10	-184.9895	23452.	0.000
24.000	0.0411	196476.	5565.6598	-0.001010	0.000	2.123E+10	-184.0694	26871.	0.000
30.000	0.0352	228738.	4466.3607	-0.000950	0.000	2.123E+10	-182.3636	31080.	0.000
36.000	0.0297	254291.	3379.7707	-0.000882	0.000	2.123E+10	-179.8330	36331.	0.000
42.000	0.0246	273211.	2310.9782	-0.000807	0.000	2.123E+10	-176.4312	42991.	0.000
48.000	0.0200	285607.	1265.3800	-0.000728	0.000	2.123E+10	-172.1015	51602.	0.000
54.000	0.0159	291629.	248.7609	-0.000647	0.000	2.123E+10	-166.7715	62999.	0.000
60.000	0.0122	291464.	-732.5811	-0.000564	0.000	2.123E+10	-160.3425	78536.	0.000
66.000	0.009111	285344.	-1671.6228	-0.000483	0.000	2.123E+10	-152.6714	100541.	0.000
72.000	0.006456	273549.	-2560.2301	-0.000404	0.000	2.123E+10	-143.5310	133394.	0.000

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    78.000   0.004265    256414. -3386.1268  -0.000329       0.000  2.123E+10
-131.7679    185375.      0.000
    84.000   0.002509    234375. -4127.6423  -0.000260       0.000  2.123E+10
-115.4039    276006.      0.000
    90.000   0.001150    208035. -4758.7718  -0.000197       0.000  2.123E+10
-94.9726     495488.      0.000
    96.000   0.000144    178145. -5199.0460  -0.000142       0.000  2.123E+10
-51.7855    2154663.      0.000
   102.000  -0.000560    146279. -5116.6123 -9.661E-05       0.000  2.123E+10
79.2634     850005.      0.000
   108.000  -0.001015    117175. -4602.7796 -5.938E-05       0.000  2.123E+10
92.0141     543861.      0.000
   114.000  -0.001272     91309. -4063.8647 -2.991E-05       0.000  2.123E+10
87.6242     413319.      0.000
   120.000  -0.001374     68541. -3562.7660 -7.317E-06       0.000  2.123E+10
79.4087     346754.      0.000
   126.000  -0.001360     48589. -3086.9245  9.237E-06       0.000  2.123E+10
79.2051     349482.      0.000
   132.000  -0.001263     31457. -2616.0253  2.055E-05       0.000  2.123E+10
77.7613     369357.      0.000
   138.000  -0.001113     17105. -2156.7071  2.741E-05       0.000  2.123E+10
75.3448     406094.      0.000
   144.000  -0.000934   5454.7911 -1714.3235  3.060E-05       0.000  2.123E+10
72.1164     463164.      0.000
   150.000  -0.000746  -3602.7031 -1293.4528  3.086E-05       0.000  2.123E+10
68.1738     548327.      0.000
   156.000  -0.000564    -10204.  -898.2257  2.891E-05       0.000  2.123E+10
63.5686     676436.      0.000
   162.000  -0.000399    -14510.  -532.5991  2.542E-05       0.000  2.123E+10
58.3070     876730.      0.000
   168.000  -0.000259    -16708.  -134.6144  2.101E-05       0.000  2.123E+10
74.3546    1723730.      0.000
   174.000  -0.000147    -16218.   215.0888  1.635E-05       0.000  2.123E+10
42.2132    1723730.      0.000
   180.000 -6.256E-05    -14199.   395.6505  1.206E-05       0.000  2.123E+10
17.9741    1723730.      0.000
   186.000 -2.275E-06    -11524.   451.5333  8.420E-06       0.000  2.123E+10
0.6535     1723730.      0.000
   192.000  3.847E-05  -8818.2633   420.3377  5.544E-06       0.000  2.123E+10
-11.0520    1723730.      0.000
   198.000  6.426E-05  -6504.7152   331.7990  3.379E-06       0.000  2.123E+10
-18.4609    1723730.      0.000
   204.000  7.902E-05  -4851.6767   208.3154  1.774E-06       0.000  2.123E+10
-22.7004    1723730.      0.000
   210.000  8.554E-05  -4012.8065   140.1480  5.209E-07       0.000  2.123E+10
-0.0221     1550.9260      0.000
   216.000  8.527E-05  -3172.2141   140.0073 -4.946E-07       0.000  2.123E+10
-0.0248     1742.7714      0.000
   222.000  7.961E-05  -2330.5228   139.8555 -1.272E-06       0.000  2.123E+10
-0.0258     1947.0011      0.000
   228.000  7.000E-05  -1488.2989   139.7022 -1.812E-06       0.000  2.123E+10
-0.0253     2165.8531      0.000
   234.000  5.787E-05   -646.0508   139.5569 -2.114E-06       0.000  2.123E+10
-0.0232     2401.3711      0.000
   240.000  4.464E-05    195.7690   139.4282 -2.177E-06       0.000  2.123E+10
-0.0198     2655.6841      0.000
   246.000  3.174E-05   1036.7547    98.3390 -2.003E-06       0.000  2.123E+10
-13.6767    2585595.      0.000
   252.000  2.060E-05   1384.7303    30.6802 -1.661E-06       0.000  2.123E+10
-8.8763     2585595.      0.000
   258.000  1.181E-05   1412.2917   -11.2123 -1.266E-06       0.000  2.123E+10
-5.0879     2585595.      0.000
   264.000  5.411E-06   1255.8024   -33.4712 -8.885E-07       0.000  2.123E+10
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-2.3318     2585595.      0.000
   270.000  1.145E-06  1014.5820   -41.9467 -5.676E-07       0.000  2.123E+10
-0.4934     2585595.      0.000
   276.000 -1.400E-06   754.9618   -41.6168 -3.175E-07       0.000  2.123E+10
0.6034      2585595.      0.000
   282.000 -2.665E-06   516.5897   -36.3614 -1.378E-07       0.000  2.123E+10
1.1484      2585595.      0.000
   288.000 -3.054E-06   319.2366   -28.9685 -1.965E-08       0.000  2.123E+10
1.3159      2585595.      0.000
   294.000 -2.901E-06   169.0554   -21.2706  4.936E-08       0.000  2.123E+10
1.2500      2585595.      0.000
   300.000 -2.461E-06    63.7698   -14.3386  8.227E-08       0.000  2.123E+10
1.0606      2585595.      0.000
   306.000 -1.914E-06    -3.3726    -8.6827  9.080E-08       0.000  2.123E+10
0.8246      2585595.      0.000
   312.000 -1.372E-06   -40.8259    -4.4355  8.455E-08       0.000  2.123E+10
0.5911      2585595.      0.000
   318.000 -8.990E-07   -56.9741    -1.5001  7.073E-08       0.000  2.123E+10
0.3874      2585595.      0.000
   324.000 -5.229E-07   -59.1407     0.3381  5.432E-08       0.000  2.123E+10
0.2253      2585595.      0.000
   330.000 -2.471E-07   -53.1585     1.3335  3.845E-08       0.000  2.123E+10
0.1065      2585595.      0.000
   336.000 -6.147E-08   -43.3097     1.7324  2.482E-08       0.000  2.123E+10
0.0265      2585595.      0.000
   342.000  5.069E-08   -32.4800     1.7463  1.410E-08       0.000  2.123E+10
-0.0218     2585595.      0.000
   348.000  1.078E-07   -22.4163     1.5415  6.345E-09       0.000  2.123E+10
-0.0464     2585595.      0.000
   354.000  1.268E-07   -14.0104     1.2382  1.197E-09       0.000  2.123E+10
-0.0547     2585595.      0.000
   360.000  1.221E-07    -7.5634     0.9163 -1.852E-09       0.000  2.123E+10
-0.0526     2585595.      0.000
   366.000  1.046E-07    -3.0064     0.6232 -3.346E-09       0.000  2.123E+10
-0.0451     2585595.      0.000
   372.000  8.198E-08    -0.0704     0.3820 -3.781E-09       0.000  2.123E+10
-0.0353     2585595.      0.000
   378.000  5.923E-08     1.5940     0.1994 -3.566E-09       0.000  2.123E+10
-0.0255     2585595.      0.000
   384.000  3.919E-08     2.3384     0.0722 -3.010E-09       0.000  2.123E+10
-0.0169     2585595.      0.000
   390.000  2.311E-08     2.4734  -0.008379 -2.330E-09       0.000  2.123E+10
-0.009961   2585595.      0.000
   396.000  1.123E-08     2.2482    -0.0528 -1.663E-09       0.000  2.123E+10
-0.004840   2585595.      0.000
   402.000  3.164E-09     1.8474    -0.0714 -1.084E-09       0.000  2.123E+10
-0.001363   2585595.      0.000
   408.000 -1.772E-09     1.3963    -0.0732 -6.253E-10       0.000  2.123E+10
0.000764    2585595.      0.000
   414.000 -4.340E-09     0.9718    -0.0653 -2.906E-10       0.000  2.123E+10
0.001870    2585595.      0.000
   420.000 -5.259E-09     0.6141    -0.0529 -6.643E-11       0.000  2.123E+10
0.002266    2585595.      0.000
   426.000 -5.137E-09     0.3375    -0.0394  6.806E-11       0.000  2.123E+10
0.002214    2585595.      0.000
   432.000 -4.442E-09     0.1405    -0.0271  1.356E-10       0.000  2.123E+10
0.001914    2585595.      0.000
   438.000 -3.509E-09     0.0122    -0.0168  1.572E-10       0.000  2.123E+10
0.001512    2585595.      0.000
   444.000 -2.556E-09    -0.0616  -0.008939  1.502E-10       0.000  2.123E+10
0.001101    2585595.      0.000
   450.000 -1.707E-09    -0.0957  -0.003428  1.280E-10       0.000  2.123E+10
0.000736    2585595.      0.000
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   456.000 -1.020E-09    -0.1033  9.734E-05  9.985E-11       0.000  2.123E+10
0.000440    2585595.      0.000
   462.000 -5.085E-10    -0.0950   0.002073  7.183E-11       0.000  2.123E+10
0.000219    2585595.      0.000
   468.000 -1.581E-10    -0.0787   0.002935  4.727E-11       0.000  2.123E+10
6.814E-05   2585595.      0.000
   474.000  5.875E-11    -0.0600   0.003064  2.767E-11       0.000  2.123E+10
-2.532E-05  2585595.      0.000
   480.000  1.739E-10    -0.0421   0.002763  1.324E-11       0.000  2.123E+10
-7.494E-05  2585595.      0.000
   486.000  2.177E-10    -0.0269   0.002257  3.493E-12       0.000  2.123E+10
-9.380E-05  2585595.      0.000
   492.000  2.158E-10    -0.0150   0.001696 -2.430E-12       0.000  2.123E+10
-9.300E-05  2585595.      0.000
   498.000  1.885E-10  -0.006514   0.001174 -5.475E-12       0.000  2.123E+10
-8.123E-05  2585595.      0.000
   504.000  1.501E-10  -0.000919   0.000736 -6.525E-12       0.000  2.123E+10
-6.469E-05  2585595.      0.000
   510.000  1.102E-10   0.002347   0.000399 -6.323E-12       0.000  2.123E+10
-4.749E-05  2585595.      0.000
   516.000  7.424E-11   0.003902   0.000161 -5.440E-12       0.000  2.123E+10
-3.199E-05  2585595.      0.000
   522.000  4.491E-11   0.004302  6.916E-06 -4.281E-12       0.000  2.123E+10
-1.935E-05  2585595.      0.000
   528.000  2.287E-11   0.004004 -8.072E-05 -3.107E-12       0.000  2.123E+10
-9.857E-06  2585595.      0.000
   534.000  7.628E-12   0.003347  -0.000120 -2.068E-12       0.000  2.123E+10
-3.287E-06  2585595.      0.000
   540.000 -1.942E-12   0.002571  -0.000128 -1.232E-12       0.000  2.123E+10
8.367E-07   2585595.      0.000
   546.000 -7.151E-12   0.001823  -0.000116      0.000       0.000  2.123E+10
3.081E-06   2585595.      0.000
   552.000 -9.268E-12   0.001185 -9.452E-05      0.000       0.000  2.123E+10
3.994E-06   2585595.      0.000
   558.000 -9.376E-12   0.000690 -7.042E-05      0.000       0.000  2.123E+10
4.040E-06   2585595.      0.000
   564.000 -8.314E-12   0.000339 -4.755E-05      0.000       0.000  2.123E+10
3.583E-06   2585595.      0.000
   570.000 -6.677E-12   0.000118 -2.817E-05      0.000       0.000  2.123E+10
2.877E-06   2585595.      0.000
   576.000 -4.840E-12  4.001E-08 -1.328E-05      0.000       0.000  2.123E+10
2.086E-06   2585595.      0.000
   582.000 -3.003E-12 -4.277E-05 -3.139E-06      0.000       0.000  2.123E+10
1.294E-06   2585595.      0.000
   588.000 -1.238E-12 -3.896E-05  2.344E-06      0.000       0.000  2.123E+10
5.337E-07   2585595.      0.000
   594.000      0.000 -1.592E-05  3.351E-06      0.000       0.000  2.123E+10
-1.983E-07  2585595.      0.000
   600.000  2.132E-12      0.000      0.000      0.000       0.000  2.123E+10
-9.186E-07   1292798.      0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 1:
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Pile-head deflection             =      0.0672935 inches
Computed slope at pile head      =     -0.0011308 radians
Maximum bending moment           =        291629. inch-lbs
Maximum shear force              =  10000.0000000 lbs
Depth of maximum bending moment  =     54.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             22
Number of zero deflection points =              8


--------------------------------------------------------------------------------
                    Computed Values of Pile Loading and Deflection
                      for Lateral Loading for Load Case Number 2
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                    =       20000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.3286 -3.928E-07     20000.  -0.004167       0.000  2.123E+10
-274.3011  2504.3990      0.000
     6.000     0.3036    124314.     18348.  -0.004150       0.000  2.123E+10
-276.2704  5460.2805      0.000
    12.000     0.2788    238605.     16682.  -0.004099       0.000  2.123E+10
-279.3121  6011.3642      0.000
    18.000     0.2544    342691.     14999.  -0.004016       0.000  2.123E+10
-281.6534  6642.9115      0.000
    24.000     0.2306    436422.     13304.  -0.003906       0.000  2.123E+10
-283.2686  7370.8262      0.000
    30.000     0.2075    519682.     11602.  -0.003771       0.000  2.123E+10
-284.1302  8215.0925      0.000
    36.000     0.1853    592386.  9896.6616  -0.003614       0.000  2.123E+10
-284.2090  9201.1036      0.000
    42.000     0.1641    654488.  8193.6145  -0.003438       0.000  2.123E+10
-283.4733    10362.      0.000
    48.000     0.1441    705974.  6497.5307  -0.003246       0.000  2.123E+10
-281.8880    11739.      0.000
    54.000     0.1252    746869.  4813.6270  -0.003040       0.000  2.123E+10
-279.4133    13390.      0.000
    60.000     0.1076    777236.  3147.3776  -0.002825       0.000  2.123E+10
-276.0032    15391.      0.000
    66.000     0.0913    797179.  1504.5594  -0.002602       0.000  2.123E+10
-271.6029    17848.      0.000
    72.000     0.0764    806845.  -108.6820  -0.002376       0.000  2.123E+10
-266.1443    20910.      0.000
    78.000     0.0628    806423. -1681.3283  -0.002148       0.000  2.123E+10
-258.0712    24657.      0.000
    84.000     0.0506    796204. -3189.0499  -0.001921       0.000  2.123E+10
-244.5027    28994.      0.000
    90.000     0.0397    776684. -4613.1109  -0.001699       0.000  2.123E+10
-230.1843    34749.      0.000
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    96.000      0.0302    748389. -5948.4544  -0.001483      0.000  2.123E+10
-214.9302     42686.      0.000
   102.000      0.0219    711888. -7188.5224  -0.001277      0.000  2.123E+10
-198.4257     54248.      0.000
   108.000      0.0149    667796. -8324.0524  -0.001082      0.000  2.123E+10
-180.0843     72570.      0.000
   114.000    0.008964    616803. -9292.6116  -0.000900      0.000  2.123E+10
-142.7688     95558.      0.000
   120.000    0.004086    560282.    -10034.  -0.000734      0.000  2.123E+10
-104.2734    153132.      0.000
   126.000    0.000157    499656.    -10482.  -0.000584      0.000  2.123E+10
-45.1686   1723730.      0.000
   132.000   -0.002924    437091.    -10330.  -0.000452      0.000  2.123E+10
95.9006    196802.      0.000
   138.000   -0.005263    377703. -9708.9074  -0.000337      0.000  2.123E+10
111.0864    126632.      0.000
   144.000   -0.006963    322078. -9018.2438  -0.000238      0.000  2.123E+10
119.1348    102665.      0.000
   150.000   -0.008115    270540. -8289.4774  -0.000154      0.000  2.123E+10
123.7874     91521.      0.000
   156.000   -0.008809    223288. -7539.0547 -8.411E-05      0.000  2.123E+10
126.3536     86058.      0.000
   162.000   -0.009125    180445. -6777.5844 -2.705E-05      0.000  2.123E+10
127.4699     83819.      0.000
   168.000   -0.009134    142077. -6012.6665  1.854E-05      0.000  2.123E+10
127.5028     83755.      0.000
   174.000   -0.008902    108210. -5250.0971  5.391E-05      0.000  2.123E+10
126.6870     85385.      0.000
   180.000   -0.008487     78836. -4494.4849  8.035E-05      0.000  2.123E+10
125.1838     88500.      0.000
   186.000   -0.007938     53920. -3749.6061  9.911E-05      0.000  2.123E+10
123.1092     93051.      0.000
   192.000   -0.007298     33401. -3018.6345   0.000111      0.000  2.123E+10
120.5481     99111.      0.000
   198.000   -0.006601     17201. -2304.3073   0.000119      0.000  2.123E+10
117.5610    106862.      0.000
   204.000   -0.005875  5222.8451 -1609.0680   0.000122      0.000  2.123E+10
114.1855    116624.      0.000
   210.000   -0.005139 -2648.1945 -1261.1146   0.000122      0.000  2.123E+10
1.7990  2100.2125      0.000
   216.000   -0.004409    -10453. -1250.6966   0.000120      0.000  2.123E+10
1.6737  2277.6516      0.000
   222.000   -0.003696    -18191. -1241.1148   0.000116      0.000  2.123E+10
1.5203  2467.9123      0.000
   228.000   -0.003014    -25862. -1232.5270   0.000110      0.000  2.123E+10
1.3423  2672.0869      0.000
   234.000   -0.002376    -33469. -1225.0650   0.000102      0.000  2.123E+10
1.1450  2891.4302      0.000
   240.000   -0.001795    -41014. -1218.8237  9.110E-05      0.000  2.123E+10
0.9354  3127.4196      0.000
   246.000   -0.001283    -48500.  -864.7406  7.844E-05      0.000  2.123E+10
117.0923    547655.      0.000
   252.000   -0.000853    -51739.  -196.2219  6.428E-05      0.000  2.123E+10
105.7473    743565.      0.000
   258.000   -0.000512    -51140.   400.1733  4.974E-05      0.000  2.123E+10
93.0510   1091483.      0.000
   264.000   -0.000256    -47158.  1010.8730  3.584E-05      0.000  2.123E+10
110.5155   2585595.      0.000
   270.000  -8.138E-05    -39168.  1447.6306  2.364E-05      0.000  2.123E+10
35.0703   2585595.      0.000
   276.000   2.726E-05    -29892.  1517.5977  1.388E-05      0.000  2.123E+10
-11.7480   2585595.      0.000
   282.000   8.521E-05    -21019.  1372.1951  6.687E-06      0.000  2.123E+10
```



```
-36.7196   2585595.      0.000
   288.000   0.000108    -13455.  1123.0490  1.815E-06      0.000  2.123E+10
-46.3291   2585595.      0.000
   294.000   0.000107 -7550.3853   845.7468 -1.154E-06      0.000  2.123E+10
-46.1049   2585595.      0.000
   300.000  9.366E-05 -3300.8632   586.3446 -2.687E-06      0.000  2.123E+10
-40.3624   2585595.      0.000
   306.000  7.474E-05  -502.3178   368.6349 -3.225E-06      0.000  2.123E+10
-32.2075   2585595.      0.000
   312.000  5.496E-05  1137.0747   200.9566 -3.135E-06      0.000  2.123E+10
-23.6853   2585595.      0.000
   318.000  3.712E-05  1923.0817    81.9178 -2.703E-06      0.000  2.123E+10
-15.9943   2585595.      0.000
   324.000  2.253E-05  2132.0886     4.8089 -2.130E-06      0.000  2.123E+10
-9.7087   2585595.      0.000
   330.000  1.156E-05  1990.2441   -39.2615 -1.547E-06      0.000  2.123E+10
-4.9814   2585595.      0.000
   336.000  3.965E-06  1667.8196   -59.3319 -1.030E-06      0.000  2.123E+10
-1.7087   2585595.      0.000
   342.000 -8.006E-07  1282.8340   -63.4232 -6.130E-07      0.000  2.123E+10
0.3450   2585595.      0.000
   348.000 -3.391E-06   909.4633   -58.0047 -3.031E-07      0.000  2.123E+10
1.4611   2585595.      0.000
   354.000 -4.438E-06   588.1231   -47.8835 -9.148E-08      0.000  2.123E+10
1.9126   2585595.      0.000
   360.000 -4.488E-06   335.2676   -36.3430  3.902E-08      0.000  2.123E+10
1.9342   2585595.      0.000
   366.000 -3.970E-06   151.8337   -25.4079  1.079E-07      0.000  2.123E+10
1.7108   2585595.      0.000
   372.000 -3.194E-06    29.8935   -16.1463  1.336E-07      0.000  2.123E+10
1.3764   2585595.      0.000
   378.000 -2.367E-06   -42.5145    -8.9565  1.318E-07      0.000  2.123E+10
1.0202   2585595.      0.000
   384.000 -1.613E-06   -78.1694    -3.8109  1.147E-07      0.000  2.123E+10
0.6950   2585595.      0.000
   390.000 -9.908E-07   -88.7546    -0.4449  9.112E-08      0.000  2.123E+10
0.4270   2585595.      0.000
   396.000 -5.194E-07   -83.9128     1.5075  6.672E-08      0.000  2.123E+10
0.2238   2585595.      0.000
   402.000 -1.902E-07   -70.9608     2.4249  4.483E-08      0.000  2.123E+10
0.0820   2585595.      0.000
   408.000  1.854E-08   -55.0129     2.6469  2.702E-08      0.000  2.123E+10
-0.007990   2585595.      0.000
   414.000  1.340E-07   -39.3181     2.4497  1.369E-08      0.000  2.123E+10
-0.0578   2585595.      0.000
   420.000  1.828E-07   -25.6779     2.0400  4.504E-09      0.000  2.123E+10
-0.0788   2585595.      0.000
   426.000  1.881E-07   -14.8578     1.5605 -1.225E-09      0.000  2.123E+10
-0.0810   2585595.      0.000
   432.000  1.681E-07    -6.9461     1.1000 -4.307E-09      0.000  2.123E+10
-0.0725   2585595.      0.000
   438.000  1.364E-07    -1.6383     0.7063 -5.520E-09      0.000  2.123E+10
-0.0588   2585595.      0.000
   444.000  1.019E-07     1.5545     0.3983 -5.532E-09      0.000  2.123E+10
-0.0439   2585595.      0.000
   450.000  7.002E-08     3.1657     0.1760 -4.865E-09      0.000  2.123E+10
-0.0302   2585595.      0.000
   456.000  4.351E-08     3.6887     0.0293 -3.896E-09      0.000  2.123E+10
-0.0188   2585595.      0.000
   462.000  2.327E-08     3.5343    -0.0571 -2.875E-09      0.000  2.123E+10
-0.0100   2585595.      0.000
   468.000  9.016E-09     3.0167    -0.0988 -1.949E-09      0.000  2.123E+10
-0.003885   2585595.      0.000
```



```
   474.000 -1.192E-10     2.3574    -0.1103 -1.189E-09      0.000  2.123E+10
5.138E-05   2585595.      0.000
   480.000 -5.257E-09     1.6984    -0.1034 -6.162E-10      0.000  2.123E+10
0.002265   2585595.      0.000
   486.000 -7.514E-09     1.1199    -0.0868 -2.179E-10      0.000  2.123E+10
0.003238   2585595.      0.000
   492.000 -7.871E-09     0.6573    -0.0670  3.329E-11      0.000  2.123E+10
0.003392   2585595.      0.000
   498.000 -7.114E-09     0.3163    -0.0476  1.709E-10      0.000  2.123E+10
0.003066   2585595.      0.000
   504.000 -5.821E-09     0.0855    -0.0309  2.277E-10      0.000  2.123E+10
0.002508   2585595.      0.000
   510.000 -4.382E-09    -0.0550    -0.0177  2.320E-10      0.000  2.123E+10
0.001888   2585595.      0.000
   516.000 -3.037E-09    -0.1275  -0.008077  2.062E-10      0.000  2.123E+10
0.001309   2585595.      0.000
   522.000 -1.907E-09    -0.1528  -0.001686  1.666E-10      0.000  2.123E+10
0.000822   2585595.      0.000
   528.000 -1.037E-09    -0.1485   0.002121  1.240E-10      0.000  2.123E+10
0.000447   2585595.      0.000
   534.000 -4.192E-10    -0.1279   0.004004  8.495E-11      0.000  2.123E+10
0.000181   2585595.      0.000
   540.000 -1.795E-11    -0.1008   0.004569  5.262E-11      0.000  2.123E+10
7.735E-06   2585595.      0.000
   546.000  2.123E-10    -0.0733   0.004318  2.801E-11      0.000  2.123E+10
-9.149E-05   2585595.      0.000
   552.000  3.182E-10    -0.0491   0.003632  1.071E-11      0.000  2.123E+10
-0.000137   2585595.      0.000
   558.000  3.408E-10    -0.0298   0.002780      0.000      0.000  2.123E+10
-0.000147   2585595.      0.000
   564.000  3.129E-10    -0.0157   0.001935 -6.878E-12      0.000  2.123E+10
-0.000135   2585595.      0.000
   570.000  2.583E-10  -0.006545   0.001196 -1.003E-11      0.000  2.123E+10
-0.000111   2585595.      0.000
   576.000  1.926E-10  -0.001346   0.000613 -1.114E-11      0.000  2.123E+10
-8.299E-05   2585595.      0.000
   582.000  1.246E-10   0.000866   0.000203 -1.121E-11      0.000  2.123E+10
-5.369E-05   2585595.      0.000
   588.000  5.804E-11   0.001144 -3.272E-05 -1.093E-11      0.000  2.123E+10
-2.501E-05   2585595.      0.000
   594.000 -6.549E-12   0.000521 -9.930E-05 -1.069E-11      0.000  2.123E+10
2.822E-06   2585595.      0.000
   600.000 -7.026E-11      0.000      0.000 -1.062E-11      0.000  2.123E+10
3.028E-05   1292798.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

```
Pile-head deflection             =      0.3285832 inches
Computed slope at pile head      =     -0.0041675 radians
Maximum bending moment           =        806845. inch-lbs
Maximum shear force              =         20000. lbs
Depth of maximum bending moment  =     72.0000000 inches below pile head
```



```
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             28
Number of zero deflection points =              7
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (BC Type 1)

```
Horizontal shear force at pile head                    =       30000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      370000.000 lbs

   Depth    Deflect.    Bending     Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y       Moment     Force          S       Stress   Stiffness      p
     Es*h    Lat. Load
   inches    inches     in-lbs      lbs      radians     psi*      lb-in^2    lb/in
    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.8532  1.571E-06     30000.  -0.009108      0.000  2.123E+10
-348.1978  1224.3118      0.000
     6.000     0.7986    193952.     27900.  -0.009080      0.000  2.123E+10
-351.8355  2643.5165      0.000
    12.000     0.7442    375115.     25773.  -0.009000      0.000  2.123E+10
-357.0240  2878.2771      0.000
    18.000     0.6906    543191.     23618.  -0.008870      0.000  2.123E+10
-361.5219  3141.1004      0.000
    24.000     0.6378    697911.     21437.  -0.008695      0.000  2.123E+10
-365.3064  3436.5366      0.000
    30.000     0.5862    839041.     19236.  -0.008477      0.000  2.123E+10
-368.3539  3770.0719      0.000
    36.000     0.5361    966385.     17019.  -0.008222      0.000  2.123E+10
-370.6397  4148.3694      0.000
    42.000     0.4876   1079779.     14791.  -0.007933      0.000  2.123E+10
-372.1383  4579.5882      0.000
    48.000     0.4409   1179099.     12556.  -0.007614      0.000  2.123E+10
-372.8221  5073.8082      0.000
    54.000     0.3962   1264257.     10320.  -0.007268      0.000  2.123E+10
-372.6619  5643.6069      0.000
    60.000     0.3537   1335206.  8086.7078  -0.006901      0.000  2.123E+10
-371.6255  6304.8524      0.000
    66.000     0.3134   1391938.  5862.8000  -0.006516      0.000  2.123E+10
-369.6771  7077.8169      0.000
    72.000     0.2755   1434489.  3653.4400  -0.006116      0.000  2.123E+10
-366.7762  7988.7722      0.000
    78.000     0.2400   1462935.  1470.6458  -0.005707      0.000  2.123E+10
-360.8218  9020.9920      0.000
    84.000     0.2070   1477474.  -654.9858  -0.005291      0.000  2.123E+10
-347.7220     10079.      0.000
    90.000     0.1765   1478568. -2700.5725  -0.004873      0.000  2.123E+10
-334.1402     11359.      0.000
    96.000     0.1485   1466705. -4663.0686  -0.004457      0.000  2.123E+10
-320.0251     12930.      0.000
   102.000     0.1230   1442400. -6539.0542  -0.004046      0.000  2.123E+10
-305.3034     14892.      0.000
   108.000     0.1000   1406200. -8324.5701  -0.003643      0.000  2.123E+10
-289.8686     17399.      0.000
```

```
   114.000     0.0793   1358682. -9932.7881  -0.003253      0.000  2.123E+10
-246.2041     18630.      0.000
   120.000     0.0609   1301447.    -11286.  -0.002877      0.000  2.123E+10
-204.8998     20178.      0.000
   126.000     0.0448   1236020.    -12470.  -0.002518      0.000  2.123E+10
-189.7101     25423.      0.000
   132.000     0.0307   1162988.    -13557.  -0.002179      0.000  2.123E+10
-172.6512     33728.      0.000
   138.000     0.0186   1083010.    -14532.  -0.001861      0.000  2.123E+10
-152.3602     49079.      0.000
   144.000   0.008376    996868.    -15363.  -0.001567      0.000  2.123E+10
-124.7686     89372.      0.000
   150.000  -0.000183    905608.    -15580.  -0.001299      0.000  2.123E+10
52.5824   1723730.      0.000
   156.000  -0.007206    815674.    -15062.  -0.001055      0.000  2.123E+10
120.1609    100044.      0.000
   162.000    -0.0128    729553.    -14285.  -0.000837      0.000  2.123E+10
138.8454     64848.      0.000
   168.000    -0.0172    647973.    -13420.  -0.000642      0.000  2.123E+10
149.4612     51989.      0.000
   174.000    -0.0206    571366.    -12503.  -0.000470      0.000  2.123E+10
156.1549     45586.      0.000
   180.000    -0.0229    500023.    -11553.  -0.000318      0.000  2.123E+10
160.4123     42052.      0.000
   186.000    -0.0244    434141.    -10583.  -0.000186      0.000  2.123E+10
162.9562     40113.      0.000
   192.000    -0.0251    373853. -9601.7109 -7.222E-05      0.000  2.123E+10
164.1963     39211.      0.000
   198.000    -0.0252    319241. -8615.9635  2.573E-05      0.000  2.123E+10
164.3861     39076.      0.000
   204.000    -0.0248    270347. -7631.7360   0.000109      0.000  2.123E+10
163.6897     39577.      0.000
   210.000    -0.0239    227176. -7112.5041   0.000179      0.000  2.123E+10
9.3876  2353.5278      0.000
   216.000    -0.0227    184200. -7055.4996   0.000238      0.000  2.123E+10
9.6139  2545.2022      0.000
   222.000    -0.0211    141455. -6997.6894   0.000284      0.000  2.123E+10
9.6562  2748.1636      0.000
   228.000    -0.0193     98969. -6940.1798   0.000318      0.000  2.123E+10
9.5136  2963.5997      0.000
   234.000    -0.0173     56763. -6884.0656   0.000340      0.000  2.123E+10
9.1911  3192.8516      0.000
   240.000    -0.0152     14853. -6830.3908   0.000350      0.000  2.123E+10
8.7005  3437.4741      0.000
   246.000    -0.0131    -26754. -6176.7048   0.000348      0.000  2.123E+10
209.1948     95990.      0.000
   252.000    -0.0110    -60813. -4947.9344   0.000336      0.000  2.123E+10
200.3954    109199.      0.000
   258.000  -0.009049    -87619. -3774.3446   0.000315      0.000  2.123E+10
190.8012    126515.      0.000
   264.000  -0.007235   -107502. -2660.6626   0.000287      0.000  2.123E+10
180.4261    149621.      0.000
   270.000  -0.005604   -120821. -1611.5921   0.000255      0.000  2.123E+10
169.2641    181218.      0.000
   276.000  -0.004178   -127972.  -631.9526   0.000220      0.000  2.123E+10
157.2824    225871.      0.000
   282.000  -0.002969   -129380.   273.1145   0.000183      0.000  2.123E+10
144.4066    291842.      0.000
   288.000  -0.001979   -125508.  1097.7900   0.000147      0.000  2.123E+10
130.4852    395581.      0.000
   294.000  -0.001202   -116860.  1834.8417   0.000113      0.000  2.123E+10
115.1987    574901.      0.000
   300.000  -0.000624   -103992.  2473.7322  8.175E-05      0.000  2.123E+10
```



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97.7648    940625.      0.000
   306.000  -0.000221    -87538.  3053.1517  5.468E-05      0.000  2.123E+10
95.3750   2585595.      0.000
   312.000  3.251E-05    -67597.  3297.2535  3.275E-05      0.000  2.123E+10
-14.0077   2585595.      0.000
   318.000   0.000172    -48117.  3033.2708  1.640E-05      0.000  2.123E+10
-73.9865   2585595.      0.000
   324.000   0.000229    -31270.  2514.9161  5.177E-06      0.000  2.123E+10
-98.7984   2585595.      0.000
   330.000   0.000234    -17961.  1916.2527 -1.781E-06      0.000  2.123E+10
-100.7561   2585595.      0.000
   336.000   0.000208 -8267.1682  1345.2238 -5.488E-06      0.000  2.123E+10
-89.5869   2585595.      0.000
   342.000   0.000168 -1793.6118   859.3365 -6.910E-06      0.000  2.123E+10
-72.3755   2585595.      0.000
   348.000   0.000125  2075.5507   480.6500 -6.870E-06      0.000  2.123E+10
-53.8533   2585595.      0.000
   354.000  8.551E-05  4004.6923   208.5461 -6.011E-06      0.000  2.123E+10
-36.8480   2585595.      0.000
   360.000  5.284E-05  4604.7931    29.6934 -4.794E-06      0.000  2.123E+10
-22.7696   2585595.      0.000
   366.000  2.798E-05  4382.2993   -74.7853 -3.524E-06      0.000  2.123E+10
-12.0567   2585595.      0.000
   372.000  1.055E-05  3723.0155  -124.5951 -2.378E-06      0.000  2.123E+10
-4.5466   2585595.      0.000
   378.000 -5.625E-07  2897.7175  -137.5078 -1.443E-06      0.000  2.123E+10
0.2424   2585595.      0.000
   384.000 -6.761E-06  2079.3279  -128.0397 -7.392E-07      0.000  2.123E+10
2.9136   2585595.      0.000
   390.000 -9.433E-06  1364.5228  -107.1038 -2.525E-07      0.000  2.123E+10
4.0651   2585595.      0.000
   396.000 -9.791E-06   795.2039   -82.2508  5.276E-08      0.000  2.123E+10
4.2193   2585595.      0.000
   402.000 -8.800E-06   377.2792   -58.2162  2.185E-07      0.000  2.123E+10
3.7923   2585595.      0.000
   408.000 -7.169E-06    95.6392   -37.5709  2.853E-07      0.000  2.123E+10
3.0895   2585595.      0.000
   414.000 -5.376E-06   -74.8381   -21.3517  2.882E-07      0.000  2.123E+10
2.3169   2585595.      0.000
   420.000 -3.710E-06  -161.8605    -9.6042  2.548E-07      0.000  2.123E+10
1.5989   2585595.      0.000
   426.000 -2.319E-06  -191.2194    -1.8094  2.049E-07      0.000  2.123E+10
0.9993   2585595.      0.000
   432.000 -1.252E-06  -184.4834     2.8067  1.518E-07      0.000  2.123E+10
0.5394   2585595.      0.000
   438.000 -4.974E-07  -158.2126     5.0681  1.034E-07      0.000  2.123E+10
0.2144   2585595.      0.000
   444.000 -1.146E-08  -124.1255     5.7260  6.345E-08      0.000  2.123E+10
0.004940   2585595.      0.000
   450.000  2.640E-07   -89.7827     5.3995  3.322E-08      0.000  2.123E+10
-0.1138   2585595.      0.000
   456.000  3.872E-07   -59.4790     4.5577  1.212E-08      0.000  2.123E+10
-0.1668   2585595.      0.000
   462.000  4.095E-07   -35.1444     3.5278 -1.249E-09      0.000  2.123E+10
-0.1765   2585595.      0.000
   468.000  3.722E-07   -17.1403     2.5172 -8.639E-09      0.000  2.123E+10
-0.1604   2585595.      0.000
   474.000  3.058E-07    -4.8993     1.6407 -1.175E-08      0.000  2.123E+10
-0.1318   2585595.      0.000
   480.000  2.311E-07     2.6006     0.9466 -1.208E-08      0.000  2.123E+10
-0.0996   2585595.      0.000
   486.000  1.609E-07     6.5131     0.4398 -1.079E-08      0.000  2.123E+10
-0.0693   2585595.      0.000
```



```
   492.000  1.016E-07     7.9260     0.1004 -8.750E-09      0.000  2.123E+10
-0.0438   2585595.      0.000
   498.000  5.586E-08     7.7570    -0.1032 -6.534E-09      0.000  2.123E+10
-0.0241   2585595.      0.000
   504.000  2.324E-08     6.7165    -0.2055 -4.488E-09      0.000  2.123E+10
-0.0100   2585595.      0.000
   510.000  2.010E-09     5.3112    -0.2381 -2.788E-09      0.000  2.123E+10
-0.000866   2585595.      0.000
   516.000 -1.021E-08     3.8714    -0.2275 -1.490E-09      0.000  2.123E+10
0.004402   2585595.      0.000
   522.000 -1.587E-08     2.5876    -0.1938 -5.773E-10      0.000  2.123E+10
0.006840   2585595.      0.000
   528.000 -1.714E-08     1.5485    -0.1511  7.282E-12      0.000  2.123E+10
0.007387   2585595.      0.000
   534.000 -1.578E-08     0.7743    -0.1085  3.356E-10      0.000  2.123E+10
0.006802   2585595.      0.000
   540.000 -1.311E-08     0.2445    -0.0712  4.795E-10      0.000  2.123E+10
0.005652   2585595.      0.000
   546.000 -1.003E-08    -0.0820    -0.0413  5.025E-10      0.000  2.123E+10
0.004322   2585595.      0.000
   552.000 -7.085E-09    -0.2529    -0.0191  4.552E-10      0.000  2.123E+10
0.003053   2585595.      0.000
   558.000 -4.568E-09    -0.3137  -0.004068  3.751E-10      0.000  2.123E+10
0.001969   2585595.      0.000
   564.000 -2.584E-09    -0.3034   0.005178  2.879E-10      0.000  2.123E+10
0.001113   2585595.      0.000
   570.000 -1.114E-09    -0.2528   0.009959  2.093E-10      0.000  2.123E+10
0.000480   2585595.      0.000
   576.000 -7.270E-11    -0.1848     0.0115  1.474E-10      0.000  2.123E+10
3.133E-05   2585595.      0.000
   582.000  6.551E-10    -0.1156     0.0107  1.050E-10      0.000  2.123E+10
-0.000282   2585595.      0.000
   588.000  1.187E-09    -0.0564   0.008358  8.066E-11      0.000  2.123E+10
-0.000511   2585595.      0.000
   594.000  1.623E-09    -0.0156   0.004726  7.048E-11      0.000  2.123E+10
-0.000699   2585595.      0.000
   600.000  2.033E-09      0.000      0.000  6.827E-11      0.000  2.123E+10
-0.000876   1292798.      0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not
equal the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence
limits.


Output Summary for Load Case No. 3:

Pile-head deflection             =      0.8532087 inches
Computed slope at pile head      =     -0.0091077 radians
Maximum bending moment           =       1478568. inch-lbs
Maximum shear force              =         30000. lbs
Depth of maximum bending moment  =     90.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             34
Number of zero deflection points =              6
```



```
--------------------------------------------------------------------------------
                    Computed Values of Pile Loading and Deflection
                      for Lateral Loading for Load Case Number 4
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head                    =       40000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil
Res.  Soil Spr.   Distrib.
     X         y        Moment     Force         S       Stress   Stiffness      p
      Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
     lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     1.6940  5.237E-07     40000.    -0.0160      0.000  2.123E+10
-413.3252   731.9682      0.000
     6.000     1.5979    268140.     37505.    -0.0160      0.000  2.123E+10
-418.4534  1571.2939      0.000
    12.000     1.5022    521047.     34973.    -0.0159      0.000  2.123E+10
-425.5465  1699.7361      0.000
    18.000     1.4073    758307.     32400.    -0.0157      0.000  2.123E+10
-431.9493  1841.5569      0.000
    24.000     1.3138    979542.     29791.    -0.0155      0.000  2.123E+10
-437.6404  1998.6574      0.000
    30.000     1.2219   1184406.     27151.    -0.0151      0.000  2.123E+10
-442.5980  2173.2763      0.000
    36.000     1.1321   1372594.     24483.    -0.0148      0.000  2.123E+10
-446.7994  2368.0649      0.000
    42.000     1.0445   1543836.     21791.    -0.0144      0.000  2.123E+10
-450.2214  2586.1820      0.000
    48.000     0.9596   1697901.     19082.    -0.0139      0.000  2.123E+10
-452.8397  2831.4167      0.000
    54.000     0.8776   1834598.     16360.    -0.0134      0.000  2.123E+10
-454.6287  3108.3474      0.000
    60.000     0.7986   1953778.     13629.    -0.0129      0.000  2.123E+10
-455.5612  3422.5500      0.000
    66.000     0.7230   2055331.     10896.    -0.0123      0.000  2.123E+10
-455.6078  3780.8758      0.000
    72.000     0.6509   2139192.  8164.7392    -0.0117      0.000  2.123E+10
-454.7365  4191.8269      0.000
    78.000     0.5824   2205341.  5449.4846    -0.0111      0.000  2.123E+10
-450.3484  4639.6656      0.000
    84.000     0.5176   2253893.  2786.6285    -0.0105      0.000  2.123E+10
-437.2703  5068.5471      0.000
    90.000     0.4567   2285289.   203.4459  -0.009833      0.000  2.123E+10
-423.7905  5567.7694      0.000
    96.000     0.3996   2299995. -2297.5751  -0.009185      0.000  2.123E+10
-409.8832  6153.9820      0.000
   102.000     0.3465   2298501. -4713.7666  -0.008535      0.000  2.123E+10
-395.5140  6849.4059      0.000
   108.000     0.2972   2281327. -7042.2180  -0.007888      0.000  2.123E+10
-380.6365  7684.3918      0.000
   114.000     0.2518   2249018. -9170.1328  -0.007248      0.000  2.123E+10
-328.6685  7831.4029      0.000
   120.000     0.2102   2203466.    -10994.  -0.006619      0.000  2.123E+10
-279.2619  7970.2491      0.000
   126.000     0.1724   2146477.    -12629.  -0.006004      0.000  2.123E+10
-265.7451  9249.4475      0.000
```

```
   132.000     0.1382   2078575.    -14181.  -0.005407      0.000  2.123E+10
-251.4522     10918.      0.000
   138.000     0.1075   2000316.    -15643.  -0.004830      0.000  2.123E+10
-236.1578     13180.      0.000
   144.000     0.0802   1912300.    -17010.  -0.004277      0.000  2.123E+10
-219.4927     16416.      0.000
   150.000     0.0562   1815183.    -18271.  -0.003750      0.000  2.123E+10
-200.7932     21444.      0.000
   156.000     0.0352   1709698.    -19410.  -0.003252      0.000  2.123E+10
-178.6710     30440.      0.000
   162.000     0.0172   1596708.    -20393.  -0.002785      0.000  2.123E+10
-149.2760     52210.      0.000
   168.000   0.001800   1477341.    -21096.  -0.002350      0.000  2.123E+10
-85.0543    283495.      0.000
   174.000    -0.0110   1353986.    -20951.  -0.001950      0.000  2.123E+10
133.6849     72594.      0.000
   180.000    -0.0216   1234594.    -20075.  -0.001584      0.000  2.123E+10
158.0945     43911.      0.000
   186.000    -0.0301   1120119.    -19086.  -0.001252      0.000  2.123E+10
171.7146     34273.      0.000
   192.000    -0.0366   1011122.    -18029.  -0.000950      0.000  2.123E+10
180.4027     29558.      0.000
   198.000    -0.0415    907985.    -16930.  -0.000679      0.000  2.123E+10
186.0955     26928.      0.000
   204.000    -0.0448    810978.    -15803.  -0.000436      0.000  2.123E+10
189.6983     25423.      0.000
   210.000    -0.0467    720292.    -15176.  -0.000220      0.000  2.123E+10
19.2471  2472.9289      0.000
   216.000    -0.0474    629846.    -15055. -2.889E-05      0.000  2.123E+10
21.1421  2675.8775      0.000
   222.000    -0.0470    539766.    -14923.   0.000136      0.000  2.123E+10
22.6435  2887.8697      0.000
   228.000    -0.0458    450162.    -14784.   0.000276      0.000  2.123E+10
23.7261  3110.3137      0.000
   234.000    -0.0437    361130.    -14640.   0.000391      0.000  2.123E+10
24.3764  3344.6154      0.000
   240.000    -0.0411    272749.    -14493.   0.000481      0.000  2.123E+10
24.5933  3592.2553      0.000
   246.000    -0.0380    185083.    -13600.   0.000545      0.000  2.123E+10
273.0571     43157.      0.000
   252.000    -0.0345    107130.    -11981.   0.000587      0.000  2.123E+10
266.6713     46332.      0.000
   258.000    -0.0309     38710.    -10402.   0.000607      0.000  2.123E+10
259.4103     50333.      0.000
   264.000    -0.0272    -20396. -8870.2244   0.000610      0.000  2.123E+10
251.3314     55344.      0.000
   270.000    -0.0236    -70440. -7388.7981   0.000597      0.000  2.123E+10
242.4773     61631.      0.000
   276.000    -0.0201   -111712. -5962.7322   0.000571      0.000  2.123E+10
232.8780     69571.      0.000
   282.000    -0.0168   -144529. -4596.4453   0.000535      0.000  2.123E+10
222.5510     79712.      0.000
   288.000    -0.0137   -169244. -3294.2905   0.000491      0.000  2.123E+10
211.5007     92870.      0.000
   294.000    -0.0109   -186239. -2060.6418   0.000440      0.000  2.123E+10
199.7156    110300.      0.000
   300.000   -0.008380  -195927.  -900.0071   0.000386      0.000  2.123E+10
187.1627    134014.      0.000
   306.000   -0.006227  -198755.   182.8094   0.000331      0.000  2.123E+10
173.7761    167431.      0.000
   312.000   -0.004412  -195202.  1182.4385   0.000275      0.000  2.123E+10
159.4336    216803.      0.000
   318.000   -0.002928  -185786.  2092.4451   0.000221      0.000  2.123E+10
```



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143.9019    294849.      0.000
   324.000   -0.001759  -171074.  2904.2298   0.000171      0.000  2.123E+10
126.6930    432054.      0.000
   330.000   -0.000881  -151693.  3603.9990   0.000125      0.000  2.123E+10
106.5634    726041.      0.000
   336.000   -0.000259  -128381.  4258.7148  8.544E-05      0.000  2.123E+10
111.6752   2585595.      0.000
   342.000    0.000145  -100968.  4406.7896  5.302E-05      0.000  2.123E+10
-62.3169   2585595.      0.000
   348.000    0.000377   -75735.  3961.2203  2.805E-05      0.000  2.123E+10
-86.2062   1371531.      0.000
   354.000    0.000481   -53558.  3427.7393  9.775E-06      0.000  2.123E+10
-91.6208   1142424.      0.000
   360.000    0.000494   -34645.  2876.1449 -2.691E-06      0.000  2.123E+10
-92.2440   1119410.      0.000
   366.000    0.000449   -19032.  2329.2846 -1.028E-05      0.000  2.123E+10
-90.0428   1203516.      0.000
   372.000    0.000371 -6648.3456  1801.5816 -1.391E-05      0.000  2.123E+10
-85.8582   1388190.      0.000
   378.000    0.000282  2648.6558  1179.4198 -1.447E-05      0.000  2.123E+10
-121.5291   2585595.      0.000
   384.000    0.000197  7568.9490   559.6005 -1.303E-05      0.000  2.123E+10
-85.0774   2585595.      0.000
   390.000    0.000126  9421.7077   141.8959 -1.063E-05      0.000  2.123E+10
-54.1575   2585595.      0.000
   396.000  6.990E-05  9318.8828  -110.9479 -7.978E-06      0.000  2.123E+10
-30.1237   2585595.      0.000
   402.000  2.994E-05  8125.7560  -240.0214 -5.513E-06      0.000  2.123E+10
-12.9008   2585595.      0.000
   408.000  3.751E-06  6463.1028  -283.5735 -3.451E-06      0.000  2.123E+10
-1.6166   2585595.      0.000
   414.000 -1.147E-05  4738.1950  -273.5919 -1.868E-06      0.000  2.123E+10
4.9438   2585595.      0.000
   420.000 -1.866E-05  3188.2918  -234.6365 -7.474E-07      0.000  2.123E+10
8.0413   2585595.      0.000
   426.000 -2.044E-05  1925.8752  -184.0868 -2.456E-08      0.000  2.123E+10
8.8086   2585595.      0.000
   432.000 -1.895E-05   979.3589  -133.1562  3.861E-07      0.000  2.123E+10
8.1683   2585595.      0.000
   438.000 -1.581E-05   326.2866   -88.2147  5.706E-07      0.000  2.123E+10
6.8122   2585595.      0.000
   444.000 -1.211E-05   -81.7505   -52.1249  6.051E-07      0.000  2.123E+10
5.2177   2585595.      0.000
   450.000 -8.546E-06  -301.8996   -25.4232  5.509E-07      0.000  2.123E+10
3.6829   2585595.      0.000
   456.000 -5.497E-06  -389.2752    -7.2683  4.532E-07      0.000  2.123E+10
2.3687   2585595.      0.000
   462.000 -3.107E-06  -391.1315     3.8553  3.429E-07      0.000  2.123E+10
1.3391   2585595.      0.000
   468.000 -1.382E-06  -344.5344     9.6587  2.390E-07      0.000  2.123E+10
0.5953   2585595.      0.000
   474.000 -2.399E-07  -276.2887    11.7548  1.512E-07      0.000  2.123E+10
0.1034   2585595.      0.000
   480.000  4.331E-07  -204.1480    11.5050  8.332E-08      0.000  2.123E+10
-0.1867   2585595.      0.000
   486.000  7.599E-07  -138.5986     9.9626  3.488E-08      0.000  2.123E+10
-0.3275   2585595.      0.000
   492.000  8.517E-07   -84.7516     7.8791  3.311E-09      0.000  2.123E+10
-0.3670   2585595.      0.000
   498.000  7.997E-07   -44.0638     5.7443 -1.490E-08      0.000  2.123E+10
-0.3446   2585595.      0.000
   504.000  6.729E-07   -15.7539     3.8405 -2.335E-08      0.000  2.123E+10
-0.2900   2585595.      0.000
```



```
   510.000  5.195E-07     2.1264     2.2990 -2.528E-08      0.000  2.123E+10
-0.2239   2585595.      0.000
   516.000  3.696E-07    11.9466     1.1496 -2.329E-08      0.000  2.123E+10
-0.1593   2585595.      0.000
   522.000  2.400E-07    16.0254     0.3615 -1.933E-08      0.000  2.123E+10
-0.1034   2585595.      0.000
   528.000  1.376E-07    16.3705    -0.1267 -1.475E-08      0.000  2.123E+10
-0.0593   2585595.      0.000
   534.000  6.297E-08    14.5705    -0.3860 -1.038E-08      0.000  2.123E+10
-0.0271   2585595.      0.000
   540.000  1.303E-08    11.7845    -0.4843 -6.657E-09      0.000  2.123E+10
-0.005615   2585595.      0.000
   546.000 -1.692E-08     8.7890    -0.4792 -3.749E-09      0.000  2.123E+10
0.007290   2585595.      0.000
   552.000 -3.196E-08     6.0504    -0.4160 -1.652E-09      0.000  2.123E+10
0.0138   2585595.      0.000
   558.000 -3.674E-08     3.8038    -0.3272 -2.591E-10      0.000  2.123E+10
0.0158   2585595.      0.000
   564.000 -3.507E-08     2.1247    -0.2344  5.788E-10      0.000  2.123E+10
0.0151   2585595.      0.000
   570.000 -2.979E-08     0.9884    -0.1505  1.019E-09      0.000  2.123E+10
0.0128   2585595.      0.000
   576.000 -2.284E-08     0.3136    -0.0825  1.203E-09      0.000  2.123E+10
0.009844   2585595.      0.000
   582.000 -1.536E-08  -0.006933    -0.0331  1.246E-09      0.000  2.123E+10
0.006619   2585595.      0.000
   588.000 -7.889E-09    -0.0892  -0.003053  1.233E-09      0.000  2.123E+10
0.003400   2585595.      0.000
   594.000 -5.695E-10    -0.0490   0.007883  1.213E-09      0.000  2.123E+10
0.000245   2585595.      0.000
   600.000  6.667E-09      0.000      0.000  1.206E-09      0.000  2.123E+10
-0.002873   1292798.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection              =      1.6940291 inches
Computed slope at pile head       =     -0.0160268 radians
Maximum bending moment            =       2299995. inch-lbs
Maximum shear force               =         40000. lbs
Depth of maximum bending moment   =     96.0000000 inches below pile head
Depth of maximum shear force      =      0.000000 inches below pile head
Number of iterations              =             37
Number of zero deflection points  =              6
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case	Load Type	Condition 1 V(lbs) or Maximum Shear	Condition 2 in-lb, rad., y(inches) or in-lb/rad. Pile-Head Rotation	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs
1	1	V = 10000.0000	M = 0.000	370000.	0.06729352	291629.
		10000.0000	0.00000000			
2	1	V = 20000.	M = 0.000	370000.	0.32858320	806845.
		20000.	0.00000000			
3	1	V = 30000.	M = 0.000	370000.	0.85320866	1478568.
		30000.	0.00000000			
4	1	V = 40000.	M = 0.000	370000.	1.69402908	2299995.
		40000.	0.00000000			

The analysis ended normally.

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 21 THRU 23
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.60000000000000E+0001 = Pipe pile diameter (in)
 5.00000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
9 = number of soil layers
3       -5.50000000000000E+0000  5.00000000000000E-0001 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
2        5.00000000000000E-0001  1.50000000000000E+0000 = soil type index for stf clay w/
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000
0.00000000000000E+0000 = top gamma (pcf), c (psf), e50, k (pci) for stiff clay w/ free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000
0.00000000000000E+0000 = bot gamma (pcf), c (psf), e50, k (pci) for stiff clay w/ free water
1        1.50000000000000E+0000  4.50000000000000E+0000 = soil type index for soft clay, Xtop
(ft), Xbot(ft)
 6.26000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for soft clay
 6.26000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for soft clay
1        4.50000000000000E+0000  9.50000000000000E+0000 = soil type index for soft clay, Xtop
(ft), Xbot(ft)
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for soft clay
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for soft clay
3        9.50000000000000E+0000  1.45000000000000E+0001 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
7        1.45000000000000E+0001  1.75000000000000E+0001 = soil type index for liq. sand, Xtop
(ft), Xbot(ft)
 6.26000000000000E+0001 = top gamma (pcf) for liquefied sand
 6.26000000000000E+0001 = bot gamma (pcf) for liquefied sand
5        1.75000000000000E+0001  4.15000000000000E+0001 = soil type index for sand , Xtop
```

```
(ft), Xbot(ft)
 6.26000000000000E+0001  3.40000000000000E+0001  0.00000000000000E+0000 = top gamma (pcf), c
(psf), k (pci) for sand
 6.26000000000000E+0001  3.40000000000000E+0001  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), k (pci) for sand
3        4.15000000000000E+0001  5.55000000000000E+0001 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
3        5.55000000000000E+0001  1.00000000000000E+0002 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 = point#,
depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 = point#,
depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000  3.70000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
2       1        1.50000000000000E+0004  0.00000000000000E+0000  3.70000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
3       1        2.00000000000000E+0004  0.00000000000000E+0000  3.70000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
4       1        2.50000000000000E+0004  0.00000000000000E+0000  3.70000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
0 = number of distributed loading points
END
```

LPile Plus for Windows, Version 6.0 (6.0.12)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

LT
PCI

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT_Nov 2011\Analyses\
Name of input data file: San Leandro Creek BOH (B21 - B23).lp6d
Name of output file: San Leandro Creek BOH (B21 - B23).lp6o
Name of plot output file: San Leandro Creek BOH (B21 - B23).lp6p
Name of runtime file: San Leandro Creek BOH (B21 - B23).lp6r

Date and Time of Analysis

Date: February 23, 2012 Time: 14:52:54

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - BENTS 21 THRU 23

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal moment capacity with pile response computed using nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -5.50 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	16.0000000
2	50.000000	16.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 16.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 9 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -5.500 ft
Distance from top of pile to bottom of layer = 0.500 ft

Layer 2 is stiff clay with water-induced erosion

Distance from top of pile to top of layer = 0.500 ft
Distance from top of pile to bottom of layer = 1.500 ft
p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 1.500 ft
Distance from top of pile to bottom of layer = 4.500 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 4.500 ft
Distance from top of pile to bottom of layer = 9.500 ft

Layer 5 is stiff clay without free water

Distance from top of pile to top of layer = 9.500 ft
Distance from top of pile to bottom of layer = 14.500 ft

Layer 6 is liquefiable sand, by Rollins et al., 2004

Distance from top of pile to top of layer = 14.500 ft
Distance from top of pile to bottom of layer = 17.500 ft

Layer 7 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 17.500 ft
Distance from top of pile to bottom of layer = 41.500 ft
p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 8 is stiff clay without free water

Distance from top of pile to top of layer = 41.500 ft
Distance from top of pile to bottom of layer = 55.500 ft

Layer 9 is stiff clay without free water

Distance from top of pile to top of layer = 55.500 ft
Distance from top of pile to bottom of layer = 100.000 ft

(Depth of lowest layer extends 50.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 18 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-5.50	125.00000
2	0.50	125.00000
3	0.50	62.60000
4	1.50	62.60000
5	1.50	62.60000
6	4.50	62.60000
7	4.50	62.60000
8	9.50	62.60000
9	9.50	62.60000
10	14.50	62.60000
11	14.50	62.60000
12	17.50	62.60000
13	17.50	62.60000
14	41.50	62.60000
15	41.50	62.60000
16	55.50	62.60000
17	55.50	62.60000
18	100.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Stiff Clay w/o Free Water	-5.500	125.000	1500.000	--	--	--	0.00	--	--	--	--	--	--
		0.500	125.000	1500.000	--	--	--	0.00	--	--	--	--	--	--
2	Stiff Clay with Free Water	0.500	62.600	1500.000	--	--	--	0.00	default	--	--	--	--	--
		1.500	62.600	1500.000	--	--	--	0.00	default	--	--	--	--	--
3	Soft Clay	1.500	62.600	350.000	--	--	--	0.00	--	--	--	--	--	--
		4.500	62.600	350.000	--	--	--	0.00	--	--	--	--	--	--
4	Soft Clay	4.500	62.600	650.000	--	--	--	0.00	--	--	--	--	--	--
		9.500	62.600	650.000	--	--	--	0.00	--	--	--	--	--	--
5	Stiff Clay w/o Free Water	9.500	62.600	1250.000	--	--	--	0.00	--	--	--	--	--	--
		14.500	62.600	1250.000	--	--	--	0.00	--	--	--	--	--	--
6	Liquefied Sand	14.500	62.600	--										

```
0.00        --          --            --           --          --           --           --
       --          --
                                                 17.500       62.600       --           --
      --          --           --           --          --           --           --
   --          --
  7     Sand (Reese, et al.)                     17.500       62.600       --
34.000      --          --           --         default       --           --           --
       --          --
                                                 41.500       62.600       --
34.000      --          --           --         default       --           --           --
       --          --
  8     Stiff Clay w/o Free Water                41.500       62.600    1500.000       --
      --          --         0.00        --          --           --           --
   --          --
                                                 55.500       62.600    1500.000       --
      --          --         0.00        --          --           --           --
   --          --
  9     Stiff Clay w/o Free Water                55.500       62.600    2500.000       --
      --          --         0.00        --          --           --           --
   --          --
                                                100.000       62.600    2500.000       --
      --          --         0.00        --          --           --           --
   --          --
```

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 10000.000 lbs	M = 0.000 in-lbs	370000.000
2	1	V = 15000.000 lbs	M = 0.000 in-lbs	370000.000
3	1	V = 20000.000 lbs	M = 0.000 in-lbs	370000.000
4	1	V = 25000.000 lbs	M = 0.000 in-lbs	370000.000

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Sections Analyzed = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	50.00000000 ft
Outer Diameter of Pipe	=	16.00000000 in
Pipe Wall Thickness	=	0.50000000 in
Yield Stress of Pipe	=	45.00000000 ksi
Elastic Modulus	=	29000. ksi
Cross-sectional Area	=	24.34734307 sq. in.
Moment of Inertia	=	731.94200090 in^4
Elastic Bending Stiffness	=	21226318. lb-in^2
Plastic Modulus, Z	=	120.16666667 in^3
Plastic Moment Capacity = Fy Z	=	5407.50000000 in-kip

Axial Structural Capacities:

Nom. Axial Structural Capacity = Fy As	=	1095.630 kips
Nominal Axial Tensile Capacity	=	-1095.630 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	370.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 370.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000003303	70.1099804	21226293.	166.6523345	15.9553581	
0.000006606	140.2199607	21226293.	87.3261673	16.7139861	
0.000009909	210.3299411	21226293.	60.8841115	17.4726140	
0.0000132	280.4399215	21226293.	47.6630836	18.2312422	
0.0000165	350.5499018	21226293.	39.7304669	18.9898699	
0.0000198	420.6598822	21226293.	34.4420558	19.7484980	
0.0000231	490.7698625	21226293.	30.6646192	20.5071261	
0.0000264	560.8798429	21226293.	27.8315418	21.2657540	
0.0000297	630.9898233	21226293.	25.6280372	22.0243821	
0.0000330	701.0998036	21226293.	23.8652335	22.7830101	
0.0000363	771.2097840	21226293.	22.4229395	23.5416380	
0.0000396	841.3197644	21226293.	21.2210279	24.3002661	
0.0000429	911.4297447	21226293.	20.2040257	25.0588941	
0.0000462	981.5397251	21226293.	19.3323096	25.8175220	
0.0000495	1051.6497054	21226293.	18.5768223	26.5761501	
0.0000528	1121.7596858	21226293.	17.9157709	27.3347781	
0.0000562	1191.8696662	21226293.	17.3324903	28.0934060	
0.0000595	1261.9796465	21226293.	16.8140186	28.8520341	

0.0000628	1332.0896269	21226293.	16.3501229	29.6106621	
0.0000661	1402.1996073	21226293.	15.9326167	30.3692901	
0.0000694	1472.3095876	21226293.	15.5548731	31.1279181	
0.0000727	1542.4195680	21226293.	15.2114698	31.8865461	
0.0000760	1612.5295484	21226293.	14.8979276	32.6451741	
0.0000793	1682.6395287	21226293.	14.6105139	33.4038021	
0.0000826	1752.7495091	21226293.	14.3460934	34.1624301	
0.0000859	1822.8594894	21226293.	14.1020129	34.9210581	
0.0000892	1892.9694698	21226293.	13.8760124	35.6796861	
0.0000925	1963.0794502	21226293.	13.6661548	36.4383141	
0.0000958	2033.1894305	21226293.	13.4707702	37.1969421	
0.0000991	2103.2994109	21226293.	13.2884112	37.9555701	
0.0001024	2173.4093913	21226293.	13.1178172	38.7141981	
0.0001057	2243.5193716	21226293.	12.9578855	39.4728261	
0.0001090	2313.6293520	21226293.	12.8076465	40.2314541	
0.0001123	2383.7393323	21226293.	12.6662451	40.9900821	
0.0001156	2453.8493127	21226293.	12.5329238	41.7487101	
0.0001189	2523.9592931	21226293.	12.4070093	42.5073381	
0.0001222	2594.0692734	21226293.	12.2879009	43.2659661	
0.0001255	2664.1792538	21226293.	12.1750614	44.0245941	
0.0001288	2734.2892342	21226293.	12.0680086	44.7832221	Y
0.0001354	2866.9718816	21170635.	11.8796433	45.0000000	Y
0.0001420	2978.5544808	20971592.	11.7365397	45.0000000	Y
0.0001486	3076.0201010	20695264.	11.6246759	45.0000000	Y
0.0001552	3163.1850276	20376100.	11.5358909	45.0000000	Y
0.0001618	3242.2891707	20033184.	11.4649973	45.0000000	Y
0.0001685	3314.7848579	19677933.	11.4084067	45.0000000	Y
0.0001751	3381.6515354	19317339.	11.3635416	45.0000000	Y
0.0001817	3443.5713722	18955739.	11.3284988	45.0000000	Y
0.0001883	3501.0544404	18595948.	11.3018159	45.0000000	Y
0.0001949	3554.8734049	18241748.	11.2818213	45.0000000	Y
0.0002015	3605.2703438	17893789.	11.2676920	45.0000000	Y
0.0002081	3652.5943181	17553156.	11.2585606	45.0000000	Y
0.0002147	3697.1623313	17220648.	11.2536696	45.0000000	Y
0.0002213	3739.4075994	16897495.	11.2521708	45.0000000	Y
0.0002279	3779.1051660	16581897.	11.2541663	45.0000000	Y
0.0002345	3816.8312719	16275672.	11.2586937	45.0000000	Y
0.0002411	3852.7103826	15978567.	11.2654480	45.0000000	Y
0.0002477	3886.8609526	15690329.	11.2741579	45.0000000	Y
0.0002543	3919.3959158	15410713.	11.2845805	45.0000000	Y
0.0002609	3950.4231141	15139476.	11.2964980	45.0000000	Y
0.0002675	3980.0456725	14876383.	11.3097133	45.0000000	Y
0.0002741	4008.3623300	14621206.	11.3240481	45.0000000	Y
0.0002808	4035.4677320	14373723.	11.3393396	45.0000000	Y
0.0002874	4061.4526904	14133719.	11.3554387	45.0000000	Y
0.0002940	4086.4044152	13900988.	11.3722083	45.0000000	Y
0.0003006	4110.4067215	13675327.	11.3895213	45.0000000	Y
0.0003072	4133.5402156	13456544.	11.4072594	45.0000000	Y
0.0003138	4155.8824619	13244451.	11.4253116	45.0000000	Y
0.0003204	4177.1669597	13037803.	11.4440471	45.0000000	Y
0.0003270	4197.7709713	12837423.	11.4629507	45.0000000	Y
0.0003336	4217.7661739	12643154.	11.4819272	45.0000000	Y
0.0003402	4237.0431956	12454319.	11.5011321	45.0000000	Y
0.0003468	4255.5468719	12270447.	11.5206545	45.0000000	Y
0.0003534	4273.6096598	12092202.	11.5400445	45.0000000	Y
0.0003600	4290.4097650	11916990.	11.5582468	45.0000000	Y
0.0003666	4306.5112932	11746187.	11.5763296	45.0000000	Y
0.0003732	4322.1427406	11580171.	11.5937314	45.0000000	Y
0.0003798	4335.9628653	11415161.	11.6092082	45.0000000	Y
0.0003864	4349.6713089	11255503.	11.6243286	45.0000000	Y
0.0003931	4362.3530681	11098599.	11.6390555	45.0000000	Y
0.0004195	4404.4318093	10499787.	11.6831503	45.0000000	Y
0.0004459	4437.6151732	9951996.	11.7157650	45.0000000	Y
0.0004723	4464.2614757	9451656.	11.7419536	45.0000000	Y
0.0004987	4486.3513288	8995196.	11.7628724	45.0000000	Y
0.0005252	4504.8959103	8577919.	11.7801068	45.0000000	Y
0.0005516	4520.6772185	8195611.	11.7948415	45.0000000	Y
0.0005780	4534.1895089	7844331.	11.8074250	45.0000000	Y
0.0006044	4545.6603898	7520387.	11.8172202	45.0000000	Y
0.0006309	4555.9460064	7221701.	11.8261639	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	370.000	4555.9

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head	=	10000.000 lbs
Applied moment at pile head	=	0.000 in-lbs
Axial thrust load on pile head	=	370000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1017	-6.546E-08	10000.0000	-0.001292	0.000	2.123E+10	-214.3154	6320.9307	0.000
6.000	0.0940	59010.	7903.0955	-0.001284	0.000	2.123E+10	-484.6527	30947.	0.000
12.000	0.0863	100536.	5038.2932	-0.001261	0.000	2.123E+10	-470.2814	32691.	0.000
18.000	0.0788	125069.	3277.3519	-0.001229	0.000	2.123E+10	-116.6991	8882.0723	0.000
24.000	0.0716	145322.	2798.5231	-0.001191	0.000	2.123E+10	-42.9106	3597.7043	0.000
30.000	0.0645	163939.	2541.2279	-0.001147	0.000	2.123E+10	-42.8545	3983.9566	0.000
36.000	0.0578	180911.	2284.7077	-0.001099	0.000	2.123E+10	-42.6522	4427.8690	0.000
42.000	0.0514	196233.	2030.6148	-0.001045	0.000	2.123E+10	-42.0454	4912.0069	0.000
48.000	0.0453	209919.	1783.5524	-0.000988	0.000	2.123E+10	-40.3088	5344.4101	0.000
54.000	0.0395	222022.	1460.3688	-0.000927	0.000	2.123E+10	-67.4191	10240.	0.000
60.000	0.0341	231558.	1014.1505	-0.000863	0.000	2.123E+10	-81.3204	14295.	0.000
66.000	0.0292	238022.	532.3218	-0.000796	0.000	2.123E+10	-79.2892	16319.	0.000
72.000	0.0246	241482.	63.7015	-0.000729	0.000	2.123E+10	-76.9176	18778.	0.000
78.000	0.0204	242021.	-384.0454	-0.000660	0.000	2.123E+10	-72.3314		

```
21263.      0.000
    84.000    0.0167    239804.  -803.8124  -0.000592     0.000  2.123E+10   -67.5909
24351.      0.000
    90.000    0.0133    235004. -1194.7373  -0.000525     0.000  2.123E+10   -62.7174
28283.      0.000
    96.000    0.0104    227799. -1555.9565  -0.000460     0.000  2.123E+10   -57.6890
33429.      0.000
   102.000  0.007790    218373. -1886.4306  -0.000397     0.000  2.123E+10   -52.4690
40412.      0.000
   108.000  0.005596    206922. -2184.8132  -0.000336     0.000  2.123E+10   -46.9919
50383.      0.000
   114.000  0.003753    193649. -2585.6603  -0.000280     0.000  2.123E+10   -86.6238
138481.     0.000
   120.000  0.002239    177136. -3181.9831  -0.000227     0.000  2.123E+10  -112.1505
300587.     0.000
   126.000  0.001024    156475. -3795.1736  -0.000180     0.000  2.123E+10   -92.2464
540244.     0.000
   132.000 7.575E-05    132394. -4153.5207  -0.000139     0.000  2.123E+10   -27.2026
2154663.     0.000
   138.000 -0.000648    107252. -3988.3159  -0.000106     0.000  2.123E+10    82.2709
761234.     0.000
   144.000 -0.001191     85003. -3454.1783 -7.837E-05     0.000  2.123E+10    95.7750
482592.     0.000
   150.000 -0.001589     66149. -2858.0368 -5.701E-05     0.000  2.123E+10   102.9388
388718.     0.000
   156.000 -0.001875     50960. -2227.3552 -4.046E-05     0.000  2.123E+10   107.2884
343352.     0.000
   162.000 -0.002074     39601. -1575.3801 -2.766E-05     0.000  2.123E+10   110.0366
318276.     0.000
   168.000 -0.002207     32178.  -910.0135 -1.751E-05     0.000  2.123E+10   111.7523
303851.     0.000
   174.000 -0.002284     28758.  -574.1316 -8.899E-06     0.000  2.123E+10     0.2084
547.2326     0.000
   180.000 -0.002314     25328.  -572.7934 -1.255E-06     0.000  2.123E+10     0.2377
616.5652     0.000
   186.000 -0.002300     21890.  -571.2853  5.419E-06     0.000  2.123E+10     0.2649
691.2536     0.000
   192.000 -0.002248     18449.  -569.6229  1.112E-05     0.000  2.123E+10     0.2892
771.7912     0.000
   198.000 -0.002166     15006.  -567.8252  1.585E-05     0.000  2.123E+10     0.3100
858.6989     0.000
   204.000 -0.002058     11564.  -565.9149  1.960E-05     0.000  2.123E+10     0.3268
952.5421     0.000
   210.000 -0.001931  8127.6175  -528.8087  2.239E-05     0.000  2.123E+10    12.0420
37419.      0.000
   216.000 -0.001790  5119.2717  -457.9691  2.426E-05     0.000  2.123E+10    11.5712
38794.      0.000
   222.000 -0.001640  2524.2781  -390.3222  2.534E-05     0.000  2.123E+10    10.9777
40168.      0.000
   228.000 -0.001486   322.8978  -326.5316  2.574E-05     0.000  2.123E+10    10.2859
41543.      0.000
   234.000 -0.001331 -1508.3944  -267.1157  2.557E-05     0.000  2.123E+10     9.5194
42917.      0.000
   240.000 -0.001179 -2996.0402  -212.4543  2.494E-05     0.000  2.123E+10     8.7010
44292.      0.000
   246.000 -0.001032 -4168.5689  -162.7965  2.393E-05     0.000  2.123E+10     7.8516
45666.      0.000
   252.000 -0.000892 -5055.8251  -118.2713  2.262E-05     0.000  2.123E+10     6.9902
47041.      0.000
   258.000 -0.000760 -5688.2628   -78.8994  2.110E-05     0.000  2.123E+10     6.1338
48415.      0.000
   264.000 -0.000638 -6096.3146   -44.6063  1.944E-05     0.000  2.123E+10     5.2973
49790.      0.000
   270.000 -0.000527 -6309.8396   -15.2353  1.768E-05     0.000  2.123E+10     4.4931
51164.      0.000
   276.000 -0.000426 -6357.6541     9.4387  1.589E-05     0.000  2.123E+10     3.7316
52538.      0.000
   282.000 -0.000336 -6267.1427    29.6956  1.411E-05     0.000  2.123E+10     3.0208
53913.      0.000
   288.000 -0.000257 -6063.9511    45.8580  1.237E-05     0.000  2.123E+10     2.3667
```



```
55287.      0.000
   294.000 -0.000188 -5771.7534    58.2782  1.069E-05     0.000  2.123E+10     1.7734
56662.      0.000
   300.000 -0.000129 -5412.0918    67.3278  9.113E-06     0.000  2.123E+10     1.2431
58036.      0.000
   306.000 -7.843E-05 -5004.2811   73.3870  7.641E-06     0.000  2.123E+10     0.7766
59411.      0.000
   312.000 -3.683E-05 -4565.3720   76.8363  6.288E-06     0.000  2.123E+10     0.3731
60785.      0.000
   318.000 -2.974E-06 -4110.1652   78.0481  5.062E-06     0.000  2.123E+10     0.0308
62160.      0.000
   324.000 2.391E-05 -3651.2702    77.3809  3.965E-06     0.000  2.123E+10    -0.2532
63534.      0.000
   330.000 4.461E-05 -3199.1997    75.1735  2.997E-06     0.000  2.123E+10    -0.4826
64909.      0.000
   336.000 5.988E-05 -2762.4941    71.7414  2.154E-06     0.000  2.123E+10    -0.6615
66283.      0.000
   342.000 7.046E-05 -2347.8674    67.3735  1.432E-06     0.000  2.123E+10    -0.7945
67658.      0.000
   348.000 7.706E-05 -1960.3697    62.3302  8.231E-07     0.000  2.123E+10    -0.8866
69032.      0.000
   354.000 8.034E-05 -1603.5595    56.8423  3.194E-07     0.000  2.123E+10    -0.9427
70407.      0.000
   360.000 8.089E-05 -1279.6799    51.1110 -8.810E-08     0.000  2.123E+10    -0.9678
71781.      0.000
   366.000 7.928E-05  -989.8367    45.3079 -4.089E-07     0.000  2.123E+10    -0.9666
73156.      0.000
   372.000 7.599E-05  -734.1703    39.5764 -6.525E-07     0.000  2.123E+10    -0.9439
74530.      0.000
   378.000 7.145E-05  -512.0228    34.0331 -8.286E-07     0.000  2.123E+10    -0.9039
75904.      0.000
   384.000 6.604E-05  -322.0934    28.7697 -9.465E-07     0.000  2.123E+10    -0.8506
77279.      0.000
   390.000 6.009E-05  -162.5841    23.8547 -1.015E-06     0.000  2.123E+10    -0.7877
78653.      0.000
   396.000 5.386E-05   -31.3304    19.3363 -1.042E-06     0.000  2.123E+10    -0.7184
80028.      0.000
   402.000 4.758E-05    74.0803    15.2445 -1.036E-06     0.000  2.123E+10    -0.6455
81402.      0.000
   408.000 4.142E-05   156.2054    11.5934 -1.004E-06     0.000  2.123E+10    -0.5715
82777.      0.000
   414.000 3.553E-05   217.6583     8.3838 -9.510E-07     0.000  2.123E+10    -0.4984
84151.      0.000
   420.000 3.001E-05   261.0331     5.6052 -8.834E-07     0.000  2.123E+10    -0.4278
85526.      0.000
   426.000 2.493E-05   288.8429     3.2384 -8.056E-07     0.000  2.123E+10    -0.3611
86900.      0.000
   432.000 2.035E-05   303.4708     1.2570 -7.219E-07     0.000  2.123E+10    -0.2993
88275.      0.000
   438.000 1.627E-05   307.1326    -0.3703 -6.356E-07     0.000  2.123E+10    -0.2431
89649.      0.000
   444.000 1.272E-05   301.8497    -1.6784 -5.496E-07     0.000  2.123E+10    -0.1929
91024.      0.000
   450.000 9.676E-06   289.4318    -2.7042 -4.660E-07     0.000  2.123E+10    -0.1490
92398.      0.000
   456.000 7.125E-06   271.4681    -3.4853 -3.867E-07     0.000  2.123E+10    -0.1114
93773.      0.000
   462.000 5.035E-06   249.3250    -4.0590 -3.131E-07     0.000  2.123E+10    -0.0798
95147.      0.000
   468.000 3.368E-06   224.1508    -4.4611 -2.462E-07     0.000  2.123E+10    -0.0542
96522.      0.000
   474.000 2.081E-06   196.8854    -4.7255 -1.867E-07     0.000  2.123E+10    -0.0340
97896.      0.000
   480.000 1.128E-06   168.2741    -4.8833 -1.351E-07     0.000  2.123E+10    -0.0187
99270.      0.000
   486.000 4.600E-07   138.8854    -4.9624 -9.167E-08     0.000  2.123E+10  -0.007717
100645.      0.000
   492.000 2.780E-08   109.1318    -4.9870 -5.661E-08     0.000  2.123E+10  -0.000473
102019.      0.000
   498.000 -2.193E-07   79.2927    -4.7049 -2.998E-08     0.000  2.123E+10     0.0945
```



```
2585595.     0.000
   504.000 -3.320E-07   52.8067    -3.9921 -1.131E-08     0.000  2.123E+10     0.1431
2585595.     0.000
   510.000 -3.551E-07   31.4381    -3.1038  5.928E-10     0.000  2.123E+10     0.1530
2585595.     0.000
   516.000 -3.249E-07   15.5589    -2.2247  7.235E-09     0.000  2.123E+10     0.1400
2585595.     0.000
   522.000 -2.683E-07    4.7101    -1.4578  1.010E-08     0.000  2.123E+10     0.1156
2585595.     0.000
   528.000 -2.037E-07   -1.9795    -0.8476  1.049E-08     0.000  2.123E+10     0.0878
2585595.     0.000
   534.000 -1.425E-07   -5.5078    -0.4001  9.428E-09     0.000  2.123E+10     0.0614
2585595.     0.000
   540.000 -9.057E-08   -6.8225    -0.0988  7.685E-09     0.000  2.123E+10     0.0390
2585595.     0.000
   546.000 -5.024E-08   -6.7280     0.0832  5.770E-09     0.000  2.123E+10     0.0217
2585595.     0.000
   552.000 -2.133E-08   -5.8499     0.1757  3.992E-09     0.000  2.123E+10   0.009192
2585595.     0.000
   558.000 -2.339E-09   -4.6371     0.2063  2.510E-09     0.000  2.123E+10   0.001008
2585595.     0.000
   564.000 8.788E-09    -3.3852     0.1980  1.376E-09     0.000  2.123E+10  -0.003787
2585595.     0.000
   570.000 1.417E-08    -2.2675     0.1683  5.771E-10     0.000  2.123E+10  -0.006108
2585595.     0.000
   576.000 1.571E-08    -1.3682     0.1297  6.323E-11     0.000  2.123E+10  -0.006771
2585595.     0.000
   582.000 1.493E-08    -0.7118     0.0900 -2.308E-10     0.000  2.123E+10  -0.006435
2585595.     0.000
   588.000 1.294E-08    -0.2867     0.0540 -3.719E-10     0.000  2.123E+10  -0.005578
2585595.     0.000
   594.000 1.047E-08    -0.0622     0.0237 -4.212E-10     0.000  2.123E+10  -0.004512
2585595.     0.000
   600.000 7.890E-09      0.000      0.000 -4.300E-10     0.000  2.123E+10  -0.003400
1292798.     0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection            =      0.1017170 inches
Computed slope at pile head     =     -0.0012920 radians
Maximum bending moment          =        242021. inch-lbs
Maximum shear force             =  10000.0000000 lbs
Depth of maximum bending moment =     78.0000000 inches below pile head
Depth of maximum shear force    =       0.000000 inches below pile head
Number of iterations            =             21
Number of zero deflection points =             4
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (Loading Type 1)

```
Horizontal shear force at pile head               =       15000.000 lbs
Applied moment at pile head                       =           0.000 in-lbs
Axial thrust load on pile head                    =      370000.000 lbs
```



```
   Depth    Deflect.   Bending     Shear      Slope     Total    Bending   Soil Res.  Soil
Spr.   Distrib.
     X          y        Moment     Force         S       Stress  Stiffness      p
Es*h    Lat. Load
   inches    inches     in-lbs       lbs     radians      psi*     lb-in^2    lb/in
lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ----------
      0.00    0.2866  9.819E-08     15000.  -0.003121     0.000  2.123E+10  -277.6694
2906.1194     0.000
     6.000    0.2679     91931.     12328.  -0.003108     0.000  2.123E+10  -613.1113
13731.      0.000
    12.000    0.2493    161732.  8657.5783  -0.003072     0.000  2.123E+10  -610.2485
14685.      0.000
    18.000    0.2310    209462.  6325.8264  -0.003020     0.000  2.123E+10  -167.0021
4336.8334     0.000
    24.000    0.2131    251049.  5639.6193  -0.002955     0.000  2.123E+10   -61.7336
1738.1072     0.000
    30.000    0.1956    290256.  5268.3763  -0.002878     0.000  2.123E+10   -62.0141
1902.3554     0.000
    36.000    0.1786    327048.  4895.9740  -0.002791     0.000  2.123E+10   -62.1200
2087.2641     0.000
    42.000    0.1621    361399.  4524.5942  -0.002694     0.000  2.123E+10   -61.6732
2282.7736     0.000
    48.000    0.1462    393303.  4160.7950  -0.002587     0.000  2.123E+10   -59.5932
2444.9179     0.000
    54.000    0.1311    422815.  3680.3714  -0.002472     0.000  2.123E+10  -100.5480
4603.2232     0.000
    60.000    0.1166    448441.  3011.3319  -0.002348     0.000  2.123E+10  -122.4651
6302.5157     0.000
    66.000    0.1029    469378.  2281.8058  -0.002219     0.000  2.123E+10  -120.7102
7040.1009     0.000
    72.000    0.0900    485674.  1564.0640  -0.002084     0.000  2.123E+10  -118.5370
7905.7768     0.000
    78.000    0.0779    497398.   869.3956  -0.001945     0.000  2.123E+10  -113.0191
8708.0946     0.000
    84.000    0.0666    504742.   208.4595  -0.001803     0.000  2.123E+10  -107.2929
9662.4262     0.000
    90.000    0.0562    507906.  -417.6105  -0.001660     0.000  2.123E+10  -101.3971
10819.      0.000
    96.000    0.0467    507101. -1007.7366  -0.001517     0.000  2.123E+10   -95.3116
12244.      0.000
   102.000    0.0380    502547. -1560.6907  -0.001374     0.000  2.123E+10   -89.0064
14041.      0.000
   108.000    0.0302    494473. -2075.0172  -0.001233     0.000  2.123E+10   -82.4357
16368.      0.000
   114.000    0.0232    483121. -2732.2210  -0.001095     0.000  2.123E+10  -136.6322
35276.      0.000
   120.000    0.0171    466547. -3701.2351  -0.000961     0.000  2.123E+10  -186.3725
65470.      0.000
   126.000    0.0117    442971. -4769.1470  -0.000832     0.000  2.123E+10  -169.5982
86881.      0.000
   132.000  0.007096    413011. -5726.8258  -0.000711     0.000  2.123E+10  -149.6281
126521.     0.000
   138.000  0.003180    377406. -6542.9826  -0.000599     0.000  2.123E+10  -122.4242
231008.     0.000
   144.000 -9.627E-05   337157. -6806.5380  -0.000498     0.000  2.123E+10    34.5724
2154663.     0.000
   150.000 -0.002800    297940. -6347.0481  -0.000409     0.000  2.123E+10   118.5909
254082.     0.000
   156.000 -0.004999    262806. -5580.0314  -0.000329     0.000  2.123E+10   137.0814
164519.     0.000
   162.000 -0.006752    232442. -4725.4443  -0.000259     0.000  2.123E+10   147.7810
131312.     0.000
   168.000 -0.008111    207252. -3817.9612  -0.000197     0.000  2.123E+10   154.7134
114441.     0.000
   174.000 -0.009119    187502. -3350.7100  -0.000141     0.000  2.123E+10     1.0370
682.3268     0.000
   180.000 -0.009808    167672. -3343.8363 -9.121E-05     0.000  2.123E+10     1.2542
767.2415     0.000
```

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   186.000    -0.0102    147781. -3335.7014 -4.662E-05      0.000  2.123E+10     1.4574
856.1869      0.000
   192.000    -0.0104    127850. -3326.4050 -7.666E-06      0.000  2.123E+10     1.6414
949.9029      0.000
   198.000    -0.0103    107898. -3316.0754  2.565E-05      0.000  2.123E+10     1.8018
1049.0408      0.000
   204.000    -0.0101     87943. -3304.8644  5.333E-05      0.000  2.123E+10     1.9352
1154.2296      0.000
   210.000   -0.009665     68003. -3118.2238  7.537E-05      0.000  2.123E+10    60.2783
37419.      0.000
   216.000   -0.009155     50190. -2759.8024  9.208E-05      0.000  2.123E+10    59.1955
38794.      0.000
   222.000   -0.008560     34477. -2410.2880   0.000104      0.000  2.123E+10    57.3093
40168.      0.000
   228.000   -0.007907     20805. -2074.1234   0.000112      0.000  2.123E+10    54.7456
41543.      0.000
   234.000   -0.007218   9090.5696 -1754.9965   0.000116      0.000  2.123E+10    51.6301
42917.      0.000
   240.000   -0.006514   -770.6244 -1455.8508   0.000117      0.000  2.123E+10    48.0852
44292.      0.000
   246.000   -0.005811 -8900.2688 -1178.9126   0.000116      0.000  2.123E+10    44.2276
45666.      0.000
   252.000   -0.005123    -15432.  -925.7309   0.000112      0.000  2.123E+10    40.1663
47041.      0.000
   258.000   -0.004462    -20508.  -697.2286   0.000107      0.000  2.123E+10    36.0011
48415.      0.000
   264.000   -0.003835    -24276.  -493.7611   0.000101      0.000  2.123E+10    31.8214
49790.      0.000
   270.000   -0.003249    -26882.  -315.1801  9.381E-05      0.000  2.123E+10    27.7056
51164.      0.000
   276.000   -0.002709    -28474.  -160.9012  8.599E-05      0.000  2.123E+10    23.7207
52538.      0.000
   282.000   -0.002217    -29195.   -29.9724  7.784E-05      0.000  2.123E+10    19.9223
53913.      0.000
   288.000   -0.001775    -29180.    78.8587  6.959E-05      0.000  2.123E+10    16.3548
55287.      0.000
   294.000   -0.001382    -28557.   167.0790  6.143E-05      0.000  2.123E+10    13.0520
56662.      0.000
   300.000   -0.001038    -27447.   236.3483  5.351E-05      0.000  2.123E+10    10.0378
58036.      0.000
   306.000   -0.000740    -25959.   288.4417  4.597E-05      0.000  2.123E+10     7.3267
59411.      0.000
   312.000   -0.000486    -24190.   325.1974  3.888E-05      0.000  2.123E+10     4.9252
60785.      0.000
   318.000   -0.000273    -22229.   348.4705  3.232E-05      0.000  2.123E+10     2.8325
62160.      0.000
   324.000 -9.836E-05    -20152.   360.0926  2.633E-05      0.000  2.123E+10     1.0415
63534.      0.000
   330.000  4.251E-05    -18025.   361.8374  2.093E-05      0.000  2.123E+10    -0.4599
64909.      0.000
   336.000   0.000153    -15903.   355.3931  1.614E-05      0.000  2.123E+10    -1.6882
66283.      0.000
   342.000   0.000236    -13832.   342.3401  1.193E-05      0.000  2.123E+10    -2.6628
67658.      0.000
   348.000   0.000296    -11848.   324.1344  8.304E-06      0.000  2.123E+10    -3.4058
69032.      0.000
   354.000   0.000336 -9979.0047   302.0961  5.219E-06      0.000  2.123E+10    -3.9403
70407.      0.000
   360.000   0.000359 -8245.8100   277.4031  2.643E-06      0.000  2.123E+10    -4.2907
71781.      0.000
   366.000   0.000368 -6661.9044   251.0883  5.364E-07      0.000  2.123E+10    -4.4809
73156.      0.000
   372.000   0.000365 -5235.1321   224.0407 -1.145E-06      0.000  2.123E+10    -4.5349
74530.      0.000
   378.000   0.000354 -3968.3320   197.0095 -2.446E-06      0.000  2.123E+10    -4.4755
75904.      0.000
   384.000   0.000336 -2860.1591   170.6105 -3.411E-06      0.000  2.123E+10    -4.3242
77279.      0.000
   390.000   0.000313 -1905.8615   145.3350 -4.085E-06      0.000  2.123E+10    -4.1010
78653.      0.000
```



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   396.000   0.000287 -1098.0040   121.5593 -4.509E-06      0.000  2.123E+10    -3.8242
80028.      0.000
   402.000   0.000259  -427.1301    99.5558 -4.725E-06      0.000  2.123E+10    -3.5102
81402.      0.000
   408.000   0.000230   117.6434    79.5049 -4.768E-06      0.000  2.123E+10    -3.1734
82777.      0.000
   414.000   0.000202   548.1001    61.5059 -4.674E-06      0.000  2.123E+10    -2.8262
84151.      0.000
   420.000   0.000174   876.4680    45.5894 -4.473E-06      0.000  2.123E+10    -2.4793
85526.      0.000
   426.000   0.000148  1115.0325    31.7281 -4.191E-06      0.000  2.123E+10    -2.1412
86900.      0.000
   432.000   0.000124  1275.8151    19.8477 -3.854E-06      0.000  2.123E+10    -1.8189
88275.      0.000
   438.000   0.000102  1370.3151     9.8370 -3.480E-06      0.000  2.123E+10    -1.5180
89649.      0.000
   444.000  8.188E-05  1409.3085     1.5567 -3.087E-06      0.000  2.123E+10    -1.2421
91024.      0.000
   450.000  6.455E-05  1402.7004    -5.1520 -2.689E-06      0.000  2.123E+10    -0.9941
92398.      0.000
   456.000  4.961E-05  1359.4246   -10.4602 -2.299E-06      0.000  2.123E+10    -0.7753
93773.      0.000
   462.000  3.697E-05  1287.3853   -14.5447 -1.925E-06      0.000  2.123E+10    -0.5862
95147.      0.000
   468.000  2.651E-05  1193.4348   -17.5826 -1.574E-06      0.000  2.123E+10    -0.4264
96522.      0.000
   474.000  1.808E-05  1083.3833   -19.7467 -1.252E-06      0.000  2.123E+10    -0.2949
97896.      0.000
   480.000  1.148E-05   962.0347   -21.2013 -9.633E-07      0.000  2.123E+10    -0.1899
99270.      0.000
   486.000  6.516E-06   833.2447   -22.0990 -7.096E-07      0.000  2.123E+10    -0.1093
100645.      0.000
   492.000  2.965E-06   699.9969   -22.5782 -4.929E-07      0.000  2.123E+10    -0.0504
102019.      0.000
   498.000  6.013E-07   564.4950   -23.5068 -3.142E-07      0.000  2.123E+10    -0.2591
2585595.      0.000
   504.000 -8.050E-07   419.3098   -23.2436 -1.751E-07      0.000  2.123E+10     0.3469
2585595.      0.000
   510.000 -1.500E-06   286.3493   -20.2636 -7.539E-08      0.000  2.123E+10     0.6464
2585595.      0.000
   516.000 -1.710E-06   176.4812   -16.1141 -9.974E-09      0.000  2.123E+10     0.7367
2585595.      0.000
   522.000 -1.620E-06    93.0247   -11.8098  2.812E-08      0.000  2.123E+10     0.6980
2585595.      0.000
   528.000 -1.372E-06    34.6387    -7.9417  4.616E-08      0.000  2.123E+10     0.5913
2585595.      0.000
   534.000 -1.066E-06    -2.4808    -4.7897  5.070E-08      0.000  2.123E+10     0.4593
2585595.      0.000
   540.000 -7.638E-07   -23.0630    -2.4243  4.709E-08      0.000  2.123E+10     0.3291
2585595.      0.000
   546.000 -5.008E-07   -31.7819    -0.7895  3.934E-08      0.000  2.123E+10     0.2158
2585595.      0.000
   552.000 -2.917E-07   -32.7121     0.2349  3.023E-08      0.000  2.123E+10     0.1257
2585595.      0.000
   558.000 -1.380E-07   -29.0971     0.7904  2.149E-08      0.000  2.123E+10     0.0595
2585595.      0.000
   564.000 -3.376E-08   -23.3225     1.0125  1.408E-08      0.000  2.123E+10     0.0145
2585595.      0.000
   570.000  3.096E-08   -17.0094     1.0161  8.383E-09      0.000  2.123E+10    -0.0133
2585595.      0.000
   576.000  6.683E-08   -11.1659     0.8897  4.401E-09      0.000  2.123E+10    -0.0288
2585595.      0.000
   582.000  8.377E-08    -6.3522     0.6950  1.925E-09      0.000  2.123E+10    -0.0361
2585595.      0.000
   588.000  8.993E-08    -2.8340     0.4705  6.264E-10      0.000  2.123E+10    -0.0388
2585595.      0.000
   594.000  9.128E-08    -0.7092     0.2362  1.256E-10      0.000  2.123E+10    -0.0393
2585595.      0.000
   600.000  9.143E-08      0.000      0.000  2.535E-11      0.000  2.123E+10    -0.0394
1292798.      0.000
```



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* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not equal
the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence limits.


Output Summary for Load Case No. 2:

Pile-head deflection             =      0.2866394 inches
Computed slope at pile head      =     -0.0031210 radians
Maximum bending moment           =        507906. inch-lbs
Maximum shear force              =         15000. lbs
Depth of maximum bending moment  =     90.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             30
Number of zero deflection points =              4


----------------------------------------------------------------------------
                  Computed Values of Pile Loading and Deflection
                     for Lateral Loading for Load Case Number 3
----------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head                    =       20000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      370000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil Res.  Soil
Spr.  Distrib.
     X          y         Moment     Force         S       Stress   Stiffness      p
Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ----------
      0.00     1.2970  2.095E-06     20000.    -0.0113      0.000  2.123E+10  -404.9677
936.7212      0.000
      6.000    1.2294    137705.     18496.    -0.0112      0.000  2.123E+10   -96.4523
470.7206      0.000
     12.000    1.1621    271851.     17830.    -0.0112      0.000  2.123E+10  -125.6139
648.5515      0.000
     18.000    1.0952    401305.     16611.    -0.0111      0.000  2.123E+10  -280.5344
1536.8311      0.000
     24.000    1.0291    520408.     15456.    -0.0110      0.000  2.123E+10  -104.3433
608.3760      0.000
     30.000    0.9638    635427.     14827.    -0.0108      0.000  2.123E+10  -105.5258
656.9547      0.000
     36.000    0.8996    746249.     14191.    -0.0106      0.000  2.123E+10  -106.4877
710.2685      0.000
     42.000    0.8366    852769.     13552.    -0.0104      0.000  2.123E+10  -106.5782
764.3629      0.000
     48.000    0.7751    954917.     12920.    -0.0101      0.000  2.123E+10  -103.8997
804.2817      0.000
     54.000    0.7152   1052726.     12077.  -0.009832      0.000  2.123E+10  -177.0209
1485.0455      0.000
     60.000    0.6571   1143501.     10893.  -0.009522      0.000  2.123E+10  -217.9394
1989.9690      0.000
     66.000    0.6010   1225713.  9586.5451  -0.009187      0.000  2.123E+10  -217.3927
2170.4789      0.000
     72.000    0.5469   1299329.  8285.3701  -0.008830      0.000  2.123E+10  -216.3323
2373.4902      0.000
     78.000    0.4950   1364342.  7008.3071  -0.008454      0.000  2.123E+10  -209.3553
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2537.6754      0.000
     84.000    0.4454   1420963.  5773.8793  -0.008060      0.000  2.123E+10  -202.1206
2722.5971      0.000
     90.000    0.3983   1469415.  4583.3554  -0.007651      0.000  2.123E+10  -194.7207
2933.4634      0.000
     96.000    0.3536   1509935.  3437.7379  -0.007230      0.000  2.123E+10  -187.1518
3175.5395      0.000
    102.000    0.3115   1542770.  2338.0571  -0.006799      0.000  2.123E+10  -179.4085
3455.5747      0.000
    108.000    0.2720   1568179.  1285.3813  -0.006359      0.000  2.123E+10  -171.4835
3782.3537      0.000
    114.000    0.2352   1586429.    39.8461  -0.005913      0.000  2.123E+10  -243.6949
6216.6648      0.000
    120.000    0.2011   1594912. -1726.8655  -0.005464      0.000  2.123E+10  -345.2090
10301.      0.000
    126.000    0.1696   1589966. -3755.0349  -0.005014      0.000  2.123E+10  -330.8475
11702.      0.000
    132.000    0.1409   1572111. -5695.1238  -0.004567      0.000  2.123E+10  -315.8488
13449.      0.000
    138.000    0.1148   1541900. -7542.9789  -0.004127      0.000  2.123E+10  -300.1029
15680.      0.000
    144.000    0.0914   1499917. -9293.6255  -0.003697      0.000  2.123E+10  -283.4460
18610.      0.000
    150.000    0.0705   1446789.    -10941.  -0.003280      0.000  2.123E+10  -265.6232
22613.      0.000
    156.000    0.0520   1383191.    -12476.  -0.002880      0.000  2.123E+10  -246.2104
28395.      0.000
    162.000    0.0359   1309861.    -13888.  -0.002500      0.000  2.123E+10  -224.4306
37491.      0.000
    168.000    0.0220   1227630.    -15157.  -0.002141      0.000  2.123E+10  -198.6190
54093.      0.000
    174.000    0.0102   1137478.    -15757.  -0.001807      0.000  2.123E+10    -1.1844
694.9006      0.000
    180.000  0.000352   1046569.    -15760.  -0.001498      0.000  2.123E+10    -0.0272
463.4002      0.000
    186.000 -0.007749    955003.    -15757.  -0.001215      0.000  2.123E+10     1.0628
822.9379      0.000
    192.000   -0.0142    862876.    -15747.  -0.000958      0.000  2.123E+10     2.3517
991.6563      0.000
    198.000   -0.0192    770292.    -15729.  -0.000727      0.000  2.123E+10     3.6459
1136.6179      0.000
    204.000   -0.0230    677356.    -15704.  -0.000523      0.000  2.123E+10     4.8800
1275.4417      0.000
    210.000   -0.0255    584171.    -15211.  -0.000344      0.000  2.123E+10   159.1472
37419.      0.000
    216.000   -0.0271    496348.    -14209.  -0.000192      0.000  2.123E+10   175.1507
38794.      0.000
    222.000   -0.0278    414519.    -13124. -6.295E-05      0.000  2.123E+10   186.2382
40168.      0.000
    228.000   -0.0278    339135.    -11987.  4.357E-05      0.000  2.123E+10   192.7922
41543.      0.000
    234.000   -0.0273    270478.    -10823.   0.000130      0.000  2.123E+10   195.2440
42917.      0.000
    240.000   -0.0263    208680. -9655.2816   0.000197      0.000  2.123E+10   194.0580
44292.      0.000
    246.000   -0.0249    153738. -8503.9578   0.000249      0.000  2.123E+10   189.7166
45666.      0.000
    252.000   -0.0233    105529. -7386.6868   0.000285      0.000  2.123E+10   182.7071
47041.      0.000
    258.000   -0.0215     63831. -6318.0355   0.000309      0.000  2.123E+10   173.5100
48415.      0.000
    264.000   -0.0196     28339. -5309.7374   0.000322      0.000  2.123E+10   162.5893
49790.      0.000
    270.000   -0.0176 -1316.8034 -4370.8176   0.000326      0.000  2.123E+10   150.3839
51164.      0.000
    276.000   -0.0157    -25558. -3507.7627   0.000322      0.000  2.123E+10   137.3011
52538.      0.000
    282.000   -0.0138    -44841. -2724.7240   0.000312      0.000  2.123E+10   123.7118
53913.      0.000
    288.000   -0.0119    -59642. -2023.7464   0.000298      0.000  2.123E+10   109.9473
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								55287.	0.000
294.000	-0.0102	-70447.	-1405.0137	0.000279	0.000	2.123E+10	96.2969	56662.	0.000
300.000	-0.008582	-77742.	-867.1011	0.000258	0.000	2.123E+10	83.0073	58036.	0.000
306.000	-0.007098	-81999.	-407.2299	0.000236	0.000	2.123E+10	70.2831	59411.	0.000
312.000	-0.005754	-83675.	-21.5161	0.000212	0.000	2.123E+10	58.2882	60785.	0.000
318.000	-0.004551	-83200.	294.7907	0.000189	0.000	2.123E+10	47.1474	62160.	0.000
324.000	-0.003489	-80975.	547.0826	0.000165	0.000	2.123E+10	36.9499	63534.	0.000
330.000	-0.002565	-77369.	741.1875	0.000143	0.000	2.123E+10	27.7517	64909.	0.000
336.000	-0.001772	-72716.	883.1822	0.000122	0.000	2.123E+10	19.5798	66283.	0.000
342.000	-0.001103	-67312.	979.2273	0.000102	0.000	2.123E+10	12.4352	67658.	0.000
348.000	-0.000547	-61419.	1035.4252	8.389E-05	0.000	2.123E+10	6.2974	69032.	0.000
354.000	-9.607E-05	-55260.	1057.6994	6.740E-05	0.000	2.123E+10	1.1274	70407.	0.000
360.000	0.000261	-49025.	1051.6971	5.266E-05	0.000	2.123E+10	-3.1282	71781.	0.000
366.000	0.000536	-42873.	1022.7116	3.967E-05	0.000	2.123E+10	-6.5337	73156.	0.000
372.000	0.000738	-36929.	975.6252	2.840E-05	0.000	2.123E+10	-9.1618	74530.	0.000
378.000	0.000877	-31292.	914.8702	1.875E-05	0.000	2.123E+10	-11.0899	75904.	0.000
384.000	0.000963	-26034.	844.4061	1.065E-05	0.000	2.123E+10	-12.3982	77279.	0.000
390.000	0.001004	-21206.	767.7106	3.975E-06	0.000	2.123E+10	-13.1670	78653.	0.000
396.000	0.001010	-16839.	687.7834	-1.402E-06	0.000	2.123E+10	-13.4754	80028.	0.000
402.000	0.000988	-12946.	607.1607	-5.612E-06	0.000	2.123E+10	-13.3989	81402.	0.000
408.000	0.000943	-9528.1448	527.9366	-8.789E-06	0.000	2.123E+10	-13.0091	82777.	0.000
414.000	0.000882	-6572.1894	451.7925	-1.106E-05	0.000	2.123E+10	-12.3722	84151.	0.000
420.000	0.000810	-4057.5107	380.0299	-1.257E-05	0.000	2.123E+10	-11.5486	85526.	0.000
426.000	0.000731	-1956.0364	313.6069	-1.342E-05	0.000	2.123E+10	-10.5924	86900.	0.000
432.000	0.000649	-234.6598	253.1763	-1.373E-05	0.000	2.123E+10	-9.5512	88275.	0.000
438.000	0.000567	1143.0217	199.1235	-1.360E-05	0.000	2.123E+10	-8.4664	89649.	0.000
444.000	0.000486	2215.1955	151.6047	-1.312E-05	0.000	2.123E+10	-7.3732	91024.	0.000
450.000	0.000409	3020.5435	110.5822	-1.238E-05	0.000	2.123E+10	-6.3009	92398.	0.000
456.000	0.000337	3597.1620	75.8588	-1.145E-05	0.000	2.123E+10	-5.2735	93773.	0.000
462.000	0.000272	3981.6762	47.1082	-1.038E-05	0.000	2.123E+10	-4.3100	95147.	0.000
468.000	0.000213	4208.5320	23.9032	-9.219E-06	0.000	2.123E+10	-3.4250	96522.	0.000
474.000	0.000161	4309.4463	5.7396	-8.015E-06	0.000	2.123E+10	-2.6295	97896.	0.000
480.000	0.000117	4312.9934	-7.9428	-6.796E-06	0.000	2.123E+10	-1.9313	99270.	0.000
486.000	7.961E-05	4244.3089	-17.7425	-5.587E-06	0.000	2.123E+10	-1.3353	100645.	0.000
492.000	4.968E-05	4124.8894	-24.2828	-4.404E-06	0.000	2.123E+10	-0.8448	102019.	0.000
498.000	2.676E-05	3972.4695	-61.4082	-3.260E-06	0.000	2.123E+10	-11.5304		

								2585595.	0.000
504.000	1.057E-05	3402.4636	-109.6610	-2.217E-06	0.000	2.123E+10	-4.5539	2585595.	0.000
510.000	1.489E-07	2666.3827	-123.5151	-1.360E-06	0.000	2.123E+10	-0.0642	2585595.	0.000
516.000	-5.748E-06	1926.3187	-116.2772	-7.105E-07	0.000	2.123E+10	2.4768	2585595.	0.000
522.000	-8.377E-06	1274.2108	-98.0171	-2.581E-07	0.000	2.123E+10	3.6099	2585595.	0.000
528.000	-8.845E-06	751.2591	-75.7524	2.813E-08	0.000	2.123E+10	3.8117	2585595.	0.000
534.000	-8.039E-06	365.0567	-53.9241	1.859E-07	0.000	2.123E+10	3.4644	2585595.	0.000
540.000	-6.614E-06	103.3445	-34.9798	2.521E-07	0.000	2.123E+10	2.8503	2585595.	0.000
546.000	-5.014E-06	-55.8200	-19.9465	2.588E-07	0.000	2.123E+10	2.1607	2585595.	0.000
552.000	-3.509E-06	-137.1626	-8.9284	2.315E-07	0.000	2.123E+10	1.5119	2585595.	0.000
558.000	-2.236E-06	-163.9893	-1.5025	1.890E-07	0.000	2.123E+10	0.9634	2585595.	0.000
564.000	-1.241E-06	-156.0313	2.9917	1.438E-07	0.000	2.123E+10	0.5347	2585595.	0.000
570.000	-5.105E-07	-128.7272	5.2557	1.035E-07	0.000	2.123E+10	0.2200	2585595.	0.000
576.000	1.338E-09	-93.4219	5.9140	7.211E-08	0.000	2.123E+10	-0.000576	2585595.	0.000
582.000	3.548E-07	-58.0788	5.4537	5.070E-08	0.000	2.123E+10	-0.1529	2585595.	0.000
588.000	6.097E-07	-28.2030	4.2068	3.850E-08	0.000	2.123E+10	-0.2627	2585595.	0.000
594.000	8.168E-07	-7.7682	2.3626	3.342E-08	0.000	2.123E+10	-0.3520	2585595.	0.000
600.000	1.011E-06	0.000	0.000	3.232E-08	0.000	2.123E+10	-0.4356	1292798.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

```
Pile-head deflection             =      1.2969741 inches
Computed slope at pile head      =     -0.0112588 radians
Maximum bending moment           =       1594912. inch-lbs
Maximum shear force              =         20000. lbs
Depth of maximum bending moment  =    120.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             74
Number of zero deflection points =              4
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 4

Pile-head conditions are Shear and Moment (Loading Type 1)

```
Horizontal shear force at pile head              =       25000.000 lbs
Applied moment at pile head                      =           0.000 in-lbs
Axial thrust load on pile head                   =      370000.000 lbs
```


Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	2.1372	-2.618E-07	25000.	-0.0170	0.000	2.123E+10	-458.8277	644.0485	0.000
6.000	2.0350	179564.	23334.	-0.0170	0.000	2.123E+10	-96.4520	284.3781	0.000
12.000	1.9331	355544.	22755.	-0.0169	0.000	2.123E+10	-96.4520	299.3717	0.000
18.000	1.8318	527828.	21467.	-0.0168	0.000	2.123E+10	-332.9956	1090.7330	0.000
24.000	1.7313	687793.	20096.	-0.0166	0.000	2.123E+10	-124.1016	430.0747	0.000
30.000	1.6321	842859.	19346.	-0.0164	0.000	2.123E+10	-125.7809	462.4033	0.000
36.000	1.5343	992868.	18587.	-0.0162	0.000	2.123E+10	-127.2299	497.5535	0.000
42.000	1.4381	1137673.	17822.	-0.0159	0.000	2.123E+10	-127.6712	532.6572	0.000
48.000	1.3439	1277168.	17065.	-0.0155	0.000	2.123E+10	-124.8200	557.2692	0.000
54.000	1.2519	1411369.	16050.	-0.0151	0.000	2.123E+10	-213.3358	1022.4872	0.000
60.000	1.1622	1537003.	14620.	-0.0147	0.000	2.123E+10	-263.5619	1360.6582	0.000
66.000	1.0752	1652185.	13037.	-0.0143	0.000	2.123E+10	-263.9096	1472.7589	0.000
72.000	0.9909	1756830.	11454.	-0.0138	0.000	2.123E+10	-263.7371	1596.9233	0.000
78.000	0.9097	1850877.	9893.9294	-0.0133	0.000	2.123E+10	-256.4338	1691.4137	0.000
84.000	0.8315	1934531.	8378.0128	-0.0127	0.000	2.123E+10	-248.8718	1795.7644	0.000
90.000	0.7567	2008012.	6907.8905	-0.0122	0.000	2.123E+10	-241.1690	1912.3082	0.000
96.000	0.6852	2071551.	5484.4021	-0.0116	0.000	2.123E+10	-233.3272	2043.0097	0.000
102.000	0.6173	2125390.	4108.3770	-0.0110	0.000	2.123E+10	-225.3478	2190.2543	0.000
108.000	0.5530	2169783.	2780.6359	-0.0104	0.000	2.123E+10	-217.2325	2356.9590	0.000
114.000	0.4924	2204994.	1249.5602	-0.009795	0.000	2.123E+10	-293.1261	3572.1121	0.000
120.000	0.4355	2228268.	-886.1426	-0.009169	0.000	2.123E+10	-418.7749	5770.1542	0.000
126.000	0.3823	2235069.	-3358.5879	-0.008538	0.000	2.123E+10	-405.3735	6361.5622	0.000
132.000	0.3330	2225873.	-5749.5465	-0.007907	0.000	2.123E+10	-391.6127	7056.0324	0.000
138.000	0.2874	2201183.	-8056.7990	-0.007282	0.000	2.123E+10	-377.4715	7879.1457	0.000
144.000	0.2456	2161522.	-10278.	-0.006665	0.000	2.123E+10	-362.9214	8865.3335	0.000
150.000	0.2075	2107440.	-12411.	-0.006062	0.000	2.123E+10	-347.9223	10062.	0.000
156.000	0.1729	2039510.	-14452.	-0.005476	0.000	2.123E+10	-332.4175	11537.	0.000
162.000	0.1418	1958333.	-16398.	-0.004911	0.000	2.123E+10	-316.3253	13389.	0.000
168.000	0.1140	1864539.	-18245.	-0.004370	0.000	2.123E+10	-299.5239	15770.	0.000
174.000	0.0893	1758793.	-19188.	-0.003858	0.000	2.123E+10	-14.6119	981.5873	0.000
180.000	0.0677	1651417.	-19266.	-0.003376	0.000	2.123E+10	-11.5887	1027.7005	0.000

186.000	0.0488	1542587.	-19327.	-0.002925	0.000	2.123E+10	-8.7162	1071.6239	0.000
192.000	0.0326	1432476.	-19371.	-0.002504	0.000	2.123E+10	-6.0220	1109.6651	0.000
198.000	0.0188	1321249.	-19400.	-0.002115	0.000	2.123E+10	-3.5401	1132.8061	0.000
204.000	0.007181	1209066.	-19415.	-0.001757	0.000	2.123E+10	-1.3261	1108.0664	0.000
210.000	-0.002339	1096075.	-19375.	-0.001432	0.000	2.123E+10	14.5866	37419.	0.000
216.000	-0.009999	982923.	-19137.	-0.001138	0.000	2.123E+10	64.6521	38794.	0.000
222.000	-0.0160	871481.	-18622.	-0.000876	0.000	2.123E+10	107.0668	40168.	0.000
228.000	-0.0205	763346.	-17875.	-0.000645	0.000	2.123E+10	141.9939	41543.	0.000
234.000	-0.0237	659844.	-16940.	-0.000444	0.000	2.123E+10	169.7293	42917.	0.000
240.000	-0.0258	562039.	-15858.	-0.000271	0.000	2.123E+10	190.6791	44292.	0.000
246.000	-0.0270	470745.	-14670.	-0.000125	0.000	2.123E+10	205.3368	45666.	0.000
252.000	-0.0273	386548.	-13412.	-3.703E-06	0.000	2.123E+10	214.2612	47041.	0.000
258.000	-0.0270	309821.	-12115.	9.472E-05	0.000	2.123E+10	218.0560	48415.	0.000
264.000	-0.0262	240751.	-10808.	0.000173	0.000	2.123E+10	217.3503	49790.	0.000
270.000	-0.0250	179354.	-9518.0875	0.000232	0.000	2.123E+10	212.7820	51164.	0.000
276.000	-0.0234	125504.	-8264.7945	0.000275	0.000	2.123E+10	204.9823	52538.	0.000
282.000	-0.0217	78955.	-7066.1589	0.000304	0.000	2.123E+10	194.5629	53913.	0.000
288.000	-0.0198	39361.	-5936.1560	0.000321	0.000	2.123E+10	182.1048	55287.	0.000
294.000	-0.0178	6297.6872	-4885.3909	0.000327	0.000	2.123E+10	168.1502	56662.	0.000
300.000	-0.0158	-20716.	-3921.3530	0.000325	0.000	2.123E+10	153.1957	58036.	0.000
306.000	-0.0139	-42202.	-3048.7032	0.000316	0.000	2.123E+10	137.6876	59411.	0.000
312.000	-0.0120	-58704.	-2269.5831	0.000302	0.000	2.123E+10	122.0191	60785.	0.000
318.000	-0.0103	-70777.	-1583.9374	0.000284	0.000	2.123E+10	106.5295	62160.	0.000
324.000	-0.008641	-78970.	-989.8374	0.000262	0.000	2.123E+10	91.5039	63534.	0.000
330.000	-0.007134	-83820.	-483.8002	0.000239	0.000	2.123E+10	77.1752	64909.	0.000
336.000	-0.005769	-85839.	-61.0958	0.000215	0.000	2.123E+10	63.7263	66283.	0.000
342.000	-0.004549	-85510.	283.9635	0.000191	0.000	2.123E+10	51.2935	67658.	0.000
348.000	-0.003474	-83280.	557.7553	0.000167	0.000	2.123E+10	39.9704	69032.	0.000
354.000	-0.002541	-79560.	767.1039	0.000144	0.000	2.123E+10	29.8124	70407.	0.000
360.000	-0.001742	-74716.	919.0641	0.000123	0.000	2.123E+10	20.8410	71781.	0.000
366.000	-0.001070	-69075.	1020.7333	0.000102	0.000	2.123E+10	13.0487	73156.	0.000
372.000	-0.000516	-62921.	1079.0913	8.355E-05	0.000	2.123E+10	6.4039	74530.	0.000
378.000	-6.758E-05	-56497.	1100.8680	6.668E-05	0.000	2.123E+10	0.8550	75904.	0.000
384.000	0.000285	-50007.	1092.4377	5.162E-05	0.000	2.123E+10	-3.6651	77279.	0.000
390.000	0.000552	-43617.	1059.7386	3.839E-05	0.000	2.123E+10	-7.2346	78653.	0.000

```
   396.000   0.000745    -37460.  1008.2145  2.693E-05       0.000  2.123E+10    -9.9400
80028.       0.000
   402.000   0.000875    -31638.   942.7782  1.717E-05       0.000  2.123E+10   -11.8721
81402.       0.000
   408.000   0.000951    -26223.   867.7920  8.988E-06       0.000  2.123E+10   -13.1233
82777.       0.000
   414.000   0.000983    -21264.   787.0652  2.276E-06       0.000  2.123E+10   -13.7857
84151.       0.000
   420.000   0.000979    -16788.   703.8628 -3.102E-06       0.000  2.123E+10   -13.9485
85526.       0.000
   426.000   0.000946    -12804.   620.9267 -7.284E-06       0.000  2.123E+10   -13.6969
86900.       0.000
   432.000   0.000891 -9304.9218   540.5039 -1.041E-05       0.000  2.123E+10   -13.1107
88275.       0.000
   438.000   0.000821 -6271.8645   464.3801 -1.261E-05       0.000  2.123E+10   -12.2638
89649.       0.000
   444.000   0.000740 -3676.3691   393.9188 -1.402E-05       0.000  2.123E+10   -11.2233
91024.       0.000
   450.000   0.000653 -1482.6054   330.0999 -1.475E-05       0.000  2.123E+10   -10.0496
92398.       0.000
   456.000   0.000563   350.3013   273.5607 -1.491E-05       0.000  2.123E+10    -8.7967
93773.       0.000
   462.000   0.000474  1866.3054   224.6341 -1.459E-05       0.000  2.123E+10    -7.5121
95147.       0.000
   468.000   0.000388  3110.7011   183.3847 -1.389E-05       0.000  2.123E+10    -6.2376
96522.       0.000
   474.000   0.000307  4128.5900   149.6424 -1.287E-05       0.000  2.123E+10    -5.0098
97896.       0.000
   480.000   0.000233  4963.5351   123.0304 -1.158E-05       0.000  2.123E+10    -3.8609
99270.       0.000
   486.000   0.000168  5656.3746   102.9898 -1.008E-05       0.000  2.123E+10    -2.8194
100645.      0.000
   492.000   0.000112  6244.1677    88.7985 -8.398E-06       0.000  2.123E+10    -1.9111
102019.      0.000
   498.000  6.730E-05  6759.2442    -3.9414 -6.560E-06       0.000  2.123E+10   -29.0022
2585595.     0.000
   504.000  3.367E-05  6225.9982  -134.4790 -4.725E-06       0.000  2.123E+10   -14.5103
2585595.     0.000
   510.000  1.060E-05  5166.4750  -191.7159 -3.115E-06       0.000  2.123E+10    -4.5687
2585595.     0.000
   516.000 -3.706E-06  3939.2368  -200.6313 -1.828E-06       0.000  2.123E+10     1.5969
2585595.     0.000
   522.000 -1.133E-05  2767.0151  -181.1903 -8.800E-07       0.000  2.123E+10     4.8834
2585595.     0.000
   528.000 -1.427E-05  1768.8608  -148.0970 -2.389E-07       0.000  2.123E+10     6.1477
2585595.     0.000
   534.000 -1.420E-05   990.9123  -111.2967  1.511E-07       0.000  2.123E+10     6.1191
2585595.     0.000
   540.000 -1.245E-05   432.6290   -76.8406  3.523E-07       0.000  2.123E+10     5.3663
2585595.     0.000
   546.000 -9.972E-06    67.2604   -47.8499  4.229E-07       0.000  2.123E+10     4.2973
2585595.     0.000
   552.000 -7.377E-06  -143.4480   -25.4207  4.122E-07       0.000  2.123E+10     3.1791
2585595.     0.000
   558.000 -5.026E-06  -239.6175    -9.3858  3.580E-07       0.000  2.123E+10     2.1658
2585595.     0.000
   564.000 -3.081E-06  -257.6670     1.0946  2.878E-07       0.000  2.123E+10     1.3276
2585595.     0.000
   570.000 -1.573E-06  -227.7598     7.1109  2.191E-07       0.000  2.123E+10     0.6778
2585595.     0.000
   576.000 -4.511E-07  -173.3097     9.7273  1.625E-07       0.000  2.123E+10     0.1944
2585595.     0.000
   582.000  3.768E-07  -111.7535     9.8233  1.222E-07       0.000  2.123E+10    -0.1624
2585595.     0.000
   588.000  1.015E-06   -55.9721     8.0240  9.847E-08       0.000  2.123E+10    -0.4374
2585595.     0.000
   594.000  1.558E-06   -15.9027     4.6970  8.831E-08       0.000  2.123E+10    -0.6716
2585595.     0.000
   600.000  2.075E-06      0.000      0.000  8.606E-08       0.000  2.123E+10    -0.8941
1292798.     0.000
```



```
* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not equal
the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence limits.


Output Summary for Load Case No. 4:

Pile-head deflection             =      2.1372352 inches
Computed slope at pile head      =     -0.0170375 radians
Maximum bending moment           =       2235069. inch-lbs
Maximum shear force              =         25000. lbs
Depth of maximum bending moment  =    126.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             35
Number of zero deflection points =              4



--------------------------------------------------------------------------------
                              Summary of Pile Response(s)
--------------------------------------------------------------------------------


Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians


Load  Load    Condition 1    Condition 2        Axial        Pile-Head       Maximum
Maximum       Pile-Head
Case  Type    V(lbs) or     in-lb, rad.,        Load        Deflection       Moment
Shear        Rotation
 No.   No.     y(inches)     or in-lb/rad.        lbs          inches         in-lbs
lbs          radians
----  ----  --------------  --------------  -------------  -------------  -------------
-------------  -------------
  1     1   V = 10000.0000  M =      0.000        370000.     0.10171703        242021.
10000.0000     -0.00129197
  2     1   V =     15000.  M =      0.000        370000.     0.28663941        507906.
  15000.     -0.00312103
  3     1   V =     20000.  M =      0.000        370000.     1.29697409       1594912.
  20000.     -0.01125875
  4     1   V =     25000.  M =      0.000        370000.     2.13723516       2235069.
  25000.     -0.01703754

The analysis ended normally.
```

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24
Job Number: 2006-139-UPR
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
4 = Section type =  steel pipe
 5.00000000000000E+0001 = Section length (ft)
 1.40000000000000E+0001 = Pipe pile diameter (in)
 4.38000000000000E-0001 = Pipe wall thickness (in)
 4.50000000000000E+0004 = yield stress of pipe (psi)
 2.90000000000000E+0007 = modulus of pipe (psi)
SOIL LAYERS
8 = number of soil layers
3       -2.00000000000000E+0000  6.50000000000000E+0000 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 1.25000000000000E+0002  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
2        6.50000000000000E+0000  7.50000000000000E+0000 = soil type index for stf clay w/
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000
0.00000000000000E+0000 = top gamma (pcf), c (psf), e50, k (pci) for stiff clay w/ free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000
0.00000000000000E+0000 = bot gamma (pcf), c (psf), e50, k (pci) for stiff clay w/ free water
1        7.50000000000000E+0000  1.05000000000000E+0001 = soil type index for soft clay, Xtop
(ft), Xbot(ft)
 6.26000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for soft clay
 6.26000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for soft clay
1        1.05000000000000E+0001  1.55000000000000E+0001 = soil type index for soft clay, Xtop
(ft), Xbot(ft)
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for soft clay
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for soft clay
3        1.55000000000000E+0001  2.05000000000000E+0001 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
7        2.05000000000000E+0001  2.35000000000000E+0001 = soil type index for liq. sand, Xtop
(ft), Xbot(ft)
 6.26000000000000E+0001 = top gamma (pcf) for liquefied sand
 6.26000000000000E+0001 = bot gamma (pcf) for liquefied sand
5        2.35000000000000E+0001  4.75000000000000E+0001 = soil type index for sand , Xtop
```

```
(ft), Xbot(ft)
 6.26000000000000E+0001  3.40000000000000E+0001  0.00000000000000E+0000 = top gamma (pcf), c
(psf), k (pci) for sand
 6.26000000000000E+0001  3.40000000000000E+0001  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), k (pci) for sand
3        4.75000000000000E+0001  6.15000000000000E+0001 = soil type index for stf clay no
water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma (pcf), c
(psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma (pcf), c
(psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1       -2.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 = point#,
depth (ft), p-multipler, y-multiplier
2        6.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 = point#,
depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000  1.30000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
2       1        1.50000000000000E+0004  0.00000000000000E+0000  1.30000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
3       1        2.00000000000000E+0004  0.00000000000000E+0000  1.30000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
4       1        3.00000000000000E+0004  0.00000000000000E+0000  1.30000000000000E+0005 1 :
Load#; BC1:Shear (lb), Moment (in-lb);          Axial Load (lb); Compute Top y vs L: 1=no,
2=yes
0 = number of distributed loading points
END
```

LPile Plus for Windows, Version 6.0 (6.0.12)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

LT
PCI

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT_Nov 2011\Analyses\
Name of input data file: San Leandro Creek BOH (A24).lp6d
Name of output file: San Leandro Creek BOH (A24).lp6o
Name of plot output file: San Leandro Creek BOH (A24).lp6p
Name of runtime file: San Leandro Creek BOH (A24).lp6r

Date and Time of Analysis

Date: February 23, 2012 Time: 15:00:26

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - ABUTMENT 24

Job Number: 2006-139-UPR

Client: R&M

Engineer: LT

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal moment capacity with pile response computed using nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 50.00 ft

Depth of ground surface below top of pile = -2.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	14.0000000
2	50.000000	14.0000000

Input Structural Properties:

Section No. 1:

Section Type = Steel Pipe Pile
Section Length = 50.000 ft
Pile Diameter = 14.000 in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 8 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -2.000 ft
Distance from top of pile to bottom of layer = 6.500 ft

Layer 2 is stiff clay with water-induced erosion

Distance from top of pile to top of layer = 6.500 ft
Distance from top of pile to bottom of layer = 7.500 ft
p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 7.500 ft
Distance from top of pile to bottom of layer = 10.500 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 10.500 ft
Distance from top of pile to bottom of layer = 15.500 ft

Layer 5 is stiff clay without free water

Distance from top of pile to top of layer = 15.500 ft
Distance from top of pile to bottom of layer = 20.500 ft

Layer 6 is liquefiable sand, by Rollins et al., 2004

Distance from top of pile to top of layer = 20.500 ft
Distance from top of pile to bottom of layer = 23.500 ft

Layer 7 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 23.500 ft
Distance from top of pile to bottom of layer = 47.500 ft
p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 8 is stiff clay without free water

Distance from top of pile to top of layer = 47.500 ft
Distance from top of pile to bottom of layer = 61.500 ft

(Depth of lowest layer extends 11.50 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 16 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-2.00	125.00000
2	6.50	125.00000
3	6.50	62.60000
4	7.50	62.60000
5	7.50	62.60000
6	10.50	62.60000
7	10.50	62.60000
8	15.50	62.60000
9	15.50	62.60000
10	20.50	62.60000
11	20.50	62.60000
12	23.50	62.60000
13	23.50	62.60000
14	47.50	62.60000
15	47.50	62.60000
16	61.50	62.60000

Summary of Soil Properties

```
Layer               Soil Type                Depth     Eff. Unit     Cohesion     Friction
      qu          RQD      Epsilon 50      kpy        Rock Emass      krm       Test Type
Test Prop.   Elas. Subgr.
 Num.         (p-y Curve Criteria)             ft       Wt., pcf         psf      Ang.,
deg.       psi        percent                  pci           psi
                     pci
-----   --------------------------------   ----------   ----------   ----------
----------   ----------   ----------   ----------   ----------   ----------   ----------
----------   ----------   ------------
  1     Stiff Clay w/o Free Water              -2.000      125.000     1500.000      --
      --           --              0.00      --           --           --           --
   --          --
                                                6.500      125.000     1500.000      --
      --           --              0.00      --           --           --           --
   --          --
  2     Stiff Clay with Free Water              6.500       62.600     1500.000      --
      --           --              0.00     default       --           --           --
   --          --
                                                7.500       62.600     1500.000      --
      --           --              0.00     default       --           --           --
   --          --
  3     Soft Clay                               7.500       62.600      350.000      --
      --           --              0.00      --           --           --           --
   --          --
                                               10.500       62.600      350.000      --
      --           --              0.00      --           --           --           --
   --          --
  4     Soft Clay                              10.500       62.600      650.000      --
      --           --              0.00      --           --           --           --
   --          --
                                               15.500       62.600      650.000      --
      --           --              0.00      --           --           --           --
   --          --
  5     Stiff Clay w/o Free Water              15.500       62.600     1250.000      --
      --           --              0.00      --           --           --           --
   --          --
                                               20.500       62.600     1250.000      --
      --           --              0.00      --           --           --           --
   --          --
  6     Liquefied Sand                         20.500       62.600      --
0.00       --           --           --           --           --           --           --
      --          --
                                               23.500       62.600      --           --
      --           --           --           --           --           --           --
   --          --
  7     Sand (Reese, et al.)                   23.500       62.600      --
34.000       --           --           --        default       --           --           --
```

```
        --          --
                                            47.500       62.600       --
34.000       --          --          --       default        --          --          --
        --          --
  8    Stiff Clay w/o Free Water            47.500       62.600     1500.000       --
     --          --             0.00       --          --          --          --
   --          --
                                            61.500       62.600     1500.000       --
     --          --             0.00       --          --          --          --
   --          --
```

---

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	-2.000	0.6000	1.0000
2	60.000	0.6000	1.0000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 4

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 10000.000 lbs	M = 0.000 in-lbs	130000.000
2	1	V = 15000.000 lbs	M = 0.000 in-lbs	130000.000
3	1	V = 20000.000 lbs	M = 0.000 in-lbs	130000.000
4	1	V = 30000.000 lbs	M = 0.000 in-lbs	130000.000

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Sections Analyzed = 1

Section No. 1:

Dimensions and Properties of Steel Pipe Pile:

Length of Section	=	50.00000000 ft
Outer Diameter of Pipe	=	14.00000000 in
Pipe Wall Thickness	=	0.43800000 in
Yield Stress of Pipe	=	45.00000000 ksi
Elastic Modulus	=	29000. ksi
Cross-sectional Area	=	18.66155045 sq. in.
Moment of Inertia	=	429.49485582 in^4
Elastic Bending Stiffness	=	12455351. lb-in^2
Plastic Modulus, Z	=	80.58840490 in^3
Plastic Moment Capacity = Fy Z	=	3626.47822032 in-kip

Axial Structural Capacities:

Nom. Axial Structural Capacity = Fy As	=	839.770 kips
Nominal Axial Tensile Capacity	=	-839.770 kips

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	130.000

Definition of Run Messages:

Y = part of pipe section has yielded

Axial Thrust Force = 130.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Total Stress psi	Run Msg
0.000004282	53.3291754	12455320.	63.1032019	7.8266759	
0.000008563	106.6583508	12455320.	35.0516009	8.6871569	
0.0000128	159.9875262	12455320.	25.7010673	9.5476376	
0.0000171	213.3167017	12455320.	21.0258005	10.4081185	
0.0000214	266.6458771	12455320.	18.2206404	11.2685994	
0.0000257	319.9750525	12455320.	16.3505336	12.1290803	
0.0000300	373.3042279	12455320.	15.0147431	12.9895612	
0.0000343	426.6334033	12455320.	14.0129002	13.8500421	
0.0000385	479.9625787	12455320.	13.2336891	14.7105229	
0.0000428	533.2917541	12455320.	12.6103202	15.5710038	
0.0000471	586.6209296	12455320.	12.1002911	16.4314847	
0.0000514	639.9501050	12455320.	11.6752668	17.2919655	
0.0000557	693.2792804	12455320.	11.3156309	18.1524464	
0.0000599	746.6084558	12455320.	11.0073716	19.0129273	
0.0000642	799.9376312	12455320.	10.7402135	19.8734082	
0.0000685	853.2668066	12455320.	10.5064501	20.7338890	
0.0000728	906.5959820	12455320.	10.3001883	21.5943699	
0.0000771	959.9251575	12455320.	10.1168445	22.4548508	
0.0000814	1013.2543329	12455320.	9.9528001	23.3153317	
0.0000856	1066.5835083	12455320.	9.8051601	24.1758125	
0.0000899	1119.9126837	12455320.	9.6715810	25.0362934	
0.0000942	1173.2418591	12455320.	9.5501455	25.8967743	
0.0000985	1226.5710345	12455320.	9.4392696	26.7572552	
0.0001028	1279.9002099	12455320.	9.3376334	27.6177360	
0.0001070	1333.2293854	12455320.	9.2441281	28.4782169	
0.0001113	1386.5585608	12455320.	9.1578155	29.3386978	
0.0001156	1439.8877362	12455320.	9.0778964	30.1991787	
0.0001199	1493.2169116	12455320.	9.0036858	31.0596595	
0.0001242	1546.5460870	12455320.	8.9345932	31.9201404	
0.0001284	1599.8752624	12455320.	8.8701067	32.7806213	
0.0001327	1653.2044378	12455320.	8.8097807	33.6411022	

0.0001370	1706.5336133	12455320.	8.7532251	34.5015830	
0.0001413	1759.8627887	12455320.	8.7000970	35.3620639	
0.0001456	1813.1919641	12455320.	8.6500942	36.2225448	
0.0001499	1866.5211395	12455320.	8.6029486	37.0830257	
0.0001541	1919.8503149	12455320.	8.5584223	37.9435065	
0.0001584	1973.1794903	12455320.	8.5163028	38.8039874	
0.0001627	2026.5086657	12455320.	8.4764000	39.6644683	
0.0001670	2079.8378412	12455320.	8.4385436	40.5249492	
0.0001755	2186.4961920	12455320.	8.3683708	42.2459109	
0.0001841	2293.1545428	12455320.	8.3047256	43.9668727	
0.0001927	2398.5533564	12448783.	8.2484809	45.0000000	Y
0.0002012	2492.6335455	12386557.	8.2123891	45.0000000	Y
0.0002098	2573.1551161	12264784.	8.1975189	45.0000000	Y
0.0002184	2645.2506201	12113975.	8.1952036	45.0000000	Y
0.0002269	2710.8515616	11945928.	8.2018557	45.0000000	Y
0.0002355	2771.1308318	11767504.	8.2152373	45.0000000	Y
0.0002441	2826.8065901	11582739.	8.2339287	45.0000000	Y
0.0002526	2878.4498186	11394537.	8.2568430	45.0000000	Y
0.0002612	2926.7752425	11205973.	8.2827756	45.0000000	Y
0.0002697	2971.9959298	11017871.	8.3112908	45.0000000	Y
0.0002783	3014.3496213	10831043.	8.3415466	45.0000000	Y
0.0002869	3052.8451214	10641920.	8.3705049	45.0000000	Y
0.0002954	3087.1705036	10449645.	8.3959829	45.0000000	Y
0.0003040	3116.6691276	10252325.	8.4165591	45.0000000	Y
0.0003126	3142.4841662	10054032.	8.4332828	45.0000000	Y
0.0003211	3165.5511749	9857757.	8.4475710	45.0000000	Y
0.0003297	3186.3756776	9664876.	8.4601168	45.0000000	Y
0.0003382	3205.3294356	9476230.	8.4713585	45.0000000	Y
0.0003468	3222.6502865	9292192.	8.4814476	45.0000000	Y
0.0003554	3238.2676337	9112230.	8.4899237	45.0000000	Y
0.0003639	3252.6384952	8937311.	8.4981372	45.0000000	Y
0.0003725	3266.0477652	8767854.	8.5059347	45.0000000	Y
0.0003811	3278.2185760	8602762.	8.5121018	45.0000000	Y
0.0003896	3289.6733579	8443090.	8.5182846	45.0000000	Y
0.0003982	3300.1544437	8287840.	8.5240899	45.0000000	Y
0.0004068	3309.9970810	8137557.	8.5290823	45.0000000	Y
0.0004153	3319.1907352	7991908.	8.5341179	45.0000000	Y
0.0004239	3327.6633425	7850444.	8.5384485	45.0000000	Y
0.0004324	3335.7731945	7713743.	8.5426357	45.0000000	Y
0.0004410	3343.1623717	7580717.	8.5465264	45.0000000	Y
0.0004496	3350.2913545	7452179.	8.5499975	45.0000000	Y
0.0004581	3356.8448804	7327191.	8.5536261	45.0000000	Y
0.0004667	3363.0869406	7206122.	8.5564874	45.0000000	Y
0.0004753	3369.0188247	7088763.	8.5600000	45.0000000	Y
0.0004838	3374.4600741	6974545.	8.5623382	45.0000000	Y
0.0004924	3379.7604642	6864013.	8.5650839	45.0000000	Y
0.0005010	3384.6739900	6756488.	8.5677444	45.0000000	Y
0.0005095	3389.3936102	6652196.	8.5695666	45.0000000	Y
0.0005438	3405.8491449	6263422.	8.5783020	45.0000000	Y
0.0005780	3419.4232848	5915740.	8.5852348	45.0000000	Y
0.0006123	3430.6422188	5603113.	8.5905794	45.0000000	Y
0.0006465	3440.0604202	5320827.	8.5951744	45.0000000	Y
0.0006808	3447.9785548	5064743.	8.5988318	45.0000000	Y
0.0007150	3454.7769765	4831629.	8.6019458	45.0000000	Y
0.0007493	3460.7518906	4618728.	8.6047064	45.0000000	Y
0.0007835	3465.9112449	4423402.	8.6073516	45.0000000	Y
0.0008178	3470.2953843	4243489.	8.6093701	45.0000000	Y
0.0008520	3474.4383395	4077759.	8.6113022	45.0000000	Y
0.0008863	3477.7284460	3923877.	8.6129091	45.0000000	Y

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip
1	130.000	3477.7

Note that the values in the above table are not factored by a strength reduction factor for LRFD.

The value of the strength reduction factor depends on the provisions of the LRFD code being followed.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to the LRFD structural design standard being followed.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head	=	10000.000 lbs
Applied moment at pile head	=	0.000 in-lbs
Axial thrust load on pile head	=	130000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1394	-9.603E-08	10000.	-0.002244	0.000	1.246E+10	-152.9044	3290.2072	0.000
6.000	0.1260	58998.	9065.6271	-0.002230	0.000	1.246E+10	-158.5533	7553.0065	0.000
12.000	0.1127	112266.	8099.7235	-0.002189	0.000	1.246E+10	-163.4146	8703.2473	0.000
18.000	0.0997	159609.	7107.1668	-0.002123	0.000	1.246E+10	-167.4376	10078.	0.000
24.000	0.0872	200865.	6093.1509	-0.002036	0.000	1.246E+10	-170.5677	11739.	0.000
30.000	0.0753	235904.	5063.2132	-0.001931	0.000	1.246E+10	-172.7448	13774.	0.000
36.000	0.0640	264636.	4023.2770	-0.001811	0.000	1.246E+10	-173.9006	16302.	0.000
42.000	0.0535	287008.	2979.7142	-0.001678	0.000	1.246E+10	-173.9537	19501.	0.000
48.000	0.0439	303010.	1939.4436	-0.001536	0.000	1.246E+10	-172.8032	23634.	0.000
54.000	0.0351	312677.	910.0862	-0.001387	0.000	1.246E+10	-170.3160	29119.	0.000
60.000	0.0272	316095.	-99.7749	-0.001236	0.000	1.246E+10	-166.3044	36656.	0.000
66.000	0.0203	313408.	-1080.1316	-0.001084	0.000	1.246E+10	-160.4812	47522.	0.000
72.000	0.0142	304825.	-2018.6514	-0.000935	0.000	1.246E+10	-152.3587	64336.	0.000
78.000	0.009037	290643.	-2914.2172	-0.000792	0.000	1.246E+10	-146.1632	97044.	0.000
84.000	0.004705	271090.	-3669.1373	-0.000657	0.000	1.246E+10	-105.4768	134510.	0.000
90.000	0.001157	247638.	-4085.6165	-0.000532	0.000	1.246E+10	-33.3496	173019.	0.000
96.000	-0.001676	222892.	-4148.8221	-0.000418	0.000	1.246E+10	12.2810	43961.	0.000
102.000	-0.003865	198505.	-4063.2811	-0.000317	0.000	1.246E+10	16.2327	25202.	0.000
108.000	-0.005479	174627.	-3959.8684	-0.000227	0.000	1.246E+10	18.2383	19971.	0.000

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   114.000  -0.006589    151341. -3846.9657  -0.000149       0.000  1.246E+10    19.3960
17661.       0.000
   120.000  -0.007262    128695. -3728.6722 -8.109E-05       0.000  1.246E+10    20.0352
16554.       0.000
   126.000  -0.007562    106723. -3558.9086 -2.439E-05       0.000  1.246E+10    36.5527
29001.       0.000
   132.000  -0.007555     86027. -3306.7429  2.203E-05       0.000  1.246E+10    47.5026
37728.       0.000
   138.000  -0.007298     67008. -3023.3577  5.889E-05       0.000  1.246E+10    46.9592
38607.       0.000
   144.000  -0.006848     49654. -2744.5603  8.699E-05       0.000  1.246E+10    45.9733
40281.       0.000
   150.000  -0.006254     33937. -2472.8269   0.000107       0.000  1.246E+10    44.6045
42792.       0.000
   156.000  -0.005562     19813. -2210.3273   0.000120       0.000  1.246E+10    42.8953
46271.       0.000
   162.000  -0.004813   7226.1998 -1959.0123   0.000127       0.000  1.246E+10    40.8763
50955.       0.000
   168.000  -0.004043 -3892.1955 -1720.6764   0.000127       0.000  1.246E+10    38.5690
57234.       0.000
   174.000  -0.003285    -13621. -1497.0068   0.000123       0.000  1.246E+10    35.9876
65740.       0.000
   180.000  -0.002565    -22048. -1289.6204   0.000115       0.000  1.246E+10    33.1412
77517.       0.000
   186.000  -0.001910    -29275.  -991.6723   0.000102       0.000  1.246E+10    66.1749
207926.       0.000
   192.000  -0.001339    -34108.  -525.5395  8.695E-05       0.000  1.246E+10    89.2027
399843.       0.000
   198.000  -0.000866    -35717.   -17.9180  7.013E-05       0.000  1.246E+10    80.0044
554212.       0.000
   204.000  -0.000497    -34432.   430.9836  5.324E-05       0.000  1.246E+10    69.6295
840677.       0.000
   210.000  -0.000227    -30628.   884.7318  3.757E-05       0.000  1.246E+10    81.6199
2154663.       0.000
   216.000 -4.614E-05    -23874.  1179.2999  2.444E-05       0.000  1.246E+10    16.5695
2154663.       0.000
   222.000  6.600E-05    -16515.  1157.9059  1.471E-05       0.000  1.246E+10   -23.7008
2154663.       0.000
   228.000  0.000130    -10002.   946.3146  8.325E-06       0.000  1.246E+10   -46.8296
2154663.       0.000
   234.000  0.000166 -5171.9443   627.0960  4.670E-06       0.000  1.246E+10   -59.5766
2154663.       0.000
   240.000  0.000186 -2484.4183   247.5001  2.826E-06       0.000  1.246E+10   -66.9554
2154663.       0.000
   246.000  0.000200 -2206.3516    46.5336  1.696E-06       0.000  1.246E+10    -0.0335
1005.1721       0.000
   252.000  0.000207 -1928.6610    46.3163  7.004E-07       0.000  1.246E+10    -0.0390
1131.0057       0.000
   258.000  0.000208 -1651.6491    46.0674 -1.620E-07       0.000  1.246E+10    -0.0440
1267.1426       0.000
   264.000  0.000205 -1375.5996    45.7905 -8.911E-07       0.000  1.246E+10    -0.0483
1414.8362       0.000
   270.000  0.000198 -1100.7723    45.4900 -1.488E-06       0.000  1.246E+10    -0.0519
1575.3980       0.000
   276.000  0.000187  -827.3986    45.1708 -1.952E-06       0.000  1.246E+10    -0.0546
1750.2532       0.000
   282.000  0.000174  -555.6778    41.7362 -2.285E-06       0.000  1.246E+10    -1.0903
37575.       0.000
   288.000  0.000160  -322.9993    35.3574 -2.497E-06       0.000  1.246E+10    -1.0360
38950.       0.000
   294.000  0.000144  -127.4945    29.3433 -2.605E-06       0.000  1.246E+10    -0.9687
40324.       0.000
   300.000  0.000128    33.1844    23.7617 -2.628E-06       0.000  1.246E+10    -0.8918
41698.       0.000
   306.000  0.000113   161.7455    18.6612 -2.581E-06       0.000  1.246E+10    -0.8084
43073.       0.000
   312.000  9.735E-05   261.1448    14.0726 -2.479E-06       0.000  1.246E+10    -0.7212
44447.       0.000
   318.000  8.285E-05   334.4840    10.0108 -2.336E-06       0.000  1.246E+10    -0.6327
45822.       0.000
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   324.000  6.932E-05   384.9186     6.4767 -2.162E-06       0.000  1.246E+10    -0.5453
47196.       0.000
   330.000  5.690E-05   415.5779     3.4589 -1.970E-06       0.000  1.246E+10    -0.4606
48571.       0.000
   336.000  4.569E-05   429.4980     0.9361 -1.766E-06       0.000  1.246E+10    -0.3803
49945.       0.000
   342.000  3.571E-05   429.5657    -1.1212 -1.559E-06       0.000  1.246E+10    -0.3054
51320.       0.000
   348.000  2.698E-05   418.4760    -2.7483 -1.355E-06       0.000  1.246E+10    -0.2369
52694.       0.000
   354.000  1.945E-05   398.7001    -3.9849 -1.158E-06       0.000  1.246E+10    -0.1753
54069.       0.000
   360.000  1.308E-05   372.4642    -4.8733 -9.724E-07       0.000  1.246E+10    -0.1209
55443.       0.000
   366.000  7.783E-06   341.7374    -5.4570 -8.003E-07       0.000  1.246E+10    -0.0737
56818.       0.000
   372.000  3.475E-06   308.2289    -5.7792 -6.438E-07       0.000  1.246E+10    -0.0337
58192.       0.000
   378.000  5.779E-08   273.3912    -5.8820 -5.037E-07       0.000  1.246E+10  -0.000574
59567.       0.000
   384.000 -2.569E-06   238.4302    -5.8055 -3.804E-07       0.000  1.246E+10     0.0261
60941.       0.000
   390.000 -4.507E-06   204.3190    -5.5868 -2.738E-07       0.000  1.246E+10     0.0468
62316.       0.000
   396.000 -5.855E-06   171.8163    -5.2599 -1.832E-07       0.000  1.246E+10     0.0621
63690.       0.000
   402.000 -6.705E-06   141.4862    -4.8553 -1.077E-07       0.000  1.246E+10     0.0727
65064.       0.000
   408.000 -7.147E-06   113.7207    -4.3997 -4.625E-08       0.000  1.246E+10     0.0791
66439.       0.000
   414.000 -7.260E-06    88.7615    -3.9161  2.524E-09       0.000  1.246E+10     0.0821
67813.       0.000
   420.000 -7.117E-06    66.7231    -3.4238  3.997E-08       0.000  1.246E+10     0.0821
69188.       0.000
   426.000 -6.781E-06    47.6140    -2.9383  6.751E-08       0.000  1.246E+10     0.0797
70562.       0.000
   432.000 -6.307E-06    31.3577    -2.4723  8.653E-08       0.000  1.246E+10     0.0756
71937.       0.000
   438.000 -5.742E-06    17.8118    -2.0349  9.838E-08       0.000  1.246E+10     0.0702
73311.       0.000
   444.000 -5.126E-06     6.7850    -1.6330  1.043E-07       0.000  1.246E+10     0.0638
74686.       0.000
   450.000 -4.491E-06    -1.9473    -1.2708  1.055E-07       0.000  1.246E+10     0.0569
76060.       0.000
   456.000 -3.861E-06    -8.6295    -0.9506  1.029E-07       0.000  1.246E+10     0.0498
77435.       0.000
   462.000 -3.256E-06   -13.5148    -0.6728  9.759E-08       0.000  1.246E+10     0.0428
78809.       0.000
   468.000 -2.690E-06   -16.8556    -0.4367  9.027E-08       0.000  1.246E+10     0.0359
80184.       0.000
   474.000 -2.172E-06   -18.8962    -0.2403  8.166E-08       0.000  1.246E+10     0.0295
81558.       0.000
   480.000 -1.710E-06   -19.8666    -0.0808  7.232E-08       0.000  1.246E+10     0.0236
82933.       0.000
   486.000 -1.304E-06   -19.9789     0.0451  6.273E-08       0.000  1.246E+10     0.0183
84307.       0.000
   492.000 -9.569E-07   -19.4238     0.1410  5.324E-08       0.000  1.246E+10     0.0137
85682.       0.000
   498.000 -6.656E-07   -18.3695     0.2110  4.413E-08       0.000  1.246E+10  0.009657
87056.       0.000
   504.000 -4.273E-07   -16.9606     0.2589  3.562E-08       0.000  1.246E+10  0.006298
88430.       0.000
   510.000 -2.381E-07   -15.3186     0.2885  2.785E-08       0.000  1.246E+10  0.003564
89805.       0.000
   516.000 -9.317E-08   -13.5426     0.3034  2.090E-08       0.000  1.246E+10  0.001416
91179.       0.000
   522.000  1.264E-08   -11.7105     0.3071  1.481E-08       0.000  1.246E+10 -0.000195
92554.       0.000
   528.000  8.460E-08    -9.8810     0.3025  9.613E-09       0.000  1.246E+10 -0.001324
93928.       0.000
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   534.000  1.280E-07    -8.0955     0.2924  5.284E-09       0.000  1.246E+10  -0.002033
95303.       0.000
   540.000  1.480E-07    -6.3801     0.2792  1.797E-09       0.000  1.246E+10  -0.002385
96677.       0.000
   546.000  1.496E-07    -4.7482     0.2647 -8.835E-10       0.000  1.246E+10  -0.002444
98052.       0.000
   552.000  1.374E-07    -3.2025     0.2505 -2.798E-09       0.000  1.246E+10  -0.002277
99426.       0.000
   558.000  1.160E-07    -1.7375     0.2378 -3.988E-09       0.000  1.246E+10  -0.001949
100801.       0.000
   564.000  8.954E-08    -0.3421     0.2274 -4.489E-09       0.000  1.246E+10  -0.001525
102175.       0.000
   570.000  6.211E-08     0.9986     0.1426 -4.331E-09       0.000  1.246E+10    -0.0268
2585595.       0.000
   576.000  3.757E-08     1.3753     0.0137 -3.759E-09       0.000  1.246E+10    -0.0162
2585595.       0.000
   582.000  1.700E-08     1.1687    -0.0569 -3.147E-09       0.000  1.246E+10  -0.007326
2585595.       0.000
   588.000 -1.904E-10     0.6979    -0.0786 -2.697E-09       0.000  1.246E+10  8.206E-05
2585595.       0.000
   594.000 -1.536E-08     0.2298    -0.0585 -2.474E-09       0.000  1.246E+10   0.006621
2585595.       0.000
   600.000 -2.987E-08      0.000      0.000 -2.418E-09       0.000  1.246E+10     0.0129
1292798.       0.000

* This analysis makes computations of pile response using nonlinear moment-curvature
relationships.
  The above values of total stress are computed for combined axial stress and do not equal
the
  actual stresses in concrete and steel in the range of nonlinear bending.


Output Verification: Computed forces and moments are within specified convergence limits.


Output Summary for Load Case No. 1:

Pile-head deflection              =      0.1394177 inches
Computed slope at pile head       =     -0.0022442 radians
Maximum bending moment            =         316095. inch-lbs
Maximum shear force               =          10000. lbs
Depth of maximum bending moment   =     60.0000000 inches below pile head
Depth of maximum shear force      =      0.000000 inches below pile head
Number of iterations              =             25
Number of zero deflection points  =              5


--------------------------------------------------------------------------------
                    Computed Values of Pile Loading and Deflection
                      for Lateral Loading for Load Case Number 2
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head                    =       15000.000 lbs
Applied moment at pile head                            =           0.000 in-lbs
Axial thrust load on pile head                         =      130000.000 lbs

   Depth    Deflect.    Bending    Shear       Slope      Total    Bending   Soil Res.  Soil
Spr.   Distrib.
    X          y         Moment     Force         S       Stress   Stiffness      p
Es*h    Lat. Load
   inches    inches     in-lbs      lbs       radians     psi*      lb-in^2    lb/in
lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ----------
      0.00     0.3345 -1.152E-07     15000.  -0.004565       0.000  1.246E+10  -190.3011
1706.5530       0.000
     6.000     0.3071     90135.     13835.  -0.004543       0.000  1.246E+10  -198.1299
```



```
3870.3777       0.000
    12.000     0.2800    173103.     12625.  -0.004480       0.000  1.246E+10  -205.1810
4396.4061       0.000
    18.000     0.2534    248620.     11375.  -0.004378       0.000  1.246E+10  -211.4121
5005.9288       0.000
    24.000     0.2275    316433.     10090.  -0.004242       0.000  1.246E+10  -216.7803
5717.6391       0.000
    30.000     0.2025    376323.  8776.3534  -0.004075       0.000  1.246E+10  -221.2411
6555.5445       0.000
    36.000     0.1786    428106.  7438.3865  -0.003881       0.000  1.246E+10  -224.7479
7550.9030       0.000
    42.000     0.1559    471638.  6082.3898  -0.003665       0.000  1.246E+10  -227.2510
8745.0436       0.000
    48.000     0.1346    506811.  4714.5467  -0.003429       0.000  1.246E+10  -228.6967
10194.       0.000
    54.000     0.1148    533561.  3341.3837  -0.003178       0.000  1.246E+10  -229.0244
11973.       0.000
    60.000     0.0965    551866.  1969.8170  -0.002917       0.000  1.246E+10  -228.1645
14190.       0.000
    66.000     0.0798    561749.   607.2225  -0.002649       0.000  1.246E+10  -226.0336
17001.       0.000
    72.000     0.0647    563285.  -738.4578  -0.002378       0.000  1.246E+10  -222.5265
20639.       0.000
    78.000     0.0512    556597. -2450.0177  -0.002108       0.000  1.246E+10  -347.9935
40750.       0.000
    84.000     0.0394    537173. -4409.4209  -0.001844       0.000  1.246E+10  -305.1409
46473.       0.000
    90.000     0.0291    506561. -5617.6534  -0.001593       0.000  1.246E+10   -97.6033
20121.       0.000
    96.000     0.0203    472246. -5995.1231  -0.001357       0.000  1.246E+10   -28.2200
8349.3201       0.000
   102.000     0.0128    436737. -6152.4417  -0.001138       0.000  1.246E+10   -24.2196
11337.       0.000
   108.000   0.006619    400192. -6283.3997  -0.000937       0.000  1.246E+10   -19.4331
17615.       0.000
   114.000   0.001577    362798. -6377.8672  -0.000753       0.000  1.246E+10   -12.0560
45861.       0.000
   120.000  -0.002416    324833. -6372.4035  -0.000587       0.000  1.246E+10    13.8773
34460.       0.000
   126.000  -0.005471    287245. -6232.3430  -0.000440       0.000  1.246E+10    32.8095
35982.       0.000
   132.000  -0.007695    250731. -5990.5346  -0.000310       0.000  1.246E+10    47.7933
37264.       0.000
   138.000  -0.009195    215843. -5695.0022  -0.000198       0.000  1.246E+10    50.7175
33094.       0.000
   144.000    -0.0101    182700. -5386.0086  -0.000102       0.000  1.246E+10    52.2803
31147.       0.000
   150.000    -0.0104    151370. -5070.5394 -2.151E-05       0.000  1.246E+10    52.8761
30450.       0.000
   156.000    -0.0103    121887. -4753.7383  4.430E-05       0.000  1.246E+10    52.7243
30626.       0.000
   162.000  -0.009887     94256. -4439.6805  9.636E-05       0.000  1.246E+10    51.9616
31533.       0.000
   168.000  -0.009173     68460. -4131.7590   0.000136       0.000  1.246E+10    50.6789
33149.       0.000
   174.000  -0.008261     44463. -3832.9027   0.000163       0.000  1.246E+10    48.9399
35547.       0.000
   180.000  -0.007220     22211. -3545.7081   0.000179       0.000  1.246E+10    46.7916
38887.       0.000
   186.000  -0.006115  1635.8229 -3139.7657   0.000185       0.000  1.246E+10    88.5225
86861.       0.000
   192.000  -0.005005    -15754. -2502.0707   0.000181       0.000  1.246E+10   124.0425
148702.       0.000
   198.000  -0.003941    -28672. -1779.4040   0.000170       0.000  1.246E+10   116.8464
177901.       0.000
   204.000  -0.002960    -37372. -1102.5447   0.000155       0.000  1.246E+10   108.7734
220522.       0.000
   210.000  -0.002086    -42143.  -477.2204   0.000135       0.000  1.246E+10    99.6681
286645.       0.000
   216.000  -0.001335    -43310.    89.1977   0.000115       0.000  1.246E+10    89.1380
```

								400696.	0.000
222.000	-0.000708	-41252.	584.8590	9.445E-05	0.000	1.246E+10	76.0825	644364.	0.000
228.000	-0.000201	-36439.	1030.0493	7.574E-05	0.000	1.246E+10	72.3143	2154663.	0.000
234.000	0.000200	-29010.	1031.1164	5.997E-05	0.000	1.246E+10	-71.9586	2154663.	0.000
240.000	0.000518	-24159.	604.1414	4.716E-05	0.000	1.246E+10	-70.3664	814610.	0.000
246.000	0.000766	-21833.	392.6092	3.609E-05	0.000	1.246E+10	-0.1443	1129.6015	0.000
252.000	0.000951	-19504.	391.5682	2.613E-05	0.000	1.246E+10	-0.2027	1278.6033	0.000
258.000	0.001080	-17175.	390.1871	1.730E-05	0.000	1.246E+10	-0.2576	1431.4348	0.000
264.000	0.001159	-14849.	388.4920	9.582E-06	0.000	1.246E+10	-0.3074	1591.4330	0.000
270.000	0.001195	-12528.	386.5179	2.988E-06	0.000	1.246E+10	-0.3507	1760.7900	0.000
276.000	0.001195	-10216.	384.3063	-2.490E-06	0.000	1.246E+10	-0.3866	1941.2919	0.000
282.000	0.001165	-7912.8724	361.2587	-6.857E-06	0.000	1.246E+10	-7.2960	37575.	0.000
288.000	0.001112	-5869.8124	317.7062	-1.018E-05	0.000	1.246E+10	-7.2215	38950.	0.000
294.000	0.001043	-4084.5225	275.0145	-1.257E-05	0.000	1.246E+10	-7.0090	40324.	0.000
300.000	0.000962	-2550.0224	233.9398	-1.417E-05	0.000	1.246E+10	-6.6826	41698.	0.000
306.000	0.000873	-1255.1371	195.0941	-1.509E-05	0.000	1.246E+10	-6.2660	43073.	0.000
312.000	0.000780	-185.3550	158.9507	-1.544E-05	0.000	1.246E+10	-5.7818	44447.	0.000
318.000	0.000688	676.3509	125.8513	-1.532E-05	0.000	1.246E+10	-5.2513	45822.	0.000
324.000	0.000597	1348.7560	96.0167	-1.483E-05	0.000	1.246E+10	-4.6936	47196.	0.000
330.000	0.000510	1851.6854	69.5586	-1.406E-05	0.000	1.246E+10	-4.1258	48571.	0.000
336.000	0.000428	2205.3912	46.4934	-1.308E-05	0.000	1.246E+10	-3.5626	49945.	0.000
342.000	0.000353	2430.0136	26.7557	-1.196E-05	0.000	1.246E+10	-3.0166	51320.	0.000
348.000	0.000284	2545.1253	10.2127	-1.077E-05	0.000	1.246E+10	-2.4978	52694.	0.000
354.000	0.000223	2569.3616	-3.3223	-9.535E-06	0.000	1.246E+10	-2.0139	54069.	0.000
360.000	0.000170	2520.1317	-14.0764	-8.309E-06	0.000	1.246E+10	-1.5708	55443.	0.000
366.000	0.000124	2413.4069	-22.3051	-7.121E-06	0.000	1.246E+10	-1.1721	56818.	0.000
372.000	8.454E-05	2263.5791	-28.2812	-5.994E-06	0.000	1.246E+10	-0.8199	58192.	0.000
378.000	5.185E-05	2083.3831	-32.2852	-4.947E-06	0.000	1.246E+10	-0.5147	59567.	0.000
384.000	2.518E-05	1883.8740	-34.5965	-3.992E-06	0.000	1.246E+10	-0.2557	60941.	0.000
390.000	3.949E-06	1674.4516	-35.4867	-3.134E-06	0.000	1.246E+10	-0.0410	62316.	0.000
396.000	-1.244E-05	1462.9234	-35.2137	-2.379E-06	0.000	1.246E+10	0.1320	63690.	0.000
402.000	-2.460E-05	1255.5986	-34.0174	-1.724E-06	0.000	1.246E+10	0.2667	65064.	0.000
408.000	-3.313E-05	1057.4040	-32.1168	-1.167E-06	0.000	1.246E+10	0.3668	66439.	0.000
414.000	-3.860E-05	872.0171	-29.7076	-7.022E-07	0.000	1.246E+10	0.4363	67813.	0.000
420.000	-4.155E-05	702.0079	-26.9614	-3.231E-07	0.000	1.246E+10	0.4791	69188.	0.000
426.000	-4.248E-05	548.9841	-24.0254	-2.174E-08	0.000	1.246E+10	0.4995		

								70562.	0.000
432.000	-4.181E-05	413.7372	-21.0228	2.101E-07	0.000	1.246E+10	0.5013	71937.	0.000
438.000	-3.995E-05	296.3821	-18.0544	3.812E-07	0.000	1.246E+10	0.4882	73311.	0.000
444.000	-3.724E-05	196.4901	-15.1992	4.999E-07	0.000	1.246E+10	0.4635	74686.	0.000
450.000	-3.396E-05	113.2114	-12.5173	5.745E-07	0.000	1.246E+10	0.4304	76060.	0.000
456.000	-3.034E-05	45.3859	-10.0511	6.127E-07	0.000	1.246E+10	0.3916	77435.	0.000
462.000	-2.660E-05	-8.3582	-7.8280	6.216E-07	0.000	1.246E+10	0.3494	78809.	0.000
468.000	-2.289E-05	-49.5199	-5.8622	6.077E-07	0.000	1.246E+10	0.3058	80184.	0.000
474.000	-1.931E-05	-79.6529	-4.1572	5.766E-07	0.000	1.246E+10	0.2625	81558.	0.000
480.000	-1.597E-05	-100.3062	-2.7077	5.332E-07	0.000	1.246E+10	0.2207	82933.	0.000
486.000	-1.291E-05	-112.9769	-1.5013	4.818E-07	0.000	1.246E+10	0.1814	84307.	0.000
492.000	-1.018E-05	-119.0736	-0.5207	4.260E-07	0.000	1.246E+10	0.1454	85682.	0.000
498.000	-7.801E-06	-119.8899	0.2552	3.684E-07	0.000	1.246E+10	0.1132	87056.	0.000
504.000	-5.764E-06	-116.5864	0.8496	3.114E-07	0.000	1.246E+10	0.0849	88430.	0.000
510.000	-4.064E-06	-110.1810	1.2869	2.568E-07	0.000	1.246E+10	0.0608	89805.	0.000
516.000	-2.682E-06	-101.5446	1.5916	2.058E-07	0.000	1.246E+10	0.0408	91179.	0.000
522.000	-1.594E-06	-91.4028	1.7876	1.593E-07	0.000	1.246E+10	0.0246	92554.	0.000
528.000	-7.698E-07	-80.3416	1.8975	1.180E-07	0.000	1.246E+10	0.0121	93928.	0.000
534.000	-1.780E-07	-68.8164	1.9422	8.205E-08	0.000	1.246E+10	0.002828	95303.	0.000
540.000	2.148E-07	-57.1635	1.9403	5.171E-08	0.000	1.246E+10	-0.003462	96677.	0.000
546.000	4.425E-07	-45.6138	1.9082	2.695E-08	0.000	1.246E+10	-0.007231	98052.	0.000
552.000	5.383E-07	-34.3072	1.8597	7.704E-09	0.000	1.246E+10	-0.008920	99426.	0.000
558.000	5.349E-07	-23.3089	1.8060	-6.173E-09	0.000	1.246E+10	-0.008987	100801.	0.000
564.000	4.642E-07	-12.6253	1.7554	-1.483E-08	0.000	1.246E+10	-0.007905	102175.	0.000
570.000	3.570E-07	-2.2215	1.2701	-1.840E-08	0.000	1.246E+10	-0.1538	2585595.	0.000
576.000	2.434E-07	2.6449	0.4940	-1.830E-08	0.000	1.246E+10	-0.1049	2585595.	0.000
582.000	1.374E-07	3.7351	0.001825	-1.677E-08	0.000	1.246E+10	-0.0592	2585595.	0.000
588.000	4.216E-08	2.6930	-0.2303	-1.522E-08	0.000	1.246E+10	-0.0182	2585595.	0.000
594.000	-4.525E-08	0.9957	-0.2263	-1.433E-08	0.000	1.246E+10	0.0195	2585595.	0.000
600.000	-1.298E-07	0.000	0.000	-1.409E-08	0.000	1.246E+10	0.0559	1292798.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	0.3345359 inches
Computed slope at pile head	=	-0.0045646 radians
Maximum bending moment	=	563285. inch-lbs
Maximum shear force	=	15000. lbs
Depth of maximum bending moment	=	72.0000000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	28
Number of zero deflection points	=	5

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head	=	20000.000 lbs
Applied moment at pile head	=	0.000 in-lbs
Axial thrust load on pile head	=	130000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.6377	7.682E-08	20000.	-0.007654	0.000	1.246E+10	-223.6026	1051.9671	0.000
6.000	0.5917	121945.	18629.	-0.007625	0.000	1.246E+10	-233.4232	2366.7944	0.000
12.000	0.5462	235442.	17201.	-0.007539	0.000	1.246E+10	-242.4761	2663.7309	0.000
18.000	0.5013	340120.	15722.	-0.007400	0.000	1.246E+10	-250.7251	3001.0152	0.000
24.000	0.4574	435645.	14195.	-0.007213	0.000	1.246E+10	-258.1340	3386.3132	0.000
30.000	0.4147	521714.	12627.	-0.006983	0.000	1.246E+10	-264.6666	3829.0712	0.000
36.000	0.3736	598058.	11022.	-0.006713	0.000	1.246E+10	-270.2871	4341.0309	0.000
42.000	0.3342	664447.	9386.0418	-0.006409	0.000	1.246E+10	-274.9592	4936.9211	0.000
48.000	0.2967	720688.	7725.2252	-0.006075	0.000	1.246E+10	-278.6463	5635.4037	0.000
54.000	0.2613	766627.	6045.3526	-0.005717	0.000	1.246E+10	-281.3112	6460.3822	0.000
60.000	0.2281	802151.	4352.6727	-0.005339	0.000	1.246E+10	-282.9154	7442.8462	0.000
66.000	0.1972	827188.	2653.6697	-0.004947	0.000	1.246E+10	-283.4189	8623.5180	0.000
72.000	0.1687	841712.	955.0755	-0.004545	0.000	1.246E+10	-282.7791	10057.	0.000
78.000	0.1427	845739.	-1387.7007	-0.004138	0.000	1.246E+10	-498.1463	20951.	0.000
84.000	0.1191	831515.	-4309.7232	-0.003734	0.000	1.246E+10	-475.8612	23983.	0.000
90.000	0.0978	799848.	-6175.9288	-0.003341	0.000	1.246E+10	-146.2074	8965.4531	0.000
96.000	0.0790	762616.	-6747.7265	-0.002965	0.000	1.246E+10	-44.3919	3373.4543	0.000
102.000	0.0623	723500.	-7003.9440	-0.002607	0.000	1.246E+10	-41.0140	3952.0676	0.000
108.000	0.0477	682636.	-7239.5463	-0.002268	0.000	1.246E+10	-37.5201	4722.4522	0.000

114.000	0.0350	640165.	-7453.6978	-0.001950	0.000	1.246E+10	-33.8637	5797.4892	0.000
120.000	0.0243	596233.	-7645.1744	-0.001652	0.000	1.246E+10	-29.9618	7406.1598	0.000
126.000	0.0152	550999.	-7873.5455	-0.001376	0.000	1.246E+10	-46.1619	18194.	0.000
132.000	0.007765	503897.	-8155.8893	-0.001122	0.000	1.246E+10	-47.9527	37051.	0.000
138.000	0.001764	454878.	-8387.5712	-0.000891	0.000	1.246E+10	-29.2746	99555.	0.000
144.000	-0.002922	404635.	-8371.5891	-0.000684	0.000	1.246E+10	34.6020	71050.	0.000
150.000	-0.006439	355486.	-8132.6735	-0.000501	0.000	1.246E+10	45.0365	41967.	0.000
156.000	-0.008928	307824.	-7846.8938	-0.000341	0.000	1.246E+10	50.2234	33751.	0.000
162.000	-0.0105	261855.	-7537.0411	-0.000204	0.000	1.246E+10	53.0609	30240.	0.000
168.000	-0.0114	217697.	-7214.5343	-8.804E-05	0.000	1.246E+10	54.4414	28727.	0.000
174.000	-0.0116	175418.	-6886.8682	6.650E-06	0.000	1.246E+10	54.7807	28373.	0.000
180.000	-0.0113	135044.	-6559.5826	8.143E-05	0.000	1.246E+10	54.3146	28863.	0.000
186.000	-0.0106	96576.	-6091.8520	0.000137	0.000	1.246E+10	101.5956	57468.	0.000
192.000	-0.009644	61728.	-5348.6084	0.000175	0.000	1.246E+10	146.1522	90925.	0.000
198.000	-0.008503	32119.	-4485.2832	0.000198	0.000	1.246E+10	141.6229	99933.	0.000
204.000	-0.007269	7595.7955	-3651.8778	0.000208	0.000	1.246E+10	136.1789	112405.	0.000
210.000	-0.006013	-12028.	-2853.7248	0.000206	0.000	1.246E+10	129.8721	129593.	0.000
216.000	-0.004792	-26971.	-2095.9883	0.000197	0.000	1.246E+10	122.7068	153652.	0.000
222.000	-0.003648	-37487.	-1383.9967	0.000182	0.000	1.246E+10	114.6238	188513.	0.000
228.000	-0.002613	-43862.	-723.7678	0.000162	0.000	1.246E+10	105.4525	242118.	0.000
234.000	-0.001705	-46425.	-123.0753	0.000140	0.000	1.246E+10	94.7783	333525.	0.000
240.000	-0.000931	-45558.	405.6962	0.000118	0.000	1.246E+10	81.4789	525115.	0.000
246.000	-0.000289	-41740.	650.2826	9.701E-05	0.000	1.246E+10	0.0499	1037.7094	0.000
252.000	0.000233	-37906.	650.2993	7.782E-05	0.000	1.246E+10	-0.0444	1142.0157	0.000
258.000	0.000645	-34058.	649.7216	6.049E-05	0.000	1.246E+10	-0.1482	1377.8911	0.000
264.000	0.000959	-30203.	648.5237	4.501E-05	0.000	1.246E+10	-0.2511	1571.1274	0.000
270.000	0.001185	-26346.	646.7272	3.139E-05	0.000	1.246E+10	-0.3477	1759.9318	0.000
276.000	0.001336	-22492.	644.3795	1.963E-05	0.000	1.246E+10	-0.4349	1953.4307	0.000
282.000	0.001421	-18644.	616.3785	9.721E-06	0.000	1.246E+10	-8.8988	37575.	0.000
288.000	0.001452	-15110.	561.3979	1.591E-06	0.000	1.246E+10	-9.4280	38950.	0.000
294.000	0.001440	-11910.	504.0794	-4.917E-06	0.000	1.246E+10	-9.6781	40324.	0.000
300.000	0.001393	-9053.5958	445.9950	-9.967E-06	0.000	1.246E+10	-9.6833	41698.	0.000
306.000	0.001320	-6542.4513	388.5070	-1.372E-05	0.000	1.246E+10	-9.4793	43073.	0.000
312.000	0.001229	-4370.1035	332.7637	-1.635E-05	0.000	1.246E+10	-9.1018	44447.	0.000
318.000	0.001124	-2523.7784	279.7010	-1.801E-05	0.000	1.246E+10	-8.5858	45822.	0.000

324.000 0.001013 -985.5925 230.0502 -1.886E-05 0.000 1.246E+10 -7.9645
47196. 0.000
330.000 0.000898 266.2414 184.3496 -1.903E-05 0.000 1.246E+10 -7.2690
48571. 0.000
336.000 0.000784 1256.2909 142.9603 -1.866E-05 0.000 1.246E+10 -6.5274
49945. 0.000
342.000 0.000674 2010.8811 106.0838 -1.788E-05 0.000 1.246E+10 -5.7648
51320. 0.000
348.000 0.000570 2557.1844 73.7815 -1.678E-05 0.000 1.246E+10 -5.0027
52694. 0.000
354.000 0.000473 2922.4308 45.9954 -1.546E-05 0.000 1.246E+10 -4.2594
54069. 0.000
360.000 0.000384 3133.2419 22.5682 -1.400E-05 0.000 1.246E+10 -3.5497
55443. 0.000
366.000 0.000305 3215.0869 3.2635 -1.247E-05 0.000 1.246E+10 -2.8852
56818. 0.000
372.000 0.000235 3191.8559 -12.2156 -1.093E-05 0.000 1.246E+10 -2.2745
58192. 0.000
378.000 0.000174 3085.5445 -24.2085 -9.414E-06 0.000 1.246E+10 -1.7232
59567. 0.000
384.000 0.000122 2916.0398 -33.0815 -7.968E-06 0.000 1.246E+10 -1.2345
60941. 0.000
390.000 7.795E-05 2700.9970 -39.2138 -6.616E-06 0.000 1.246E+10 -0.8096
62316. 0.000
396.000 4.216E-05 2455.7950 -42.9850 -5.373E-06 0.000 1.246E+10 -0.4475
63690. 0.000
402.000 1.347E-05 2193.5598 -44.7656 -4.254E-06 0.000 1.246E+10 -0.1460
65064. 0.000
408.000 -8.885E-06 1925.2434 -44.9085 -3.262E-06 0.000 1.246E+10 0.0984
66439. 0.000
414.000 -2.567E-05 1659.7456 -43.7429 -2.398E-06 0.000 1.246E+10 0.2902
67813. 0.000
420.000 -3.766E-05 1404.0699 -41.5695 -1.660E-06 0.000 1.246E+10 0.4343
69188. 0.000
426.000 -4.559E-05 1163.5014 -38.6580 -1.042E-06 0.000 1.246E+10 0.5362
70562. 0.000
432.000 -5.016E-05 941.7993 -35.2450 -5.346E-07 0.000 1.246E+10 0.6014
71937. 0.000
438.000 -5.201E-05 741.3949 -31.5343 -1.292E-07 0.000 1.246E+10 0.6355
73311. 0.000
444.000 -5.171E-05 563.5895 -27.6967 1.851E-07 0.000 1.246E+10 0.6437
74686. 0.000
450.000 -4.979E-05 408.7462 -23.8720 4.193E-07 0.000 1.246E+10 0.6312
76060. 0.000
456.000 -4.668E-05 276.4711 -20.1711 5.843E-07 0.000 1.246E+10 0.6025
77435. 0.000
462.000 -4.278E-05 165.7813 -16.6781 6.909E-07 0.000 1.246E+10 0.5619
78809. 0.000
468.000 -3.839E-05 75.2564 -13.4533 7.489E-07 0.000 1.246E+10 0.5131
80184. 0.000
474.000 -3.379E-05 3.1739 -10.5361 7.678E-07 0.000 1.246E+10 0.4593
81558. 0.000
480.000 -2.918E-05 -52.3748 -7.9483 7.560E-07 0.000 1.246E+10 0.4033
82933. 0.000
486.000 -2.472E-05 -93.3846 -5.6964 7.208E-07 0.000 1.246E+10 0.3473
84307. 0.000
492.000 -2.053E-05 -121.8556 -3.7749 6.690E-07 0.000 1.246E+10 0.2932
85682. 0.000
498.000 -1.669E-05 -139.7274 -2.1690 6.060E-07 0.000 1.246E+10 0.2422
87056. 0.000
504.000 -1.326E-05 -148.8286 -0.8563 5.365E-07 0.000 1.246E+10 0.1954
88430. 0.000
510.000 -1.025E-05 -150.8403 0.1902 4.643E-07 0.000 1.246E+10 0.1535
89805. 0.000
516.000 -7.685E-06 -147.2709 1.0009 3.925E-07 0.000 1.246E+10 0.1168
91179. 0.000
522.000 -5.542E-06 -139.4421 1.6077 3.235E-07 0.000 1.246E+10 0.0855
92554. 0.000
528.000 -3.803E-06 -128.4830 2.0428 2.589E-07 0.000 1.246E+10 0.0595
93928. 0.000

534.000 -2.435E-06 -115.3324 2.3375 2.002E-07 0.000 1.246E+10 0.0387
95303. 0.000
540.000 -1.401E-06 -100.7458 2.5212 1.482E-07 0.000 1.246E+10 0.0226
96677. 0.000
546.000 -6.574E-07 -85.3089 2.6212 1.033E-07 0.000 1.246E+10 0.0107
98052. 0.000
552.000 -1.607E-07 -69.4532 2.6614 6.606E-08 0.000 1.246E+10 0.002663
99426. 0.000
558.000 1.353E-07 -53.4755 2.6625 3.646E-08 0.000 1.246E+10 -0.002274
100801. 0.000
564.000 2.768E-07 -37.5595 2.6416 1.453E-08 0.000 1.246E+10 -0.004713
102175. 0.000
570.000 3.097E-07 -21.7991 2.2271 2.318E-10 0.000 1.246E+10 -0.1335
2585595. 0.000
576.000 2.796E-07 -10.8348 1.4653 -7.628E-09 0.000 1.246E+10 -0.1205
2585595. 0.000
582.000 2.181E-07 -4.2035 0.8219 -1.125E-08 0.000 1.246E+10 -0.0940
2585595. 0.000
588.000 1.446E-07 -0.9547 0.3530 -1.249E-08 0.000 1.246E+10 -0.0623
2585595. 0.000
594.000 6.822E-08 0.0519 0.0779 -1.271E-08 0.000 1.246E+10 -0.0294
2585595. 0.000
600.000 -7.964E-09 0.000 0.000 -1.270E-08 0.000 1.246E+10 0.003432
1292798. 0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 3:

Pile-head deflection = 0.6376700 inches
Computed slope at pile head = -0.0076542 radians
Maximum bending moment = 845739. inch-lbs
Maximum shear force = 20000. lbs
Depth of maximum bending moment = 78.0000000 inches below pile head
Depth of maximum shear force = 0.000000 inches below pile head
Number of iterations = 32
Number of zero deflection points = 5

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 4

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head = 30000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 130000.000 lbs

Depth Deflect. Bending Shear Slope Total Bending Soil Res. Soil
Spr. Distrib.
X y Moment Force S Stress Stiffness p
Es*h Lat. Load
inches inches in-lbs lbs radians psi* lb-in^2 lb/in
lb/inch lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ----------
0.00 2.0566 2.305E-06 30000. -0.0186 0.000 1.246E+10 -299.6484
437.1057 0.000
6.000 1.9453 189080. 28158. -0.0185 0.000 1.246E+10 -314.3051

969.4529 0.000
12.000 1.8345 366773. 26230. -0.0184 0.000 1.246E+10 -328.2548
1073.6246 0.000
18.000 1.7247 532512. 24221. -0.0182 0.000 1.246E+10 -341.4723
1187.9082 0.000
24.000 1.6166 685757. 22135. -0.0179 0.000 1.246E+10 -353.9339
1313.6603 0.000
30.000 1.5103 826003. 19976. -0.0175 0.000 1.246E+10 -365.6165
1452.4445 0.000
36.000 1.4065 952777. 17750. -0.0171 0.000 1.246E+10 -376.4984
1606.0704 0.000
42.000 1.3055 1065638. 15461. -0.0166 0.000 1.246E+10 -386.5584
1776.6409 0.000
48.000 1.2075 1164184. 13114. -0.0161 0.000 1.246E+10 -395.7761
1966.6123 0.000
54.000 1.1129 1248043. 10714. -0.0155 0.000 1.246E+10 -404.1319
2178.8677 0.000
60.000 1.0219 1316885. 8266.9533 -0.0149 0.000 1.246E+10 -411.6060
2416.8127 0.000
66.000 0.9347 1370415. 5777.6002 -0.0142 0.000 1.246E+10 -418.1784
2684.4980 0.000
72.000 0.8514 1408375. 3251.5804 -0.0135 0.000 1.246E+10 -423.8282
2986.7822 0.000
78.000 0.7722 1430548. 1199.9171 -0.0129 0.000 1.246E+10 -260.0595
2020.5746 0.000
84.000 0.6972 1442821. -498.6256 -0.0122 0.000 1.246E+10 -306.1214
2634.4507 0.000
90.000 0.6263 1443532. -2231.3810 -0.0115 0.000 1.246E+10 -271.4638
2600.5282 0.000
96.000 0.5596 1433928. -3301.5851 -0.0108 0.000 1.246E+10 -85.2709
914.2183 0.000
102.000 0.4971 1420716. -3803.3007 -0.0101 0.000 1.246E+10 -81.9676
989.3894 0.000
108.000 0.4386 1404018. -4285.0647 -0.009403 0.000 1.246E+10 -78.6203
1075.4316 0.000
114.000 0.3842 1383963. -4746.6053 -0.008731 0.000 1.246E+10 -75.2265
1174.6562 0.000
120.000 0.3339 1360680. -5187.6345 -0.008070 0.000 1.246E+10 -71.7832
1290.0549 0.000
126.000 0.2874 1334301. -5771.7069 -0.007421 0.000 1.246E+10 -122.9076
2565.8587 0.000
132.000 0.2448 1302996. -6594.8110 -0.006786 0.000 1.246E+10 -151.4605
3712.1239 0.000
138.000 0.2060 1265749. -7478.1540 -0.006167 0.000 1.246E+10 -142.9872
4165.1218 0.000
144.000 0.1708 1222878. -8310.1221 -0.005568 0.000 1.246E+10 -134.3355
4718.9097 0.000
150.000 0.1392 1174713. -9089.5351 -0.004990 0.000 1.246E+10 -125.4689
5409.4459 0.000
156.000 0.1109 1121589. -9814.9377 -0.004437 0.000 1.246E+10 -116.3320
6292.5703 0.000
162.000 0.0859 1063855. -10484. -0.003911 0.000 1.246E+10 -106.8383
7460.6224 0.000
168.000 0.0640 1001876. -11095. -0.003413 0.000 1.246E+10 -96.8448
9079.8786 0.000
174.000 0.0450 936034. -11644. -0.002946 0.000 1.246E+10 -86.0965
11489. 0.000
180.000 0.0286 866740. -12125. -0.002512 0.000 1.246E+10 -74.0775
15520. 0.000
186.000 0.0148 794455. -12678. -0.002112 0.000 1.246E+10 -110.4630
44725. 0.000
192.000 0.003295 717894. -13345. -0.001748 0.000 1.246E+10 -111.7662
203519. 0.000
198.000 -0.006154 637039. -13289. -0.001421 0.000 1.246E+10 130.6143
127346. 0.000
204.000 -0.0138 560648. -12418. -0.001133 0.000 1.246E+10 159.7342
69643. 0.000
210.000 -0.0197 489796. -11414. -0.000880 0.000 1.246E+10 174.8329
53117. 0.000
216.000 -0.0243 425054. -10337. -0.000660 0.000 1.246E+10 184.1764

45437. 0.000
222.000 -0.0277 366783. -9213.6934 -0.000469 0.000 1.246E+10 190.2040
41254. 0.000
228.000 -0.0299 315221. -8061.0431 -0.000305 0.000 1.246E+10 194.0128
38872. 0.000
234.000 -0.0313 270525. -6890.4109 -0.000163 0.000 1.246E+10 196.1979
37588. 0.000
240.000 -0.0319 232791. -5710.4701 -4.225E-05 0.000 1.246E+10 197.1157
37065. 0.000
246.000 -0.0318 202066. -5094.2820 6.249E-05 0.000 1.246E+10 8.2803
1561.0773 0.000
252.000 -0.0312 171562. -5043.0735 0.000152 0.000 1.246E+10 8.7892
1692.4783 0.000
258.000 -0.0300 141311. -4989.2448 0.000228 0.000 1.246E+10 9.1538
1831.0169 0.000
264.000 -0.0284 111336. -4933.6793 0.000289 0.000 1.246E+10 9.3681
1977.4729 0.000
270.000 -0.0265 81656. -4877.2836 0.000335 0.000 1.246E+10 9.4305
2132.6884 0.000
276.000 -0.0244 52286. -4820.9587 0.000367 0.000 1.246E+10 9.3444
2297.5995 0.000
282.000 -0.0221 23232. -4377.3067 0.000386 0.000 1.246E+10 138.5396
37575. 0.000
288.000 -0.0198 -843.7291 -3576.5801 0.000391 0.000 1.246E+10 128.3693
38950. 0.000
294.000 -0.0174 -20297. -2840.0521 0.000386 0.000 1.246E+10 117.1400
40324. 0.000
300.000 -0.0151 -35526. -2172.8998 0.000372 0.000 1.246E+10 105.2441
41698. 0.000
306.000 -0.0130 -46953. -1578.0541 0.000353 0.000 1.246E+10 93.0378
43073. 0.000
312.000 -0.0109 -55013. -1056.4310 0.000328 0.000 1.246E+10 80.8365
44447. 0.000
318.000 -0.009023 -60142. -607.1876 0.000300 0.000 1.246E+10 68.9113
45822. 0.000
324.000 -0.007308 -62768. -227.9895 0.000271 0.000 1.246E+10 57.4881
47196. 0.000
330.000 -0.005775 -63300. 84.7177 0.000240 0.000 1.246E+10 46.7477
48571. 0.000
336.000 -0.004424 -62126. 335.4439 0.000210 0.000 1.246E+10 36.8277
49945. 0.000
342.000 -0.003253 -59603. 529.4014 0.000181 0.000 1.246E+10 27.8248
51320. 0.000
348.000 -0.002254 -56055. 672.2707 0.000153 0.000 1.246E+10 19.7983
52694. 0.000
354.000 -0.001418 -51774. 769.9884 0.000127 0.000 1.246E+10 12.7742
54069. 0.000
360.000 -0.000730 -47014. 828.5599 0.000103 0.000 1.246E+10 6.7496
55443. 0.000
366.000 -0.000179 -41993. 853.8996 8.176E-05 0.000 1.246E+10 1.6969
56818. 0.000
372.000 0.000251 -36894. 851.6971 6.276E-05 0.000 1.246E+10 -2.4311
58192. 0.000
378.000 0.000574 -31870. 827.3114 4.619E-05 0.000 1.246E+10 -5.6975
59567. 0.000
384.000 0.000805 -27039. 785.6902 3.201E-05 0.000 1.246E+10 -8.1763
60941. 0.000
390.000 0.000958 -22492. 731.3133 2.008E-05 0.000 1.246E+10 -9.9493
62316. 0.000
396.000 0.001046 -18294. 668.1581 1.025E-05 0.000 1.246E+10 -11.1024
63690. 0.000
402.000 0.001081 -14490. 599.6839 2.356E-06 0.000 1.246E+10 -11.7224
65064. 0.000
408.000 0.001074 -11102. 528.8329 -3.808E-06 0.000 1.246E+10 -11.8946
66439. 0.000
414.000 0.001035 -8137.8744 458.0456 -8.442E-06 0.000 1.246E+10 -11.7011
67813. 0.000
420.000 0.000973 -5592.1071 389.2865 -1.175E-05 0.000 1.246E+10 -11.2186
69188. 0.000
426.000 0.000894 -3448.1074 324.0787 -1.393E-05 0.000 1.246E+10 -10.5173

```
70562.      0.000
   432.000   0.000806 -1681.4365   263.5448 -1.516E-05      0.000  1.246E+10    -9.6606
71937.      0.000
   438.000   0.000712  -261.9164   208.4511 -1.563E-05      0.000  1.246E+10    -8.7040
73311.      0.000
   444.000   0.000618   844.3598   159.2540 -1.549E-05      0.000  1.246E+10    -7.6951
74686.      0.000
   450.000   0.000526  1673.2962   116.1469 -1.488E-05      0.000  1.246E+10    -6.6740
76060.      0.000
   456.000   0.000440  2261.3405    79.1050 -1.394E-05      0.000  1.246E+10    -5.6733
77435.      0.000
   462.000   0.000359  2644.2966    47.9292 -1.275E-05      0.000  1.246E+10    -4.7186
78809.      0.000
   468.000   0.000287  2856.3882    22.2854 -1.143E-05      0.000  1.246E+10    -3.8293
80184.      0.000
   474.000   0.000222  2929.5510     1.7407 -1.004E-05      0.000  1.246E+10    -3.0189
81558.      0.000
   480.000   0.000166  2892.9323   -14.2041 -8.633E-06      0.000  1.246E+10    -2.2960
82933.      0.000
   486.000   0.000118  2772.5702   -26.0870 -7.269E-06      0.000  1.246E+10    -1.6650
84307.      0.000
   492.000  7.889E-05  2591.2281   -34.4613 -5.977E-06      0.000  1.246E+10    -1.1265
85682.      0.000
   498.000  4.677E-05  2368.3580   -39.8767 -4.782E-06      0.000  1.246E+10    -0.6786
87056.      0.000
   504.000  2.150E-05  2120.1685   -42.8630 -3.701E-06      0.000  1.246E+10    -0.3169
88430.      0.000
   510.000  2.355E-06  1859.7756   -43.9193 -2.743E-06      0.000  1.246E+10    -0.0353
89805.      0.000
   516.000 -1.141E-05  1597.4148   -43.5048 -1.910E-06      0.000  1.246E+10     0.1734
91179.      0.000
   522.000 -2.056E-05  1340.6973   -42.0329 -1.202E-06      0.000  1.246E+10     0.3172
92554.      0.000
   528.000 -2.584E-05  1094.8950   -39.8678 -6.156E-07      0.000  1.246E+10     0.4045
93928.      0.000
   534.000 -2.795E-05   863.2433   -37.3225 -1.439E-07      0.000  1.246E+10     0.4439
95303.      0.000
   540.000 -2.757E-05   647.2494   -34.6582  2.199E-07      0.000  1.246E+10     0.4442
96677.      0.000
   546.000 -2.531E-05   447.0020   -32.0848  4.835E-07      0.000  1.246E+10     0.4136
98052.      0.000
   552.000 -2.176E-05   261.4773   -29.7620  6.541E-07      0.000  1.246E+10     0.3607
99426.      0.000
   558.000 -1.746E-05    88.8378   -27.8000  7.385E-07      0.000  1.246E+10     0.2934
100801.     0.000
   564.000 -1.290E-05   -73.2742   -26.2608  7.422E-07      0.000  1.246E+10     0.2197
102175.     0.000
   570.000 -8.555E-06  -227.4491   -14.5422  6.698E-07      0.000  1.246E+10     3.6865
2585595.      0.000
   576.000 -4.864E-06  -248.8260     2.8059  5.551E-07      0.000  1.246E+10     2.0963
2585595.      0.000
   582.000 -1.894E-06  -194.6439    11.5427  4.483E-07      0.000  1.246E+10     0.8160
2585595.      0.000
   588.000  5.148E-07  -111.0133    13.3251  3.747E-07      0.000  1.246E+10    -0.2219
2585595.      0.000
   594.000  2.602E-06   -35.3277     9.2952  3.394E-07      0.000  1.246E+10    -1.1214
2585595.      0.000
   600.000  4.588E-06      0.000     0.000  3.309E-07      0.000  1.246E+10    -1.9770
1292798.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 4:

```
Pile-head deflection             =      2.0565849 inches
Computed slope at pile head      =     -0.0185554 radians
Maximum bending moment           =       1443532. inch-lbs
Maximum shear force              =         30000. lbs
Depth of maximum bending moment  =     90.0000000 inches below pile head
Depth of maximum shear force     =       0.000000 inches below pile head
Number of iterations             =             54
Number of zero deflection points =              4
```

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

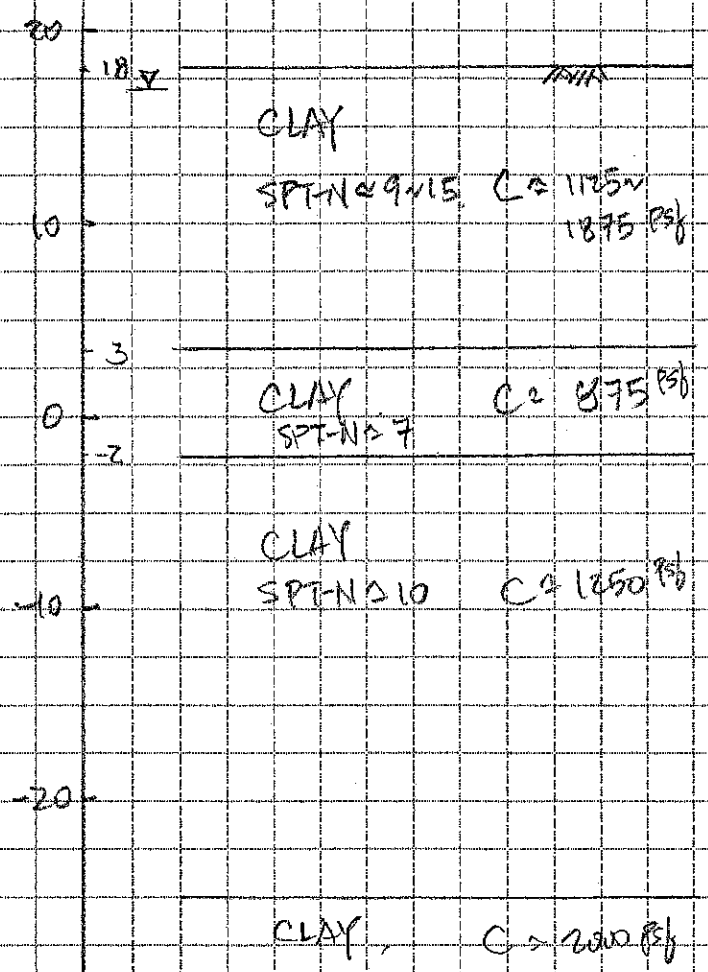
Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad. radians	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Pile-Head Shear lbs
1	1	V = 10000.0000	M = 0.000	130000.	0.13941770	316095.	10000.
		-0.00224421					
2	1	V = 15000.	M = 0.000	130000.	0.33453587	563285.	15000.
		-0.00456462					
3	1	V = 20000.	M = 0.000	130000.	0.63767003	845739.	20000.
		-0.00765416					
4	1	V = 30000.	M = 0.000	130000.	2.05658491	1443532.	30000.
		-0.01855539					

The analysis ended normally.

VERTICAL & LATERAL ANALYSES FOR RETAINING WALLS RW SB-1 & RW SB-2

RTE 880 - SAN LEANDRO

RETAINING WALL RW SB-1 (SOUTH)
RW-30, RW-31 (2008) & AS-BUILT
B-5 (CALTRANS 1966)
(NEAR SAN LEANDRO CREEK BR. AREA)



FURTHER SOUTH AWAY FROM THE BRIDGE, THE SOIL IS STIFFER PER RW-30 & RW-31 (2008). THE SOIL STRENGTH IS ON THE ORDER OF 1500 TO 1800 psf.

∴ ULTIMATE BEARING (C ≈ 1650 psf)

$q_{ult} = 5.53C$
$= 9.1$ ksf.

OK TO USE $q_{ult} = 9$ ksf FOR SW ON RW (TYPE 5 SWB)

USE PILE IF DEMAND > 9 ksf.

⇒ SHALLOW FOUNDATION FOR ULT. DEMAND UP TO 9 ksf. USE PILE FOR HIGHER DEMAND.

WALL HEIGHT UP TO 20'
USE 45-TON, 24" CIDH CONC PILE DUE TO RIGHT-OF-WAY LIMIT WHEN FOOTING DEMAND EXCEEDS ULT. BEARING CAPACITY

CAST-IN-DRILLED-HOLE PILE CAPACITY
Design per O'Neil and Reese (1999)

Route 880 San Leandro - Retaining Wall SB-1
206139.10

PILE DIA, B (ft) = 2

SIDE MOBILIZATION
FACTOR (CLAY) = 1
FACTOR (SAND) = 1

INCREAMENTS (FT)= 5

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS
3. IGM (COHESIONLESS MATERIAL)

SOIL TYPES
GRAVEL, SAND, NSILT, CLAY, PSILT

PILE CAPACTY

F.S. FOR COMPRESSION = 2

F.S. FOR UPLIFT = 1

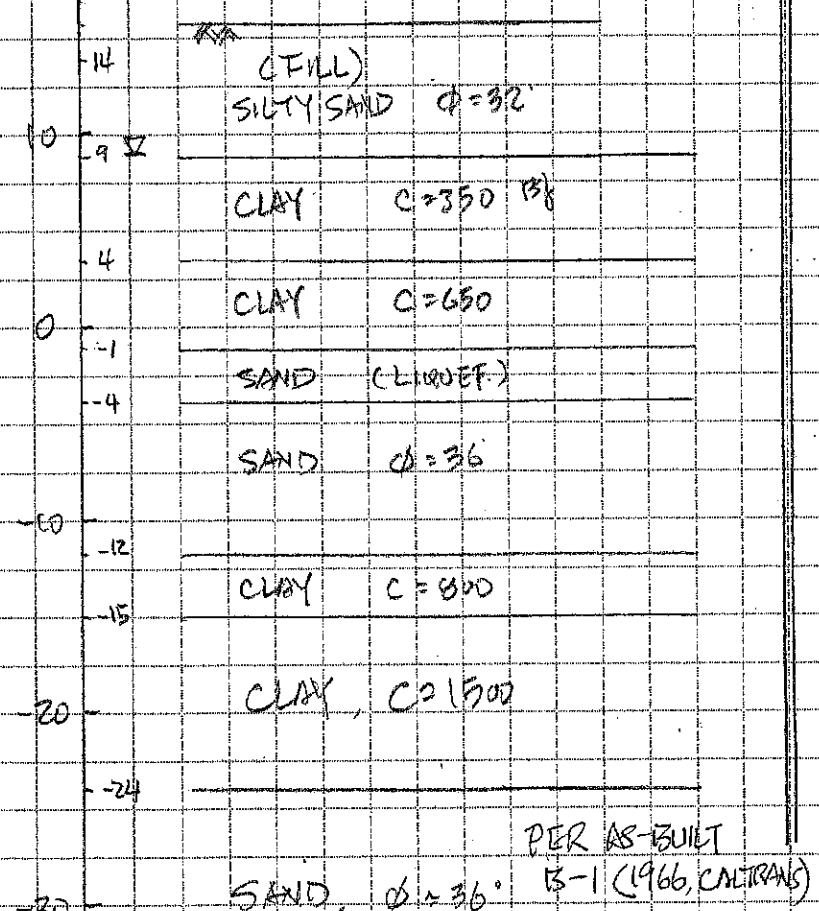
PERIMETER OF THE PILE (ft) = 6.28 SQ. FT.
AREA OF THE PILE TIP 3.14 SQ. FT.

DEPTH FROM	DEPTH TO	SOIL GROUP	SOIL TYPE	γ' (pcf)	Δσ' (psf)	σ' (psf)	BLOW COUNT	SAMPLER TYPE	AVG. S.P.T - N	CONSISTENCY	SHEAR STRENGTH PARAMETERS α	c(psf)	β	φ (°)	ALLOWABLE COMPRESSION (PER SECTION) (Ton)	ALLOWABLE COMPRESSION CAPACITY (Ton)	ULTIMATE UPLIFT (PER SECTION) (Ton)	ULTIMATE UPLIFT CAPACITY (Ton)
0	5	2	CLAY	120	600	300	9	SPT	9	STIFF	0.55	1125			4.86	4.86	6.80	6.80
5	10	2	CLAY	60	300	750	9	SPT	9	STIFF	0.55	1125			4.86	9.72	6.80	13.61
10	15	2	CLAY	60	300	1050	9	SPT	9	STIFF	0.55	1125			4.86	14.58	6.80	20.41
15	20	2	CLAY	60	300	1350	7	SPT	7	MEDIUM	0.55	875			3.78	18.36	5.29	25.70
20	25	2	CLAY	63	315	1658	10	SPT	10	STIFF	0.55	1250			5.40	23.76	7.56	33.26
25	30	2	CLAY	63	315	1973	10	SPT	10	STIFF	0.55	1250			5.40	29.16	7.56	40.82
30	35	2	CLAY	63	315	2288	10	SPT	10	STIFF	0.55	1250			5.40	34.56	7.56	48.38
35	40	2	CLAY	63	315	2603	10	SPT	12	STIFF	0.55	1500			6.48	41.04	9.07	57.45
40	45	2	CLAY	63	315	2918	10	SPT	12	STIFF	0.55	1500			6.48	47.52	9.07	66.52
45	50	2	CLAY	63	315	3233	10	SPT	12	STIFF	0.55	1500			6.48	54.00	9.07	75.59
50	55	2	CLAY	63	315	3548	15	SPT	15	STIFF	0.55	1875			8.10	62.10	11.34	86.93
55	60	2	CLAY	63	315	3863	15	SPT	15	STIFF	0.55	1875			8.10	70.19	11.34	98.27
60	65	2	CLAY	63	315	4178	15	SPT	15	STIFF	0.55	1875			8.10	78.29	11.34	109.61
65	70	2	CLAY	63	315	4493	15	SPT	15	STIFF	0.55	1875			8.10	86.39	11.34	120.95

Use Pile Length = 45 ft for service load of 45 Tons

RTE 880 - SAN LEANDRO

RETAINING WALL RW SB-2 (NORTH)
CPT-2 & RW-32, B-1 (CALTRANS 1966)
(NEAR SAN LEANDRO CREEK BR. AREA)



FURTHER NORTH AWAY FROM THE BRIDGE, THE SOIL IS STIFFER PER AS-BUILT B-1 (1966), AS-BUILT B-1 (1992) & RW-33 (2008). THE SOIL STRENGTH IS ON THE ORDER OF 1500 TO 2000 PSF (B-1 (1966), SPT$_{avg}$=12, B-1 (1992), q_{bu}=2 tsf).

∴ ULTIMATE BEARING (C = 1750 psf)

$q_{ult} = 5.53\,C$
$= 9.7$ ksf

OK TO USE $q_{ult} = 9$ ksf FOR SW ON RW (TYPE 5 SW13)

USE PILE IF DEMAND > 9 ksf

WALL HEIGHT UP TO 18'
USE 45-TON, 24" CIDH CONC PILE FOR SUPPORT DUE TO RIGHT-OF-WAY & SOFT SOIL NEAR FTG SUBGRADE

CAST-IN-DRILLED-HOLE PILE CAPACITY
Design per O'Neil and Reese (1999)

Route 880 San Leandro - Retaining Wall SB-2
206139.10

PILE DIA, B (ft) = 2

SIDE MOBILIZATION
FACTOR (CLAY) = 1
FACTOR (SAND) = 1

INCREAMENTS (FT)= 5

SOIL GROUPS
1. GRAVELS, SANDS AND NONPLASTIC SILTS
2. CLAYS AND PLASTIC SILTS
3. IGM (COHESIONLESS MATERIAL)

SOIL TYPES
GRAVEL, SAND, NSILT, CLAY, PSILT

PILE CAPACTY

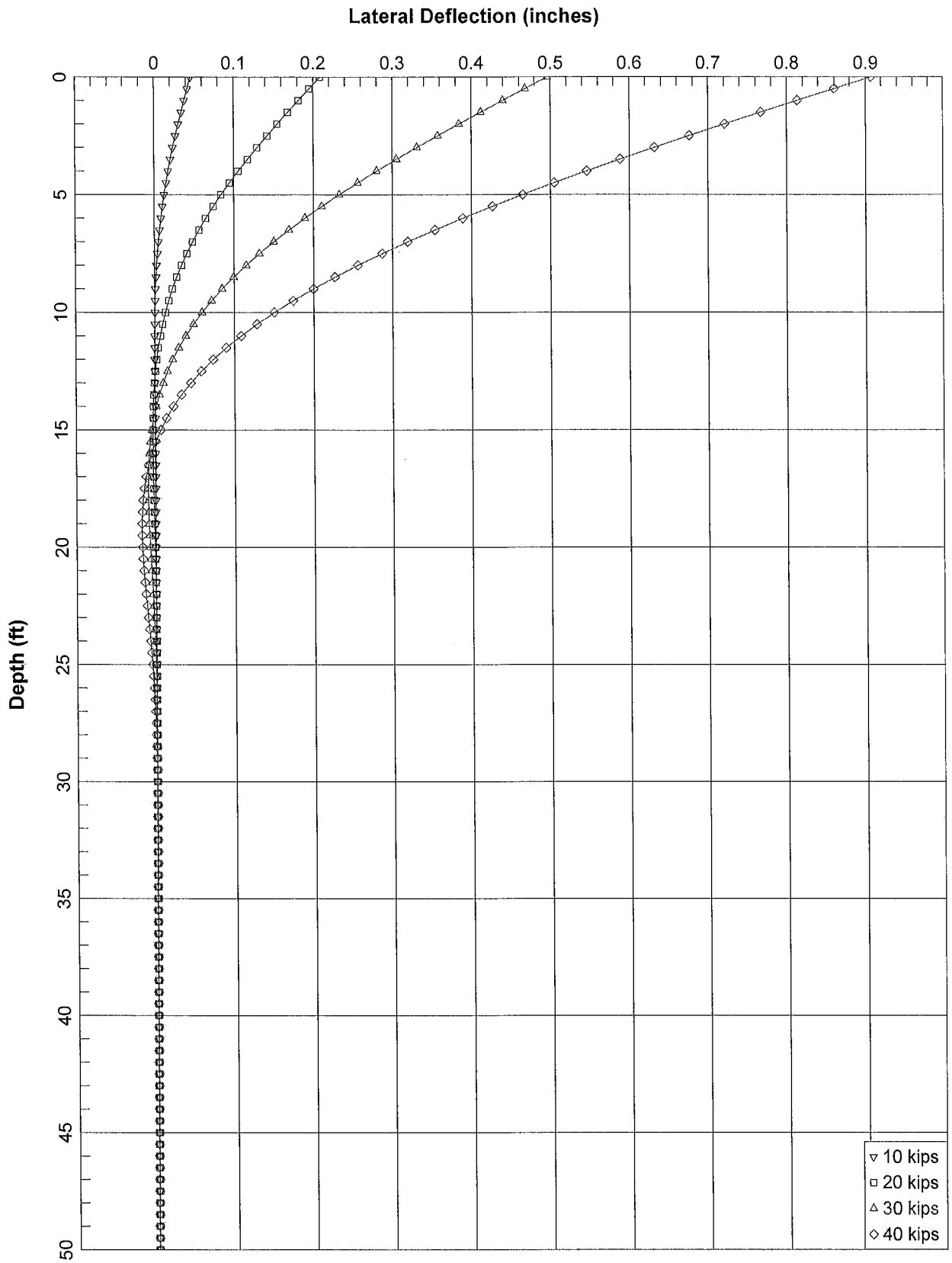
F.S. FOR COMPRESSION = 2

F.S. FOR UPLIFT = 1

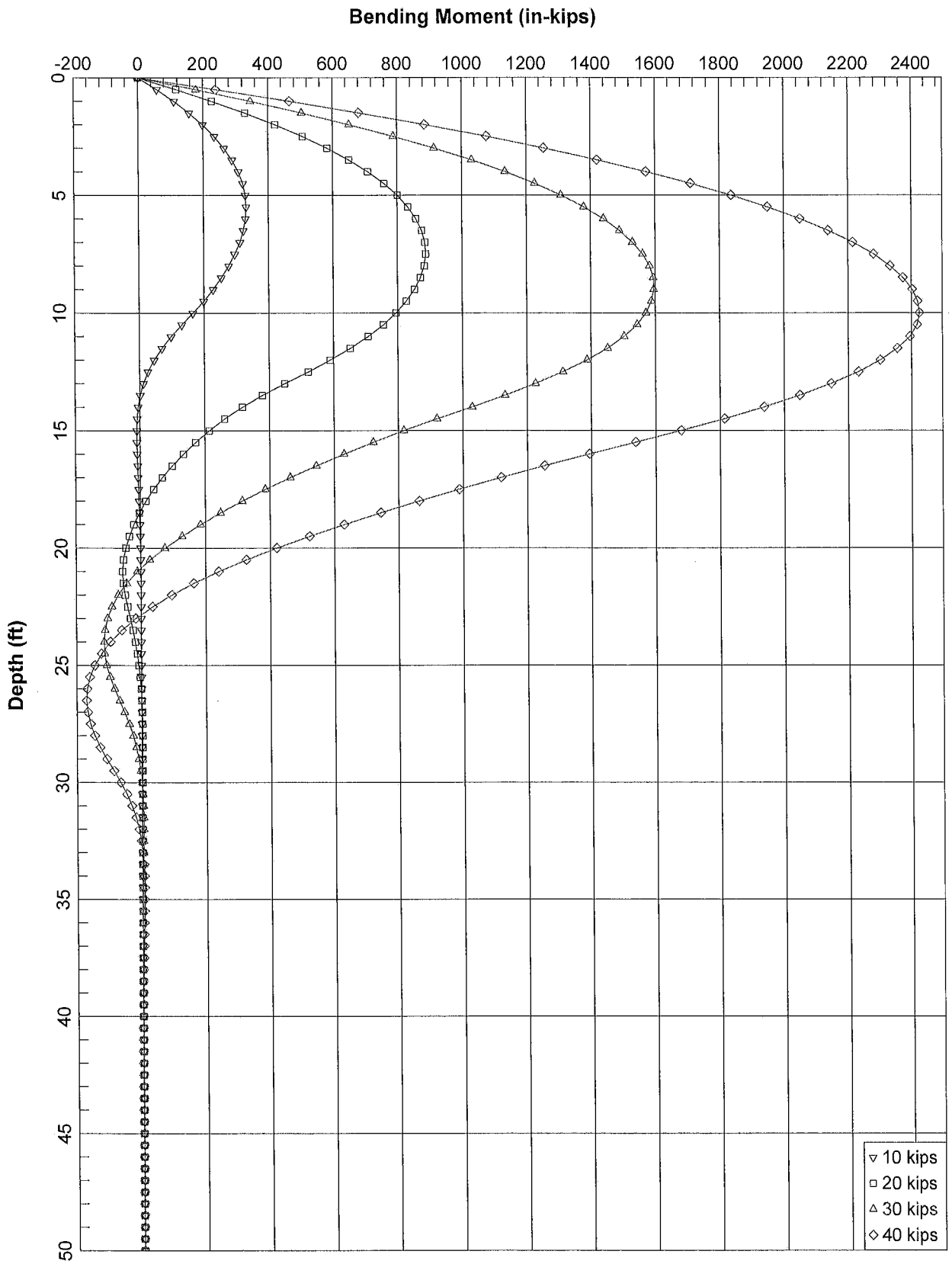
PERIMETER OF THE PILE (ft) = 6.28 SQ. FT.
AREA OF THE PILE TIP 3.14 SQ. FT.

DEPTH FROM	DEPTH TO	SOIL GROUP	SOIL TYPE	γ' (pcf)	Δσ' (psf)	σ' (psf)	BLOW COUNT	SAMPLER TYPE	AVG. S.P.T - N	CONSISTENCY	SHEAR STRENGTH PARAMETERS α	c(psf)	β	φ (°)	ALLOWABLE COMPRESSION (PER SECTION) (Ton)	ALLOWABLE COMPRESSION CAPACITY (Ton)	ULTIMATE UPLIFT (PER SECTION) (Ton)	ULTIMATE UPLIFT CAPACITY (Ton)
0	5	1	SAND	120	600	300	5	SPT	5	MED DENSE			0.43	33	1.01	1.01	1.01	1.01
5	10	2	CLAY	120	600	900	3	SPT	3	SOFT	0.55	350			1.51	2.52	2.12	3.13
10	15	2	CLAY	60	300	1350	5	SPT	5	MEDIUM	0.55	650			2.81	5.33	3.93	7.06
15	18	2	CLAY	60	180	1590	0	SPT	0	V. SOFT	0.55	0			0.00	5.33	0.00	7.06
18	23	1	SAND	63	315	1838	25	SPT	25	DENSE			0.89	38	12.83	18.16	12.83	19.88
23	26	1	SAND	63	189	2090	25	SPT	25	DENSE			0.83	38	8.19	26.35	8.19	28.07
26	29	2	CLAY	63	189	2279	6	SPT	6	MEDIUM	0.55	800			2.07	28.42	2.90	30.98
29	34	2	CLAY	63	315	2531	10	SPT	12	STIFF	0.55	1500			6.48	34.90	9.07	40.05
34	38	2	CLAY	63	252	2814	13	SPT	12	STIFF	0.55	1500			5.18	40.08	7.26	47.31
38	43	2	CLAY	63	315	3098	15	SPT	12	STIFF	0.55	1500			6.48	46.56	9.07	56.38
43	48	2	CLAY	63	315	3413	15	SPT	15	STIFF	0.55	1875			8.10	54.66	11.34	67.72
48	53	2	CLAY	63	315	3728	15	SPT	15	STIFF	0.55	1875			8.10	62.76	11.34	79.06
53	58	2	CLAY	63	315	4043	15	SPT	15	STIFF	0.55	1875			8.10	70.86	11.34	90.40
58	63	2	CLAY	63	315	4358	15	SPT	15	STIFF	0.55	1875			8.10	78.96	11.34	101.73

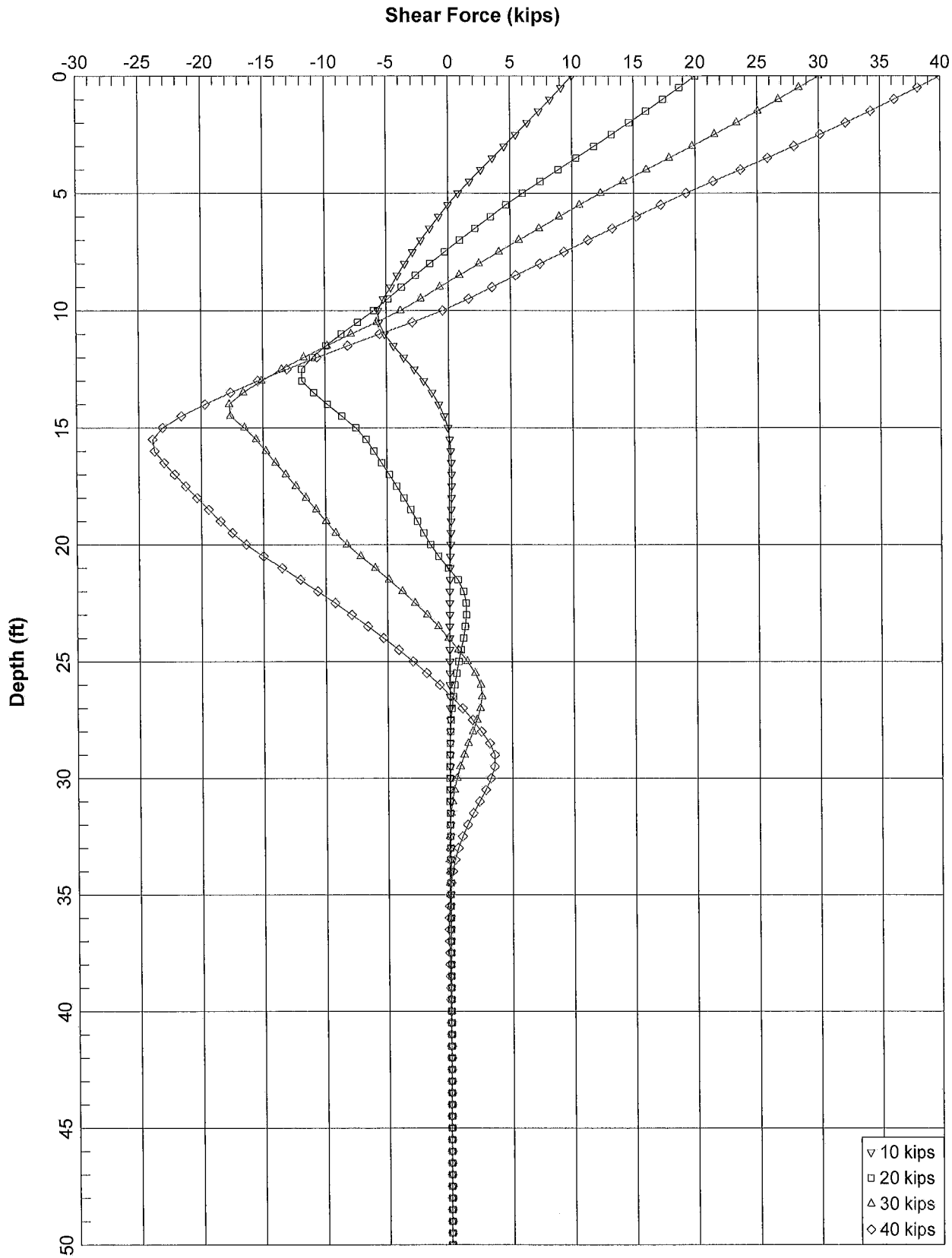
Use Pile Length = 45 ft for service load of 45 Tons



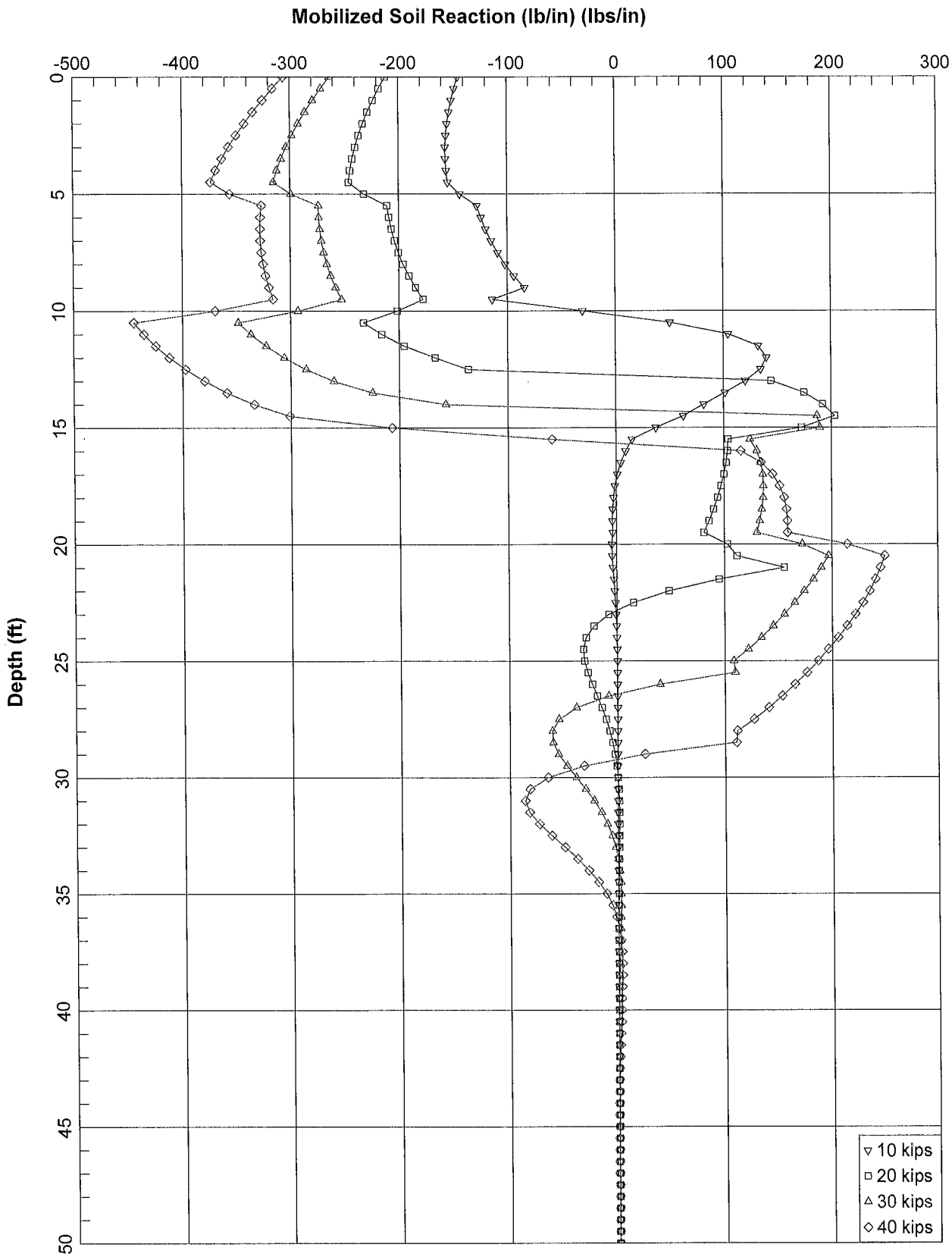
ROUTE 880 SAN LEANDRO (RW SB-1) - FREE HEAD



ROUTE 880 SAN LEANDRO (RW SB-1) - FREE HEAD



ROUTE 880 SAN LEANDRO (RW SB-1) - FREE HEAD



ROUTE 880 SAN LEANDRO (RW SB-1) - FREE HEAD

```
LPILEP6
TITLE
Project Name: ROUTE 880 SAN LEANDRO (RW SB-1) - FREE HEAD
Job Number: 2006-139-010
Client: R&M
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 5.00000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.00000000000000E+0006 = Elastic modulus (psi)
 2.40000000000000E+0001 = Section circular pile width at top (in)
 2.40000000000000E+0001 = Section circular pile width at bottom (in)
 4.52389342116930E+0002 = Section area at top (sq in)
 4.52389342116930E+0002 = Section area at bottom (sq in)
 1.62860163162095E+0004 = Section MOI at top (in^4)
 1.62860163162095E+0004 = Section MOI at bottom (in^4)
SOIL LAYERS
9 = number of soil layers
3       -2.00000000000000E+0000  5.00000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.20000000000000E+0002  1.37500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.20000000000000E+0002  1.37500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        5.00000000000000E+0000  1.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.00000000000000E+0001  1.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.50000000000000E+0001  2.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  8.75000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  8.75000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
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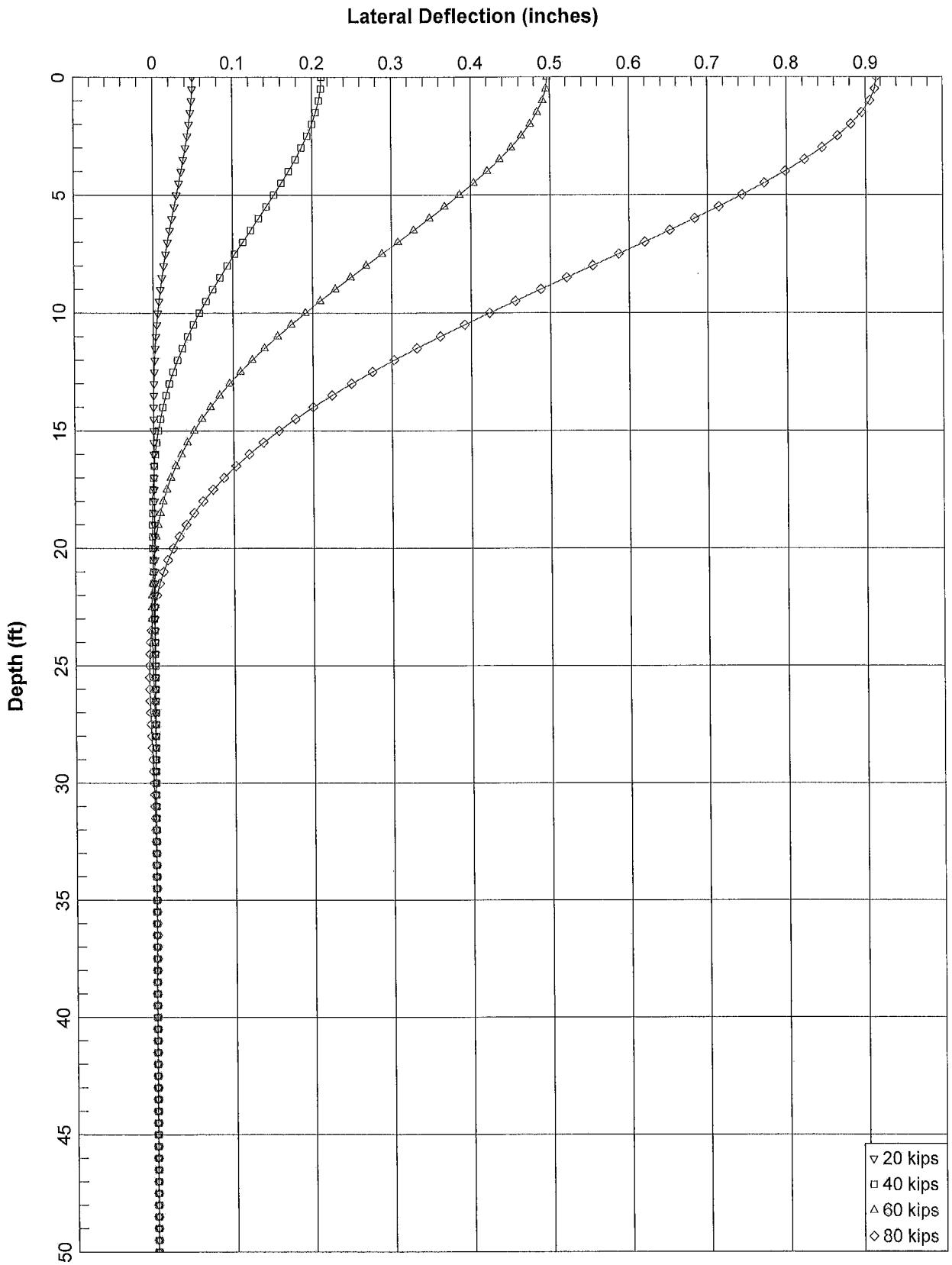
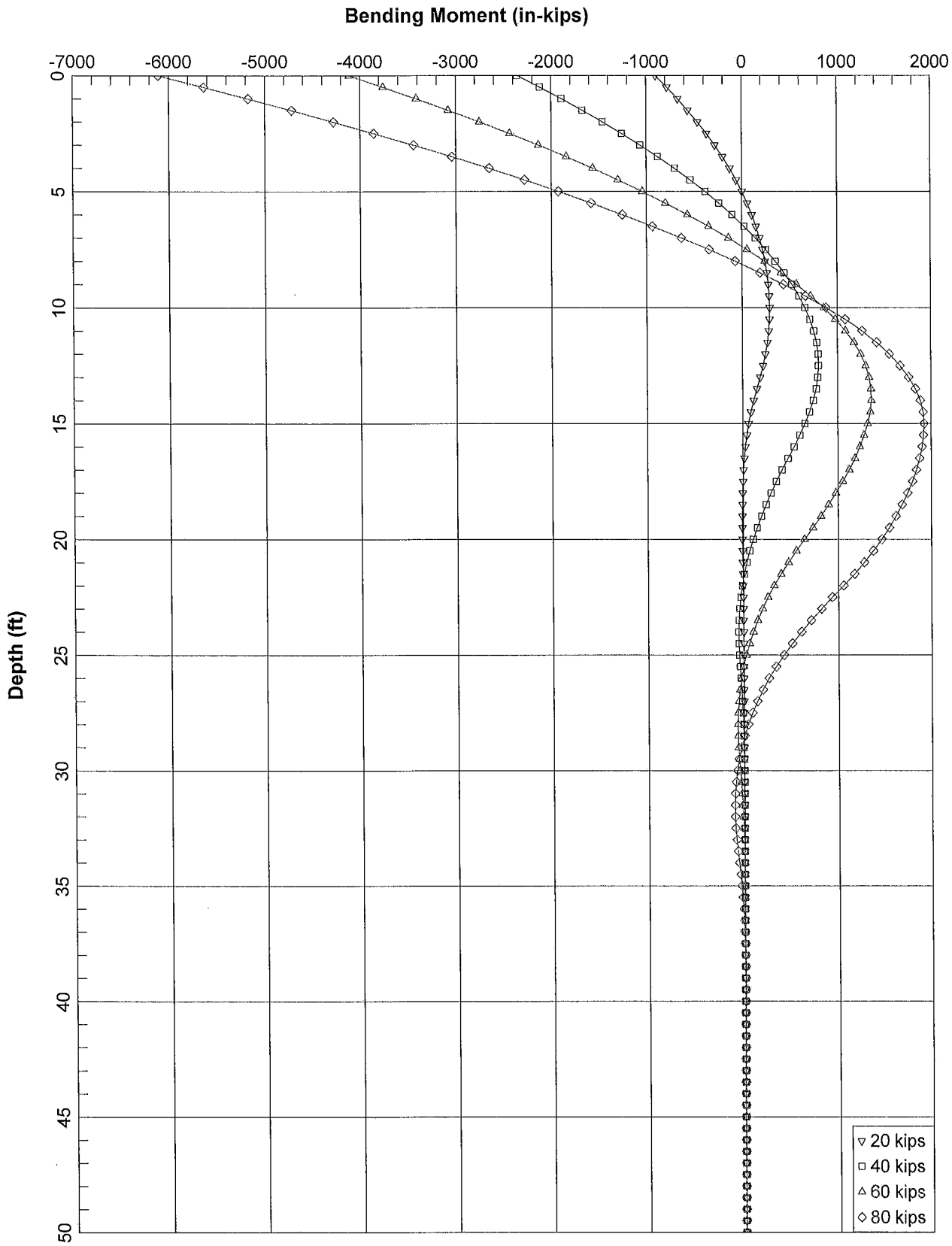
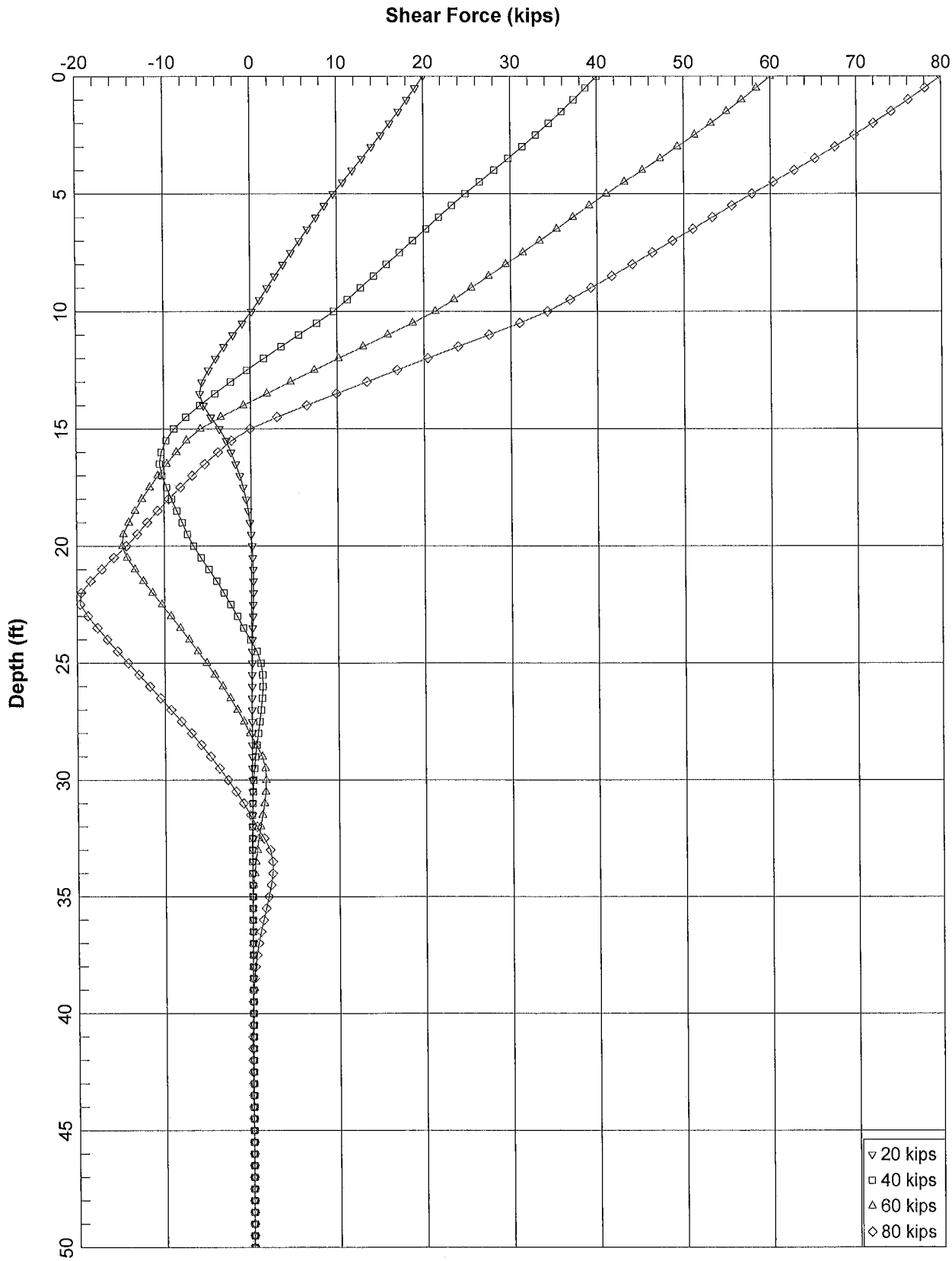
```
3        2.00000000000000E+0001  3.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.50000000000000E+0001  4.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.00000000000000E+0001  4.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.62500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.62500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.50000000000000E+0001  5.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.12500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.12500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        5.50000000000000E+0001  6.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1        0.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        5.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```



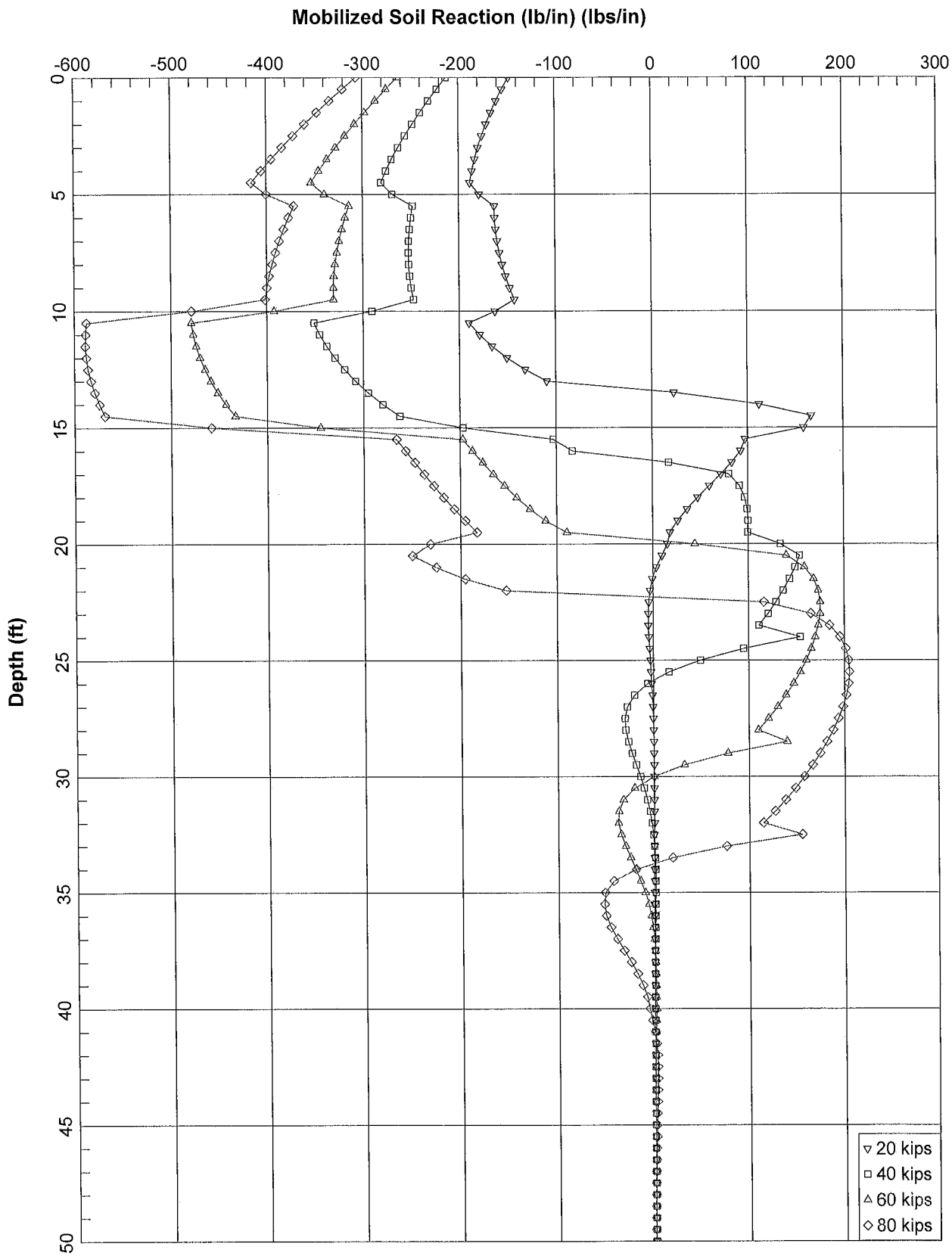
ROUTE 880 SAN LEANDRO (RW SB-1) - FIXED HEAD



ROUTE 880 SAN LEANDRO (RW SB-1) - FIXED HEAD



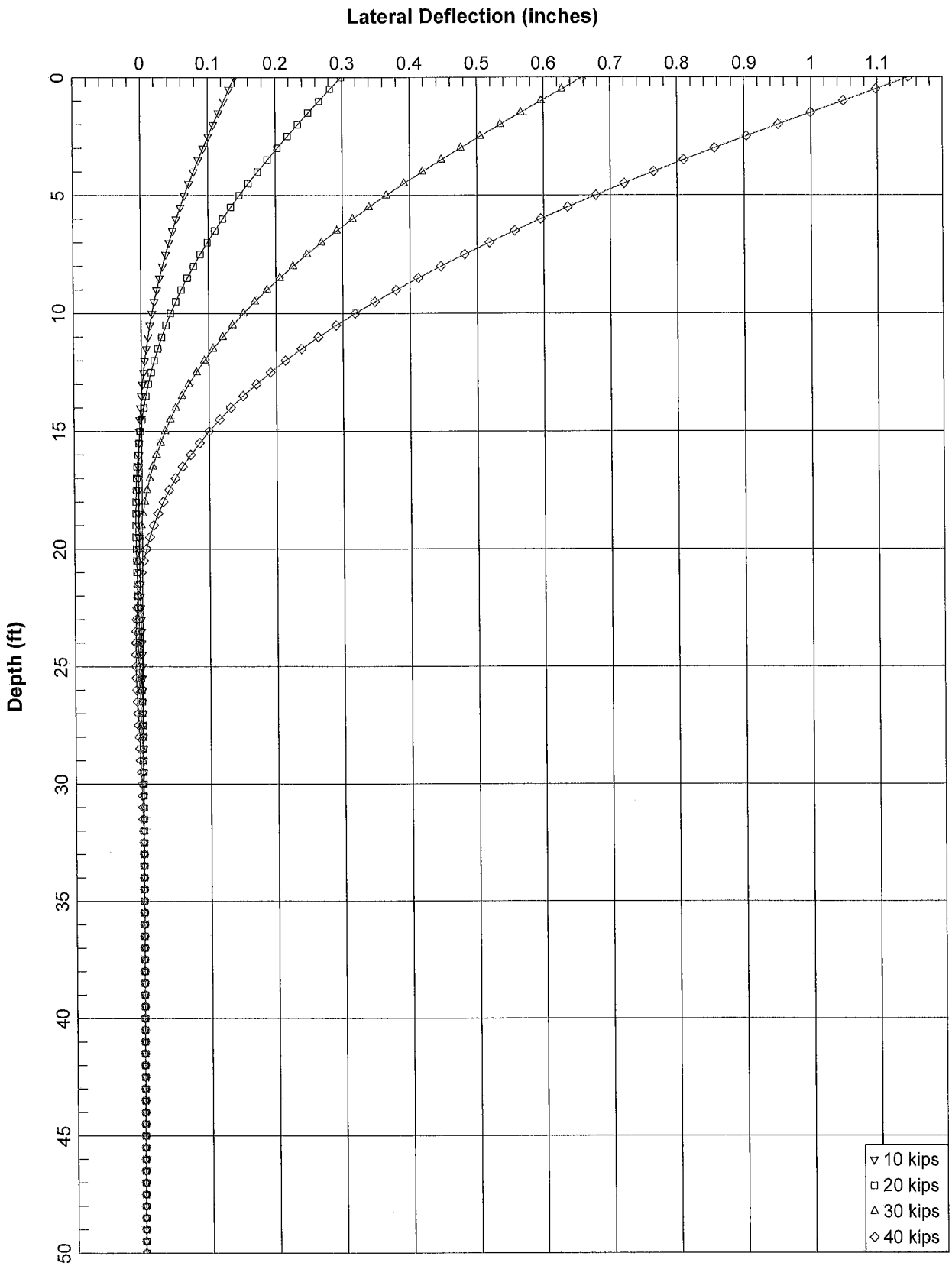
ROUTE 880 SAN LEANDRO (RW SB-1) - FIXED HEAD



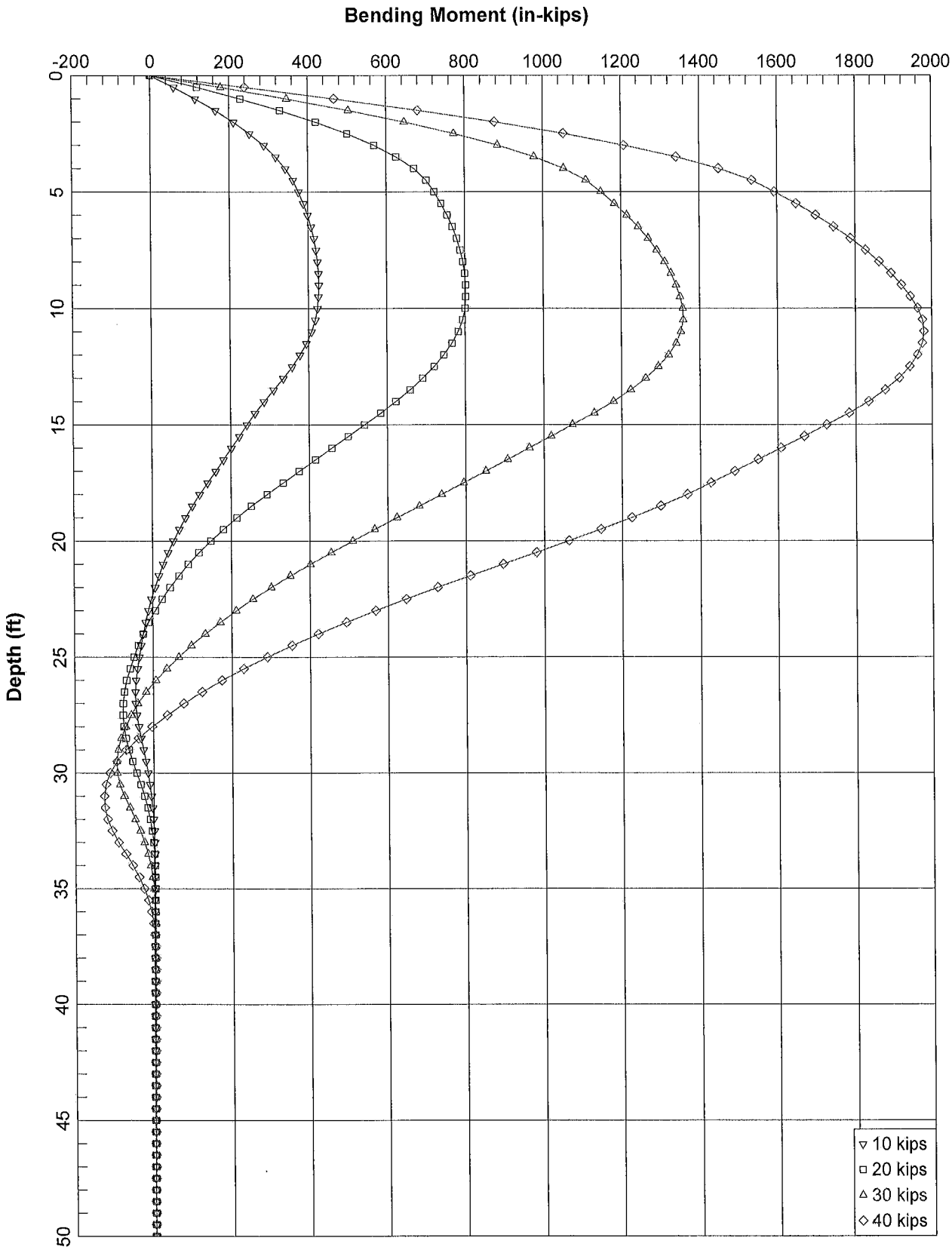
ROUTE 880 SAN LEANDRO (RW SB-1) - FIXED HEAD

```
LPILEP6
TITLE
Project Name: ROUTE 880 SAN LEANDRO (RW SB-1) - FIXED HEAD
Job Number: 2006-139-010
Client: R&M
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 5.00000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.00000000000000E+0006 = Elastic modulus (psi)
 2.40000000000000E+0001 = Section circular pile width at top (in)
 2.40000000000000E+0001 = Section circular pile width at bottom (in)
 4.52389342116930E+0002 = Section area at top (sq in)
 4.52389342116930E+0002 = Section area at bottom (sq in)
 1.62860163162095E+0004 = Section MOI at top (in^4)
 1.62860163162095E+0004 = Section MOI at bottom (in^4)
SOIL LAYERS
9 = number of soil layers
3       -2.00000000000000E+0000  5.00000000000000E+0000 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 1.20000000000000E+0002  1.37500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 1.20000000000000E+0002  1.37500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        5.00000000000000E+0000  1.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.00000000000000E+0001  1.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        1.50000000000000E+0001  2.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  8.75000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  8.75000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
```

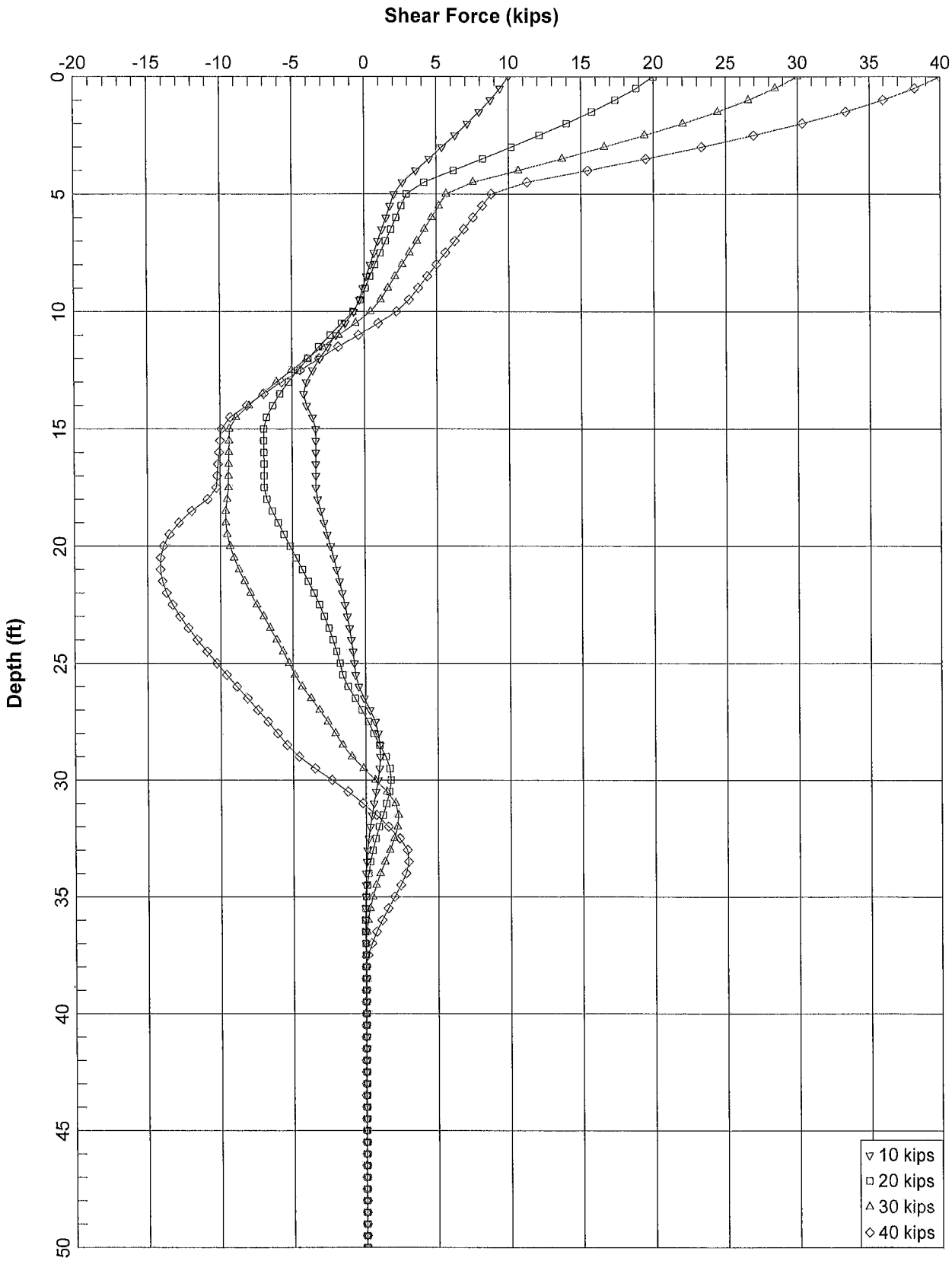
```
3        2.00000000000000E+0001  3.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.25000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        3.50000000000000E+0001  4.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.12500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.00000000000000E+0001  4.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.62500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.62500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        4.50000000000000E+0001  5.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.12500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.12500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        5.50000000000000E+0001  6.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.87500000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1        0.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        5.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       2        2.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);            Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       2        4.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);            Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       2        6.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);            Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       2        8.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);            Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```



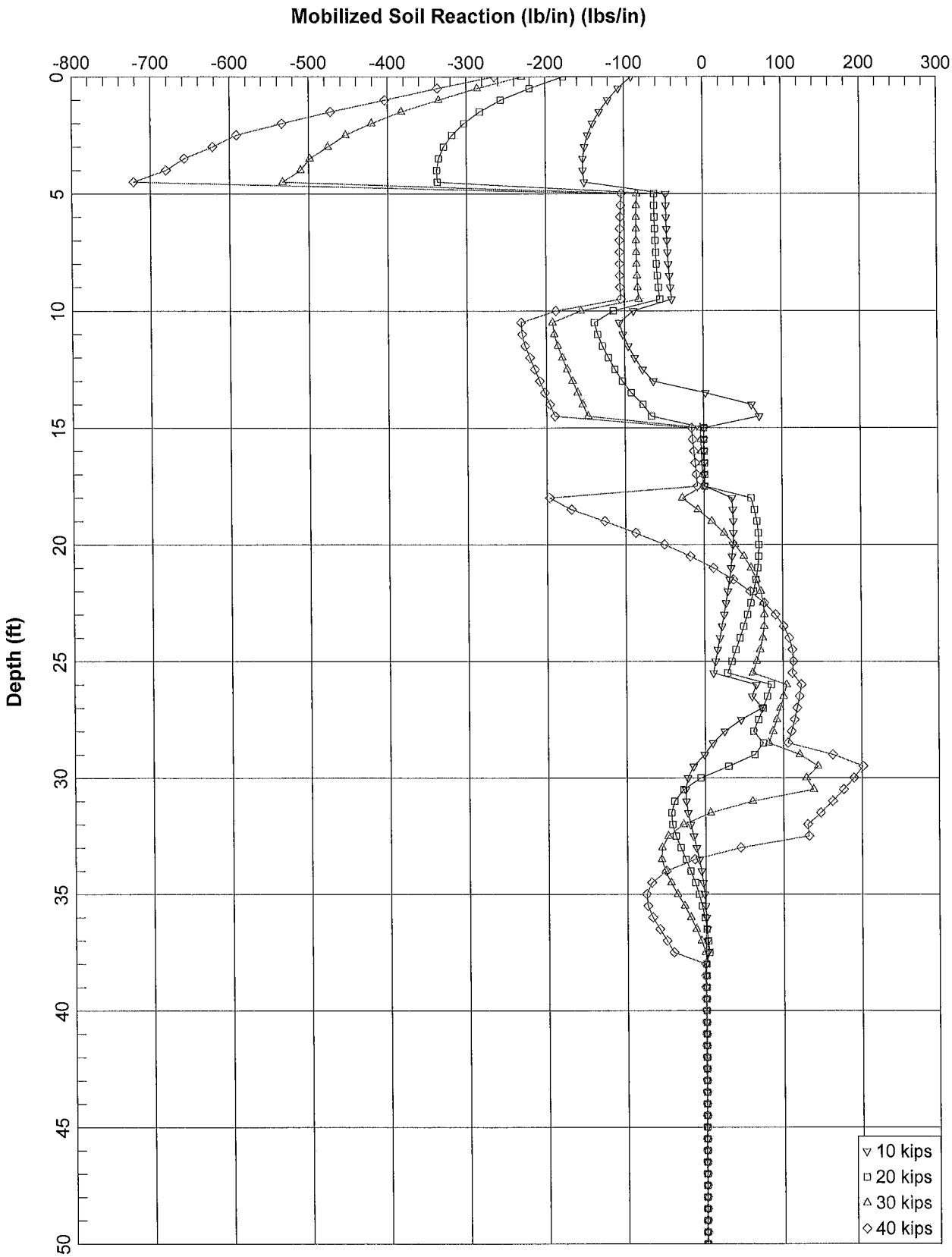
ROUTE 880 SAN LEANDRO (RW SB-2) - FREE HEAD



ROUTE 880 SAN LEANDRO (RW SB-2) - FREE HEAD



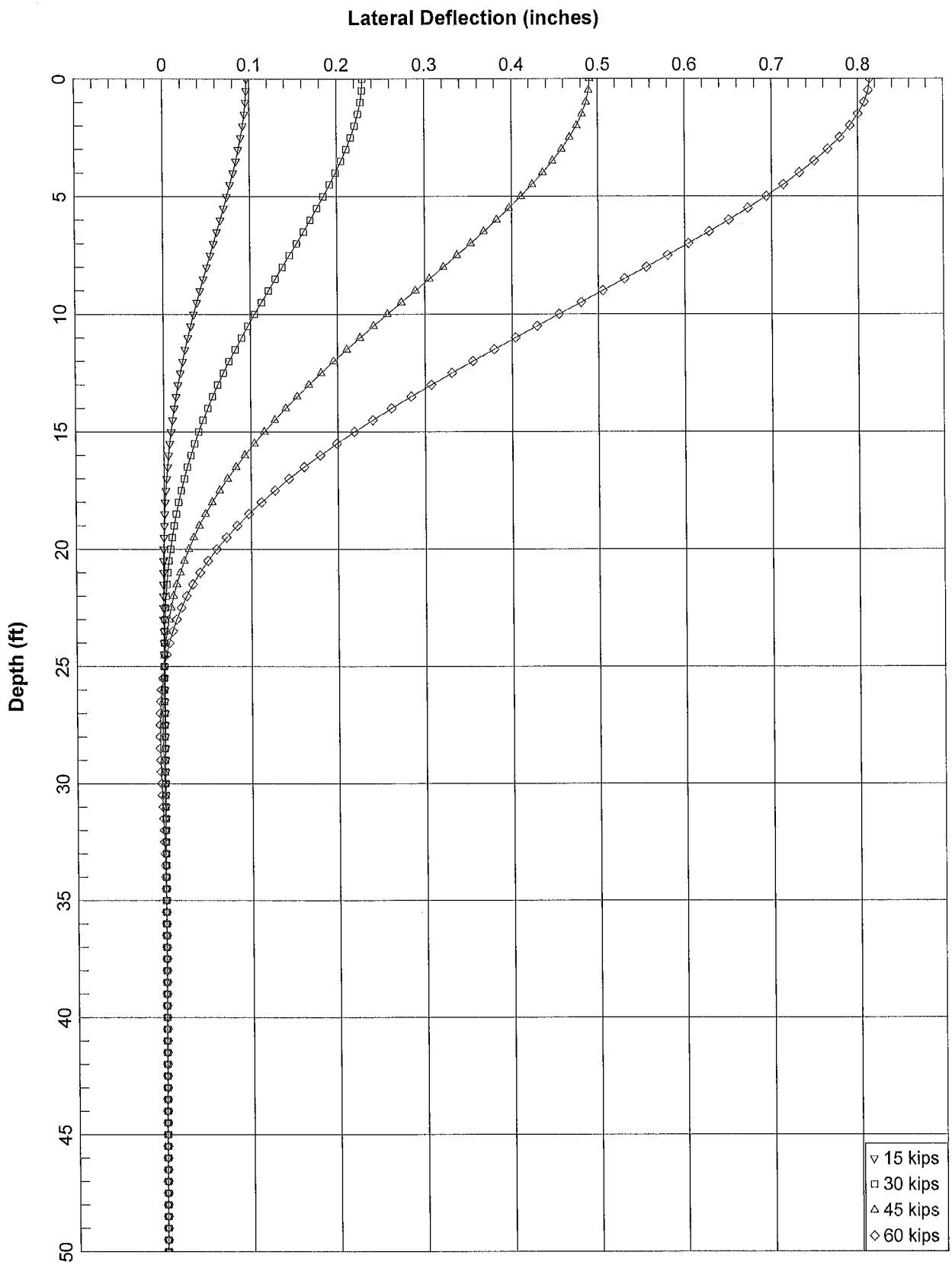
ROUTE 880 SAN LEANDRO (RW SB-2) - FREE HEAD



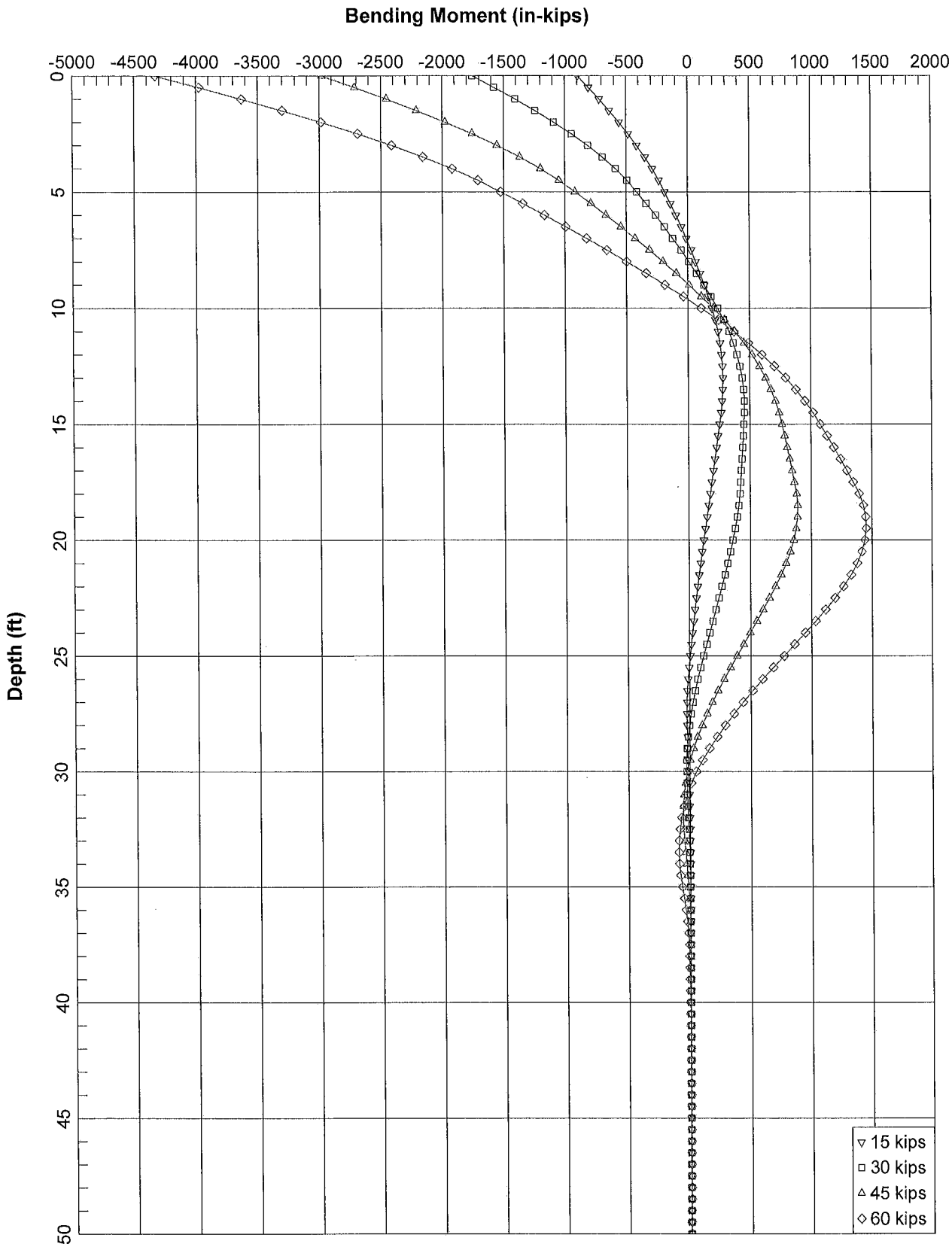
ROUTE 880 SAN LEANDRO (RW SB-2) - FREE HEAD

```
LPILEP6
TITLE
Project Name: ROUTE 880 SAN LEANDRO (RW SB-2) - FREE HEAD
Job Number: 2006-139-010
Client: R&M
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 5.00000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.00000000000000E+0006 = Elastic modulus (psi)
 2.40000000000000E+0001 = Section circular pile width at top (in)
 2.40000000000000E+0001 = Section circular pile width at bottom (in)
 4.52389342116930E+0002 = Section area at top (sq in)
 4.52389342116930E+0002 = Section area at bottom (sq in)
 1.62860163162095E+0004 = Section MOI at top (in^4)
 1.62860163162095E+0004 = Section MOI at bottom (in^4)
SOIL LAYERS
8 = number of soil layers
5       -2.00000000000000E+0000  5.00000000000000E+0000 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 1.20000000000000E+0002  3.20000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 1.20000000000000E+0002  3.20000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
1        5.00000000000000E+0000  1.00000000000000E+0001 = soil type index for soft
clay, Xtop (ft), Xbot(ft)
 6.00000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for soft clay
 6.00000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for soft clay
3        1.00000000000000E+0001  1.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
7        1.50000000000000E+0001  1.80000000000000E+0001 = soil type index for liq.
sand, Xtop (ft), Xbot(ft)
 6.00000000000000E+0001 = top gamma (pcf) for liquefied sand
 6.00000000000000E+0001 = bot gamma (pcf) for liquefied sand
5        1.80000000000000E+0001  2.60000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
```

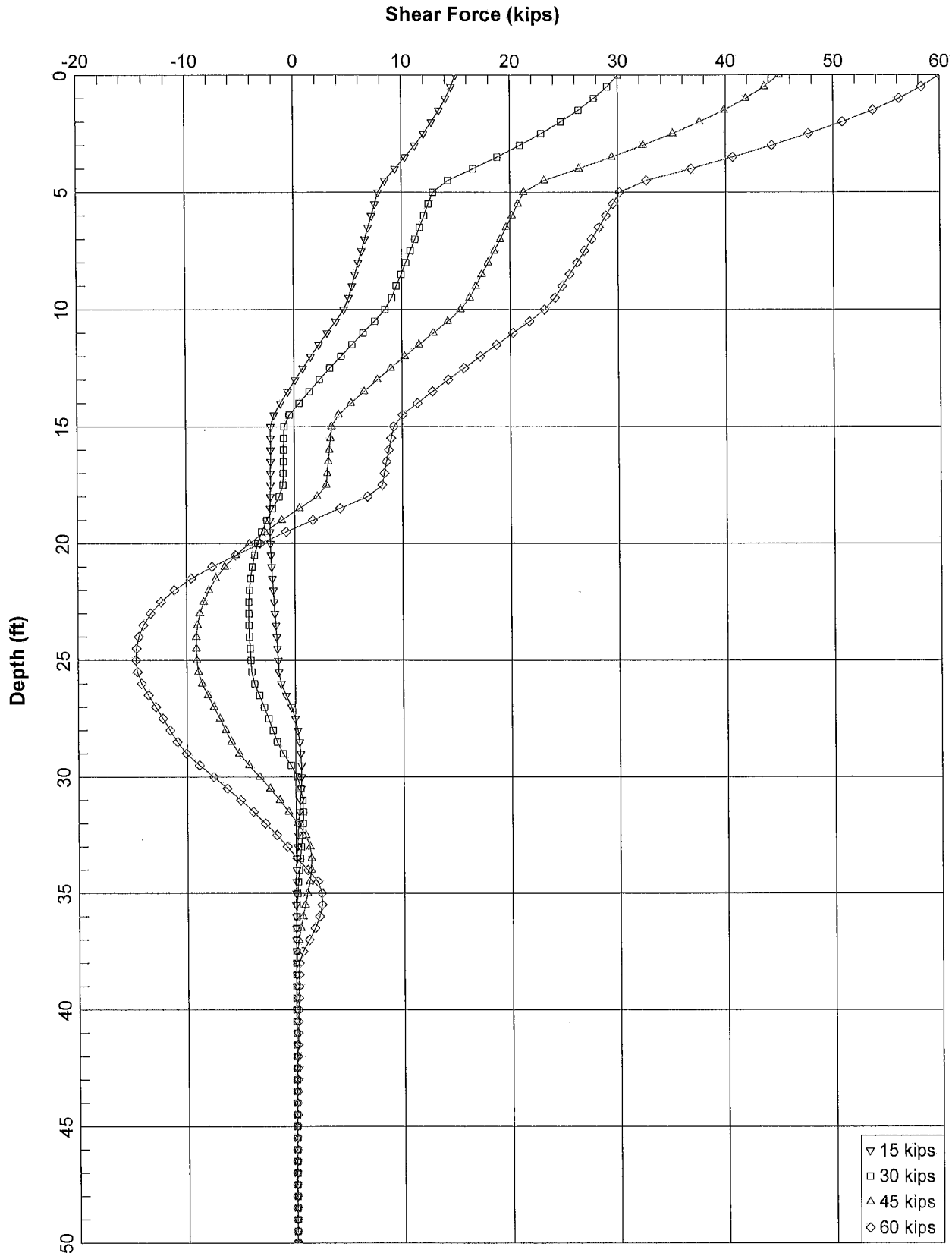
```
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
3        2.60000000000000E+0001  2.90000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  8.00000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  8.00000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.90000000000000E+0001  3.80000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
5        3.80000000000000E+0001  5.40000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1        0.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        5.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       1        2.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       1        3.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       1        4.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```



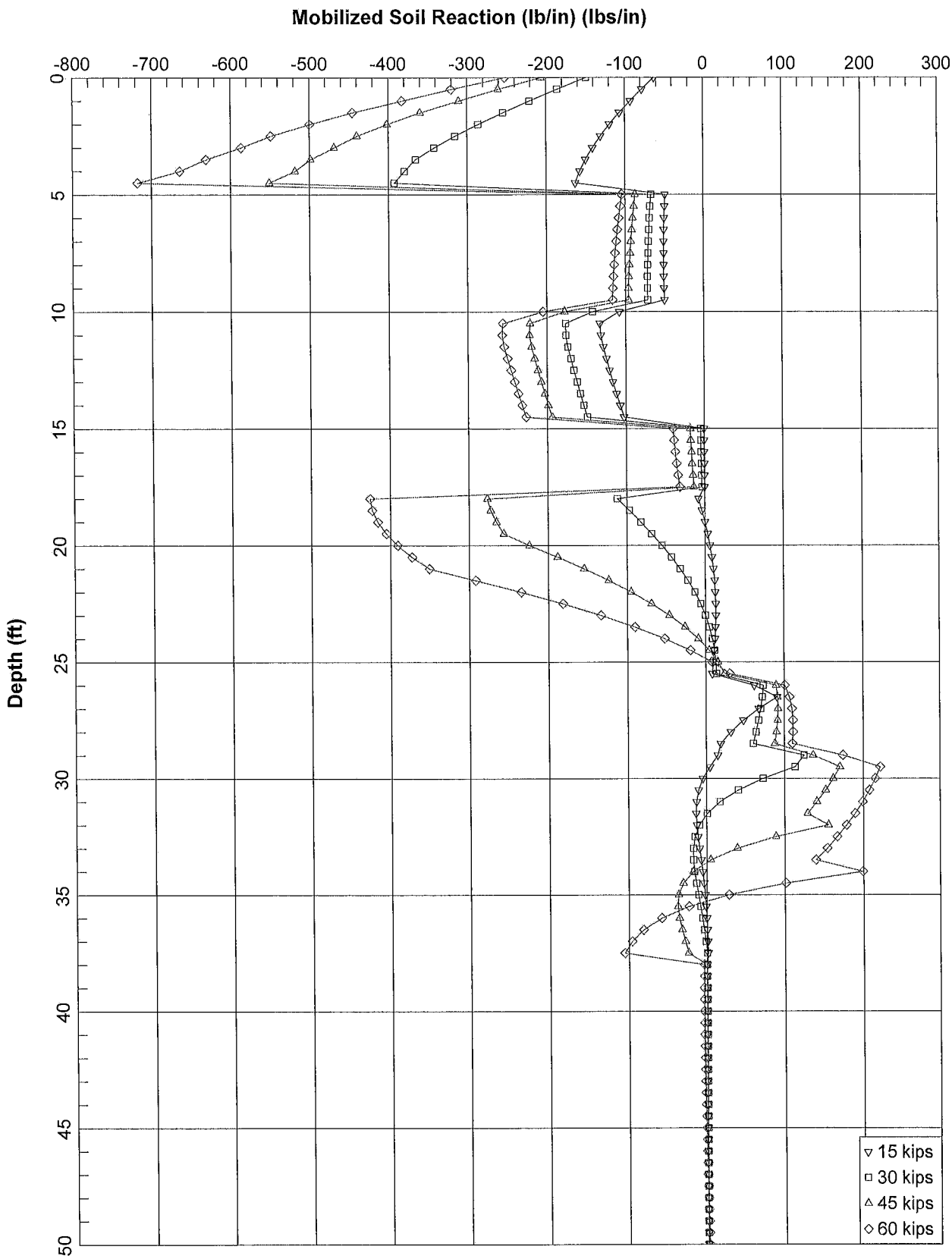
ROUTE 880 SAN LEANDRO (RW SB-2) - FIXED HEAD



ROUTE 880 SAN LEANDRO (RW SB-2) - FIXED HEAD



ROUTE 880 SAN LEANDRO (RW SB-2) - FIXED HEAD



ROUTE 880 SAN LEANDRO (RW SB-2) - FIXED HEAD

```
LPILEP6
TITLE
Project Name: ROUTE 880 SAN LEANDRO (RW SB-2) - FIXED HEAD
Job Number: 2006-139-010
Client: R&M
Engineer:
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 5.00000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.00000000000000E+0006 = Elastic modulus (psi)
 2.40000000000000E+0001 = Section circular pile width at top (in)
 2.40000000000000E+0001 = Section circular pile width at bottom (in)
 4.52389342116930E+0002 = Section area at top (sq in)
 4.52389342116930E+0002 = Section area at bottom (sq in)
 1.62860163162095E+0004 = Section MOI at top (in^4)
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SOIL LAYERS
8 = number of soil layers
5       -2.00000000000000E+0000  5.00000000000000E+0000 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 1.20000000000000E+0002  3.20000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 1.20000000000000E+0002  3.20000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
1        5.00000000000000E+0000  1.00000000000000E+0001 = soil type index for soft
clay, Xtop (ft), Xbot(ft)
 6.00000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for soft clay
 6.00000000000000E+0001  3.50000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for soft clay
3        1.00000000000000E+0001  1.50000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  6.50000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
7        1.50000000000000E+0001  1.80000000000000E+0001 = soil type index for liq.
sand, Xtop (ft), Xbot(ft)
 6.00000000000000E+0001 = top gamma (pcf) for liquefied sand
 6.00000000000000E+0001 = bot gamma (pcf) for liquefied sand
5        1.80000000000000E+0001  2.60000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
```

```
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
3        2.60000000000000E+0001  2.90000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  8.00000000000000E+0002  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  8.00000000000000E+0002  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
3        2.90000000000000E+0001  3.80000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
5        3.80000000000000E+0001  5.40000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1        0.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
2        5.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
4 = Number of load cases
1       2        1.50000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);             Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
2       2        3.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);             Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
3       2        4.50000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);             Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
4       2        6.00000000000000E+0004  0.00000000000000E+0000
9.00000000000000E+0004  1 : Load#; BC2:Shear (lb), Slope (rad);             Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

VERTICAL & LATERAL ANALYSES FOR PRE-FABRICATED BRIDGE (ALAMEDA FLOOD CONTROL)

PRE-FABRICATED BRIDGE

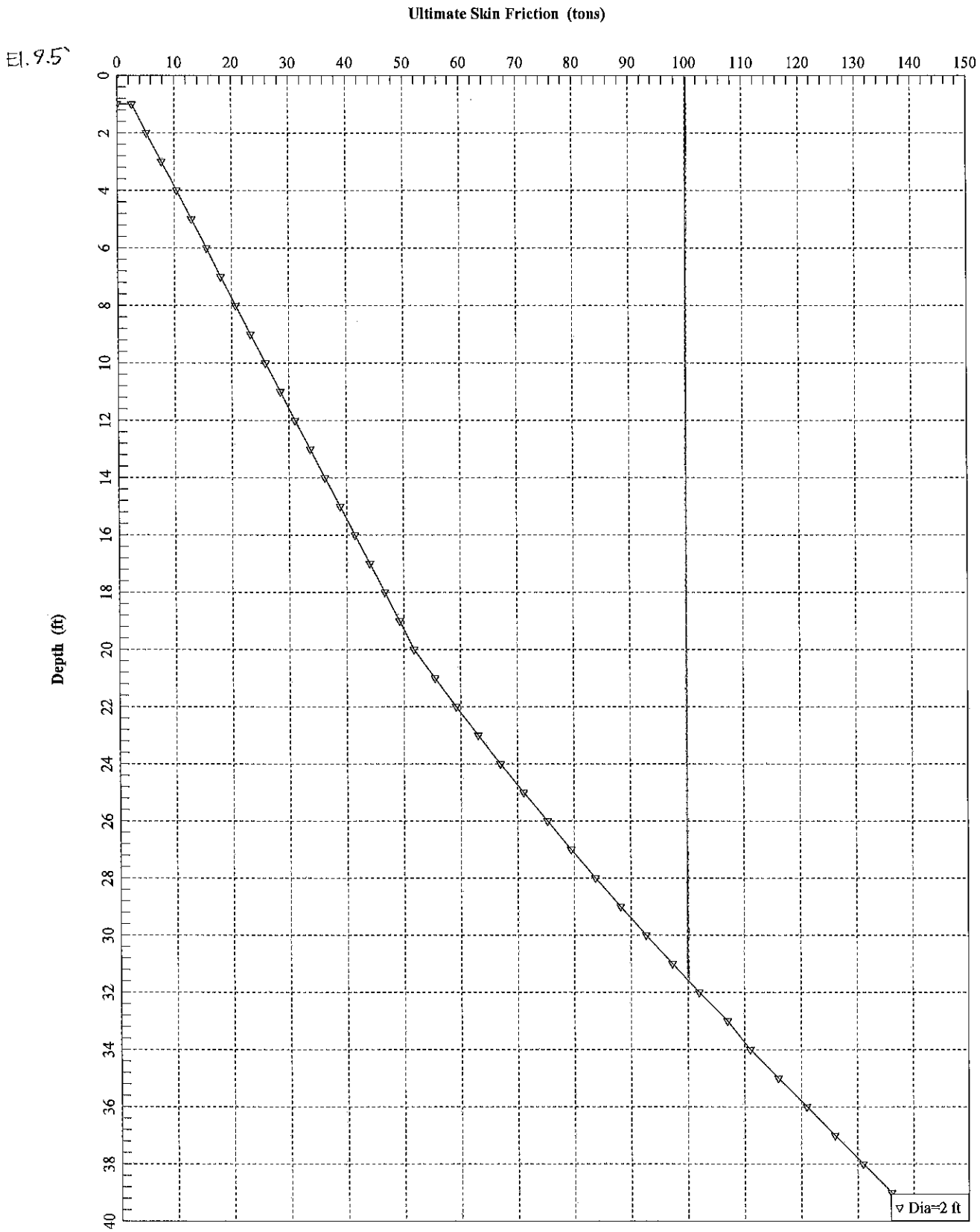
Geotechnical Parameters for LPILE (V. 6) Analysis

Approx. Elevation (ft.)	Generalized Soil Profile	LPILE Soil Type	Soil Strength	Effect Unit Wt. (pcf)
Above 10	Clay, medium stiff to stiff	Stiff Clay w/o Free Water	C = 1500 psf	125
10 to -10	Clay, medium stiff to stiff	Stiff Clay w/o Free Water	C = 1500 psf	62.6
-10 to -30	Sand, medium dense to dense	Sand (Reese)	ϕ = 36 deg	62.6
Below -30	Clay, very stiff	Stiff Clay w/o Free Water	C = 2500 psf	62.6

Notes

1. The default values in LPILE Ver. 6.0 for K and E50 were used.

2. For group efficiency, a p-multiplier of 0.6 and y-multiplier of 1.0 were used for pile spacing of 3D when performing LPILE analysis.



Service : 9.5 − 40 = Elev −30.5'

SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE

```
SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE
1
2 1 1 1 1
2 2 0 0 0 0 3000000
3 0 40 2.5 3
2 19.5
0 125 0.0 1500 0 0 0
0 125 0.0 1500 0 0 0
0 0
1 39.5
0.0 125 36 0.0 0 0 0
0.0 125 36 0.0 0 0 0
2
0 0
2 75
0 125 0.0 2500 0 0 0
0 125 0.0 2500 0 0 0
0 0
```

LPile Plus for Windows, Version 6 (6.0.27)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This copy of LPile is licensed to:

PCI
PCI

Serial Number of Security Device: 157693800
Company Name Stored in Security Device: Parikh Consultants

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT_Nov 2011\Crashwall & Private Bridge\
Name of input data file: Pre-fab Bridge.lp6d
Name of output report file: Pre-fab Bridge.lp6o
Name of plot output file: Pre-fab Bridge.lp6p
Name of runtime messeage file: Pre-fab Bridge.lp6r

Date and Time of Analysis

Date: January 13, 2012 Time: 14:15:43

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE

Job Number: 2006-139-010

Client: R&M

Engineer: LT

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for selected section types.

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 25.00 ft

Depth of ground surface below top of pile = -2.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	25.000000	24.0000000

Input Structural Properties:

Pile Section No. 1:

Section Type = Elastic Pile

Cross-sectional Shape	=	Circular
Section Length	=	25.000 ft
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	16286.016 in^4
Moment of Inertia at Bottom	=	16286.016 in^4
Elastic Modulus	=	3000000. lbs/in^2

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -2.000 ft
Distance from top of pile to bottom of layer = 19.500 ft

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 19.500 ft
Distance from top of pile to bottom of layer = 39.500 ft
NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 39.500 ft
Distance from top of pile to bottom of layer = 50.000 ft

(Depth of lowest layer extends 25.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-2.00	62.60000
2	19.50	62.60000
3	19.50	62.60000
4	39.50	62.60000
5	39.50	62.60000
6	50.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	J	kpy pci	Rock Emass	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Stiff Clay w/o Free Water	-2.000	62.600	1500.000	--	--	--	0.00	--	--	--	--	--	--	--
		19.500	62.600	1500.000	--	--	--	0.00	--	--	--	--	--	--	--
2	Sand (Reese, et al.)	19.500	62.600	--	36.000	--	--	--	--	--	--	--	--	--	--
		39.500	62.600	--	36.000	--	--	--	--	--	default	--	--	--	--
3	Stiff Clay w/o Free Water	39.500	62.600	2500.000	--	--	--	0.00	--	--	--	--	--	--	--
		50.000	62.600	2500.000	--	--	--	0.00	--	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.6000	1.0000
2	50.000	0.6000	1.0000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 10000.00000 lbs	M = 0.0000 in-lbs	200000.

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head = 10000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 200000.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.0416	-3.767E-08	10000.0000	-0.000617	442.0971	4.886E+10	-150.7781	5439.5031	0.000
3.000	0.0397	29691.	9545.6729	-0.000616	463.9746	4.886E+10	-152.1066	11486.	0.000
6.000	0.0379	58013.	9087.5508	-0.000613	484.8427	4.886E+10	-153.3081	12140.	0.000
9.000	0.0361	84952.	8626.0188	-0.000609	504.6925	4.886E+10	-154.3799	12847.	0.000
12.000	0.0342	110499.	8161.4703	-0.000603	523.5162	4.886E+10			

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
							-155.3191	13612.	0.000
15.000	0.0324	134645.	7694.3073	-0.000595	541.3070	4.886E+10	-156.1229	14441.	0.000
18.000	0.0307	157379.	7224.9401	-0.000586	558.0587	4.886E+10	-156.7885	15341.	0.000
21.000	0.0289	178698.	6753.7881	-0.000576	573.7665	4.886E+10	-157.3128	16320.	0.000
24.000	0.0272	198593.	6281.2794	-0.000564	588.4262	4.886E+10	-157.6929	17389.	0.000
27.000	0.0255	217062.	5807.8515	-0.000552	602.0348	4.886E+10	-157.9257	18557.	0.000
30.000	0.0239	234102.	5333.9513	-0.000538	614.5902	4.886E+10	-158.0078	19836.	0.000
33.000	0.0223	249711.	4860.0355	-0.000523	626.0914	4.886E+10	-157.9360	21242.	0.000
36.000	0.0208	263890.	4386.5711	-0.000507	636.5385	4.886E+10	-157.7069	22790.	0.000
39.000	0.0193	276639.	3914.0354	-0.000490	645.9327	4.886E+10	-157.3169	24500.	0.000
42.000	0.0178	287963.	3442.9170	-0.000473	654.2760	4.886E+10	-156.7620	26395.	0.000
45.000	0.0164	297864.	2973.7162	-0.000455	661.5720	4.886E+10	-156.0385	28501.	0.000
48.000	0.0151	306351.	2506.9457	-0.000437	667.8252	4.886E+10	-155.1419	30850.	0.000
51.000	0.0138	313430.	2043.1312	-0.000418	673.0412	4.886E+10	-154.0678	33481.	0.000
54.000	0.0126	319111.	1582.8126	-0.000398	677.2270	4.886E+10	-152.8112	36438.	0.000
57.000	0.0114	323405.	1126.5453	-0.000378	680.3908	4.886E+10	-151.3670	39777.	0.000
60.000	0.0103	326324.	674.9012	-0.000358	682.5420	4.886E+10	-149.7291	43565.	0.000
63.000	0.009265	327884.	228.4707	-0.000338	683.6914	4.886E+10	-147.8913	47885.	0.000
66.000	0.008281	328101.	-212.1355	-0.000318	683.8513	4.886E+10	-145.8462	52839.	0.000
69.000	0.007356	326993.	-646.2832	-0.000298	683.0350	4.886E+10	-143.5857	58558.	0.000
72.000	0.006492	324581.	-1073.3121	-0.000278	681.2577	4.886E+10	-141.1003	65205.	0.000
75.000	0.005687	320887.	-1492.5311	-0.000258	678.5358	4.886E+10	-138.3790	72993.	0.000
78.000	0.004942	315936.	-1903.2128	-0.000239	674.8876	4.886E+10	-135.4088	82198.	0.000
81.000	0.004255	309754.	-2304.5865	-0.000220	670.3329	4.886E+10	-132.1737	93192.	0.000
84.000	0.003625	302372.	-2695.8278	-0.000201	664.8932	4.886E+10	-128.6539	106479.	0.000
87.000	0.003050	293820.	-3076.0453	-0.000182	658.5922	4.886E+10	-124.8244	122763.	0.000
90.000	0.002530	284134.	-3444.2604	-0.000165	651.4554	4.886E+10	-120.6524	143060.	0.000
93.000	0.002062	273352.	-3799.3788	-0.000148	643.5108	4.886E+10	-116.0932	168889.	0.000
96.000	0.001645	261515.	-4140.1450	-0.000131	634.7890	4.886E+10	-111.0842	202635.	0.000
99.000	0.001275	248669.	-4465.0699	-0.000116	625.3234	4.886E+10	-105.5324	248274.	0.000
102.000	0.000952	234863.	-4772.3045	-0.000101	615.1512	4.886E+10	-99.2907	313024.	0.000
105.000	0.000671	220156.	-5059.3985	-8.669E-05	604.3141	4.886E+10	-92.1053	411638.	0.000

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
108.000	0.000431	204611.	-5389.9737	-7.365E-05	592.8603	4.886E+10	-128.2781	891896.	0.000
111.000	0.000229	187904.	-5685.8881	-6.159E-05	580.5503	4.886E+10	-68.9982	902373.	0.000
114.000	6.191E-05	170570.	-5817.6438	-5.059E-05	567.7777	4.886E+10	-18.8390	912849.	0.000
117.000	-7.414E-05	153059.	-5811.6729	-4.065E-05	554.8754	4.886E+10	22.8196	923326.	0.000
120.000	-0.000182	135748.	-5692.4651	-3.179E-05	542.1204	4.886E+10	56.6523	933802.	0.000
123.000	-0.000265	118943.	-5482.4352	-2.397E-05	529.7373	4.886E+10	83.3676	944278.	0.000
126.000	-0.000326	102883.	-5201.8508	-1.716E-05	517.9039	4.886E+10	103.6886	954755.	0.000
129.000	-0.000368	87752.	-4868.8113	-1.130E-05	506.7553	4.886E+10	118.3377	965231.	0.000
132.000	-0.000394	73683.	-4499.2704	-6.348E-06	496.3890	4.886E+10	128.0229	975708.	0.000
135.000	-0.000406	60764.	-4107.0962	-2.220E-06	486.8697	4.886E+10	133.4266	986184.	0.000
138.000	-0.000407	49043.	-3704.1604	1.151E-06	478.2336	4.886E+10	135.1973	996661.	0.000
141.000	-0.000399	38538.	-3300.4507	3.840E-06	470.4927	4.886E+10	133.9425	1007137.	0.000
144.000	-0.000384	29236.	-2904.2007	5.921E-06	463.6390	4.886E+10	130.2241	1017614.	0.000
147.000	-0.000363	21105.	-2522.0321	7.466E-06	457.6481	4.886E+10	124.5549	1028090.	0.000
150.000	-0.000339	14095.	-2159.1044	8.547E-06	452.4826	4.886E+10	117.3969	1038567.	0.000
153.000	-0.000312	8140.4939	-1819.2675	9.230E-06	448.0952	4.886E+10	109.1610	1049043.	0.000
156.000	-0.000284	3168.2280	-1505.2150	9.577E-06	444.4315	4.886E+10	100.2073	1059519.	0.000
159.000	-0.000255	-902.2886	-1218.6337	9.646E-06	442.7619	4.886E+10	90.8469	1069996.	0.000
162.000	-0.000226	-4155.1501	-960.3480	9.491E-06	445.1587	4.886E+10	81.3436	1080472.	0.000
165.000	-0.000198	-6675.7661	-730.4570	9.159E-06	447.0160	4.886E+10	71.9171	1090949.	0.000
168.000	-0.000171	-8548.8822	-528.4624	8.691E-06	448.3961	4.886E+10	62.7459	1101425.	0.000
171.000	-0.000146	-9856.9702	-353.3874	8.126E-06	449.3600	4.886E+10	53.9708	1111902.	0.000
174.000	-0.000122	-10679.	-203.8838	7.496E-06	449.9656	4.886E+10	45.6983	1122378.	0.000
177.000	-0.000101	-11089.	-78.3291	6.827E-06	450.2680	4.886E+10	38.0048	1132855.	0.000
180.000	-8.118E-05	-11157.	25.0874	6.144E-06	450.3180	4.886E+10	30.9396	1143331.	0.000
183.000	-6.378E-05	-10946.	108.2900	5.466E-06	450.1625	4.886E+10	24.5289	1153807.	0.000
186.000	-4.839E-05	-10514.	173.2520	4.807E-06	449.8440	4.886E+10	18.7791	1164284.	0.000
189.000	-3.494E-05	-9912.3732	221.9412	4.180E-06	449.4008	4.886E+10	13.6803	1174760.	0.000
192.000	-2.331E-05	-9187.3134	256.2751	3.593E-06	448.8665	4.886E+10	9.2089	1185237.	0.000
195.000	-1.338E-05	-8379.0346	278.0849	3.054E-06	448.2710	4.886E+10	5.3309	1195713.	0.000
198.000	-4.984E-06	-7522.4690	289.0873	2.566E-06	447.6398	4.886E+10	2.0040	1206190.	0.000
201.000	2.021E-06	-6647.5899	290.8642	2.131E-06	446.9952	4.886E+10			

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
							-0.8194	1216666.	0.000
204.000	7.801E-06	-5779.8409	284.8486	1.749E-06	446.3558	4.886E+10	-3.1910	1227143.	0.000
207.000	1.252E-05	-4940.5976	272.3167	1.420E-06	445.7374	4.886E+10	-5.1636	1237619.	0.000
210.000	1.632E-05	-4147.6450	254.3854	1.141E-06	445.1532	4.886E+10	-6.7906	1248095.	0.000
213.000	1.936E-05	-3415.6549	232.0140	9.090E-07	444.6138	4.886E+10	-8.1236	1258572.	0.000
216.000	2.178E-05	-2756.6516	206.0110	7.195E-07	444.1282	4.886E+10	-9.2117	1269048.	0.000
219.000	2.368E-05	-2180.4524	177.0432	5.679E-07	443.7037	4.886E+10	-10.1001	1279525.	0.000
222.000	2.518E-05	-1695.0739	145.6494	4.489E-07	443.3460	4.886E+10	-10.8291	1290001.	0.000
225.000	2.637E-05	-1307.0948	112.3572	3.568E-07	443.0602	4.886E+10	-11.3657	1292798.	0.000
228.000	2.732E-05	-1021.3587	77.6461	2.853E-07	442.8496	4.886E+10	-11.7750	1292798.	0.000
231.000	2.809E-05	-841.5603	41.8286	2.281E-07	442.7171	4.886E+10	-12.1033	1292798.	0.000
234.000	2.869E-05	-770.6609	23.1995	1.786E-07	442.6649	4.886E+10	-0.3161	33046.	0.000
237.000	2.916E-05	-702.5778	22.2367	1.334E-07	442.6147	4.886E+10	-0.3258	33522.	0.000
240.000	2.949E-05	-637.4011	21.2466	9.223E-08	442.5667	4.886E+10	-0.3342	33998.	0.000
243.000	2.971E-05	-575.2090	20.2331	5.500E-08	442.5209	4.886E+10	-0.3414	34474.	0.000
246.000	2.982E-05	-516.0685	19.1998	2.150E-08	442.4773	4.886E+10	-0.3474	34950.	0.000
249.000	2.984E-05	-460.0359	18.1501	-8.469E-09	442.4360	4.886E+10	-0.3524	35425.	0.000
252.000	2.977E-05	-407.1577	17.0871	-3.509E-08	442.3971	4.886E+10	-0.3563	35901.	0.000
255.000	2.963E-05	-357.4712	16.0138	-5.857E-08	442.3605	4.886E+10	-0.3593	36377.	0.000
258.000	2.942E-05	-311.0049	14.9327	-7.909E-08	442.3262	4.886E+10	-0.3614	36853.	0.000
261.000	2.916E-05	-267.7800	13.8464	-9.686E-08	442.2944	4.886E+10	-0.3628	37329.	0.000
264.000	2.884E-05	-227.8102	12.7571	-1.121E-07	442.2649	4.886E+10	-0.3634	37804.	0.000
267.000	2.848E-05	-191.1028	11.6668	-1.249E-07	442.2379	4.886E+10	-0.3634	38280.	0.000
270.000	2.809E-05	-157.6594	10.5773	-1.356E-07	442.2132	4.886E+10	-0.3629	38756.	0.000
273.000	2.767E-05	-127.4762	9.4902	-1.444E-07	442.1910	4.886E+10	-0.3618	39232.	0.000
276.000	2.722E-05	-100.5448	8.4070	-1.514E-07	442.1711	4.886E+10	-0.3603	39708.	0.000
279.000	2.676E-05	-76.8526	7.3288	-1.568E-07	442.1537	4.886E+10	-0.3584	40183.	0.000
282.000	2.628E-05	-56.3837	6.2568	-1.609E-07	442.1386	4.886E+10	-0.3562	40659.	0.000
285.000	2.579E-05	-39.1186	5.1920	-1.639E-07	442.1259	4.886E+10	-0.3537	41135.	0.000
288.000	2.530E-05	-25.0353	4.1351	-1.658E-07	442.1155	4.886E+10	-0.3509	41611.	0.000
291.000	2.480E-05	-14.1093	3.0868	-1.670E-07	442.1075	4.886E+10	-0.3479	42087.	0.000
294.000	2.430E-05	-6.3140	2.0479	-1.677E-07	442.1017	4.886E+10	-0.3447	42562.	0.000

```
   297.000  2.379E-05    -1.6209     1.0187 -1.679E-07   442.0983  4.886E+10
-0.3413     43038.      0.000
   300.000  2.329E-05     0.000      0.000 -1.680E-07   442.0971  4.886E+10
-0.3378     21757.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      0.0415786 inches
Computed slope at pile head      =     -0.0006167 radians
Maximum bending moment           =       328101. inch-lbs
Maximum shear force              =  10000.0000000 lbs
Depth of maximum bending moment  =     66.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             19
Number of zero deflection points =              2
```

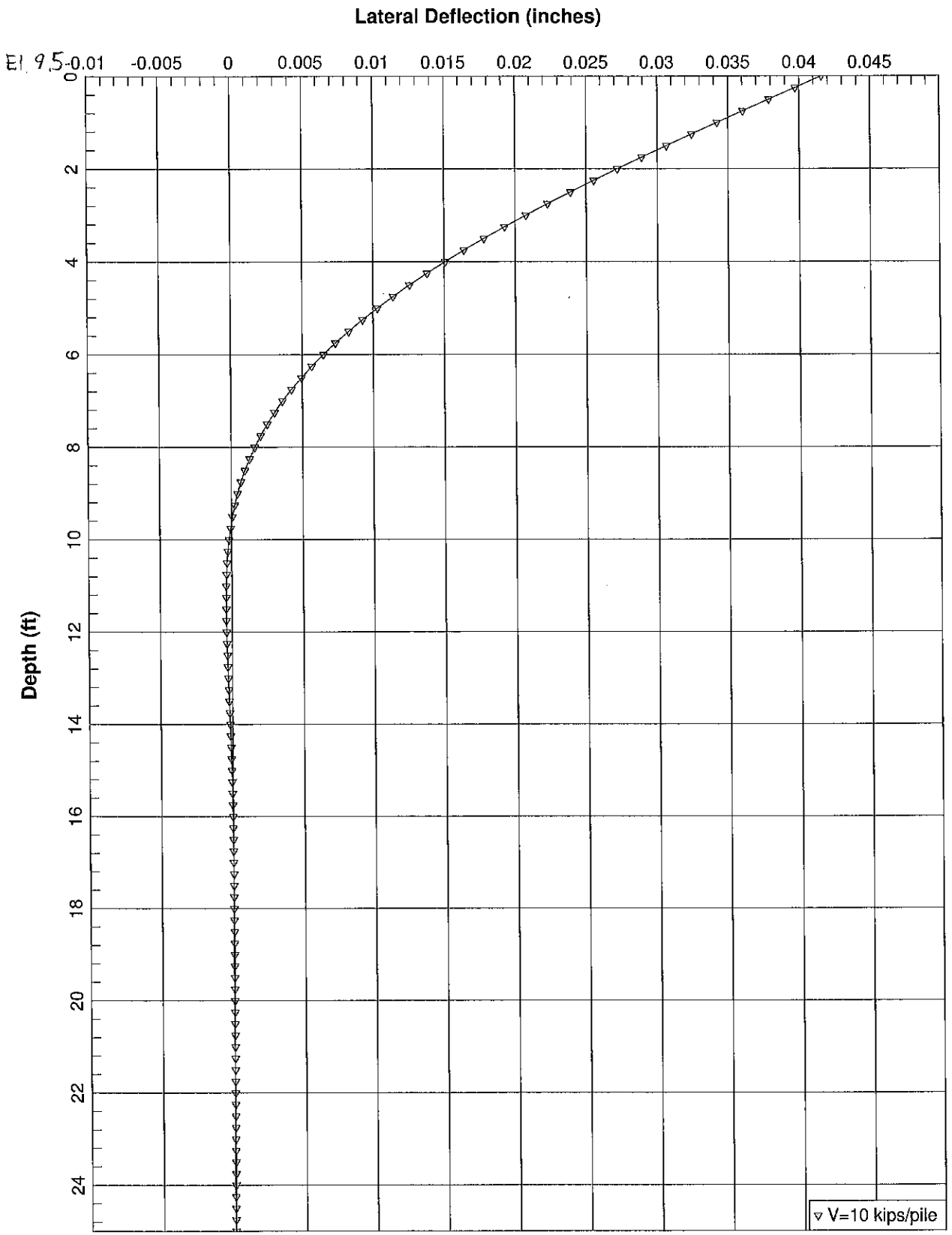
Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

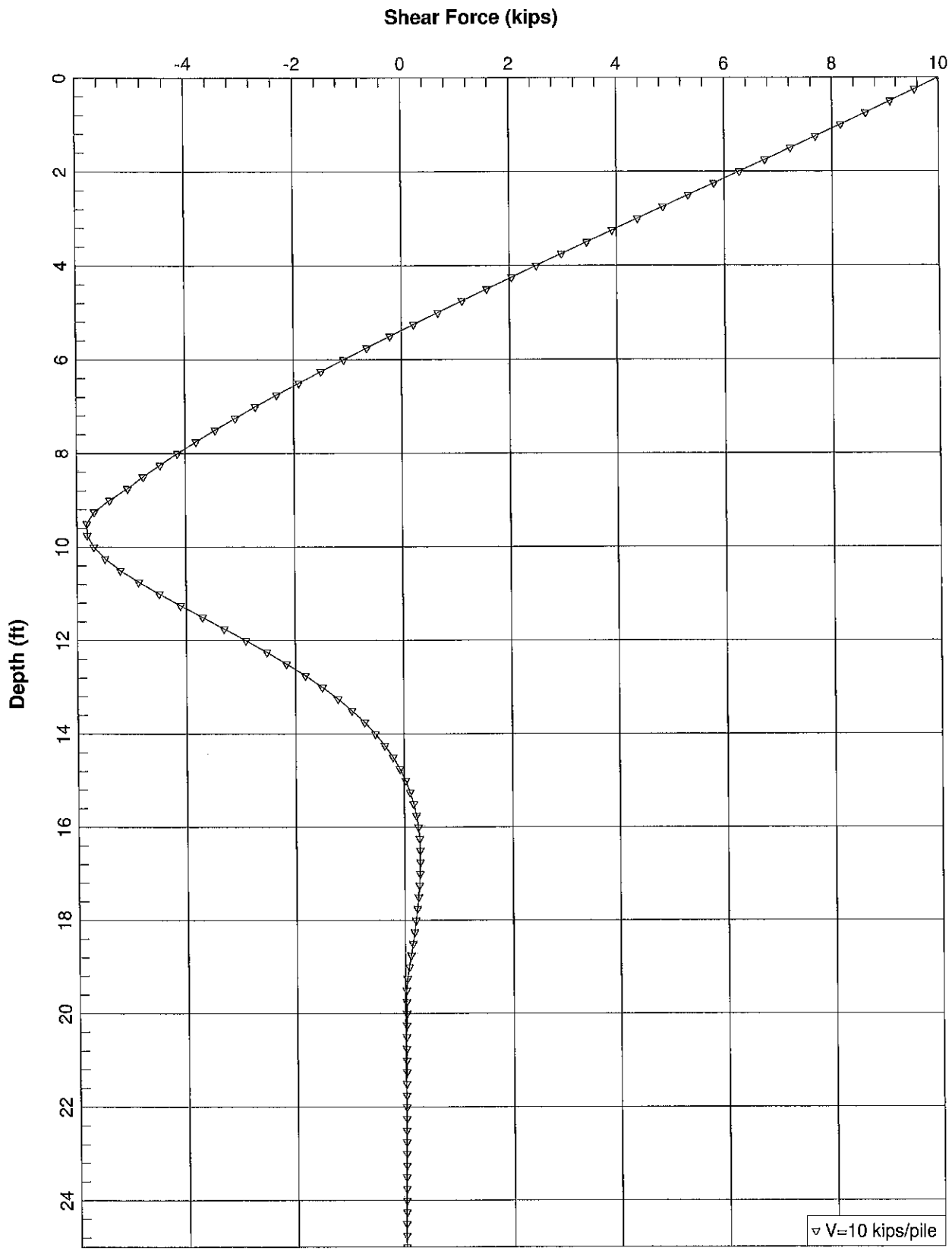
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

```
                Pile-head      Pile-head
Load  Load    Condition 1    Condition 2        Axial        Pile-head       Maximum
       Maximum       Pile-head
Case  Type    V(lbs) or     in-lb, rad.,       Loading      Deflection       Moment
        Shear        Rotation
 No.   No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
         lbs          radians
----  ----  --------------  --------------  --------------  -------------
-------------  -------------  -------------
  1     1   V = 10000.0000  M =      0.000        200000.     0.04157864
328101.     10000.0000    -0.00061667
```

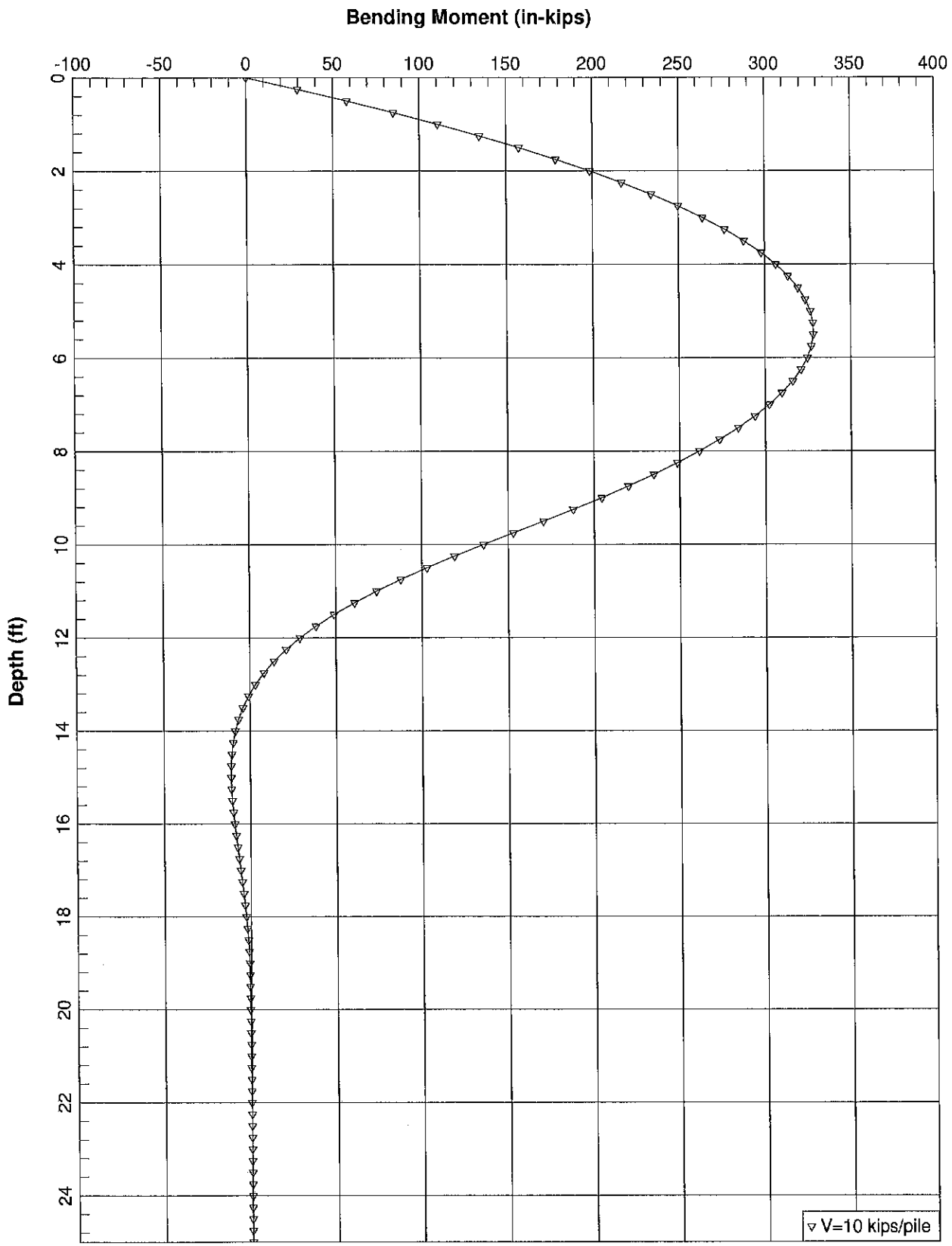
The analysis ended normally.



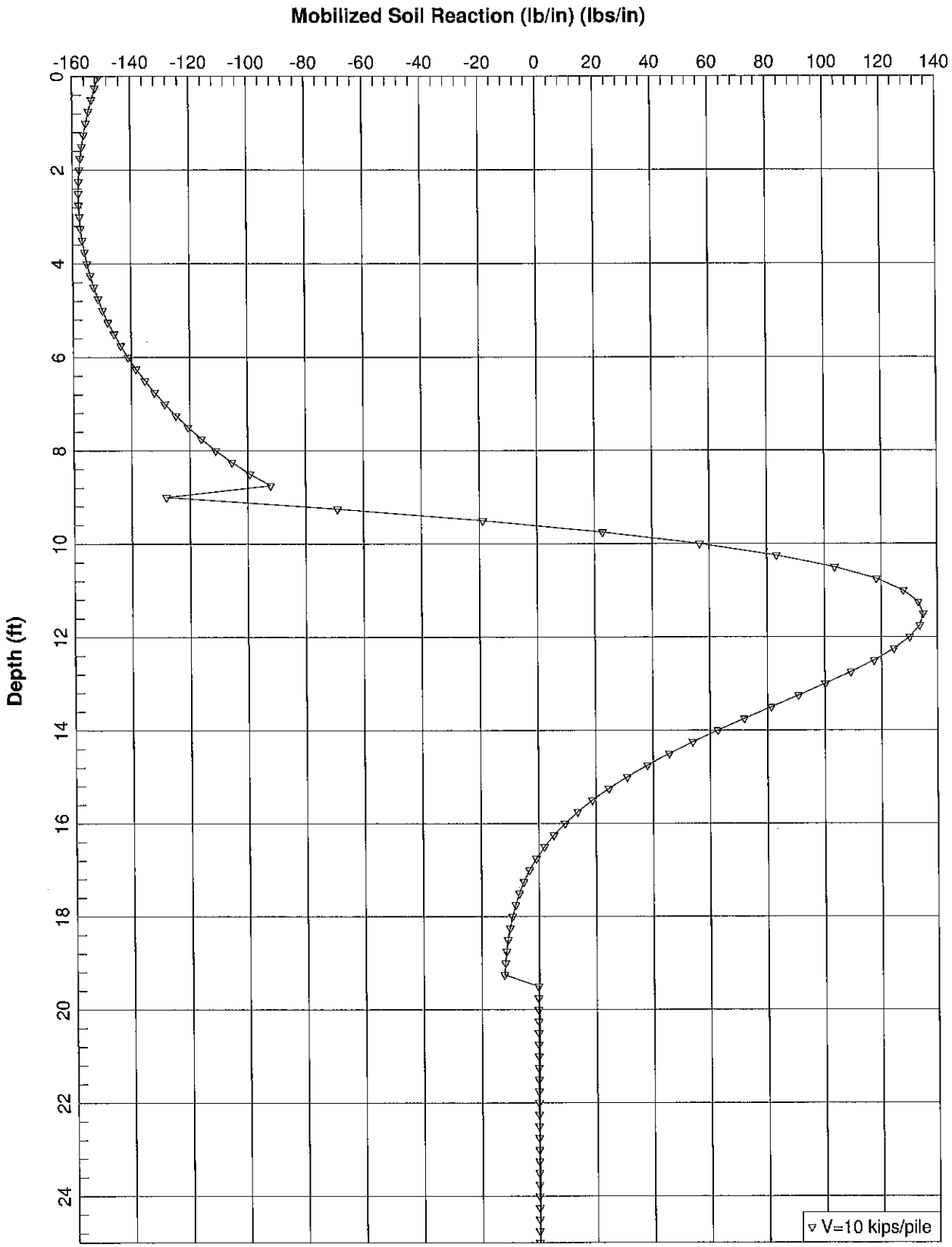
SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE 9.5 – 20 – -10.5



SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE



SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE



SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE

```
LPILEP6
TITLE
Project Name: SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE
Job Number: 2006-139-010
Client: R&M
Engineer: LT
Description:
OPTIONS
Units USCS
UseLRFD NO
ComputeKmatrix NO
UseTipShear NO
UseSoilMovement NO
UsePYModifiers YES
ComputeEIOnly NO
Loading STATIC     1 Cycle of Loading
IterationsLimit      100
MaxDeflectionLimit    1.00000000000000E+0002
ConvergenceTolerance  1.00000000000000E-0005
NumberPileIncrements 100
PrintSummaryOnly NO
PrintIncrement 1
PrintPYCurves NO
ComputeInteraction NO
SECTIONS
1 = Total Number of Sections
1 = Section Number
11 = Section type =  elastic section
 2.50000000000000E+0001 = Section length (ft)
2 = Elastic circular section
 3.00000000000000E+0006 = Elastic modulus (psi)
 2.40000000000000E+0001 = Section circular pile width at top (in)
 2.40000000000000E+0001 = Section circular pile width at bottom (in)
 4.52389342116930E+0002 = Section area at top (sq in)
 4.52389342116930E+0002 = Section area at bottom (sq in)
 1.62860163162095E+0004 = Section MOI at top (in^4)
 1.62860163162095E+0004 = Section MOI at bottom (in^4)
SOIL LAYERS
3 = number of soil layers
3       -2.00000000000000E+0000  1.95000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  1.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
5        1.95000000000000E+0001  3.95000000000000E+0001 = soil type index for sand ,
Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = top gamma
(pcf), c (psf), k (pci) for sand
 6.26000000000000E+0001  3.60000000000000E+0001  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), k (pci) for sand
3        3.95000000000000E+0001  5.00000000000000E+0001 = soil type index for stf
clay no water, Xtop (ft), Xbot(ft)
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = top gamma
(pcf), c (psf), e50 for stiff clay w/o free water
 6.26000000000000E+0001  2.50000000000000E+0003  0.00000000000000E+0000 = bot gamma
(pcf), c (psf), e50 for stiff clay w/o free water
PILE BATTER AND SLOPE
 0.00000000000000E+0000 = Ground Slope (deg)
 0.00000000000000E+0000 = Pile Batter  (deg)
GROUP EFFECT FACTORS
2
1        0.00000000000000E+0000  6.00000000000000E-0001  1.00000000000000E+0000 =
```

```
point#, depth (ft), p-multipler, y-multiplier
2        5.00000000000000E+0001  6.00000000000000E-0001  1.00000000000000E+0000 =
point#, depth (ft), p-multipler, y-multiplier
LOADING
1 = Number of load cases
1       1        1.00000000000000E+0004  0.00000000000000E+0000
2.00000000000000E+0005  1 : Load#; BC1:Shear (lb), Moment (in-lb);          Axial
Load (lb); Compute Top y vs L: 1=no, 2=yes
0 = number of distributed loading points
END
```

LPile Plus for Windows, Version 6 (6.0.27)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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PCI
PCI

Serial Number of Security Device: 157693800
Company Name Stored in Security Device: Parikh Consultants

Files Used for Analysis

Path to file locations: T:\Ongoing Projects\2006\206139.10 880 R&M OAKLAND\UPRR FOUNDATION REPORT_Nov 2011\Crashwall & Private Bridge\
Name of input data file: Pre-fab Bridge.lp6d
Name of output report file: Pre-fab Bridge.lp6o
Name of plot output file: Pre-fab Bridge.lp6p
Name of runtime messeage file: Pre-fab Bridge.lp6r

Date and Time of Analysis

Date: January 13, 2012 Time: 14:15:43

Problem Title

Project Name: SAN LEANDRO CREEK BOH (WIDEN) - PRE-FABRICATED BRIDGE

Job Number: 2006-139-010

Client: R&M

Engineer: LT

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for selected section types.

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multiplers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 25.00 ft

Depth of ground surface below top of pile = -2.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	25.000000	24.0000000

Input Structural Properties:

Pile Section No. 1:

Section Type = Elastic Pile

Cross-sectional Shape	=	Circular
Section Length	=	25.000 ft
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.389342 sq. in
Bottom Area	=	452.389342 sq. in
Moment of Inertia at Top	=	16286.016 in^4
Moment of Inertia at Bottom	=	16286.016 in^4
Elastic Modulus	=	3000000. lbs/in^2

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer = -2.000 ft
Distance from top of pile to bottom of layer = 19.500 ft

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 19.500 ft
Distance from top of pile to bottom of layer = 39.500 ft
NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 39.500 ft
Distance from top of pile to bottom of layer = 50.000 ft

(Depth of lowest layer extends 25.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 6 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-2.00	62.60000
2	19.50	62.60000
3	19.50	62.60000
4	39.50	62.60000
5	39.50	62.60000
6	50.00	62.60000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	J	kpy pci	Rock Emass	krm	Test Type	Test Prop.	Elas. Subgr. pci
1	Stiff Clay w/o Free Water	-2.000	62.600	1500.000	--	--	--	0.00	--	--	--	--	--	--	--
		19.500	62.600	1500.000	--	--	--	0.00	--	--	--	--	--	--	--
2	Sand (Reese, et al.)	19.500	62.600	--	36.000	--	--	--	--	--	--	--	--	--	--
		39.500	62.600	--	36.000	--	--	--	--	--	default	--	--	--	--
3	Stiff Clay w/o Free Water	39.500	62.600	2500.000	--	--	--	0.00	--	--	--	--	--	--	--
		50.000	62.600	2500.000	--	--	--	0.00	--	--	--	--	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.6000	1.0000
2	50.000	0.6000	1.0000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

```
--------------------------------------------------------------------------------
               Pile-head Loading and Pile-head Fixity Conditions
--------------------------------------------------------------------------------

Number of loads specified = 1

Load    Load         Condition               Condition             Axial Thrust
 No.    Type             1                       2                  Force, lbs
-----   ----    --------------------   ----------------------   ----------------
   1      1     V =  10000.00000 lbs   M =        0.0000 in-lbs          200000.

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.


--------------------------------------------------------------------------------
    Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
--------------------------------------------------------------------------------

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-Curvature properties derived from elastic section properties



--------------------------------------------------------------------------------
                 Computed Values of Pile Loading and Deflection
                   for Lateral Loading for Load Case Number 1
--------------------------------------------------------------------------------

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head                      =       10000.000 lbs
Applied moment at pile head                              =           0.000 in-lbs
Axial thrust load on pile head                           =      200000.000 lbs

   Depth    Deflect.    Bending     Shear       Slope      Total     Bending   Soil
Res.  Soil Spr.   Distrib.
     X          y        Moment     Force         S       Stress   Stiffness      p
     Es*h    Lat. Load
   inches    inches     in-lbs       lbs       radians     psi*      lb-in^2    lb/in
    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
     0.00     0.0416 -3.767E-08 10000.0000  -0.000617   442.0971  4.886E+10
-150.7781  5439.5031      0.000
    3.000     0.0397     29691.  9545.6729  -0.000616   463.9746  4.886E+10
-152.1066     11486.      0.000
    6.000     0.0379     58013.  9087.5508  -0.000613   484.8427  4.886E+10
-153.3081     12140.      0.000
    9.000     0.0361     84952.  8626.0188  -0.000609   504.6925  4.886E+10
-154.3799     12847.      0.000
   12.000     0.0342    110499.  8161.4703  -0.000603   523.5162  4.886E+10
```



```
-155.3191     13612.      0.000
   15.000     0.0324    134645.  7694.3073  -0.000595   541.3070  4.886E+10
-156.1229     14441.      0.000
   18.000     0.0307    157379.  7224.9401  -0.000586   558.0587  4.886E+10
-156.7885     15341.      0.000
   21.000     0.0289    178698.  6753.7881  -0.000576   573.7665  4.886E+10
-157.3128     16320.      0.000
   24.000     0.0272    198593.  6281.2794  -0.000564   588.4262  4.886E+10
-157.6929     17389.      0.000
   27.000     0.0255    217062.  5807.8515  -0.000552   602.0348  4.886E+10
-157.9257     18557.      0.000
   30.000     0.0239    234102.  5333.9513  -0.000538   614.5902  4.886E+10
-158.0078     19836.      0.000
   33.000     0.0223    249711.  4860.0355  -0.000523   626.0914  4.886E+10
-157.9360     21242.      0.000
   36.000     0.0208    263890.  4386.5711  -0.000507   636.5385  4.886E+10
-157.7069     22790.      0.000
   39.000     0.0193    276639.  3914.0354  -0.000490   645.9327  4.886E+10
-157.3169     24500.      0.000
   42.000     0.0178    287963.  3442.9170  -0.000473   654.2760  4.886E+10
-156.7620     26395.      0.000
   45.000     0.0164    297864.  2973.7162  -0.000455   661.5720  4.886E+10
-156.0385     28501.      0.000
   48.000     0.0151    306351.  2506.9457  -0.000437   667.8252  4.886E+10
-155.1419     30850.      0.000
   51.000     0.0138    313430.  2043.1312  -0.000418   673.0412  4.886E+10
-154.0678     33481.      0.000
   54.000     0.0126    319111.  1582.8126  -0.000398   677.2270  4.886E+10
-152.8112     36438.      0.000
   57.000     0.0114    323405.  1126.5453  -0.000378   680.3908  4.886E+10
-151.3670     39777.      0.000
   60.000     0.0103    326324.   674.9012  -0.000358   682.5420  4.886E+10
-149.7291     43565.      0.000
   63.000   0.009265    327884.   228.4707  -0.000338   683.6914  4.886E+10
-147.8913     47885.      0.000
   66.000   0.008281    328101.  -212.1355  -0.000318   683.8513  4.886E+10
-145.8462     52839.      0.000
   69.000   0.007356    326993.  -646.2832  -0.000298   683.0350  4.886E+10
-143.5857     58558.      0.000
   72.000   0.006492    324581. -1073.3121  -0.000278   681.2577  4.886E+10
-141.1003     65205.      0.000
   75.000   0.005687    320887. -1492.5311  -0.000258   678.5358  4.886E+10
-138.3790     72993.      0.000
   78.000   0.004942    315936. -1903.2128  -0.000239   674.8876  4.886E+10
-135.4088     82198.      0.000
   81.000   0.004255    309754. -2304.5865  -0.000220   670.3329  4.886E+10
-132.1737     93192.      0.000
   84.000   0.003625    302372. -2695.8278  -0.000201   664.8932  4.886E+10
-128.6539    106479.      0.000
   87.000   0.003050    293820. -3076.0453  -0.000182   658.5922  4.886E+10
-124.8244    122763.      0.000
   90.000   0.002530    284134. -3444.2604  -0.000165   651.4554  4.886E+10
-120.6524    143060.      0.000
   93.000   0.002062    273352. -3799.3788  -0.000148   643.5108  4.886E+10
-116.0932    168889.      0.000
   96.000   0.001645    261515. -4140.1450  -0.000131   634.7890  4.886E+10
-111.0842    202635.      0.000
   99.000   0.001275    248669. -4465.0699  -0.000116   625.3234  4.886E+10
-105.5324    248274.      0.000
  102.000   0.000952    234863. -4772.3045  -0.000101   615.1512  4.886E+10
-99.2907    313024.      0.000
  105.000   0.000671    220156. -5059.3985 -8.669E-05   604.3141  4.886E+10
-92.1053    411638.      0.000
```



```
  108.000   0.000431    204611. -5389.9737 -7.365E-05   592.8603  4.886E+10
-128.2781    891896.      0.000
  111.000   0.000229    187904. -5685.8881 -6.159E-05   580.5503  4.886E+10
-68.9982    902373.      0.000
  114.000  6.191E-05    170570. -5817.6438 -5.059E-05   567.7777  4.886E+10
-18.8390    912849.      0.000
  117.000 -7.414E-05    153059. -5811.6729 -4.065E-05   554.8754  4.886E+10
22.8196    923326.      0.000
  120.000  -0.000182    135748. -5692.4651 -3.179E-05   542.1204  4.886E+10
56.6523    933802.      0.000
  123.000  -0.000265    118943. -5482.4352 -2.397E-05   529.7373  4.886E+10
83.3676    944278.      0.000
  126.000  -0.000326    102883. -5201.8508 -1.716E-05   517.9039  4.886E+10
103.6886    954755.     0.000
  129.000  -0.000368     87752. -4868.8113 -1.130E-05   506.7553  4.886E+10
118.3377    965231.     0.000
  132.000  -0.000394     73683. -4499.2704 -6.348E-06   496.3890  4.886E+10
128.0229    975708.     0.000
  135.000  -0.000406     60764. -4107.0962 -2.220E-06   486.8697  4.886E+10
133.4266    986184.     0.000
  138.000  -0.000407     49043. -3704.1604  1.151E-06   478.2336  4.886E+10
135.1973    996661.     0.000
  141.000  -0.000399     38538. -3300.4507  3.840E-06   470.4927  4.886E+10
133.9425   1007137.     0.000
  144.000  -0.000384     29236. -2904.2007  5.921E-06   463.6390  4.886E+10
130.2241   1017614.     0.000
  147.000  -0.000363     21105. -2522.0321  7.466E-06   457.6481  4.886E+10
124.5549   1028090.     0.000
  150.000  -0.000339     14095. -2159.1044  8.547E-06   452.4826  4.886E+10
117.3969   1038567.     0.000
  153.000  -0.000312  8140.4939 -1819.2675  9.230E-06   448.0952  4.886E+10
109.1610   1049043.     0.000
  156.000  -0.000284  3168.2280 -1505.2150  9.577E-06   444.4315  4.886E+10
100.2073   1059519.     0.000
  159.000  -0.000255  -902.2886 -1218.6337  9.646E-06   442.7619  4.886E+10
90.8469   1069996.     0.000
  162.000  -0.000226 -4155.1501  -960.3480  9.491E-06   445.1587  4.886E+10
81.3436   1080472.     0.000
  165.000  -0.000198 -6675.7661  -730.4570  9.159E-06   447.0160  4.886E+10
71.9171   1090949.     0.000
  168.000  -0.000171 -8548.8822  -528.4624  8.691E-06   448.3961  4.886E+10
62.7459   1101425.     0.000
  171.000  -0.000146 -9856.9702  -353.3874  8.126E-06   449.3600  4.886E+10
53.9708   1111902.     0.000
  174.000  -0.000122    -10679.  -203.8838  7.496E-06   449.9656  4.886E+10
45.6983   1122378.     0.000
  177.000  -0.000101    -11089.   -78.3291  6.827E-06   450.2680  4.886E+10
38.0048   1132855.     0.000
  180.000 -8.118E-05    -11157.    25.0874  6.144E-06   450.3180  4.886E+10
30.9396   1143331.     0.000
  183.000 -6.378E-05    -10946.   108.2900  5.466E-06   450.1625  4.886E+10
24.5289   1153807.     0.000
  186.000 -4.839E-05    -10514.   173.2520  4.807E-06   449.8440  4.886E+10
18.7791   1164284.     0.000
  189.000 -3.494E-05 -9912.3732   221.9412  4.180E-06   449.4008  4.886E+10
13.6803   1174760.     0.000
  192.000 -2.331E-05 -9187.3134   256.2751  3.593E-06   448.8665  4.886E+10
9.2089   1185237.     0.000
  195.000 -1.338E-05 -8379.0346   278.0849  3.054E-06   448.2710  4.886E+10
5.3309   1195713.     0.000
  198.000 -4.984E-06 -7522.4690   289.0873  2.566E-06   447.6398  4.886E+10
2.0040   1206190.     0.000
  201.000  2.021E-06 -6647.5899   290.8642  2.131E-06   446.9952  4.886E+10
```



```
-0.8194   1216666.      0.000
  204.000  7.801E-06 -5779.8409   284.8486  1.749E-06   446.3558  4.886E+10
-3.1910   1227143.      0.000
  207.000  1.252E-05 -4940.5976   272.3167  1.420E-06   445.7374  4.886E+10
-5.1636   1237619.      0.000
  210.000  1.632E-05 -4147.6450   254.3854  1.141E-06   445.1532  4.886E+10
-6.7906   1248095.      0.000
  213.000  1.936E-05 -3415.6549   232.0140  9.090E-07   444.6138  4.886E+10
-8.1236   1258572.      0.000
  216.000  2.178E-05 -2756.6516   206.0110  7.195E-07   444.1282  4.886E+10
-9.2117   1269048.      0.000
  219.000  2.368E-05 -2180.4524   177.0432  5.679E-07   443.7037  4.886E+10
-10.1001   1279525.     0.000
  222.000  2.518E-05 -1695.0739   145.6494  4.489E-07   443.3460  4.886E+10
-10.8291   1290001.     0.000
  225.000  2.637E-05 -1307.0948   112.3572  3.568E-07   443.0602  4.886E+10
-11.3657   1292798.     0.000
  228.000  2.732E-05 -1021.3587    77.6461  2.853E-07   442.8496  4.886E+10
-11.7750   1292798.     0.000
  231.000  2.809E-05  -841.5603    41.8286  2.281E-07   442.7171  4.886E+10
-12.1033   1292798.     0.000
  234.000  2.869E-05  -770.6609    23.1995  1.786E-07   442.6649  4.886E+10
-0.3161     33046.      0.000
  237.000  2.916E-05  -702.5778    22.2367  1.334E-07   442.6147  4.886E+10
-0.3258     33522.      0.000
  240.000  2.949E-05  -637.4011    21.2466  9.223E-08   442.5667  4.886E+10
-0.3342     33998.      0.000
  243.000  2.971E-05  -575.2090    20.2331  5.500E-08   442.5209  4.886E+10
-0.3414     34474.      0.000
  246.000  2.982E-05  -516.0685    19.1998  2.150E-08   442.4773  4.886E+10
-0.3474     34950.      0.000
  249.000  2.984E-05  -460.0359    18.1501 -8.469E-09   442.4360  4.886E+10
-0.3524     35425.      0.000
  252.000  2.977E-05  -407.1577    17.0871 -3.509E-08   442.3971  4.886E+10
-0.3563     35901.      0.000
  255.000  2.963E-05  -357.4712    16.0138 -5.857E-08   442.3605  4.886E+10
-0.3593     36377.      0.000
  258.000  2.942E-05  -311.0049    14.9327 -7.909E-08   442.3262  4.886E+10
-0.3614     36853.      0.000
  261.000  2.916E-05  -267.7800    13.8464 -9.686E-08   442.2944  4.886E+10
-0.3628     37329.      0.000
  264.000  2.884E-05  -227.8102    12.7571 -1.121E-07   442.2649  4.886E+10
-0.3634     37804.      0.000
  267.000  2.848E-05  -191.1028    11.6668 -1.249E-07   442.2379  4.886E+10
-0.3634     38280.      0.000
  270.000  2.809E-05  -157.6594    10.5773 -1.356E-07   442.2132  4.886E+10
-0.3629     38756.      0.000
  273.000  2.767E-05  -127.4762     9.4902 -1.444E-07   442.1910  4.886E+10
-0.3618     39232.      0.000
  276.000  2.722E-05  -100.5448     8.4070 -1.514E-07   442.1711  4.886E+10
-0.3603     39708.      0.000
  279.000  2.676E-05   -76.8526     7.3288 -1.568E-07   442.1537  4.886E+10
-0.3584     40183.      0.000
  282.000  2.628E-05   -56.3837     6.2568 -1.609E-07   442.1386  4.886E+10
-0.3562     40659.      0.000
  285.000  2.579E-05   -39.1186     5.1920 -1.639E-07   442.1259  4.886E+10
-0.3537     41135.      0.000
  288.000  2.530E-05   -25.0353     4.1351 -1.658E-07   442.1155  4.886E+10
-0.3509     41611.      0.000
  291.000  2.480E-05   -14.1093     3.0868 -1.670E-07   442.1075  4.886E+10
-0.3479     42087.      0.000
  294.000  2.430E-05    -6.3140     2.0479 -1.677E-07   442.1017  4.886E+10
-0.3447     42562.      0.000
```

```
   297.000  2.379E-05    -1.6209     1.0187 -1.679E-07   442.0983  4.886E+10
-0.3413     43038.      0.000
   300.000  2.329E-05     0.000      0.000 -1.680E-07   442.0971  4.886E+10
-0.3378     21757.      0.000
```

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection             =      0.0415786 inches
Computed slope at pile head      =     -0.0006167 radians
Maximum bending moment           =       328101. inch-lbs
Maximum shear force              =  10000.0000000 lbs
Depth of maximum bending moment  =     66.0000000 inches below pile head
Depth of maximum shear force     =      0.000000 inches below pile head
Number of iterations             =             19
Number of zero deflection points =              2
```

Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

```
                Pile-head      Pile-head
Load  Load    Condition 1    Condition 2        Axial        Pile-head       Maximum
       Maximum       Pile-head
Case  Type    V(lbs) or     in-lb, rad.,       Loading      Deflection       Moment
        Shear        Rotation
 No.   No.    y(inches)     or in-lb/rad.        lbs          inches         in-lbs
         lbs          radians
----  ----  --------------  --------------  --------------  -------------
-------------  -------------  -------------
  1     1   V = 10000.0000  M =      0.000        200000.     0.04157864
328101.     10000.0000    -0.00061667
```

The analysis ended normally.

APPENDIX V

OSFP Review Comment & Response Form

General Project Information	Review Phase		Reviewer Information
Dist: 04 EA: 3A9201 **Project Name: San Leandro Creek Bridge & Overhead (widen)** **OSFP Liaison: Yiwei Hu** **Phone: (916)227-8917** **e-mail: oyiwei hu@dot.ca.gov**	☐ PSR/PDS (Review No. _) ☐ APS/PSR (Review No. _) ☐ APS/PR (Review No. _) ☐ Type Selection	☐ 65% PS&E Unchecked Details ☐ PS&E (Review No. _) ☐ Construction Support ☒ Other: Foundation Report	**Reviewer Name: John Moore/R.Nashed** **Functional Unit: GS-GDW** **Phone Number: (510)622-8742 / (510)622-1773** **e-mail: j moore@dot.ca.gov** **Date of Review: 02/28/12**
	Structure Information (Use when necessary to document comments by individual structure) **Structure Name: San Leandro Creek Bridge & Overhead (Widen)** **Br No: 33-0735**		

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	
1	FR	N/A	FR prepared for Rajappan & Meyer Consulting Engineers, Inc. San Jose, CA, prepared by Parikh Consultant, Inc., dated January 2011.		
2	FR	**6.2 Subsurface Conditions** Page 4	1- Please provide a description of the material specifically encountered in each of the Caltrans Logs of Test Borings, the exploratory boring RW-32, and the material interpretations of the two CPT's, since the general statement "primarily consist of …." doesn't reflect an accurate description to the soil profile required. *2-* *Groundwater Data.* Please indicate specifically where groundwater was encountered in the exploratory boring, LOTB's and CPT's	We have made these changes and provided additional descriptions. We have included a table showing the borings, groundwater depths, elevations, and date drilled.	
3	FR	**9.2 Seismic Hazard/ Liquefaction**	1- According to ABAG web-site map , the ground shaking level in the project area ranges between **very strong level** (at the northern part of the project	Based on the Earthquake Shaking Potential Map by CSSC, CGS, CalEMA, and USGS (2003), the shaking level is strong. We have included that in the report.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

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		Potential Page 7	, north the rail road) and **strong level** (at the southern part of the project , south the rail road). This should be stated in the report. 2- Please explain why the loose, saturated sand encountered in the exploratory Boring RW-32 from elevation 0 to -12 feet is not considered to be liquefiable.		

Due to limited room, a portable minuteman solid stem auger equipment was used for drilling RW-32 on the slope. Based on the surrounding data, CPT-2 (drilled by PARIKH) and borings (Caltrans, 1966), assuming 12-ft layer of liquefaction appears to be too conservative. The CPT data (CPT-2 is located below the bridge deck and in front of the north abutment) shows dense sand within the layer (Tip Bearing greater than 200 tsf) and B-1 shows stiff organic silt/clay material. In our opinion, it will be more realistic to use the CPT data at the abutment. The data from the portable equipment may be too conservative to use and not representative. We have considered a 3-ft thick liquefaction within that layer, which is consistent with the CPT-2 data. We have included a discussion on Page 9.

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State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

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To: MR. MAHMOOD MOMENZADEH
Chief, Branch C
Office of Geotechnical Design-West

Date: January 25, 2012

Attention: J. Moore

File: 04-ALA-880, PM 22.5-24.0
04-3A9201
San Leandro Creek Bridge
And Overhead Widening
Foundation Report Review

From: RONALD KARPOWICZ
Engineering Geologist
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

GRANT WILCOX
Chief, Branch B
Office of Geotechnical Design-West
Geotechnical Services
Division of Engineering Services

Subject: Foundation Report Review

In accordance with your request, we have reviewed the Foundation Report for the San Leandro Creek Bridge and Overhead Widening by Parikh Consultants, Inc., dated January 2012. Based on our review, we have the following comments listed below.

1) **6.2 Subsurface Conditions:** Description of the subsurface conditions is vague. Please provide a description of the material specifically encountered in each of the Caltrans Logs of Test Borings, the exploratory boring RW-32, and the material interpretations of the two CPT's.

   Response: We have provided additional and a more detailed description for the subsurface conditions on Pages 4 and 5.

2) **6.2 Groundwater Conditions:** Please indicate specifically where groundwater was encountered in the exploratory boring, LOTBs, and CPTs.

   Response: We have included a table showing the borings, groundwater depths, elevations, and date drilled on Page 5.

3) **9.2 Seismic Hazards/Liquefaction Potential:** Please indicate if the site is located in a State Seismic Hazard Zone, delineated in compliance with chapter 7.8, Division 2 of the California Public Resources Code (Seismic Hazards Mapping Act) by the California Geologic Survey. If so, please include the appropriate map with the site location clearly indicated.

Response: We have included the Seismic Hazard Zone Map and the Historical Ground Failures Map. The project vicinity is located within the State Seismic Hazard Zone, however, based on the Historical Ground Failures Map, there has not been any historical ground failures within our project area. This is discussed on Page 8.

4) **9.2 Seismic Hazards/Liquefaction Potential:** Please provide a reference that supports the statement "*Based on available geo logic and seismic data, the possibility of the site to experience strong ground shaking is considered high*."

   Response: Based on the peak ground acceleration obtained from the recommended Probabilistic ARS Curve (USGS Deaggregation 2008 (Beta) data), the PGA is 0.7g, which we believe may produce strong ground shaking. This is discussed on Page 8.

5) **9.2 Seismic Hazards/Liquefaction Potential:** Please provide a reference in the text to the Liquefaction Potential Analysis attached in the Appendix of the report.

   Response: The analysis was performed based on methods by Youd et al., 2001, Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, ASCE, V. 127, No. 10. We will include a sentence in that section to refer to Appendix IV for liquefaction analyses results. This is referenced on Page 8.

6) **9.2 Seismic Hazards/Liquefaction Potential:** Please provide a discussion of what type of Liquefaction Potential Analysis was performed along with a discussion of the results of the analysis.

   Response: The Liquefaction Potential Analyses (for SPT and CPT) were following the procedures based on the publication as mentioned in Comment 5. See Page 8.

7) **9.2 Seismic Hazards/Liquefaction Potential:** The text states that "*only thin sand lens (less than 3 feet thick in CPT-2 at 20ft depth) may be subject to liquefaction*." Please provide a basis for this statement.

   Response: Based on the liquefaction analyses shown in Appendix IV, a 3 feet thick sand layer is encountered at a depth of 20 to 23 feet.

8) **9.2 Seismic Hazards/Liquefaction Potential:** Please explain why the loose, saturated sand encountered in the exploratory Boring RW-32 from elevation 0 to -12 feet is not considered to be liquefiable.

   Response: Due to limited room, a portable minuteman solid stem auger equipment was used for drilling RW-32 on the slope. Based on the surrounding data, CPT-2 (drilled by

PARIKH) and borings (Caltrans, 1966), assuming 12-ft layer of liquefaction appears to be too conservative. The CPT data (CPT-2 is located below the bridge deck and in front of the north abutment) shows dense sand within the layer (Tip Bearing greater than 200 tsf) and B-1 shows stiff organic silt/clay material. In our opinion, it will be more realistic to use the CPT data at the abutment. The data from the portable equipment may be too conservative to use and not representative. We have considered a 3-ft thick liquefaction within that layer, which is consistent with the CPT-2 data. We have included a discussion on Page 9.

9) **9.2 Seismic Hazards/Liquefaction Potential:** Please comment on slope stability.

   Response: We performed a slope stability analyses. Based on the results, the global stability appears to be acceptable for both static and pseudo static conditions. We have included a section on Page 24.

10) **Plate I-1:** Please indicate the source of the map used for this figure.

   Response: Yahoo Maps was used for Plate I-1. We have referenced that on the plate.

If you have any questions or require further information, please contact Ron Karpowicz at (510) 286-5640 or Grant Wilcox at (510) 286-4835.

c: TPokrywka, GWilcox, Daily File

RKarpowicz

OSFP Review Comment & Response Form

General Project Information	Review Phase		Reviewer Information
Dist: 04 EA: 3A9201 **Project Name: San Leandro Creek Bridge & Overhead (Widen)** **OSFP Liaison: Yiwei Hu** **Phone: (916) 227-8917** **e-mail:oyiwei_hu@dot.ca.gov**	☐ PSR/PDS (Review No. _) ☐ APS/PSR (Review No. _) ☐ APS/PR (Review No. 1) ☐ Type Selection	☐ 65% PS&E Unchecked Details ☐ PS&E (Review No. _) ☐ Construction Support ☒ Other:Foundation Report	**Reviewer Name:John Moore** **Functional Unit:GS** **Phone Number: (510) 622-8742** **e-mail: j_moore@dot.ca.gov** **Date of Review: 01/11/12**
	Structure Information (Use when necessary to document comments by individual structure) **Structure Name: San Leandro Creek Bridge & Overhead (Widen)** **Br No: 33-0735**		

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	
1	Foundation Report (FR) Structure Plans (P)	FR P	Draft Geotechnical Foundation Report prepared for Rajappan & Meyer Consulting Engineers, Inc., San Jose, CA, by Parikh Consultants, Inc., San Jose, CA; dated November 2011. Bridge Plans prepared for Alameda County Congestion Management Agency, Oakland, CA by Rajappan & Meyer Consulting Engineers, Inc., San Jose, CA, dated November 29, 2011.		
2	Foundation Report (FR)	FR	**The following comments, by Hossain Salimi, (Senior Materials and Research Engineer, Office of Geotechnical Design-West, (916) 227-7147), pertain to the seismic recommendations of the report.** I have in my previous reviews of reports by Parikh Consultants repeatedly requested certain data be included as part of the Seismic Design Recommendations. These data have once again been left out. The consultant is		

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			required to perform the following tasks and include them in their next submittal. I. One plate containing the Probabilistic and Deterministic Response Spectra generated from Caltrans ARS On-line (V1.0.4). In addition, the ARS curve generated from the 2008 USGS Interactive Deaggregation Site with 20% increase for directivity shall also be added for comparison. This Plate shall be titled Acceleration Response Spectrum.Comparisons. II. A second plate containing the governing ARS curve shall be generated and titled Recommended Acceleration Response Spectrum.	We have generated two plates: one plate shows the comparisons between USGS Deag. Hazard (Beta) Probabilistic (data generated in 2009 vs. 2012), ARS Online Probabilistic, 2008 USGS Deagg. Hazard Probabilistic (Rock Adj. by CT), and the Deterministic Acceleration Response Spectrums. The 2nd plate shows the 2008 USGS Deaggregation Hazard (Beta) Probabilistic, which is the recommended curve. A 20% increase for directivity has been included in the final adjusted spectral acceleration.	
3	Foundation Report (FR)	FR Page 6, Section 9.2	Page 6, Section 9.2 Seismic Hazard/Liquefaction Potential According to the first paragraph, the possibility of the site to experience strong ground shaking is considered high. Furthermore, the Peak Ground Acceleration of 0.7g is adopted for the analysis, and a Vs30 = 230m/s chosen to represent the site shear wave velocity. However, the liquefaction potential is considered to be low. The consultant shall provide liquefaction analysis to show that there is indeed no liquefaction potential.	The statement has been revised to say that the impact on design is low. The post liquefaction settlement is less than 0.6 inch. The calculation for CPT-2 is included in Appendix IV-Liquefaction Potential per CPT Procedures. This layer was neglected when calculating vertical capacity.	
4	Foundation Report (FR)	FR Plate No. IV-2	I ran an independent analysis and generated the different response spectra for the site (Vs30=230m/s) using both the Caltrans ARS On-line (V1.0.4) and the 2008 USGS Interactive Deaggregation Site and neither of the three curves match what is shown on Plate No. IV-2. I have had telephone conversations with engineers from Parikh Consultants about the aforementioned issues to no avail. They are required to correct these issues before I can approve this report.	Due to ongoing updates occurring on the USGS Deaggregation website, the submitted response spectrum is slightly different than the data recently generated. We have included a plate showing multiple curves, mentioned in Response No. 2. The design is based on the ARS Curve generated in 2009, which was submitted in the Type Selection that has been used for design since 2009. To be consistent, the USGS 2008 Deagg (Beta) curve developed in 2009 is recommended. It appears that the response spectra used for design is slightly more conservative. Caltrans ARS Online is also under on-going updates. For example, we noticed that the probabilistic curves of Caltrans ARS Online generated in 2009 are slightly different than 2012.	

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5	Foundation Report (FR)	FR Pages 8, 10 Section 11.2	On page 8, It is stated that "…Bents 6 thru 23 will be supported on pile caps… ," yet the table labeled Foundation Design Data (BR. NO. 33-0100) on page 10 indicates that the pile cap size for Bent 6 is not applicable (N/A). Please clarify.	The pile data table has been revised to agree with the statement.	
6	Foundation Report (FR) Structure Plans (P)	FR Page 14 Section 11.2 P Sheet 2 of 43	The data in Pile Data Table (BR. NO. 33-0100) on page 14, Section 11.2, Foundation, is not consistent with the data located in the Pile Data Table on Sheet 2 of 43 of the Bridge Plans, specifically Bents 21 through 23. Please ensure that the pile data is consistent for Pile Data Tables in both the Foundation Report and the Bridge Plans.	The pile data table in the plans and the foundation report are now consistent.	
7	Foundation Report (FR)	Appendix	Please include with the Foundation Report printouts for all input and output files for APILE Plus, SHAFT, and L-Pile analyses.	We have included the APILE, SHAFT, and LPILE results.	

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Materials Testing ■
Construction Inspection ■

Rajappan & Meyer Consulting Engineers, Inc.
1038 Leigh Avenue, Suite 100
San Jose, CA 95126

Job No. 2006-139-UPR
May 7, 2012

Attn: Mr. Keith Meyer

Subject: Geotechnical Information Memo
San Leandro Creek Bridge & Overhead (Widen) (Br. No. 33-0100)
Alameda County, California

Reference: Foundation Report for San Leandro Creek Bridge & Overhead (Widen) (Br. No. 33-0100) dated February 29, 2012.

Dear Mr. Meyer:

As requested, we are providing a memorandum stating the validity of our initial recommendations for Bent 11 and Retaining Wall SB-2. Bent 11 has been shifted approximately 13 feet south of its original location and the maximum wall height for Retaining Wall SB-2 has been modified to 16 feet. Due to the wall height change, the structural engineer has redesigned the wall and refined the pile layout. The original foundation design recommendations for Bent 11 and Retaining Wall SB-2 remain valid and have not changed.

Please be advised that we are performing a professional service and that our conclusions and professional opinions only. All work done and all recommendations made are in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work.

Very truly yours,
PARIKH CONSULTANTS, INC.

Y. David Wang, Ph.D., P.E. C52911
Senior Engineer

Gary Parikh, P.E., G.E., 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-13
GEOTECHNICAL
STATE OF CALIFORNIA

GEOTECHNICAL DESIGN & MATERIALS REPORT

ROUTE I-880 SB HOV LANE EXTENSION IMPROVEMENTS
BETWEEN DAVIS STREET AND
HEGENBERGER ROAD INTERCHANGE
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880 PM 24.0/25.5 EA 3A9221

For

RAJAPPAN & MEYER
CONSULTING ENGINEERS, INC.
1038 Leigh Avenue Suite 100
San Jose, CA 95126

PARIKH CONSULTANTS, INC.

2360 Qume Drive, Suite A,
San Jose, CA 95131
(408) 452-9000

February 13, 2012 Job No. 2006-139-GDR

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Construction Inspection ■

Rajappan & Meyer Consulting Engineering, Inc.
1038 Leigh Avenue, Suite 100
San Jose, CA 95126

Job No.: 2006-139-GDR
February 13, 2012

Attn: Mr. Keith Meyer

Sub: GEOTECHNICAL DESIGN & MATERIALS REPORT
Route I-880 SB HOV Lane Extension and Other Improvements between Davis Street and Hegenberger Road Interchange, Alameda County, California
04-ALA-880 PM 24.0/25.5 EA 3A9221 CU 04248

Dear Mr. Rajappan:

Transmitted herewith is the Geotechnical Design & Materials Report for the subject project. The report was prepared in accordance with the scope of work outlined in our proposal. The report is for submittal to Caltrans for their review and approval. This report presents the updated pavement design sections per latest Caltrans comments.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning our findings or conclusions, please feel free to contact this office at (408) 452-9000.

Very truly yours,
PARIKH Consultants, Inc.

Gary Parikh, P.E., G.E.
Project Manager

Attachment: Geotechnical Design & Materials Report

"Approved as to impact on State facilities and conformance with applicable State standards and practices, and the technical oversight were performed as described in the California Department of Transportation A&E Consultant Services Manual."

Caltrans_____

Title_____

Date_____

Caltrans_____

Title_____

Date_____

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GEOTECHNICAL DESIGN & MATERIALS REPORT
ROUTE I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS
BETWEEN DAVIS STREET AND HEGENBERGER ROAD INTERCHANGE
ALAMEDA COUNTY, CALIFORNIA
04-ALA-880 PM 24.0/25.5 EA 3A9221

1. INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the proposed "I-880 SB HOV Lane Extension and Other Improvements between Davis Street and Hegenberger Road Interchange" in Alameda County, California, hereinafter referred to as "PROJECT". The project includes improvements on Interstate 880 (I-880) southbound HOV lane. The work was performed in general accordance with the scope of work outlined in our proposal to Rajappan & Meyer Consulting Engineers, Inc. (Designer). The general location of the project site and its limits are shown on Plate 1, Project Location Map.

This report addresses geotechnical design recommendation for earth retaining system, soundwalls, embankment, corrosion investigation, culverts, and structural pavement sections. The investigation included review of readily available soils and geologic literature pertaining to the site including as-built information and "Log of Test Borings" (LOTB) and pavement as-built data, site reconnaissance, obtaining representative samples and logging soil materials encountered in exploratory borings, performing Cone Penetration Tests (CPT's), laboratory testing of the representative samples, performing engineering analyses, and preparation of this report.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions, if any. A Foundation Report for widening of the San Leandro Creek Bridge/UPRR Overhead is submitted separately.

This report is intended for use by the project roadway design engineer, construction personnel, bidders and contractors for information and reference purposes only and should not be construed as project specifications

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain a properly constructed project. We, therefore recommend that a contingency fund be provided to accommodate any additional charges resulting from technical services that may be required during construction.

2. EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

Existing Facilities

The proposed project site is located in Alameda County from the Hegenberger Road OC ("I-880" Line, Sta. 468+48) to north of Davis Street OC ("I-880" Line, Sta. 385+00). The existing facility for this segment was originally constructed with 0.67 feet thick PCC pavement and has been resurfaced and widened with AC pavement by Caltrans at different times. I-880 is a north-south connector between Oakland and San Jose. Within the project limits, the freeway is an eight-lane facility with four mixed flow lanes in each direction and shoulders. Soundwalls exist along the project corridor on both sides of the freeway. The extent of the proposed project is shown on Plate 1.

The existing bridge structure within the project limits includes the San Leandro Creek Bridge/Overhead. The existing bridge/overhead is a 23-span structure, approximately 1,400 feet long, crossing over San Leandro Creek/UPRR. The structure was originally built in 1955, widened in 1968, and retrofitted in 1997.

Major stream in the vicinity of the project area is San Leandro Creek, which crosses I-880 near the UPRR overhead.

Proposed Improvements

The proposed project generally consists of the following design elements:

1. Extend the existing southbound high-occupancy vehicle (HOV) lane from north of Davis Street OC ("I-880" Line, Sta. 385+00) to the Hegenberger Road on-ramp;

2. Widen the southbound mainline to the outside to provide the additional width for a standard HOV lane, redelineate the mainline, reconstruct the on-ramp and off-ramps at Hegenberger Road;

3. Widen the San Leandro Creek/UPRR Overhead (OH) between Davis Street and 98th Avenue interchanges;

4. Retaining walls and Soundwall at the following locations:

   - Soundwall on Retaining Wall (RW SB-1, Type 5SWB) – Approximately 546 feet along southbound I-880 for roadway widening south of San Leandro Creek Bridge;

   - Soundwall on Retaining Wall (RW SB-2, Type 5SWB) – Approximately 460 feet along southbound I-880 for roadway widening north of San Leandro Creek Bridge;

   - Retaining Wall No. 1 (RW No. 1) – Approximately 198 feet standard Caltrans Type 1 wall south of 98th Ave OC to retain a small cut (approx. 4 feet) for roadway widening;

   - Soundwall No. 1 (SW No. 1) – Approximately 335 feet standard Caltrans soundwall on barrier connecting to north end of RW SB-2;

5. Several overhead signposts are proposed.

3. PERTINENT REPORTS AND INVESTIGATION

The following geotechnical investigation report and Caltrans as-built plans were also reviewed to supplement the subsurface soil information for the project:

- PARIKH, November 2006, "Foundation Type Selection Report, I-880 Southbound HOV Lane Widening and Northbound Auxiliary Lane Project, San Leandro Creek Bridge and Overhead (Br. No. 33-0100)", prepared for the designer.

- Caltrans as-built roadway plans of 2000 (04-OC7024), 1998, 1997 (04-123174), 1966 (04-292014), 1952 (53-4TC28), 1949 (O-4TC83F)

- Caltrans as-built structural plans of San Leandro Creek Bridge & OH (1955, 1968 widening & 1997 retrofit), and 98th Ave OC

4. PHYSICAL SETTING

4.1 Climate

The climate at the project site and the surrounding area is Mediterranean with definite wet and dry seasons. Mild winters, cool summers, small daily temperature ranges and low to medium relative humidity. The temperature at the site typically ranges from 55°F to 73°F in summer and 44°F to 57°F during winter. The average annual rainfall is approximately 22.6 inches per year in the project area; most of the rainfall occurs in the months of October through April.

4.2 Topography and Drainage

The topography along the project alignment is relatively flat and decreases from south to north. Some grade differences are noted due to bridge crossingt along the alignment. I-880 was mostly built at-grade or on fill with approximate Elev. 30 feet near Davis Street OC, Elev. 52 feet at San Leandro Creek Bridge, and Elev. 11 feet near Hegenberger Road OC on I-880. It is mainly occupied by urban residential/commercial development in the vicinity of the project area. The site drainage is generally by sheet flow towards the southwest, or collected by local drainage systems. San Leandro Creek is one of the main drainage elements for the project area.

4.3 Man-Made and Natural Features of Engineering and Construction Significance

The subject was considered and was determined to be not significant for the project.

4.4 Regional Geology and Seismicity

The project area is located in the Coast Range Province. The regional structure consists of a complex series of northwest-trending synclines and anticlines with a number of northwest-trending faults.

In the general project area, the geologic unit comprises the Alluvial fan and fluvial deposit deposited during the Holocene period. The deposits generally consist of clay, sand and gravel.

Active faults in the vicinity of the project site include the Hayward Fault, Calaveras-Pacines-San Benito Fault, the San Andreas/N Fault and the Silver Creek Fault. Significant earthquakes, which have occurred in this area, are generally associated with crustal movements along well-defined active fault zones. A Fault Map, showing the project site location relative to the major active faults in the vicinity, is presented on Plate 4.

5. EXPLORATION

5.1 Drilling and Sampling

Based on the preliminary plans, discussions with the design team, and readily available geotechnical data in the vicinity of the project area, 17 borings were drilled at selected locations to the depths ranging from 5 ft to 100 ft and three Cone Penetration Tests (CPT's) were performed to a depth of 100 feet below the existing ground surface.

Gregg Drilling & In Situ, Inc. performed the CPT work. The CPTs were conducted using a 60-degree cone pushed into the subsurface. The soil resistance exerted to the tip and side of the cone were recorded and correlated to soil type, classification and strength characteristics.

Selected soil samples were obtained from 2.5-inch I.D. (Modified California, MC) and 1.4-inch I.D. (Standard Penetration Test, SPT) samplers at various depths. The samplers were driven into subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts are presented on the LOTB in Appendix A. (When correlating standard penetration data, the blow counts for the Modified California Sampler may be converted to equivalent Standard Penetration Test blow counts by multiplying a factor of 0.65.) The samples were sealed and transported to our laboratory for further evaluation and testing. The field investigation was conducted under the supervision of our field engineer who logged the test borings and prepared the samples for subsequent laboratory testing and evaluation. Table 1 below summarizes the boring program.

TABLE 1: BORING PROGRAM (North of Davis St OC to Hegenberger Rd OC)

Boring/ CPT No.	Station (ft.) "I-880" Line	Offset (ft.)	Purpose	Boring Depth (ft)	Approx. Ground Elev.(ft)	Approx. Ground-water Elev. (ft)	Approx. Finish Grade of the Widening (ft)
OH-28	"I-880" 387+63	82' Lt.	Overhead Sign	30	24.5	7.5	25.37
R-29	"I-880" 393+28	83' Lt.	Pavement	5	-	-	24.31
RW-30	"I-880" 395+07	74' Lt.	Retaining Wall.	30	24.0	13.0	26.06
RW-31	"I-880" 398+37	80' Lt.	Retaining Wall.	30	25.0	17.0	32.61
CPT-1	"I-880" 407+54	92' Lt.	UPRR OH	100	18.3	-	51.54
CPT-2	"I-880" 414+12	13' Lt.	UPRR OH	100	16.0	-	38.69
CPT-3	"I-880" 427+43	87' Lt.	Retaining Wall	100	23.0	-	16.24
RW-32	"I-880" 415+23	76' Lt.	Retaining Wall	34.5	22.0	8.5	33.99
R-33/RW-33	"I-880" 419+13	83 Lt.	Retaining Wall/Pavement	34	21.0	1.0	22.94
RW-34	"98TH-3" 422+02	18' Lt.	Retaining Wall.	30	18.0	2.0	18.05
R-35/RW-35	"I-880" 428+25	87' Lt.	Retaining Wall/Pavement	49.5	20.0	4.0	16.01
R-36	"I-880" 428+31	84' Lt.	Pavement	5	-	-	26.64
E-37	"I-880" 432+92	119' Lt.	Embankment	30	16.0	5.0	12.95
R-38	"I-880" 436+93	74' Lt.	Pavement	5	-	-	16.20
OH-39	"I-880" 441+83	85' Lt.	Overhead Sign	30	14.5	5.0	14.43
R-40	"I-880" 446+85	87' Lt.	Pavement	5	-	-	13.77
R-41	"I-880" 456+02	100' Lt.	Pavement	5	-	-	11.21

5.2 Geologic Mapping

The subject was considered and was determined to be not significant for the project.

5.3 Geophysical Studies

The subject was considered and was determined to be not applicable to the project.

5.4 Instrumentation

The subject was considered and was determined to be not applicable to the project.

5.5 Exploration Notes

The existing roadway fill material consisting of sandy lean clay and/or clayey sand with gravel was typically encountered in the shallow (5 feet) borings. The other (deeper than 5 feet) exploratory borings encountered localized fill, alluvial deposits predominantly consisting of stiff to very stiff lean clay with pockets/lenses of loose to medium dense sand.

In general, drilling using the hollow stem auger did not encounter any unusual conditions. No caving of the drilled holes was observed during drilling. However, caving may occur in large diameter drilled holes where the granular soils exist below the water table.

6. GEOTECHNICAL TESTING

6.1 In-Situ Testing

In-situ testing consists of recording blow counts during sampling in the field. The soil samples were obtained during drilling by driving a 2.5-inch I.D. Modified California sampler or a 1.4-inch I.D. Standard Penetration Test (SPT) Sampler into the subsurface soils under the impact of a 140-lb hammer falling through 30 inches. Based on our previous experience and Daniel et al (2003), when correlating standard penetration data in similar soils, the blow counts for the Modified California Sampler can be converted to equivalent Standard Penetration Test blow counts by multiplying a factor of 0.65. Based on the average values of the SPT-N values for the materials encountered in the field exploration, the subsurface soils are classified generally as firm to very stiff lean clays with pockets/lenses of loose to medium dense sands. The in-situ test results are presented on the LOTB sheets in Appendix A.

6.2 Laboratory Testing

Laboratory tests performed for the study include the following: Laboratory determination of Moisture-Density (California Test Method 226), Atterberg Limits (California Test Method 204), Grain Size Analysis (California Test Method 202), Unconfined Compression Test (California Test Method 221), R-value Test (California Test Method 301), Consolidation Test (California Test Method T219), and Corrosion Test (California Test Method 643). The laboratory test results are included in Appendix B. Laboratory test results for moisture

content, unit weight and unconfined compression tests are presented on the LOTB at the appropriate sample depths.

7. GEOTECHNICAL CONDITIONS

7.1 Site Geology

General geologic features pertaining to the site were evaluated by reference to the "Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California" by R.W. Graymer, 2000 (USGS Map, MF-2342). Based on the geologic map, the site subsoil consists of Alluvial fan and fluvial deposits (Holocene, Qhaf), Basin Deposits (Holocene, Qhb), and Natural Levee Deposits (Holocene, Qhl). A geologic map of the project vicinity is shown on Plate 3.

Qhaf – Alluvial fan and fluvial deposits (Holocene) – Alluvial fan deposits are brown or tan, medium dense to dense, gravely sand or sandy gravel that generally grades upward, to sandy or silty clay.

Qhb – Basin Deposits (Holocene) – Very fine silty clay to clay deposits occupying flat-floored basins at the distal edge of alluvial fans adjacent to the bay mud (Qhbm).

Qhl – Natural Levee Deposits (Holocene) – Loose, moderately to well-sorted sandy or clayey silt grading to sandy or silty clay. Levee deposits border stream channels, usually both banks, and slope away to flatter floodplains and basins.

7.1.1 Lithology

The geological unit present at the project site consists of mainly the alluvial fan and fluvial deposits, basin deposits, and natural levee deposits. The subject was considered and was determined to be not applicable for the project.

7.1.2 Structure

The fault that is closest to the project site is Hayward Fault, which is a strike-slip fault. The structures of the geological units such as bedding, folds, fracture, jointing,

and foliation had been considered and were determined to be not applicable for the project.

7.1.3 Existing Slope Stability

The slopes at the project site consist of man-made embankment slope at the existing bridges abutments and the interchanges. No other major slopes are present within the project limits. These existing slopes have gradient of 2(H): 1(V) and flatter and are covered with vegetations and generally appear to be in good condition.

7.2 Subsurface Soil Conditions

Based on the boring data and as-built LOTBs, the subsurface soil conditions at the project site generally consist of the following:

TABLE 2: SUBSURFACE CONDITIONS

General Location	Reference Borings	Subsurface Soil Conditions
Between Davis Street and San Leandro Creek	OH-28, RW-30, RW-31	Stiff to very stiff lean clays with pocket/lens of firm fat clay/silt
Between San Leandro Creek and 98th Avenue	CPT-1, CPT-2, RW-32- RW-34 and Caltrans as-built LOTB of 1992 & 1996 for soundwall & retaining wall adjacent to San Leandro Creek Bridge	Predominantly firm to stiff clays with interbedded layers of loose to medium dense sands
98th Avenue/I-880 interchange	CPT-3, RW-35, E-37	Medium stiff to very stiff lean clays with intermittent pockets/lenses/layers of loose to very dense sands.
Between 98th Avenue and Hegenberger Road	OH-39	Medium dense clayey sand, underlain by firm to very stiff lean clays, underlain by loose silty, clayey sand

The near surface material consists of existing roadway fill which is generally sandy clay and/or clayey sand with gravel. Detailed descriptions of the materials encountered in the exploratory borings are presented in the LOTB in Appendix A “Log of Test Borings”. It should be noted that these descriptions and related information depict subsurface conditions only at the locations indicated and on the particular date noted on the LOTB. Because of the variability from place to place within soil/rock in general, subsurface soil conditions at other locations may differ from conditions occurring at the locations explored. The abrupt stratum changes shown on the logs may be gradational and relatively minor changes in soil types

within a stratum may not be noted due to field limitations. Also, the passage of time may result in a change in the soil conditions at the locations due to environmental changes.

7.3 Water

7.3.1 Surface Water

The terrain at the project site gently slopes towards the south, and the surface water /drainage sheet flows towards the south.

7.3.1.1 Scour

The subject was considered and was determined to be not applicable for the roadway project.

7.3.1.2 Erosion

The existing slopes have established landscaping to help control erosion. The subject was considered and was determined to be not applicable for the project. It is recommended that construction of the proposed project be undertaken during the dry season.

7.3.1.3 Groundwater

Groundwater was encountered in some of the borings during field exploration in June 2008. The boring numbers, station and offset, approximate ground elevations and approximate groundwater elevations are summarized in Table 1. In general, groundwater was encountered between Elev. 1.0 foot (in Boring R-33/RW33) and Elev. 17 feet (in Boring RW-31).

It is anticipated that groundwater level will vary with the passage of time due to seasonal groundwater fluctuations, surface and subsurface flow, ground surface run-off, water level in the adjacent San Leandro Creek and/or other creeks in the area, as well as other environment factors that may not be present at the time of our investigation.

7.4 Project Site Seismicity

7.4.1 Ground Motions

The project is located in a seismically active part of northern California. Many faults in the San Francisco Bay Area are capable of producing earthquakes that may cause strong ground shaking at the site. The attached Fault Map (Plate 4) presents the locations of the fault systems relative to the project site.

Maximum earthquake magnitudes (Mmax) for some of the major faults in the area determined in accordance with Caltrans 2007 Deterministic PGA Map are summarized in Table 2 below. These maximum earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure.

TABLE 3: EARTHQUAKE DATA

Fault	Estimated Closest Distance to the Project Area (miles)	Mmax
353 - Hayward fault zone (strike-slip)	2.4	7.3
321 - Calaveras fault zone (strike-slip)	10.9	7.4
308 - San Andreas fault zone (strike-slip)	16.1	7.9
152 – Silver Creek fault	11.6	7.1

7.4.2 Ground Rupture

Since no active faults pass through the project site, the potential for fault rupture is low.

8. GEOTECHNICAL ANALYSIS AND DESIGN

8.1 Dynamic Analysis

8.1.1 Parameter Selection

The recommended response spectrum was determined based on the new 2007 Caltrans Deterministic PGA Map and the Caltrans ARS Online (Ver. 1.0.4). The development of the design ARS curve is based on several input parameters, including

site location (longitude/latitude), average shear wave velocity for the top 100 feet (VS30m), and other site parameters, such as fault characteristics, site-to-fault distances. The new design methods incorporate both deterministic and probabilistic seismic hazards to produce the Design Response Spectrum.

Average shear wave velocity (Vs) for the top 100 feet at the site was estimated by using established correlations and the procedure provided in the Caltrans Design Manual (Ver. 1.0, August 2009). The site location and the relevant parameters are summarized as follows, and the recommended design curve is presented on Plate 5.

1. Site Location: 37.7254ºN/122.1829ºW
2. Estimated V_{S30m} = 230 m/s
3. Peak Ground Acceleration = 0.7g
4. The recommended ARS curve is governed by the USGS Deaggregations 2008 (beta) data.
5. An adjustment factor for near fault effects were applied to the calculated spectral acceleration values. The increase of 20% to the spectral acceleration values corresponds to periods longer than 1-second and linearly tapers to zero at a period of 0.5-second.
6. No adjustments were made for basin effect.

8.1.2 Analysis

Based on the "Typical Cross Section", minor cut and fill will be required for the pavement construction and both cut and sliver fill will be required for the roadway widening. The project uses retaining walls for the minor cut and wedge fill for roadway widening.

8.1.3 Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils, which usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Based on the field boring logs, CPT and available data, the majority of the soils encountered during our investigation are mainly soft/medium stiff to very stiff lean/fat clay and medium dense to very dense clayey sand. Thin sand lens (less than 3 feet thick in CPT-2 at 20-ft depth) is subject to liquefaction. The impact on the project is design is low. We do not anticipate global failure due to these conditions. Localized settlement is anticipated to be small and considered insignificant for the project.

In our opinion, the impact of liquefaction potential within the project site is generally relatively low to moderate. Based on the evaluation, the post-liquefaction settlement on the roadway should be relatively small because:

- The post-liquefaction settlements were estimated to be relatively small from isolated lenses.
- The potentially liquefiable soil layers are generally covered by predominantly cohesive soils, which tend to serve as a "soil mat" and should reduce the potential impact of liquefaction.
- The post-liquefaction settlement probably would be random and localized and could spread out over some distance/area.

For a roadway type of project, we do not see a need to implement a mitigation program.

8.2 Cuts and Excavations

It is expected that cuts and excavations will be for pavement construction and roadway widening.

8.2.1 Stability

There is a relatively small cut (approx. 4 ft) just south of 98th Avenue OC for roadway widening. Retaining Wall No. 1 (Caltrans standard Type 1) is planned at the location. No stability issue is anticipated at the location.

8.2.2 Rippability

Based on the investigation, rippability does not appear to be a concern for construction.

8.2.3 Grading Factor

Source of the fill may include the fill generated from the cuts (as long as the on-site native soil meets the project specifications) planned for the project. Fill may also be imported from outside borrow sources. Per our understanding, there is no need for imported borrow for the project. Based on previous experience, for preliminary estimate, a grading factor of 0.9 may be assumed for grading factor.

8.3 Embankments

Based on the "Typical Cross Sections", the project requires wedge fill for the roadway widening. The wedge fill is along I-880 southbound just north and south of the San Leandro Creek Bridge where Soundwall on Retaining Walls (RW SB-1 & RW SB-2, both Type 5SWB) are planned.

For embankment settlement evaluation, we have investigated the embankment at the north abutment, which is the governing case. The reference boring data include CPT-2, RW-32, RW-33 (Parikh 2008), as-built B-1 (Caltrans 1966, Contract 04-174364), and as-built B-1 (Caltrans 1992). Due to a small drainage path/wetland in the vicinity, just west of I-880, the CPT and boring data indicate soft clay and loose sand layer through about Elev. -4 feet near the max. height of the wall. The underlying soil consists of stiff clay over dense sand at approx. Elev. -30 feet (Caltrans as-built B-1, 1966). Groundwater was encountered at Elev. 8.5 feet in 2008.

Majority of the fill weight is supported by the wall on piles. The remaining wedge fill, in a triangular shape of approximately 12 feet wide and maximum 7 feet high, will be on the existing slope embankment. Settlement estimation is based on Boring RW-32 and CPT-2. Elevation view of the wedge fill with soil profile and settlement estimation are presented in Appendix C.

Based on the results of the settlement analyses, the total settlement is estimated to be on the order of 1 inch. The estimation of cohesionless soils was developed by the Hough method as cited in the AASHTO LRFD Guideline. The estimation of preconsolidation pressure in the cohesive material is based on Su/p per Skempton (1957) and NAVFAC DM-7.1. The modified compression index (Cc/(1+e0)) were correlated with the natural moisture based on Lambe and Whitman (1969) and the recompression index was adopted as 20% of the virgin compression index (Holtz and Kovacs, 1982). Based on available boring information and the proposed embankment dimension, the estimated consolidation settlement from the clay layers is on the order of 0.3 inch. The estimated settlement in the over- consolidated (OC)/elastic range is about 0.7 inch. The settlement amount is acceptable for project design.

8.4 Earth Retaining System

Due to right-of-way and other geometric constraints, the project will require construction of three retaining walls (two of them are supporting soundwalls). Information of approximate wall locations, length and maximum wall heights provided by the designer are summarized in Table 3 below. The subsurface soil conditions and design considerations of each of the retaining walls are discussed below.

TABLE 4: SUMMARY OF PROPOSED RETAINING WALLS

Wall No.	Approximate Wall Location	Max. Wall Height (ft)	Approx. Length (ft)	Proposed Wall Type
RW SB-1	Along SB I-880, south of San Leandro Creek Bridge (Sta. 395+33 to 400+79)	20	546	Type 5SWB
RW SB-2	Along SB I-880, north of San Leandro Creek Bridge (Sta. 414+90 to 419+50)	18	460	Type 5SWB
RW No. 1	SB I-880, south of 98th Ave OC (Sta. 427+25 to 429+23)	4	198	Type 1

Recommendations for Walls No. RW SB-1 and RW SB-2 have been included in the Foundation Report for San Leandro Creek Bridge & Overhead (Br. No. 33-0100), dated January 16, 2010, submitted separately under the same design contract.

- **Retaining Wall No. 1 (Type 1)**

The wall is to retain a small cut for widening of SB I-880 just south of 98th Avenue OC ("I-880 Line", Sta. 427+25 to 429+23 approx.) The anticipated wall height is on the order of 4

feet. The reference boring data include RW-35 and CPT-3 (Parikh 2008). The subsurface soil material generally consists of firm to stiff clay with minor sand lenses of clayey fine sand. Groundwater was encountered at Elev. 4 feet in 2008.

Based on the boring data at the anticipated footing subgrade, the recommended allowable bearing capacity is 2500 psf, which exceeds the foundation demand of the proposed Type 1 wall per standard plans. Therefore, the proposed Type 1wall is feasible.

8.5 Corrosion Investigation

During our investigation, fourteen corrosion tests were performed through out the project limit. The corrosion investigation for this project was performed in general accordance with the provisions of California Test Method 643. Representative native soil sample at the anticipated pipe subgrade were obtained for corrosion tests. A summary of the corrosion test results is presented in Table 5.

TABLE 5: SUMMARY OF CORROSION TEST RESULTS (PM 24.0/25.5)

Sample No.	Depth (ft)	Resistivity (ohm-cm)	pH	Sulfate (ppm)	Chloride (ppm)
OH-28 #3	9.5	1100	6.95	51.4	11.8
RW-30 #2	4.5	960	7.40	102.1	22.7
RW-31 #3	9.5	1210	7.39	34.5	7.9
RW-33 #4	16.0	1150	7.97	236.1	70.6
RW-35 #3	9.5	590	7.13	117.2	21.2
OH-39 #3	9.5	1690	7.41	27.8	15.1

For structural elements, Caltrans Corrosion Guidelines (September 2003) consider a site to be corrosive if one or more of the following conditions exist: chloride concentration $\geq$ 500 ppm, sulfate concentration $\geq$ 2000 ppm and pH $\leq$ 5.5.

Corrosion test results indicate that the subsurface soil is generally non- corrosive according to Caltrans guidelines. Standard reinforced concrete pipe design is suitable with Type IP (MS) modified cement or Type II Modified cement, minimum required as per Caltrans Bridge Design Specifications (Section 8.22).

For selection of pipe material for culvert and storm drain applications, AltPipe computer program is used by Caltrans to assist designers. AltPipe program is a web-based tool (http://dap1.dot.ca.gov//design/altpipe/). The computations performed by AltPipe are based

on the procedures and California Test Methods described in Chapter 850 of the Caltrans Highway Design Manual (HDM). AltPipe incorporates current requirements from the HDM supplemented by Caltrans Design Information Bulletin No. 83 (D.I.B. No. 83, June 30, 2003) for abrasion potential for material selection.

Based on the test results obtained, corrosion analyses were carried out using Caltrans ALTPIPE program by the designer. The "ALTPIPE" data indicate that, for corrugated steel pipes the recommended pipe thickness is typically 0.052" to 0.109". For steel spiral rib pipes, the recommended pipe thickness is typically 0.064" to 0.109". For aluminum pipes, the recommended pipe thickness is 0.06" and 0.075". Plastic pipes are allowable for most occasions. Reinforced concrete pipes should have steel cover of 0.75" to 1", 5 sacks of cement and 10% of water.

A copy of the "ALTPIPE" analyses results and Plan sheet DQ-1 are included in Appendix C.

8.6 Minor Structure Foundations

8.6.1 Soundwall (SW No. 1)

In addition to the soundwall on retaining walls, one standard soundwall on barrier (SW No. 1) is planned (Sta. 419+50 to 422+85). Based on Borings RW-33 and RW-34, the subsoil consists of medium dense granular fill and stiff clay. The existing grade is at approx. Elev. 18 to 21 feet. Groundwater was encountered at Elev. 1 foot in 2008.

For design of soundwall foundations, Caltrans standard soundwall plans using 16-inch diameter Cast-In-Drilled-Hole (CIDH) concrete piles are applicable. Based on the layout and topographic maps provided by the designer, sloping ground is expected along one side of the wall. Therefore, Case 2 design for CIDH piles is applicable. The recommended angle of shearing resistance (ϕ) is 30 degrees.

8.6.2 Overhead Sign Structures

Based on information provided by the designer, there are four overhead signs planned for the project. The sign locations, types, and relevant boring information are shown below.

TABLE 6: SUMMARY OF OVERHEAD SIGN STRUCTURES

Sign No.	Approx. Location	Type	Relevant Boring Information	Standard Foundation
A	Sta. 388+11	Post Type VII	Boring OH-28: medium stiff to stiff lean clay	5' x 22' CIDH
B	Sta. 407+00	(Light weight sign post foundation on bridge)	N/A	N/A (on bridge)
C	Sta. 440+66	Post Type VI	Boring OH-39:granular fill over firm lean clay	5' x 18' CIDH
D	Sta. 453+71	Post Type VI	As-Built Boring B30(Caltrans 1992): predominantly very stiff clay	5' x 18' CIDH

Based on the boring information, it is feasible to use the standard CIDH foundations for these overhead signs per Caltrans standard plans.

From a construction standpoint, the site should be considered potentially gassy for constructing the 5-foot diameter sign foundations as the general area is old urban/residential.

Construction Considerations. Caltrans standard specifications and standard special provisions (SSP) for "Cast-in-Place Concrete Piling" should be used for the construction of CIDH piles. It is expected that groundwater will be encountered during construction, and "dry" condition as per the standard specifications Section 49-4 could not be maintained.

Vertical inspection pipes for acceptance testing should be provided in all CIDH piles that are 24 inches in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control groundwater. The acceptance test should include Gamma- Gamma Logging and may also include crosshole sonic logging. Gamma-Gamma Logging should be performed in accordance with California Test 233 Standard (CT233) to check the homogeneity of CIDH piles. CT233 defines pile rejection criteria based on the statistical principles of mean and three standard deviations to analyze the homogeneity of a pile. Anomalies detected should be evaluated by the designer for their significance and potential impact on design and to see if mitigation plans are required. Details of the acceptance testing and Gamma-Gamma Logging are contained in Caltrans SSP and CT233.

The site appears to be predominantly clayey soil; however, local variation including presence of sand/gravel layers and lenses is not unusual. Due to the presence of groundwater, raveling or caving is expected which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. It is prudent to make the contractor aware of these conditions so that he takes appropriate steps to comply with the standards and maintain the integrity of the CIDH piles. The use of temporary steel casing should be anticipated at all times to maintain the integrity of the piles. Prior to construction, the qualifications and previous work experience of the potential sub-contractors should be reviewed. The intent is to help select qualified contractors to reduce construction issues.

All piles excavations should be observed by the geotechnical engineer or regulatory agency prior to the placement of reinforcement and concrete so that if conditions differ from those anticipated, appropriate recommendations can be made.

9. STRUCTURAL PAVEMENT SECTIONS

R-value tests were conducted on representative samples collected at subgrade level. The test results are summarized in Table 7.

TABLE 7: SUMMARY OF R-VALUE TEST RESULTS
ROUTE 880 SB HOV LANE EXTENSION Ala 880-PM 24.0/25.5

Boring No.	Station & Offset (ft.)	Date Drilled	Description	R-Value
R-27	"I-880" Line 383+13 81' Lt.	06/09/08	Sandy Lean Clay with Gravel	--
R-29	"I-880" Line 393+28 83' Lt.	06/09/08	Sandy Lean Clay	26
R-33	"I-880" Line 419+13 83 Lt.	06/09/08	Silty Sand with Gravel	--
R-35	"I-880" Line 428+25 87' Lt.	06/16/08	Poorly-Graded Sand	--
R-36	"I-880" Line 428+31 84' Lt.	06/09/08	Clayey Sand	45
R-38	"I-880" Line 436+93 74' Lt.	06/16/08	Clayey Sand	47
R-40	"I-880" Line 446+85 87' Lt.	06/13/08	Clayey Gravel	73
R-41	"I-880" Line 456+02 100' Lt.	06/09/08	Sandy Clay	14

As-built Pavement Sections

Existing Median Structural Section. Caltrans Materials Division cited Contract No. 04-233284 (September 2, 1998) and Contract No. 04-233194 (January 30, 1998), which indicate that between PM 24.4 and 26.1 the existing median was replaced with 0.85 ft AC (A)/0.50 ft CTB (A)/1.25 ft AS (4). The section appears to be consistent with that shown on Contract No. 04-OC7024 (November 14, 2002), which indicates inside shoulder of 260 mm AC/150 mm CTB/375 mm AS between Davis Street (PM 23.6) and Hegenberger Road (PM 25.5). The 2002 improvement added 30 mm OGAC & 45 mm RAC-G.

In March 2010 when CHEC Management Systems, Inc. (CHEC), performed Deflection testing along the median shoulder, the coring data indicated 13.5 to 14 inches of AC. At north of Davis Street, the coring encountered 5 inches of AC and 9 inches of PCC. Based on investigation for the I-880 SB HOV project (PM 22.6 to 24.0) immediately connecting to the south end of the current segment, the as-built plans suggest a 3-foot wide concrete curb installed as part of the original median construction, remains in place and has been buried by several layers of AC under subsequent contracts. The PCC layers encountered by CHEC at north of Davis Street appears to be part of the buried concrete curb. CHEC's coring along the median south of Davis Street also encountered PCC.

Existing Structural Sections along Travel Lanes. The existing structural sections along the outside travel lanes (Lane #4) typically consist of 0.10' OGAC, 0.15' RAC-G, 0.65' AC and 0.25' ATPB over CTB and AS.

As-built data (Roadway plans) showing the existing structural pavement sections obtained from Caltrans, including Contract No. 04-OC7024 (11/14/2002), Contract No. 04-213404 (12/27/1999), Contract No. 04-233194 (1/30/1998), Contract No. 04-233284 (9/2/1998), Contract No. 04-123174 (11/29/1995 & 12/19/1997), Contract No. 04-292014 (undated, Document No. 40000761), Contract No. 53-4TC28 (undated, Documented No. 40000770), and Contracted No. O-4TC83F (undated, Document No. 40000764), are attached in Appendix C of the report.

Findings and Recommendations

- **ATPB, Edge Drains & Underdrains**. According to Highway Design Manual (HDM) 633.1, the general guideline is to use rigid pavement when TI is over 15. The design TI for mainline is 16.5. For the project, however, the as-built sections contain ATPB layer, and the design has to continue the ATPB layer and connect to new edge drain on the outside. Based

on communication with Caltrans, the project design is using flexible pavement, and the existing ATPB layer will be extended to the outside with edge drain. Underdrains are typically installed in cut near toe of existing hilly terrains to take care of water from outside the travel lane. Pavement surface drainage is accounted for by edge drain. If there are existing underdrains, the proposed widening will require installation of new underdrains on the outside of the widening.

- **Design R-Value & Subgrade Enhancement Geotextile.** According to HDM 614.5, the use of SEG on weak subgrade may improve the design R-value. Based on the laboratory R-value test data obtained (Table 7), majority of lab data show R-value greater than 20; the lowest R-value is 14 in the segment. Therefore, with the use of SEG, we recommend that the design R-value be raised to 20. The recommended R-value for design is 20. According to Caltrans Subgrade Enhancement Geotextiles Guide (April 28, 2009), it is recommended that the requirements for SEG conform to Stabilization Application (STAB), Class B2 of the guide. Based on the R-value test data and boring information, it is recommended that SEG be applied to the following segments of the mainline: (1) from Sta. 385+00 to Sta. 400+50 (south end of San Leandro Creek Bridge), and (2) from Sta. 447+00 to north end of project alignment. For the ramps, SEG is only needed in the gore areas per Caltrans comment.

- **Atterberg Limits.** Plasticity Index (PI) data are presented in Appendix B of the report. Based on the data points at shallow depths (2 to 5 ft depths, relevant to pavement design), we found that majority of the PI are in the range of 15 to 20. The PI data per se, however, should not be construed to imply significant expansive clay condition for pavement design. The Atterberg Limits test is performed in accordance with ASTM D4318, and the specimen is processed to remove any material retained on No. 40 sieve. Therefore, the effect of gravel and sand (coarser than No. 40 sieve) only manifests in the R-value tests. For pure "clays" with such PI's and no presence of sand/gravel, the R-values would have been much lower, probably similar to that shown in HDM 623.1A (7/1/08). Majority portion of the Route 880 widening subgrade soils contain substantial amount of sand and gravel (imported material for roadway prism construction through the years), and therefore many R-values tested are over 20. Some segments of the subgrade soil tend to be more clayey (with less granular material) that showed R-values lower than 20. Per current HDM guidelines, the material with R-value less than 20 is still considered relatively poor and weak. Therefore, a layer of SEG for separation and stabilization is recommended for these segments (Sta. 385+00 to 400+50, north of Sta. 447+00, and ramp gores).

- **Use of RHMA & HMA (O)**. The existing section contains OGAC and RAC-G on top. The current project will also use rubberized HMA (RHMA-G). Caltrans indicated that it is preferable to use RHMA-G of the same thickness to match the existing RAC-G since future rehab projects could be required within the project limits. To address the concern of low temperature for RHMA paving, it is our understanding that based on work staging and traffic handling, all the RHMA work can be done behind K-rail during day light hours and that would help to control the temperature. Open graded friction course (OGFC, now named HMA (O)) will be used as final overlay and to match as-built condition. The median pavement rehab work should be done during the same stage of construction that the final 0.1 ft mill/overlay is done.

  Per Caltrans comment, the asphalt binder for the HMA (O) should be PG 58-34 PM since it has to be placed over RHMA-G.

- **Deflection Testing, Analysis & Design Recommendations for Median Shoulder by CHEC.** Per Caltrans comments, Deflection testing was performed along the existing median shoulder from approx. PM 25.5 on the north (Hegenberger Rd) to PM 22.5 on the south (Marina Blvd) since the inside travel lane may encroach into existing median shoulder after the outside widening and restriping. CHEC performed the work in March 2010. The final report (October 24, 2011) prepared by CHEC, presenting the testing data, analysis and design recommendations for the median shoulder, is attached in Appendix D of the report.

  CHEC's recommendations are provided to minimize the vertical elevation change wile satisfying the structural and reflective cracking needs of the existing pavement. The report indicates that the analysis is in accordance with California Test Method 356 and the Caltrans Flexible Pavement Rehabilitation Design Manual (June 2001). Coring data was taken and recorded during the testing process to determine the existing AC thickness. For the current design segment of Hegenberger Rd to north of Davis St (PM 25.5 to PM 24.0), the coring encountered about 13.5 to 14 inches of AC for majority of the alignment and 5 inches of AC over 9 inches PCC by north of Davis Street. The PCC appears to be old concrete curb buried in place. The concrete curb extends further south beyond the current segment through Davis Street and Marina Blvd.

  CHEC's recommendations consist of the following: Mill the existing pavement surface 3.0 inches and overlay the remaining pavement with 3.0 inches HMAC overlay utilizing a paving fabric to aid in the retardation of reflective cracks after milling. Please refer to

CHEC's report for detail recommendations. Figure 1 of CHEC's report summarizes the existing thickness, and the design recommendations are presented in Table 1 of the report.

- **20-Year Flexible Pavement Design & Design Alternatives.** Per Caltrans comments, we have updated the Pavement Design Alternatives. The Design TIs are 16.5 and 12 for mainline and ramps, respectively. For comparison, we have considered the following options:

  (1) Flexible Option 1 – HMA, LCB & AS,
  (2) Flexible Option 2 – HMA, LCB & Lime Treated Subbase,
  (3) Flexible Option 3 – Full Depth HMA, and
  (4) Rigid Option – JPCP.

  These options are presented in Tables 8 & 9. Typical cross sections (Sheets X-1 thru X-17) are attached in Appendix D of the report.

  For Rigid Option, the native subgrade (with 10<R<40) fits Type II soil of HDM Table 623.1A, and the design can directly follow Table 623.1E. However, there are ATPB layers in the existing pavement sections. Matching the new ATPB with the existing ATPB is complicated with the use of JPCP sections. Per HDM Table 623.1E footnote, the ATPB layer should be placed between the surface JPCP and the base. This causes issues and complicated connections between the ATPB. This Rigid Option may not be desirable.

  To do lime treatment on a busy highway for the narrow outside widening is not suitable. In our experience, the pulverizing/mixing blade of the equipment (majority of them on the market in construction practice) cannot cover edge-to-edge/lane-to-lane treatment. There are zones, which may be formed by existing travel lane/traffic and physical limitations that the treatment would be difficult to be effectively executed. We have seen this being construction QA/QC issues in a recent project. In addition, the lime treatment operation could render the area an "open trench" next to a busy travel lane for several days due to spreading, mixing, mellowing, etc. This could pose a safety issue for the existing traffic.

  For pavement type selection on existing adjacent lanes, we believe it is best to provide continuity of existing pavement type; this also ensures consistency in maintenance operations (HDM 616). The existing pavement along the outside lane consists of AC,

Pavement Design Alternatives
Route 880 SB HOV Lane Extension, Ala 880-PM 24.0/25.5

TABLE 8 - Pavement Alternatives - Mainline Widening (TI = 16.5)

Flexible Option 1 (HMA, LCB & AS)	**Flexible Option 2 (HMA, LCB & LTS)**	**Flexible Option 3 (Full Depth HMA)**	**Rigid Option (JPCP)**
0.10'HMA (O) (Wearing Surface) 0.15' RHMA-G 0.65' HMA (A) 0.25' ATPB 0.65' LCB 1.35' AS over SEG (Sta. 385+00 to 400+50, north of Sta. 447+00 & ramp gores)	0.10' HMA (O) (Wearing Surface) 0.15' RHMA-G 0.65' HMA (A) 0.25' ATPB 0.10' HMA (A) 0.50' LCB 1.50' LTS (Lime Treated Subbase)	0.10' HMA (O) (Wearing Surface) 0.15' RHMA-G 0.65' HMA (A) 0.25' ATPB 1.10' HMA (A) 0.50' AB (Cl. 2) over SEG (Sta. 385+00 to 400+50, north of Sta. 447+00 & ramp gores)	0.10' HMA (O) (Wearing Surface) 1.10' JPCP 0.25' ATPB 0.50' LCB 0.70' AS
Remarks: -Use Subgrade Enhance. Geotextile	**Remarks**:	**Remarks**: -Use 0.50' AB (Cl.2) below pavement -Use Subgrade Enhance. Geotextile	**Remarks**: Per HDM Table 623.1E footnote, the ATPB layer is between the JPCP and the base. This causes issues and complicated connection between the new and as-built ATPB.

TABLE 9 - Pavement Alternatives - Ramp (TI = 12)

Flexible Option 1 (HMA, LCB & AS)	**Flexible Option 2 (HMA, LCB & LTS)**	**Flexible Option 3 (Full Depth HMA)**	**Rigid Option (JPCP)**
0.60' HMA 0.65' LCB 0.90' AS over SEG (ramp gores)	0.55' HMA 0.35' LCB 1.50' LTS (Lime Treated Subbase)	1.50' HMA 0.50' AB (Cl. 2) over SEG	0.85' JPCP 0.40' LCB 0.60' AS
Remarks: -Use Subgrade Enhance. Geotextile	**Remarks**:	**Remarks**: -Use 0.50' AB (Cl.2) below pavement -Use Subgrade Enhance. Geotextile	**Remarks**: This option is provided for reference and cost comparison by prime designer.

ATPB, CTB & AS. Therefore, the listed Option 1 (HMA, ATPB, LCB & AS) appears to be best-suited.

- Based on information provided, ramp structural sections will be designed for TI of 12 in accordance with HDM Table 613.5A. Rigid pavement is not proposed at ramp termini since the TI is not greater than 12. A TI of 9 (3-year duration) will be used for detour and temporary construction sections. Per our understanding, calculations supporting the use of TI = 9 for temporary detour were reviewed and verified by Caltrans Highway Operations. Detour pavement is not required on the mainline.

  For ramp (TI = 12), the following pavement section is recommended:
  - 0.65' HMA, 0.90' AB (Cl. 2), 0.95' AS (Cl. 4) or 1.45' Full Depth HMA

  For temporary detour (TI = 9), the following pavement section is recommended:
  - 0.45' HMA, 0.75' AB (Cl. 2), 0.80' AS (Cl. 4) or 1.10' Full Depth HMA

- **Structural Section No. 6**. For the planned Structural Section No. 6 along median shoulder, a 0.10' HMA (O) surface layer should be included to extend the 0.10' HMA (O) surface layer being placed as part of new adjacent Structural Section No. 2. Thus, Section No. 6 should consist of 0.40' Cold Plane and 0.10' HMA (O)/0.30' HMA(A) with Geosynthetic Pavement Interlayer (GPI) - paving mat. In addition, Section No. 6 should be extended to the bottom face of the existing median concrete barrier that is to remain in place based on Caltrans comments (2/8/2012).

- **Structural Section No. 3**. To maintain continuity of the new mainline 0.10' HMA (O) surface layer and underlying 0.15' RHMA-G layer, these two layers should be extended to the proposed paved sliver widenings beyond the ultimate outside edge of shoulders for Structural Section No. 3 per Caltrans comments (2/8/2012). Based on discussion with the designer, Section No. 3 will consist of 0.10' HMA (O) , 0.15' RHMA-G, 0.10' HMA (A) over 0.50' AB (Class 2). The area is between the ultimate outside shoulder and soundwall. No traffic is expected for the area. Nevertheless, pavement is needed to "fill the gap". The selection of the section is designer's choice and appears reasonable. Based on our evaluation, Section No. 3 is adequate for TI of 4.5 (for comparison and information sake).

- Majority of the widening is in original ground. Along Route 880, the only fill area is near San Leandro creek where retaining walls are planned for wedge fill on existing sloping embankments (roadway prism). Majority of the fill weight will be supported by retaining

wall piles. The remaining wedge fill will be placed on existing sloping embankments. When properly constructed in accordance with Caltrans earthwork/ compaction standards, we do not anticipate significant differential settlements between existing pavement and new widening.

- The recommended minimum R-value for Class 2 Aggregate Base (AB) is 78 and for Class 4 Aggregate Subbase (AS) is 50 per Caltrans 2006 Standard Specifications.

10. MATERIAL SOURCES

There are several commercial sources of asphalt, concrete, and aggregate products in the vicinity of the project area. Some of the available commercial suppliers in the vicinity of the project site are listed in the following table.

TABLE 10: SOURCES OF ASPHALT AND AGGREGATE MATERIAL

Source	Location	Approx. Haul Dist. (One way, miles)
Sierra Concrete	9819 Pearmain St, Oakland, CA	1.0
Quick Mix Concrete & Pumping	754 Castro Street, San Leandro, CA	3.7
Central Concrete Supply Co.	1844 W Winton Ave, Hayward, CA	10.5

11. MATERIAL DISPOSAL

Any Aerially Deposited Lead (ADL) material found on the project site should be documented. Project specific disposal, staging, or borrow areas should be incorporated in the project report (DIB 85). The requirement applies to ADL and other surplus material. Refer to Section 12.4 for more details.

12. CONSTRUCTION CONSIDERATIONS

12.1 Construction Advisories

The sections are written primarily for the engineer responsible for the preparation of plans and specifications. Since these sections identify potential construction issues related to the project, it may also be of use to the Agency's representatives involved in monitoring of construction activity. The field investigation performed by us primarily addresses design issues and was not planned specifically to identify construction issues.

The project site is located along existing I-880. Therefore, traffic control is required to maintain traffic flow along I-880 and the respective city streets. Several underground utilities exist at the site. The contractor should verify the utility lines, be aware of the existing conditions and plan the construction activities accordingly.

In our opinion, conventional equipment may be used to excavate the on-site soil materials. The materials to be excavated may consist of firm to very stiff clays with varying amounts of medium dense to dense sand and gravel. Localized subgrade pumping may be encountered during earthwork construction depending on the weather, moisture condition of the subsurface soils, and surface drainage conditions. Equipment mobility may also be difficult if the subgrade is wet. In which case, the subgrade soils may require reworking, aeration, or over-excavation and replacing with dry granular fill to facilitate earthwork construction. It is possible that unknown old buried utilities or abandoned structures, concrete rubble etc. are located along the alignment. It might require special equipment and additional efforts to remove these buried objects.

Prospective contractors for the project must evaluate construction-related issues on the basis of their own knowledge and experience in the local area, on the basis of similar projects in other localities, or on the basis of field investigation on the site performed by them, taking into account their proposed construction methods and procedures. In addition, construction activities related to excavation and lateral earth support must conform to safety requirements of OSHA and other applicable municipal and Stage regulatory agencies.

12.2 Construction Consideration that Influence Specifications

The contractor should verify the conditions of the existing utility lines. These locations should not be used for stockpiling of materials. Any utility conflicts with proposed construction should also be reviewed prior to construction.

12.3 Construction Monitoring and Instrumentation

The construction monitoring and instrumentation subject was considered and was determined to be not significant for the project.

12.4 Hazardous Waste Considerations

The project environmental study report should be referred to for further details about any potential hazardous materials within the project site. Per information provided by the designer, all ADL material will not be re-used and will be disposed off site for the project. Details for ADL handling should be based on SSP 19-900, "Material Containing Hazardous Waste Concentrations of Aerially Deposited Lead".

12.5 Differing Site Conditions

The soil conditions described in this report are based on available boring data. It should be noted that these borings depict subsurface conditions only at the locations drilled. Because of the variability from place to place within soils in general, and the nature of geologic depositions, subsurface soil conditions could change between the explored locations.
Early communication should be made between the Resident Engineer, the Contractor and the Geotechnical Engineer as soon as conditions that differ from those established in this report are recognized by any of the parties. Additional recommendations could be provided if such conditions arise.

13. RECOMMENDATIONS AND SPECIFICATIONS

13.1 Summary of Recommendations

If the designer has questions or concerns with any of these recommendations, or, if conditions are found to be different during construction, the Geotechnical Engineer who prepared this report should be contacted. Additional fieldwork, analysis or changes in recommendations may be required. These services may be provided under a separate authorization, as necessary. A concise summary of the geotechnical recommendations is presented below:

- Design peak bedrock acceleration (PBA) = 0.7 g. (Ref.: Section 7.4)
- The boring/CPT data indicates that the subsurface soil conditions at the project site generally consists of mainly medium stiff to very stiff lean clays with pockets/ lenses/layers of loose to medium dense sands/gravels. Subsurface soil conditions consist of interbedded layers of medium stiff to very stiff lean clays and loose to medium dense sands/gravels were also encountered in some of the soil borings/CPTs. Groundwater was encountered at the depths between 8 feet and 23

feet. The impact of liquefaction potential to this roadway-widening project is considered relatively low (Ref.: Section 8.1.3)

- Retaining Walls (Ref.: Section 8.4)
- Soundwall (Ref.: Section 8.6)
- Pavement Sections for widening (Ref: Section 9)

13.2 Recommended Materials Specifications

13.2.1 Standard Specifications

Unless otherwise stated in the special provisions, all materials specifications should conform to Caltrans Standard Specifications, May 2006 edition, including but not limited to the following: Earthwork, Structure Backfill, Pervious Backfill Material, Reinforcing Geofabric, Thermoplastic Pipes, Hot-Mixed Asphalt, Aggregate Base and Aggregate Subbase, Cement Treated Base, etc. Note that there are most-current specifications included in the "Amendments to the Standard Specifications dated May 2006" – last revised/issued on December 5, 2008. The entire Section 90, "Portland Cement Concrete" was replaced on this date.

13.2.2 Special Provisions

The project design follows Caltrans 2006 standard plans and specifications. The standard specifications should be augmented with relevant and current standard special provisions. The up-to-date SSPs for all pavement-related items should be used.

<u>Imported Borrow:</u> Based on the earthwork quantities shown on the project plans ("Roadway Quantities" table shown on Sheet Q-1), there is no need for imported borrow for the project.

Aggregate Base: Aggregate Base (Class 2) shall conform to the 1½-inch maximum or the ¾–inch maximum grading for Class 2 aggregate based specified in Section 26-1.02A, "Class 2 Aggregate Base" of Caltrans 2006 Standard Specifications.

<u>Aggregate Subbase:</u> Aggregate Subbase (Class 4) shall conform to the provisions in Section 25 of the Standard Specifications and to these Special Provisions.

Aggregate Subbase (Class 4) shall be clean and free from organic matter and other deleterious substances. The percentage composition by weight of Class 4 aggregate subbase shall conform to the following grading as determined by California Test Method No. 202.

Gradation Requirement (Percent Passing)

Sieve Sizes	Operating Range	Contract Compliance
2 1/2 "	100	100
No. 4	30 - 65	25 – 70
No. 200	0 - 15	0 - 18

Aggregate Subbase (Class 4) shall also conform to the quality requirements given on the following table:

Quality Requirements

California Test Method	Operating Range	Contract Compliance
Sand Equivalent (217)	21 Min.	18 Min.
Resistance (R-value) (301)	50	50 Min.

14. INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our field exploration and the assumption that the soil conditions do not deviate from observed conditions. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed "Route I-880 SB HOV Lane Extension and Other Improvements between Davis Street and Hegenberger Road Interchange" as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our findings and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project and that necessary steps are also taken to see that the recommendations are carried out in the field.

The findings in this report are valid as of the present date. However, changes in the soil conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

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Senior Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-13
GEOTECHNICAL
STATE OF CALIFORNIA

T:/ONGOING PROJECTS/2006/206139.GDR(R&M 880 SB HOV LANE)

REFERENCES

1. California Department of Transportation, May 2006, Standard Plans.

2. California Department of Transportation, May 2006, Standard Specifications, Sections 1 through 95.

3. California Department of Transportation, Highway Design Manual, September 2006.

4. Caltrans, ARS Online Tool (v. 1.04), 2009.

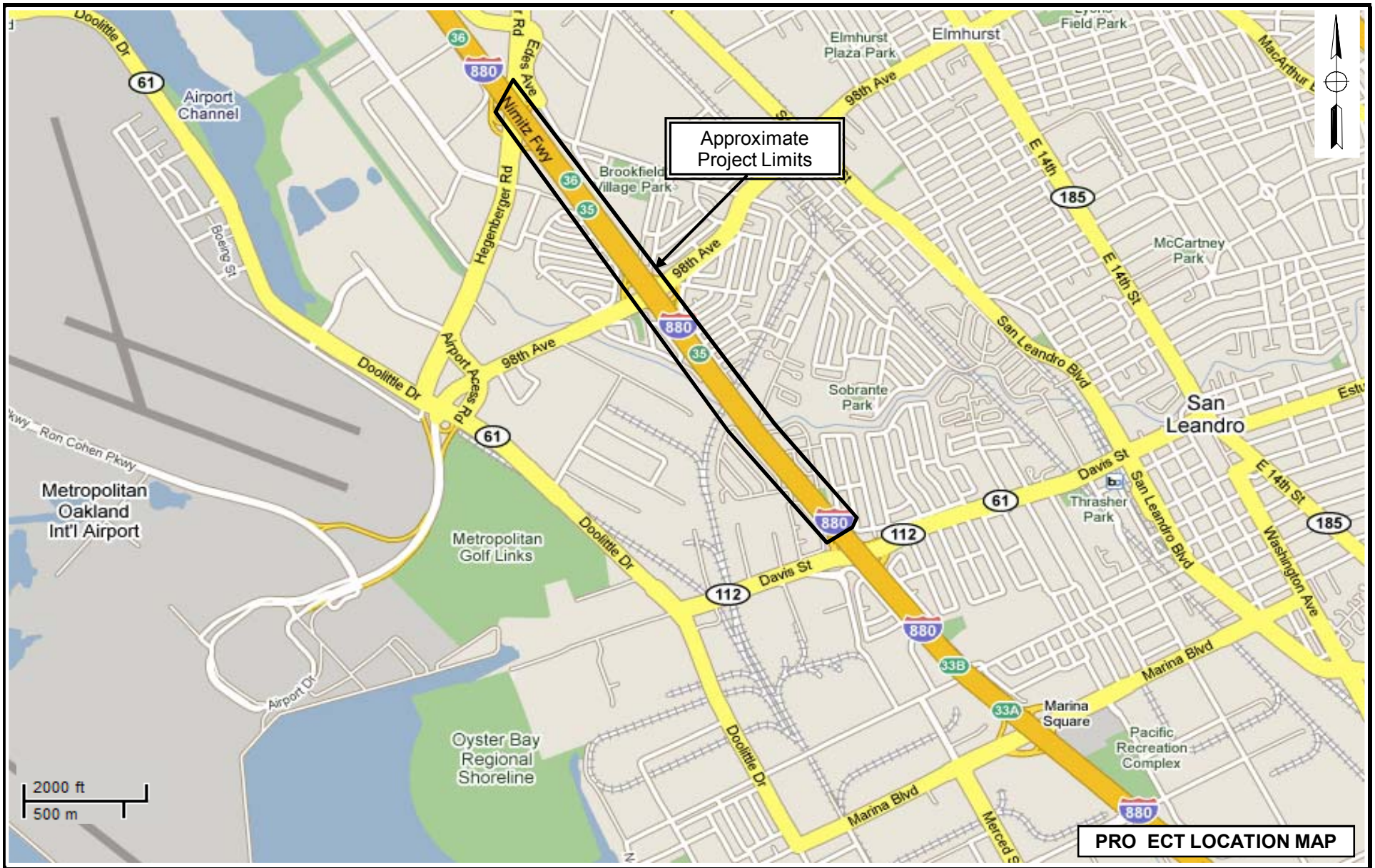
5. Daniel, E.R., Howie, J.A., and Sy, A., 2003, A Method for Correlating Large Penetration Test (LPT) to Standard Penetration Test (SPT) Blow Counts, Canadian Geotechnical Journal 40: 66-77

6. "Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California" by R.W. Graymer, 2000 (USGS Map MF-2342).

7. PARIKH Consultants, Inc., November 2006, "Foundation Type Selection Report, I-880 Southbound HOV Lane Widening and Northbound Auxiliary Lane Project, Route 112/880 Separation (Br. No. 33-0168)".

8. PARIKH Consultants, Inc., November 2006, "Foundation Type Selection Report, I-880 Southbound HOV Lane Widening and Northbound Auxiliary Lane Project, Marina Boulevard Overcrossing (Br. No. 33-0167)".

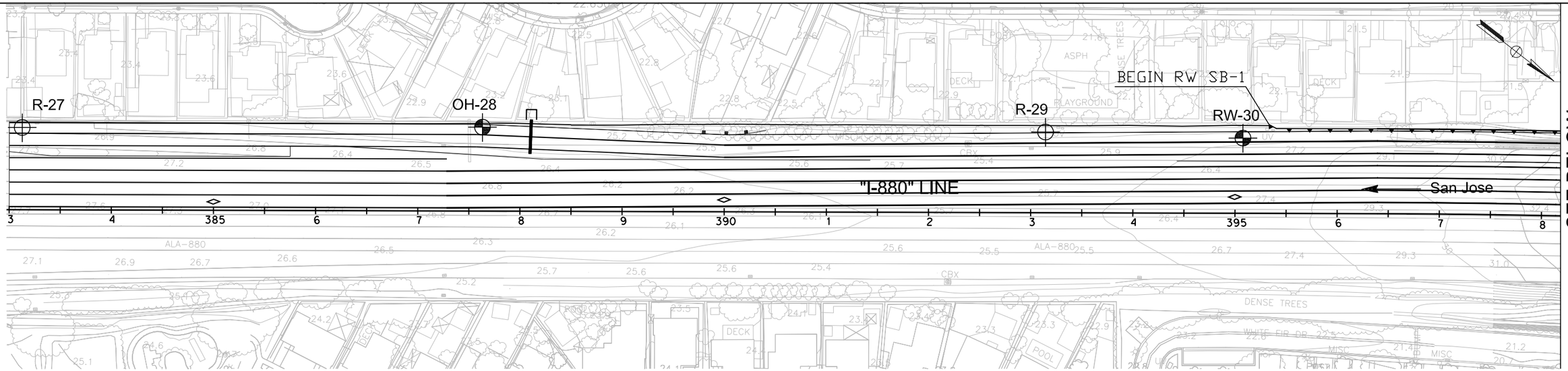
9. PARIKH Consultants, Inc., November 2006, "Foundation Type Selection Report, I-880 Southbound HOV Lane Widening and Northbound Auxiliary Lane Project, San Leandro Creek Bridge and Overhead (Br. No. 33-0100)".

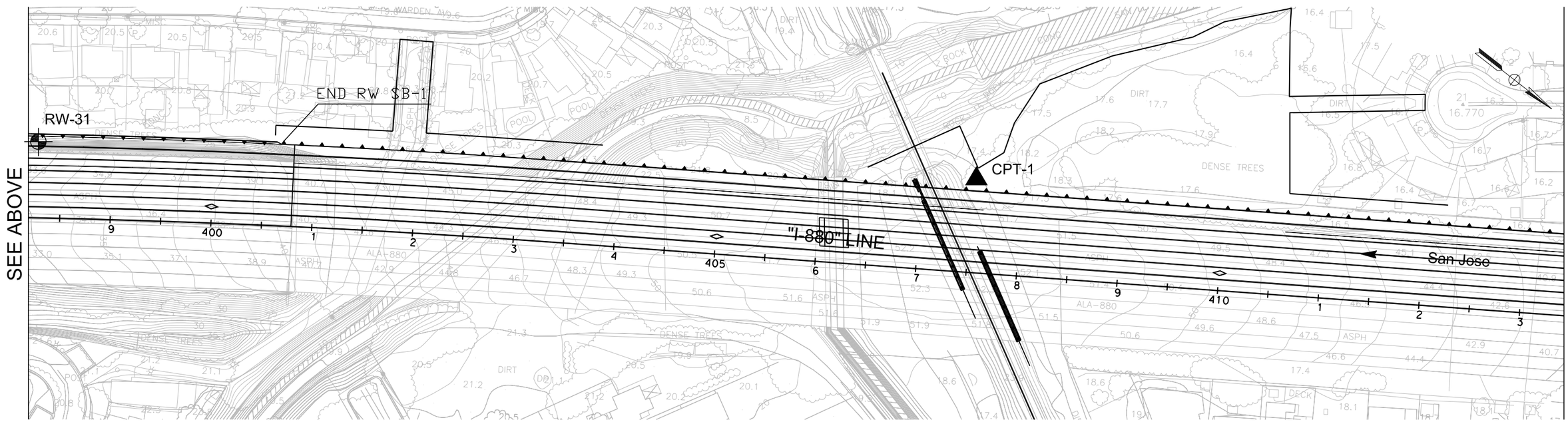


PARI H CONS LTANTS, INC.
GEOTECHNICAL CONS LTANTS
MATERIALS TESTING

I-880 SB HO LANE E TENSION AND OTHER IMPRO EMENTS
BET EEN DA IS STREET AND HEGENBERGER ROAD INTERCHANGE
ALAMEDA CO NT , CALIFORNIA

OB NO.: 206139.GDR	PLATE NO.: 1





LEGEND

OH-28 — Approx. Boring Location

R-29 — Approx. R-Value Boring Location

CPT-2 — Approx. Cone Penetration Test Location

SCALE 1 inch = 100 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by Rajappan & Meyer

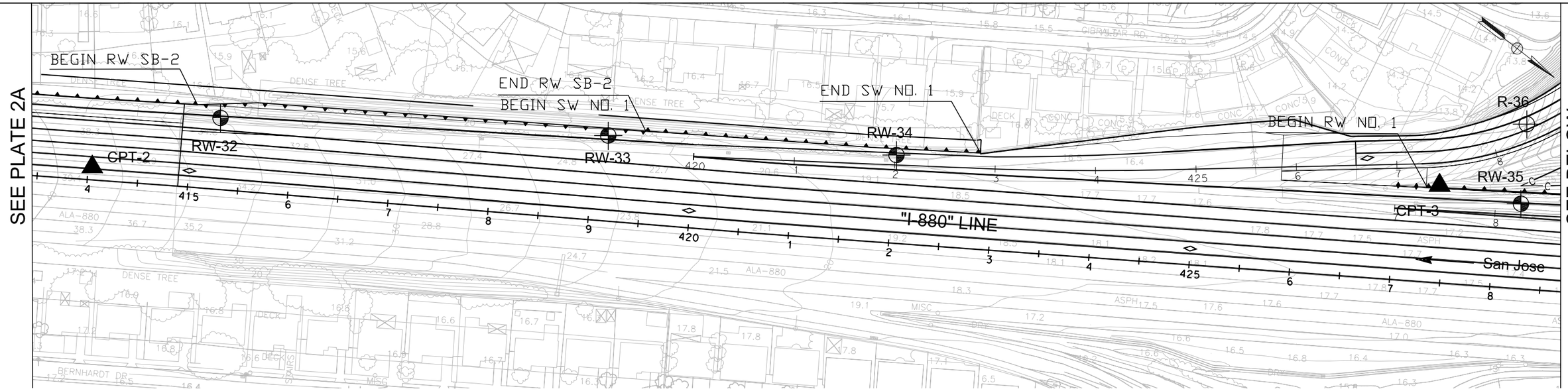
SITE PLAN

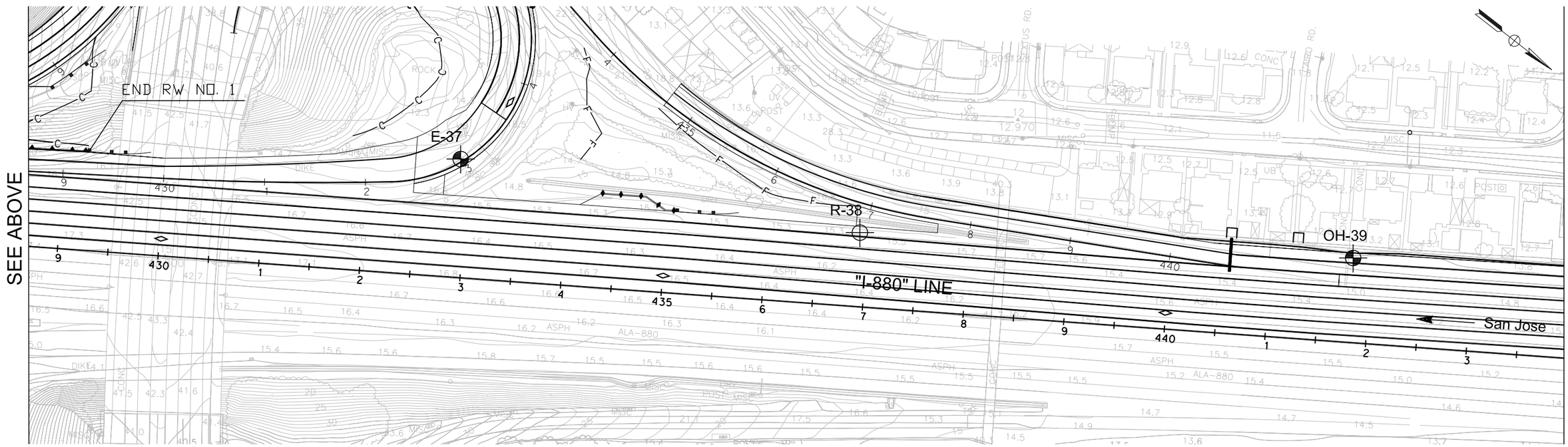
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS
DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.GDR

PLATE NO: 2A





SITE PLAN

LEGEND

E-37 — Approx. Boring Location

R-33 — Approx. R-Value Boring Location

SCALE 1 inch = 100 feet

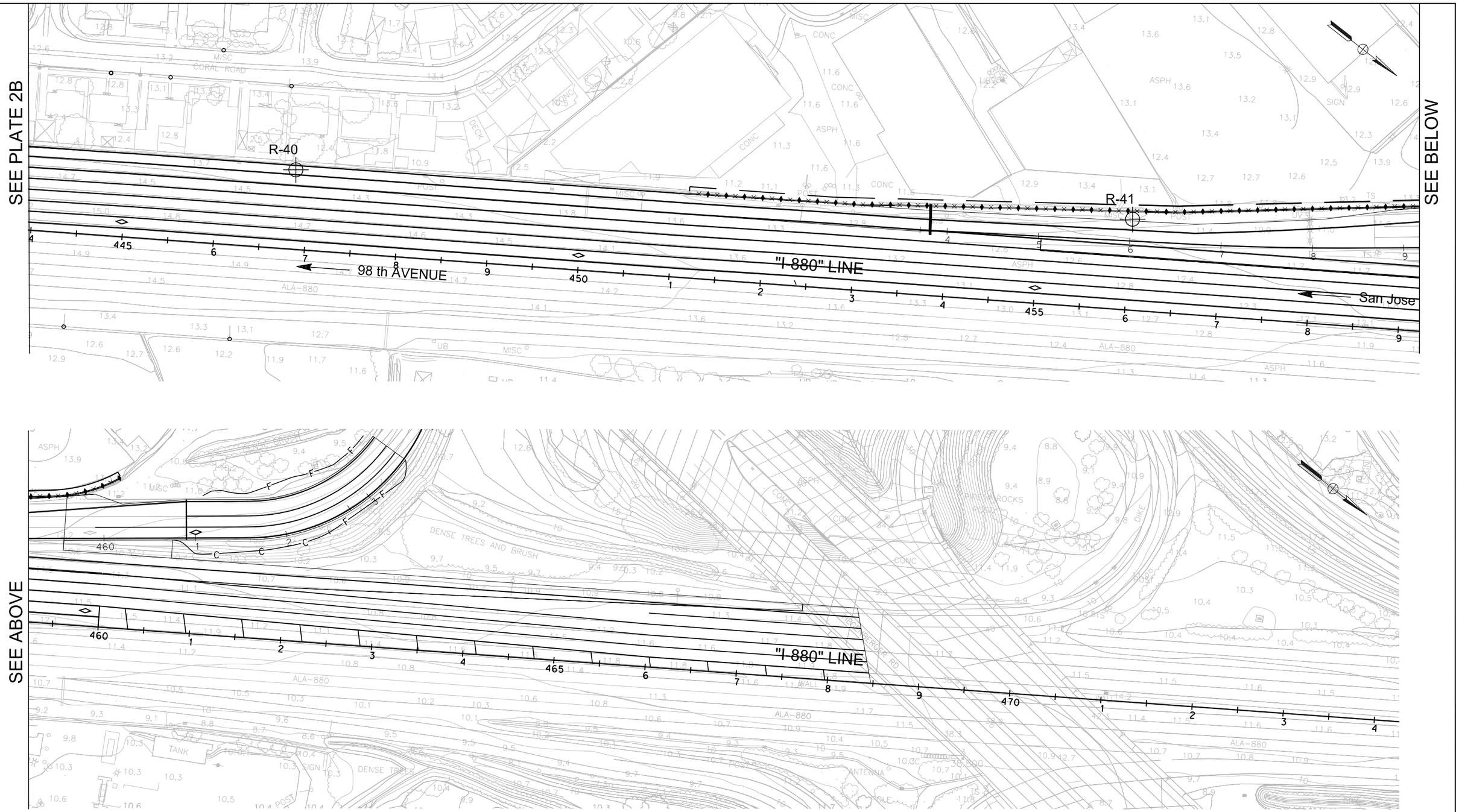
Note: All units are in feet unless otherwise specified
Reference Map was provided by Rajappan & Meyer

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS
DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.GDR

PLATE NO: 2B



SITE PLAN

LEGEND

R-40 ⊕ Approx. R-Value Boring Location

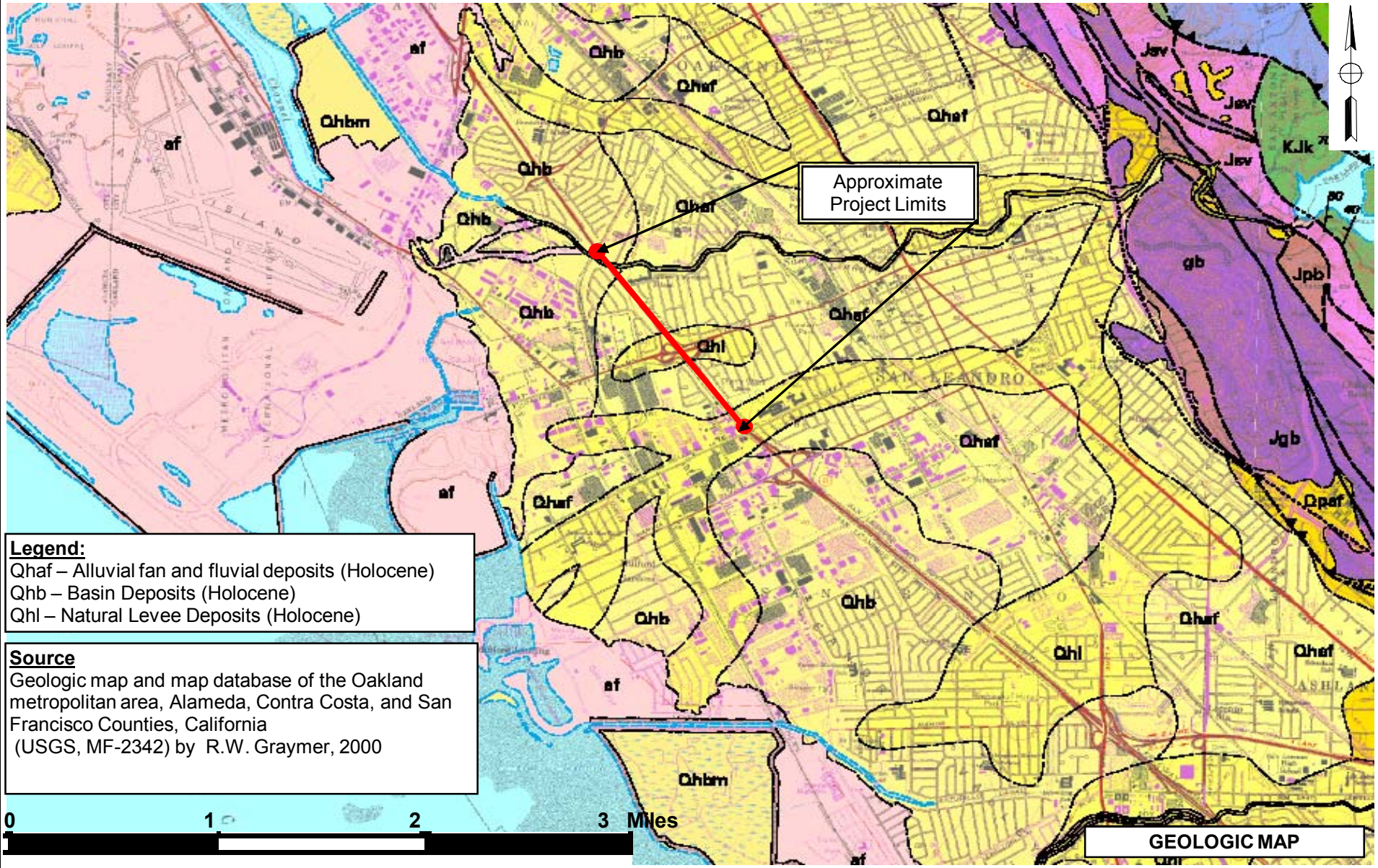
SCALE 1 inch = 100 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by Rajappan & Meyer

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS
DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE
ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.GDR | PLATE NO: 2C

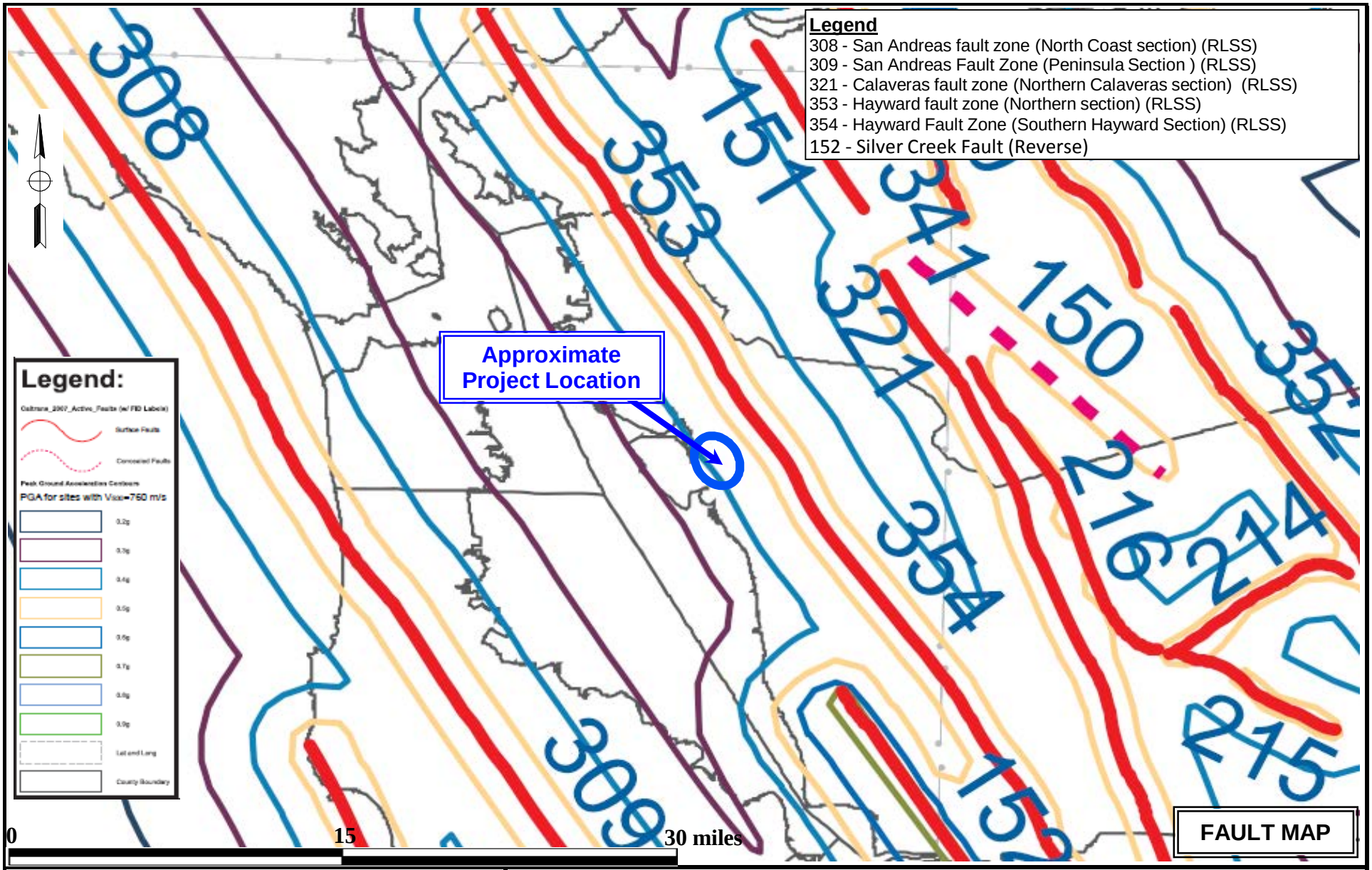


PARI H CONS LTANTS, INC.
GEOTECHNICAL CONS LTANTS
MATERIALS TESTING

I-880 SB HO LANE E TENSION AND OTHER IMPRO EMENTS
BET EEN DA IS STREET AND HEGENBERGER ROAD INTERCHANGE
ALAMEDA CO NT , CALIFORNIA

OB NO.: 206139.GDR

PLATE NO.: 3



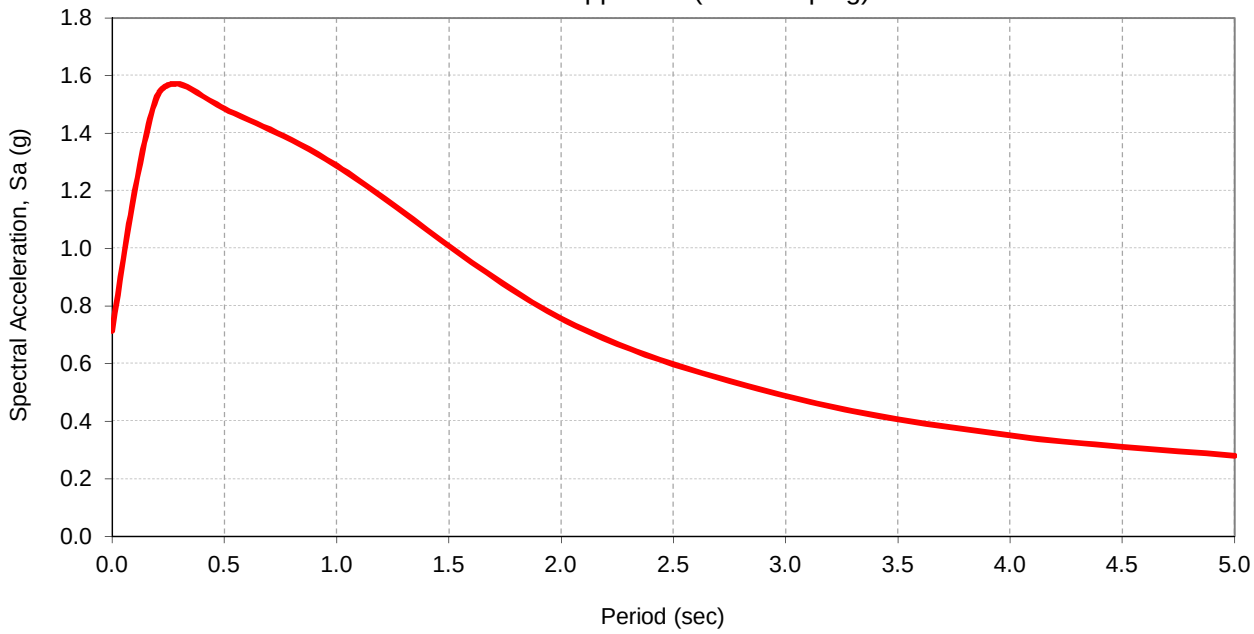
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS BETWEEN DAVIS STREET AND HEGENBERGER ROAD INTERCHANGE ALAMEDA COUNTY, CALIFORNIA

JOB NO.: 206139.10 | **PLATE NO.: 4**

RECOMMENDED ARS CURVE

Probabilistic Approach (5% Damping)



Site Information

Latitude:	37.7254
Longitude	-122.1829
V_{S30} (m/s) =	230
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	4.9

Governing Curve:

USGS Deaggregation 2008 (beta)

Recommended Response Spectrum

Period (sec)	USGS Deagg. Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.7126	1.000	1.000	0.713
0.1	1.1945	1.000	1.000	1.195
0.2	1.5259	1.000	1.000	1.526
0.3	1.5692	1.000	1.000	1.569
0.5	1.4841	1.000	1.000	1.484
1.0	1.0717	1.200	1.000	1.286
2.0	0.6301	1.200	1.000	0.756
3.0	0.4058	1.200	1.000	0.487
4.0	0.2911	1.200	1.000	0.349
5.0	0.2326	1.200	1.000	0.279

Source:

1. Caltrans ARS Online tool (V.1.0.4, http://dap3.dot.ca.gov/shake_stable/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Geotechnical Services Design Manual (Version 1.0)

Note:

Refer to "Probablistic Response Spectum Spreadsheet" (attached) for development of the recommended ARS curve.

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MATERIALS TESTING

SAN LEANDRO CREEK BRIDGE AND OVERHEAD (WIDEN)
ALAMEDA COUNTY, CALIFORNIA

Project No.: 2006-139-UPR | **Plate No.: 5**

APPENDIX A

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

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
- (PP) Pocket Penetrometer
- (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)
- (TV) Pocket Torvane
- (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)
- (VS) Vane Shear (AASHTO T 223)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

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

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

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.

CONSISTENCY OF COHESIVE SOILS

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

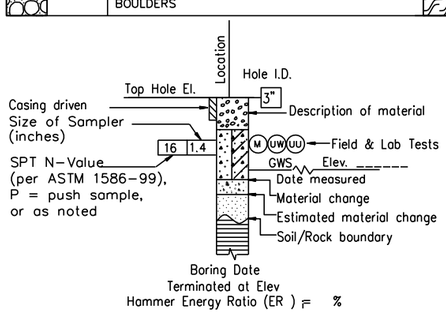
PLASTICITY OF FINE-GRAINED SOILS

Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

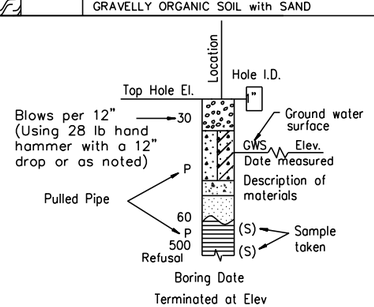
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
□	O	Other

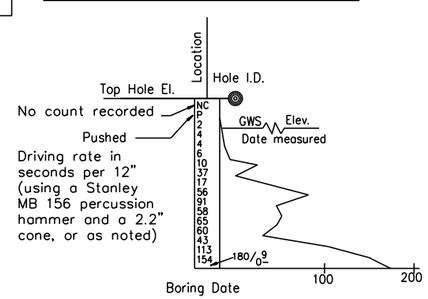
Note: Size in inches.



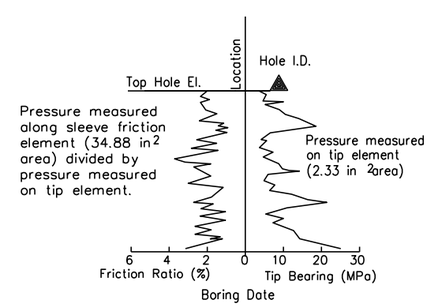
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

SOIL LEGEND

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SIGN OFF DATE	CHECKED BY	D. WANG	DATE: JUNE 2008		

BRIDGE NO. –
POST MILES 23.8/25.5

SOIL LEGEND
LOG OF TEST BORINGS

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

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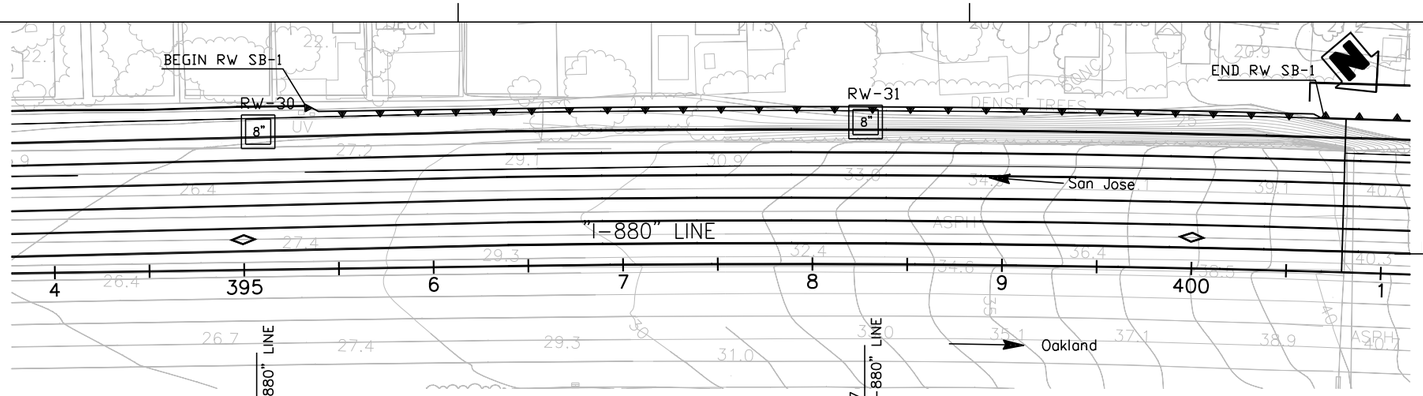
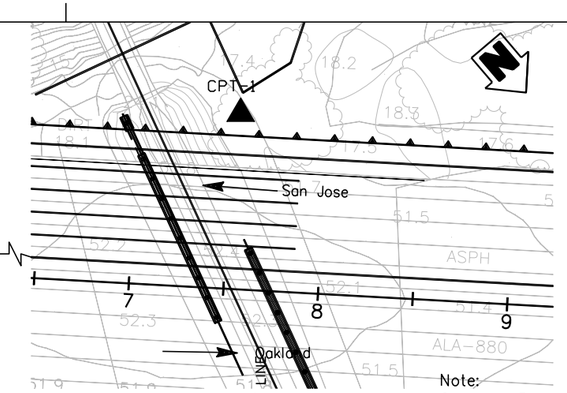
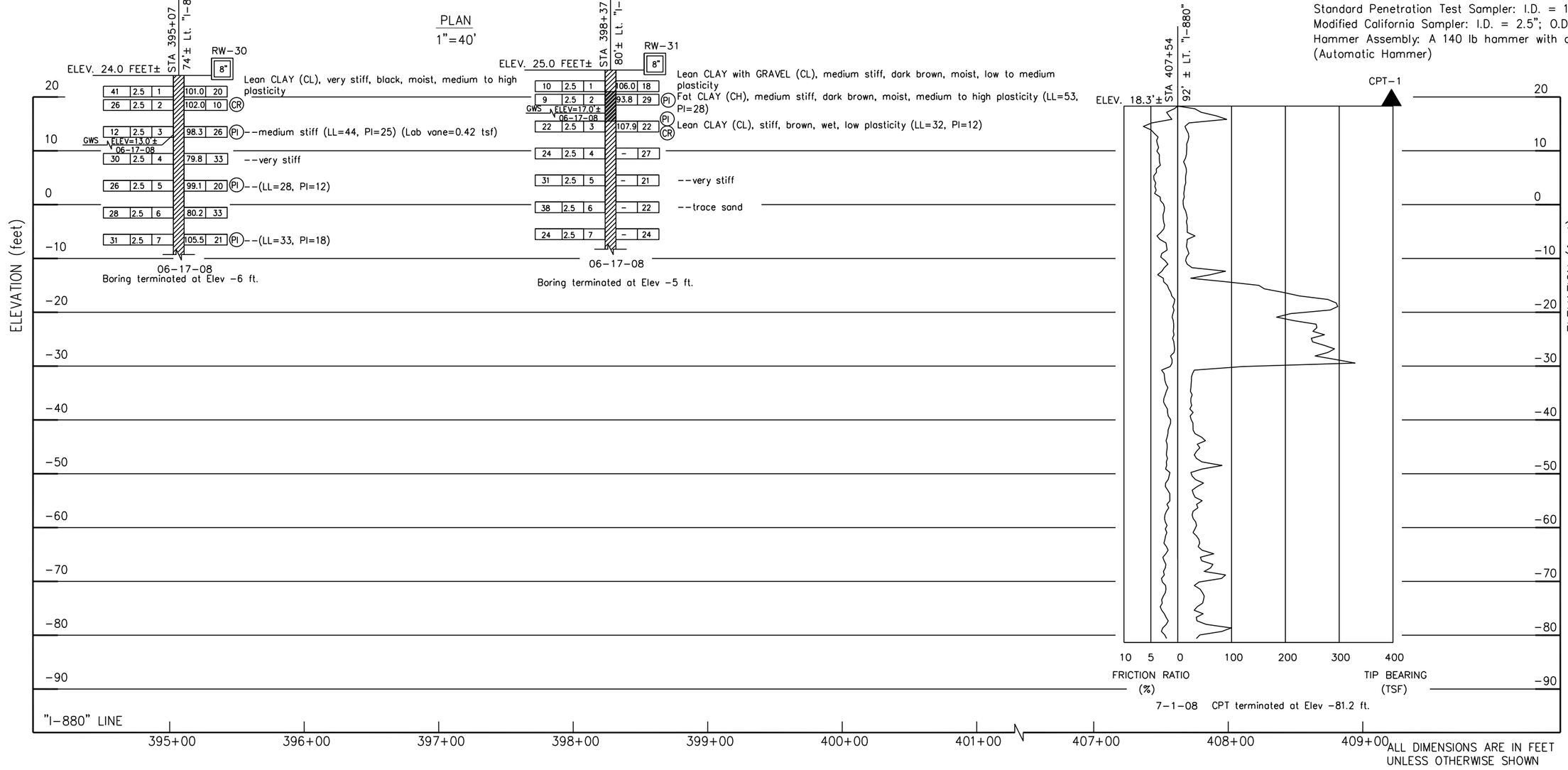




Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop
(Automatic Hammer)

PLAN
1"=40'



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

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POST MILES 23.8/25.5

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS BETWEEN DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE

LOG OF TEST BORINGS 1 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

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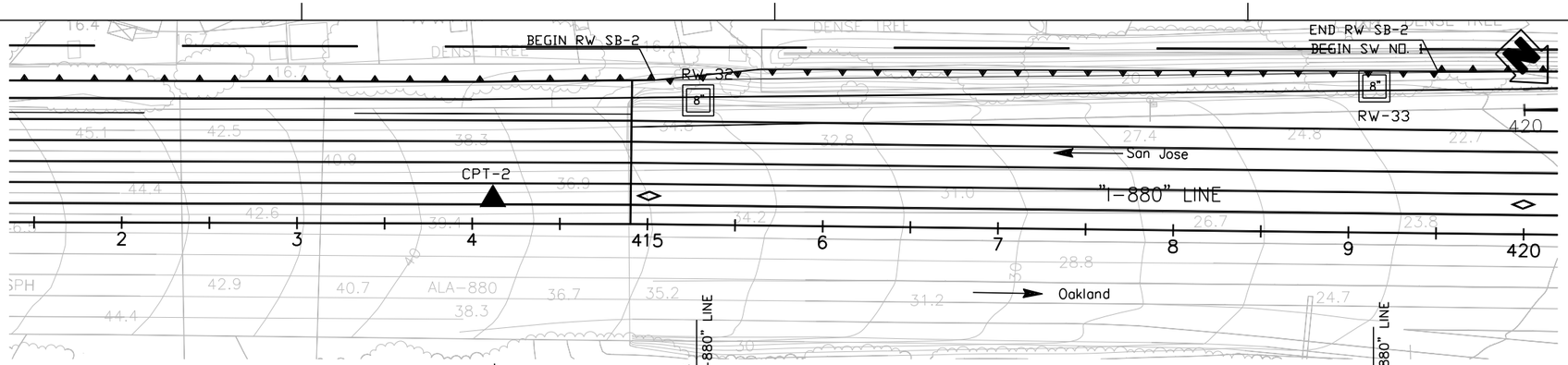

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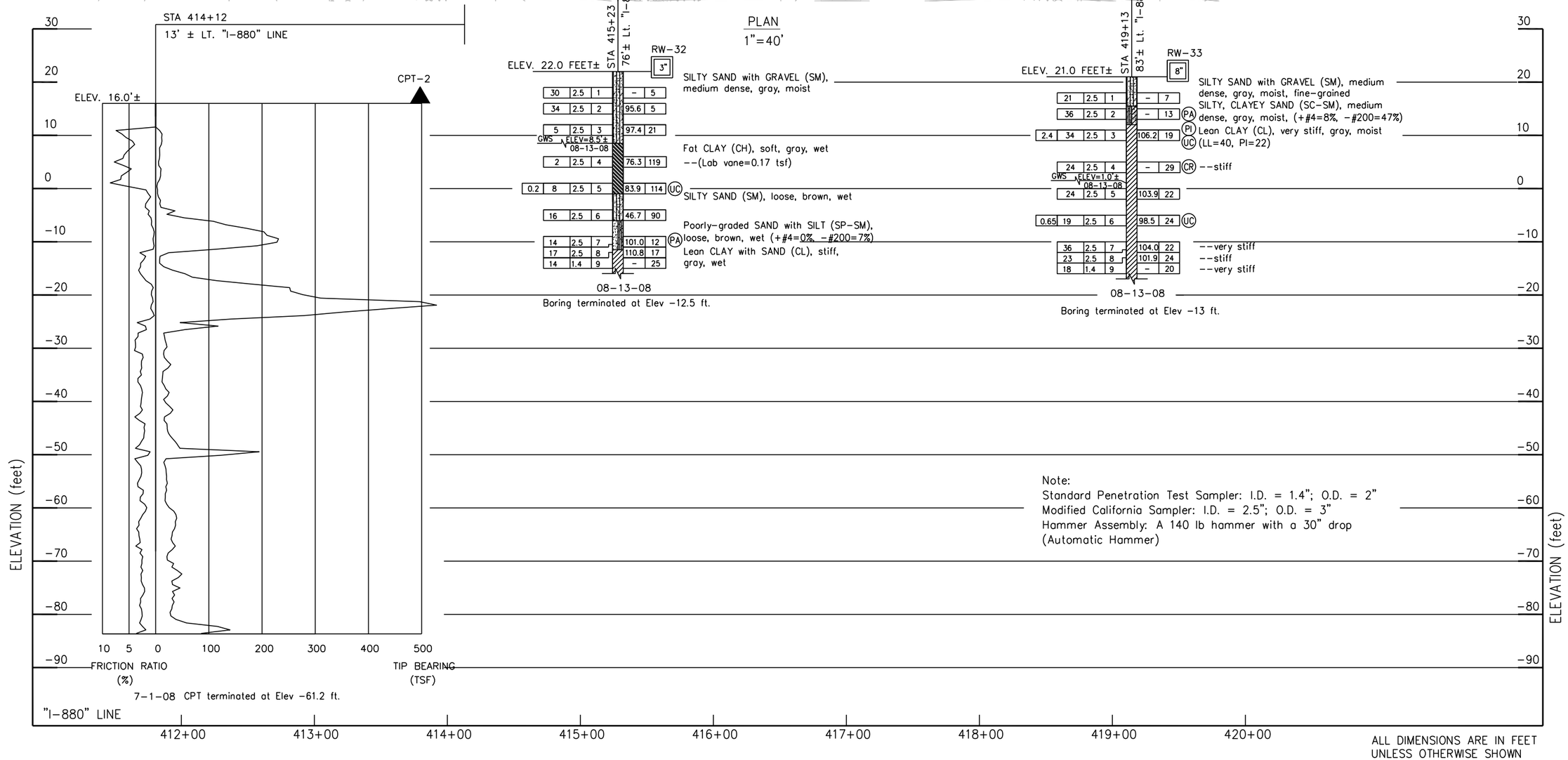

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I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS BETWEEN DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE

LOG OF TEST BORINGS 2 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

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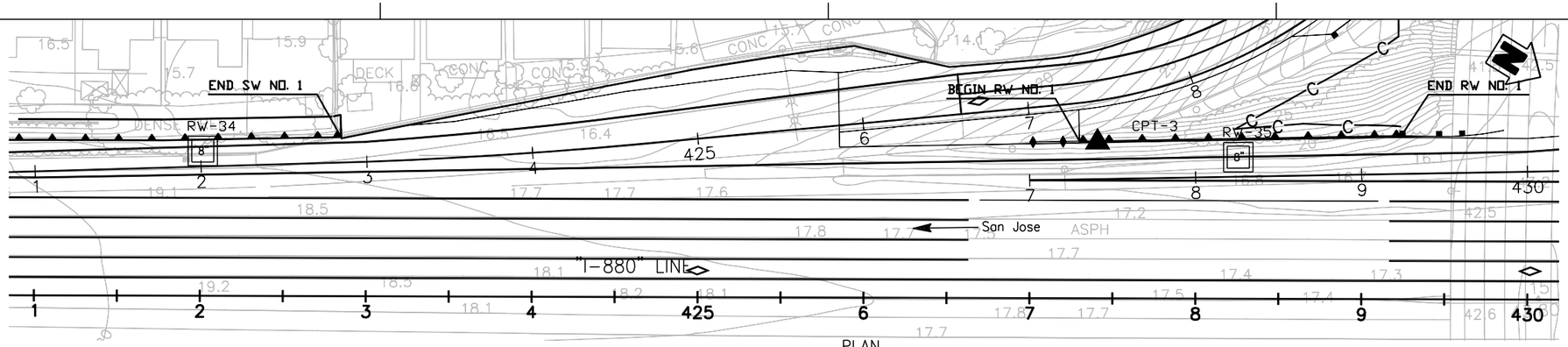

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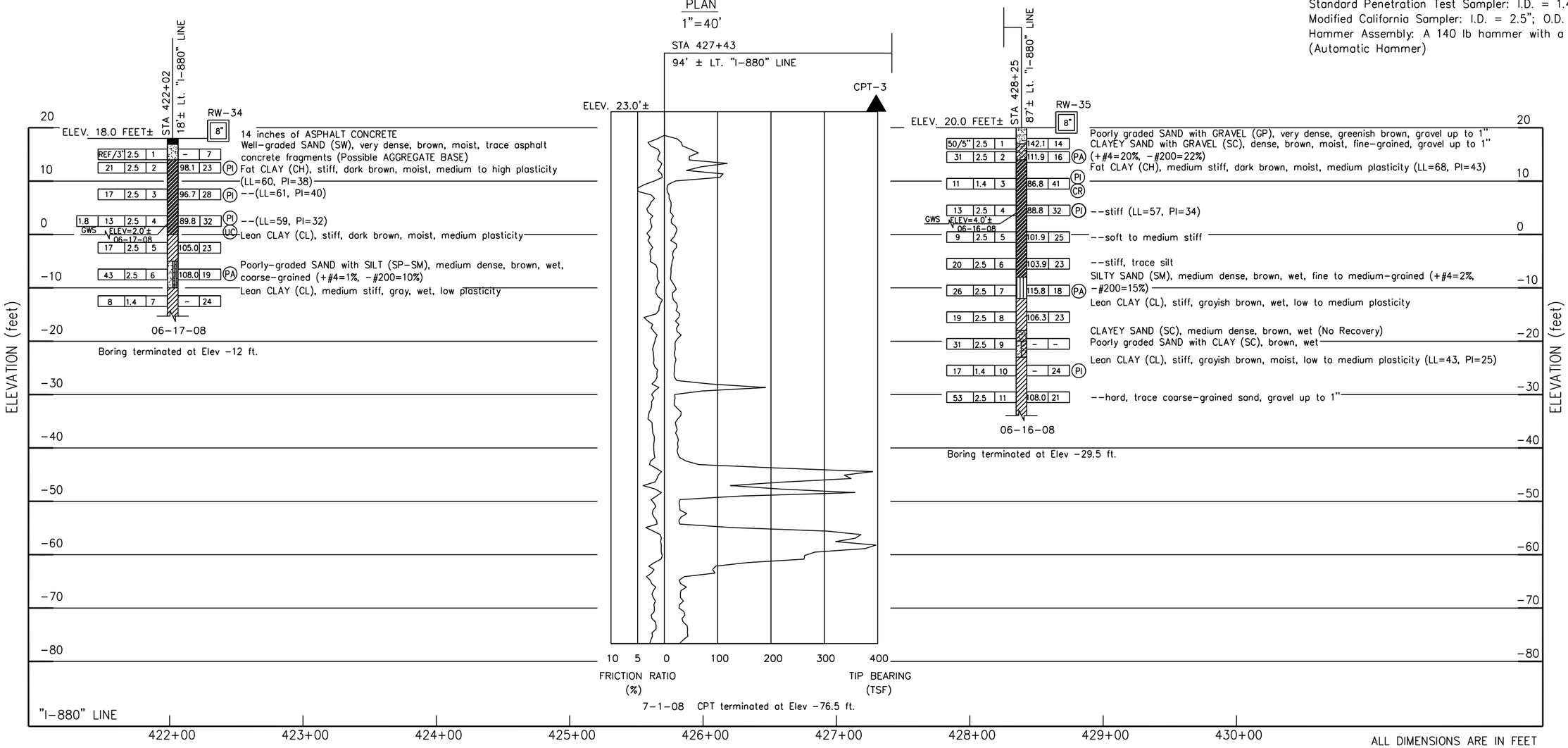

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PROFILE
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Hor. : 1" = 40'

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SIGN OFF DATE	CHECKED BY	D. WANG	FIELD INVESTIGATION BY: DATE: JUNE 2008		PROJECT ENGINEER

BRIDGE NO. –
POST MILES 23.8/25.5

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS BETWEEN DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE

LOG OF TEST BORINGS 3 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
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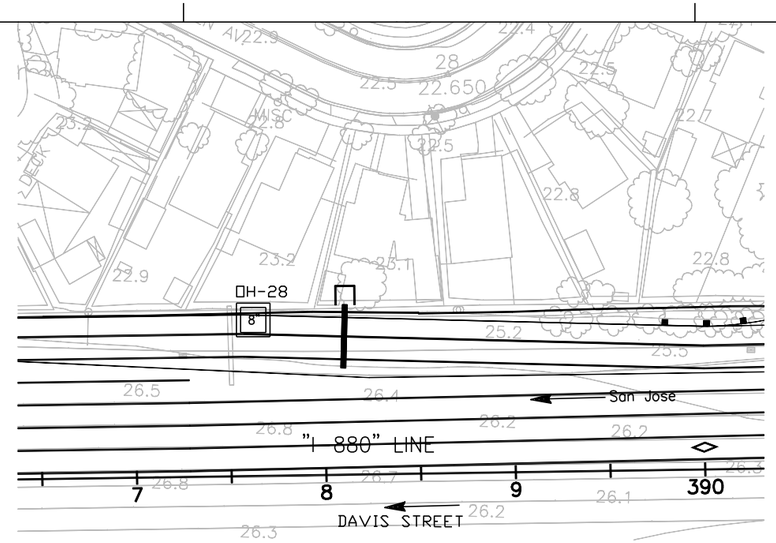

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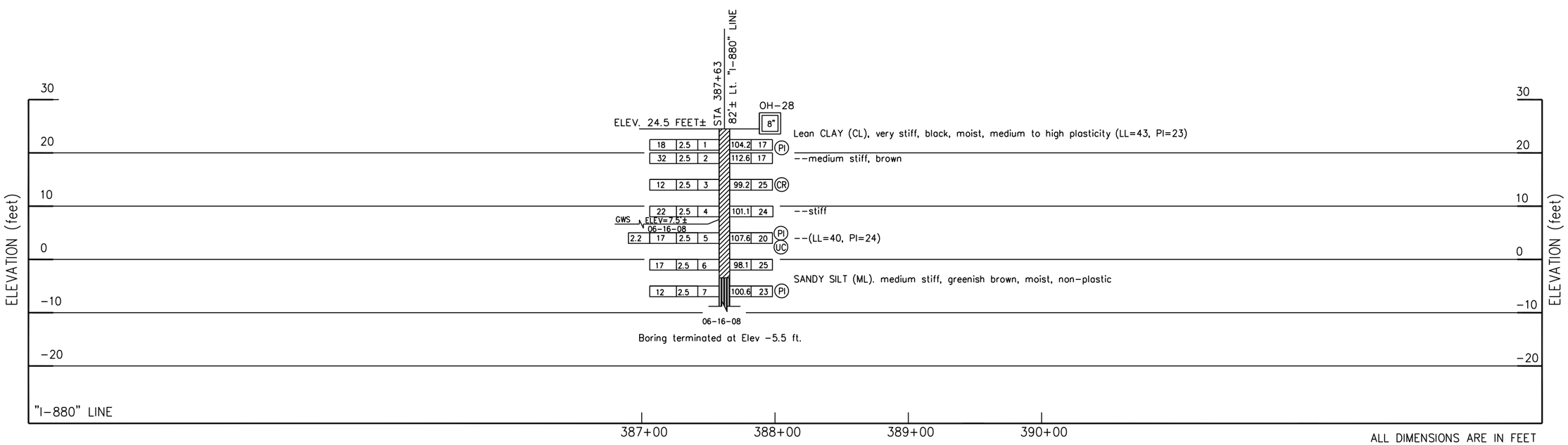

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I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS BETWEEN DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE

LOG OF TEST BORINGS 4 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 8/12/09 SHEET OF

FILE => $REQUEST

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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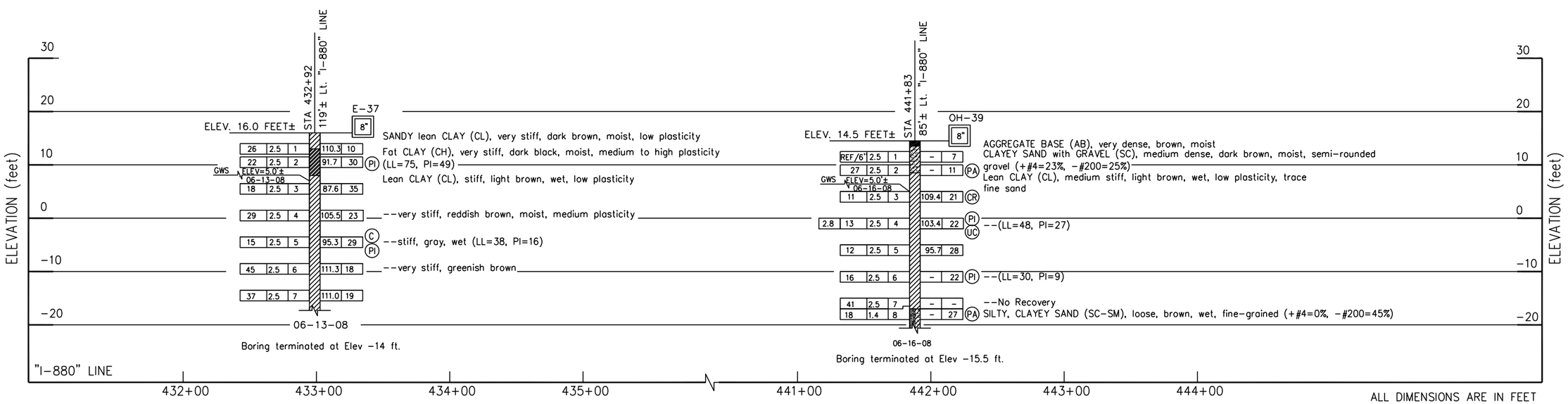
ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

PLAN
1"=40'

Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)



PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT	DRAWN BY	L. TRAN	L. BHANGOO/G. TRIPATHI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	D. WANG	DATE: JUNE 2008		

BRIDGE NO. –
POST MILES 23.8/25.5

I-880 SB HOV LANE EXTENSION AND OTHER IMPROVEMENTS BETWEEN DAVIS STREET TO HEGENBERGER ROAD INTERCHANGE

LOG OF TEST BORINGS 5 OF 5

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 8/12/09 SHEET OF

FILE => $REQUEST

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

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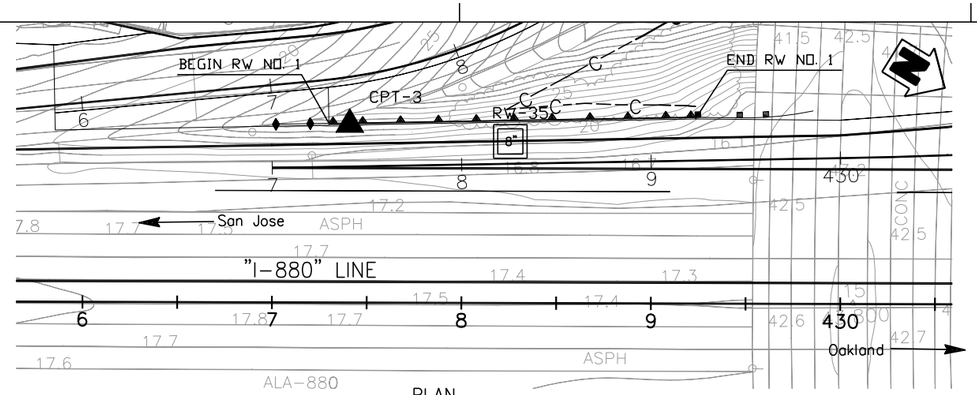

PLAN
1"=40'

Note:
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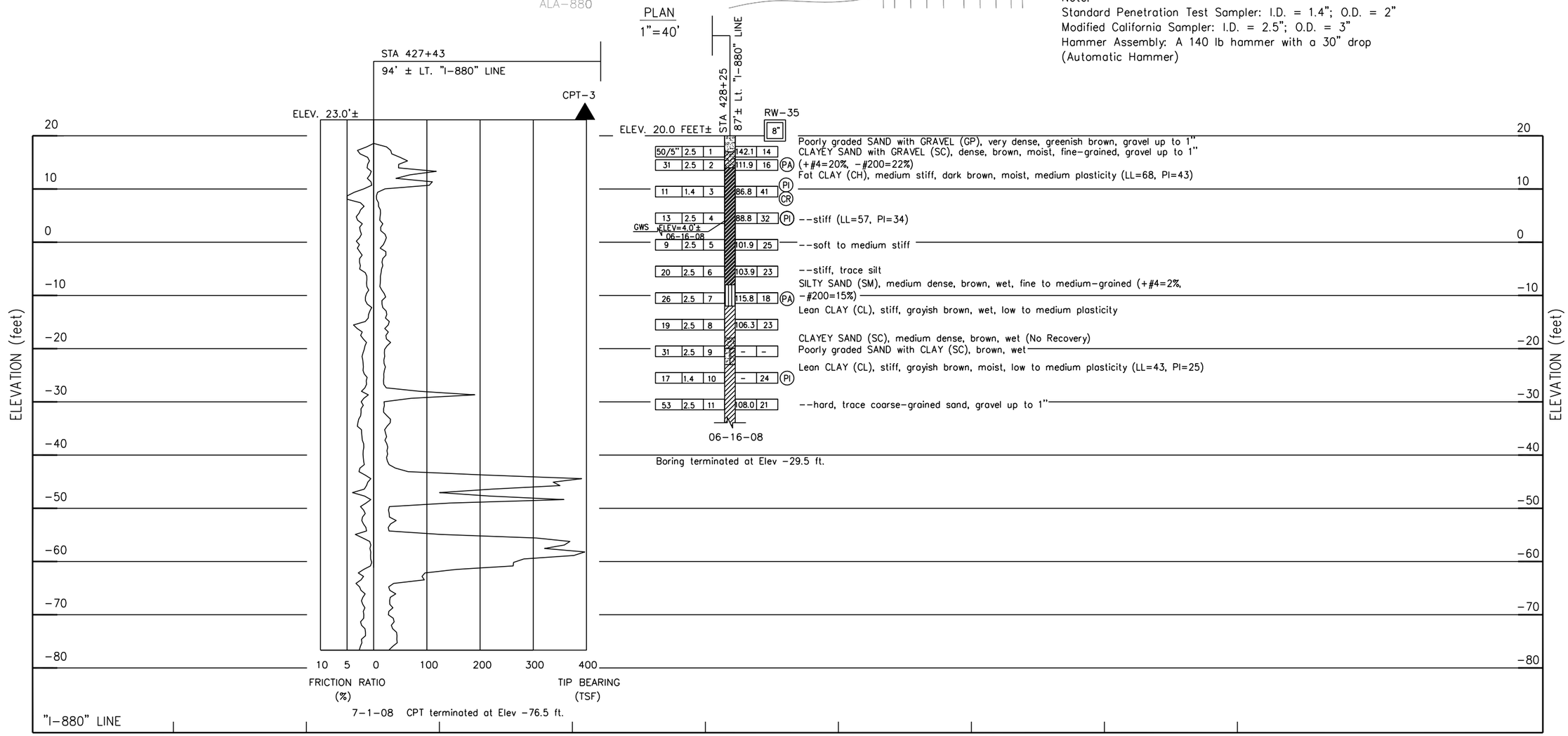

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

DESIGN OVERSIGHT	DRAWN BY	L. TRAN	L. BHANGOO/G. TRIPATHI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	D. WANG PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	D. WANG	DATE: JUNE 2008		

BRIDGE NO.
POST MILES 23.8/25.5

RETAINING WALL NO. 1
LOG OF TEST BORINGS

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

DISREGARD PRINTS BEARING EARLIER REVISION DATES 08/12/09

REVISION DATES SHEET OF

FILE => $REQUEST

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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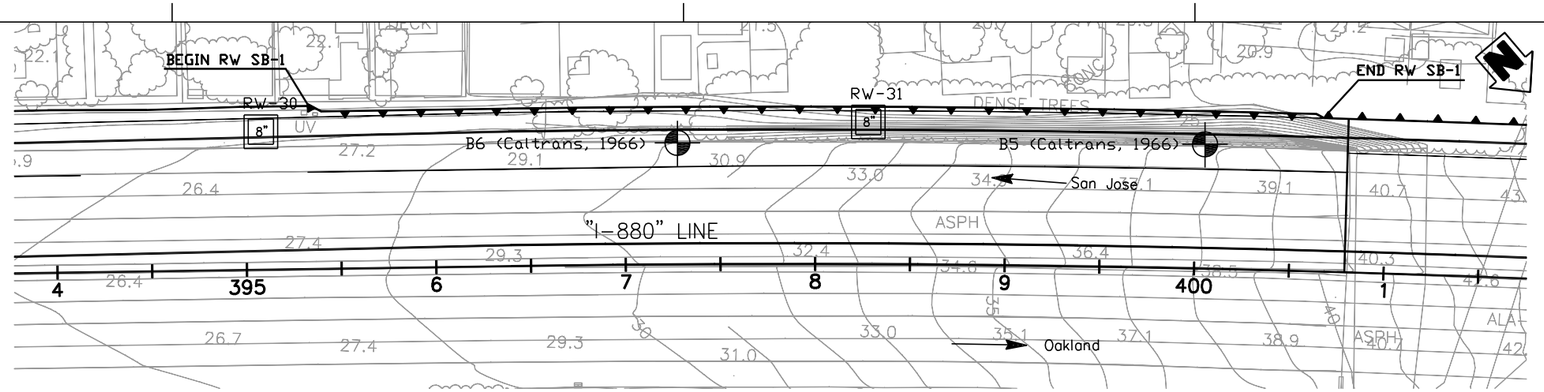
SAN JOSE, CA 95131



PLAN
1"=40'

Note:
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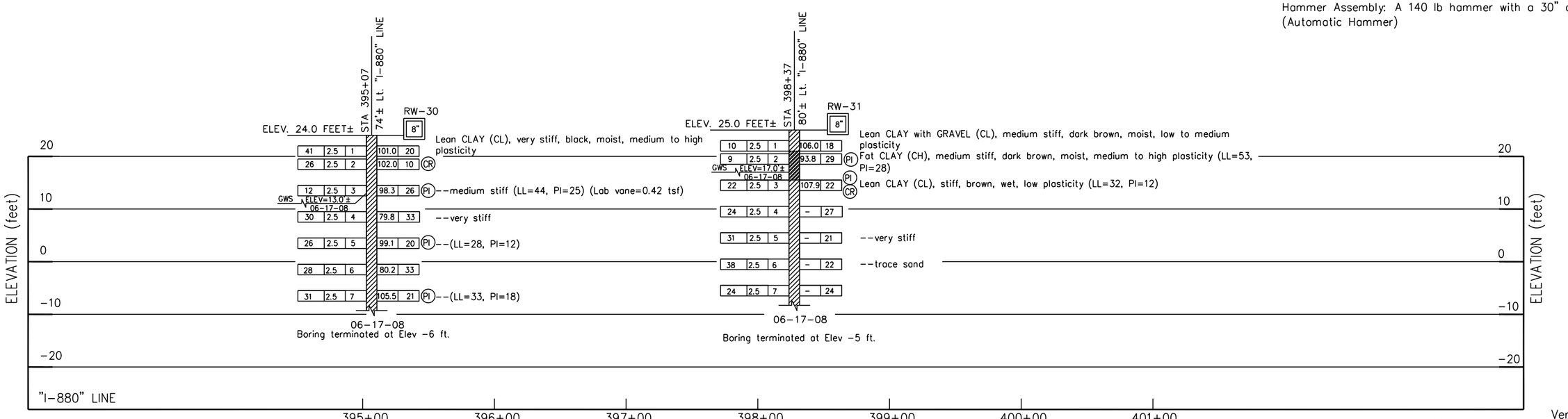
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)



ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

DESIGN OVERSIGHT	DRAWN BY L. TRAN	L. BHANGOO/G. TRIPATHI FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	D. WANG PROJECT ENGINEER	BRIDGE NO.
SIGN OFF DATE	CHECKED BY D. WANG	DATE: JUNE 2008			POST MILES 23.8/25.5

RETAINING WALL RW SB-1

LOG OF TEST BORINGS 1 OF 2

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

DISREGARD PRINTS BEARING EARLIER REVISION DATES 08/12/09

REVISION DATES SHEET OF

FILE => $REQUEST

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

7	CALIF.

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
04	Ala	17	207/260	139	146

Date Approved November 12, 1968

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DIST.	COUNTY	ROUTE	POST MILE-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

RETAINING WALL RW SB-1

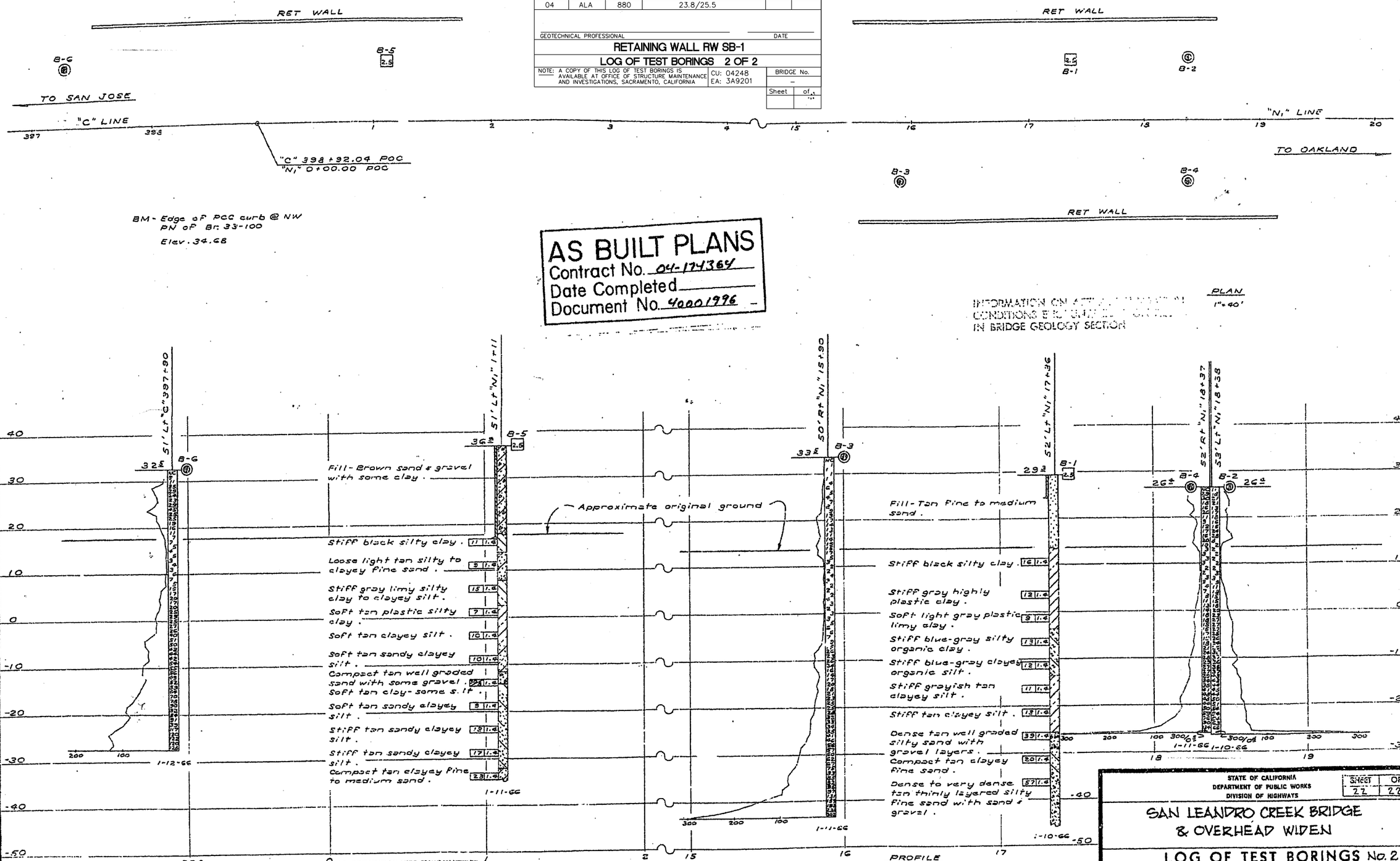
LOG OF TEST BORINGS 2 OF 2

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

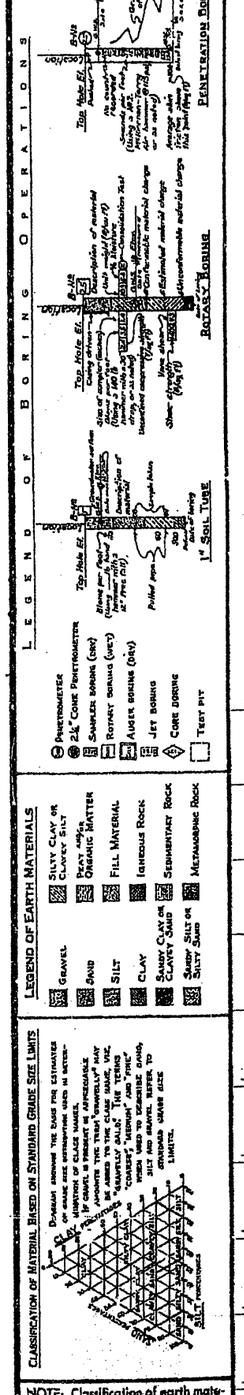
BRIDGE No. –

Sheet ___ of ___



AS BUILT PLANS
Contract No. 04-174364
Date Completed
Document No. 40001996

INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXCEPTIONAL ON FILE IN BRIDGE GEOLOGY SECTION



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
22	22

SAN LEANDRO CREEK BRIDGE & OVERHEAD WIDEN

LOG OF TEST BORINGS No. 2

SCALE AS Noted	BRIDGE 33-100	FILE	DRAWING 33100-22

04218

Discard prior bearing earlier numbers → PREL. DRAWING NO. PR- 7821

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/13 GEOTECHNICAL STATE OF CALIFORNIA

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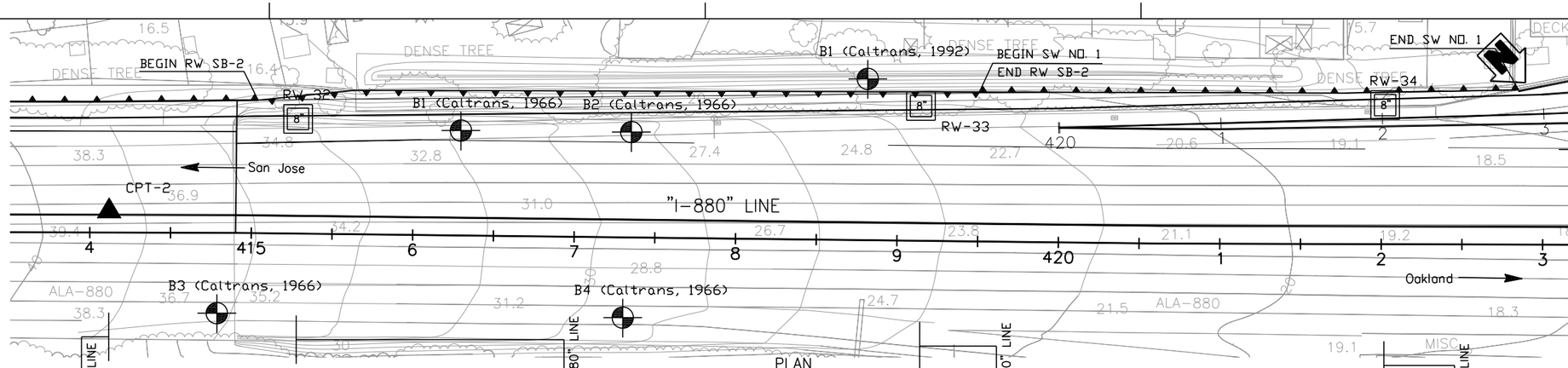
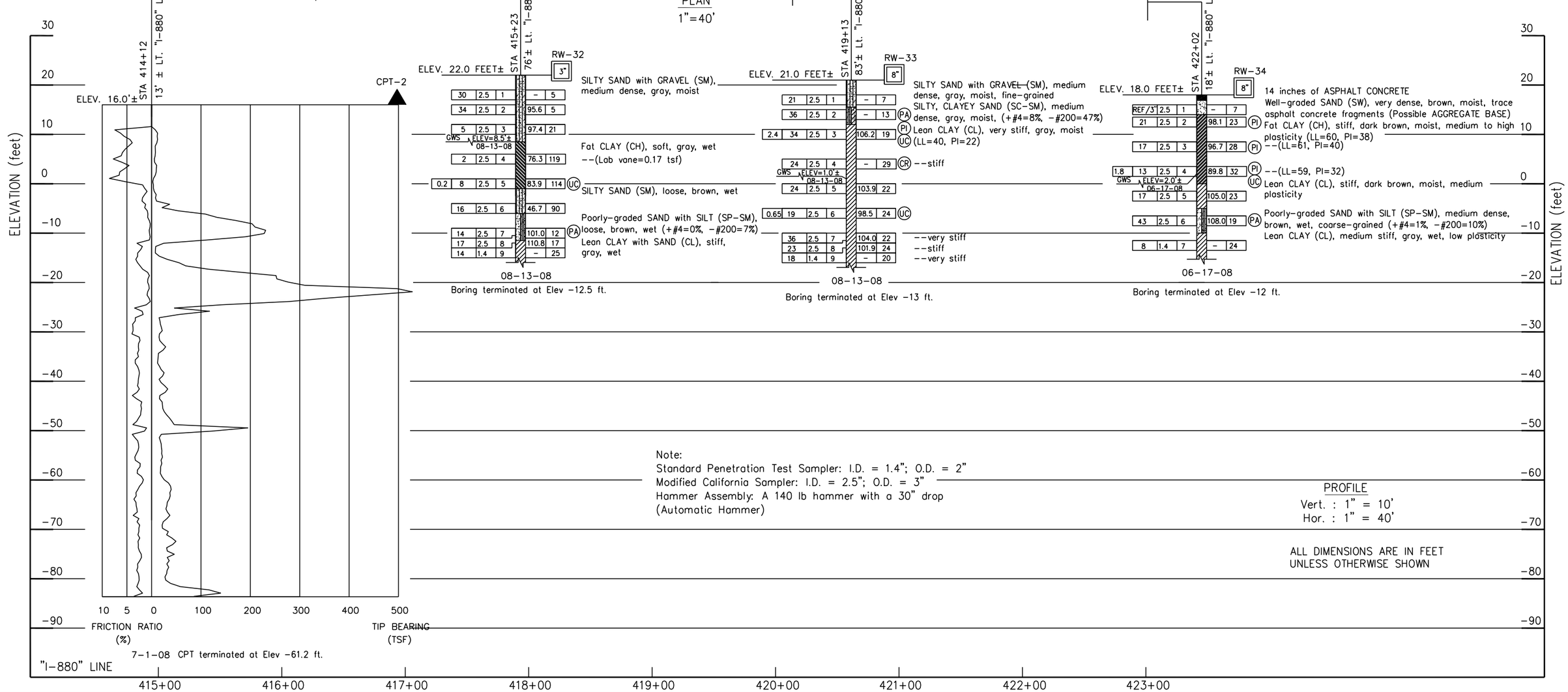
ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612

PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131





Note:
Standard Penetration Test Sampler: I.D. = 1.4"; O.D. = 2"
Modified California Sampler: I.D. = 2.5"; O.D. = 3"
Hammer Assembly: A 140 lb hammer with a 30" drop (Automatic Hammer)

PROFILE
Vert. : 1" = 10'
Hor. : 1" = 40'

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT	DRAWN BY	L. TRAN	L. BHANGOO/G. TRIPATHI — FIELD INVESTIGATION BY:
SIGN OFF DATE	CHECKED BY	D. WANG	DATE: JUNE 2008

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

D. WANG — PROJECT ENGINEER

BRIDGE NO.

POST MILES 23.8/25.5

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

LOG OF TEST BORINGS 1 OF 4

OGS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 06-01-09)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04248
EA 3A9201

FILE => $REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 08/12/09

REVISION DATES SHEET OF

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

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	24.4/25.2	236	367

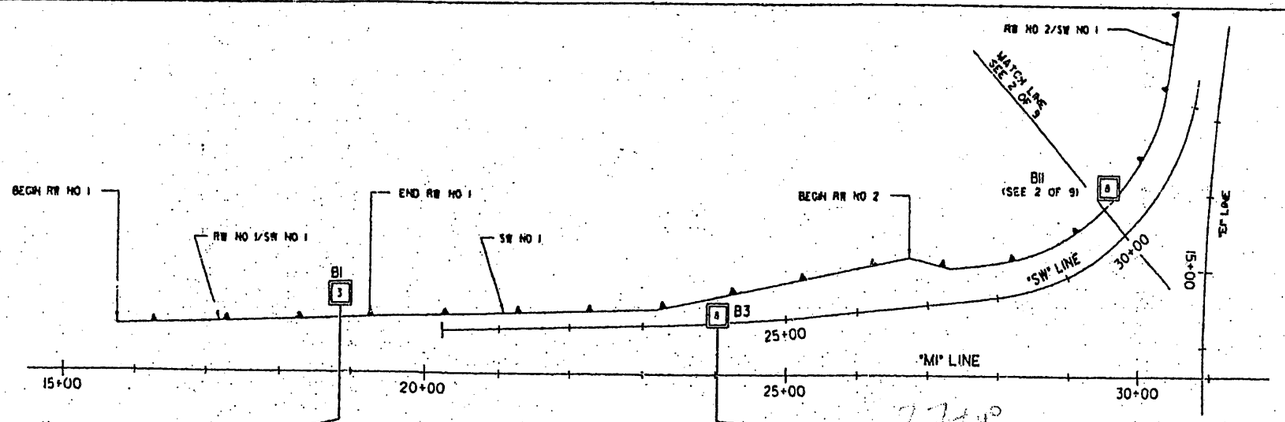
REGISTERED CIVIL ENGINEER 3/31/98

PLANS APPROVAL DATE August 21, 1995

ALAMEDA COUNTY TRANSPORTATION AUTHORITY
1401 Lakeside Drive, Suite 1201
Oakland, CA 94612

WOODWARD-CLYDE CONSULTANTS
500 12th Street, Suite 100
Oakland, CA 94607

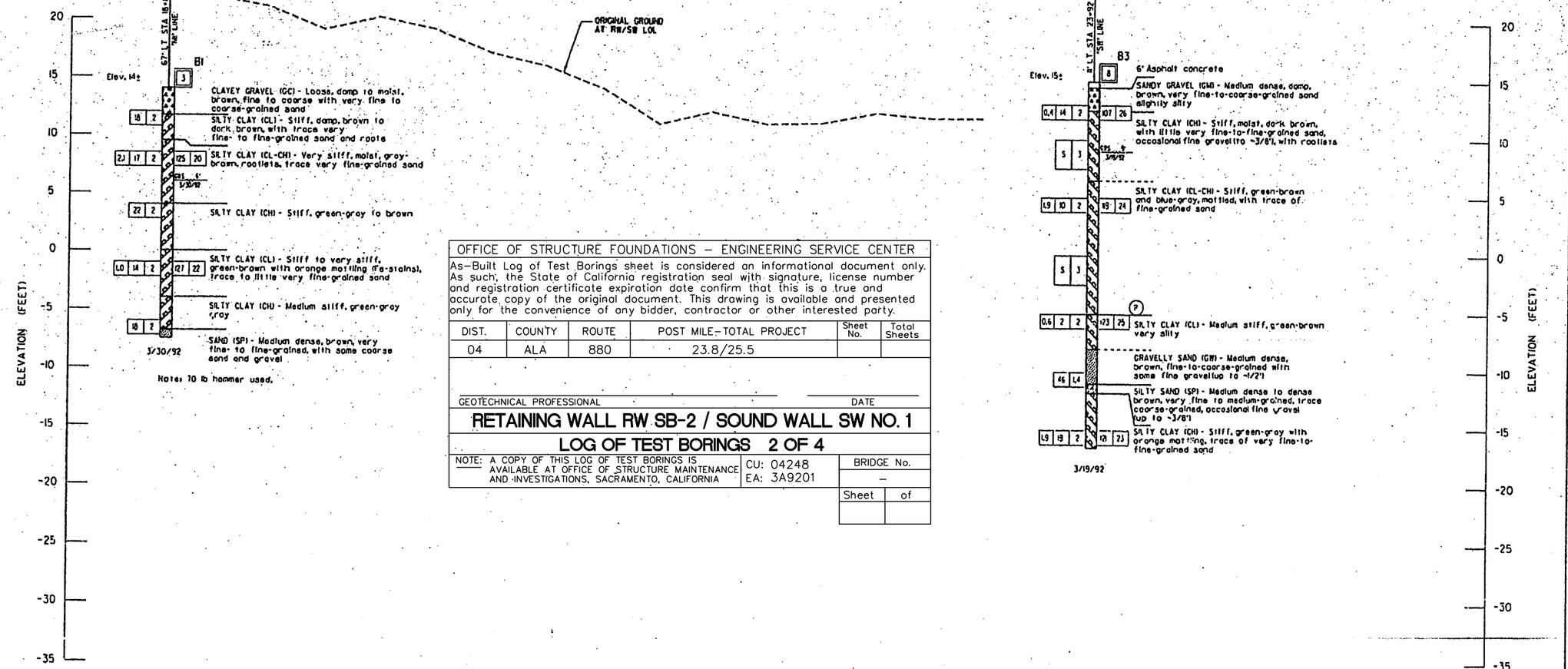
REGISTERED PROFESSIONAL ENGINEER — HORST J. BERGER — No. 0139 — Exp. 3/31/98 — GEOTECHNICAL — STATE OF CALIFORNIA



PLAN
1"=100'

BENCHMARK: CALTRANS
A-438ECC
ELEV. 33.38 FEET
LOCATED ON REST SIDE OF EXISTING
98TH AVENUE VEHICLE BRIDGE.

AS BUILT
☒ No Changes
☐ Changes as Noted
By:
Date: 12/16/99
Resident Eng: Jon Dal
Surveyors Rep:



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DIST.	COUNTY	ROUTE	POST MILE-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

LOG OF TEST BORINGS 2 OF 4

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

BRIDGE No. –

Sheet of

16+00 18+00 20+00 22+00 24+00 26+00 28+00 30+00

RW/SW STATIONS

PROFILE
Scale Horiz: 1" = 100'
Scale Vert.: 1" = 5'

SW-59

LEGEND OF BORING OPERATIONS

KEY 1: Penetration Index (140 lb. hammer 30" fall or as noted); Shelby tube sample (ou); Pitcher sample (cu)

KEY 2: Grain size analysis; Plasticity index; Consolidation test; Shear test

BORING TYPE: 2¼" CONE PENETROMETER; SAMPLE BORING (DRY); ROTARY SAMPLE BORING (WET); AUGER BORING (DRY); TEST PIT; DIAMOND CORE BORING; JET BORING; ELECTRONIC CONE PENETROMETER

Pressure measured using sleeve friction equivalent F20 CR (pressure measured on tip element divided by pressure measured on tip element)

Pressure measured on tip element (B-No.)

Top hole El.

ELECTRONIC CONE PENETRATION TEST
Cone Penetrometer dimensions and testing procedures are in accordance with ASTM Standard D 3441-75 or as noted

Friction Ratio (%) Tip bearing (TSF)

Boring type
Size
Boring No.
Description of material
Interpretation of material
Lateral weight (lb/cu ft)
% moisture
KEY 2
Bedrock
Weathered material
Unconformable material change
Boring Date
Top hole El.
Casing driven
Size of Sampler
KEY 1
Unconfined compressive strength (T/sq ft)
Shear strength (lb/sq ft)
Unconsolidated/undrained triaxial test
TYPICAL BORING

LEGEND OF EARTH MATERIALS: GRAVEL; SAND; SILT; CLAY; CLAYEY SILT; SILTY CLAY; SANDY CLAY or CLAYEY SAND; SILTY SAND; PEAT and/or ORGANIC MATTER; FILL MATERIAL; IGNEOUS ROCK; SEDIMENTARY ROCK; METAMORPHIC ROCK

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

NOTE: Classification of earth materials shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis

DESIGN OVERSIGHT	DRAWN BY	RA	PR, SC, MJ
SIGN OFF DATE	CHECKED BY	JP	FIELD INVESTIGATOR / DATE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04184
EA 2332B1

BRIDGE NO.
POST MILE

RETAINING WALLS / SOUND WALLS - 'SW' LINE

LOG OF TEST BORINGS 1 OF 9

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

880A- 414194

7	CALIF.

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
04	Ala	17	207/260	139	146

Date Approved November 12, 1968

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DIST.	COUNTY	ROUTE	POST MILE-TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

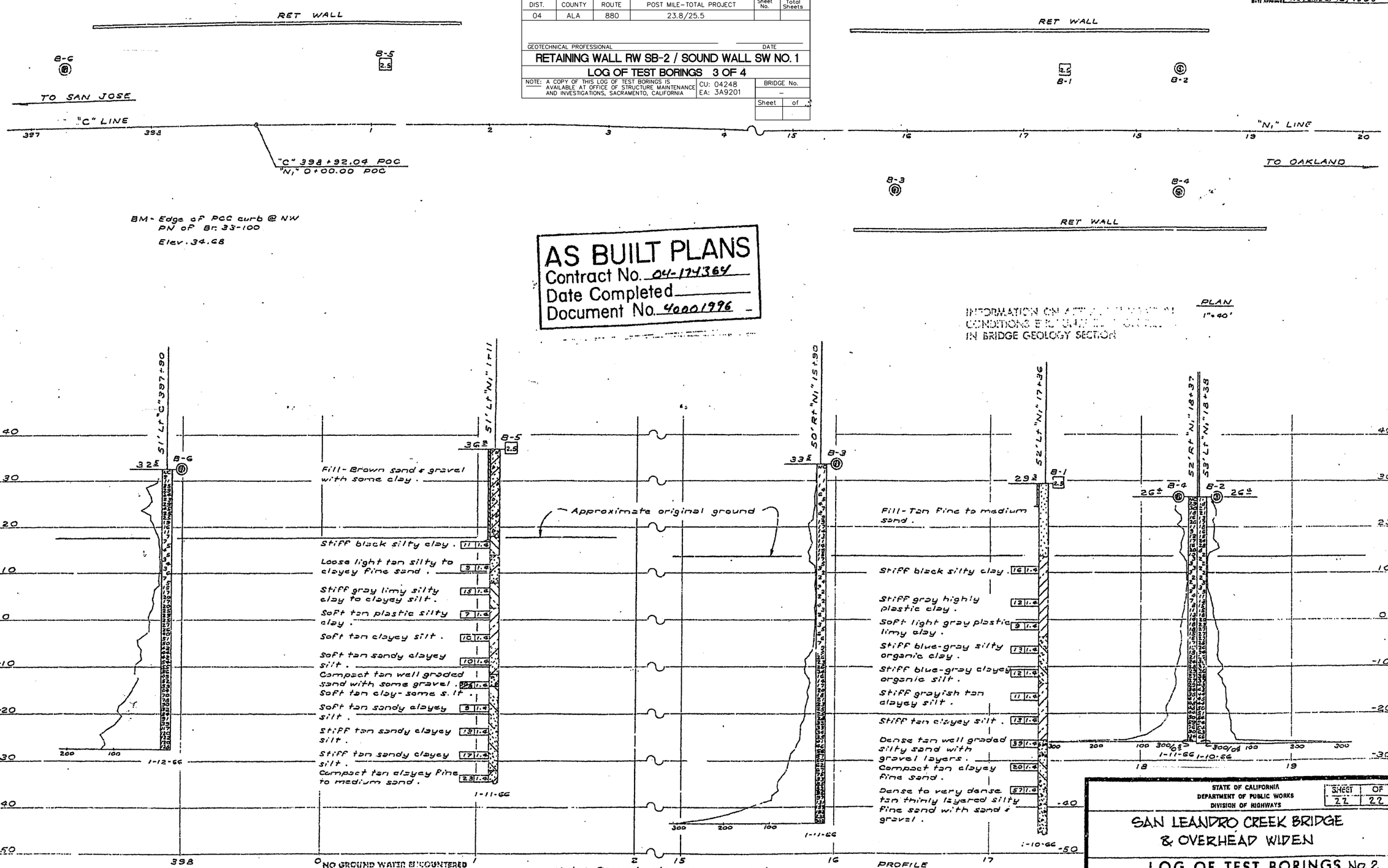
LOG OF TEST BORINGS 3 OF 4

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

BRIDGE No. –

Sheet of



AS BUILT PLANS
Contract No. 04-174364
Date Completed
Document No. 40001996

INFORMATION ON ACTUAL SUBSURFACE CONDITIONS ON FILE IN BRIDGE GEOLOGY SECTION

NO GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION
DATE Jan., 1966

Note: Ground water was measured as high as Elev. 10.5, during a soil investigation, in 10-49

LEGEND OF BORING OPERATIONS

Penetrometer; 2½" Core Penetrometer; Sampler Boring (Dry); Rotary Boring (Wet); Auger Boring (Dry); Jet Boring; Core Boring; Test Pit

Penetration Boring; Rotary Boring; 1" Soil Tube

LEGEND OF EARTH MATERIALS

Gravel; Sand; Silt; Clay; Sandy Clay or Clayey Sand; Silty Clay or Clayey Silt; Peat and Organic Matter; Fill Material; Igneous Rock; Sedimentary Rock; Sandy Silt or Silty Sand; Metamorphic Rock

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

Diagram showing the sizes for estimated identification of class names and to interpret if gravel is present or approximate percentage of gravel. The terms "gravelly" may be used to describe the presence of gravel, the terms "sandy" and "coarse", "medium" and "fine" which refer to specific grain size limits.

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
22	22

SAN LEANDRO CREEK BRIDGE & OVERHEAD WIDEN

LOG OF TEST BORINGS No. 2

SCALE AS Noted	BRIDGE 33-100	FILE	DRAWING 33100-22

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	17	207/26.0	138	146

BRIDGE ENGINEER — REGISTERED CIVIL ENGINEER — REGISTERED GEOTECHNICAL ENGINEER

DATE APPROVED November 12, 1968

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.	F-017 (10)		26	42

DIST.	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS
04	Ala	880	23.8/25.4	13	72

October 14, 1966

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DIST.	COUNTY	ROUTE	POST MILE–TOTAL PROJECT	Sheet No.	Total Sheets
04	ALA	880	23.8/25.5		

GEOTECHNICAL PROFESSIONAL — DATE

RETAINING WALL RW SB-2 / SOUND WALL SW NO. 1

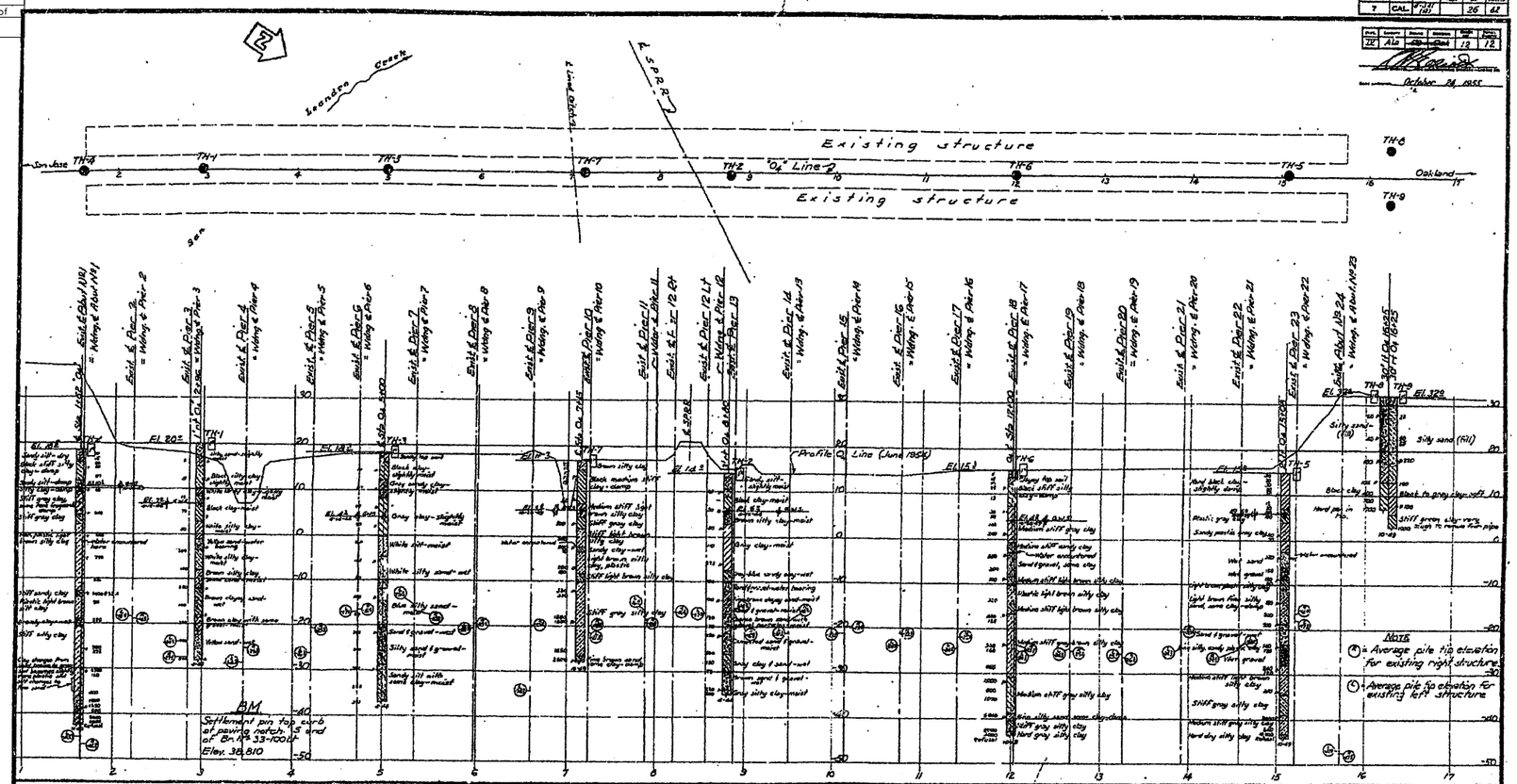
LOG OF TEST BORINGS 4 OF 4

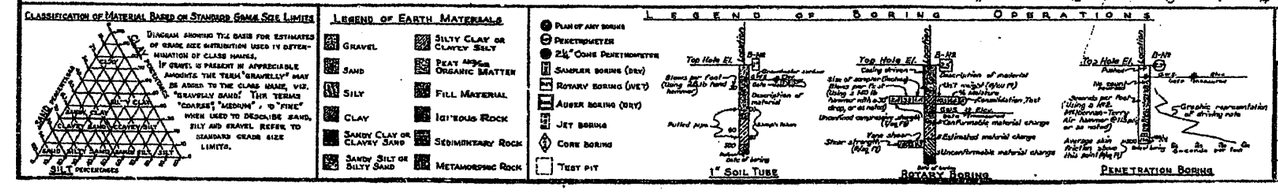
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 04248
EA: 3A9201

BRIDGE No. –

Sheet of





NOTES

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.

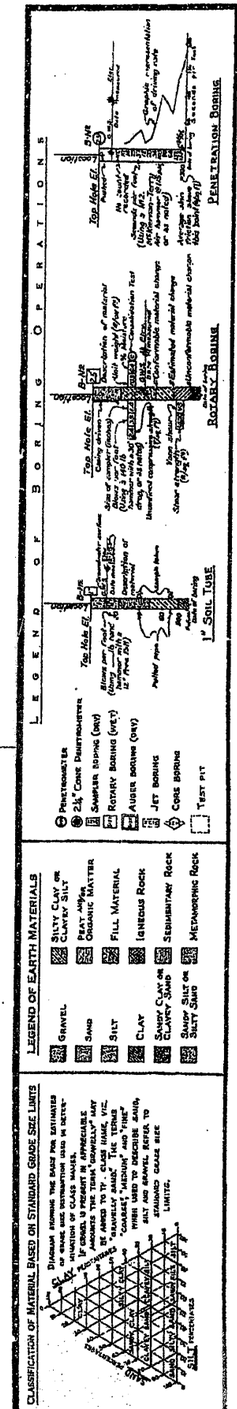
Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SAN LEANDRO CREEK BRIDGE & OH WIDENING

LOG OF TEST BORINGS

SCALE Horiz. 1" = 20' Vert. 1" = 10' | BRIDGE 33-100 | FILE | DRAWING S-1969 .22



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.

Approval Recommended by

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

AS BUILT PLANS
Contract No. 04-174364
Date Completed
Document No. 40001996

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION

SAN LEANDRO CREEK BRIDGE & OVERHEAD WIDEN

LOG OF TEST BORINGS No. 1

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
33-100		33-100-21	21	22

APPENDIX B

APPENDIX B

LABORATORY TESTS

Classification Tests
The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented in “Log of Test Borings”, Appendix A.

Moisture-Density
The natural moisture contents and dry unit weights were determined for selected undisturbed samples of the soils in general accordance with ASTM Test Method D 2216-92. This information was used to classify and correlate the soils. The results are presented at the appropriate depths on the "Log of Test Borings", Appendix A.

Atterberg Limits
The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the effective strength characteristics and expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM Test Method D 4318-93. The results of these tests are presented on Plate B-2A thru Plate B-2B, “Plasticity Chart”.

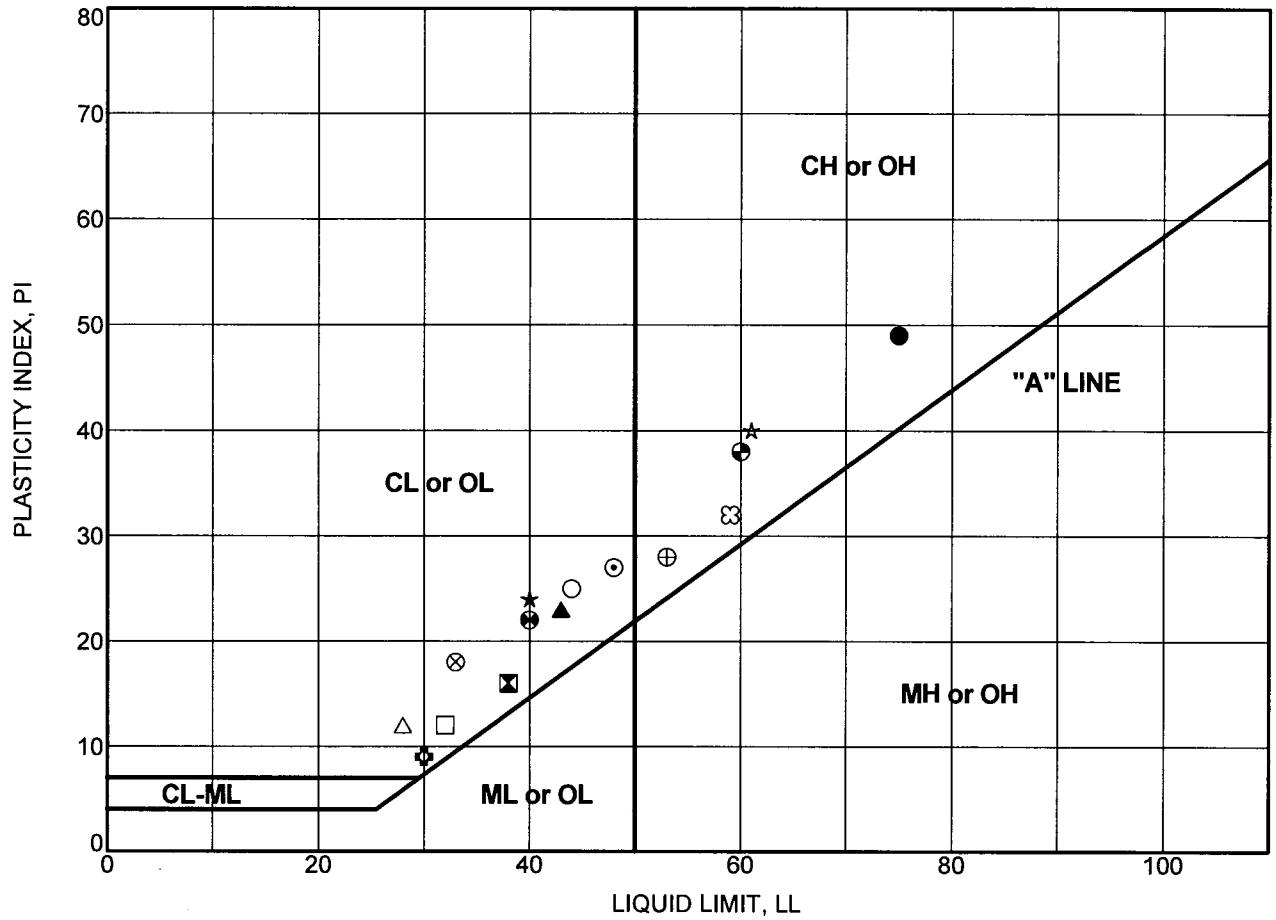
Grain Size Classification
Grain size classification tests (ASTM Test Method D422-63) were performed on selected samples of granular soil to aid in the classification. The results are presented on Plate B-3A and Plate B-3B, “Grain Size Distribution Curves”.

Unconfined Compression Tests
Strength tests were performed on selected undisturbed samples using unconfined compression machine. Unconfined compression tests were performed in general accordance with ASTM Test Method D 2166-91. The results are presented on “Log of Test Borings”, Appendix A.

Corrosion Tests
Corrosion tests were performed on selected samples to determine the corrosion potential of the soils. The pH and minimum resistively tests were performed according to California Test Method 643. The tests were performed by Sunland Analytical. The test results are presented on Plate B-4A thru Plate B-4F.

Consolidation Tests
Consolidation tests (California Test Method T219) were performed on two selected undisturbed samples. The test results are presented on Plates B-5A thru B-5C.

R-value Tests
R-value tests were performed on representative bulk samples for pavement design. The tests were performed according to California Test Method 301. The test results are presented on Plates B-6A and B-6E.



PLASTICITY CHART

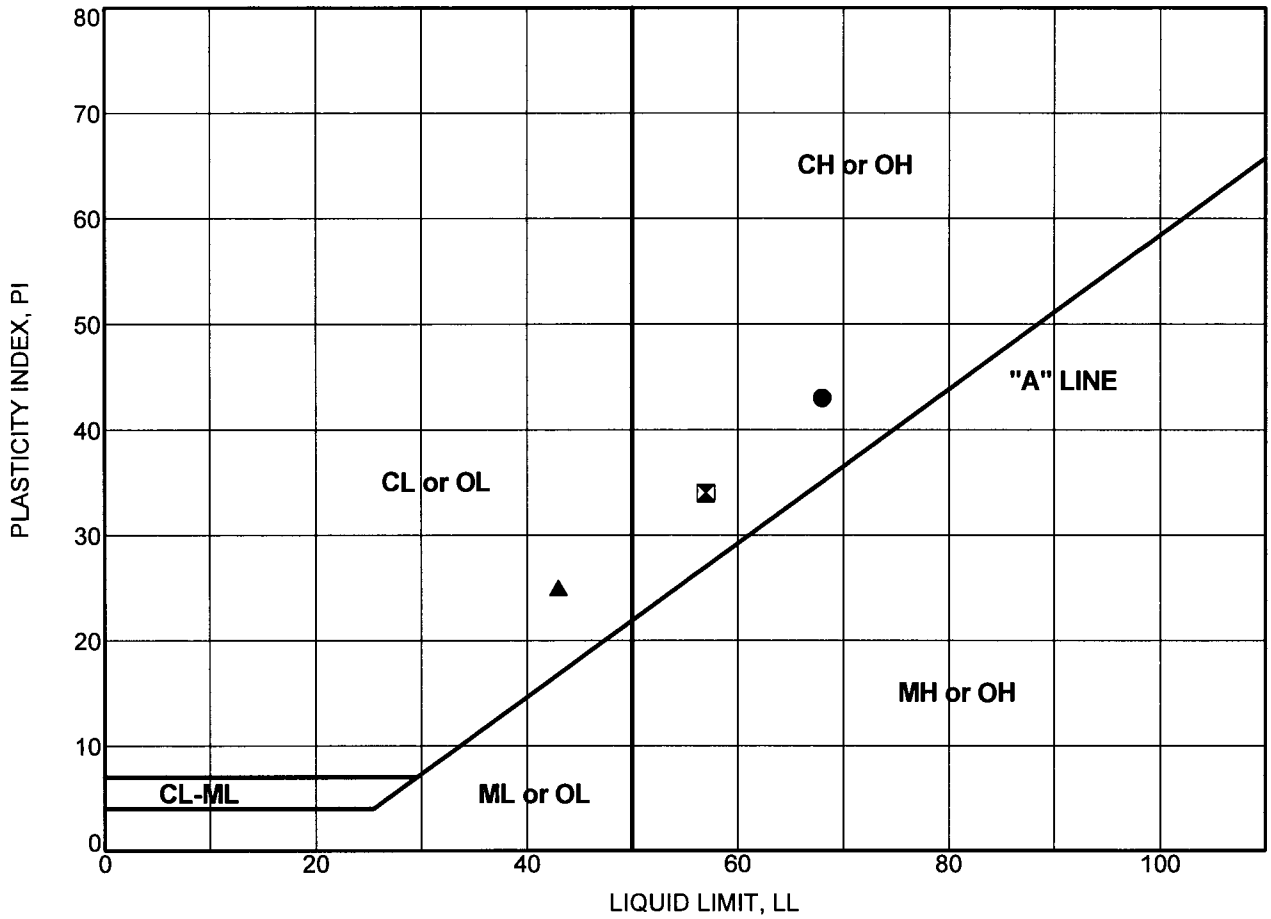
Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
E-37	MC-2	4.5	●	30	75	26	49	FAT CLAY (CH)
E-37	MC-5	19.5	⊠	29	38	22	16	LEAN CLAY (CL)
OH-28	MC-1	2.0	▲	17	43	20	23	LEAN CLAY (CL)
OH-28	MC-5	19.5	★	20	40	16	24	LEAN CLAY (CL)
OH-39	MC-4	14.5	⊙	22	48	21	27	LEAN CLAY (CL)
OH-39	MC-6	24.5	✪	22	30	21	9	LEAN CLAY (CL)
RW-30	MC-3	9.5	○	26	44	19	25	LEAN CLAY (CL)
RW-30	MC-5	19.5	△	20	28	16	12	LEAN CLAY (CL)
RW-30	MC-7	29.5	⊗	21	33	15	18	LEAN CLAY (CL)
RW-31	MC-2	4.5	⊕	29	53	25	28	FAT CLAY (CH)
RW-31	MC-3	9.5	□	22	32	20	12	LEAN CLAY (CL)
RW-33	MC-3	11.0	⊗	19	40	18	22	LEAN CLAY (CL)
RW-34	MC-2	4.5	◕	23	60	22	38	FAT CLAY (CH)
RW-34	MC-3	9.5	☆	28	61	21	40	FAT CLAY (CH)
RW-34	MC-4	14.5	⊠	32	59	27	32	FAT CLAY (CH)

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

RTE 880 SB HOV LANE EXT. (DAVIS ST TO HEGENBERGER ROAD IC)
ALAMEDA COUNTY, CALIFORNIA

JOB NO: 206139.GDR

PLATE NO: B-2A



PLASTICITY CHART

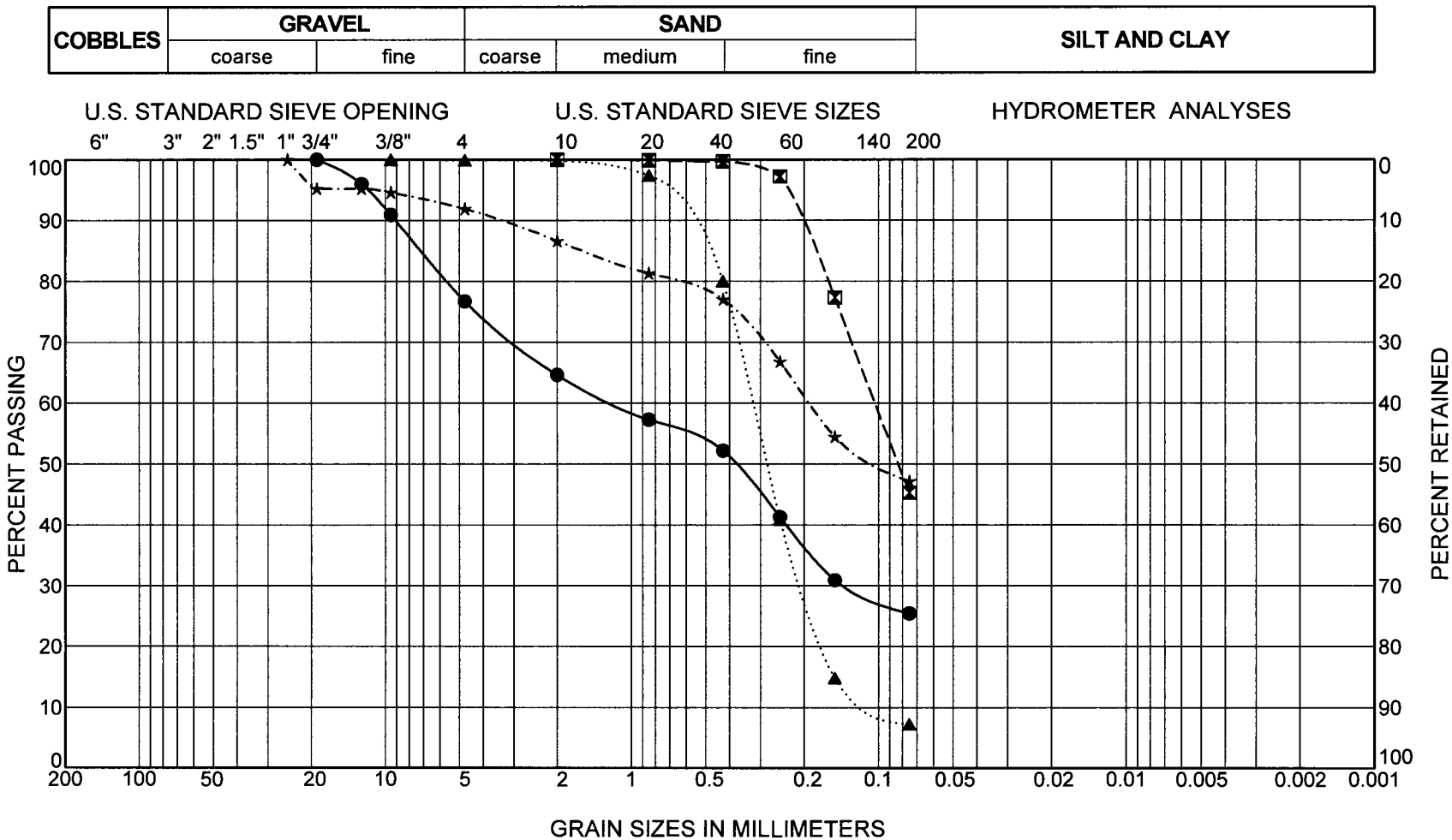
Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
RW-35	MC-3	9.5	●	41	68	25	43	FAT CLAY (CH)
RW-35	MC-4	14.5	⊠	32	57	23	34	FAT CLAY (CH)
RW-35	SPT-10	44.5	▲	24	43	18	25	LEAN CLAY (CL)

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

RTE 880 SB HOV LANE EXT. (DAVIS ST TO HEGENBERGER ROAD IC)
ALAMEDA COUNTY, CALIFORNIA

JOB NO: 206139.GDR | PLATE NO: B-2B

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
OH-39	MC-2	4.5	●			CLAYEY SAND WITH GRAVEL (SC)
OH-39	SPT-7	29.5	⊠			SILTY CLAYEY SAND (SC)
RW-32	MC-7	31.0	▲			POORLY-GRADED SAND WITH SILT (SP-SM)
RW-33	MC-2	6.0	★			SILTY CLAYEY SAND (SC)

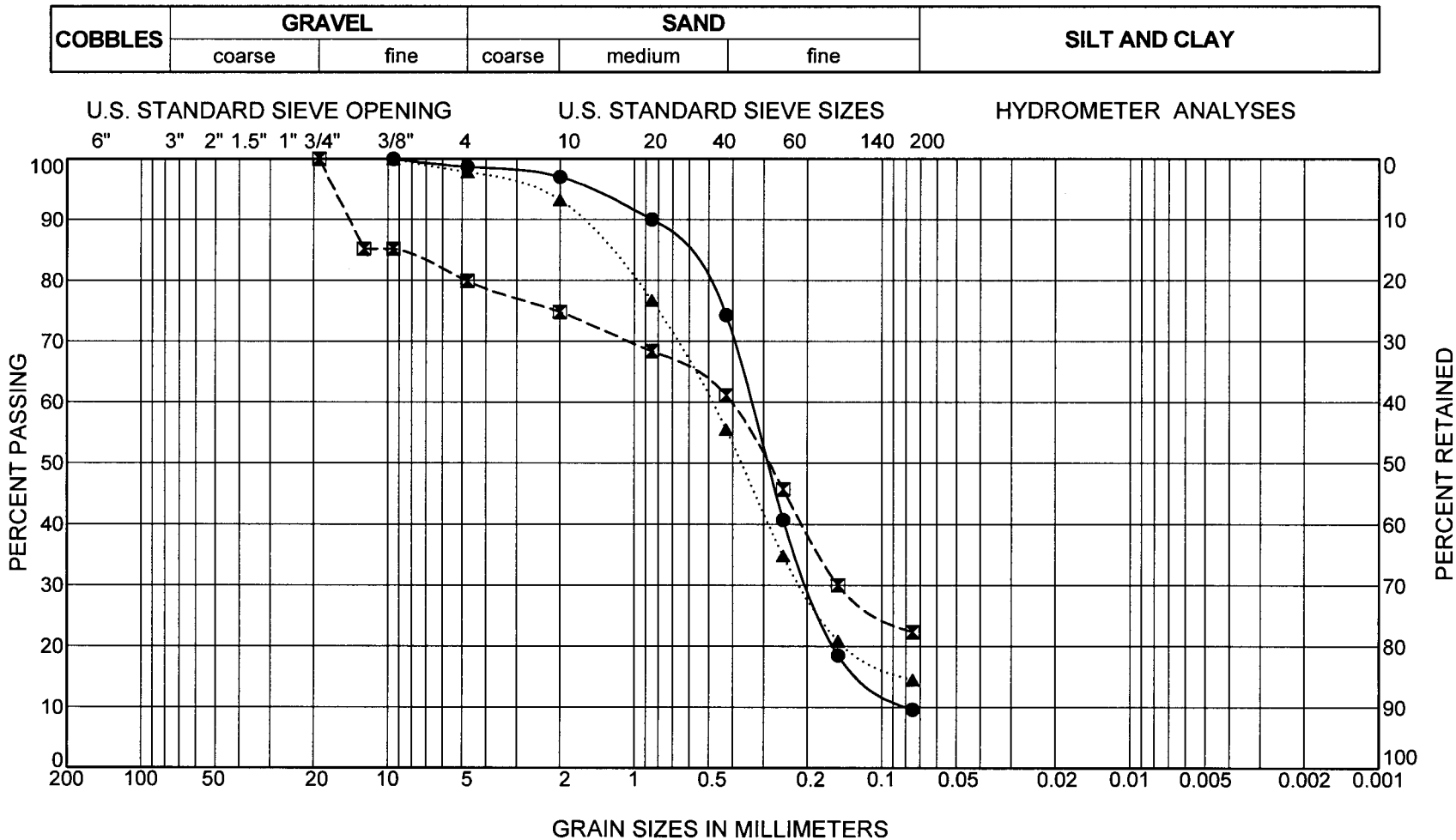
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

RTE 880 SB HOV LANE EXT. (DAVIS ST TO HEGENBERGER ROAD IC)
ALAMEDA COUNTY, CALIFORNIA

JOB NO: 206139.GDR

PLATE NO: B-3A

GRAIN SIZE DISTRIBUTION CURVES



Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Description
RW-34	MC-6	24.5	●			POORLY-GRADED SAND WITH SILT (SP-SM)
RW-35	MC-2	4.5	⊠			CLAYEY SAND WITH GRAVEL (SC)
RW-35	MC-7	29.5	▲			SILTY SAND (SM)

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

RTE 880 SB HOV LANE EXT. (DAVIS ST TO HEGENBERGER ROAD IC)
ALAMEDA COUNTY, CALIFORNIA

JOB NO: 206139.GDR

PLATE NO: B-3B

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/27/2008
Date Submitted 08/20/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139.GDR I-880 Site ID : OH-28#3@9.5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 54220-108791.

EVALUATION FOR SOIL CORROSION

Soil pH	6.95		
Minimum Resistivity	1.10 ohm-cm (x1000)		
Chloride	11.8 ppm	00.00118	%
Sulfate	51.4 ppm	00.00514	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/06/2008
Date Submitted 08/01/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139.GDR/ I-880 Site ID : OH39 #3 @ 9.5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 54032-108389.

EVALUATION FOR SOIL CORROSION

Soil pH	7.41		
Minimum Resistivity	1.69 ohm-cm (x1000)		
Chloride	15.1 ppm	00.00151	%
Sulfate	27.8 ppm	00.00278	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/06/2008
Date Submitted 08/01/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139.GDR/ I-880 Site ID : RW-30 #2 @ 4.5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 54032-108393.

EVALUATION FOR SOIL CORROSION

Soil pH	7.40		
Minimum Resistivity	0.96 ohm-cm (x1000)		
Chloride	22.7 ppm	00.00227	%
Sulfate	102.1 ppm	00.01021	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 07/18/2008
Date Submitted 07/14/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139-GDR/ I-880 Site ID : RW31#3 @ 9.5'.
Thank you for your business.

* For future reference to this analysis please use SUN # 53807-107957.

EVALUATION FOR SOIL CORROSION

Soil pH	7.39		
Minimum Resistivity	1.21 ohm-cm (x1000)		
Chloride	7.9 ppm	00.00079	%
Sulfate	34.5 ppm	00.00345	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 09/17/2008
Date Submitted 09/10/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139.GDR Site ID : RW33#4@16'.
Thank you for your business.

* For future reference to this analysis please use SUN # 54378-109147.

EVALUATION FOR SOIL CORROSION

Soil pH	7.97	
Minimum Resistivity	1.15 ohm-cm (x1000)	
Chloride	70.6 ppm	00.00706 %
Sulfate	236.1 ppm	00.02361 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

PLATE NO.: B-4E

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 07/18/2008
Date Submitted 07/14/2008

To: Prav Dayah
Parikh Consultants, Inc.
356 S. Milpitas Blvd.
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 206139-GDR/ I-880 Site ID : RW35#3 @ 9.5'.
Thank you for your business.

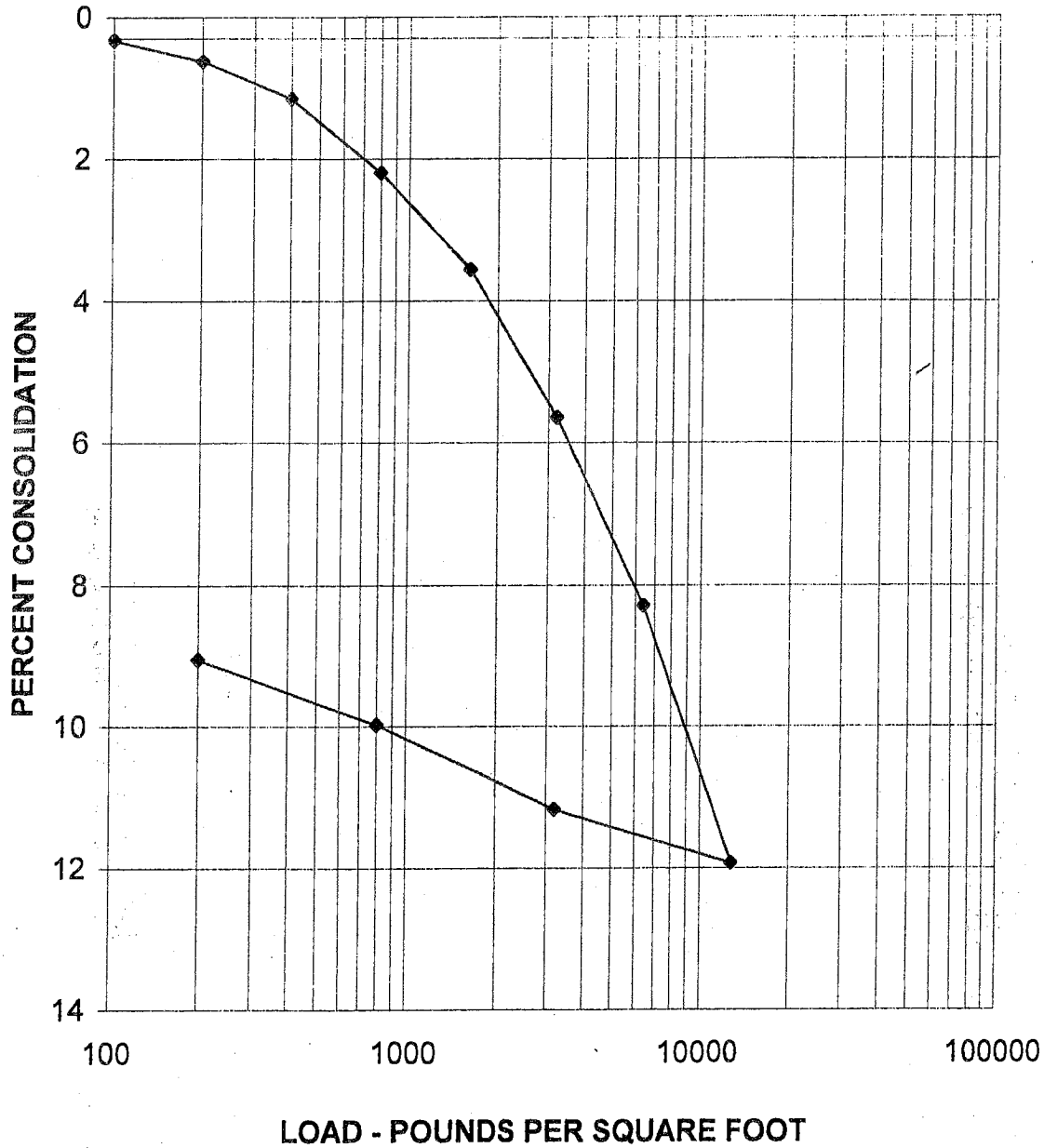
* For future reference to this analysis please use SUN # 53807-107958.

EVALUATION FOR SOIL CORROSION

Soil pH	7.13	
Minimum Resistivity	0.59 ohm-cm (x1000)	
Chloride	21.2 ppm	00.00212 %
Sulfate	117.2 ppm	00.01172 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

CONSOLIDATION TEST RESULTS



	MOISTURE CONTENT %	DRY DENSITY PCF	HEIGHT (INCHES)	DIAMETER (INCHES)
INITIAL	29.1	95.3	1.0000	2.416
FINAL	24.2	104.8	0.9095	2.416

BORING NO.	E-37	SAMPLE NO.	5	ELEV. OR DEPTH	19.5'
DESCRIPTION	Lean clay, yellowish brown				

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

I-880 SB HOV Lane Extension
R & M

DATE	JOB NO:
8/5/08	206139.GDR

Reported by: Prav Dayah

PLATE NO.: B-5A

CONSOLIDATION TEST - TIME CURVE

JOB #: 206139.GDR

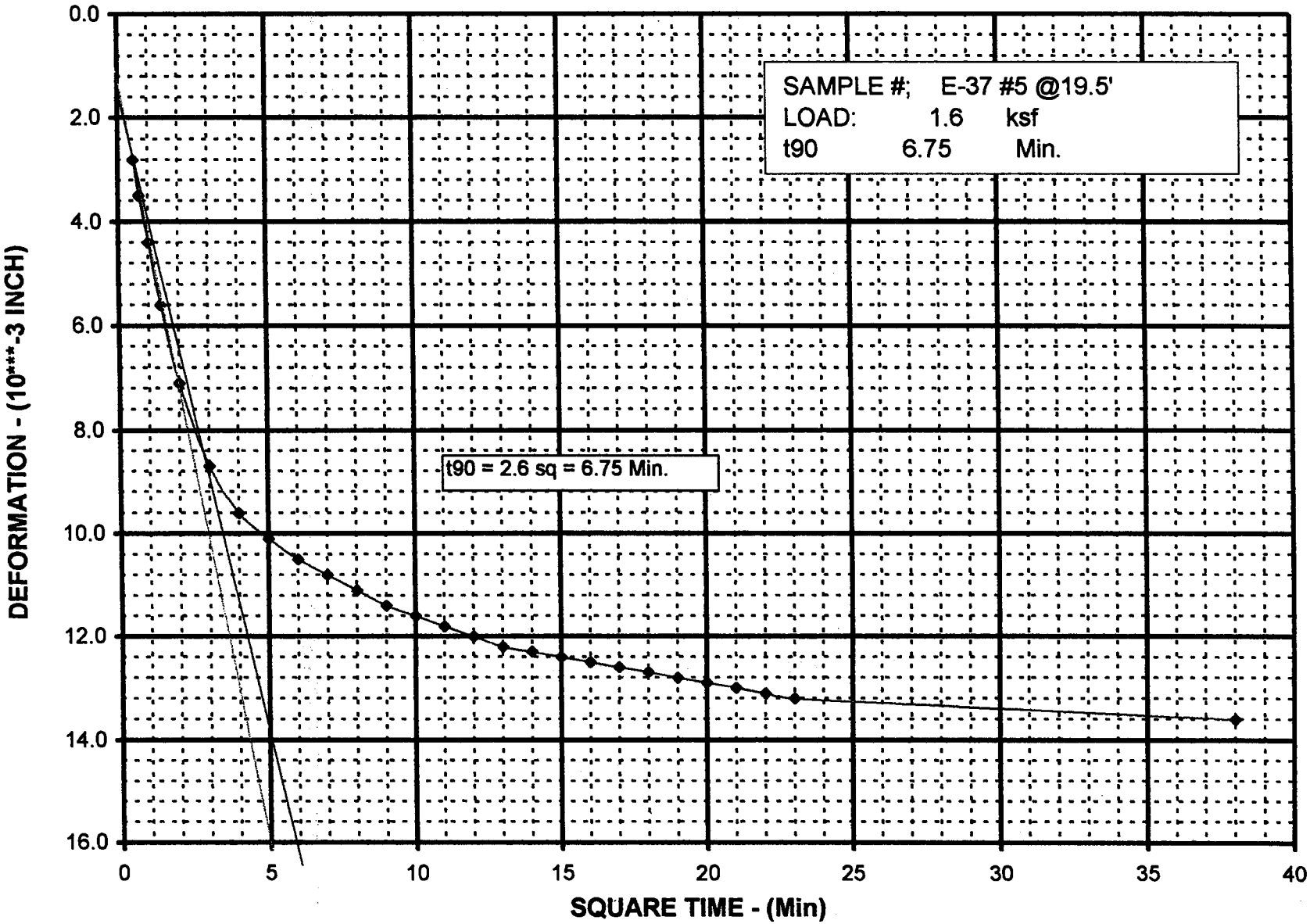


PLATE NO.: B-5B

CONSOLIDATION TEST - TIME CURVE

JOB #: 206139.GDR

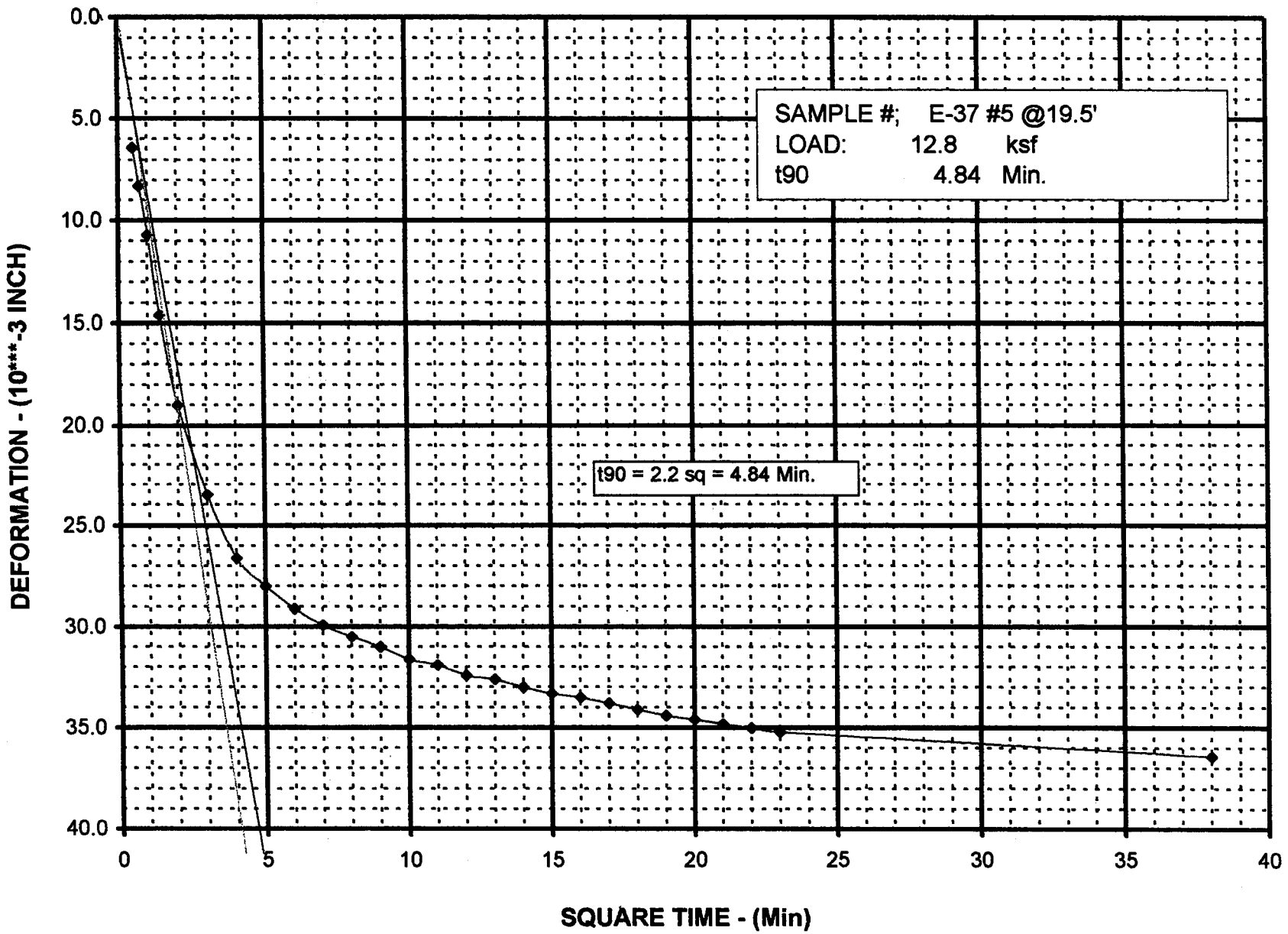
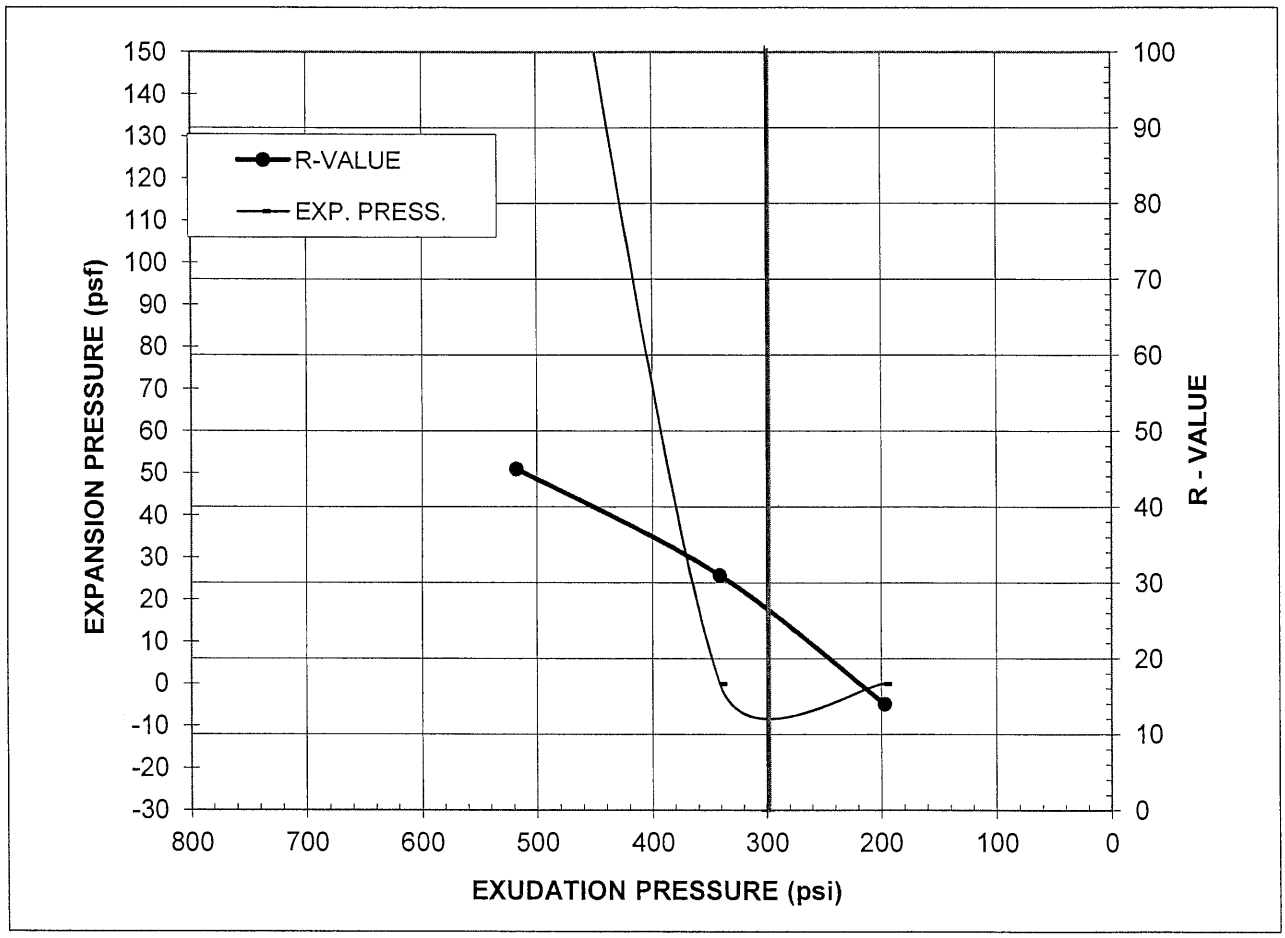


PLATE NO.: B-5C

R-VALUE REPORT

Parikh Consultants, Inc. | ASTM D2844 or CTM 301 | (408) 945-1011

Project Name:	I-880 SB - HOV Lane Ext. from Hegenberger to Marina Rd	Date:	7/30/08
Client:	Rajappan & Mayer	Project #:	206139.GDR
Sample #: R-29	Depth: 0' - 5'	Lab #:	M722
Location / Source:	Onsite / Native	Sample Date:	
Material :	Sandy clay, brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	197	341	518
Expansion Pressure, psf	0	0	260
R-Value	14	31	45
Moisture Content at Test, %	19.1	17.7	16.7
Dry Density at Test, pcf	108.0	111.9	114.0

R-Value @ 300 psi Exudation Pressure = 26

Expansion Pressure @300 psi Exudation, psf = **0**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

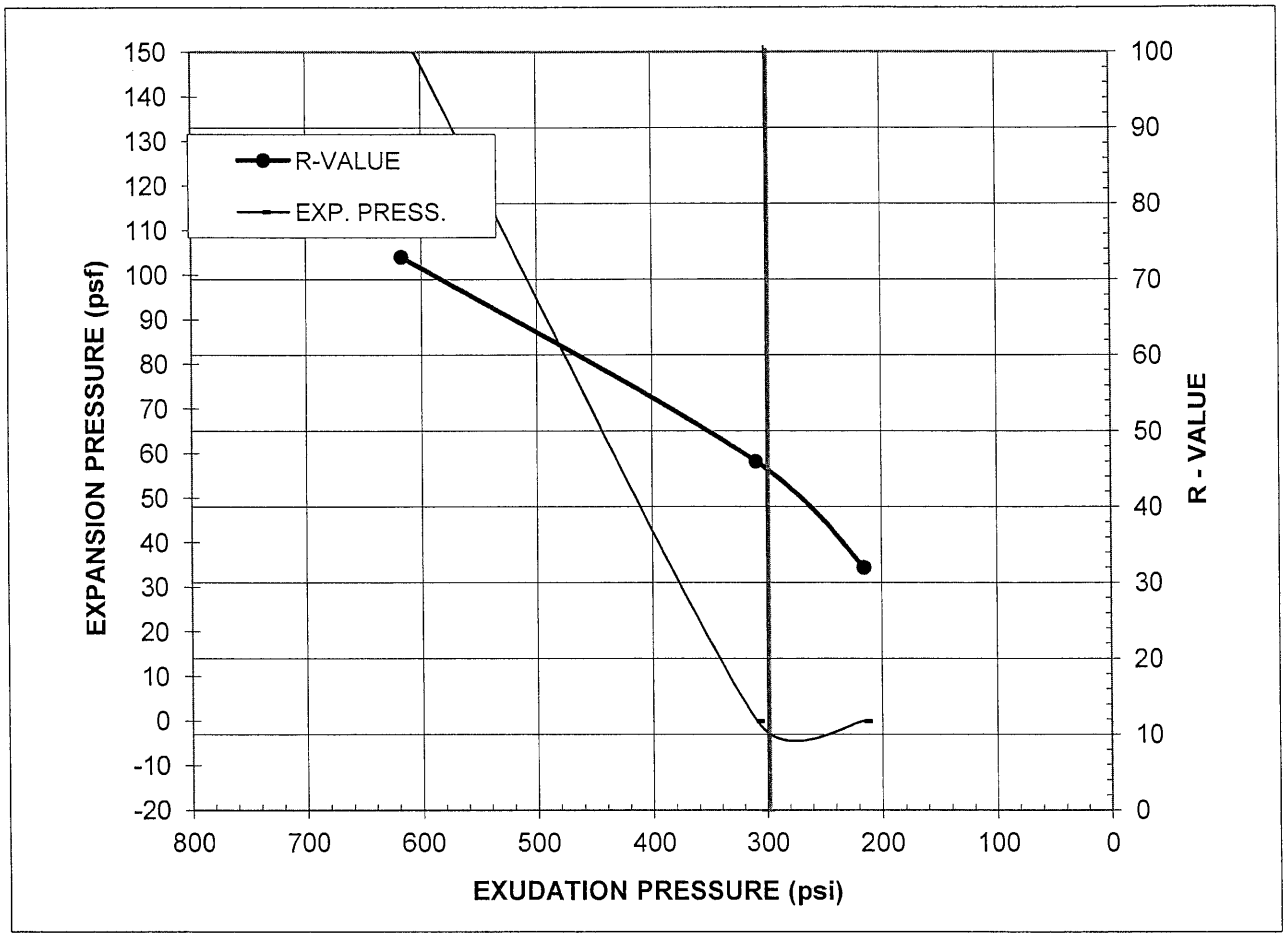
PLATE NO: B-6A

RVALUE with calcs pdp

R-VALUE REPORT

Parikh Consultants, Inc. | ASTM D2844 or CTM 301 | (408) 945-1011

Project Name:	I-880 SB - HOV Lane Ext. from Hegenberger to Marina Rd	Date:	7/30/08
Client:	Rajappan & Mayer	Project #:	206139.GDR
Sample #:	R-36 Depth: 0' - 5'	Lab #:	M722
Location / Source:	Onsite / Native	Sample Date:	
Material :	Clayey sands, brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	215	309	617
Expansion Pressure, psf	0	0	156
R-Value	32	46	73
Moisture Content at Test, %	13.6	12.6	11.7
Dry Density at Test, pcf	118.9	121.3	122.8

R-Value @ 300 psi Exudation Pressure = 45

Expansion Pressure @300 psi Exudation, psf = **0**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

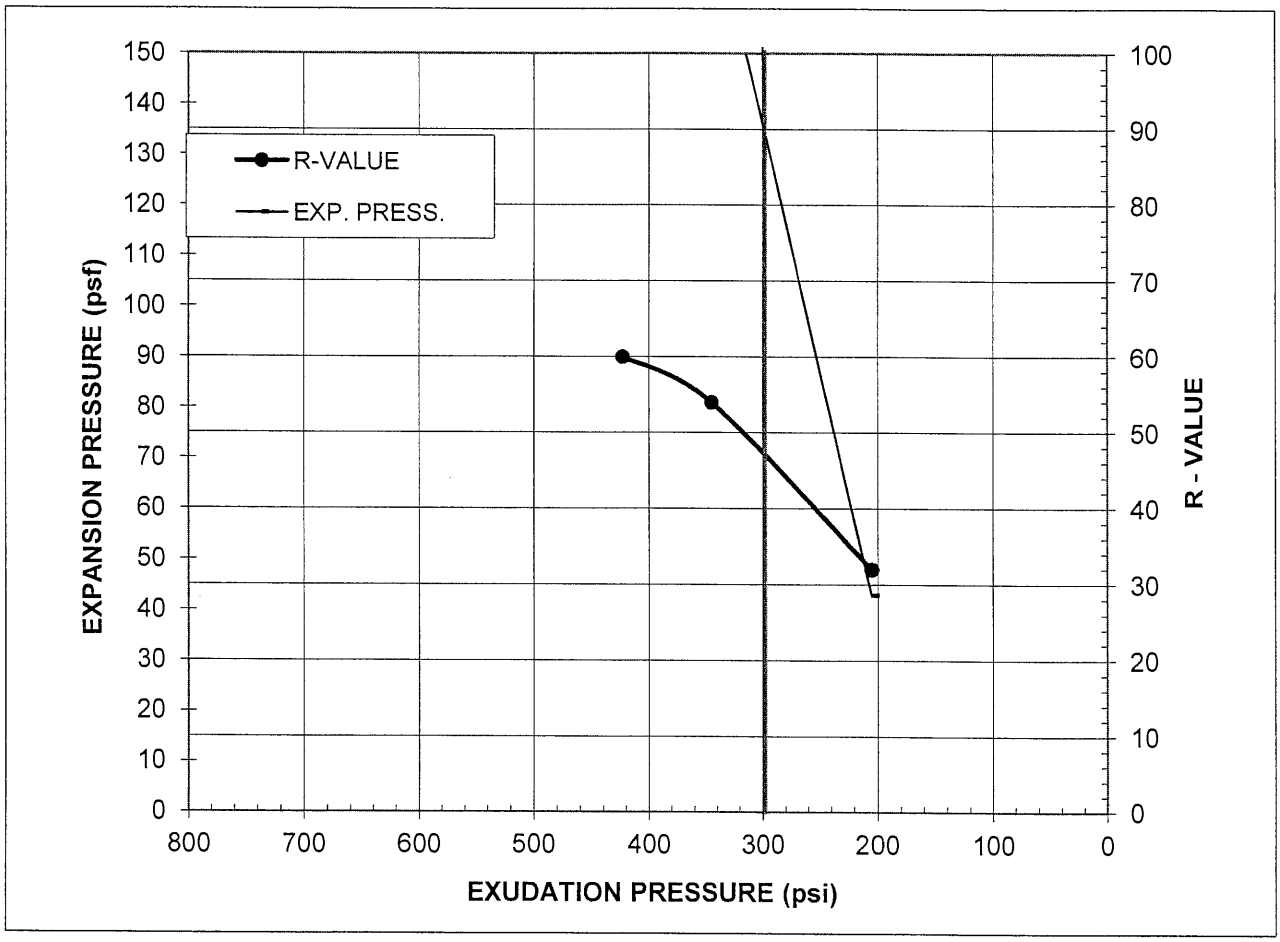
PLATE NO: B-6B

RVALUE with calcs pdp

R-VALUE REPORT

Parikh Consultants, Inc. ASTM D2844 or CTM 301 (408) 945-1011

Project Name:	I-880 SB - HOV Lane Ext. from Hegenberger to Marina Rd	Date:	7/30/08
Client:	Rajappan & Mayer	Project #:	206139.GDR
Sample #:	R-38 Depth: 0' - 5'	Lab #:	M722
Location / Source:	Onsite / Native	Sample Date:	
Material :	Clayey sands, brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	205	345	423
Expansion Pressure, psf	43	178	230
R-Value	32	54	60
Moisture Content at Test, %	15.2	14.3	13.4
Dry Density at Test, pcf	115.3	117.0	118.3

R-Value @ 300 psi Exudation Pressure = 47

Expansion Pressure @300 psi Exudation, psf = **135**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

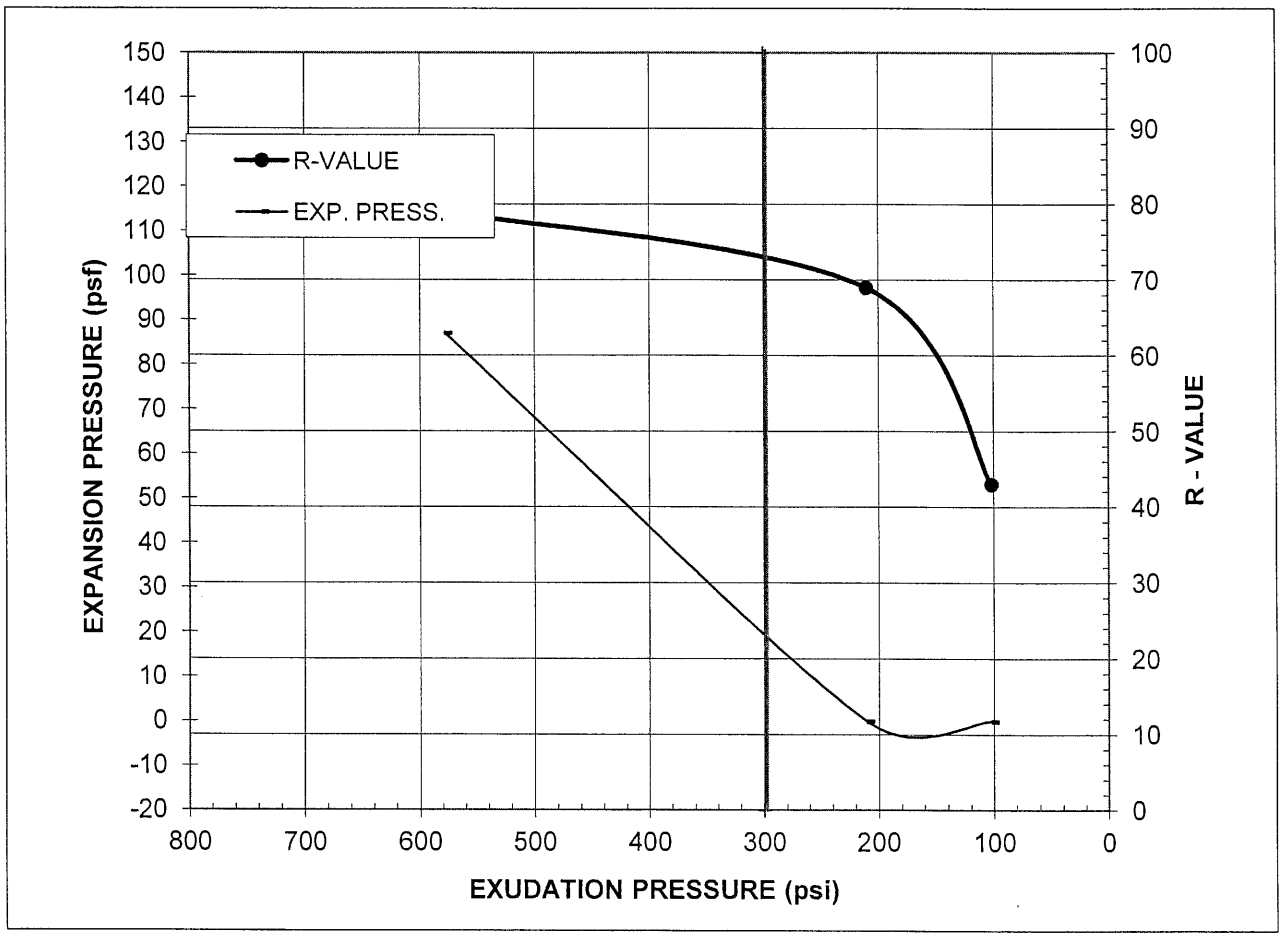
PLATE NO: B-6C

RVALUE with calcs pdp

R-VALUE REPORT

Parikh Consultants, Inc. ASTM D2844 or CTM 301 (408) 945-1011

Project Name:	I-880 SB - HOV Lane Ext. from Hegenberger to Marina Rd	Date:	7/30/08
Client:	Rajappan & Mayer	Project #:	206139.GDR
Sample #:	R-40 Depth: 0' - 5'	Lab #:	M722
Location / Source:	Onsite / Native	Sample Date:	
Material :	Clayey gravel, brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	102	210	578
Expansion Pressure, psf	0	0	87
R-Value	43	69	79
Moisture Content at Test, %	12.3	11.4	10.5
Dry Density at Test, pcf	120.7	123.7	124.5

R-Value @ 300 psi Exudation Pressure = 73

Expansion Pressure @300 psi Exudation, psf = **20**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

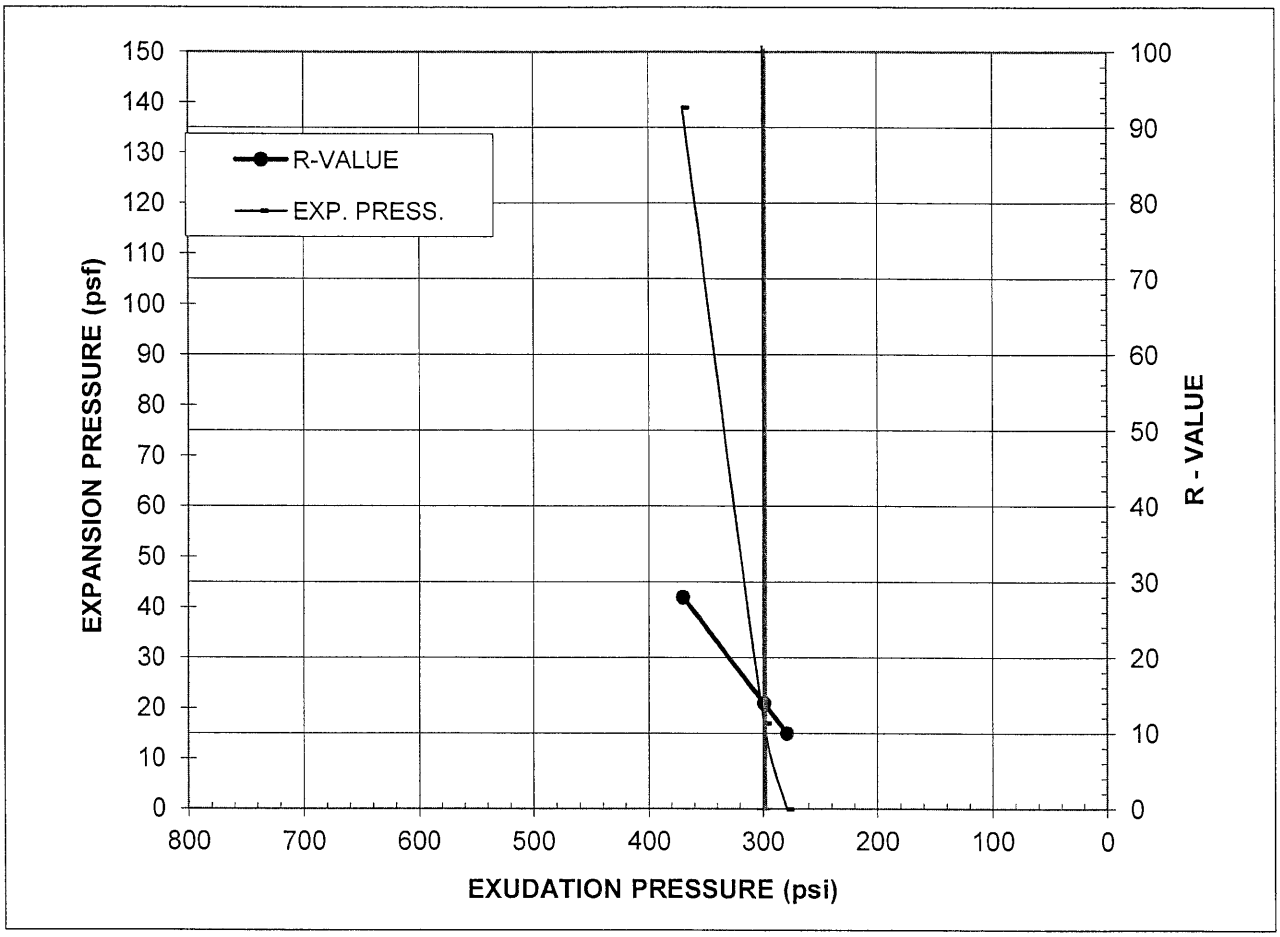
PLATE NO: B-6D

RVALUE with calcs pdp

R-VALUE REPORT

Parikh Consultants, Inc. | ASTM D2844 or CTM 301 | (408) 945-1011

Project Name:	I-880 SB - HOV Lane Ext. from Hegenberger to Marina Rd	Date:	7/30/08
Client:	Rajappan & Mayer	Project #:	206139.GDR
Sample #: R-41	Depth: 0' - 5'	Lab #:	M722
Location / Source:	Onsite / Native	Sample Date:	
Material :	Sandy clay, brown	Sampled By:	



Specimen No.	A	B	C
Exudation Pressure, psi	279	299	370
Expansion Pressure, psf	0	17	139
R-Value	10	14	28
Moisture Content at Test, %	23.0	21.5	19.5
Dry Density at Test, pcf	103.2	107.8	111.0

R-Value @ 300 psi Exudation Pressure = 14

Expansion Pressure @300 psi Exudation, psf = **17**

Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

PLATE NO: B-6E

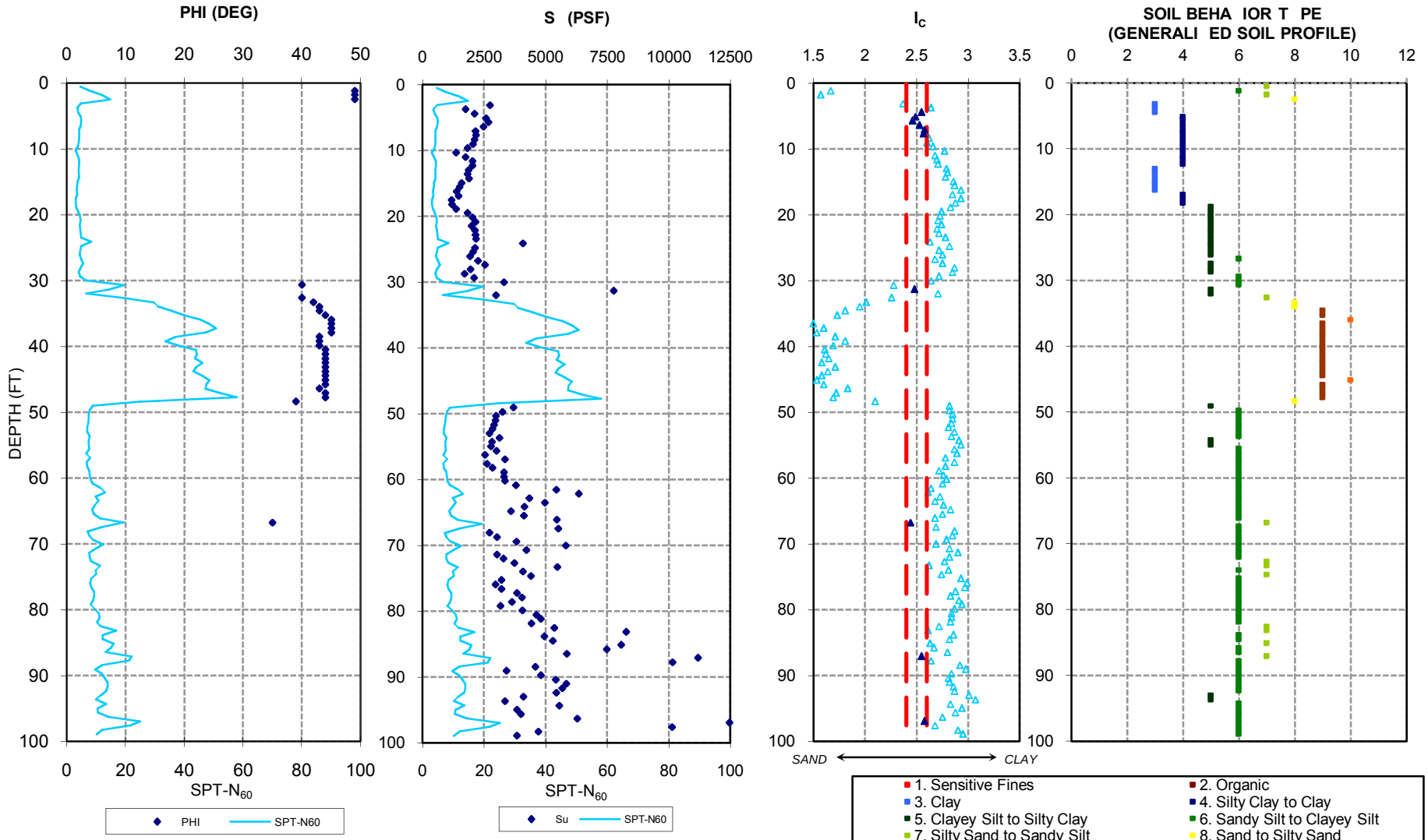
RVALUE with calcs pdp

APPENDIX C

CPT CORRELATION & LIQUEFACTION ANALYSES

CPT DATA CORRELATION

CPT-1



Reference: CPT data and correlation provided by Gregg Drilling and Testing, Inc.

PARIKH

Practicing in the Geosciences

SAN LEANDRO CREE O ERHEAD AT RTE 880
ALAMEDA CO NT , CALIFORNIA

OB NO.: 206139.10

PLATE NO.:

LI EFACTION POTENTIAL ANAL SIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge and Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-1***

FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} *(g)=* 0.6

FAULT M_w = 7.5
MSF = 1.00

			CPT RESULT INPUT							*CSR*		*CRR 7.5*						*F.S.=(CRR 7.5/CSR)*MSF*K σ*K α*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	Kσ	Kα	F.S.
0.492	7	Silty Sand to Sandy Silt	31.439	0.206	0.029		0.029	1.12	1.7	1.00	0.390	1.120	1.70	53.45	1.000	53.446	0.09	1.00	1	
1.148	6	Sandy Silt to Clayey Silt	43.395	0.903	0.067		0.067	1.67	1.7	1.00	0.390	1.670	1.70	73.77	1.017	75.053	0.12	1.00	1	
1.804	7	Silty Sand to Sandy Silt	71.27	1.153	0.105		0.105	1.57	1.68582	1.00	0.389	1.570	1.69	120.15	1.000	120.149	0.24	1.00	1	
2.461	8	Sand to Silty Sand	90.812	0.997	0.145		0.145	1.43	1.63569	1.00	0.389	1.430	1.64	148.54	1.000	148.540	0.38	1.00	1	
3.117	3	Clay	20.753	0.996	0.181		0.181	2.37	1.59305	0.99	0.388	2.370	1.59	33.06	2.194	72.536	0.12	1.00	1	
3.773	3	Clay	13.379	0.853	0.218		0.218	2.64	1.55148	0.99	0.387							1.00	1	
4.429	3	Clay	16.154	0.799	0.255		0.255	2.55	1.51203	0.99	0.387	2.550	1.51	24.43	3.034	74.112	0.12	1.00	1	
5.085	4	Silty Clay to Clay	19.715	0.855	0.292		0.292	2.49	1.47453	0.99	0.386	2.490	1.47	29.07	2.718	79.024	0.13	1.00	1	
5.741	4	Silty Clay to Clay	20.565	0.751	0.33		0.33	2.46	1.43791	0.99	0.386	2.460	1.44	29.57	2.574	76.123	0.12	1.00	1	
6.398	4	Silty Clay to Clay	18.965	0.742	0.367	0.011	0.356	2.53	1.41388	0.99	0.397	2.530	1.41	26.81	2.925	78.426	0.12	1.00	1	0.31
7.054	4	Silty Clay to Clay	16.608	0.628	0.405	0.032	0.373	2.58	1.3986	0.99	0.417	2.580	1.40	23.23	3.206	74.479	0.12	1.00	1	0.28
7.71	4	Silty Clay to Clay	16.825	0.597	0.443	0.052	0.391	2.57	1.38278	0.98	0.435	2.570	1.38	23.27	3.148	73.238	0.12	1.00	1	0.27
8.366	4	Silty Clay to Clay	16.399	0.635	0.48	0.072	0.408	2.62	1.36816	0.98	0.451							1.00	1	
9.022	4	Silty Clay to Clay	15.995	0.546	0.518	0.093	0.425	2.6	1.35385	0.98	0.466							1.00	1	
9.678	4	Silty Clay to Clay	14.287	0.491	0.555	0.113	0.442	2.66	1.33983	0.98	0.480							1.00	1	
10.335	4	Silty Clay to Clay	10.805	0.367	0.593	0.134	0.459	2.77	1.3261	0.98	0.493							1.00	1	
10.991	4	Silty Clay to Clay	13.696	0.446	0.63	0.154	0.476	2.68	1.31265	0.98	0.504							1.00	1	
11.647	4	Silty Clay to Clay	15.88	0.633	0.668	0.175	0.493	2.7	1.29947	0.98	0.516							1.00	1	
12.303	4	Silty Clay to Clay	15.931	0.634	0.706	0.195	0.51	2.71	1.28655	0.97	0.526							1.00	1	
12.959	3	Clay	14.597	0.652	0.742	0.216	0.526	2.79	1.27462	0.97	0.535							1.00	1	
13.615	3	Clay	14.402	0.638	0.779	0.236	0.543	2.8	1.26219	0.97	0.544							1.00	1	
14.272	3	Clay	14.828	0.609	0.815	0.257	0.559	2.78	1.25071	0.97	0.552							1.00	1	
14.928	3	Clay	12.708	0.543	0.852	0.277	0.575	2.86	1.23944	0.97	0.560							1.00	1	
15.584	3	Clay	12.089	0.486	0.888	0.298	0.591	2.87	1.22836	0.97	0.567							1.00	1	
16.24	3	Clay	11.223	0.482	0.925	0.318	0.607	2.93	1.21749	0.97	0.574							1.00	1	
16.896	4	Silty Clay to Clay	11.93	0.391	0.963	0.339	0.624	2.85	1.20614	0.96	0.580							1.00	1	
17.552	4	Silty Clay to Clay	9.897	0.319	1	0.359	0.641	2.93	1.195	0.96	0.586							1.00	1	
18.209	4	Silty Clay to Clay	10.02	0.266	1.038	0.38	0.658	2.88	1.18407	0.96	0.591							1.00	1	
18.865	5	Clayey Silt to Silty Clay	11.281	0.279	1.075	0.4	0.675	2.83	1.17333	0.96	0.596							1.00	1	
19.521	5	Clayey Silt to Silty Clay	14.691	0.372	1.113	0.42	0.692	2.74	1.16279	0.96	0.601							1.00	1	
20.177	5	Clayey Silt to Silty Clay	16.334	0.45	1.151	0.441	0.71	2.73	1.15183	0.96	0.605							1.00	1	
20.833	5	Clayey Silt to Silty Clay	17.365	0.473	1.188	0.461	0.727	2.71	1.14167	0.95	0.608							1.00	1	
21.49	5	Clayey Silt to Silty Clay	15.966	0.423	1.226	0.482	0.744	2.74	1.13169	0.95	0.612							1.00	1	
22.146	5	Clayey Silt to Silty Clay	17.149	0.423	1.263	0.502	0.761	2.7	1.12188	0.95	0.616							1.00	1	
22.802	5	Clayey Silt to Silty Clay	17.444	0.456	1.301	0.523	0.778	2.72	1.11223	0.95	0.619							1.00	1	
23.458	5	Clayey Silt to Silty Clay	17.654	0.554	1.338	0.543	0.795	2.78	1.10276	0.95	0.622							1.00	1	
24.114	5	Clayey Silt to Silty Clay	31.998	1.233	1.376	0.564	0.812	2.63	1.09344	0.94	0.624							1.00	1	
24.77	5	Clayey Silt to Silty Clay	17.553	0.583	1.414	0.584	0.829	2.82	1.08428	0.94	0.627							1.00	1	
25.427	5	Clayey Silt to Silty Clay	16.897	0.369	1.451	0.605	0.847	2.72	1.07474	0.94	0.628							1.00	1	
26.083	5	Clayey Silt to Silty Clay	15.758	0.332	1.489	0.625	0.864	2.75	1.06589	0.94	0.630							1.00	1	
26.739	6	Sandy Silt to Clayey Silt	18.165	0.366	1.526	0.646	0.881	2.68	1.05718	0.94	0.632							1.00	1	
27.395	5	Clayey Silt to Silty Clay	20.292	0.617	1.564	0.666	0.898	2.75	1.04862	0.93	0.633							1.00	1	
28.051	5	Clayey Silt to Silty Clay	15.873	0.515	1.602	0.687	0.915	2.87	1.04019	0.93	0.635							1.00	1	
28.707	5	Clayey Silt to Silty Clay	14.056	0.341	1.639	0.707	0.932	2.85	1.03189	0.93	0.636							1.00	1	
29.364	6	Sandy Silt to Clayey Silt	16.846	0.321	1.677	0.728	0.949	2.72	1.02373	0.92	0.637							1.00	1	
30.02	6	Sandy Silt to Clayey Silt	25.568	0.665	1.714	0.748	0.966	2.64	1.0157	0.92	0.637							1.00	1	
30.676	6	Sandy Silt to Clayey Silt	88.599	2.614	1.752	0.769	0.984	2.28	1.00733	0.92	0.637	2.280	1.01	89.25	1.886	168.337		1.00	1	
31.332	5	Clayey Silt to Silty Clay	60.169	2.25	1.79	0.789	1.001	2.48	0.99955	0.91	0.637	2.480	1.00	60.14	2.669	160.539		1.00	1	
31.988	5	Clayey Silt to Silty Clay	24.3	0.65	1.827	0.809	1.018	2.71	0.99188	0.91	0.637							1.00	1	
32.644	7	Silty Sand to Sandy Silt	89.745	2.354	1.866	0.83	1.036	2.26	0.9839	0.91	0.636	2.260	0.98	88.30	1.827	161.305		0.99	1	
33.301	8	Sand to Silty Sand	150.808	2.906	1.906	0.85	1.055	2.01	0.97561	0.90	0.635	2.010	0.98	147.13	1.313	193.223		0.98	1	
33.957	8	Sand to Silty Sand	161.152	2.698	1.945	0.871	1.074	1.95	0.96746	0.90	0.634	1.950	0.97	155.91	1.240	193.304		0.98	1	
34.613	9	Sand	195.796	2.535	1.986	0.891	1.095	1.81	0.95861	0.89	0.632	1.810	0.96	187.69	1.114	209.090		0.97	1	
35.269	9	Sand	226.316	2.525	2.027	0.912	1.115	1.73	0.95032	0.89	0.630	1.730	0.95	215.07	1.058	227.560		0.96	1	
35.925	10	Gravelly Sand to Sand	279.003	1.568	2.068	0.932	1.136	1.46	0.94178	0.88	0.628	1.460	0.94	262.76	1.000	262.760		0.95	1	
36.581	9	Sand	294.753	1.999	2.109	0.953	1.156	1.5	0.93379	0.88	0.626	1.500	0.93	275.24	1.000	275.236		0.94	1	
37.238	9	Sand	297.536	2.736	2.15	0.973	1.177	1.6	0.92554	0.87	0.623	1.600	0.93	275.38	1.000	275.380		0.94	1	
37.894	9	Sand	283.314	1.987	2.191	0.994	1.197	1.53	0.91781	0.87	0.620	1.530	0.92	260.03	1.000	260.030		0.93	1	
38.55	9	Sand	209.986	1.884	2.231	1.014	1.217	1.71	0.91022	0.86	0.617	1.710	0.91	191.13	1.045	199.658		0.93	1	
39.206	9	Sand	183.887	1.937	2.272	1.035	1.237	1.81	0.90275	0.86	0.615	1.810	0.90	166.00	1.114	184.930		0.93	1	
39.862	9	Sand	215.229	1.786	2.313	1.055	1.258	1.69	0.89504	0.85	0.611	1.690	0.90	192.64	1.031	198.626		0.92	1	
40.518	9	Sand	257.335	1.956	2.354	1.076	1.278	1.61	0.88781	0.85	0.608	1.610	0.89	228.47	1.000	228.465		0.91	1	
41.175	9	Sand	258.646	1.991	2.394	1.096	1.298	1.62	0.8807	0.84	0.605	1.620	0.88	227.79	1.000	227.791		0.90	1	
41.831	9	Sand	251.179	2.087	2.435	1.117	1.318	1.65	0.87371	0.83	0.601	1.650	0.87	219.46	1.003	220.190		0.90	1	
42.487	9	Sand	272.739	1.912	2.476	1.137	1.339	1.58	0.86648	0.83	0.597	1.580	0.87	236.32	1.000	236.324		0.89	1	
43.143	9	Sand	248.382	2.375	2.516	1.158	1.359	1.71	0.85971	0.82	0.593	1.710	0.86	213.54	1.045	223.060		0.89	1	
43.799	9	Sand	250.609	1.853	2.557	1.178	1.379	1.64	0.85304	0.82	0.590	1.640	0.85	213.78	1.000	213.780		0.88	1	
44.455	9	Sand	272.479	1.828	2.598	1.198	1.399	1.58	0.84648	0.81	0.586	1.580	0.85	230.65	1.000	230.648		0.87	1	
45.112	10	Gravelly Sand to Sand	291.546	1.71	2.64	1.219	1.421	1.53	0.83937	0.80	0.581	1.530	0.84	244.72	1.000	244.716		0.87	1	
45.768	9	Sand	279.111	1.948	2.68	1.239	1.441	1.6	0.83302	0.80	0.577	1.600	0.83	232.50	1.000	232.504		0.86	1	
46.424	9	Sand	255.46	3.457	2.721	1.26	1.461	1.83	0.82676	0.79	0.573	1.830	0.83	211.20	1.129	238.487		0.87	1	
47.08	9	Sand	292.943	3.137	2.762	1.28	1.482	1.72	0.82028	0.78	0.569	1.720	0.82	240.30	1.051	252.630		0.85	1	
47.736	9	Sand	329.592	3.513	2.803	1.301	1.502	1.69	0.81421	0.78	0.565	1.690	0.81	268.36	1.031	276.699		0.85	1	
48.392	8	Sand to Silty Sand	121.001	1.707	2.842	1.321	1.521	2.1	0.80853	0.77	0.560	2.100	0.81	97.83	1.455	142.322	0.35	0.90	1	0.62
49.049	5	Clayey Silt to Silty Clay	30.73	0.924	2.88	1.342	1.538	2.82	0.80351	0.76	0.557							0.92	1	
49.705	6	Sandy Silt to Clayey Silt	27.385	0.69	2.917	1.362	1.555	2.82	0.79855	0.76	0.553							0.92	1	
50.361	6	Sandy Silt to Clayey Silt	25.446	0.626	2.955	1.383	1.572	2.85	0.79365	0.75	0.549							0.91	1	
51.017	6	Sandy Silt to Clayey Silt	25.395	0.605	2.993	1.403	1.589	2.85	0.78881	0.74	0.545							0.91	1	
51.673	6	Sandy Silt to Clayey Silt	24.92	0.542	3.03	1.424	1.607	2.84	0.78375	0.74	0.541							0.91	1	
52.329	6	Sandy Silt to Clayey Silt	24.422	0.447	3.068	1.444	1.624	2.81	0.77904	0.73	0.537							0.91	1	
52.986	6	Sandy Silt to Clayey Silt	23.615	0.503	3.105	1.465	1.641	2.87	0.77438	0.72	0.533							0.91	1	
53.642	6	Sandy Silt to Clayey Silt	26.685	0.622	3.143	1.485	1.658	2.84	0.76977	0.72	0.530							0.90	1	
54.298	5	Clayey Silt to Silty Clay	24.365	0.626	3.181	1.506	1.675	2.91	0.76522	0.71	0.526							0.90	1	
54.954	5	Clayey Silt to Silty Clay	24.199	0.638	3.218	1.526	1.692	2.93	0.76072	0.70	0.522							0.90	1	
55.61	6	Sandy Silt to Clayey Silt	25.871	0.6	3.256	1.546	1.709	2.87	0.75627	0.70	0.518							0.90	1	
56.266	6	Sandy Silt to Clayey Silt	22.469	0.433	3.293	1.567	1.726	2.89	0.75188	0.69	0.515							0.90	1	
56.923	6	Sandy Silt to Clayey Silt	28.495	0.54	3.331	1.587	1.744	2.78	0.74728	0.69	0.511							0.89	1	
57.579	6	Sandy Silt to Clayey Silt	23.11	0.413	3.369	1.608	1.761	2.87	0.74299	0.68	0.507							0.89	1	
58.235	6	Sandy Silt to Clayey Silt	24.797	0.332	3.406	1.628	1.778	2.78	0.73875	0.67	0.504							0.89	1	
58.891	6	Sandy Silt to Clayey Silt	28.17	0.373	3.444	1.649	1.795	2.72	0.73456	0.67	0.500							0.89	1	
59.547	6	Sandy Silt to Clayey Silt	28.271	0.446	3.481	1.669	1.812	2.76	0.73041	0.66	0.497							0.89	1	
60.203	6	Sandy Silt to Clayey Silt	28.517	0.515	3.519	1.69	1.829	2.79	0.72631	0.66	0.493							0.89	1	
60.86	6	Sandy Silt to Clayey Silt	32.006	0.585	3.557	1.71	1.846	2.75	0.72226	0.65	0.490							0.88	1	

LI EFACTION POTENTIAL ANAL SIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge and Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-1***

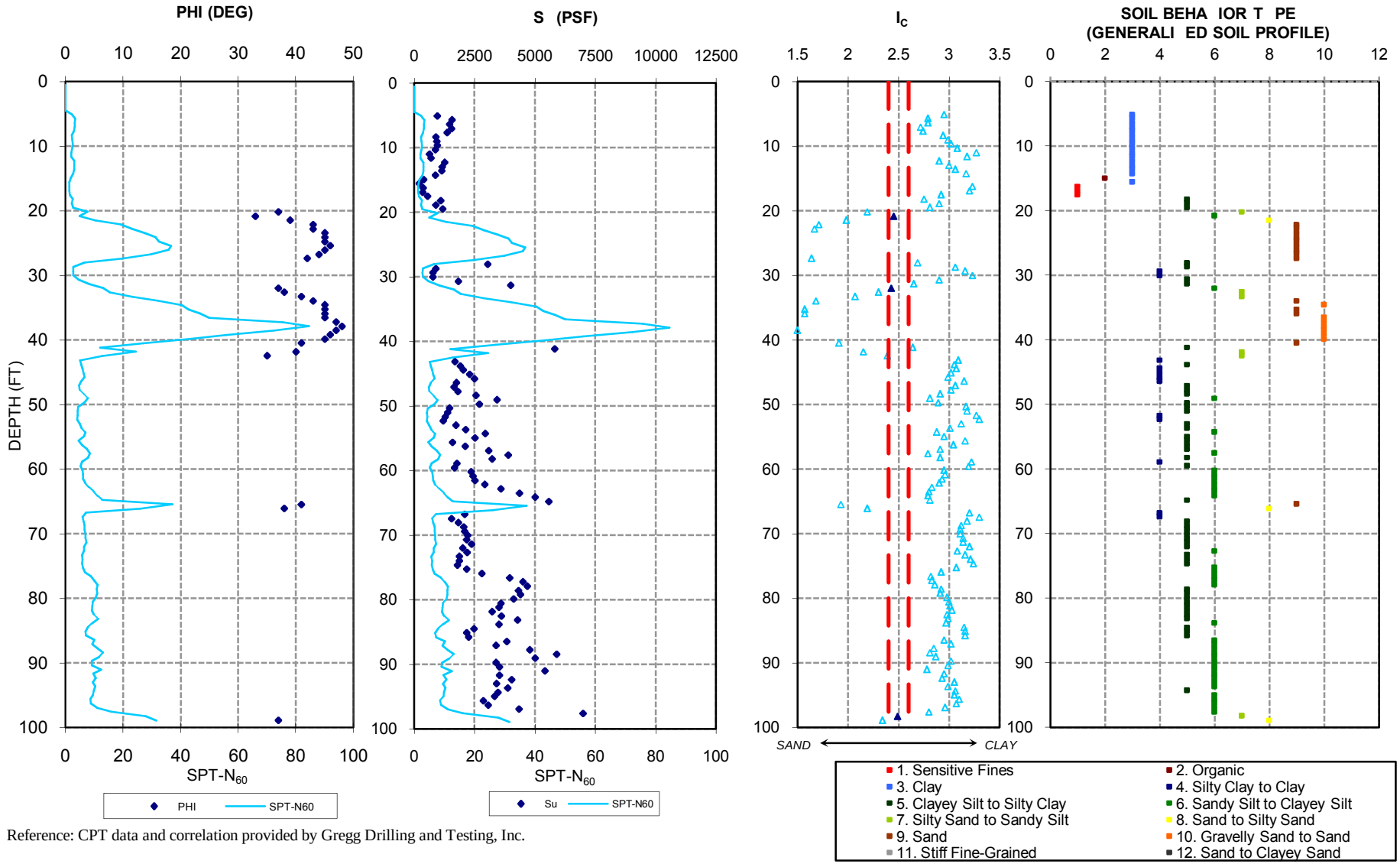
FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} (g)= 0.6

FAULT M_w = 7.5
MSF = 1.00

			CPT RESULT INPUT							*CSR*		*$CRR_{7.5}$*						*F.S.=($CRR_{7.5}$/CSR)*MSF*K_σ*K_α*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	$K\sigma$	$K\alpha$	F.S.
61.516	6	Sandy Silt to Clayey Silt	44.296	0.881	3.594	1.731	1.863	2.64	0.71825	0.65	0.487							0.88	1	
62.172	6	Sandy Silt to Clayey Silt	51.129	1.118	3.632	1.751	1.881	2.61	0.71405	0.64	0.484							0.88	1	
62.828	6	Sandy Silt to Clayey Silt	35.984	0.715	3.669	1.772	1.898	2.73	0.71014	0.64	0.480							0.88	1	
63.484	6	Sandy Silt to Clayey Silt	40.591	0.803	3.707	1.792	1.915	2.68	0.70626	0.63	0.478							0.88	1	
64.14	6	Sandy Silt to Clayey Silt	34.283	0.719	3.745	1.813	1.932	2.76	0.70243	0.63	0.475							0.88	1	
64.797	6	Sandy Silt to Clayey Silt	29.994	0.647	3.782	1.833	1.949	2.83	0.69863	0.62	0.472							0.88	1	
65.453	6	Sandy Silt to Clayey Silt	33.325	0.662	3.82	1.854	1.966	2.75	0.69488	0.62	0.469							0.87	1	
66.109	6	Sandy Silt to Clayey Silt	42.659	0.96	3.857	1.874	1.983	2.68	0.69117	0.61	0.466							0.87	1	
66.765	7	Silty Sand to Sandy Silt	81.585	1.69	3.896	1.895	2.001	2.44	0.68729	0.61	0.464	2.440	0.69	56.07	2.483	139.235	0.33	0.87	1	0.71
67.421	6	Sandy Silt to Clayey Silt	45.37	1.026	3.934	1.915	2.019	2.69	0.68344	0.61	0.461							0.87	1	
68.077	6	Sandy Silt to Clayey Silt	24.307	0.357	3.971	1.935	2.036	2.87	0.67985	0.60	0.458							0.87	1	
68.734	6	Sandy Silt to Clayey Silt	26.318	0.431	4.009	1.956	2.053	2.85	0.6763	0.60	0.456							0.87	1	
69.39	6	Sandy Silt to Clayey Silt	31.868	0.587	4.046	1.976	2.07	2.79	0.67278	0.60	0.454							0.86	1	
70.046	6	Sandy Silt to Clayey Silt	46.451	1.085	4.084	1.997	2.087	2.69	0.6693	0.59	0.452							0.86	1	
70.702	6	Sandy Silt to Clayey Silt	35.199	0.823	4.121	2.017	2.104	2.82	0.66586	0.59	0.449							0.86	1	
71.358	6	Sandy Silt to Clayey Silt	25.568	0.497	4.159	2.038	2.121	2.9	0.66245	0.58	0.447							0.86	1	
72.014	6	Sandy Silt to Clayey Silt	27.01	0.431	4.197	2.058	2.138	2.82	0.65908	0.58	0.445							0.86	1	
72.671	7	Silty Sand to Sandy Silt	29.857	0.477	4.235	2.079	2.157	2.77	0.65535	0.58	0.443							0.86	1	
73.327	7	Silty Sand to Sandy Silt	44.123	0.661	4.274	2.099	2.175	2.62	0.65185	0.58	0.441							0.86	1	
73.983	6	Sandy Silt to Clayey Silt	34.377	0.706	4.312	2.12	2.192	2.81	0.64858	0.57	0.439							0.85	1	
74.639	7	Silty Sand to Sandy Silt	36.511	0.63	4.35	2.14	2.21	2.74	0.64516	0.57	0.437							0.85	1	
75.295	6	Sandy Silt to Clayey Silt	27.37	0.6	4.388	2.161	2.227	2.93	0.64196	0.57	0.435							0.85	1	
75.951	6	Sandy Silt to Clayey Silt	25.078	0.634	4.425	2.181	2.244	2.99	0.63879	0.56	0.433							0.85	1	
76.608	6	Sandy Silt to Clayey Silt	26.722	0.702	4.463	2.202	2.261	2.97	0.63565	0.56	0.432							0.85	1	
77.264	6	Sandy Silt to Clayey Silt	31.169	0.77	4.501	2.222	2.278	2.88	0.63255	0.56	0.430							0.85	1	
77.92	6	Sandy Silt to Clayey Silt	32.589	0.695	4.538	2.243	2.296	2.83	0.62929	0.56	0.428							0.85	1	
78.576	6	Sandy Silt to Clayey Silt	29.771	0.737	4.576	2.263	2.313	2.91	0.62625	0.55	0.427							0.85	1	
79.232	6	Sandy Silt to Clayey Silt	26.318	0.577	4.613	2.283	2.33	2.94	0.62323	0.55	0.425							0.84	1	
79.888	6	Sandy Silt to Clayey Silt	32.899	0.799	4.651	2.304	2.347	2.87	0.62024	0.55	0.424							0.84	1	
80.545	6	Sandy Silt to Clayey Silt	37.051	0.945	4.689	2.324	2.364	2.84	0.61728	0.55	0.423							0.84	1	
81.201	6	Sandy Silt to Clayey Silt	38.608	1.051	4.726	2.345	2.381	2.84	0.61435	0.54	0.421							0.84	1	
81.857	6	Sandy Silt to Clayey Silt	35.696	0.796	4.764	2.365	2.398	2.83	0.61145	0.54	0.420							0.84	1	
82.513	7	Silty Sand to Sandy Silt	42.803	0.811	4.802	2.386	2.417	2.72	0.60824	0.54	0.418							0.84	1	
83.169	7	Silty Sand to Sandy Silt	65.294	1.48	4.841	2.406	2.435	2.61	0.60523	0.54	0.417							0.84	1	
83.825	6	Sandy Silt to Clayey Silt	41.585	1.171	4.879	2.427	2.452	2.86	0.60241	0.54	0.416							0.84	1	
84.482	6	Sandy Silt to Clayey Silt	42.753	1.136	4.916	2.447	2.469	2.82	0.59962	0.53	0.415							0.83	1	
85.138	7	Silty Sand to Sandy Silt	61.43	1.443	4.955	2.468	2.487	2.63	0.59669	0.53	0.413							0.83	1	
85.794	6	Sandy Silt to Clayey Silt	57.408	1.414	4.992	2.488	2.504	2.67	0.59395	0.53	0.412							0.83	1	
86.45	6	Sandy Silt to Clayey Silt	46.711	1.31	5.03	2.509	2.521	2.8	0.59124	0.53	0.411							0.83	1	
87.106	7	Silty Sand to Sandy Silt	88.03	2.222	5.069	2.529	2.539	2.55	0.58839	0.53	0.410	2.550	0.59	51.80	3.034	157.162	0.44	0.83	1	1.08
87.762	6	Sandy Silt to Clayey Silt	81.304	2.472	5.106	2.55	2.557	2.64	0.58557	0.52	0.409							0.83	1	
88.419	6	Sandy Silt to Clayey Silt	39.538	1.133	5.144	2.57	2.574	2.92	0.58294	0.52	0.408							0.83	1	
89.075	6	Sandy Silt to Clayey Silt	30.607	0.698	5.181	2.591	2.591	2.98	0.58032	0.52	0.407							0.83	1	
89.731	6	Sandy Silt to Clayey Silt	40.98	0.909	5.219	2.611	2.608	2.84	0.57773	0.52	0.406							0.83	1	
90.387	6	Sandy Silt to Clayey Silt	45.348	1.064	5.257	2.632	2.625	2.81	0.57516	0.52	0.405							0.82	1	
91.043	6	Sandy Silt to Clayey Silt	48.433	1.319	5.294	2.652	2.642	2.82	0.57262	0.52	0.404							0.82	1	
91.699	6	Sandy Silt to Clayey Silt	47.114	1.438	5.332	2.672	2.659	2.86	0.5701	0.52	0.403							0.82	1	
92.356	6	Sandy Silt to Clayey Silt	45.824	1.337	5.369	2.693	2.676	2.87	0.5676	0.51	0.402							0.82	1	
93.012	5	Clayey Silt to Silty Clay	35.703	1.184	5.407	2.713	2.694	3.01	0.56497	0.51	0.401							0.82	1	
93.668	5	Clayey Silt to Silty Clay	30.052	0.911	5.445	2.734	2.711	3.07	0.56252	0.51	0.400							0.82	1	
94.324	6	Sandy Silt to Clayey Silt	46.848	1.18	5.482	2.754	2.728	2.83	0.56008	0.51	0.399							0.82	1	
94.98	6	Sandy Silt to Clayey Silt	34.219	0.748	5.52	2.775	2.745	2.94	0.55767	0.51	0.399							0.82	1	
95.636	6	Sandy Silt to Clayey Silt	35.184	0.636	5.557	2.795	2.762	2.88	0.55528	0.51	0.398							0.82	1	
96.293	6	Sandy Silt to Clayey Silt	51.757	1.124	5.595	2.816	2.779	2.75	0.5529	0.51	0.397							0.82	1	
96.949	6	Sandy Silt to Clayey Silt	98.77	2.777	5.633	2.836	2.796	2.58	0.55055	0.50	0.396	2.580	0.55	54.38	3.206	174.360		0.81	1	
97.605	6	Sandy Silt to Clayey Silt	81.578	2.497	5.67	2.857	2.813	2.68	0.54822	0.50	0.395							0.81	1	
98.261	6	Sandy Silt to Clayey Silt	40.295	0.989	5.708	2.877	2.831	2.9	0.54577	0.50	0.395							0.81	1	
98.917	6	Sandy Silt to Clayey Silt	32.805	0.716	5.745	2.898	2.848	2.95	0.54348	0.50	0.394							0.81	1	

CPT DATA CORRELATION

CPT-2



Reference: CPT data and correlation provided by Gregg Drilling and Testing, Inc.

PARIKH

Practicing in the Geosciences

SAN LEANDRO CREE O ERHEAD AT RTE 880
ALAMEDA CO NT , CALIFORNIA

OB NO.: 206139.10

PLATE NO.:

LI EFACTION POTENTIAL ANAL SIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge & Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-2***

FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} *(g)=* 0.6

FAULT M_w = 7.5
MSF = 1.00

Depth (ft)		Soil Behavior Type	CPT RESULT INPUT qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	CSR γ_d	CSR	CRR 7.5 Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	F.S.=(CRR 7.5/CSR)*MSF*Kσ*Kα Kσ	Kα	F.S.
0.492									1.7	1.00									1	
1.148									1.7	1.00									1	
1.804									1.7	1.00									1	
2.461									1.7	1.00									1	
3.117									1.7	0.99									1	
3.773									1.7	0.99									1	
4.429									1.7	0.99									1	
5.085	3	Clay	7.497	0.559	0.283		0.283	2.95	1.48348	0.99	0.386							1.00	1	
5.741	3	Clay	11.966	0.758	0.32		0.32	2.79	1.44737	0.99	0.386							1.00	1	
6.398	3	Clay	11.339	0.631	0.356	0.011	0.345	2.79	1.42395	0.99	0.397							1.00	1	
7.054	3	Clay	11.916	0.522	0.393	0.032	0.361	2.72	1.40935	0.99	0.418							1.00	1	
7.71	3	Clay	10.661	0.419	0.429	0.052	0.377	2.74	1.39505	0.98	0.437							1.00	1	
8.366	3	Clay	7.252	0.339	0.466	0.072	0.394	2.94	1.38018	0.98	0.453							1.00	1	
9.022	3	Clay	7.475	0.404	0.503	0.093	0.41	2.99	1.36646	0.98	0.469							1.00	1	
9.678	3	Clay	7.648	0.454	0.539	0.113	0.426	3.02	1.35301	0.98	0.483							1.00	1	
10.335	3	Clay	7.094	0.437	0.576	0.134	0.442	3.08	1.33983	0.98	0.497							1.00	1	
10.991	3	Clay	5.421	0.42	0.612	0.154	0.458	3.27	1.3269	0.98	0.509							1.00	1	
11.647	3	Clay	5.897	0.355	0.649	0.175	0.474	3.18	1.31422	0.98	0.521							1.00	1	
12.303	3	Clay	10.222	0.466	0.685	0.195	0.49	2.9	1.30178	0.97	0.531							1.00	1	
12.959	3	Clay	9.414	0.514	0.722	0.216	0.506	3	1.28957	0.97	0.541							1.00	1	
13.615	3	Clay	9.327	0.599	0.758	0.236	0.522	3.06	1.27758	0.97	0.550							1.00	1	
14.272	3	Clay	7.461	0.488	0.795	0.257	0.538	3.17	1.26582	0.97	0.559							1.00	1	
14.928	2	Organic	3.767	0.318	0.821	0.277	0.544	3.55	1.26147	0.97	0.570							1.00	1	
15.584	3	Clay	2.386	0.124	0.858	0.298	0.56	3.73	1.25	0.97	0.578							1.00	1	
16.24	1	Sensitive Fines	3.619	0.065	0.894	0.318	0.576	3.23	1.23874	0.97	0.585							1.00	1	
16.896	1	Sensitive Fines	3.556	0.051	0.931	0.339	0.592	3.2	1.22768	0.96	0.591							1.00	1	
17.552	1	Sensitive Fines	5.176	0.048	0.967	0.359	0.608	2.92	1.21681	0.96	0.597							1.00	1	
18.209	5	Clayey Silt to Silty Clay	9.097	0.13	1.005	0.38	0.625	2.75	1.20548	0.96	0.603							1.00	1	
18.865	5	Clayey Silt to Silty Clay	7.584	0.145	1.042	0.4	0.642	2.9	1.19435	0.96	0.608							1.00	1	
19.521	5	Clayey Silt to Silty Clay	9.587	0.193	1.08	0.42	0.66	2.81	1.1828	0.96	0.611							1.00	1	
20.177	7	Silty Sand to Sandy Silt	36.244	0.437	1.119	0.441	0.678	2.19	1.17146	0.96	0.616	2.190	1.17	42.46	1.643	69.743	0.11	1.00	1	0.18
20.833	6	Sandy Silt to Clayey Silt	21.162	0.298	1.156	0.461	0.695	2.45	1.16095	0.95	0.619	2.450	1.16	24.57	2.528	62.113	0.10	1.00	1	0.17
21.49	8	Sand to Silty Sand	54.013	0.471	1.196	0.482	0.714	1.98	1.14943	0.95	0.622	1.980	1.15	62.08	1.275	79.141	0.13	1.00	1	0.20
22.146	9	Sand	108.624	0.812	1.237	0.502	0.734	1.71	1.13754	0.95	0.625	1.710	1.14	123.56	1.045	129.075	0.28	1.00	1	0.45
22.802	9	Sand	132.167	1.05	1.277	0.523	0.755	1.67	1.12532	0.95	0.626	1.670	1.13	148.73	1.017	151.314	0.40	1.00	1	0.64
23.458	9	Sand	171.057	0.805	1.318	0.543	0.775	1.44	1.11392	0.95	0.628	1.440	1.11	190.54	1.000	190.545		1.00	1	
24.114	9	Sand	203.502	0.598	1.359	0.564	0.795	1.27	1.10276	0.94	0.630	1.270	1.10	224.41	1.000	224.413		1.00	1	
24.77	9	Sand	209.564	0.684	1.4	0.584	0.815	1.29	1.09181	0.94	0.632	1.290	1.09	228.80	1.000	228.804		1.00	1	
25.427	9	Sand	231.175	1.136	1.44	0.605	0.836	1.38	1.08055	0.94	0.632	1.380	1.08	249.80	1.000	249.796		1.00	1	
26.083	9	Sand	228.147	0.961	1.481	0.625	0.856	1.35	1.07004	0.94	0.633	1.350	1.07	244.13	1.000	244.126		1.00	1	
26.739	9	Sand	190.779	0.566	1.522	0.646	0.876	1.33	1.05973	0.94	0.634	1.330	1.06	202.17	1.000	202.174		1.00	1	
27.395	9	Sand	112.776	0.519	1.562	0.666	0.896	1.64	1.04962	0.93	0.634	1.640	1.05	118.37	1.000	118.372	0.23	1.00	1	0.37
28.051	5	Clayey Silt to Silty Clay	24.581	0.725	1.6	0.687	0.913	2.69	1.04117	0.93	0.635							1.00	1	
28.707	5	Clayey Silt to Silty Clay	8.434	0.156	1.638	0.707	0.931	3.06	1.03238	0.93	0.636							1.00	1	
29.364	4	Silty Clay to Clay	7.605	0.169	1.675	0.728	0.948	3.16	1.02421	0.92	0.637							1.00	1	
30.02	4	Silty Clay to Clay	7.54	0.211	1.713	0.748	0.965	3.23	1.01617	0.92	0.637							1.00	1	
30.676	5	Clayey Silt to Silty Clay	15.397	0.436	1.75	0.769	0.982	2.9	1.00825	0.92	0.637							1.00	1	
31.332	5	Clayey Silt to Silty Clay	31.753	1.019	1.788	0.789	0.999	2.65	1.00045	0.91	0.638							1.00	1	
31.988	6	Sandy Silt to Clayey Silt	55.188	1.574	1.826	0.809	1.016	2.43	0.99278	0.91	0.638	2.430	0.99	54.79	2.439	133.633	0.30	1.00	1	0.47
32.644	7	Silty Sand to Sandy Silt	69.079	1.613	1.864	0.83	1.034	2.3	0.98478	0.91	0.637	2.300	0.98	68.03	1.949	132.568	0.30	0.99	1	0.47
33.301	7	Silty Sand to Sandy Silt	114.55	2.077	1.903	0.85	1.053	2.07	0.97648	0.90	0.636	2.070	0.98	111.86	1.403	156.924	0.44	0.99	1	0.69
33.957	9	Sand	182.886	1.477	1.944	0.871	1.073	1.68	0.96788	0.90	0.634	1.680	0.97	177.01	1.024	181.307		0.98	1	
34.613	10	Gravelly Sand to Sand	252.137	1.127	1.985	0.891	1.094	1.41	0.95902	0.89	0.632	1.410	0.96	241.81	1.000	241.805		0.96	1	
35.269	9	Sand	253.817	1.907	2.026	0.912	1.114	1.57	0.95073	0.89	0.630	1.570	0.95	241.31	1.000	241.313		0.96	1	
35.925	9	Sand	276.646	2.257	2.067	0.932	1.135	1.57	0.94218	0.88	0.628	1.570	0.94	260.65	1.000	260.651		0.95	1	
36.581	10	Gravelly Sand to Sand	310.223	1.73	2.109	0.953	1.156	1.43	0.93379	0.88	0.626	1.430	0.93	289.68	1.000	289.682		0.94	1	
37.238	10	Gravelly Sand to Sand	495.732	2.446	2.15	0.973	1.177	1.25	0.92554	0.87	0.623	1.250	0.93	458.82	1.000	458.818		0.94	1	
37.894	10	Gravelly Sand to Sand	528.149	4.302	2.192	0.994	1.198	1.4	0.91743	0.87	0.620	1.400	0.92	484.54	1.000	484.540		0.93	1	
38.55	10	Gravelly Sand to Sand	438.995	4.017	2.234	1.014	1.22	1.5	0.90909	0.86	0.617	1.500	0.91	399.09	1.000	399.086		0.92	1	
39.206	10	Gravelly Sand to Sand	351.383	1.793	2.276	1.035	1.241	1.38	0.90127	0.86	0.614	1.380	0.90	316.69	1.000	316.691		0.92	1	
39.862	10	Gravelly Sand to Sand	279.327	0.751	2.318	1.055	1.262	1.3	0.89358	0.85	0.610	1.300	0.89	249.60	1.000	249.602		0.91	1	
40.518	9	Sand	141.92	1.521	2.358	1.076	1.283	1.91	0.88602	0.85	0.607	1.910	0.89	125.74	1.198	150.693	0.40	0.93	1	0.66
41.175	5	Clayey Silt to Silty Clay	46.228	1.594	2.396	1.096	1.3	2.64	0.88	0.84	0.604							0.95	1	
41.831	7	Silty Sand to Sandy Silt	117.484	2.257	2.434	1.117	1.318	2.15	0.87371	0.83	0.601	2.150	0.87	102.65	1.553	159.389	0.46	0.93	1	0.76
42.487	7	Silty Sand to Sandy Silt	55.159	0.951	2.473	1.137	1.336	2.39	0.86751	0.83	0.598	2.390	0.87	47.85	2.272	108.718	0.20	0.94	1	0.33
43.143	4	Silty Clay to Clay	15.037	0.498	2.511	1.158	1.353	3.09	0.86173	0.82	0.595							0.94	1	
43.799	5	Clayey Silt to Silty Clay	16.637	0.556	2.548	1.178	1.37	3.05	0.85603	0.82	0.592							0.94	1	
44.455	4	Silty Clay to Clay	17.567	0.685	2.586	1.198	1.387	3.07	0.85041	0.81	0.588							0.94	1	
45.112	4	Silty Clay to Clay	19.564	0.75	2.623	1.219	1.405	3.02	0.84453	0.80	0.584							0.93	1	
45.768	4	Silty Clay to Clay	20.955	0.806	2.661	1.239	1.422	2.99	0.83905	0.80	0.581							0.93	1	
46.424	4	Silty Clay to Clay	15.239	0.629	2.699	1.26	1.439	3.15	0.83365	0.79	0.577							0.93	1	
47.08	5	Clayey Silt to Silty Clay	14.403	0.376	2.736	1.28	1.456	3.06	0.82831	0.78	0.574							0.93	1	
47.736	5	Clayey Silt to Silty Clay	15.311	0.382	2.774	1.301	1.473	3.02	0.82305	0.78	0.570							0.93	1	
48.392	5	Clayey Silt to Silty Clay	20.97	0.583	2.811	1.321	1.49	2.91	0.81784	0.77	0.566							0.92	1	
49.049	6	Sandy Silt to Clayey Silt	27.436	0.765	2.849	1.342	1.507	2.81	0.81271	0.76	0.562							0.92	1	
49.705	5	Clayey Silt to Silty Clay	22.368	0.606	2.887	1.362	1.524	2.89	0.80764	0.76	0.558							0.92	1	
50.361	5	Clayey Silt to Silty Clay	12.536	0.398	2.924	1.383	1.542	3.17	0.80233	0.75	0.554							0.92	1	
51.017	5	Clayey Silt to Silty Clay	11.771	0.356	2.962	1.403	1.559	3.18	0.79739	0.74	0.550							0.92	1	
51.673	4	Silty Clay to Clay	11.101	0.42	2.999	1.424	1.576	3.27	0.79251	0.74	0.546							0.91	1	
52.329	4	Silty Clay to Clay	10.301	0.399	3.037	1.444	1.593	3.3	0.78768	0.73	0.542							0.91	1	
52.986	5	Clayey Silt to Silty Clay	14.165	0.458	3.075	1.465	1.61	3.12	0.78292	0.72	0.538							0.91	1	
53.642	5	Clayey Silt to Silty Clay	17.517	0.503	3.112	1.485	1.627	3.01	0.77821	0.72	0.534							0.91	1	
54.298	6	Sandy Silt to Clayey Silt	23.514	0.63	3.15	1.506	1.644	2.88	0.77356	0.71	0.531							0.91	1	
54.954	5	Clayey Silt to Silty Clay	20.523	0.571	3.187	1.526	1.661	2.95	0.76896	0.70	0.527							0.90	1	
55.61	5	Clayey Silt to Silty Clay	13.098	0.404	3.225	1.546	1.679	3.16	0.76415	0.70	0.523							0.90	1	
56.266	5	Clayey Silt to Silty Clay	17.625	0.524	3.263	1.567	1.696	3.04	0.75967	0.69	0.519							0.90	1	
56.923	5	Clayey Silt to Silty Clay	24.307	0.753	3.3	1.587	1.713	2.91	0.75524	0.69	0.515							0.90	1	
57.579	6	Sandy Silt to Clayey Silt	30.196	0.811	3.338	1.608	1.73	2.79	0.75085	0.68	0.512							0.90	1	
58.235	5	Clayey Silt to Silty Clay	25.914	0.814	3.375	1.628	1.747	2.91	0.74652	0.67	0.508							0.89	1	
58.891	4	Silty Clay to Clay	15.585	0.65	3.413	1.649	1.764	3.22	0.74224	0.67	0.504							0.89	1	
59.547	5	Clayey Silt to Silty Clay	14.215	0.489	3.451	1.669	1.781	3.19	0.73801	0.66	0.501							0.89	1	
60.203	6	Sandy Silt to Clayey Silt	19.067	0.422	3.488	1.69	1.798	2.95	0.73382	0.66	0.498							0.89	1	
60.86	6	Sandy Silt to Clayey Silt	19.456	0.48	3.526	1.71	1.815	2.96	0.72968	0.65	0.494							0.89	1	

LI EFACTION POTENTIAL ANAL SIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge & Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-2***

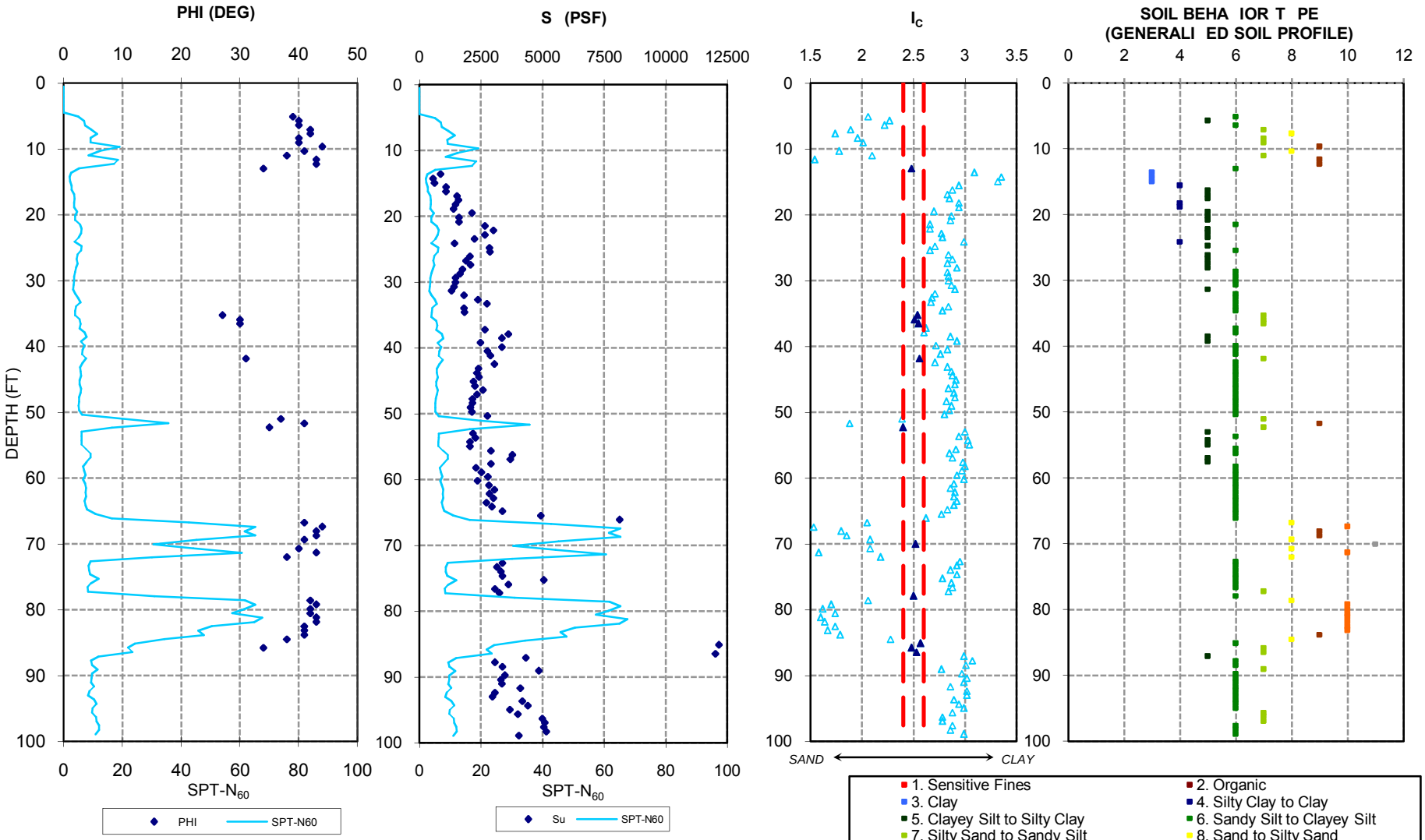
FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} *(g)=* 0.6

FAULT M_w = 7.5
MSF = 1.00

			CPT RESULT INPUT							*CSR*		*CRR 7.5*						*F.S.=(CRR 7.5/CSR)*MSF*Kσ*Kα*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	Kσ	Kα	F.S.
61.516	6	Sandy Silt to Clayey Silt	20.227	0.464	3.563	1.731	1.833	2.93	0.72535	0.65	0.491							0.89	1	
62.172	6	Sandy Silt to Clayey Silt	23.276	0.557	3.601	1.751	1.85	2.9	0.72131	0.64	0.488							0.88	1	
62.828	6	Sandy Silt to Clayey Silt	28.56	0.682	3.639	1.772	1.867	2.83	0.71731	0.64	0.484							0.88	1	
63.484	6	Sandy Silt to Clayey Silt	34.615	0.963	3.676	1.792	1.884	2.8	0.71336	0.63	0.481							0.88	1	
64.14	6	Sandy Silt to Clayey Silt	39.741	1.253	3.714	1.813	1.901	2.79	0.70945	0.63	0.478							0.88	1	
64.797	5	Clayey Silt to Silty Clay	44.491	1.735	3.751	1.833	1.918	2.81	0.70558	0.62	0.476							0.88	1	
65.453	9	Sand	194.225	2.013	3.792	1.854	1.938	1.93	0.70108	0.62	0.472	1.930	0.70	136.17	1.218	165.916		0.82	1	
66.109	8	Sand to Silty Sand	122.306	1.778	3.832	1.874	1.958	2.19	0.69664	0.61	0.469	2.190	0.70	85.20	1.643	139.958	0.33	0.86	1	0.71
66.765	4	Silty Clay to Clay	19.636	0.766	3.869	1.895	1.975	3.2	0.69291	0.61	0.467							0.87	1	
67.421	4	Silty Clay to Clay	15.412	0.522	3.907	1.915	1.992	3.3	0.68922	0.61	0.464							0.87	1	
68.077	5	Clayey Silt to Silty Clay	17.567	0.497	3.944	1.935	2.009	3.18	0.68557	0.60	0.461							0.87	1	
68.734	5	Clayey Silt to Silty Clay	19.312	0.515	3.982	1.956	2.026	3.12	0.68196	0.60	0.459							0.87	1	
69.39	5	Clayey Silt to Silty Clay	19.513	0.516	4.02	1.976	2.043	3.11	0.67838	0.60	0.457							0.87	1	
70.046	5	Clayey Silt to Silty Clay	20.141	0.57	4.057	1.997	2.06	3.11	0.67485	0.59	0.454							0.87	1	
70.702	5	Clayey Silt to Silty Clay	19.521	0.633	4.095	2.017	2.078	3.14	0.67114	0.59	0.452							0.86	1	
71.358	5	Clayey Silt to Silty Clay	20.869	0.75	4.132	2.038	2.095	3.14	0.66768	0.58	0.450							0.86	1	
72.014	5	Clayey Silt to Silty Clay	17.848	0.634	4.17	2.058	2.112	3.2	0.66425	0.58	0.448							0.86	1	
72.671	6	Sandy Silt to Clayey Silt	18.958	0.474	4.208	2.079	2.129	3.08	0.66086	0.58	0.446							0.86	1	
73.327	5	Clayey Silt to Silty Clay	16.162	0.429	4.245	2.099	2.146	3.16	0.6575	0.58	0.444							0.86	1	
73.983	5	Clayey Silt to Silty Clay	15.909	0.524	4.283	2.12	2.163	3.21	0.65418	0.57	0.442							0.86	1	
74.639	5	Clayey Silt to Silty Clay	15.527	0.518	4.32	2.14	2.18	3.24	0.65089	0.57	0.440							0.86	1	
75.295	6	Sandy Silt to Clayey Silt	18.252	0.427	4.358	2.161	2.197	3.07	0.64763	0.57	0.438							0.85	1	
75.951	6	Sandy Silt to Clayey Silt	22.347	0.425	4.396	2.181	2.214	2.92	0.64441	0.56	0.436							0.85	1	
76.608	6	Sandy Silt to Clayey Silt	31.011	0.654	4.433	2.202	2.232	2.82	0.64103	0.56	0.434							0.85	1	
77.264	6	Sandy Silt to Clayey Silt	34.896	0.932	4.471	2.222	2.249	2.83	0.63787	0.56	0.433							0.85	1	
77.92	6	Sandy Silt to Clayey Silt	38.161	1.106	4.508	2.243	2.266	2.86	0.63474	0.56	0.431							0.85	1	
78.576	5	Clayey Silt to Silty Clay	35.826	1.175	4.546	2.263	2.283	2.92	0.63164	0.55	0.430							0.85	1	
79.232	5	Clayey Silt to Silty Clay	36.122	1.172	4.584	2.283	2.3	2.91	0.62857	0.55	0.428							0.85	1	
79.888	5	Clayey Silt to Silty Clay	33.7	1.275	4.621	2.304	2.317	2.98	0.62553	0.55	0.427							0.85	1	
80.545	5	Clayey Silt to Silty Clay	29.569	1.002	4.659	2.324	2.334	3	0.62252	0.55	0.425							0.84	1	
81.201	5	Clayey Silt to Silty Clay	29.31	0.967	4.696	2.345	2.351	3.01	0.61954	0.54	0.424							0.84	1	
81.857	5	Clayey Silt to Silty Clay	28.127	0.862	4.734	2.365	2.369	3.03	0.61642	0.54	0.422							0.84	1	
82.513	5	Clayey Silt to Silty Clay	31.004	0.927	4.772	2.386	2.386	2.98	0.6135	0.54	0.421							0.84	1	
83.169	5	Clayey Silt to Silty Clay	36.014	1.38	4.809	2.406	2.403	2.99	0.6106	0.54	0.420							0.84	1	
83.825	6	Sandy Silt to Clayey Silt	29.836	0.801	4.847	2.427	2.42	2.97	0.60773	0.54	0.419							0.84	1	
84.482	5	Clayey Silt to Silty Clay	22.577	0.693	4.884	2.447	2.437	3.15	0.60489	0.53	0.417							0.84	1	
85.138	5	Clayey Silt to Silty Clay	19.759	0.514	4.922	2.468	2.454	3.16	0.60208	0.53	0.416							0.84	1	
85.794	5	Clayey Silt to Silty Clay	20.278	0.569	4.96	2.488	2.471	3.16	0.59929	0.53	0.415							0.83	1	
86.45	6	Sandy Silt to Clayey Silt	32.748	0.873	4.997	2.509	2.488	2.95	0.59653	0.53	0.414							0.83	1	
87.106	6	Sandy Silt to Clayey Silt	28.855	0.844	5.035	2.529	2.506	3.02	0.59363	0.53	0.413							0.83	1	
87.762	6	Sandy Silt to Clayey Silt	37.989	0.987	5.072	2.55	2.523	2.85	0.59092	0.52	0.411							0.83	1	
88.419	6	Sandy Silt to Clayey Silt	46.055	1.357	5.11	2.57	2.54	2.81	0.58824	0.52	0.410							0.83	1	
89.075	6	Sandy Silt to Clayey Silt	39.719	1.146	5.147	2.591	2.557	2.87	0.58557	0.52	0.409							0.83	1	
89.731	6	Sandy Silt to Clayey Silt	28.25	0.826	5.185	2.611	2.574	3.02	0.58294	0.52	0.408							0.83	1	
90.387	6	Sandy Silt to Clayey Silt	28.827	0.782	5.223	2.632	2.591	2.99	0.58032	0.52	0.408							0.83	1	
91.043	6	Sandy Silt to Clayey Silt	44.274	0.965	5.26	2.652	2.608	2.78	0.57773	0.52	0.407							0.83	1	
91.699	6	Sandy Silt to Clayey Silt	31.314	0.654	5.298	2.672	2.625	2.95	0.57516	0.52	0.406							0.82	1	
92.356	6	Sandy Silt to Clayey Silt	34.507	0.856	5.335	2.693	2.643	2.93	0.57247	0.51	0.404							0.82	1	
93.012	6	Sandy Silt to Clayey Silt	28.733	0.874	5.373	2.713	2.66	3.05	0.56995	0.51	0.404							0.82	1	
93.668	6	Sandy Silt to Clayey Silt	32.381	0.972	5.411	2.734	2.677	2.99	0.56745	0.51	0.403							0.82	1	
94.324	5	Clayey Silt to Silty Clay	29.613	0.946	5.448	2.754	2.694	3.06	0.56497	0.51	0.402							0.82	1	
94.98	6	Sandy Silt to Clayey Silt	29.065	0.812	5.486	2.775	2.711	3.05	0.56252	0.51	0.401							0.82	1	
95.636	6	Sandy Silt to Clayey Silt	25.266	0.691	5.523	2.795	2.728	3.1	0.56008	0.51	0.400							0.82	1	
96.293	6	Sandy Silt to Clayey Silt	26.225	0.721	5.561	2.816	2.745	3.07	0.55767	0.51	0.399							0.82	1	
96.949	6	Sandy Silt to Clayey Silt	35.733	1.044	5.599	2.836	2.762	2.96	0.55528	0.50	0.399							0.82	1	
97.605	6	Sandy Silt to Clayey Silt	56.723	1.749	5.636	2.857	2.779	2.8	0.5529	0.50	0.398							0.82	1	
98.261	7	Silty Sand to Sandy Silt	115.162	2.865	5.675	2.877	2.798	2.49	0.55028	0.50	0.397	2.490	0.55	63.37	2.718	172.266		0.81	1	
98.917	8	Sand to Silty Sand	139.83	2.576	5.715	2.898	2.817	2.34	0.54767	0.50	0.396	2.340	0.55	76.58	2.084	159.577	0.46	0.80	1	1.16

CPT DATA CORRELATION

CPT-3



Reference: CPT data and correlation provided by Gregg Drilling and Testing, Inc.

PARIKH

Practicing in the Geosciences

SAN LEANDRO CREE O ERHEAD AT RTE 880
ALAMEDA CO NT , CALIFORNIA

OB NO.: 206139.10

PLATE NO.:

LI EFACTION POTENTIAL ANAL SIS (per Youd & Idriss, 2001)

PROJECT NAME ***San Leandro Creek Bridge and Overhead (Widen)***
PROJECT NO. ***206139.UPR***
CPT NO. ***CPT-3***

FAULT INFO
COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)
a_{max} *(g)=* 0.6

FAULT M_w = 7.5
MSF = 1.00

Depth (ft)		Soil Behavior Type	CPT RESULT INPUT qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	CSR γ_d	CSR	CRR 7.5 Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	F.S.=(CRR 7.5/CSR)*MSF*Kσ*Kα Kσ	Kα	F.S.
0.492									1.7	1.00									1	
1.148									1.7	1.00									1	
1.804									1.7	1.00									1	
2.461									1.7	1.00									1	
3.117									1.7	0.99									1	
3.773									1.7	0.99									1	
4.429									1.7	0.99									1	
5.085	6	Sandy Silt to Clayey Silt	24.134	0.318	0.291		0.291	2.06	1.47552	0.99	0.386	2.060	1.48	35.61	1.387	49.382	0.09	1.00	1	
5.741	5	Clayey Silt to Silty Clay	31.991	0.979	0.329		0.329	2.27	1.43885	0.99	0.386	2.270	1.44	46.03	1.856	85.436	0.14	1.00	1	
6.398	6	Sandy Silt to Clayey Silt	34.024	0.867	0.367		0.367	2.22	1.40396	0.99	0.385	2.220	1.40	47.77	1.717	82.027	0.13	1.00	1	
7.054	7	Silty Sand to Sandy Silt	49.688	0.568	0.405		0.405	1.89	1.37072	0.99	0.384	1.890	1.37	68.11	1.180	80.338	0.13	1.00	1	
7.71	8	Sand to Silty Sand	63.679	0.515	0.445		0.445	1.74	1.33739	0.98	0.384	1.740	1.34	85.16	1.065	90.683	0.15	1.00	1	
8.366	7	Silty Sand to Sandy Silt	46.97	0.529	0.483		0.483	1.96	1.30719	0.98	0.383	1.960	1.31	61.40	1.251	76.816	0.12	1.00	1	
9.022	7	Silty Sand to Sandy Silt	46.668	0.576	0.522		0.522	2.01	1.27758	0.98	0.383	2.010	1.28	59.62	1.313	78.301	0.12	1.00	1	
9.678	9	Sand	117.634	0.538	0.563		0.563	1.45	1.24787	0.98	0.382	1.450	1.25	146.79	1.000	146.792	0.37	1.00	1	
10.335	8	Sand to Silty Sand	68.242	0.486	0.603	0.01	0.592	1.78	1.22768	0.98	0.389	1.780	1.23	83.78	1.092	91.516	0.15	1.00	1	0.39
10.991	7	Silty Sand to Sandy Silt	41.801	0.5	0.641	0.031	0.61	2.1	1.21547	0.98	0.400	2.100	1.22	50.81	1.455	73.913	0.12	1.00	1	0.29
11.647	9	Sand	110.261	0.566	0.682	0.051	0.631	1.54	1.20153	0.98	0.411	1.540	1.20	132.48	1.000	132.482	0.30	1.00	1	0.72
12.303	9	Sand	104.313	0.385	0.723	0.072	0.651	1.49	1.18855	0.97	0.422	1.490	1.19	123.98	1.000	123.981	0.26	1.00	1	0.61
12.959	6	Sandy Silt to Clayey Silt	21.387	0.392	0.76	0.092	0.668	2.48	1.17773	0.97	0.432	2.480	1.18	25.19	2.669	67.236	0.11	1.00	1	0.25
13.615	3	Clay	7.266	0.267	0.797	0.113	0.684	3.09	1.16773	0.97	0.441							1.00	1	
14.272	3	Clay	5.039	0.253	0.833	0.133	0.7	3.35	1.15789	0.97	0.450							1.00	1	
14.928	3	Clay	5.435	0.274	0.87	0.154	0.716	3.32	1.14823	0.97	0.459							1.00	1	
15.584	4	Silty Clay to Clay	8.909	0.223	0.907	0.174	0.733	2.94	1.13813	0.97	0.467							1.00	1	
16.24	5	Clayey Silt to Silty Clay	8.946	0.164	0.945	0.195	0.75	2.88	1.12821	0.97	0.475							1.00	1	
16.896	5	Clayey Silt to Silty Clay	12.247	0.304	0.983	0.215	0.768	2.83	1.11789	0.96	0.481							1.00	1	
17.552	5	Clayey Silt to Silty Clay	12.636	0.351	1.02	0.236	0.785	2.85	1.10831	0.96	0.488							1.00	1	
18.209	4	Silty Clay to Clay	11.793	0.392	1.058	0.256	0.802	2.94	1.0989	0.96	0.495							1.00	1	
18.865	4	Silty Clay to Clay	11.31	0.346	1.095	0.277	0.819	2.94	1.08965	0.96	0.500							1.00	1	
19.521	5	Clayey Silt to Silty Clay	16.954	0.367	1.133	0.297	0.836	2.7	1.08055	0.96	0.506							1.00	1	
20.177	5	Clayey Silt to Silty Clay	13.062	0.348	1.171	0.317	0.853	2.87	1.0716	0.96	0.512							1.00	1	
20.833	5	Clayey Silt to Silty Clay	13.22	0.338	1.208	0.338	0.87	2.86	1.0628	0.95	0.517							1.00	1	
21.49	6	Sandy Silt to Clayey Silt	21.149	0.49	1.246	0.358	0.887	2.66	1.05414	0.95	0.522							1.00	1	
22.146	5	Clayey Silt to Silty Clay	23.68	0.631	1.283	0.379	0.905	2.66	1.04513	0.95	0.526							1.00	1	
22.802	5	Clayey Silt to Silty Clay	21.193	0.696	1.321	0.399	0.922	2.77	1.03676	0.95	0.530							1.00	1	
23.458	5	Clayey Silt to Silty Clay	18.1	0.488	1.359	0.42	0.939	2.78	1.02852	0.95	0.535							1.00	1	
24.114	4	Silty Clay to Clay	12.024	0.372	1.396	0.44	0.956	2.99	1.02041	0.94	0.538							1.00	1	
24.77	5	Clayey Silt to Silty Clay	22.584	0.599	1.434	0.461	0.973	2.71	1.01243	0.94	0.542							1.00	1	
25.427	6	Sandy Silt to Clayey Silt	22.663	0.497	1.471	0.481	0.99	2.66	1.00457	0.94	0.545							1.00	1	
26.083	5	Clayey Silt to Silty Clay	16.572	0.45	1.509	0.502	1.007	2.84	0.99683	0.94	0.548							1.00	1	
26.739	5	Clayey Silt to Silty Clay	15.138	0.416	1.547	0.522	1.024	2.88	0.98921	0.94	0.551							1.00	1	
27.395	5	Clayey Silt to Silty Clay	16.659	0.43	1.584	0.543	1.042	2.83	0.98127	0.93	0.553							0.99	1	
28.051	5	Clayey Silt to Silty Clay	14.208	0.388	1.622	0.563	1.059	2.92	0.97388	0.93	0.555							0.99	1	
28.707	6	Sandy Silt to Clayey Silt	13.365	0.22	1.659	0.584	1.076	2.83	0.96661	0.93	0.557							0.99	1	
29.364	6	Sandy Silt to Clayey Silt	11.923	0.163	1.697	0.604	1.093	2.84	0.95944	0.92	0.559							0.98	1	
30.02	6	Sandy Silt to Clayey Silt	11.93	0.163	1.735	0.625	1.11	2.84	0.95238	0.92	0.561							0.98	1	
30.676	6	Sandy Silt to Clayey Silt	11.411	0.162	1.772	0.645	1.127	2.87	0.94542	0.92	0.562							0.98	1	
31.332	5	Clayey Silt to Silty Clay	10.762	0.147	1.81	0.665	1.144	2.9	0.93857	0.91	0.564							0.97	1	
31.988	6	Sandy Silt to Clayey Silt	14.258	0.142	1.847	0.686	1.161	2.71	0.93181	0.91	0.564							0.97	1	
32.644	6	Sandy Silt to Clayey Silt	18.72	0.266	1.885	0.706	1.178	2.68	0.92515	0.91	0.565							0.97	1	
33.301	6	Sandy Silt to Clayey Silt	21.589	0.349	1.923	0.727	1.196	2.67	0.9182	0.90	0.566							0.96	1	
33.957	6	Sandy Silt to Clayey Silt	14.388	0.24	1.96	0.747	1.213	2.84	0.91173	0.90	0.566							0.96	1	
34.613	6	Sandy Silt to Clayey Silt	14.359	0.191	1.998	0.768	1.23	2.78	0.90535	0.89	0.566							0.96	1	
35.269	7	Silty Sand to Sandy Silt	15.887	0.063	2.036	0.788	1.248	2.54	0.89869	0.89	0.565	2.540	0.90	14.28	2.979	42.532	0.09	0.96	1	0.15
35.925	7	Silty Sand to Sandy Silt	22.404	0.169	2.075	0.809	1.266	2.51	0.89213	0.88	0.565	2.510	0.89	19.99	2.820	56.355	0.10	0.95	1	0.17
36.581	7	Silty Sand to Sandy Silt	23.168	0.238	2.114	0.829	1.284	2.55	0.88567	0.88	0.564	2.550	0.89	20.52	3.034	62.260	0.10	0.95	1	0.18
37.238	6	Sandy Silt to Clayey Silt	20.847	0.225	2.151	0.85	1.301	2.62	0.87965	0.87	0.564							0.95	1	
37.894	6	Sandy Silt to Clayey Silt	28.005	0.466	2.189	0.87	1.319	2.6	0.87336	0.87	0.562							0.95	1	
38.55	5	Clayey Silt to Silty Clay	26.613	1.039	2.226	0.891	1.336	2.86	0.86751	0.86	0.561							0.94	1	
39.206	5	Clayey Silt to Silty Clay	19.816	0.648	2.264	0.911	1.353	2.92	0.86173	0.86	0.560							0.94	1	
39.862	6	Sandy Silt to Clayey Silt	26.037	0.593	2.302	0.932	1.37	2.72	0.85603	0.85	0.558							0.94	1	
40.518	6	Sandy Silt to Clayey Silt	21.979	0.564	2.339	0.952	1.387	2.83	0.85041	0.85	0.557							0.94	1	
41.175	6	Sandy Silt to Clayey Silt	22.757	0.467	2.377	0.973	1.404	2.76	0.84485	0.84	0.555							0.93	1	
41.831	7	Silty Sand to Sandy Silt	30.182	0.427	2.415	0.993	1.422	2.56	0.83905	0.83	0.553	2.560	0.84	25.32	3.091	78.266	0.12	0.93	1	0.23
42.487	6	Sandy Silt to Clayey Silt	23.91	0.412	2.453	1.014	1.439	2.71	0.83365	0.83	0.551							0.93	1	
43.143	6	Sandy Silt to Clayey Silt	19.347	0.368	2.491	1.034	1.457	2.83	0.828	0.82	0.548							0.93	1	
43.799	6	Sandy Silt to Clayey Silt	19.138	0.405	2.528	1.054	1.474	2.87	0.82274	0.82	0.545							0.93	1	
44.455	6	Sandy Silt to Clayey Silt	19.715	0.452	2.566	1.075	1.491	2.88	0.81754	0.81	0.543							0.92	1	
45.112	6	Sandy Silt to Clayey Silt	17.97	0.393	2.603	1.095	1.508	2.91	0.81241	0.80	0.540							0.92	1	
45.768	6	Sandy Silt to Clayey Silt	18.288	0.389	2.641	1.116	1.525	2.9	0.80734	0.80	0.538							0.92	1	
46.424	6	Sandy Silt to Clayey Silt	20.739	0.426	2.679	1.136	1.542	2.84	0.80233	0.79	0.535							0.92	1	
47.08	6	Sandy Silt to Clayey Silt	19.023	0.407	2.716	1.157	1.559	2.89	0.79739	0.78	0.532							0.92	1	
47.736	6	Sandy Silt to Clayey Silt	17.776	0.341	2.754	1.177	1.576	2.9	0.79251	0.78	0.529							0.91	1	
48.392	6	Sandy Silt to Clayey Silt	17.927	0.237	2.791	1.198	1.594	2.82	0.7874	0.77	0.525							0.91	1	
49.049	6	Sandy Silt to Clayey Silt	17.365	0.259	2.829	1.218	1.611	2.87	0.78264	0.76	0.522							0.91	1	
49.705	6	Sandy Silt to Clayey Silt	17.718	0.255	2.867	1.239	1.628	2.85	0.77793	0.76	0.519							0.91	1	
50.361	6	Sandy Silt to Clayey Silt	22.31	0.391	2.904	1.259	1.645	2.8	0.77329	0.75	0.516							0.91	1	
51.017	7	Silty Sand to Sandy Silt	85.651	1.998	2.943	1.28	1.663	2.39	0.76842	0.74	0.512	2.390	0.77	65.82	2.272	149.536	0.39	0.90	1	0.76
51.673	9	Sand	189.993	1.898	2.983	1.3	1.683	1.88	0.76309	0.74	0.509	1.880	0.76	144.98	1.171	169.713		0.85	1	
52.329	7	Silty Sand to Sandy Silt	70.311	1.297	3.022	1.321	1.702	2.4	0.7581	0.73	0.505	2.400	0.76	53.30	2.312	123.255	0.25	0.90	1	0.50
52.986	5	Clayey Silt to Silty Clay	19.578	0.459	3.06	1.341	1.719	3	0.75368	0.72	0.502							0.90	1	
53.642	6	Sandy Silt to Clayey Silt	20.27	0.395	3.097	1.362	1.736	2.94	0.74932	0.72	0.498							0.90	1	
54.298	5	Clayey Silt to Silty Clay	18.756	0.444	3.135	1.382	1.753	3.03	0.74501	0.71	0.495							0.89	1	
54.954	5	Clayey Silt to Silty Clay	18.67	0.44	3.173	1.402	1.77	3.04	0.74074	0.70	0.492							0.89	1	
55.61	6	Sandy Silt to Clayey Silt	25.042	0.614	3.21	1.423	1.787	2.91	0.73652	0.70	0.489							0.89	1	
56.266	6	Sandy Silt to Clayey Silt	31.616	0.889	3.248	1.443	1.804	2.85	0.73236	0.69	0.486							0.89	1	
56.923	5	Clayey Silt to Silty Clay	31.025	0.92	3.285	1.464	1.821	2.88	0.72824	0.69	0.482							0.89	1	
57.579	5	Clayey Silt to Silty Clay	25.15	0.771	3.323	1.484	1.839	2.98	0.72392	0.68	0.479							0.89	1	
58.235	6	Sandy Silt to Clayey Silt	20.681	0.475	3.36	1.505	1.856	3	0.7199	0.67	0.476							0.88	1	
58.891	6	Sandy Silt to Clayey Silt	22.317	0.505	3.398	1.525	1.873	2.97	0.71591	0.67	0.473							0.88	1	
59.547	6	Sandy Silt to Clayey Silt	24.285	0.537	3.436	1.546	1.89	2.92	0.71197	0.66	0.470							0.88	1	
60.203	6	Sandy Silt to Clayey Silt	21.171	0.453	3.473	1.566	1.907	2.99	0.70808	0.66	0.467							0.88	1	
60.86	6	Sandy Silt to Clayey Silt	24.602	0.463	3.511	1.587	1.924	2.89	0.70423	0.65	0.464							0.88	1	

LI EFACTION POTENTIAL ANAL SIS (per Youd & Idriss, 2001)

PROJECT NAME	***San Leandro Creek Bridge and Overhead (Widen)***	*FAULT INFO*	
PROJECT NO.	***206139.UPR***	*COAST RANGE - SIERRAN BLOCK BOUNDARY ZONE (CSB)*	
CPT NO.	***CPT-3***	*a_{max} (g)=* 0.6	*FAULT M_w =* 7.5
			MSF = 1.00

		CPT RESULT INPUT							*CSR*		*$CRR_{7.5}$*						*F.S.=($CRR_{7.5}$/CSR)*MSF*Kσ*Kα*		
Depth (ft)		Soil Behavior Type	qc (tsf)	fs (tsf)	σ_v (tsf)	u (tsf)	σ_v' (tsf)	Ic*	C_N*	γ_d	CSR	Ic	C_Q	q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	Kσ	Kα	F.S.
61.516	6	Sandy Silt to Clayey Silt	26.303	0.491	3.548	1.607	1.941	2.86	0.70041	0.65	0.461							0.88	1	
62.172	6	Sandy Silt to Clayey Silt	24.746	0.49	3.586	1.628	1.958	2.9	0.69664	0.64	0.459							0.87	1	
62.828	6	Sandy Silt to Clayey Silt	25.82	0.523	3.624	1.648	1.975	2.89	0.69291	0.64	0.456							0.87	1	
63.484	6	Sandy Silt to Clayey Silt	23.73	0.469	3.661	1.669	1.993	2.92	0.68901	0.63	0.453							0.87	1	
64.14	6	Sandy Silt to Clayey Silt	25.208	0.486	3.699	1.689	2.01	2.89	0.68536	0.63	0.451							0.87	1	
64.797	6	Sandy Silt to Clayey Silt	27.817	0.513	3.736	1.71	2.027	2.83	0.68175	0.62	0.448							0.87	1	
65.453	6	Sandy Silt to Clayey Silt	38.998	1.051	3.774	1.73	2.044	2.77	0.67818	0.62	0.446							0.87	1	
66.109	6	Sandy Silt to Clayey Silt	63.658	1.794	3.812	1.751	2.061	2.62	0.67464	0.61	0.444							0.87	1	
66.765	8	Sand to Silty Sand	213.183	3.392	3.851	1.771	2.08	2.05	0.67073	0.61	0.441	2.050	0.67	142.99	1.371	196.045		0.80	1	
67.421	10	Gravelly Sand to Sand	390.756	2.076	3.893	1.791	2.102	1.53	0.66626	0.61	0.438	1.530	0.67	260.35	1.000	260.346		0.74	1	
68.077	9	Sand	337.298	3.759	3.934	1.812	2.122	1.8	0.66225	0.60	0.436	1.800	0.66	223.38	1.107	247.201		0.75	1	
68.734	9	Sand	350.323	4.761	3.975	1.832	2.142	1.85	0.65829	0.60	0.433	1.850	0.66	230.61	1.145	264.071		0.74	1	
69.39	8	Sand to Silty Sand	222.236	3.939	4.014	1.853	2.161	2.08	0.65457	0.60	0.431	2.080	0.65	145.47	1.420	206.514		0.79	1	
70.046	11	Sitff Fine-Grained	124.029	4.939	4.057	1.873	2.184	2.52	0.65012	0.59	0.429	2.520	0.65	80.63	2.872	231.549		0.86	1	
70.702	8	Sand to Silty Sand	217.58	3.736	4.097	1.894	2.203	2.08	0.64649	0.59	0.427	2.080	0.65	140.66	1.420	199.692		0.79	1	
71.358	10	Gravelly Sand to Sand	357.553	1.891	4.138	1.914	2.224	1.58	0.64252	0.58	0.424	1.580	0.64	229.74	1.000	229.736		0.73	1	
72.014	8	Sand to Silty Sand	142.446	2.054	4.178	1.935	2.243	2.18	0.63898	0.58	0.422	2.180	0.64	91.02	1.619	147.376	0.38	0.82	1	0.89
72.671	6	Sandy Silt to Clayey Silt	29.576	0.728	4.216	1.955	2.26	2.95	0.63584	0.58	0.421							0.85	1	
73.327	6	Sandy Silt to Clayey Silt	27.918	0.53	4.253	1.976	2.278	2.92	0.63255	0.58	0.419							0.85	1	
73.983	6	Sandy Silt to Clayey Silt	29.194	0.463	4.291	1.996	2.295	2.86	0.62947	0.57	0.417							0.85	1	
74.639	6	Sandy Silt to Clayey Silt	29.706	0.625	4.329	2.017	2.312	2.92	0.62642	0.57	0.416							0.85	1	
75.295	6	Sandy Silt to Clayey Silt	42.349	0.946	4.366	2.037	2.329	2.78	0.62341	0.57	0.414							0.84	1	
75.951	6	Sandy Silt to Clayey Silt	31.674	0.605	4.404	2.058	2.346	2.87	0.62042	0.56	0.413							0.84	1	
76.608	6	Sandy Silt to Clayey Silt	27.442	0.396	4.441	2.078	2.363	2.88	0.61746	0.56	0.411							0.84	1	
77.264	7	Silty Sand to Sandy Silt	28.92	0.388	4.48	2.099	2.381	2.84	0.61435	0.56	0.410							0.84	1	
77.92	6	Sandy Silt to Clayey Silt	126.573	4.37	4.518	2.119	2.399	2.5	0.61128	0.56	0.408	2.500	0.61	77.37	2.768	214.199		0.84	1	
78.576	8	Sand to Silty Sand	305.826	6.286	4.557	2.139	2.418	2.06	0.60807	0.55	0.407	2.060	0.61	185.96	1.387	257.881		0.73	1	
79.232	10	Gravelly Sand to Sand	368.871	2.81	4.599	2.16	2.439	1.7	0.60456	0.55	0.405	1.700	0.60	223.01	1.038	231.448		0.70	1	
79.888	10	Gravelly Sand to Sand	358.44	1.905	4.641	2.18	2.46	1.62	0.60109	0.55	0.404	1.620	0.60	215.46	1.000	215.456		0.70	1	
80.545	10	Gravelly Sand to Sand	321.273	2.261	4.683	2.201	2.482	1.74	0.5975	0.55	0.402	1.740	0.60	191.96	1.065	204.402		0.71	1	
81.201	10	Gravelly Sand to Sand	396.919	2.173	4.724	2.221	2.503	1.6	0.59411	0.54	0.400	1.600	0.59	235.81	1.000	235.815		0.69	1	
81.857	10	Gravelly Sand to Sand	376.519	2.183	4.766	2.242	2.524	1.64	0.59076	0.54	0.399	1.640	0.59	222.43	1.000	222.433		0.69	1	
82.513	10	Gravelly Sand to Sand	282.521	1.603	4.808	2.262	2.546	1.74	0.58729	0.54	0.398	1.740	0.59	165.92	1.065	176.676		0.72	1	
83.169	10	Gravelly Sand to Sand	263.195	0.977	4.85	2.283	2.567	1.67	0.58402	0.54	0.396	1.670	0.58	153.71	1.017	156.382	0.44	0.73	1	1.10
83.825	9	Sand	262.287	1.602	4.89	2.303	2.587	1.79	0.58093	0.54	0.395	1.790	0.58	152.37	1.099	167.524		0.73	1	
84.482	8	Sand to Silty Sand	155.739	2.916	4.93	2.324	2.606	2.28	0.57803	0.53	0.394	2.280	0.58	90.02	1.886	169.798		0.80	1	
85.138	6	Sandy Silt to Clayey Silt	96.283	2.793	4.968	2.344	2.623	2.57	0.57546	0.53	0.393	2.570	0.58	55.41	3.148	174.420		0.82	1	
85.794	7	Silty Sand to Sandy Silt	90.798	1.731	5.006	2.365	2.642	2.48	0.57262	0.53	0.392	2.480	0.57	51.99	2.669	138.786	0.33	0.82	1	0.84
86.45	7	Silty Sand to Sandy Silt	95.231	2.275	5.045	2.385	2.66	2.53	0.56995	0.53	0.391	2.530	0.57	54.28	2.925	158.747	0.45	0.82	1	1.16
87.106	5	Clayey Silt to Silty Clay	37.448	1.25	5.082	2.406	2.677	2.99	0.56745	0.53	0.390							0.82	1	
87.762	6	Sandy Silt to Clayey Silt	27.998	0.744	5.12	2.426	2.694	3.07	0.56497	0.52	0.389							0.82	1	
88.419	6	Sandy Silt to Clayey Silt	30.225	0.72	5.158	2.447	2.711	3.01	0.56252	0.52	0.388							0.82	1	
89.075	7	Silty Sand to Sandy Silt	41.362	0.665	5.196	2.467	2.729	2.77	0.55994	0.52	0.387							0.82	1	
89.731	6	Sandy Silt to Clayey Silt	30.989	0.635	5.234	2.488	2.746	2.97	0.55753	0.52	0.386							0.82	1	
90.387	6	Sandy Silt to Clayey Silt	29.684	0.695	5.272	2.508	2.764	3.02	0.55499	0.52	0.386							0.82	1	
91.043	6	Sandy Silt to Clayey Silt	29.684	0.622	5.309	2.528	2.781	2.99	0.55262	0.52	0.385							0.82	1	
91.699	6	Sandy Silt to Clayey Silt	35.285	0.599	5.347	2.549	2.798	2.86	0.55028	0.52	0.384							0.81	1	
92.356	6	Sandy Silt to Clayey Silt	27.284	0.555	5.384	2.569	2.815	3.02	0.54795	0.51	0.383							0.81	1	
93.012	6	Sandy Silt to Clayey Silt	26.044	0.511	5.422	2.59	2.832	3.02	0.54563	0.51	0.383							0.81	1	
93.668	6	Sandy Silt to Clayey Silt	34.81	0.692	5.459	2.61	2.849	2.89	0.54334	0.51	0.382							0.81	1	
94.324	6	Sandy Silt to Clayey Silt	36.684	0.952	5.497	2.631	2.866	2.94	0.54107	0.51	0.381							0.81	1	
94.98	6	Sandy Silt to Clayey Silt	30.787	0.757	5.535	2.651	2.883	2.99	0.53882	0.51	0.381							0.81	1	
95.636	7	Silty Sand to Sandy Silt	32.604	0.578	5.573	2.672	2.902	2.88	0.53632	0.51	0.380							0.81	1	
96.293	7	Silty Sand to Sandy Silt	39.495	0.658	5.612	2.692	2.92	2.78	0.53398	0.51	0.379							0.81	1	
96.949	7	Silty Sand to Sandy Silt	40.31	0.674	5.651	2.713	2.938	2.78	0.53166	0.50	0.378							0.81	1	
97.605	6	Sandy Silt to Clayey Silt	40.475	0.997	5.688	2.733	2.955	2.88	0.52948	0.50	0.378							0.81	1	
98.261	6	Sandy Silt to Clayey Silt	41.211	0.982	5.726	2.754	2.972	2.86	0.52733	0.50	0.377							0.80	1	
98.917	6	Sandy Silt to Clayey Silt	34.262	0.9	5.763	2.774	2.989	2.99	0.52519	0.50	0.376							0.80	1	

STRUCTURAL PAVEMENT DESIGN

PARIKH
Practicing in the Geosciences

JOB ROUTE 880 SB - ALA 880 PM 22.5/25.5
SHEET NO OF
CALCULATED BY Y. DAVID WANG DATE 11/29/10
CHECKED BY DATE
SCALE 206139

ROUTE 880 SB HOV LANE EXTENSION

- PAVEMENT CALC - MAIN LINE WIDENING (MATCHING AS-BUILT AT P.B), TI=16.5
- PAVEMENT CALC - RAMP, TI=12

(COVER PAGE FOR HAND-CALC PAGES 1 THRU 11)

PARIKH
Practicing in the Geosciences

JOB ROUTE 880 - MARINA TO HEGENBERGER
SHEET NO OF
CALCULATED BY Y. DAVID WANG DATE 11/29/10
CHECKED BY DATE 1/16/12
SCALE 206139 pg 1/1

ROUTE 880 SB HOV LANE EXTENSION Ala 880-PM 22.5/25.5

- AS-BUILT SECTIONS CONSIST OF

(MARINA – DAVIS (1997)	(SAN LEANDRO CRK – HEGENBERGER (1998)
0.10' OGAC	0.10' OGAC
0.15' RAC-G	0.15' RAC-G
0.10' OGAC	
0.65' AC	0.65' AC
0.25' ATPB (W/ EDGE DRAIN)	0.25' ATPB (W/ EDGE DRAIN)
0.70' CTB	0.50' CTB
1.60' AS	1.55' AS

- THE AS-BUILT ATPB NEEDS TO BE PERPETUATED IN THE NEW SECTIONS.
- DESIGN TI = 16.5 (MAINLINE) > 20-YEAR DESIGN
  12 (RAMP)
- SUBGRADE R-VALUE DATA –

SUMMARY OF R-VALUE TEST RESULTS
ROUTE 880 SB HOV LANE EXTENSION Ala 880-PM 22.5/25.5

Boring No.	Station & Offset (ft.)	Date Drilled	Description	R-Value
R-1	"I-880" Line 314+49 82 Lt.	06/09/08	Clayey Sand	48
R-2	"I-880" Line 320+48 89 Lt.	06/09/08	Silty Gravel	82
R-3	"I-880" Line 324+34 70 Lt.	06/09/08	Lean Clay with Gravel	--
R-6	"I-880" Line 333+88 66' Lt.	06/09/08	Sandy Lean Clay	--
R-8	"I-880" Line 344+42 104' Lt	06/11/08	Clayey Sand	48
R-9	"I-880" Line 347+10 99' Lt.	06/11/08	Sandy Lean Clay with Gravel	--
R-10	"I-880" Line 349+97 87' Lt.	06/11/08	Lean Clay with Gravel	68
R-12	"I-880" Line 353+95 87' Lt.	06/10/08	Gravelly Lean Clay	--
R-13	"I-880" Line 365+43 81' Lt.	06/10/08	Sandy Lean Clay with Gravel	--
R-14	"I-880" Line 366+63 82' Lt.	06/09/08	Clayey Sand	58
R-15	"I-880" Line 369+06 182' Rt.	06/09/08	Sandy Lean Clay	16
R-16	"I-880" Line 370+05 417' Rt.	06/09/08	Sandy Lean Clay	--
R-18	"DA1" Line 21+92 112' Rt.	06/10/08	Clayey Sand	37
R-19	"DA1" Line 19+15 79' Rt.	06/10/08	Lean Clay with Gravel	--
R-20	"I-880" Line 375+43 749' Lt.	06/09/08	Clayey Sand	44
R-26	"I-880" Line 378+47 143' Lt.	06/09/08	Sandy Lean Clay	21
R-27	"I-880" Line 383+13 81' Lt.	06/09/08	Sandy Lean Clay with Gravel	--
R-29	"I-880" Line 393+28 83' Lt.	06/09/08	Sandy Lean Clay	26
R-33	"I-880" Line 419+13 83 Lt.	06/09/08	Silty Sand with Gravel	--
R-35	"I-880" Line 428+25 87' Lt.	06/16/08	Poorly-Graded Sand	--
R-36	"I-880" Line 428+31 84' Lt.	06/09/08	Clayey Sand	45
R-38	"I-880" Line 436+93 74' Lt.	06/16/08	Clayey Sand	47
R-40	"I-880" Line 446+85 87' Lt.	06/13/08	Clayey Gravel	73
R-41	"I-880" Line 456+02 100' Rt.	06/09/08	Sandy Clay	14

PM 22.5/24.0
PM 24.0/25.5

- PER CALTRANS COMMENT (7/28/09), IT IS REQUIRED TO SHOW PAVEMENT ALTERNATIVES, IDENTIFY THE PREFERRED ALTERNATIVES AND STATE REASONS FOR SELECTION.

- DESIGN R-VALUE
  THE PAVEMENT SUBGRADE IS EXISTING ROADWAY FILL/IMPORT THAT CONTAINS SUBSTANTIAL AMOUNT OF GRANULAR MATERIAL. THE LOWEST R-VALUE IS 14 ~ 16. MAJORITY ARE OVER 20. PER HDM 614.5 IT IS FEASIBLE TO USE A LAYER OF SUBGRADE ENHANCEMENT GEOTEXTILE (SEG) AND USE R-VALUE = 20 FOR DESIGN.

(I) MAINLINE WIDENING (TI = 16.5, R = 20)

CONSIDER THE FOLLOWING ALTERNATIVES:

(1) FLEXIBLE OPTION 1 - HMA, LCB & AS, NEED ATPB TO CONNECT TO EXIST. ATPB
(2) FLEXIBLE OPTION 2 - HMA, LCB & LIME TREATED SUBBASE (LTS), NEED ATPB
(3) FLEXIBLE OPTION 3 - FULL DEPTH HMA, NEED ATPB TO CONNECT TO EXIST. ATPB
(4) RIGID OPTION - JPCP, NEED ATPB

* FLEXIBLE OPTION 1 - HMA, LCB & AS (W/ ATPB)

$TI = 16.5$, $R_{base} = 20$ (W/ SEG), $R_{AS} = 50$ (CL.4 AS)

$$GE_{TOTAL} = 0.0032\, TI\,(100 - R_{base})$$
$$= 0.0032(16.5)(100-20)$$
$$= 4.22$$

$$GE_{HMA+ATPB+LCB} = 0.0032\, TI\,(100 - R_{AS})$$
$$= 0.0032(16.5)(100-50)$$
$$= 2.64$$

$$GE_{HMA} = (GE_{HMA+ATPB+LCB})(0.4) + 0.2' = 1.26$$

$t > 0.5'$, $$GF_{HMA} = (7.0)\frac{(t)^{1/3}}{(TI)^{1/2}} = (7.0)\frac{t^{1/3}}{16.5^{1/2}} = 1.72\,(t)^{1/3}$$

HMA THICKNESS $$t = GE_{HMA}/GF = \frac{1.26}{1.72\,(t)^{1/3}}$$

$t \cdot t^{1/3} = \frac{1.26}{1.72}$, $t^{4/3} = 0.733$, $t = (0.733)^{3/4} = 0.79 \rightarrow$ use 0.80

$Gf_{HMA} = 1.72\,(t)^{1/3} = 1.72\,(0.80)^{1/3} = 1.60$

$t = 0.80' \longrightarrow$ USE HMA $t = 0.80'$

$GE_{HMA} = 0.80 \times 1.60 = 1.28 > 1.26$ OK

- ATPB LAYER $\longrightarrow$ USE 0.25' ATPB TO MATCH AS-BUILT

  $Gf_{ATPB} = 1.4$ $\therefore$ $GE_{ATPB} = 0.25 \times 1.40 = 0.35$

- LCB LAYER

  $GE_{LCB} = GE_{HMA+ATPB+LCB} - GE_{HMA} - 0.35 + 0.2$

  $= 2.64 - 1.28 - 0.35 + 0.2 = 1.21$

  $Gf_{LCB} = 1.9$, $\therefore$ $t_{LCB} = 1.21/1.9 = 0.64$

  USE LCB $t = 0.65'$, $GE_{LCB} = 0.65 \times 1.9 = 1.24$

- AS LAYER

  $GE_{AS} = GE_{TOTAL} - GE_{HMA} - GE_{ATPB} - GE_{LCB}$

  $= 4.22 - 1.28 - 0.35 - 1.24 = 1.35$

CALCULATED SECTION: 0.80' HMA, 0.25' ATPB, 0.65' LCB & 1.35' AS

NEED TO USE 0.10' HMA(O) FOR WEARING SURFACE & MATCH AS-BUILT ATPB (@ 0.90' DEPTH). ALSO NEED TO MATCH EXISTING 0.15' RAC-G

$\therefore$ PAVEMENT SECTION =

0.10'	HMA (O)
0.15'	RHMA-G
0.65'	HMA (A)
0.25'	ATPB
0.65'	LCB
1.35'	AS OVER SEG

* IF THERE IS NO AS-BUILT ATPB TO MATCH, REPLACE THE 0.25' ATPB W/ 0.25' HMA

* FLEXIBLE OPTION 2 - HMA, LCB & LTS (W/ ATPB)

- USE LIME TREATED SUBBASE (LTS), SPECIFY UNCONFINED COMP STRENGTH (UCS) = 300 PSI (HDM 614.4), AND $G_f = 1.2$ FOR LTS. USE 1.5' LTS, WHICH IS THE LIMIT CONTRACTOR CAN MIX & COMPACT IN ONE LIFT.

- USE 1.5' LTS, $GE_{LTS} = 1.5' \times 1.2 = 1.8$
- NATIVE R = 14, TI = 16.5

$$GE_{TOTAL} = 0.0032\, TI\,(100 - R_{native})$$
$$= 0.0032\,(16.5)(100-14)$$
$$= 4.54$$

$$GE_{HMA+ATPB+LCB} = GE_{TOTAL} - GE_{LTS}$$
$$= 4.54 - 1.8 = 2.74$$

$$GE_{HMA} = (GE_{HMA-ATPB+LCB})(0.4) + 0.2'$$
$$= (2.74)(0.4) + 0.2 = 1.30'$$

$$t > 0.5', \quad G_{f\,HMA} = (7.0)\frac{t^{1/3}}{(TI)^{1/2}} = 1.72\,(t)^{1/3}$$

HMA THICKNESS $t = GE_{HMA}/G_f = \dfrac{1.30}{1.72\,t^{1/3}}$

$$t \cdot t^{1/3} = \frac{1.30}{1.72}, \quad t^{4/3} = 0.756, \quad t = (0.756)^{3/4} = 0.81'$$ NEED TO USE 0.90'

NEED TO USE t = 0.90' TO LINE UP ATPB W/ THE AS-BUILT

$$G_{f\,HMA} = 1.72\,(0.9)^{1/3} = 1.66$$

$$GE_{HMA} = 0.9' \times 1.66 = 1.49 > 1.30 \quad \text{OK}$$

- ATPB LAYER → USE 0.25' ATPB TO MATCH AS-BUILT

$$G_{f\,ATPB} = 1.40, \quad GE_{ATPB} = 0.25 \times 1.4 = 0.35$$

- LCB LAYER

$$GE_{LCB} = GE_{TOTAL} - GE_{HMA} - GE_{ATPB} - GE_{LTS}$$
$$= 4.54 - 1.49 - 0.35 - 1.8$$
$$= 0.90$$

$G_{f\,LCB} = 1.9$, ∴ $t_{LCB} = 0.9/1.9 = 0.47'$, USE LCB $t = 0.50'$

CALCULATED SECTION: 0.90' HMA, 0.25' ATPB, 0.50' LCB & 1.50' LTS
NEED TO USE 0.10' OGFC (WEARING SURFACE) & MATCH AS-BUILT ATPB (@ 0.90' DEPTH). ALSO NEED TO MATCH EXISTING 0.15' RAC-G.

∴ PAVEMENT SECTIONS:

0.10' OGFC	⟹	0.10' HMA (O)
0.90' HMA		0.15' RHMA-G
0.25' ATPB		0.65' HMA (A)
0.50' LCB		0.25' ATPB
1.50' LTS		0.10' HMA (A)
		0.50' LCB
		1.50' LTS

* FLEXIBLE OPTION 3 - FULL DEPTH HMA (W/ ATPB)

$GE_{TOTAL} = 0.0032\,TI\,(100 - R_{base})$
$= 0.0032\,(16.5)\,(100 - 20)$ ← W/ SEG
$= 4.22$

FULL DEPTH, $GE_{HMA} = 4.22 + 0.1\,(PS) - GE_{ATPB}$ ← 0.25'
$= 4.32 - 0.35 = 3.97$

$G_f = (7.0)\dfrac{t^{1/3}}{TI^{1/2}} = 7.0\dfrac{t^{1/3}}{16.5^{1/2}} = 1.72\,t^{1/3}$

FULL DEPTH THICKNESS $t = GE_{HMA}/G_f = \dfrac{3.97}{1.72\,t^{1/3}}$

$t \cdot t^{1/3} = \dfrac{3.97}{1.72}$, $t^{4/3} = 2.31$, $t = (2.31)^{3/4} = 1.87$, USE $t = 1.90'$ (FULL DEPTH)

- PER HDM 633.1(3), PLACE MIN. 0.5' AB (CL 2) UNDERNEATH.
CALCULATED SECTION = 1.90' HMA, 0.25' ATPB, 0.50' AB
NEED TO USE 0.10' OGFC (WEARING SURFACE) & MATCH AS-BUILT ATPB (@ 0.9' DEPTH). SANDWICH THE ATPB IN-BETWEEN HMA.

∴ PAVEMENT SECTIONS:

0.10'	OGFC
0.80'	HMA
0.25'	ATPB
1.10'	HMA
0.50'	AB (CL 2) OVER SEG

FLEXIBLE OPTION 3A - FULL DEPTH HMA
(WITHOUT AS-BUILT ATPB)

$GE_{TOTAL} = 0.0032\,TI\,(100 - R_{base})$
$= 0.0032\,(16.5)\,(100 - 20)$
$= 4.22$

FULL DEPTH, $GE_{HMA} = 4.22 + 0.1\,(FS) = 4.32$

$$G_f = 7.0\frac{t^{1/3}}{TI^{1/2}} = 7.0\frac{t^{1/3}}{16.5^{1/2}} = 1.72\,t^{1/3}$$

$$t = GE/G_f = \frac{4.32}{1.72\,t^{1/3}}$$

$$t \cdot t^{1/3} = \frac{4.32}{1.72}, \quad t^{4/3} = 2.51, \quad t = (2.51)^{3/4} = 1.99,$$

$\therefore$ USE $t = 2.0$.

USE 0.10' OGFC (WEARING SURFACE) & EXTRA 0.50' AB TO IMPROVE PERFORMANCE

PAVEMENT SECTIONS : 0.10' OGFC
2.00' HMA
0.50' AB (CL 2)

* RIGID OPTION - JPCP

THE SUBGRADE R VALUE DATA FITS TYPE II SOIL OF HDM TABLE 623.1A. THE DESIG CAN DIRECTLY FOLLOW TABLE 623.1E. FOR TI = 16.5, HDM TABLE 623.1E (CENTRAL COAST, TYPE II SUBGRADE SOIL) INDICATE 1.10' JPCP, 0.50 LCB & 0.70' AS

THE FOOTNOTES OF TABLE 623.1E INDICATE THAT ATPB SHOULD BE PLACED BETWEEN THE SURFACE LAYER (JPCP) AND THE BASE LAYER. FOR SURFACE DRAINAGE PURPOSE, NEED 0.10' OGFC ON TOP OF THE JPCP (HDM 631.2, NEEDS MODIFIED BINDER) TO PROVIDE DRAINAGE OVER THE FULL CROSS SECTION WIDTH OF THE FREEWAY TO AVOID "BATHTUB".

PAVEMENT SECTIONS:

0.10' OGFC
1.10' JPCP
0.25' ATPB (TABLE 623.1E. FOOTNOTE)
0.50' LCB
0.70' AS

(* NOTE THE ATPB LAYER IS AT DIFFERENT ELEV. OF THE AS-BUILT ATPB. THE CONNECTION WOULD BE COMPLICATED AND MAY HAVE TO SACRIFICE THE JPCP THICKNESS.)

THIS OPTION IS NOT SUITABLE & NOT ADOPTED.

(II) RAMP (TI = 12, R = 20)

CONSIDER THE FOLLOWING ALTERNATIVES:

(1) FLEXIBLE OPTION 1 - HMA, LCB & AS
(2) FLEXIBLE OPTION 2 - HMA, LCB & LIME TREATED SUBBASE (LTS)
(3) FLEXIBLE OPTION 3 - FULL DEPTH HMA
(4) RIGID OPTION - JPCP

* FLEXIBLE OPTION 1 - HMA, LCB & AS

TI = 12, R_{base} = 20 (W/ SEG), R_{AS} = 50 (CL. 4 AS)

$GE_{TOTAL} = 0.0032\ TI(100 - R_{base})$
$= 0.0032(12)(100 - 20)$
$= 3.07$

- HMA, LCB & AS

$GE_{HMA+LCB} = 0.0032\ TI(100 - R_{AS})$
$= 0.0032(12)(100 - 50)$
$= 1.92$

- $GE_{HMA} = (GE_{HMA+LCB})(0.4) + 0.2' = 0.97$

$t > 0.5'$, $G_{f\,HMA} = (7.0)\dfrac{t^{1/3}}{TI^{1/2}} = 7.0\dfrac{t^{1/3}}{12^{1/2}} = 1.87\,t^{1/3}$

HMA THICKNESS $t = GE_{HMA}/G_f = \dfrac{0.97}{1.87\,t^{1/3}}$

$t \cdot t^{1/3} = \dfrac{0.97}{1.87}$, $t^{4/3} = 0.52$, $t = (0.52)^{3/4} = 0.61'$

USE HMA $t = 0.60'$ $G_f = 1.87\,t^{1/3} = 1.58$, $GE_{HMA} = 0.95$

- LCB LAYER

$GE_{LCB} = GE_{HMA+LCB} - GE_{HMA} + 0.2$
$= 1.92 - 0.95 + 0.2 = 1.17$, $G_{f\,LCB} = 1.9$

$t_{LCB} = 1.17/1.9 = 0.62'$, USE $t_{LCB} = 0.65'$, $GE_{LCB} = 1.24$

- AS LAYER

$GE_{AS} = GE_{TOTAL} - GE_{HMA} - GE_{LCB}$
$= 3.07 - 0.95 - 1.24 = 0.88$ USE $t_{AS} = 0.90'$

PAVEMENT SECTIONS: 0.60' HMA
0.65' LCB
0.90' AS OVER SEG

* FLEXIBLE OPTION 2 - HMA, LCB & LTS

- USE LIME TREATED SUBBASE (LTS). SPECIFY UNCONFINED COMP STRENGTH (UCS) = 300 PSI (HDM 614.4), AND $G_f = 1.2$ FOR LTS. USE 1.5' LTS, WHICH IS THE LIMIT CONTRACTOR CAN MIX & COMPACT IN ONE LIFT.

- USE 1.5' LTS, $GE_{LTS} = 1.5 \times 1.2 = 1.8$
- NATIVE R = 14, TI = 12

$$GE_{TOTAL} = 0.0032\,TI\,(100 - R_{native})$$
$$= 0.0032\,(12)\,(100-14)$$
$$= 3.30$$

$$GE_{HMA+LCB} = GE_{TOTAL} - GE_{LTS}$$
$$= 3.30 - 1.8 = 1.5$$

$$GE_{HMA} = (GE_{HMA+LCB})(0.4) + 0.2$$
$$= (1.5)(0.4) + 0.2 = 0.8$$

$$t > 0.5', \quad G_{f\,HMA} = (7.0)\frac{t^{1/3}}{(TI)^{1/2}} = 7.0\frac{t^{1/3}}{12^{1/2}} = 1.87\,t^{1/3}$$

HMA THICKNESS $t = GE_{HMA}/G_f = \dfrac{0.8}{1.87\,t^{1/3}}$

$$t \cdot t^{1/3} = \frac{0.8}{1.87}, \quad t^{4/3} = 0.428, \quad t = (0.428)^{3/4} = 0.53'$$

USE $t_{HMA} = 0.55'$, $G_{f\,HMA} = 1.87\,t^{1/3} = 1.53$

$$GE_{HMA} = 0.55' \times 1.53 = 0.84$$

- LCB LAYER

$$GE_{LCB} = GE_{TOTAL} - GE_{HMA} - GE_{LTS}$$
$$= 3.30 - 0.84 - 1.8$$
$$= 0.66$$

$G_{f\,LCB} = 1.9$ ∴ $t_{LCB} = 0.66/1.9 = 0.35$. USE $t_{LCB} = 0.35'$

PAVEMENT SECTIONS:

0.55' HMA
0.35' LCB
1.50' LTS

x FLEXIBLE OPTION 3 - FULL DEPTH HMA

$GE_{TOTAL} = 0.0032\ TI\,(100 - R_{base})$
$= 0.0032\,(12)(100 - 20)$ w/ SEG
$= 3.07$

FULL DEPTH, $GE_{HMA} = 3.07 + 0.1\ (CFS)$
$= 3.17$

$G_f = 7.0 \dfrac{t^{1/3}}{TI^{1/2}} = 7.0 \dfrac{t^{1/3}}{12^{1/2}} = 1.87\ t^{1/3}$

FULL DEPTH THICKNESS $t = GE_{HMA}/G_f = \dfrac{3.17}{1.87\,t^{1/3}}$

$t \cdot t^{1/3} = \dfrac{3.17}{1.87}$, $t^{4/3} = 1.70$, $t = (1.70)^{3/4} = 1.49$

USE $t = 1.50'$ (FULL DEPTH HMA)

- PER HDM 633.1(3), PLACE MIN. 0.5' AB (Cl. 2) UNDERNEATH.

∴ PAVEMENT SECTIONS:

1.50' HMA
0.50' AB (Cl. 2) OVER SEG

* RIGID OPTION - JPCP

THE SUBGRADE R-VALUE DATA FITS TYPE II SOIL OF HDM TABLE 623.1A. THE DESIGN CAN DIRECTLY FOLLOW TABLE 623.1E. FOR TI = 12 HDM TABLE 623.1E (CENTRAL COAST, TYPE II SUBGRADE SOIL) INDICATE 0.85' JPCP, 0.40' LCB & 0.60' AS

PAVEMENT SECTIONS: 0.85' JPCP
0.40' LCB
0.60' AS

PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

TEMPORAR PA EMENT

PROJECT NAME: *Route 880*
PROJECT NO.: *206139.WMH*

Design Case: AC over AB over AS

Design TI=	***9***	
R_{BS}=	***15***	
R_{AB}=	78	
R_{AS}=	50	(Class 4 AS)

$GE_{TOTAL} = 0..0032*TI*(100-R_{BS}) =$ 2.45

$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$ 0.63

=> GE'_{AC} = 0.83 (add 0.2 ft safety factor)

AC thickness = 0.44 ft

=> AC Thickness= **0.45** ft (round up to the nearest 0.05 ft)

$G_{f,AC}$= 1.89

GE_{AC}= 0.85

$GE_{AB+AC} = 0.0032*TI*(100-R_{AS}) =$ 1.44

=> GE_{AC+AB}= 1.64 (add 0.2 ft safety factor)

$GE_{AB} = GE_{AC+AB} - GE_{AC} =$ 0.79

=> AB thickness= 0.72

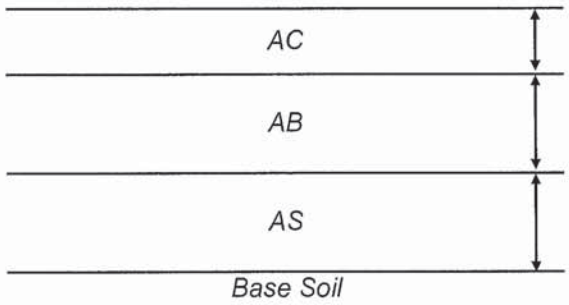
=> AB Thickness= **0.75** ft (round up to the nearest 0.05 ft)

GE_{AB}= 0.83 $G_{f,AB}$=1.1

$GE_{AS} = GE_{TOTAL} - GE_{AB} - GE_{AC} =$ 0.77

=> AS Thickness= **0.80** ft (round up to the nearest 0.05 ft)

Design Section:



0.45 ft

0.75 ft

0.80 ft

PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

TEMPORAR
PA EMENT

PROJECT NAME: *Route 880*
PROJECT NO.: *206139.WMH*

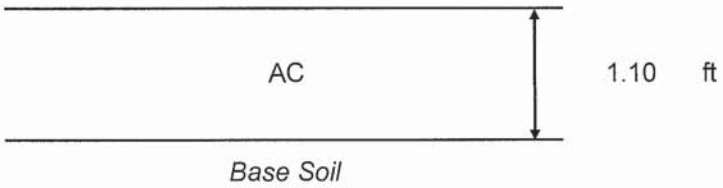
Design Case: Full depth AC

Design TI= ***9***
R_{BS}= ***15***

$GE_{AC} = 0.0032*TI*(100-R_{BS}) =$ 2.45
=> GE'_{AC}= 2.55 (add 0.1 ft safety factor)
=> AC Thickness= 1.07

=> AC Thickness= **1.10** ft (round up to the nearest 0.05 ft)

Design Section:



PAVEMENT DESIGN

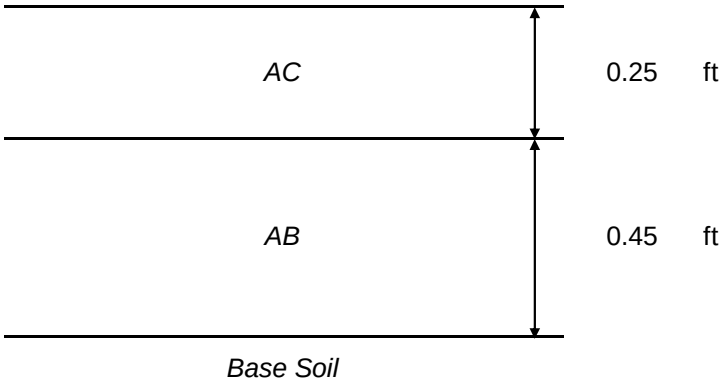
PER HIGHWAY DESIGN MANUAL, CHAP. 600

PROJECT NAME: *Route 880*
PROJECT NO.: *2006-139-GDR*

Design Case: AC over AB

Design TI=	***4.5***	
R_{BS}=	***20***	
R_{AB}=	78	
$GE_{AC+AB} = 0.0032*TI*(100-R_{BS}) =$	1.15	
$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$	0.32	
=> GE'_{AC} =	0.52	(add 0.2 ft safety factor)
AC Thickness =	0.19	ft
=> AC Thickness =	**0.25**	ft (round up to the nearest 0.05 ft)
$G_{f,\ AC}$ =	2.67	
GE_{AC} =	0.67	
$GE_{AB} = GE_{AC+AB} - GE_{AC} =$	0.48	
AB thickness=	0.44	ft
=> AB Thickness=	**0.45**	ft (round up to the nearest 0.05 ft)
GE_{AB}=	0.50	$G_{f,\ AB}$=1.1

Design Section:



erification of Section 3 on -1 sheet

This is to verify the new Section #3 shown on X-1. The area is between soundwall and outside shoulder. No traffic is expected for this area. Pavement is needed to "fill the gap". The plan calls for 0.10' HMA(O), 0.15' RHMA-G & 0.10' HMA (A) over 0.50' AB. The upper 0.10' HMA(O) and 0.15' RHMA-G match the adjacent sections. The selection is designer's choice and appears reasonable. It is adequate for TI of 4.5 (for comparison and information sake).

As-Built Structural Pavement Sections

Contract No.	Date
04-OC7024	11/14/2002
04-213404	12/27/1999
04-233194	01/30/1998
04-233284	09/02/1998
04-123174	12/19/1997 & 11/29/1995
04-292014	undated (Document No. 40000761)
53-4TC28	undated (Document No. 40000770)
O-4TC83F	undated (Document No. 40000764)

2002

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	24.6/44.5	2	85

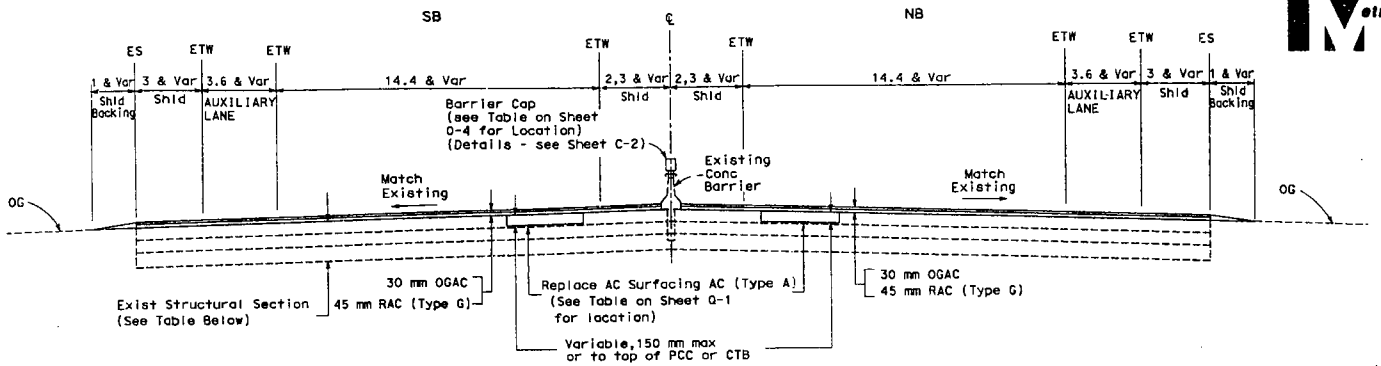
Vijith Thilakaratne 04-27-00
REGISTERED CIVIL ENGINEER

6-12-00
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER V. Thilakaratne No. 51278 Exp. 9-30-01 CIVIL STATE OF CALIFORNIA

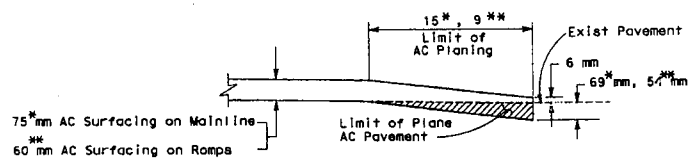
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Caltrans now has a web site! To get to the web site, go to http://www.dot.ca.gov



TYPICAL CROSS SECTION

FROM KP 24.6 (PM 15.3) TO KP 44.5 (PM 27.6)



AC PLANING AT CONFORM

*For conform on the mainline at project limits, approach slabs of bridges, undercrossings and at ramps with no new AC surfacing. For conforming to pavement underneath overcrossings, use detail A on C-1

** For conform on ramps

DETAIL A

EXISTING MAINLINE STRUCTURAL SECTION

KILOMETER POST (POSTMILE)	DESCRIPTION			
	Inside Shoulder	#1,#2,#3 Lanes	#4 & Auxiliary Lane	Outside Shoulder
25.2(15.6) Tennyson Road to 29.5(18.4) "A" Street Northbound + Southbound	30 mm OGAC 200 mm AC 70 mm ATPB 210 mm CTB 375 mm AS	30 mm OGAC 110 mm AC 200 mm PCC 105 mm CTB 250 mm AS	30 mm OGAC 200 mm AC 75 mm ATPB 210 mm CTB 375 mm AS	30 mm OGAC 200 mm AC 75 mm ATPB 210 mm CTB 375 mm AS
29.5(18.4) "A" Street to 32.4(20.2) Hesperian Boulevard Northbound + Southbound	30 mm OGAC 200 mm AC 210 mm CTB 480 mm AS	30 mm OGAC 110 mm AC 200 mm PCC 105 mm CTB 250 mm AS	30 mm OGAC 200 mm AC 75 mm ATPB 210 mm CTB 375 mm AS	30 mm OGAC 200 mm AC 75 mm ATPB 210 mm CTB 375 mm AS
32.4(20.2) Hesperian Boulevard to 33.5(20.8) Washington Avenue Northbound + Southbound	30 mm OGAC 200 mm AC 210 mm CTB 480 mm AS	30 mm OGAC Var 60-150 mm AC 200 mm PCC 105 mm CTB 250 mm AS	30 mm OGAC 170 mm AC 300 mm CTB 300 mm AS	30 mm OGAC Var 105-170 mm AC 150 mm AB 450 mm AS
33.5(20.8) Washington Avenue to 38.1(23.6) Davis Street Northbound + Southbound	30 mm OGAC Var60-150 mm AC 20 mm PCC 100 mm CTB 400mm AB	30 mm OGAC Var 60-150 mm AC 200 mm PCC 400 mm AS	30 mm OGAC 170 mm AC 300 mm CTB 300 mm AS	30 mm OGAC Var 105-170 mm AC 150 mm AB 450 mm AS
38.1(23.6) Davis Street to 41.0(25.5) Hegenberger Road Northbound + Southbound	260 mm AC 150 mm CTB 375 mm AS	30 mm OGAC Var 100-150 mm AC 200 mm PCC 300 mm AS	200 mm AC 75 mm ATPB 300 mm CTB 465 mm AS	300 mm AC 75 mm ATPB 300 mm CTB 465 mm AS
41.0(25.5) Hegenberger Road to 44.5(27.6) High Street Overhead Northbound + Southbound	50 mm AC Var600 mm AS	30 mm CGAC 175 mm AC 200 mm PCC 100 mm CTB 400 mm AS	30 mm OGAC 200 mm AC 250 mm CTB 200 mm AS	50 mm AC 150 mm AB

200mm

NOTES:

1. Dimensions of the structural sections are subject to tolerances specified in the Standard Specifications.
2. Superelevation as shown or as directed by the Engineer.
3. No AC surfacing on structures, structure approach slabs and PCC Pavement.
4. Existing utility facilities have not been plotted on these plans.
5. See detail on C-2 for cross drainage correction between 98th Ave and Hegenberger Ave on southbound Route 880.

NO Construction Changes

CONTRACT No. 04-0C7024
DATE ACCEPTED 11/14/02
AS BUILT
RESIDENT ENGINEER S KANSIL

TYPICAL CROSS SECTIONS

NO SCALE

All Dimensions are in Meters unless otherwise shown

X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT
PROJECT ENGINEER: VIJITH THILAKARATNE
CALCULATED/DESIGNED BY | CHECKED BY
DATE REVISED BY | DATE REVISED

LAST REVISION 04-22-00 | DATE PLOTTED => 25-MAR-2003 | TIME PLOTTED => 15:01

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => cburks
DGN FILE => 40c702b01.dgn

CU 04233 | EA 0C7021

04-OC7024
11/14/2002

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	880	38.0/50.0	1	47

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

ACIM-ACIMG-880-1(037)33E

PROJECT PLANS FOR CONSTRUCTION ON

STATE HIGHWAY

IN ALAMEDA COUNTY
IN OAKLAND AND SAN LEANDRO
FROM ROUTE 112/880 SEPARATION
TO MADISON STREET UNDERCROSSING

To be supplemented by Standard Plans dated July, 1995

INDEX OF SHEETS

Sheet No.	
1	Title and Location Map
2-4	Typical Cross Sections
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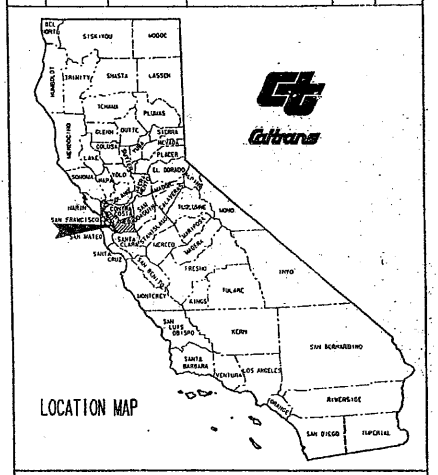
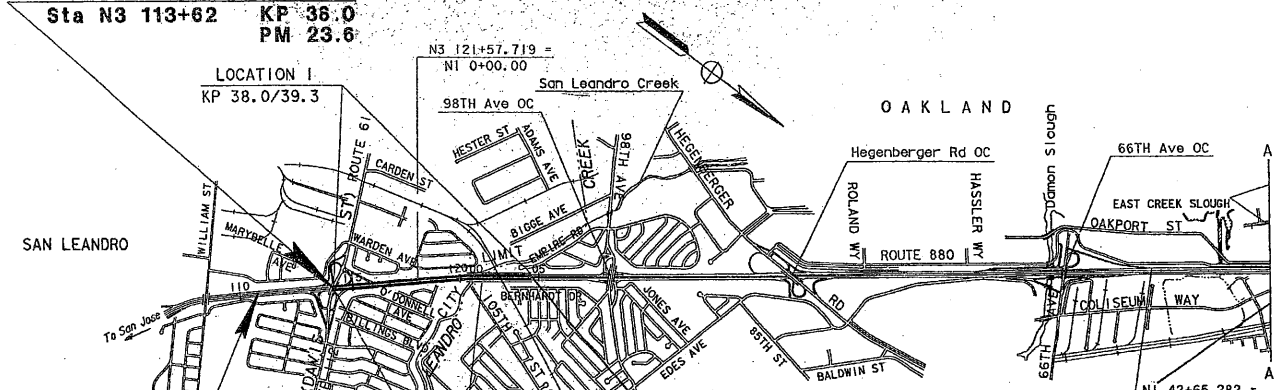
7-17	Layouts
18-21	Construction Details
22-26	Drainage Details and Quantities
27-28	Construction Area Signs
29-39	Pavement Delineation Plans, Details and quantities
40-41	Summary of Quantities
42	Sign Details
43	Electrical Plans
44-47	Revised Standard Plans



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.

Caltrans Metric

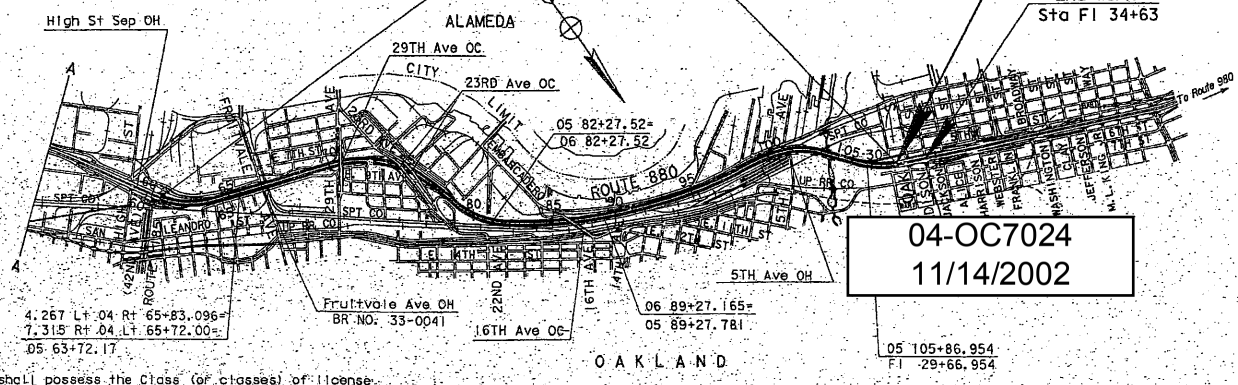
BEGIN CONSTRUCTION
Sta N3 113+62 KP 36.0
PM 23.6



NO CONSTRUCTION THIS PORTION
Sta N1 4+76 to Sta 04 61+19
KP 39.3/KP43.5

END CONSTRUCTION
Sta F1 32+97 KP 50.0
PM 31.1

End Work
Sta F1 34+63



NO CONSTRUCTION CHANGES
CONTRACT No. 04-213404
DATE ACCEPTED 12-27-99
AS BUILT
RESIDENT ENGINEER

04-OC7024
11/14/2002

4-16-97
Project Engineer Date
Registered Civil Engineer

June 23, 1997
Plans Approval Date

REGISTERED PROFESSIONAL ENGINEER
D.N. Le
No. 28032
Exp. 3-31-98
CIVIL
STATE OF CALIFORNIA

The Contractor shall possess the Class (or classes) of license as specified in the "Notice to Contractors".

Contract No. 04-2134U4

04-213404
12/27/1999

PROJECT ENGINEER: D.N.P. LE | PROJECT MANAGER: R.E. BAXTER | DATE

LAST REVISION 04-15-97 | DATE PLOTTED => 26-Jun-1997 | TIME PLOTTED => 15:04

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	Ala	880	38.0/50.0	2	47

REGISTERED CIVIL ENGINEER 4-16-97

6-23-97
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER D.N. Le No. 28032 Exp. 3-31-98 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.

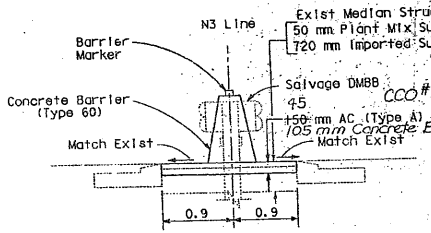
4 Caltrans Metric

NOTES:

1. Dimensions of the structural sections are subject to tolerances specified in the Standard Specifications.
2. All existing DMBB and SMBB are with wood post except noted.
3. Superelevation as shown, or as directed by the Engineer.
4. For work within median, see sheets X-1 and X-2.
5. For locations and limits of replace asphalt concrete surfacing and replace concrete pavement, see Layout sheets.
6. For Concrete Barrier Details not shown, see Sheets C-3 and C-4.
7. For offset roadway surface "H" see sheet C-3.

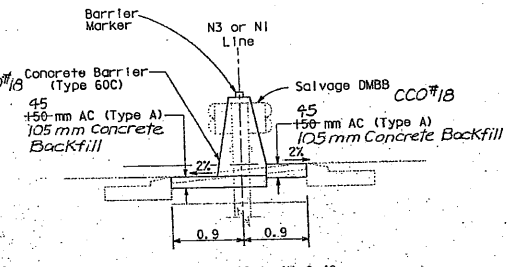
ABBREVIATION

SMBB - SINGLE METAL BEAM BARRIER



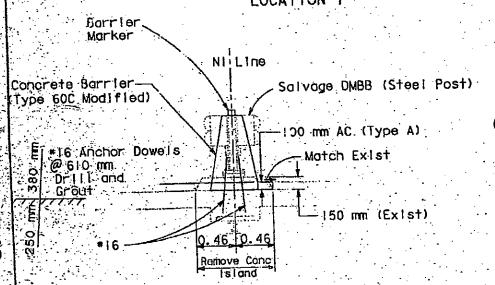
Sta N3 113+62.25 to N3 120+60

LOCATION 1



Sta N3 120+60 to N1 0+49

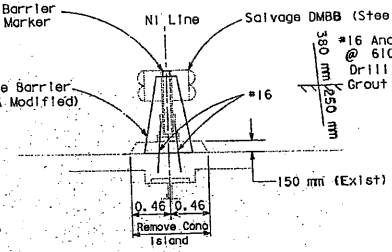
LOCATION 1



Sta N1 0+49 to N1 1+40

(SAN LEANDRO CREEK BRIDGE OH)
BR NO. 33-0100

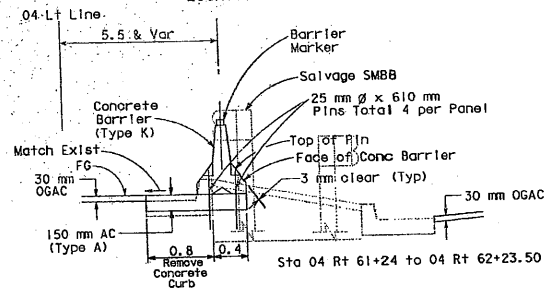
LOCATION 1



Sta N1 1+40 to N1 4+76.50

(SAN LEANDRO CREEK BRIDGE OH)
BR NO. 33-0100

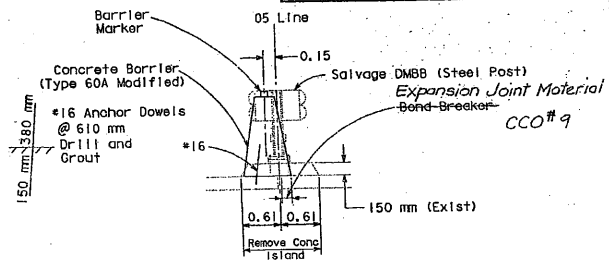
LOCATION 1



Sta 04 Rt 61+24 to 04 Rt 62+23.50

Sta 04 Lt 61+19 to 04 Lt 62+17

LOCATION 2

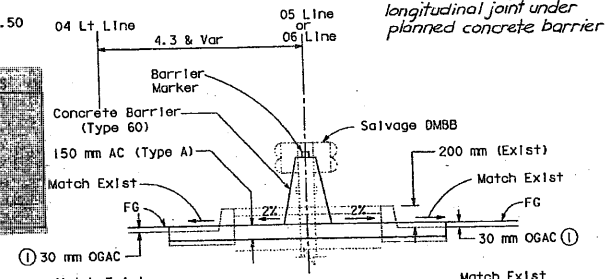


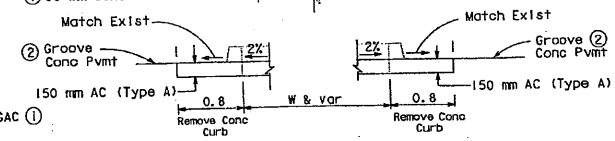
Sta 05 63+72.17 to 05 68+02

(FRUITVALE AVE OH)
BR NO. 33-0041

LOCATION 2

CCO #9
Substitute expansion joint material for bond breaker in longitudinal joint under planned concrete barrier

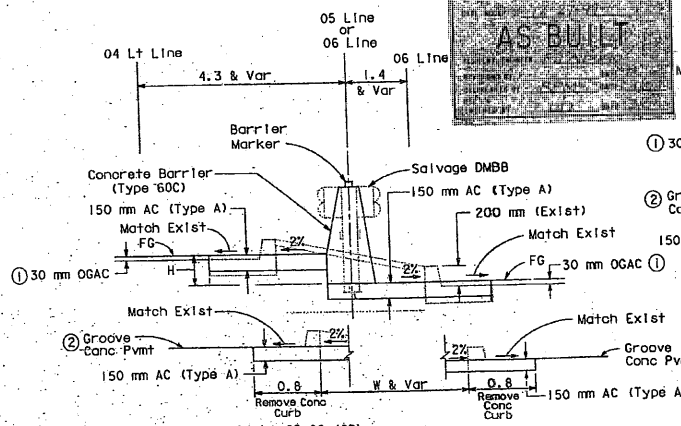




① Sta 04 Lt 65+00 to 04 Lt 65+72 (SB) W = 0.6
Sta 04 Rt 65+11 to 04 Rt 65+75 (NB) W = 1.1
Sta 05 89+38.00 to 05 89+83.00 (NB) W = 1.1

② Sta 05 68+02.00 to 05 68+80.00 W = 0.6
Sta 05 78+00.00 to 05 78+90.00 W = 1.9
Sta 06 85+00.00 to 06 86+42.00 W = 1.7
Sta 06 87+40.00 to 06 88+63.00 W = 1.9
Sta 05 89+38.00 to 05 89+83.00 (SB) W = 1.1
Sta 05 93+50 to 05 95+00 W = 0.7

LOCATION 2



① Sta 04 Lt 62+17 to 04 Lt 65+00 (SB) W = 0.7
Sta 04 Rt 62+23.50 to 04 Rt 65+11 (NB) W = 1.9

② Sta 05 78+90.00 to 05 79+94.00 W = 1.6
Sta 06 82+37.84 to 06 85+00.00 W = 1.5
Sta 06 88+63.00 to 05 89+38.00

LOCATION 2

CONSTRUCTION CHANGES
AS BUILT

4 REVISED PER ADDENDUM NO. 1 DATED SEPTEMBER 10, 1997

All Dimensions are in Meters unless otherwise shown

TYPICAL CROSS SECTIONS AND CONSTRUCTION DETAILS

NO SCALE

X-1

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => trlenard
DGN FILE => 42134ub0108134552

CU 04224

EA 2134U1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans SPECIAL PROJECTS

PROJECT ENGINEER DIEP N. LE

CALCULATED/DESIGNED BY SKC DATE 10/96 REVISED BY
CHECKED BY DATE REVISED

DATE PLOTTED => 8-Sep-1997
TIME PLOTTED => 13:47
04-15-97

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	Ala	880	38.0/50.0	3	7

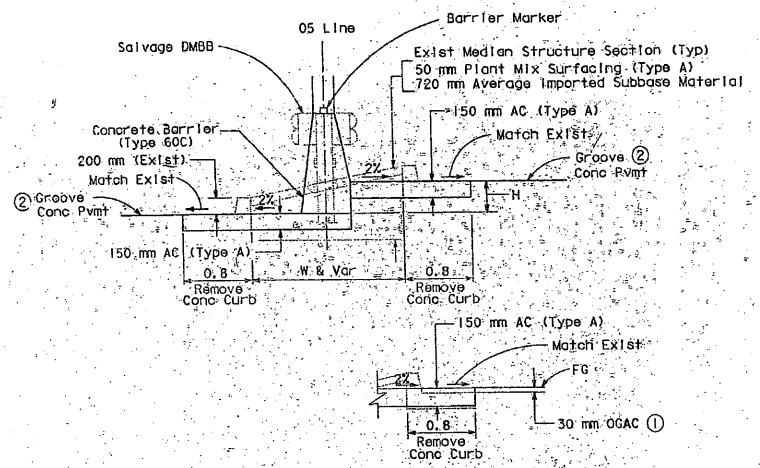
REGISTERED CIVIL ENGINEER 4-16-97

6-23-97
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER D.N. Le No. 28032 EXP. 3-31-98 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.

Caltrans Metric

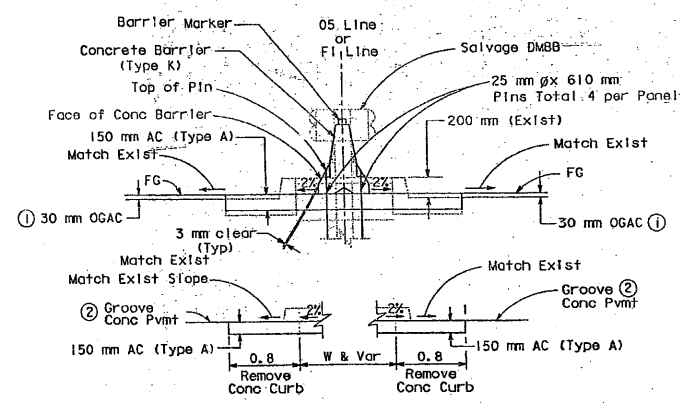


① Sta 05 89+83.00 to 05 91+40.00 (NB) ~~W = 0.1 H = 40 mm-110 mm~~

② Sta 05 68+80.00 to 05 70+84.00 ~~W = 1.5 H = 40 mm-680 mm~~
Sta 05 77+23.00 to 05 78+00.00 ~~W = 1.7 H = 40 mm-560 mm~~
Sta 05 89+83.00 to 05 93+50.00 (SB) ~~W = 0.1 H = 40 mm-110 mm~~
Sta 05 91+40.00 to 05 93+50.00 (NB) ~~W = 0.1 H = 40 mm-110 mm~~

4

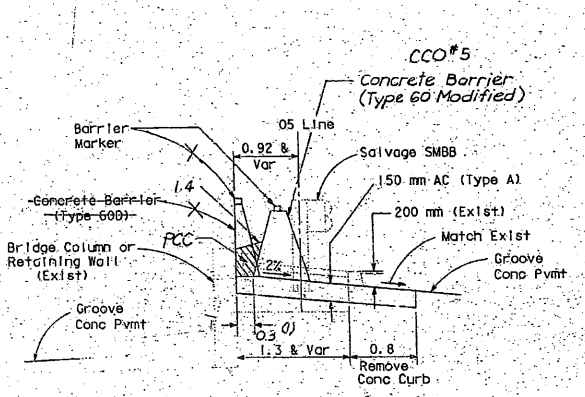
LOCATION 2



① Sta 05 105+82.50 to Fl 32+97.50 W = 1.7
② Sta 05 95+00.00 to 05 98+02.50 W = 0.8

LOCATION 2

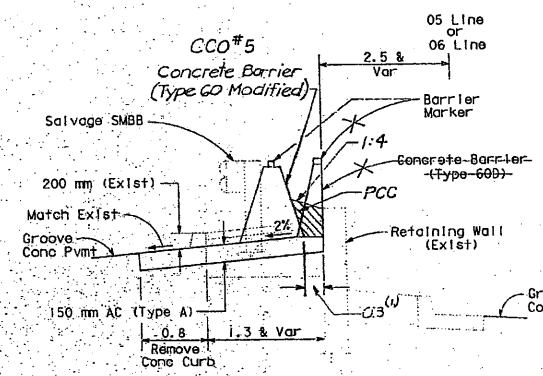
CONSTRUCTION CHANGES
AS BUILT



Sta 05 70+84.00 to 05 77+23.00

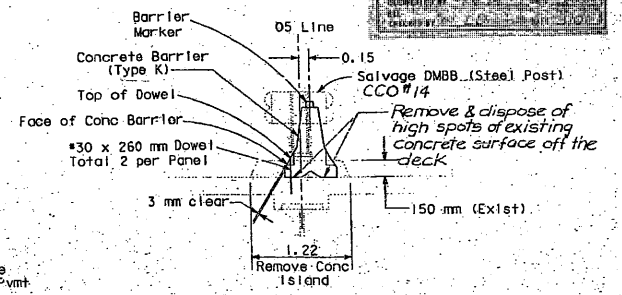
LOCATION 2

(1) Dimension can be reduced to be compatible with slip-form machine



Sta 05 79+94.00 to 06 82+37.84

LOCATION 2



Sta 05 98+02.50 to 05 105+82.50
(FIFTH AVE OH BR NO. 33-0027)

LOCATION 2

4 REVISED PER ADDENDUM NO. 1 DATED SEPTEMBER 10, 1997

FOR NOTES, ABBREVIATIONS &/OR LEGEND, SEE SHEET X-1

All Dimensions are in Meters unless otherwise shown

TYPICAL CROSS SECTIONS AND CONSTRUCTION DETAILS

NO SCALE

X-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans SPECIAL PROJECTS

PROJECT ENGINEER: DIEP N. LE

CALCULATED/DESIGNED BY: SKC DATE 1/96 REVISED BY
CHECKED BY DATE REVISED

LAST REVISION 04-15-97 DATE PLOTTED => 8-Sep-1997 TIME PLOTTED => 13:44

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	38.0/50.0	4	47

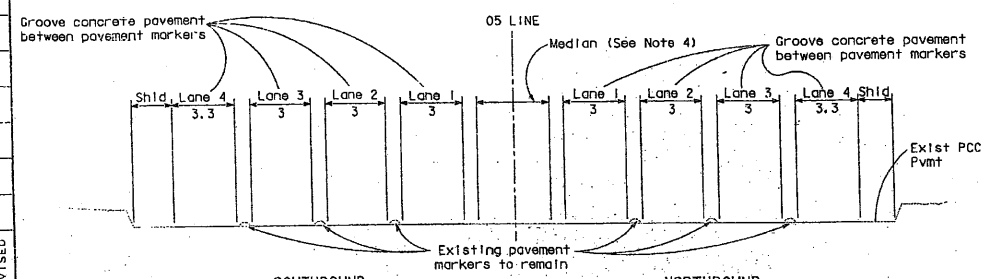
REGISTERED CIVIL ENGINEER 4-16-97

6-23-97
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER D. N. Le No. 28032 Exp. 3-31-98 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.

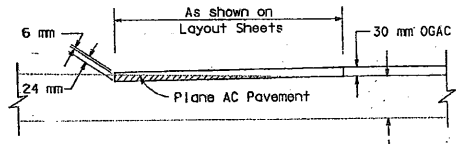
Caltrans Metric



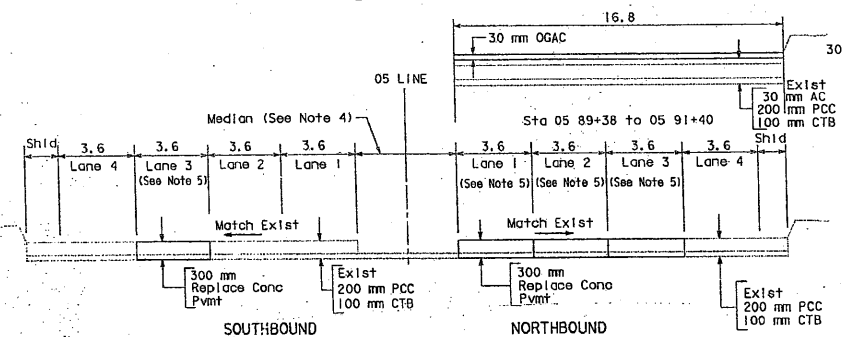
SOUTHBOUND
Sta 05 68+02 to 05 98+02.50

NORTHBOUND
Sta 05 68+02 to 05 89+38
Sta 05 91+40 to 05 98+02.50

LOCATION 2



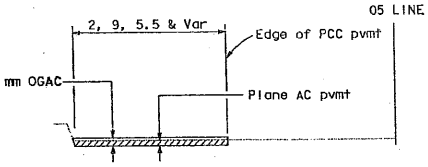
PAVEMENT CONFORM



SOUTHBOUND
Sta 05 91+25 to 97+39.2

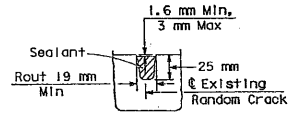
NORTHBOUND
Sta 05 91+45 to 05 95+45.6

LOCATION 2

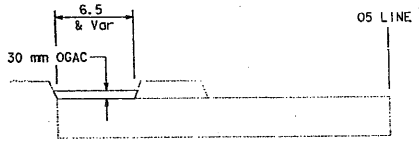


Sta 06 88+70.0 to 05 91+26.0
Sta 05 92+43.0 to 05 94+83.0

LOCATION 2



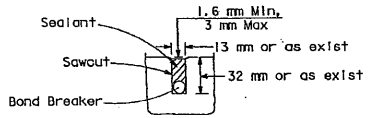
ROUT AND SEAL RANDOM CRACKS



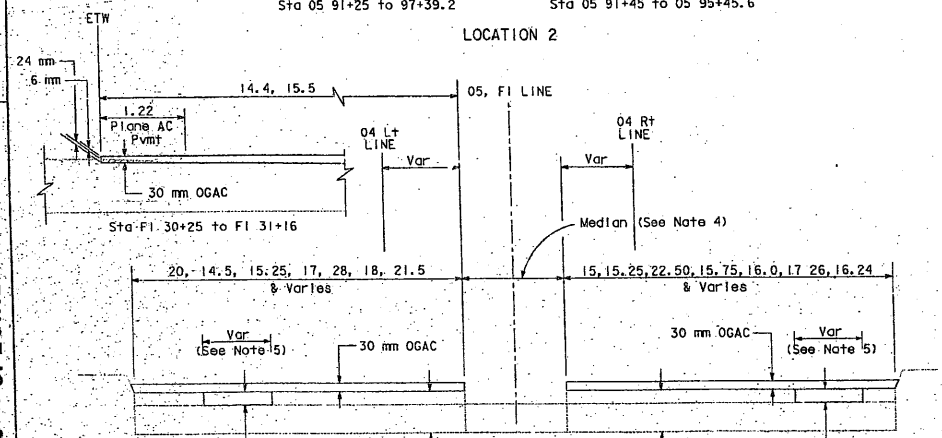
Sta 06 88+38.00 to 06 88+70.00

SOUTHBOUND ON RAMP FROM EMBARCADERO AND SOUTHBOUND OFF RAMP TO 16TH AVE / EMBARCADERO

LOCATION 2



SEAL LONGITUDINAL AND TRAVERSE JOINTS



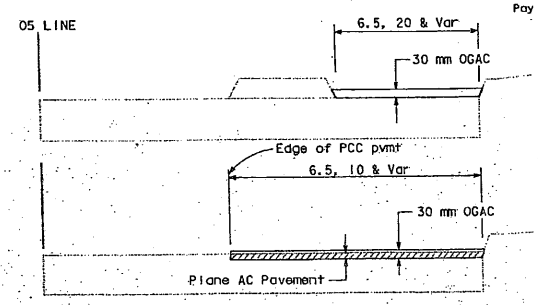
SOUTHBOUND
Sta 04 Lt 61+17 to 04 Lt 65+72
Sta FI 105+82.50 to FI 30+25
Sta FI 31+16 to FI 32+97.5

Exist 150 mm AC 114 mm CTB 348 mm AS

Exist 150 mm AC 114 mm CTB 348 mm AS

NORTHBOUND
Sta 04 Rt 61+24 to 04 Rt 65+75
Sta 05 105+82.50 to FI 32+97.50

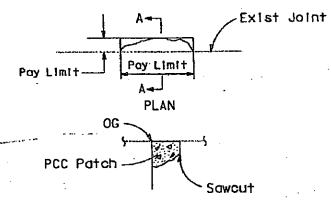
LOCATION 2



Sta 05 69+06 to 05 70+00

NORTHBOUND OFF RAMP TO 29TH AVE

LOCATION 2



SECTION A-A
REPAIR SPALLED JOINTS

NO CONSTRUCTION CHANGES
CONTRACT NO. 04-213404
DATE ACCEPTED 12-27-99
AS BUILT
RESIDENT ENGINEER F. J. Albano

TYPICAL CROSS SECTIONS AND CONSTRUCTION DETAILS

NO SCALE

All Dimensions are in Meters unless otherwise shown

FOR NOTES, ABBREVIATIONS &/OR LEGEND, SEE SHEET X-1

X-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans SPECIAL PROJECTS

PROJECT ENGINEER DIEP N. LE
CALCULATED/DESIGNED BY SKC DATE 10/96
CHECKED BY
REVISED BY DATE REVISED

LAST REVISION 04-15-97
DATE PLOTTED => 26-Jun-1997
TIME PLOTTED => 15:15

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => trbing
DGN FILE => [ESC-OE]42134Ub03.psf

CU 04224 EA 21134U1

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	25.1/26.1	1	308

ALAMEDA COUNTY TRANSPORTATION AUTHORITY

PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY

IN ALAMEDA COUNTY IN OAKLAND FROM 0.4 MILE SOUTH TO 0.6 MILE NORTH OF HEGENBERGER ROAD OVERCROSSING

To be supplemented by Standard Plans dated July, 1992

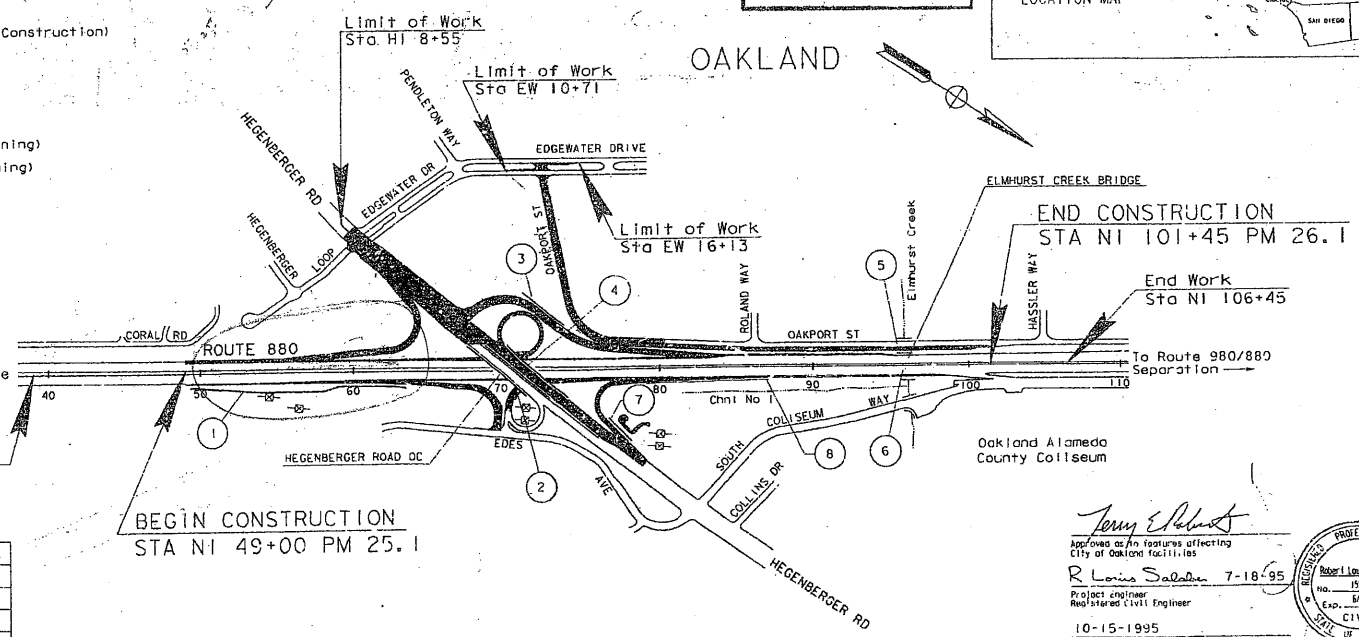
AS-BUILT
Date 1/29/98
By

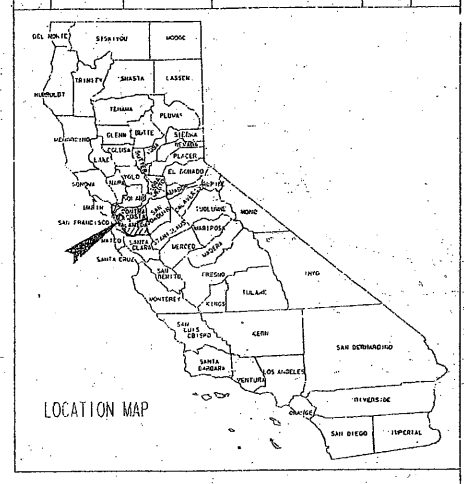
INDEX OF SHEETS

SHEET NO	SHEET TITLE
1	Title Sheet
2-5	Typical Cross Sections
6-7	Standard Plans List
8	Key Map and Line Index
9-16	Layouts
17-26	Profiles
27-39	Construction Details
40-44	Contour Grading Plans
45-77	Drainage Plans, Profiles, Details and Quantities
78-82	Sanitary Sewer Profiles, Details and Quantities
83-90	Utility Plans
91-118	Stage Construction Plans
119-123	Detour Plans
124-129	Construction Area Signs
130-138	Pavement Delineation Plans
139-141	Summary of Quantities
142-151	Sign Plans, Details and Quantities
152-166	Sound Wall Plans (SW1 Line)
167-185	Planting and Irrigation Plans and Details
186-221	Electrical Plans
222-229	Lighting and Sign Illumination (Stage Construction)
230-234	New Standard Plans

STRUCTURE PLANS

235-264	Hegenberger Road Overcrossing
265-272	Elmhurst Creek Bridge No 33C-45L (Widening)
273-280	Elmhurst Creek Bridge No 33-113 (Widening)
281-285	Retaining Wall (RW1-HR2 Line)
286-296	Retaining Wall (RW2-HL3 Line)
297-301	Retaining Wall (RW3-HR3 Line)
302-308	Retaining Wall (RW4-N1 Line)





STRUCTURE LIST

No	Name	Bridge No
1	Sound Wall	None
2	Retaining Wall RW1	None
3	Retaining Wall RW2	None
4	Hegenberger Rd OC (Replace)	33-88
5	Elmhurst Cr Br (Widen)	33C-45L
6	Elmhurst Cr Br (Widen)	33-113
7	Retaining Wall RW3	None
8	Retaining Wall RW4	None

The Contractor shall possess the Class (or Classes) of license as specified in the "Notice to Contractors".

Approved as to features affecting City of Oakland facilities

R Louis Salaber 7-18-95
Project Engineer
Registered Civil Engineer

10-15-1995
Plans Approval Date

REGISTERED PROFESSIONAL ENGINEER
Robert Louis Salaber
No. 15532
Exp. 6/30/97
CIVIL
STATE OF CALIFORNIA

Alameda County Transportation Authority
1401 Lakeside Dr Ste 1201
Oakland, California 94612

Tudor Engineering Company
1800 Harrison Street
Oakland, California 94612

Contract No. 04-233194

DESIGN EXPERIMENT APPROVAL
Chun Tsung
PROJECT ENGINEER
R Louis Salaber
DISTRICT ENGINEER CHIEF
LINCOLN, CHU
DATE
REGISTRATION NO.
45130

Approved as to impact on State Facilities and conformance with applicable State standards and practices and that technical oversight was performed as described in the California Department of Transportation A & E Consultant Services Manual.

423319A01.DGN

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

04-233194
01/30/1998

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	25.1/26.1	2	308

REGISTERED CIVIL ENGINEER 11-18-94

10-15-1995
PLANS APPROVAL DATE

PROFESSIONAL ENGINEER Michael W Tirrone No. C 46469 Exp. 9/30/97 CIVIL STATE OF CALIFORNIA

ALAMEDA COUNTY
TRANSPORTATION AUTHORITY
1401 LAKESIDE DRIVE SUITE 600
OAKLAND, CA 94612

TUDOR ENGINEERING COMPANY
1800 HARRISON STREET
OAKLAND, CALIFORNIA 94612

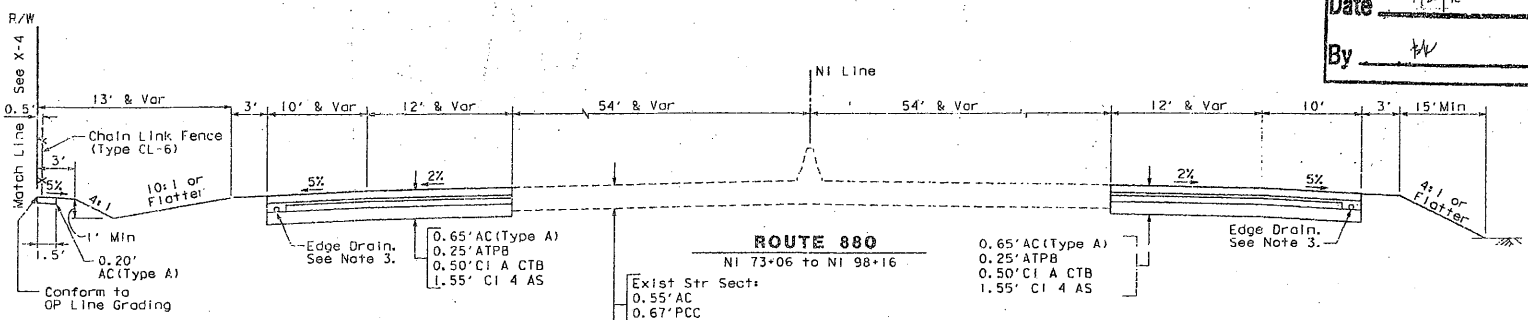
AS-BUILT
Date 1/20/98
By [illegible]

Abbreviations:

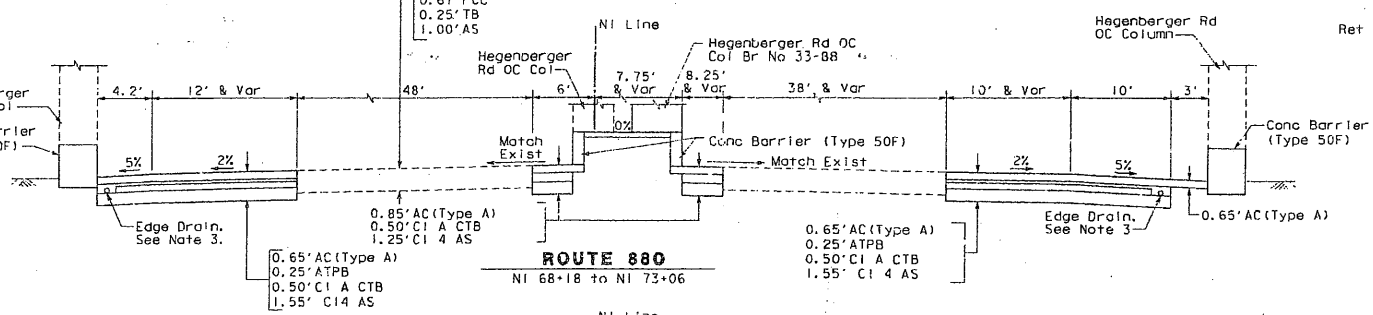
ESAB	Expanded Shale Aggregate Base
OAK	City of Oakland Std Detail
ESA	Environmentally Sensitive Area

Notes:

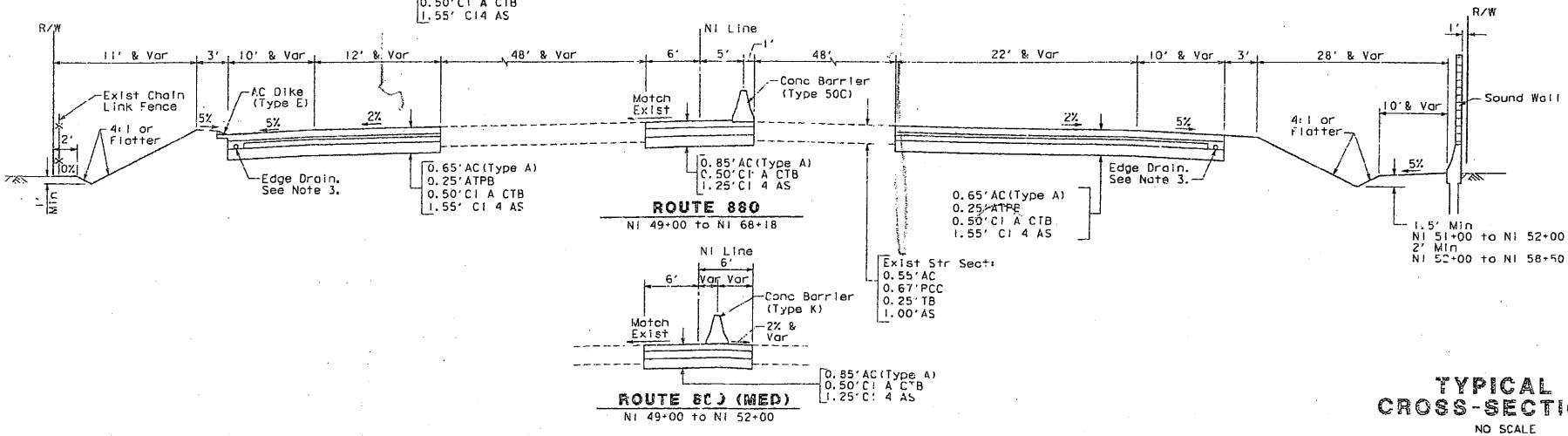
1. Dimensions of the structural section are subject to tolerances specified in the Standard Specifications.
2. Superelevation as shown or as directed by the Engineer.
3. For locations of edge drains, see Drainage Plans.
4. For location of AC Dike, see Layout and Summary of Quantity sheets.
5. For median treatment, see Highway Planting plans.
6. The minimum distance from edge of shoulder pavement to catch point of cut or fill shall be 18' where R/W permits.
7. For Concrete Barrier (Type 50F) and Conc Barrier (Type K), see Construction Details.
8. For embankment material limits see C-7.



ROUTE 880
NI 73+06 to NI 98+16



ROUTE 880
NI 68+18 to NI 73+06

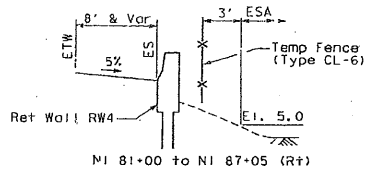


ROUTE 880
NI 49+00 to NI 68+18

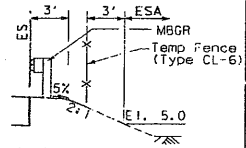
ROUTE 880 (MED)
NI 49+00 to NI 52+00

DESIGN DESIGNATION (RTE 880)

1990 ADT = 179000 D = 56%
2015 ADT = 190200 T = 16%
DHV = 15200 V = 70 MPH



NI 81+00 to NI 87+05 (Rt)



NI 87+05 to NI 90+50 (Rt)

TYPICAL CROSS-SECTIONS

NO SCALE

X-1

FOR REDUCED PLANS 0 1 2 3

CHUN TSUNG | CHECKED BY | RLS | 6/92 | DATE REVISED

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	25.1/26.1	3	308

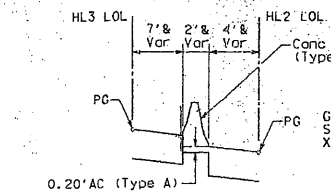
REGISTERED CIVIL ENGINEER 2-13-95

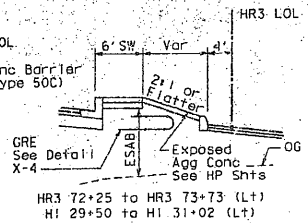
10-15-1995
PLANS APPROVAL DATE

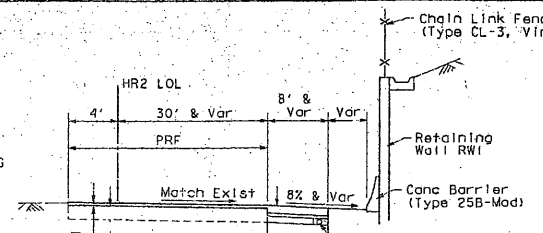
ALAMEDA COUNTY
TRANSPORTATION AUTHORITY
1401 LAKESIDE DRIVE SUITE 600
OAKLAND, CA 94612

TUDOR ENGINEERING COMPANY
1800 HARRISON STREET
OAKLAND, CALIFORNIA 94612

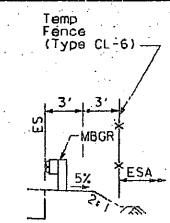
REGISTERED PROFESSIONAL ENGINEER Michael W Throne No. C 46469 Exp. 6/30/97 CIVIL STATE OF CALIFORNIA



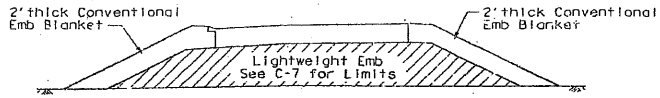




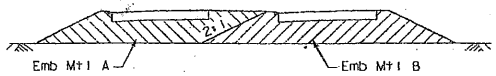
HR2 RAMP
HR2 69+96 to HR2 71+37



HR2 RAMP (RT)
HR2 73+00 to NI 75+50

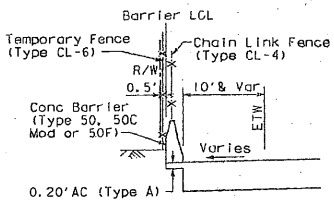


H1, HL2, HL3 AND HR3 LIGHTWEIGHT EMB DETAIL

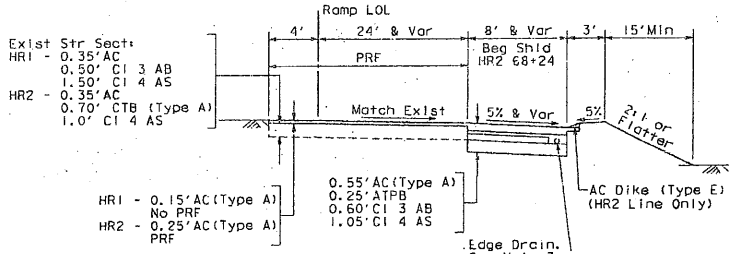


LIGHTWEIGHT EMB INTERFACE
Emb Mtl B Has Greater Density Than Emb Mtl A And Is Placed First

HL2 73+80 to 75+26
HL3 70+00 to 71+66

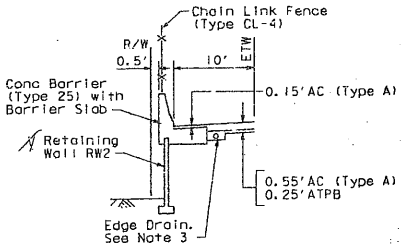


HL1 57+00 to HL1 60+63.40 (Lt)
HL3 73+90 to HL3 80+38 (Lt)

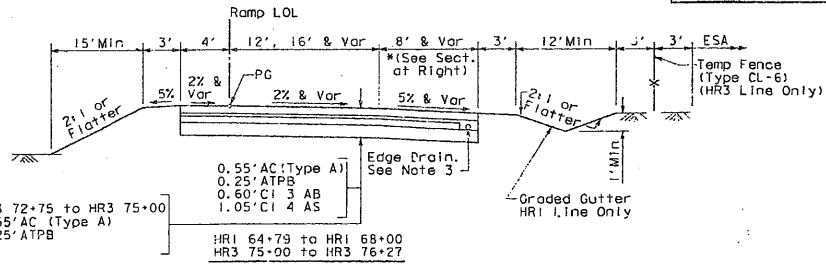


HR1 68+00 to HR1 71+87
HR2 68+79 to HR2 69+96

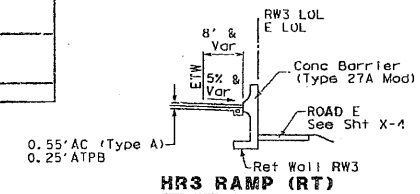
AS-BUILT
Date 1/20/98
By BW



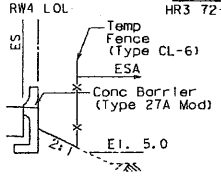
HL3 RAMP (LT)
HL3 70+54 to HL3 73+90



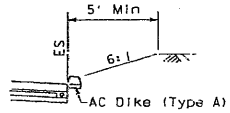
HR1 64+79 to HR1 68+00
HR3 75+00 to HR3 76+27



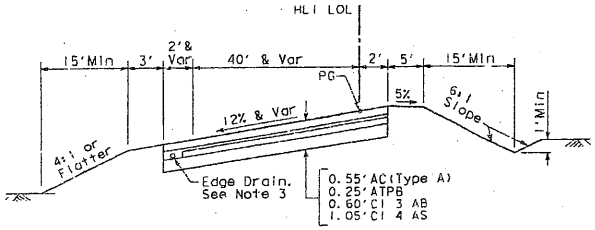
HR3 RAMP (RT)
HR3 72+25 to HR3 74+50



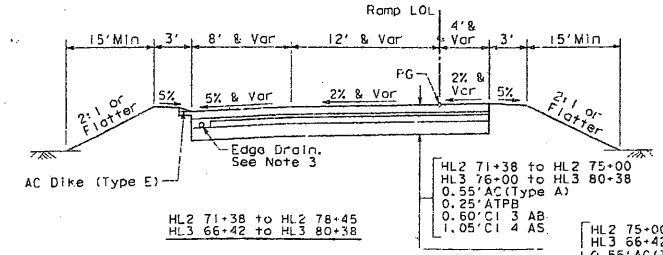
HR3 RAMP (RT)
HR3 79+00 to HR3 81+00



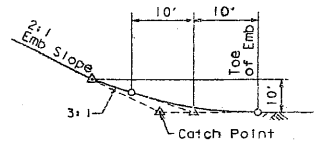
HR3 RAMP (RT)
HR3 75+00 to HR3 76+57



HL1 RAMP
HL1 58+77 to HL1 67+18



HL2 71+38 to HL2 78+45
HL3 66+42 to HL3 80+38



EMB SLOPE ROUNDING

For notes, abbreviations, and legend, see Sht X-1.

TYPICAL CROSS-SECTIONS
NO SCALE

X-2

CHUN TSUNG | CHECKED BY | RLS | 6/92 | DATE REVISED

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	25.1/26.1	4	308

Michael W Throne 11-18-94
REGISTERED CIVIL ENGINEER

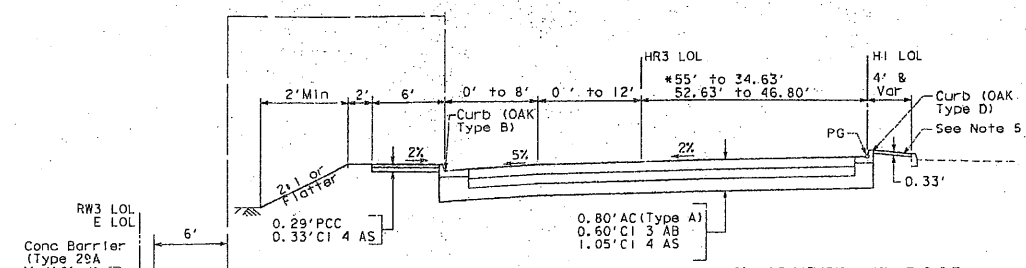
10-15-1995
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael W Throne No. C 46469 Exp. 6/30/97 CIVIL STATE OF CALIFORNIA

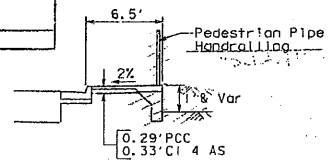
ALAMEDA COUNTY
TRANSPORTATION AUTHORITY
1401 LAKESIDE DRIVE SUITE 600
OAKLAND, CA 94612

TUDOR ENGINEERING COMPANY
1800 HARRISON STREET
OAKLAND, CALIFORNIA 94612

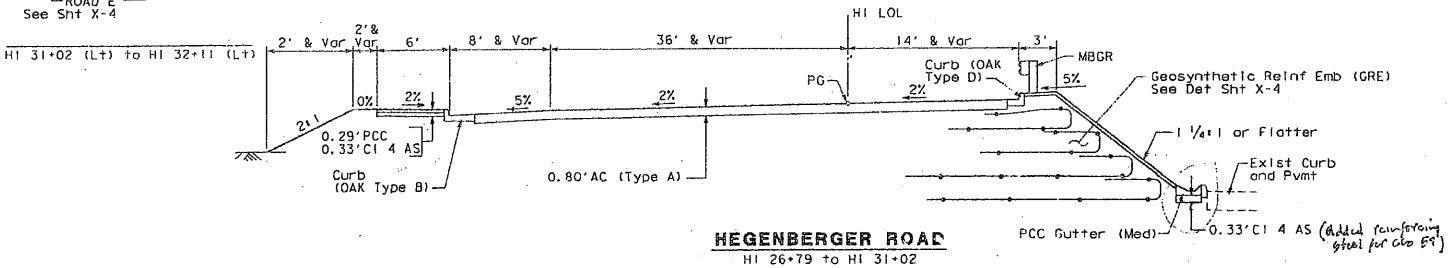
AS-BUILT
Date 1/20/98
By [illegible]



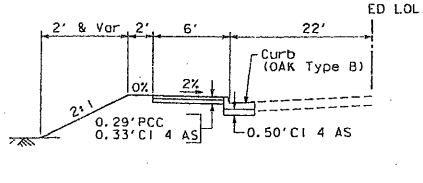
HEGENBERGER ROAD
*HI 31+02 to HI 33+00.22
HI 31+02 to HI 34+00



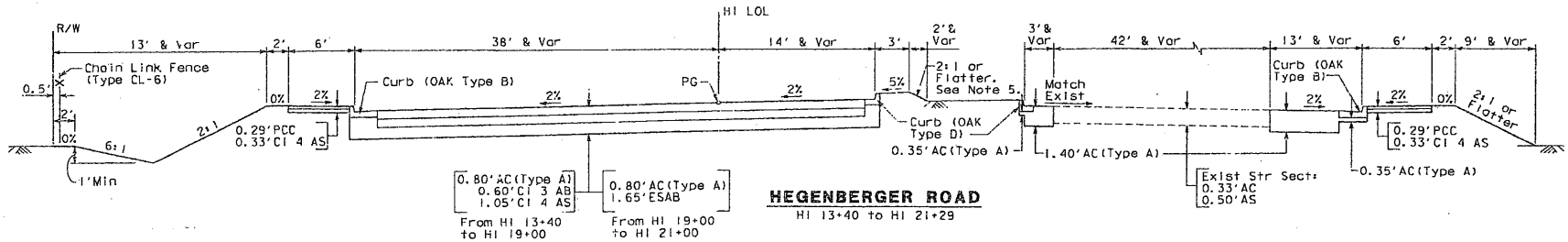
HEGENBERGER RD-RT
HI 16+50 to HI 19+98



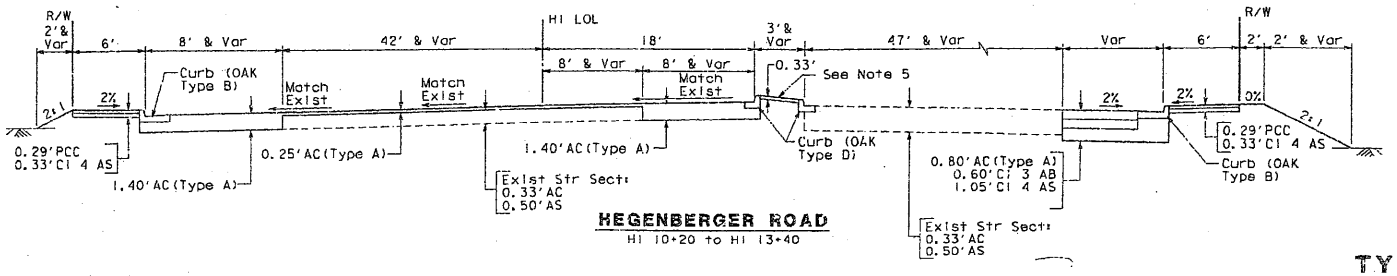
HEGENBERGER ROAD
HI 26+79 to HI 31+02



EDES AVENUE
ED 12+26 to ED 13+49



HEGENBERGER ROAD
HI 13+40 to HI 21+29



HEGENBERGER ROAD
HI 10+20 to HI 13+40

For notes, abbreviations, and legend, see Sht X-1.

TYPICAL CROSS-SECTIONS

NO SCALE

X-3

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU 04184 EA 233191

DATE REVISED 6/92 | CHECKED BY RLS | CHUN TSUNG

D-DE-92-PE (REV. 3/98)

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJ
04	Ala	880	25.1/26.

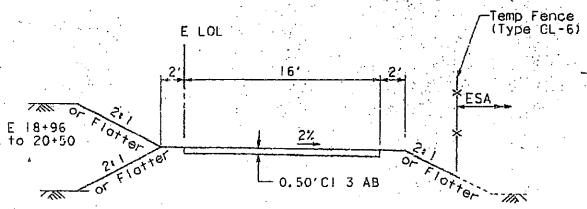
REGISTERED CIVIL ENGINEER 11-18-94

10-15-1995
PLANS APPROVAL DATE

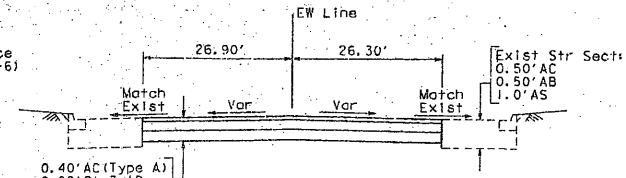
ALAMEDA COUNTY
TRANSPORTATION AUTHORITY
1401 LAKESIDE DRIVE SUITE 600
OAKLAND, CA 94612

TUDOR ENGINEERING COMPANY
1800 HARRISON STREET
OAKLAND, CALIFORNIA 94612

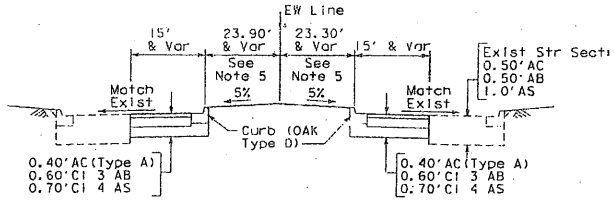
AS-BUILT
Date 11/20/98
By



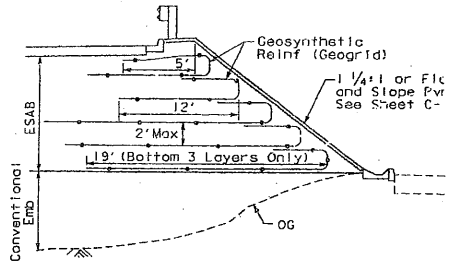
E LINE
E 18+96 to E 24+22



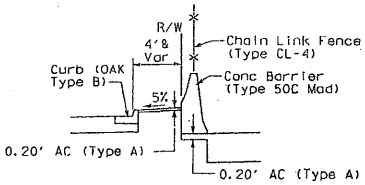
EDGEWATER DRIVE
EW 13+03 to EW 13+83



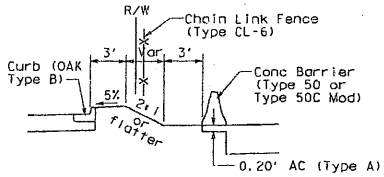
EDGEWATER DRIVE
EW 10+71 to EW 13+03
EW 13+83 to EW 16+13



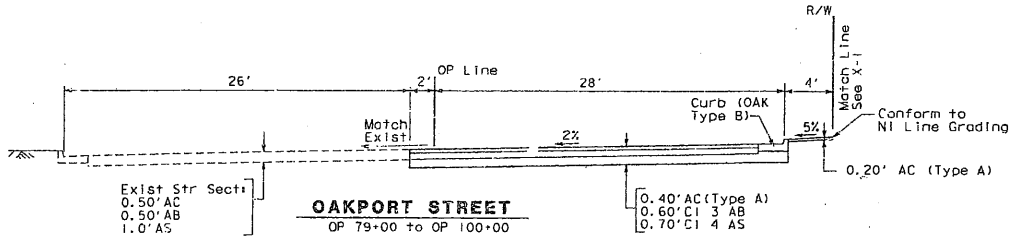
GEOSYNTHETIC REINF EMB (GRE) AT H1 LINE
H1 27+00 to H1 31+00 (Rt)
H1 29+50 to H1 31+02 (Lt) (For Geogrid Layo



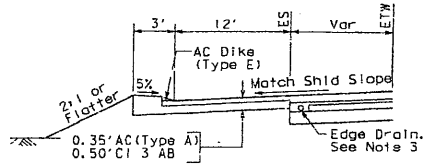
HL3 75+47 to HL3 77+16 (Lt)
OP 75+75 to OP 77+23 (Rt)



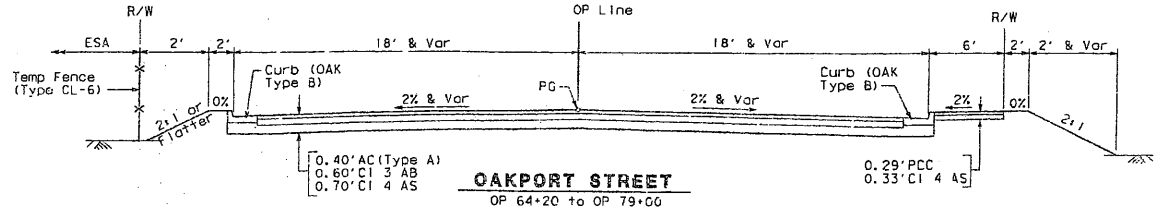
HL3 74+25 to HL3 75+47 (Lt)
OP 74+75 to OP 75+75 (Rt)
and
HL3 77+16 to HL3 80+38 (Lt)
OP 77+23 to OP 80+38 (Rt)



OAKPORT STREET
OP 79+00 to OP 100+00



MAINTENANCE VEHICLE PULLOUT



OAKPORT STREET
OP 64+20 to OP 79+00

For notes, abbreviations, and legend, see Sht X-1.

TYPICAL CROSS-SECTIONS

NO SCALE

DATE	REVISED BY	DATE REVISED
6/92	RLS	6/92

CALCULATED/DESIGNED BY MWT
CHECKED BY RLS
DESIGN OVERSIGHT CHUN TSUNG

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

4233 904.DGN

FORM DC-OE-92-PF (REV. 3/88)

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU 04184 EA 233191

1998

INDEX OF SHEETS

1	TITLE SHEET
2-5	TYPICAL CROSS SECTIONS
6-7	STANDARD PLANS LIST
8	KEY MAP AND LINE INDEX
9-13	LAYOUTS
14-21	PROFILES AND SUPERELEVATION DIAGRAMS
22-37	CONSTRUCTION DETAILS
38-41	CONTOUR GRADING
42-46	DRAINAGE PLANS
47-48	EDGE DRAIN PLANS
49-69	DRAINAGE PROFILES AND DETAILS
70-79	DRAINAGE QUANTITIES
80-82	TEMPORARY CONSTRUCTION DRAINAGE PLANS AND DETAILS
83-92	SANITARY SEWER PLANS, PROFILES, DETAILS, AND QUANTITIES
93-98	UTILITY PLANS
99-139	STAGE CONSTRUCTION PLANS
140-142	DETOUR PLANS
143-157	CONSTRUCTION AREA SIGNS
158-163	PAVEMENT DELINEATION PLANS
164-165	SUMMARY OF QUANTITIES
166-175	SIGN PLANS, DETAILS, AND QUANTITIES
176-177	RETAINING WALL DETAILS
178-244	SOUNDWALL AND RETAINING WALL PLANS, PROFILES, AND DETAILS
245-252	PLANTING AND IRRIGATION PLANS
253-260	STREET LIGHTING PLANS AND DETAILS
261-308	SIGNAL AND LIGHTING PLANS AND DETAILS
309-311	REVISED STANDARD PLANS
312-315	NEW STANDARD PLANS
316-339	STRUCTURE PLANS (98TH AVENUE OVERCROSSING)
340-367	STRUCTURE PLANS (JONES AVENUE PEDESTRIAN OVERCROSSING)

ALAMEDA COUNTY TRANSPORTATION AUTHORITY

PROJECT PLANS FOR CONSTRUCTION ON

STATE HIGHWAY

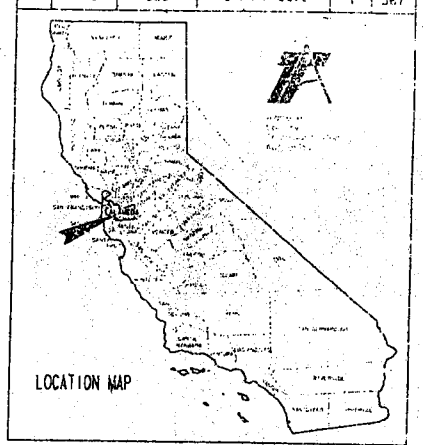
IN ALAMEDA COUNTY IN OAKLAND

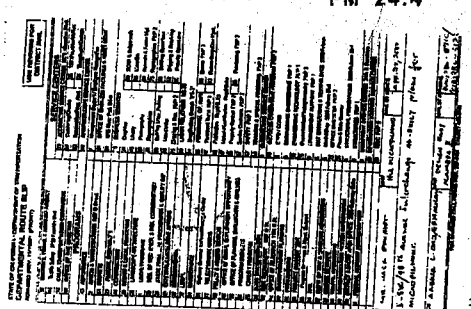
FROM SAN LEANDRO CREEK BRIDGE AND OVERHEAD

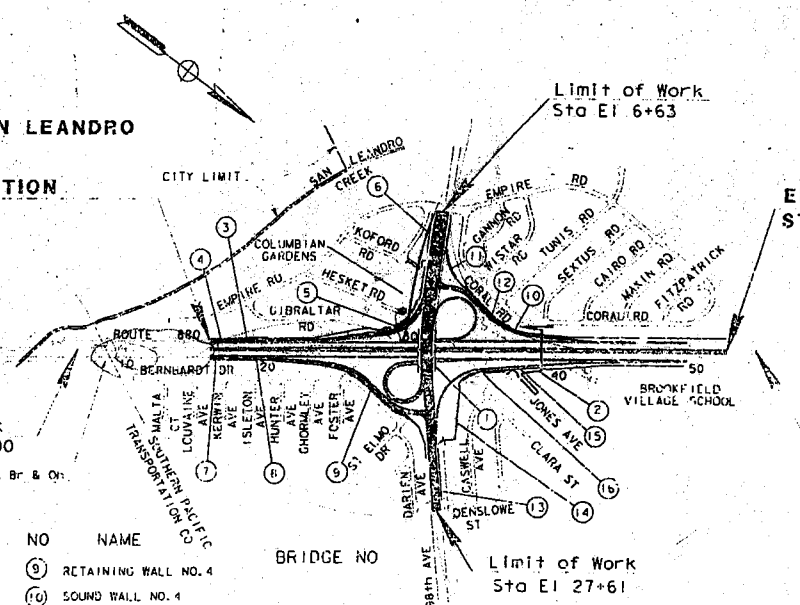
TO 0.4 MILE NORTH OF 98TH AVENUE OVERCROSSING

To be supplemented by Standard Plans dated July, 1992

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT	TOTAL SHEETS	TOTAL PROJECT SHEETS
04	Ala	880	24.4 / 25.2	1	367



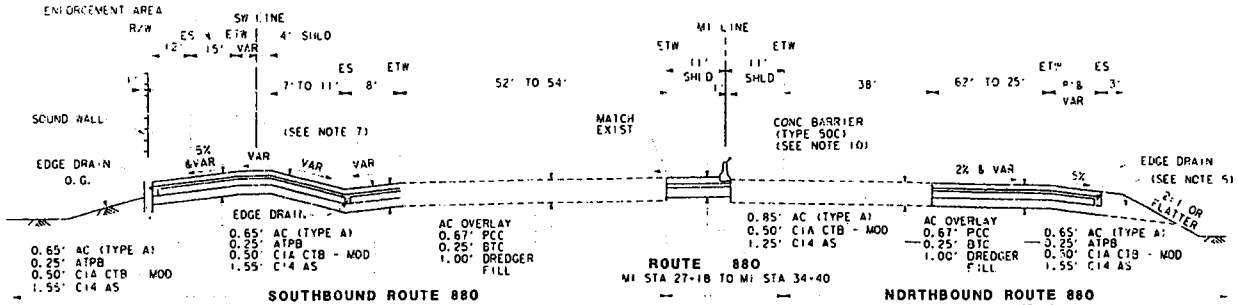


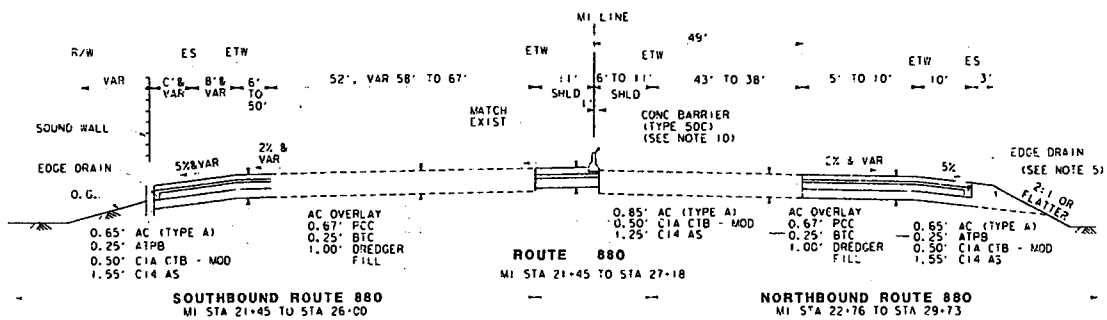


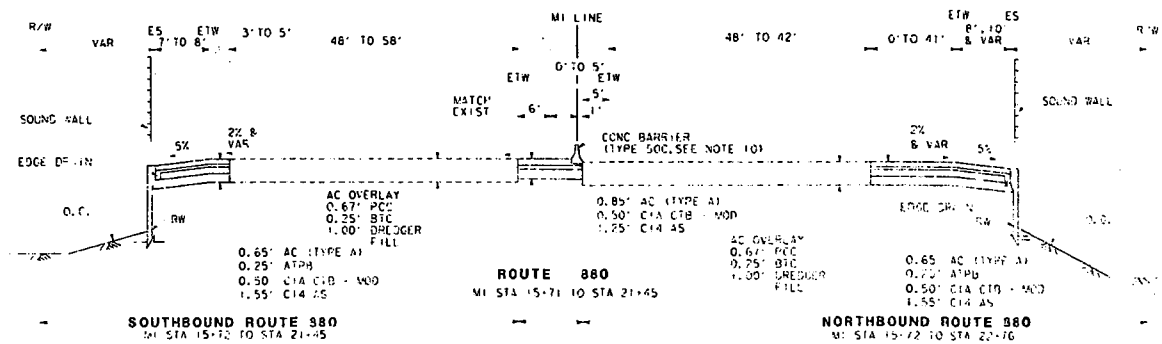
NO	NAME
1	98TH AVE OVERCROSSING
2	JONES AVENUE PED. OVERCROSSING
3	SOUND WALL NO. 1
4	RETAINING WALL NO. 1
5	RETAINING WALL NO. 2
6	SOUND WALL NO. 2
7	SOUND WALL NO. 3
8	RETAINING WALL NO. 3
9	RETAINING WALL NO. 4
10	SOUND WALL NO. 4
11	RETAINING WALL NO. 5
12	RETAINING WALL NO. 6
13	SOUND WALL NO. 5
14	SOUND WALL NO. 6
15	SOUND WALL NO. 7
16	RETAINING WALL NO. 7

The Contractor shall possess the Class (or classes) of License as specified in the "Notice to Contractors".

04-233284
09/02/1998







ABBREVIATIONS

BTC BITUMINOUS TREATED SUBGRADE

DESIGN DESIGNATION (880)

1995 ADT	=	187,000
2015 ADT	=	235,000
DHV	=	14,880
D	=	50%
T	=	12%
V	=	70 MPH

NOTES:

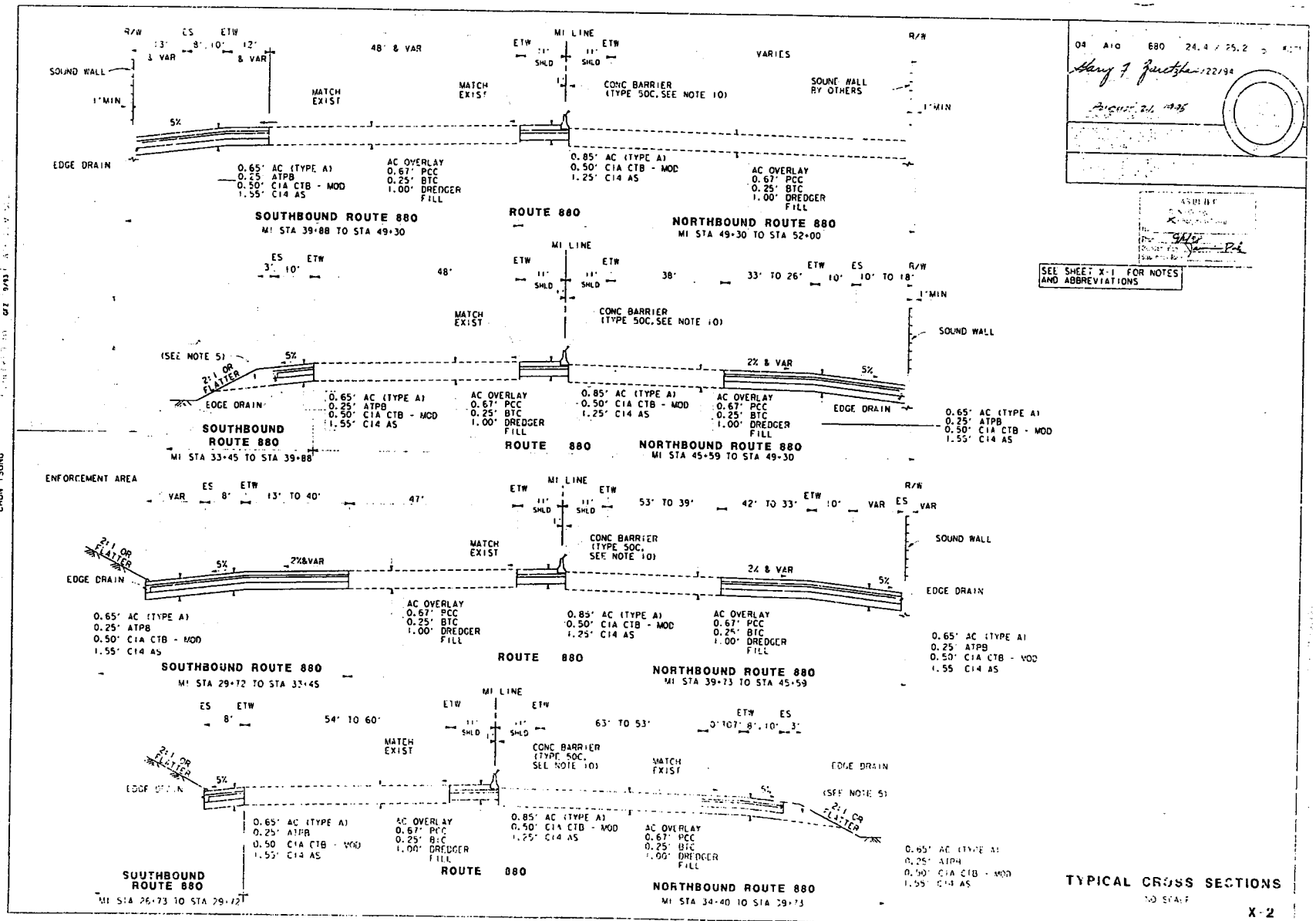
1. DIMENSIONS OF THE STRUCTURAL SECTIONS ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATIONS AS SHOWN ON THE PROFILE PLANS OR AS DIRECTED BY THE ENGINEER.
3. FOR LOCATIONS AND LIMITS OF DIKES, CURBS AND GUTTERS, AND CONC BARRIERS, SEE LAYOUT PLANS AND CONSTRUCTION DETAILS.
4. FOR LOCATIONS OF EDGE DRAINS SEE EDGE DRAIN PLANS.
5. FOR FILL SLOPES STEEPER THAN 4:1, SUBBASE IS TO BE EXTENDED TO THE FILL SLOPE.
6. ON HIGH SIDE OF SUPERELEVATIONS AND AT MEDIAN IN CROWN SECTION, CONSTRUCT GUTTER IN SAME PLANE AS ROADWAY.
7. FOR PAVEMENT ELEVATIONS, SEE CONSTRUCTION DETAIL SHEET C-8
8. SALVAGE TYPE C1 EXISTING CENTERLINE OF ROUTE 880 ARE NOT SHOWN, SEE LAYOUT SHEET FOR [illegible]
9. MINIMUM 0.15' AC PAVEMENT UNDER THE CONCRETE BARRIER (TYPE 50C).

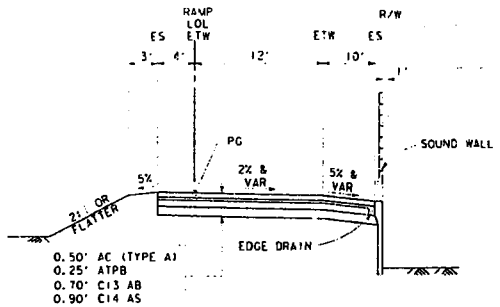
TYPICAL CROSS SECTIONS

X-1

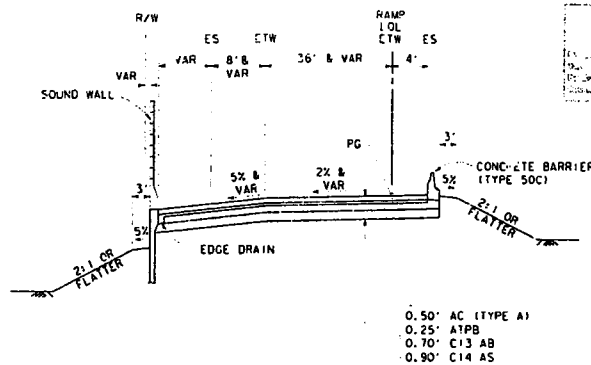
CHUN TSUNG

Caltrans

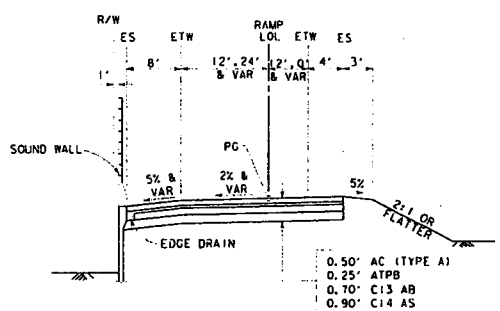

04 ALA 880 24.4 / 25.2
SEE SHEET X-1 FOR NOTES AND ABBREVIATIONS
R/W
ES
ETW
SOUND WALL
1' MIN
5%
EDGE DRAIN
MATCH EXIST
48' & VAR
MI LINE
SHLD
CONC BARRIER (TYPE 50C, SEE NOTE 10)
VARIES
SOUND WALL BY OTHERS
0.65' AC (TYPE A)
0.25' ATPB
0.50' CIA CTB - MOD
1.55' CIA AS
AC OVERLAY
0.67' PCC
0.25' BTC
1.00' DREDGER FILL
0.85' AC (TYPE A)
0.50' CIA CTB - MOD
1.25' CIA AS
SOUTHBOUND ROUTE 880
MI STA 39+88 TO STA 49+30
ROUTE 880
NORTHBOUND ROUTE 880
MI STA 49+30 TO STA 52+00
48'
38'
33' TO 26'
10' TO 18'
2% & VAR
(SEE NOTE 5)
2:1 OR FLATTER
SOUTHBOUND ROUTE 880
MI STA 33+45 TO STA 39+88
NORTHBOUND ROUTE 880
MI STA 45+59 TO STA 49+30
ENFORCEMENT AREA
13' TO 40'
47'
53' TO 39'
42' TO 33'
2%&VAR
SOUTHBOUND ROUTE 880
MI STA 29+72 TO STA 33+45
NORTHBOUND ROUTE 880
MI STA 39+73 TO STA 45+59
54' TO 60'
63' TO 53'
SOUTHBOUND ROUTE 880
MI STA 26+73 TO STA 29+72
NORTHBOUND ROUTE 880
MI STA 34+40 TO STA 39+73
TYPICAL CROSS SECTIONS
NO SCALE
X-2
Caltrans
CHUN TSUNG



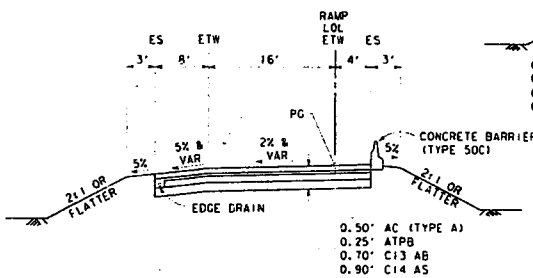
NE LINE
STA 30+35 TO STA 39+73



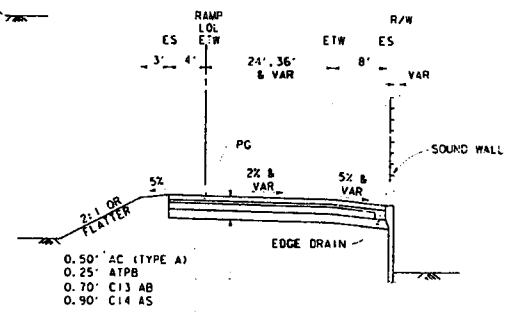
SW LINE
STA 26+73 TO STA 30+98



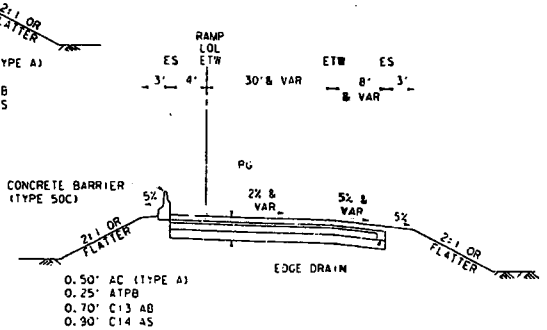
NW LINE
STA 30+60 TO STA 39+86



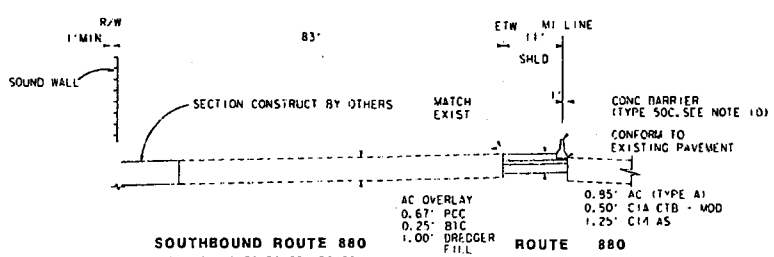
NWL LINE
STA 33+45 TO STA 39+15



SE LINE
STA 22+76 TO STA 31+82



SEL LINE
STA 23+30 TO STA 29+73



SOUTHBOUND ROUTE 880
M1 STA 49+30 TO STA 52+00

ROUTE 880

SEE SHEET X-1 FOR NOTES AND ABBREVIATION

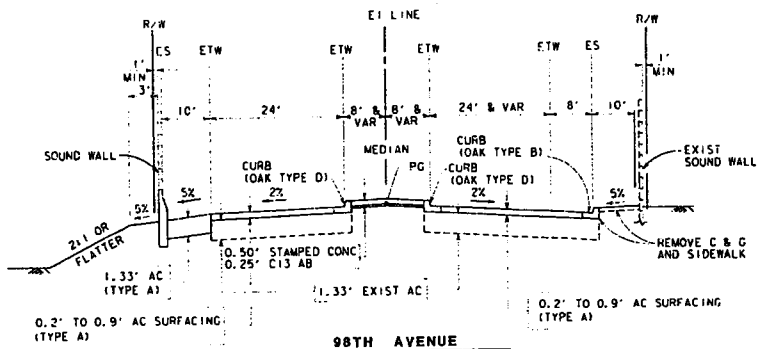
TYPICAL CROSS SECTIONS

NO SCALE

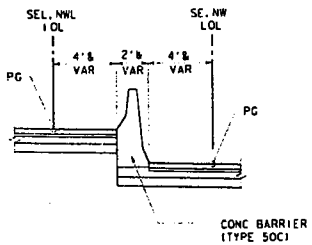
X-3

CHUN TSUNG

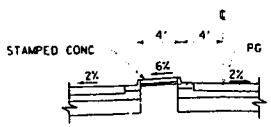
Caltrans



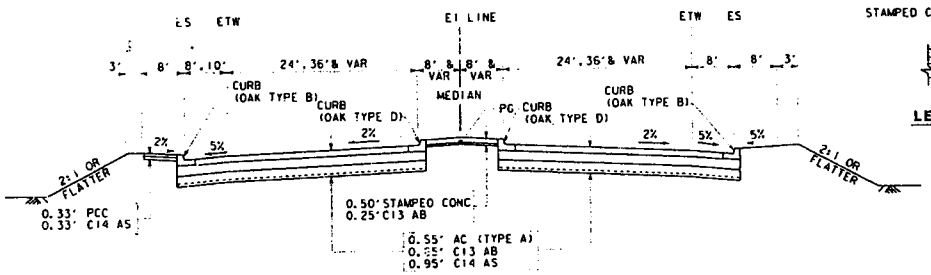
98TH AVENUE
EI STA 24+00 TO STA 25+00



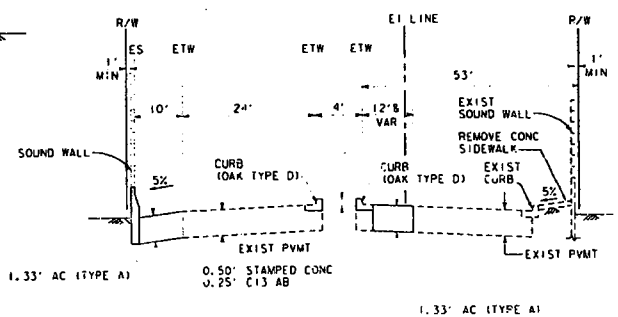
CONCRETE BARRIER BETWEEN
SEL & SE, NWL & NE



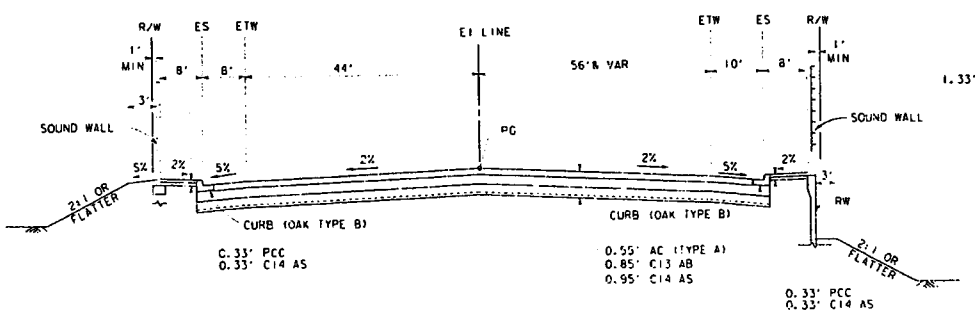
LEFT TURN POCKET SECTION



98TH AVENUE
EI STA 12+40 TO STA 14+90
EI STA 17+95 TO STA 24+00



98TH AVENUE
EI STA 25+00 TO STA 27+00



98TH AVENUE
EI STA 6+63 TO STA 12+40

SEE SHEET X-1 FOR NOTES

TYPICAL CROSS SECTIONS
NO SCALE

X-4

04 A10 880 24.4 / 25.2

Gary J. Gantzhorn 12/22/94

August 31, 1995

ASPHALT
CONCRETE
CHANGE ORDER
By
Date 7/1/94
Revision No.
Supplement No.

CHUN TSUNG

Caltrans

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	20.3/23.6	1	354

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN ALAMEDA COUNTY IN SAN LEANDRO FROM 0.3 MILE SOUTH OF LEWELLING BOULEVARD UNDERCROSSING TO DAVIS STREET OVERCROSSING

To be supplemented by Standard Plans dated January, 1989

INDEX OF SHEETS

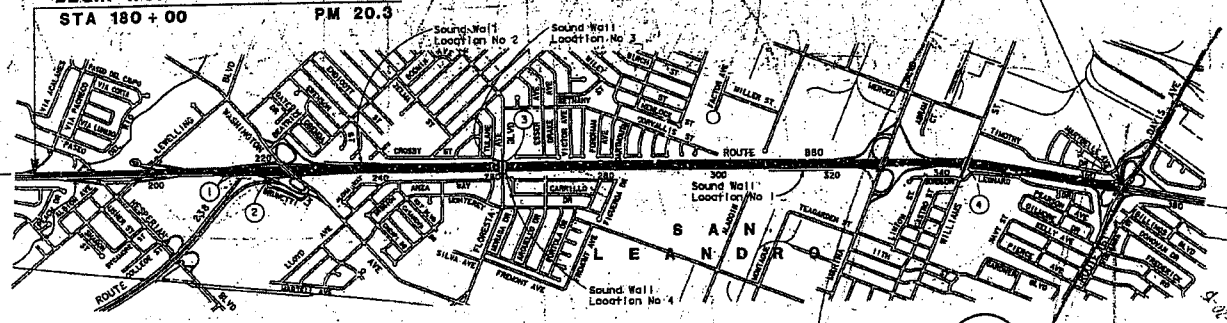
Sheet No. 1 Title and Location Map
" " 2-4 Typical Cross Sections
" " 5 Standard Plans List
" " 6 Key Map and Line Index
" " 7-20 Layouts 9A,B,C & D
" " 21-44 Profiles 18A, 42A
" " 45-51 Construction Details
" " 52-56 Contour Grading
" " 57-121 Drainage Plans, Profiles, Details and Quantities 68A, 69A, 117A, 118A, 119A & B
" " 122-124 Utility Plans 122A-G, 124A,B,C,D,E,F & G 170A,171A & 172A
" " 125-165 Stage Construction Plans
" " 166-179 Pavement Delineation Plans, Details and Quantities
" " 180-187 Summary of Quantities
" " 188-195 Sign Plans, Details and Quantities
" " 196-197 Retaining Wall
" " 198-209 Sound Wall
" " 210-211 Highway Planting
" " 212-235 Electrical 235A
" " 236-249 Revised and New Standard Plan

STRUCTURE PLANS

" " 250-265 Williams Street Overcrossing Br. No. 33-169
" " 266-280 Floresta Boulevard Overcrossing Br. No. 33-293
" " 281-297 880/238 Off-Ramp Br. No. 33-173S
" " 298-329 Rte. 880/238 Separation Br. No. 33-172
" " 330-354 Williams Street Overcrossing Pumping Plant Br. No. 33-169W

BEGIN WORK AND CONSTRUCTION
STA 180 + 00 PM 20.3

END WORK AND CONSTRUCTION
STA 372 + 00 PM 23.6



LOCATION MAP

STRUCTURE LIST

	NAME	BRIDGE NO.
1	880/238 SEPARATION	33-172
2	880/238 OFF-RAMP	33-173
3	FLORESTA BLVD OC	33-293
4	WILLIAMS ST OC	33-169

NO Construction Changes
CONTRACT No. 04-123174
DATE ACCEPTED 12-29-95
AS BUILT
RESIDENT ENGINEER K Lonaharich

NO SCALE

AS-BUILT
DATE: 12-19-97
TYPE OF WORK: Widen freeway ramps and structures

Tony Wong
Project Engineer
Registered Civil Engineer
August 29, 1991
Plans Approved Date

T. Y. F. Rong
No. 40018
Exp. 12-31-93
CIVIL
STATE OF CALIFORNIA

The Contractor shall possess the Class (or Classes) of license as specified in the Notice to Contractors.

T. Y. F. RONG
PROJECT ENGINEER DATE

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

Contract No. 04-123174
CU 04173 EA 123171

04-123174
11/29/1995 & 12/19/1997

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
D4	Ala	680	20.3/23.6	2	354

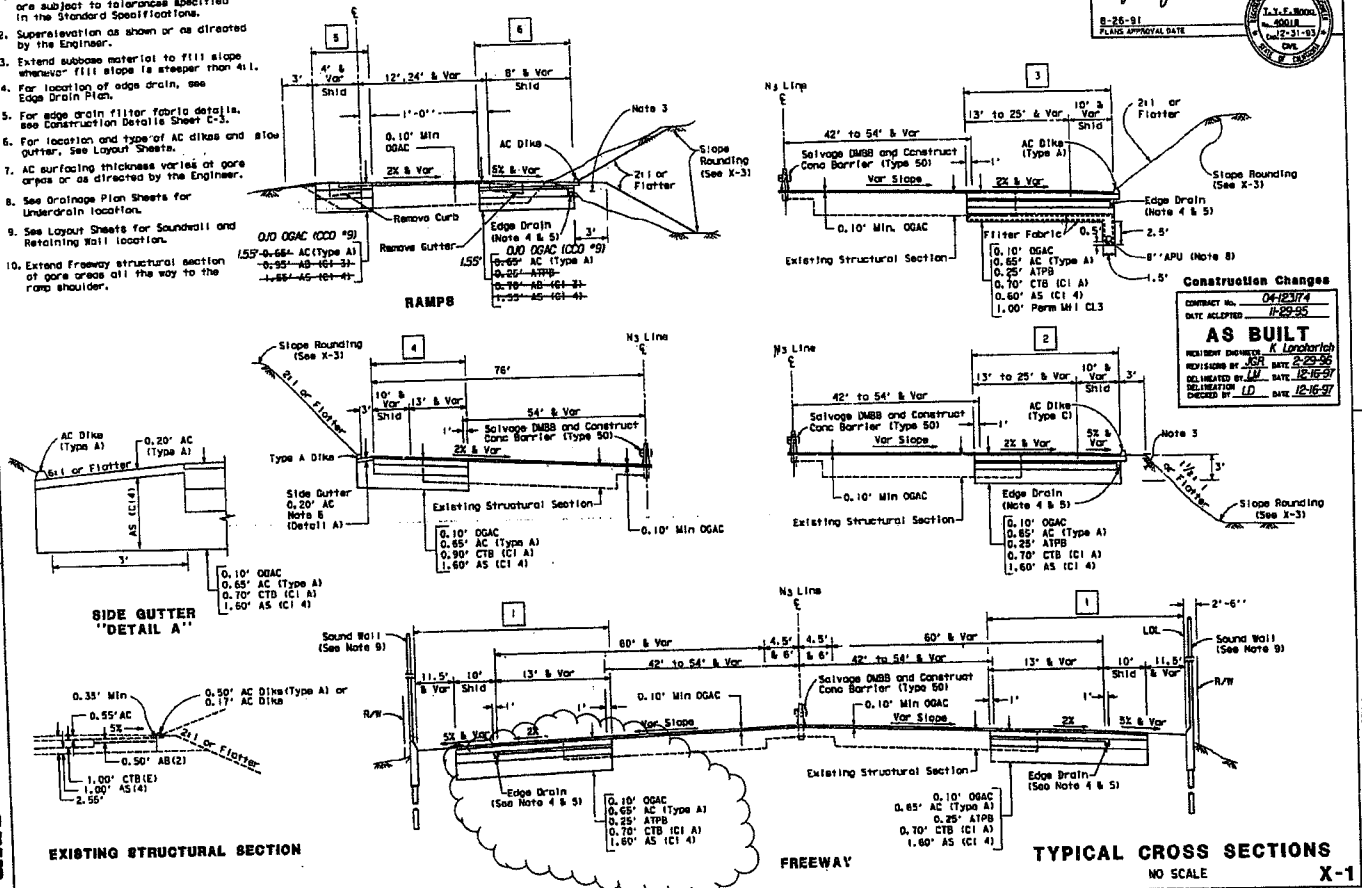
REGISTERED CIVIL ENGINEER

8-26-91
PLANS APPROVAL DATE

T.Y.F. Bong
No. 40018
Exp. 12-31-93
CIVIL
STATE OF CALIFORNIA

NOTES:

1. Dimensions of the structural sections are subject to tolerances specified in the Standard Specifications.
2. Superelevation as shown or as directed by the Engineer.
3. Extend subbase material to fill slope whenever fill slope is steeper than 4:1.
4. For location of edge drain, see Edge Drain Plan.
5. For edge drain filter fabric details, see Construction Details Sheet C-3.
6. For location and type of AC dikes and slow gutter, See Layout Sheets.
7. AC surfacing thickness varies at gore areas or as directed by the Engineer.
8. See Drainage Plan Sheets for Underdrain location.
9. See Layout Sheets for Soundwall and Retaining Wall location.
10. Extend freeway structural section of gore areas all the way to the ramp shoulder.



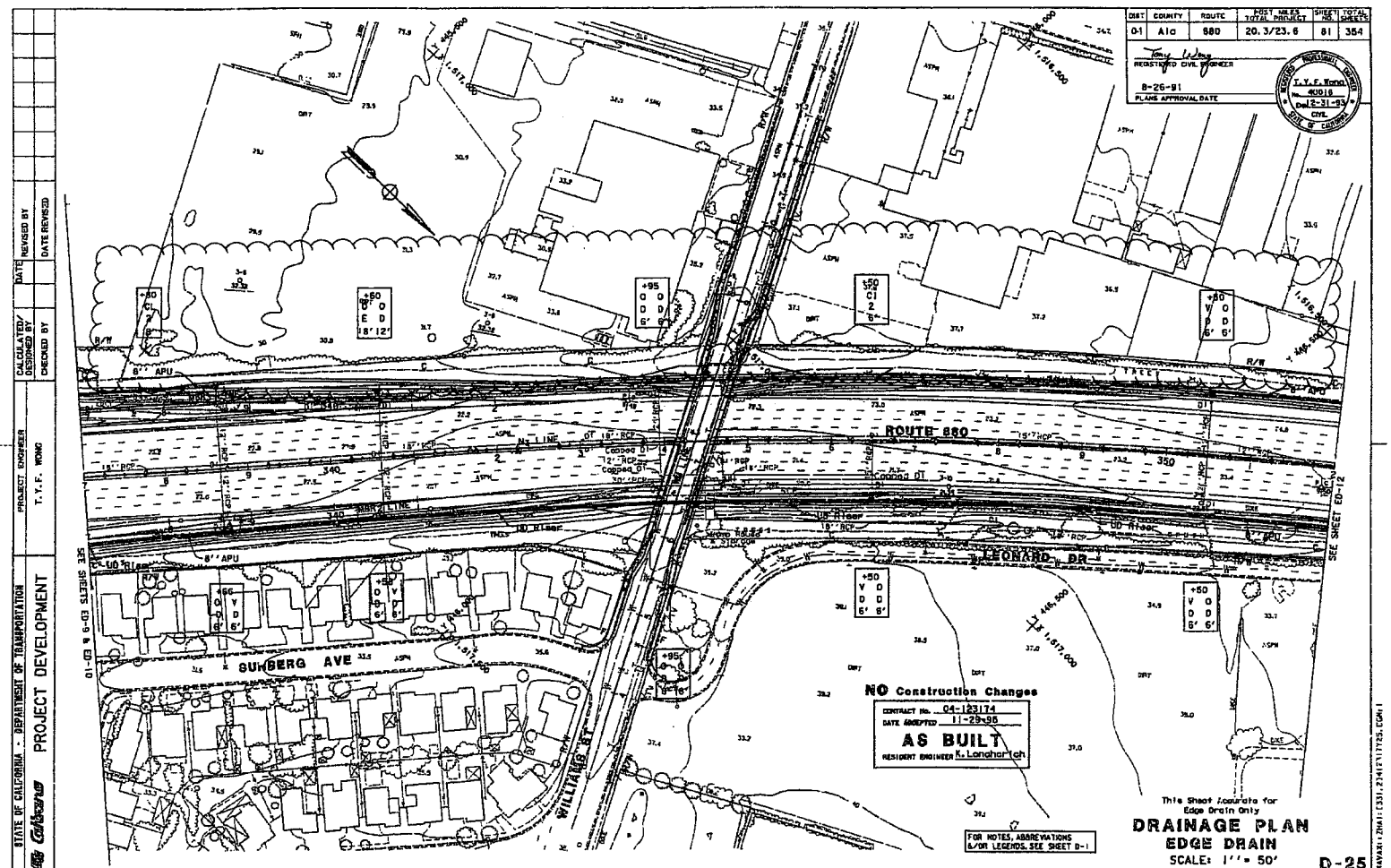
TYPICAL CROSS SECTIONS
NO SCALE
X-1

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES

DU 04173 | EA 123171

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT
PROJECT ENGINEER T.Y.F. BONG
CALCULATED/DESIGNED BY | CHECKED BY | DATE REVISED BY | DATE REVISED

t4hkhall 412317y25 25-Nov-1997 07:52 /home/t4ldelac/123171/412317y25.osb



t4hkhall 412317y25 25-Nov-1997 07:52 /home/t4ldelac/123171/412317y25.osb

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	20.3/23.6	180	354

REGISTERED CIVIL ENGINEER
8-28-91
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.Y.F. Wong No. 40018 Exp. 12-31-93 CIVIL STATE OF CALIFORNIA

ROADWAY QUANTITIES

STATION LIMITS	ASPHALT CONCRETE (TYPE A)	ASPHALT CONCRETE (OPEN GRADED)	ATPM	CTB (PLANT-MIXED CLASS A)	CLASS 3 AGGREGATE BASE	CLASS 4 AGGREGATE SUBBASE	CLASS 3 PERM NTL (BLANKET)	ASPHALTIC EMULSION (PAINT BINDER)	LIQUID ASPHALT (CURING SEAL)
	TON			CUBIC YARD				TON	
N3 180+00.00 to 372+00.00	32360	18740	5835	17975		40600	3560	120.00	63.00
L2N ~~199+88.58 to 202+17.2~~	~~[illegible]~~	~~[illegible]~~	~~16~~		105	200		0.30	0.30
W9N 214+15± to 219+67±	760	18	130		450	950		0.11	1.50
W7N 210+00.00 to 237+30±	1960	146	240		1200	2350		0.88	3.50
W3N 215-95± to 229+41±	320		66		183	405			0.61
W6 217+25± to 220+25±	720	50						0.30	
W8N 224+54± to 228+25±	550		113		315	700			1.05
W6N 224+90± to 228+25±		73						0.45	
W2N 223+50± to 229+41±	445	50	80		270	578		0.30	0.87
MBR1 323+72± to 328+00±	226	95	38		145	298		0.60	0.50
MBR2 330+15± to 335+28±	250	90	46		157	167	240	0.55	0.50
MBR3 329+84± to 339+90±	737	55	132		445	573	470	0.34	1.48
MBR4 319+74± to 323+58±		36						0.22	
MBL4 326-51± to 328+85±	95	21	18		50	110		0.12	0.17
DSR1 370+95± to 374+45±	147	117	7		100	173		0.26	0.70
DSR4 363+53± to 370+68±	316	135	62		198	425		0.85	0.65
FB 16+00± to 24+50.40±	798				662	980		0.30	2.50
WM 23+85± to 32+00±	695				415	615		0.40	1.50
Maintance Vehicle Pullout	108				75				0.35
TOTAL	40655	19674	6785	17975	4770	49124	4270	125.98	79.18

EARTHWORK SUMMARY

STATION LIMITS	ROADWAY EXC	EMBANKMENT (N)
	CY	
N3 195+00 to 370+00 Lt	36000	10000
N3 210+00 to 370+00 Rt	39100	6400
W9N 214+15 to 217+62	1390	4090
W7N 210+25 to 237+33	1700	1670
W3N 215+95 to 223+90	1700	7650
W2N 222+00 to 226+84	900	
MBR1 323+71 to 328+00	970	20
MBR2 330+15 to 335+28	2000	
MBR3 329+85 to 339+90	5900	
DSR1 370+95 to 374+44	780	
DSR4 363+53 to 370+68	1350	
L2N 200+00 to 202+14	680	700
FB 16+00 to 24+50.40		2900
WM 23+85 to 32+00.00		760
LOOP Lt of DSR4 370+00	8334	
W8N 224+40 to 230+95	1150	245
MBR4 321+00 to 323+50	130	75
W7N 214+14 to 217+46	400	
W6 217+25 to 220+25	360	
TOTAL	102844	34510

(N) Not a separate pay item, for information only.

NO Construction Changes

CONTRACT No. 04-123174
DATE ACCEPTED 11-29-95
AS BUILT
RESIDENT ENGINEER K. Lonchar 1/3

SOUNDWALL QUANTITIES

SOUND WALL NO	STATION LIMITS	SOUND WALL (MASONRY BLOCK)	CONCRETE BARRIER TYPE 275V HE=1	HE=2	HE=3	(N) 18" CIDH CONCRETE PILING	(N) ACCESS GATE (SOUND-WALL)
		SQFT	LF			LF	EA
1	N3 307+94 to 320+30	11730	480	792		3280	1
2	N3 231+90 to 241+47	12700	260	623	80	2624	
3	N3 261+24.50 to 262+48.50	1654	124			288	
4	N3 261+24.50 to 262+48.22	1654	124			288	
SUBTOTAL			988	1415	80		
TOTAL		27738	2483			6480	1

SALVAGE CHAIN LINK FENCE

STATION LIMITS	LOCATION	LF
N3 231+05 to 241+47	LT	1042
N3 307+95 to 320+30	RT	1235
TOTAL		2277

RECONSTRUCT METAL BEAM GUARD RAILING (WOOD POST)

STATION LIMITS	LOCATION	LF	CABLE ANCHOR ASSEMBLY BREAKAWAY (EA) TYPE A	TYPE B	TERMINAL SECTION (EA) TYPE B	TYPE C	RETURN
N3 195+10 to 197+15	Lt	205	1		1	1	
N3 198+90 to 202+55	Lt	365	1		1	1	
L2N 201+42 to W9N 215+50	Lt	1408	1		1		
N3 209+75 to W3N 213+90	Rt	415		1	1		
W3N 217+40 to 218+15	Lt	75	1		1	1	
FB 17+89 to 18+84	Lt	75	1		1	1	
FB 21+36 to 22+11	Lt	75	1		1	1	
WM 25+09 to 25+84	Rt	75	1		1	1	
WM 28+55 to 29+20	Lt	75	1		1	1	
DSR4 368+06 to 370+70	Rt	264	1		1	1	
TOTAL		3032	9	1	10	9	

RECONSTRUCT CHAIN LINK FENCE

STATION LIMITS	LOCATION	LF
N3 231+00 to 231+80	LT	80
TOTAL		80

CONCRETE BARRIER

STATION LIMITS	LOC	TYPE 25B	50	500	50E	50E MODIFIED	275V
		LF					
N3 214+76 to 216+24	Lt			146			
N3 219+10 to 227+10	Lt			800			
N3 218+30 to 226+00	Rt			770			
N3 209+85 to 371+45	Med		15702				
N3 222+18 to 223+68	Med				150		
N3 261+32 to 262+40	Med				108		
N3 329+95 to 331+05	Med				110		
N3 343+93 to 344+83	Med				90		
W7N 213+95 to 218+00	Rt					408	
W7N 213+66 to 217+20	Lt					354	
W3N 215+62.50 to 217+76.50	Rt	214					
W3N 221+92 to 222+70	Rt	72					
DSR4 361+50 to 368+06	Rt						640
TOTAL		286	15702	1716	458	760	640

SUMMARY OF QUANTITIES
Q-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT

PROJECT ENGINEER T.Y.F. WONG
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

CU 04173 EA 123171

FORM DC-OE-02-07 REV. 3/90

1966

STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

PLANS FOR CONSTRUCTION ON

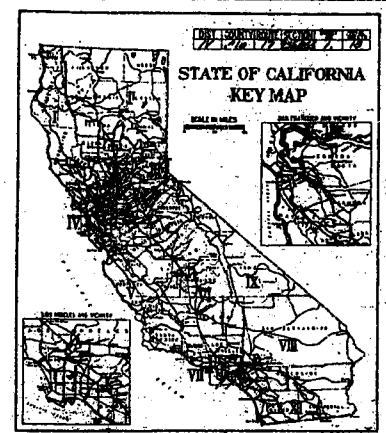
STATE HIGHWAY

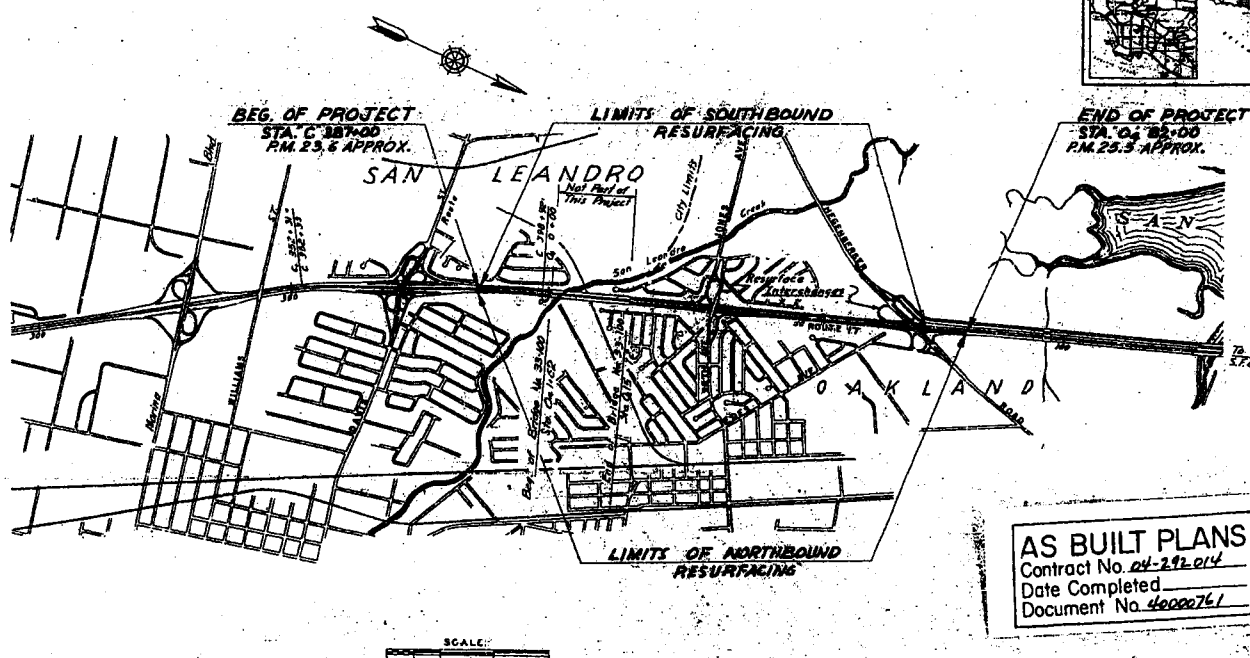
IN ALAMEDA COUNTY
BETWEEN DAVIS STREET IN SAN LEANDRO
AND HEGENBERGER ROAD IN OAKLAND

INDEX OF SHEETS

Sheet No.	1	Title Sheet
" "	2	Typical Cross-Sections
" "	3-4	Construction Details
" "	5-6	Drainage Details
" "	7	Structure List
" "	8-18	Standard Construction Details

STATE OF CALIFORNIA
KEY MAP





SCALE:
0 500 1000 2000 3000 FEET

LENGTH OF PROJECT: 8,392 FEET 1.78 MILES

AS BUILT PLANS
Contract No. 04-292014
Date Completed
Document No. 40000761

04-292014

292011
04602

64-04T10H2920.1

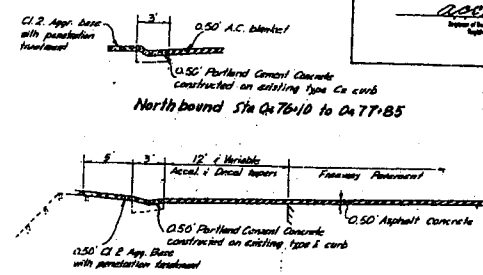
PROJECT ENGINEER	DATE	BRIDGE ENGINEER	DATE	APPROVAL RECOMMENDED BY	DATE

04-292014
Undated
(Document No. 40000761)

DIST.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	Ala	17	23.6/25.5	2	18

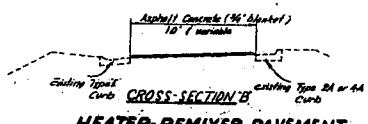
July 1, 1964



Northbound Sta Oa 76+10 to Oa 77+85

CROSS-SECTION "D"

ACCELERATION, DECELERATION AND AUXILIARY LANES

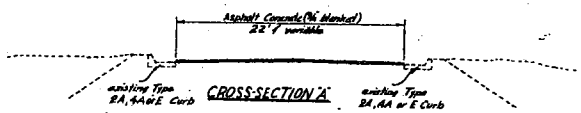


CROSS-SECTION "B"

HEATER-REMIXER PAVEMENT ONE-WAY RAMPS

No Scale

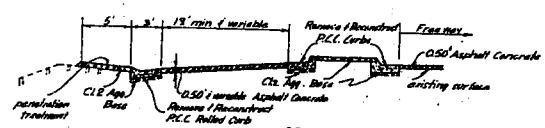
AS BUILT PLANS
Contract No. 04-292.014
Date Completed
Document No. 40000761



CROSS-SECTION "A"

HEATER-REMIXER PAVEMENT 2 LANE-2 WAY STREETS & RAMPS

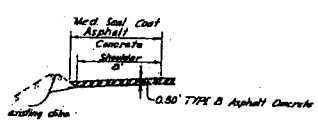
No Scale



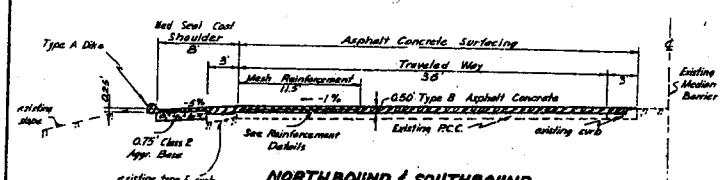
CROSS-SECTION "C"

CONFORM SECTION AT RAMP CONNECTIONS

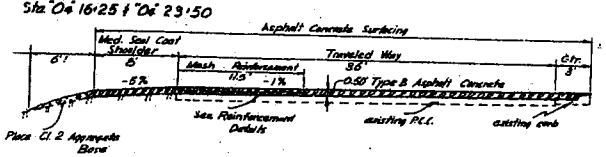
No Scale



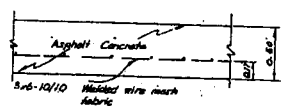
Shoulder Between
Sta "Oa" 16+25 & "Oa" 23+50



NORTHBOUND & SOUTHBOUND LANES BETWEEN
Sta Oa 28+00 & Sta Oa 1+62
(Southbound shown)



NORTHBOUND & SOUTHBOUND LANES BETWEEN
Sta Oa 18+72 & Sta Oa 21+00
(Southbound shown)



DETAILS FOR MESH REINFORCEMENT

No Scale

IV-Ala-17-23.6/25.5

TYPICAL CROSS SECTIONS

Scale: 1"=5'

Note: Dimensions are subject to tolerances specified in the Standard Specifications

04-292014

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
DISTRICT IV

TYPICAL CROSS SECTIONS

DRAWN BY: N.T.T. DATE: 1-23-64 SCALE: As Shown

04-04T10H2920.1

(29.5)

2

1952

F.A.I. Rte. No.	STATE	F.A. PROJECT NO.	SHEET NO.	TOTAL SHEETS
7	CALIF			

INDEX OF SHEETS

Sheet No. 1 Title Sheet
" 2 Layout Plan
" 3-4 Construction Details
" 5-6 Pavement Elevations
" 7 Special Structures
8-11 Highway Lighting
12-15 Standard Structures
1-12 Cross Sections

STATE OF CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

DIVISION OF HIGHWAYS

PLAN OF

STATE HIGHWAY

In Alameda County, Eastshore Freeway at Hegenberger Road

Scales as shown

(being the detail plans of a portion of the route for the State highway adopted by the California Highway Commission July 25, 1941 and declared a

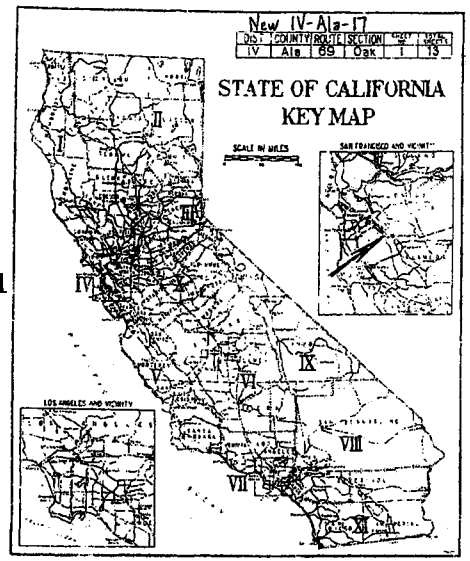
FREEWAY

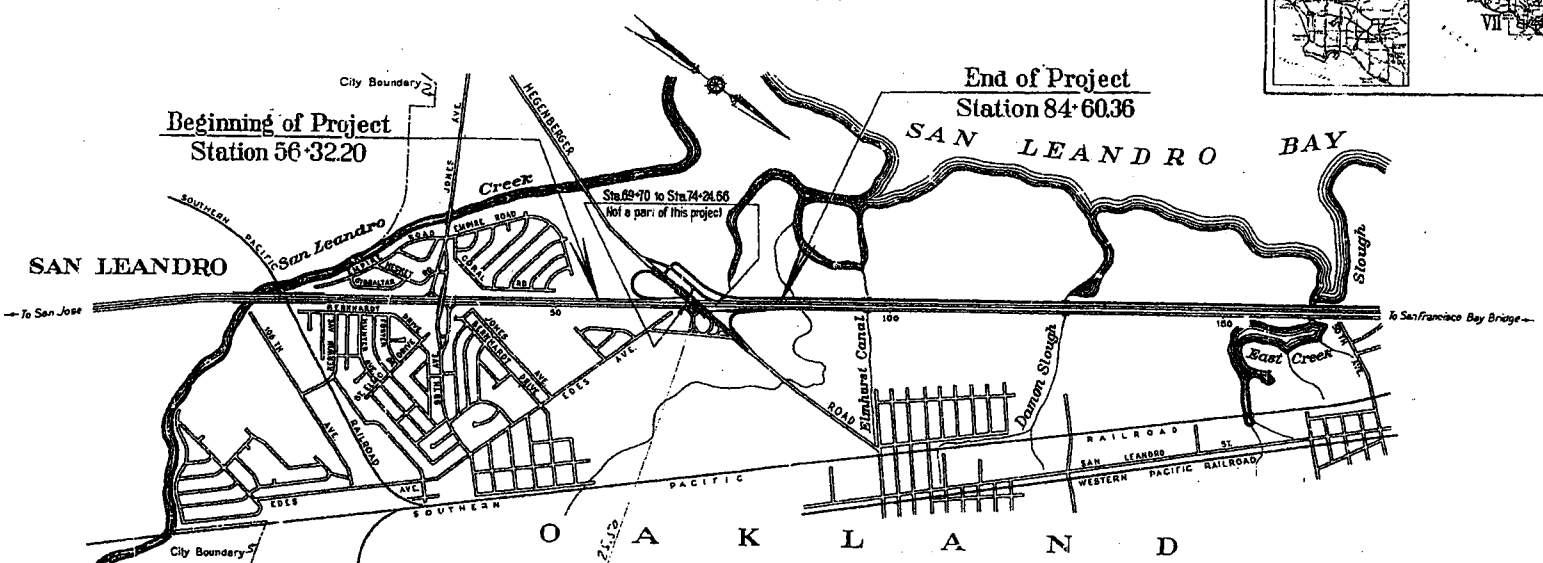
by resolution of the California Highway Commission July 25, 1941)

New IV-Ala-17

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	Ala	89	Oak	1	15

STATE OF CALIFORNIA KEY MAP





CONVENTIONAL SIGNS

County Line
City or Town Limits
Township Line
Section Line
Grant Line
Fence
Guard Rail
Unfenced Property
Right of Way Line
Base or Survey Line
Traveled Way
Railway Tracks
Bank or Retaining Wall
Levee
Culverts
Drop Inlet
Trolley Pole
Power Pole
Power Tower
Telegraph or Telephone Pole
Marsh

SCALE

0 500 1000 2000 3000 FEET

Length of Project = 2,373.50 feet = 0.450 mile

AS BUILT PLANS
Contract No. 53-4TC28
Date Completed
Document No. 40000770

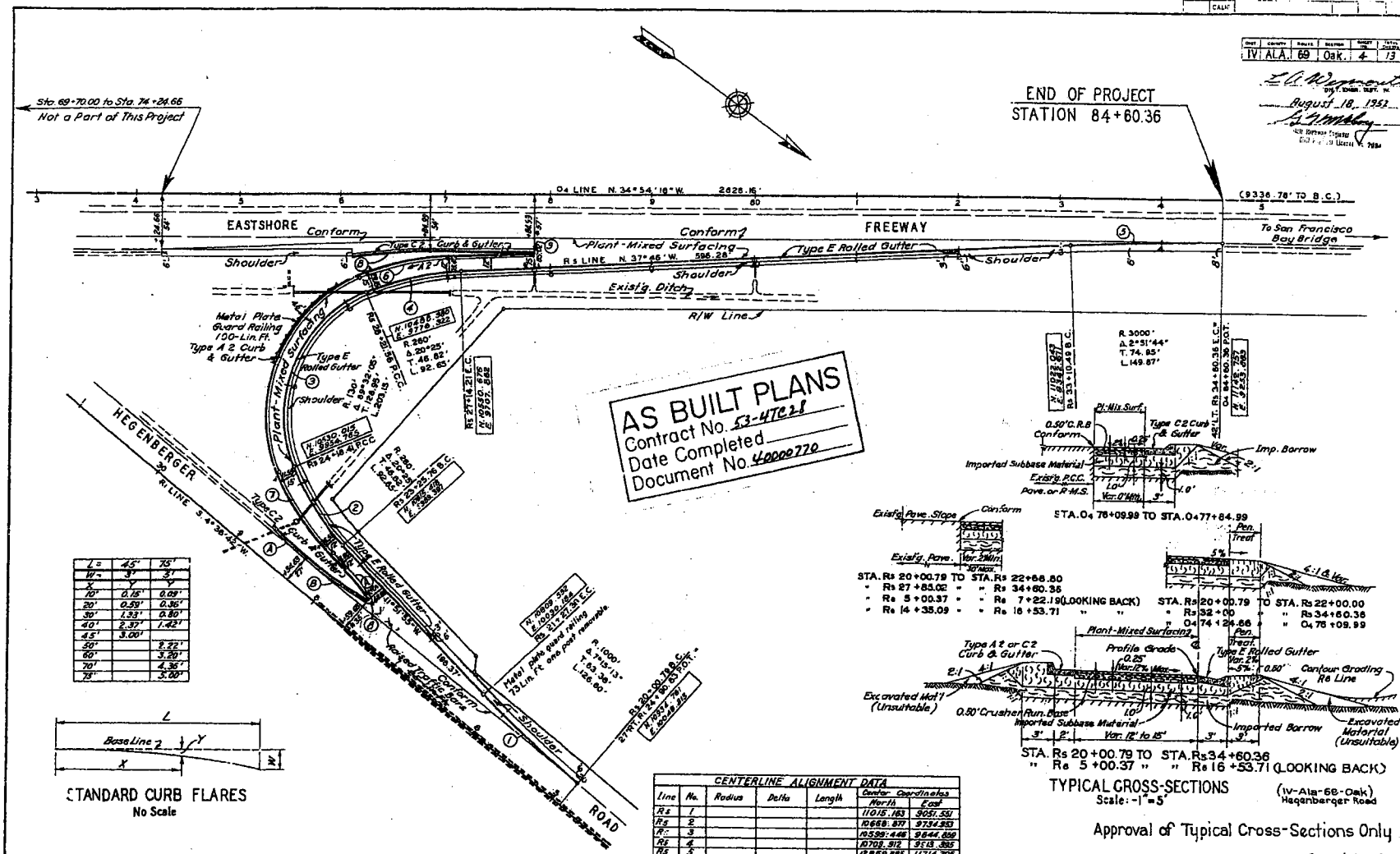
August 18, 1952

Assistant State Highway Engineer Dist IV
Andrew Recommends
Planning Engineer
Approved August 18, 1952
State Highway Engineer
Civil Engineer License 2084
Director of Public Works

53-4TC28
Undated
(Document No. 40000770)

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	ALA.	69	Oak.	4	13

August 18, 1952



L =	45'	75'
W =	3'	3'
X	Y	Y
10'	0.18'	0.09'
20'	0.59'	0.36'
30'	1.33'	0.80'
40'	2.37'	1.42'
45'	3.00'	
50'		2.22'
60'		3.20'
70'		4.35'
75'		5.00'

CENTERLINE ALIGNMENT DATA

Line	No.	Radius	Delta	Length	Center Coordinates North	Center Coordinates East
R1	1				11015.163	9051.551
R2	2				10688.819	9734.953
R3	3				10589.448	9844.656
R4	4				10708.913	9708.865
R5	5				12859.385	11714.209
CURVE ALIGNMENT DATA						
6	260	17°14'24"	78.23'		10693.656	9910.809
7	260	17°14'16"	78.22'		10655.380	9744.378
CURB NOSE DATA R. = 1'						
8					10567.473	10018.727
9					10597.464	9652.637
STANDARD CURB FLARES						
A	45'					
B	75'					

Bill

1843

Contract No. 53-4TC28

IV-786

11.2

1949

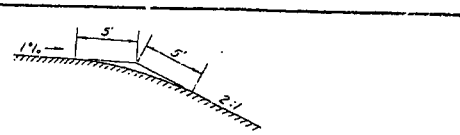
O-4TC83F
Undated
(Document No. 40000764)

STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
CALIF.	UI 3410(2)	19	2	

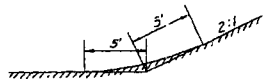
DESIGN CLASSIFICATION 4000-55-M-60

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	ALA.	69	Oak.	2	43

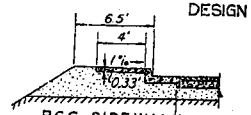
APPROVED March 21, 1949



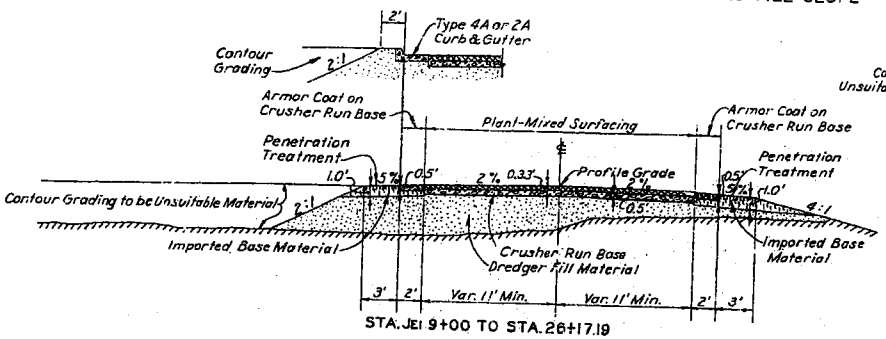
ROUNDED FILL SLOPE



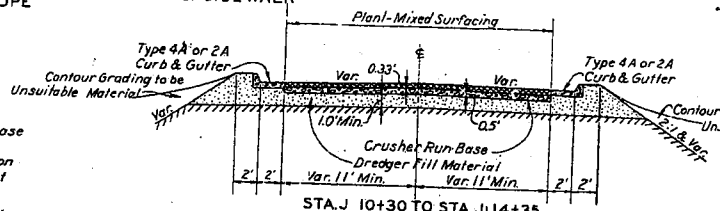
ROUNDED FILL SLOPE



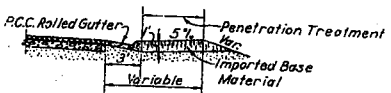
P.C.C. SIDEWALK

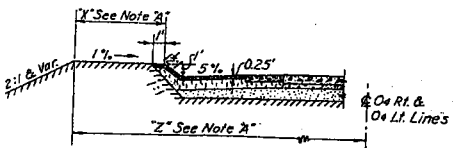


STA. J21 9+00 TO STA. 26+17.19



STA. J 10+30 TO STA. J1 14+35
STA. J1 19+60 TO STA. J 25+10.48
STA. J3 1+25 TO STA. J3 8+29.71

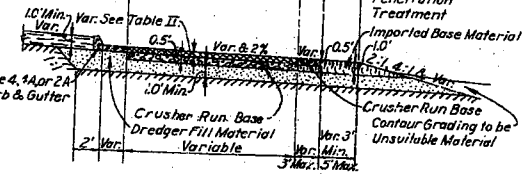




PLANT-MIXED SHOULDERS
STA. O4 RT. 179+01 TO STA. 183+55.32
STA. O4 LT. 180+18± TO STA. 183+58.15

NOTE "A"

STATION	LOCTN.	"X"	"Y"	"Z"
O4 16+25.00 to 21+00	Rt.	28.5	Var.	
O4 16+25.00 to 16+62	Lt.	Var.	"	
O4 16+62 to 21+00	Lt.	28.5	"	
O4 21+00 to Ahead		Var.	4:1	
O4 Rt. 179+41.50	Rt.	1.0'		22.5
O4 Rt. 179+91.10	Rt.	1.0'		22.5
O4 Rt. 180+60.50	Rt.	2.0'		23.5
O4 Rt. 180+90.20	Rt.	2.0'		23.5
O4 Lt. 180+63± to 183+58±	Lt.	5.5'		27.0'
O4 Rt. 181+41	Rt.	2.5'		24.0'
O4 Rt. 181+91	Rt.	4.2'		25.7'
O4 Rt. 182+40.10	Rt.	5.5		27.0'
O4 Rt. 182+91.60	Rt.	5.5'		27.0'
O4 Rt. 183+41.50	Rt.	5.5'		27.0'
O4 Rt. 183+54.90	Rt.	5.5'		27.0'

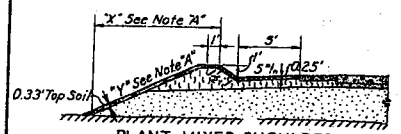


MISCELLANEOUS ROADWAYS

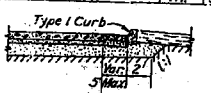
Plant-Mixed Surfacing
Armor Coat
Penetration Treatment
Imported Base Material

TABLE II.

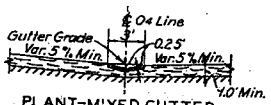
LOCATION	Pl-Mixed Surfacing
98TH AVE.	
J1 & J2 Lines	0.33'
J2 Line & Connections	0.33'
HEGENBERGER ROAD	
D3 & R3 Lines	0.33'
T2 63+69.91 to 67+00.01	0.33'
J21 to R1 Ramp	0.25'
R4 & D2 Lines	0.33'
C1 & C2 Lines	0.33'



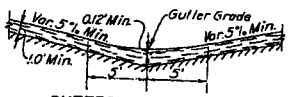
PLANT-MIXED SHOULDER
STA. O4 16+25.00 TO STA. 21+00



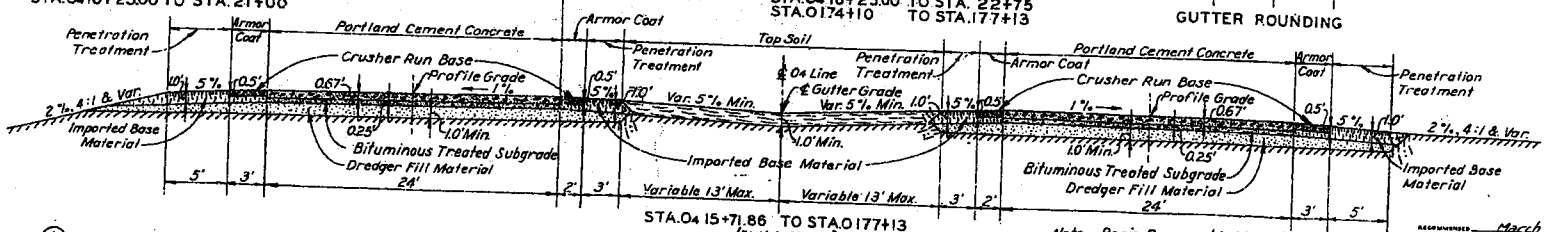
LT. & RT. STA. O1 73+18 TO 177+14



PLANT-MIXED GUTTER
STA. O4 16+25.00 TO STA. 22+75
STA. O1 74+10 TO STA. 177+13



GUTTER ROUNDING



STA. O4 15+71.86 TO STA. O1 77+13
(IV-ALA.-69-OAK.)
0.1 MI. NO. OF SO. CITY LIMITS OF OAKLAND TO 0.18 MI. SO. OF HIGH ST.

Note:- Begin Pavement & Shoulders at Sta. O4 16+25.00

Ⓐ

TYPICAL CROSS-SECTIONS

Scale 1"=5'

Note: See Sheet № 4 for Paving Detail

RECOMMENDED March 18, 1949
Sam Gibbs
ASST. STATE HIGHWAY ENGINEER
J. H. Wakefield
ASST. STATE HIGHWAY ENGINEER

Contr. O-47C83F

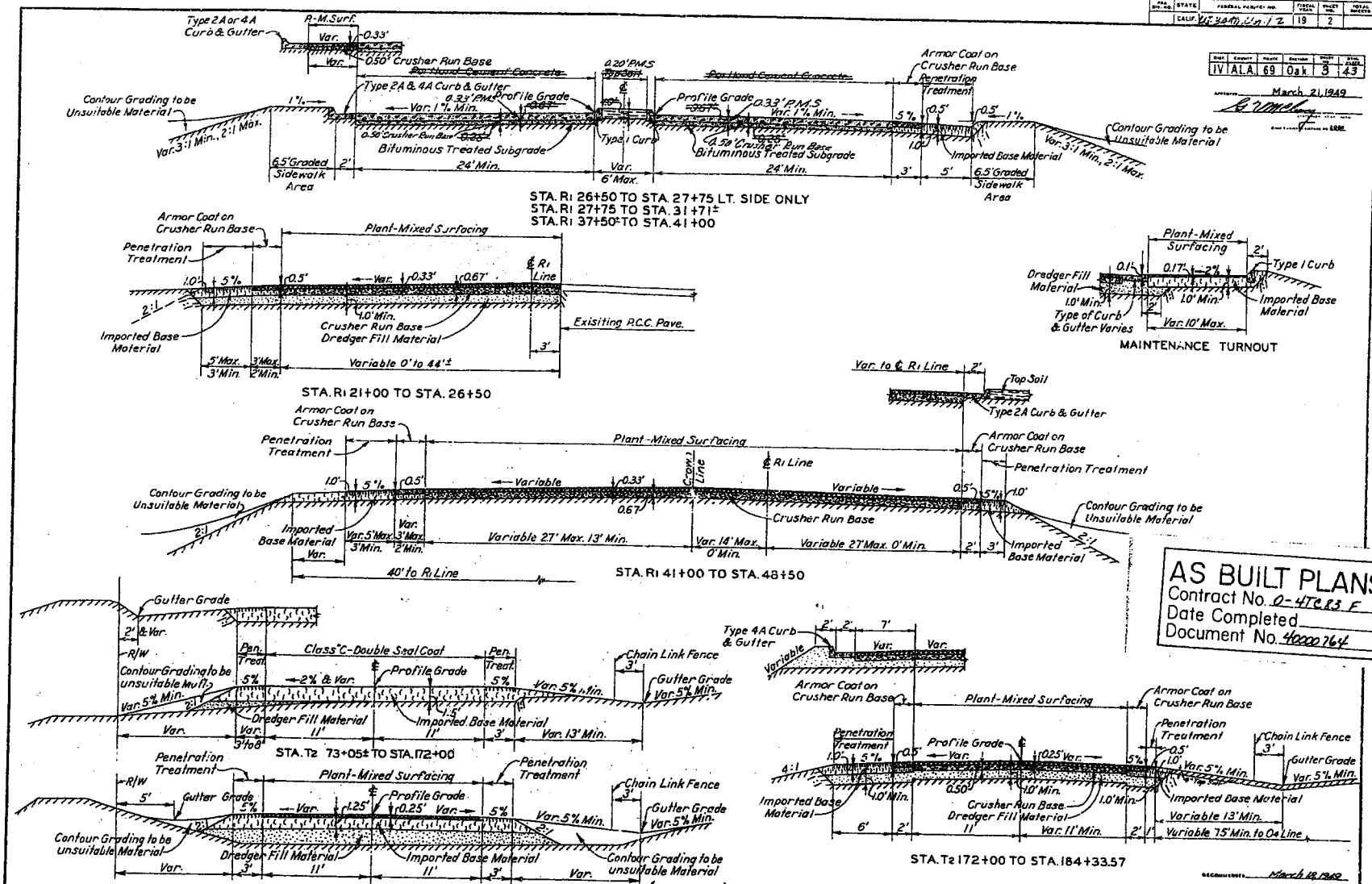
AS BUILT PLANS
Contract No. O-47C83F
Date Completed
Document No. 4000764

37

STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
CALIF.	[illegible]	19	2	

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	ALA.	69	Oak	3	43

March 21, 1949



TYPICAL CROSS-SECTIONS

Scale 1"=5'

Note: See Sheet No 4 for Paving Detail

AS BUILT PLANS
Contract No. 0-4TC83 F
Date Completed
Document No. 40000764

RECOMMENDED March 18, 1949
ASST. STATE HIGHWAY ENGINEER
ASST. STATE HIGHWAY ENGINEER

Contr. 0-4TC83F

ALTPIPE Analysis Results & Sheet DQ-1

AltPipe

Project EA: **EA 39221**
Project Engineer:
Location: **Davis St- Hegenberger Rd**
Description: **I-880 SB HOV Lane Extension**

Steel Pipes

DSN/U		Case#1(18"-Level1)	Case#2a(18"-Level1)	Case#2b(24"-Level1)	Case#2c(36"-Level2)	Case#2d(36"-Level1)	Case#3(18"-Level1)	Case#4a(18"-Level2)	Case#4b(18"-Level1)	Case#4b(24"-Level1)	Case#5(18"-Level1)	Case#6a(12"-Level1)	Case#6b(18"-Level1)	Case#6c(18"-Level2)	Case#6d(24"-Level1)	Case#6e(30"-Level2)	Case#6f(30"-Level1)
Pipe Diameter (in)		**18**	**18**	**24**	**36**	**36**	**18**	**18**	**18**	**18**	**18**	**12**	**18**	**18**	**24**	**30**	**30**
Pipe Type	**Coat**	**Minimum Thickness (in)**															
Corrugated Steel Pipe - Helical Corrugations - 2⅔" X ½" Corrugations	GAL				0.109	0.109										0.109	0.109
	AL2											0.052	0.052		0.052	0.109	0.052
	BC				0.109	0.109									0.079	0.109	0.079
	BCI			0.079	0.109	0.079						0.064	0.064		0.064	0.079	0.064
	PA	0.052	0.052	0.052	0.109	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.064	0.052	0.079	0.052
	PS	0.052	0.052	0.052	0.109	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.064	0.052	0.079	0.052
Corrugated Steel Pipe - Annular Corrugations - 2⅔" X ½" Corrugations	GAL				0.109	0.109											
	AL2												0.064		0.064		0.064
	BC				0.109	0.109									0.079		0.079
	BCI			0.079	0.109	0.079							0.064		0.064	0.079	0.064
	PA	0.064	0.064	0.064	0.109	0.064	0.064	0.064	0.064	0.064	0.064		0.064	0.064	0.064	0.079	0.064
	PS	0.064	0.064	0.064	0.109	0.064	0.064	0.064	0.064	0.064	0.064		0.064	0.064	0.064	0.079	0.064
Steel Spiral Rib Pipe - ¾" X 1" Ribs At 11½" Pitch	GAL			0.109	0.109	0.109									0.109	0.109	0.109
	AL2														0.064	0.109	0.064
	BC			0.109	0.109	0.109									0.079	0.109	0.079
	BCI			0.079	0.109	0.079									0.064	0.079	0.064
	PA			0.064	0.109	0.064									0.064	0.079	0.064
	PS			0.064	0.109	0.064									0.064	0.079	0.064
Steel Spiral Rib Pipe - ¾" X 1" Ribs At 8½" Pitch	GAL			0.109	0.109	0.109									0.109	0.109	0.109
	AL2														0.064	0.109	0.064
	BC			0.109	0.109	0.109									0.079	0.109	0.079
	BCI			0.079	0.109	0.079									0.064	0.079	0.064
	PA			0.064	0.109	0.064									0.064	0.079	0.064
	PS			0.064	0.109	0.064									0.064	0.079	0.064
Steel Spiral Rib Pipe - ¾" X ¾" Ribs At 7½" Pitch	GAL			0.109	0.109	0.109									0.109	0.109	0.109
	AL2														0.064	0.109	0.064
	BC			0.109	0.109	0.109									0.079	0.109	0.079
	BCI			0.079	0.109	0.079									0.064	0.079	0.064
	PA			0.064	0.109	0.064									0.064	0.079	0.064
	PS			0.064	0.109	0.064									0.064	0.079	0.064
	CSS				0.064	0.064										0.064	0.064

Aluminum Pipes

DSN/U	Case#1(18"-Level1)	Case#2a(18"-Level1)	Case#2b(24"-Level1)	Case#2c(36"-Level2)	Case#2d(36"-Level1)	Case#3(18"-Level1)	Case#4a(18"-Level2)	Case#4b(18"-Level1)	Case#4b(24"-Level1)	Case#5(18"-Level1)	Case#6a(12"-Level1)	Case#6b(18"-Level1)	Case#6c(18"-Level2)	Case#6d(24"-Level1)	Case#6e(30"-Level2)	Case#6f(30"-Level1)
Pipe Diameter (in)	**18**	**18**	**24**	**36**	**36**	**18**	**18**	**18**	**18**	**18**	**12**	**18**	**18**	**24**	**30**	**30**
Pipe Type	**Minimum Thickness (in)**															
Corrugated Aluminum Pipe - Annular Corrugations											0.060	0.060	0.060	0.060	0.075	0.075

Corrugations - 2⅔" X ½" Corrugations																
Corrugated Aluminum Pipe - Annular Corrugations - 3" X 1" Corrugations															0.060	0.060
Corrugated Aluminum Pipe - Helical Corrugations - 2⅔" X ½" Corrugations											0.060	0.060	0.060	0.060	0.075	0.075
Corrugated Aluminum Pipe - Helical Corrugations - 3" X 1" Corrugations															0.060	0.060
Aluminum Spiral Rib Pipe - ¾" X 1" Ribs At 11½" Pitch														0.060	0.060	0.060
Aluminum Spiral Rib Pipe - ¾" X ¾" Ribs At 7½" Pitch														0.060	0.060	0.060

Plastic Pipes

DSN/U	Case#1(18"-Level1)	Case#2a(18"-Level1)	Case#2b(24"-Level1)	Case#2c(36"-Level2)	Case#2d(36"-Level1)	Case#3(18"-Level1)	Case#4a(18"-Level2)	Case#4b(18"-Level1)	Case#4b(24"-Level1)	Case#5(18"-Level1)	Case#6a(12"-Level1)	Case#6b(18"-Level1)	Case#6c(18"-Level2)	Case#6d(24"-Level1)	Case#6e(30"-Level2)	Case#6f(30"-Level1)
Pipe Diameter (in)	**18**	**18**	**24**	**36**	**36**	**18**	**18**	**18**	**18**	**18**	**12**	**18**	**18**	**24**	**30**	**30**
Pipe Type	**Availability**															
PVC Corrugated	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable
PVC Ribbed	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable		Allowable	Allowable	Allowable	Allowable	Allowable
HDPE Corrugated - Type S	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable	Allowable		Allowable	Allowable	Allowable	Allowable	Allowable
HDPE Ribbed	Allowable	Allowable	Allowable			Allowable	Allowable	Allowable	Allowable	Allowable		Allowable	Allowable	Allowable		
HDPE Corrugated - Type C	Allowable	Allowable	Allowable			Allowable	Allowable	Allowable	Allowable	Allowable		Allowable	Allowable	Allowable		

Reinforced Concrete Pipes

DSN/U	Case#1(18"-Level1)	Case#2a(18"-Level1)	Case#2b(24"-Level1)	Case#2c(36"-Level2)	Case#2d(36"-Level1)	Case#3(18"-Level1)	Case#4a(18"-Level2)	Case#4b(18"-Level1)	Case#4b(24"-Level1)	Case#5(18"-Level1)	Case#6a(12"-Level1)	Case#6b(18"-Level1)	Case#6c(18"-Level2)	Case#6d(24"-Level1)	Case#6e(30"-Level2)	Case#6f(30"-Level1)
Pipe Diameter (in)	**18**	**18**	**24**	**36**	**36**	**18**	**18**	**18**	**18**	**18**	**12**	**18**	**18**	**24**	**30**	**30**
Steel Cover (in)	0.75	0.75	1	1	1	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	1	1	1
Sacks of Cement	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Percentage Water	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Other Information

DSN/U	Case#1(18"-	Case#2a(18"-	Case#2b(24"-	Case#2c(36"-	Case#2d(36"-	Case#3(18"-	Case#4a(18"-	Case#4b(18"-	Case#4b(24"-	Case#5(18"-	Case#6a(12"-	Case#6b(18"-	Case#6c(18"-	Case#6d(24"-	Case#6e(30"-	Case#6f(30"-

DSN/O	Level1)	Level1)	Level1)	Level2)	Level1)	Level1)	Level2)	Level1)	Level1)	Level1)	Level1)	Level1)	Level2)	Level1)	Level2)	Level1)
Soil pH	6.95	7.4	7.4	7.4	7.4	7.39	7.97	7.97	7.97	7.13	7.41	7.41	7.41	7.41	7.41	7.41
Minimum Soil Resistivity (ohm-cm)	1100	960	960	960	960	1210	1150	1150	1150	590	1690	1690	1690	1690	1690	1690
Sulfate Concentration (ppm)	51.4	102.1	102.1	102.1	102.1	34.5	236.1	236.1	236.1	117.2	27.8	27.8	27.8	27.8	27.8	27.8
Chloride Concentration (ppm)	11.8	22.7	22.7	22.7	22.7	7.9	70.6	70.6	70.6	21.2	15.1	15.1	15.1	15.1	15.1	15.1
Abrasion Level	1	1	1	2	1	1	1	1	1	1	1	1	2	1	2	1
2–5 Year Flow Velocity (ft/sec)	3.73	4.86	2.7	6.7	4.37	4.41	5.16	4.86	1.05	1.44	0.88	1.06	5.61	2.87	8.28	4.1
Design Service Life (years)	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Height of Cover (ft)	3.89	4.15	5.39	5.22	5.22	4	5.44	5.44	3.79	2.4	2	2.63	2.63	3.13	5.73	5.73

AltPipe Version 6.08 © State of California

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 1/23/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — William D. Arulsingam — No. C64773 — 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 SCANNED COPIES OF THIS PLAN SHEET.

RAJAPPAN & MEYER
CONSULTING ENGINEERS, INC.
1038 LEIGH AVENUE, SUITE 100
SAN JOSE, CA 95126

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

ABBREVIATIONS:

BC – BITUMINOUS COATING
S – STANDARD JOINT TYPE
w/ – WITH

ALTERNATIVE PIPE CULVERT (APC) TABLE

PIPE SIZE	PLASTIC PVC CORRUGATED	PLASTIC PVC RIBBED	PLASTIC HDPE CORRUGATED	PLASTIC HDPE RIBBED	PLASTIC HDPE CORRUGATED INTERIOR	RCP	CORRUGATED STEEL PIPE HELICAL CORRUGATION 2 2/3 x 1/2" CORRUGATION Galv ONLY	HELICAL Galv ALUMINIZED (TYPE 2)	HELICAL Bit Ctd BC	HELICAL Bit Ctd Inv PAVED (BC1)	HELICAL Poly Ctd (PA) or (PS)	CORRUGATED STEEL PIPE ANNULAR CORRUGATION 2 2/3 x 1/2" CORRUGATION Galv ONLY	ANNULAR Galv ALUMINIZED (TYPE 2)	ANNULAR Bit Ctd BC	ANNULAR Bit Ctd Inv PAVED (BC1)	ANNULAR Poly Ctd (PA) or (PS)	STEEL SPIRAL RIB PIPE ANNULAR CORRUGATION 3/4 x 1" RIBS At 11 1/2" Pitch 3/4 x 1" RIBS At 8 1/2" Pitch Galv ONLY	ANNULAR Galv ALUMINIZED (TYPE 2)	ANNULAR Bit Ctd BC	ANNULAR Bit Ctd Inv PAVED (BC1)	ANNULAR Poly Ctd (PA) or (PS)	STEEL SPIRAL RIB PIPE ANNULAR CORRUGATION 3/4 x 3/4 RIBS At 7 1/2" Pitch Galv ONLY	ANNULAR Galv ALUMINIZED (TYPE 2)	ANNULAR Bit Ctd BC	ANNULAR Bit Ctd Inv PAVED (BC1)	ANNULAR Poly Ctd (PA) or (PS)	ANNULAR CSS	CORRUGATED ALUMINIUM PIPE ANNULAR CORRUGATION 2 2/3 x 1 1/2 CORRUGATIONS	CORRUGATED ALUMINIUM PIPE HELICAL CORRUGATION 2 2/3 x 1 1/2 CORRUGATIONS	CORRUGATED ALUMINIUM PIPE ANNULAR CORRUGATION 3" X 1" CORRUGATIONS	CORRUGATED ALUMINIUM PIPE HELICAL CORRUGATION 3" X 1" CORRUGATIONS	ALUMINIUM SPIRAL RIB PIPE 3/4" x 1" RIBS AT 1 1/2" PITCH	ALUMINIUM SPIRAL RIB PIPE 3/4" x 3/4" RIBS AT 7 1/2" PITCH
12"	Y	N	N	N	N	N	N	0.052	N	0.064	0.052	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	0.060	–	N		
18"	Y	Y	Y	Y	Y	Y	N	N	N	N	0.052	N	0.64	–	0.64	0.64	N	N	N	N	N	N	N	N	N	N	N	0.060	–	N		
24"	Y	Y	Y	Y	Y	Y	N	0.052	0.079	0.064 0.679 0.079	0.052	–	0.64	0.079	0.64 0.079	0.64	0.109	0.064	0.109 0.079	0.079 0.064	0.064	0.109	0.064	0.109 0.079	0.079 0.064	0.064	–	0.060	–	0.060		
30"	Y	Y	Y	N	N	Y	0.109	0.109 0.052	0.109 0.079	0.079 0.064	0.079 0.052	–	0.64	0.079	0.64 0.079	0.64 0.079	0.109	0.109 0.64	0.109 0.079	0.079 0.064	0.079 0.064	0.109	0.109 0.064	0.109 0.079	0.079 0.064	0.079 0.064	0.064 0.064	0.075	0.060	0.060		
36"	Y	Y	Y	N	N	Y	0.109	N	0.109	0.109 0.079	0.109 0.052	0.109	–	0.079	0.109 0.079	0.109 0.64	0.109	–	0.109	0.109 0.079	0.109 0.064	0.109	–	0.109	0.109 0.079	0.109 0.064	0.064	–	–	N		

100% SUBMITTAL
JANUARY 2012

DRAINAGE QUANTITIES

DQ-1

REVISED BY	DATE REVISED
KRANTHI MANNILA	WILLIAM D. ARULSINGAM

CALCULATED-DESIGNED BY: KRANTHI MANNILA
CHECKED BY: WILLIAM D. ARULSINGAM
CONSULTANT FUNCTIONAL SUPERVISOR: WILLIAM D. ARULSINGAM

STATE OF CALIFORNIA – DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 01-23-12 | DATE PLOTTED => $DATE | TIME PLOTTED => $TIME

Embankment Settlement Estimation

SETTLEMENT ANALYSIS

EMBANKMENT SETTLEMENT (N. ABUT)

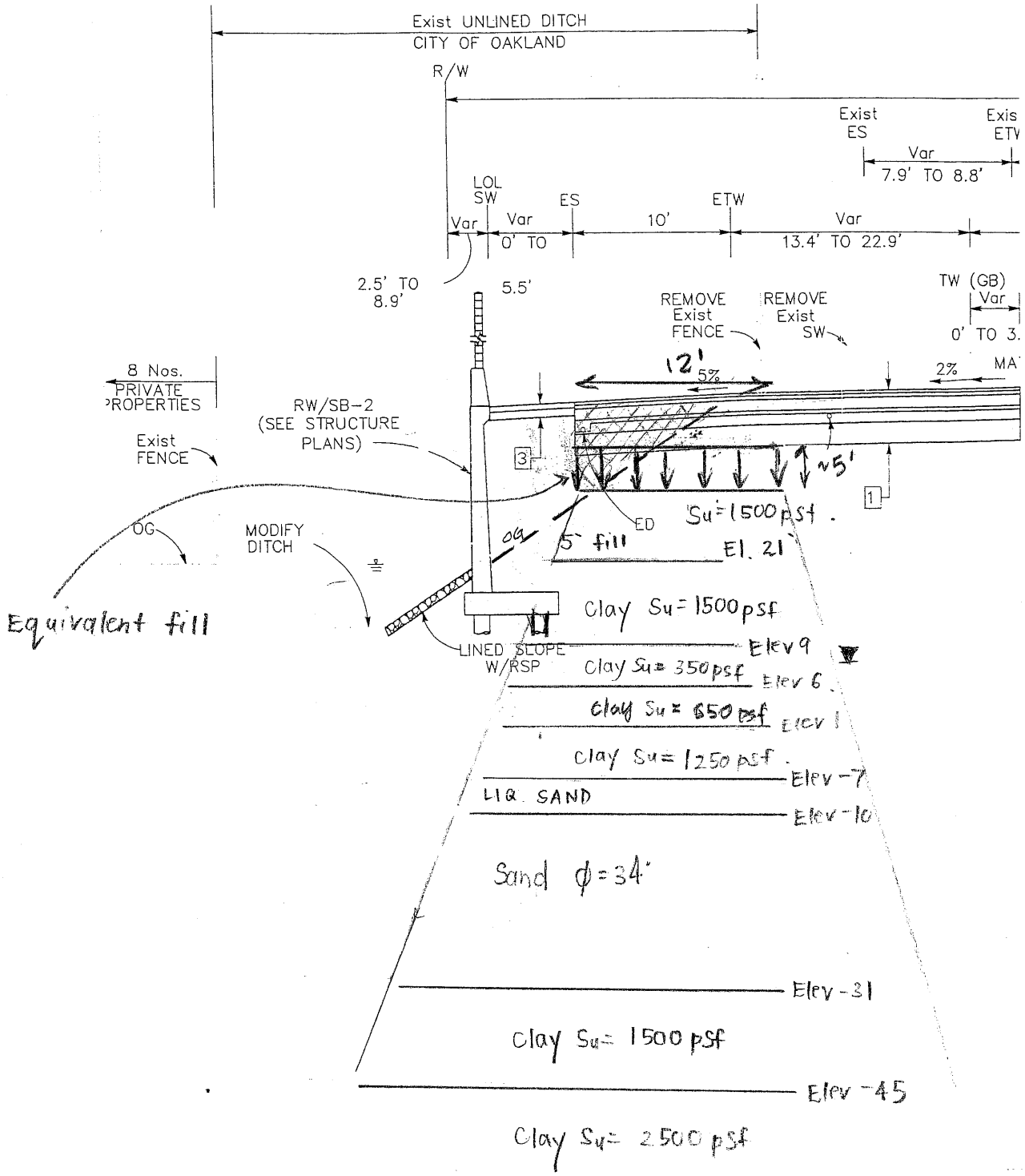
PROJECT NAME **SAN LEANDRO CREEK BOH (WIDEN)**
PROJECT NO. **2006-139-010**
BORING NO. **CPT-1**

Embankment H (ft) 5 *Contact Pressure (psf)=* 625 *Contact Area, B (ft)=* 12 *Cr/Cc=* 20.0%
Unit Weight (pcf)= 125 *GW Level (ft)=* 16 *Contact Area, L (ft)=* -
Plain Strain? (Y/N)= y

GROUPS
1. GRAVELS AND SANDS
2. CLAYS AND SILTS

Soil Type	Depth From	Depth To	γ_T (pcf)	γ' (pcf)	ω	σ_v' (psf)	$\Delta\sigma_v'$ (psf)	Su (psf)	Pp (psf)	$Cr/1+e_0$	$Cc/1+e_0$	C' (Hough Method)	Settlements (in) OC	NC	SAND	Sum
1	0	5	125.0	125.0	10.0%	313	517.2					69			0.370	
2	5	17	125.0	62.6	25.0%	1001	326.1	1500	6000	0.0275	0.1376		0.123			0.123
2	17	20	125.0	62.6	25.0%	1470	245.9	350	1470	0.0275	0.1376			0.333		0.333
2	20	25	125.0	62.6	25.0%	1721	217.4	650	2600	0.0275	0.1376		0.052			0.052
2	25	33	125.0	62.6	25.0%	2127	182.9	1250	5000	0.0275	0.1376		0.036			0.036
1	33	36	125.0	62.6	10.0%	2472	161.3					34			0.029	
1	36	57	125.0	62.6	10.0%	3223	128.2					52			0.082	
2	57	78	125.0	62.6	25.0%	4538	94.3	2500	10000	0.0275	0.1376		0.009			0.009
2	78	100	125.0	62.6	25.0%	5883	74.3	2500	10000	0.0275	0.1376		0.005			0.005
												Estimated Settlement (in)=	*0.2*	*0.3*	*0.5*	***1.0***

SEE FOLLOWING PAGE FOR SCHEMATIC


Exist UNLINED DITCH
CITY OF OAKLAND
R/W
Exist ES
Exis ETW
Var
7.9' TO 8.8'
LOL SW
ES
ETW
Var
Var
0' TO
10'
Var
13.4' TO 22.9'
2.5' TO 8.9'
5.5'
TW (GB)
Var
0' TO 3.
REMOVE Exist FENCE
REMOVE Exist SW
12'
5%
2%
MA
8 Nos. PRIVATE PROPERTIES
RW/SB-2 (SEE STRUCTURE PLANS)
Exist FENCE
3
1
~5'
Su=1500 psf
ED
OG
MODIFY DITCH
5' fill
El. 21
Equivalent fill
Clay Su=1500psf
Elev 9
LINED SLOPE W/RSP
Clay Su= 350psf
Elev 6
Clay Su= 650 psf
Elev 1
Clay Su= 1250 psf
Elev -7
LIQ. SAND
Elev -10
Sand φ=34°
Elev -31
Clay Su= 1500 psf
Elev -45
Clay Su= 2500 psf

N. ABUT

APPENDIX D

Hwy 880 Deflection Testing and Analysis
(PM 25.5 to 22.5 Southbound direction)
October 24, 2011, prepared by CHEC

CHEC
MANAGEMENT SYSTEMS INC.

Pavement Engineering
Pavement Management
Asset Management
GIS Linkage & Mapping
Visual Condition Rating
Deflection Testing

October 24, 2011

Job No. 09088
REVISED

Parikh Consultants, Inc.
2360 Qume Drive
Suite A
San Jose, CA 95131

Attn: Mr. Y. David Wang, Ph.D., P.E.
Principal

Subject: Hwy 880 Median Deflection Testing and Analysis
MP 25.5 to MP 22.5 southbound direction.

Gentlemen:

We have completed our analysis for the subject project and revised it allowing for a Traffic Index of 13. In this report, CHEC has included the structural overlay requirements based on California Test Method 356, our recommendations, and graphs for this project.

The Appendix of this report contains all data to support our findings. If you have any questions regarding this information, please contact CHEC at 800-523-2124.

Very truly yours,
MANAGEMENT SYSTEMS, INC.

James B. Curtis
President

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER
Charles Alan Curtis
No. 23,326
CIVIL
STATE OF CALIFORNIA

Alan Curtis, P. E.
Vice President
CA C. E. #23326

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Figures 1
Deflections Plots and Graphs

BACKGROUND

CHEC Management Systems, Inc. was hired by Parikh Consultants, Inc. to provide a structural adequacy determination for the median shoulder of Highway 880 starting at PM 25.5 in the north and continuing south to PM 22.5. In this revised final report, we have provided our analysis using a traffic index value of 13. Within this final design report recommendations are given to minimize the vertical elevation change while satisfying the structural and reflective cracking needs of the existing pavement.

Parikh Consultants, Inc. provided the limits of deflection testing and the Traffic Index for this project. We have prepared this report, which provides a measure of the structural adequacy of each pavement section and our recommendation of current repair techniques.

On the evening of March 23, 2010, Mr. Bob Freeman performed deflection testing, and Mr. Ian Anderson collected 6 core samples, one for each test section. In all 6 different pavement test sections were established, with testing and coring being completed on each test section. Highway Technologies, Inc. provided traffic control on March 23 where full lane closures were required. Figure 1 of this report provides a pictorial representation of each test section location, the existing AC thickness, and the corresponding CTM 356 overlay recommendation.

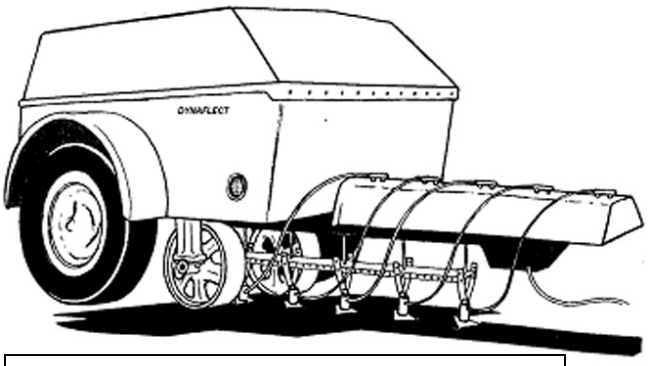
After field testing was completed, all field notes and data sheets were provided to the engineer for review and analysis. The engineer has provided his analysis within this bound report.

This report provides overlay requirements required to protect the existing shoulder median investment for a 20-year service life at a traffic index of 13.0. Alternative design methods were utilized, as appropriate, to evaluate the most cost effective or feasible approach, while still providing a 20-year design life.

DEFLECTION TESTING AND ANALYSIS

TESTING AND ANALYSIS PROCEDURE

California Test Method 356



The image above provides a schematic of a dvnaflect.

Testing was performed using a DYNAFLECT nondestructive pavement testing device. The device places a 1000-lb. oscillatory load on the pavement surface. Motion sensing geophones (sensors) placed on the pavement surface "read" the pavement deflection resulting from the load. A strong pavement will deflect less than a weak pavement under the same loading. A single sensor was used for this analysis. The testing equipment and analysis procedure is based on California Test Method (CTM) 356 (using a DYNAFLECT and the Caltrans Rehabilitation Design Manual dated 2001).

Design Analysis

1. The procedure is basically a fatigue analysis. The measured maximum deflection is the amplitude of pavement bending for each repetition of a load. (The design number of load repetitions is indicated by the Traffic Index - T.I.) If the existing pavement is fairly thick, the tolerable deflection to prevent fatigue failure is lower than for a comparable thinner pavement. Thus, a thicker pavement requires a thicker overlay to reduce the deflection.

2. The second half of the analysis is based on the need to retard reflective cracking, or the propagation of old cracks in the underlying pavement through the new overlay. The overlay should be at least half the thickness of the existing pavement to retard reflective cracking. A fabric interlayer may be substituted for 0.10 ft. of HMAC for crack control purposes only. The structural needs of the pavement must first be satisfied before reflective crack retardation is considered.

DESIGNER'S GENERAL NOTES

The following notes are provided to assist the design engineer in developing the plans and specifications for this project. Some of these guidelines are reflected in the recommendations found within this report.

1. All specified thicknesses in this report are design minimums and do not include construction tolerances.

2. With asphalt overlays, wedge cutting is recommended at all conforms to provide a smooth taper and transition.

3. Prior to an overlay, an adequate application of a tack coat is required for a proper bond. The type and application rates are to be determined by the design engineer.

4. When placing paving fabric over a milled surface, the tack oil coverage rate must be increased to cover the additional surface area and promote a good bond. This is typically a minor increase depending on the type of fabric being utilized.

5. All areas of moderate to severe alligator cracking and/or bleeding should be removed and replaced with full-depth AC repairs. The thickness of the repairs may vary, but should never be less than the thickness of the existing AC section, and preferably one to two inches below the existing AC surface layer.

6. All transverse and longitudinal cracks wider than 1/4 of an inch should be sealed with an emulsified crack seal.

7. Paving Fabric - We highly recommend a paving fabric, such as TruPave, to be utilized to help retard reflective cracking. The TruPave fabric is recommended because of the recycling capabilities, the extremely high operating temperature range, and the fact that disposal of the asphalt with TruPave fabric does not have an

increase in cost over asphalt alone. For example; the operating range of a standard paving fabric is 325 degrees F and then the material crystallizes, melt or begins to breakdown. TruPave paving fabric has an operation range that is over 400 degrees F which is well above the placement temperatures of HMAC or RAC therefore being able to be used in either environment without concerns.

8. Defects After Milling – When performing a partial depth milling as part of the rehabilitation design the possibility always exists that the underlying material is not as good of quality as the surface material that is visually present. If during or after the milling process has been completed the remaining asphalt concrete is in considerably worse case than the surface layer some structural repairs may be required. These repairs will typically be in the form of a full-depth AC repair of a localized area.

SUMMARY OF FINDINGS

From the testing completed, CHEC Management Systems, Inc. was able to identify different pavement design sections. When performing the engineering analysis, CHEC Management Systems, Inc. tried to provide a design that would meet both the structural and reflective crack control needs; as well as, minimize the vertical elevation change if possible. From our analysis the project can be broken into three (3) different pavement design areas. Each design recommendation is discussed in detail within the section "CHEC'S FINDINGS AND RECOMMENDATIONS".

In general, the engineering analysis shows the existing pavement need between zero (0) inches and 3 ¾ inches of new HMAC per CTM 256 and the CALTRANS Flexible Pavement Rehabilitation Design Manual – June 2001. Alternate designs were produced to try and minimized the vertical elevation change, while still meeting the structural and reflective crack control needs. The alternate designs range from milling 3.0 inches of existing AC and placing 3.0 inches of new HMAC, to milling only 5.5 inches of the existing AC and placing 5.5 inches of new HMAC. By utilizing a mill and

overlay technique, the maximum vertical elevation change is 0 inches. This is one of the design constraints of the project, zero vertical elevation change if possible.

None of the overlay thicknesses recommended are thicker than one-half of the existing AC that will be left after milling. So CHEC Management Systems, Inc. recommends the use of a paving fabric to help retard reflective cracking. The recommended designs take into account the different existing asphalt layer thicknesses with respect to the recommended milling depths.

The summary table, Table 1, provides a quick look at the limits and design recommendation of each pavement section. Figures 1, found in the Appendix, provide a pictorial view of the location of each test section and its limits. A detailed look at each test section can be found in the section titled “CHEC’S FINDINGS AND RECOMMENDATIONS”.

Table 1

Summary of Findings

20 Year Designs

Road Name	**From**	**To**	**CTM Structural Requirement (20 Year Design)**	**CHEC's Design Recommendations**
Hwy 880 (SB) Median	MP 25.5 Hegenburger Way	MP 23.75	**T.I. 13.0** **MP 25.5 – MP 25.25** 0.10 ft. HMAC Overlay **MP 25.0 – MP 24.75** 0.00 ft. HMAC Overlay **MP 24.5 – MP 24.25** 0.00 ft. HMAC Overlay **MP 24.0 – MP 23.75** 0.15 ft. HMAC Overlay	**SB Median Shoulder MP 25.5 to MP 23.75** 1. Mill 3.0" / 3.0" HMAC Overlay with Paving Fabric
Hwy 880 (SB) Median	MP 23.5	MP 23.25	**T.I. 13.0** **MP 23.5 – 23.25** 0.25 ft. HMAC Overlay	**SB Median Shoulder MP 23.5 to MP 23.25** 1. Mill 5 ½ " / 5 ½ " HMAC Overlay with Paving Fabric
Hwy 880 (SB) Median	MP 23.0	MP 22.75	**T.I. 13.0** **MP 23.0 – MP 22.75** 0.15 ft. HMAC Overlay	**SB Median Shoulder MP 23.0 to MP 22.75** 1. Mill 4.0" / 4.0" HMAC Overlay with Paving Fabric

Note: Figures 1 of this report show the project sections as described in the table above.

PROCEDURE

The structural overlay requirement was determined using California Test Method 356 and the Caltrans Rehabilitation Manual (2001), which is based on a 20-year design. CHEC's design recommendations are for a 20-year service life. CHEC Management Systems, Inc. evaluated the different sections of Hwy 880 SB Median from MP 25.5 to MP 22.5 utilizing a Traffic Index factor of 13.0. Parikh Consultants, Inc. provided the Traffic Index factor to CHEC Management Systems, Inc. for this project. In all, three different pavement design sections were established, and six test sections were evaluated.

Deflection testing was performed within the median lane two and one-half to three feet from the median barrier. Segments were selected based on pavement type and visual defects present in the road; as well as the avoidance of physical structures, such as bridge decks. The testing occurred in the southbound median lane, and tests were taken at an interval that provided at least 20 points per segment. The actual interval used is stated on the deflection graphs located in the Appendix.

The next step in our field work was to note the existing visible defects. Photographs were not taken due to the nighttime conditions during testing. Coring data was taken and recorded during the testing process to determine the existing thickness of asphalt concrete (AC), which aided in segmentation of the roadway. In all, six different test sections were created over the project area.

The following section describes the test sections CHEC analyzed in detail, providing our primary design recommendations.

CHEC'S FINDINGS AND RECOMMENDATIONS

Hwy 880 SB Median
MP 25.5 to MP 23.75
(SB: 0 to 9,240 ft.)

Section Limits: (Approx.)	MP 25.5 to MP 23.75	**Current Structural Section**	SB Median MP 25.5 to MP 24.25 14.0 inches AC MP 24.0 to MP 23.75 5" AC / 9" PCC
Direction Tested	SB Median Shoulder	**CTM 356 – T.I. 13.0**	**MP 25.5 – MP 25.25** 0.10 ft. HMAC Overlay **MP 25.0 – MP 24.75** 0.00 ft. HMAC Overlay **MP 24.5 – MP 24.25** 0.00 ft. HMAC Overlay **MP 24.0 – MP 23.75** 0.15 ft. HMAC Overlay
CHEC Primary Recommendation	**SB Median Shoulder** Mill 3.0" / 3.0" HMAC Overlay with Paving Fabric	**CHEC Alternate Recommendations**	Mill 3.0" / .15' RAC Over .15'HMAC with TruPave Paving Fabric

This section of highway median starts at MP 25.5 (Hegenburger Road) and continues southbound for 1 ¾ miles to approximately Davis Street. The median shoulder was found to be between 13 ½ inches and 14 inches thick. The first three test sections were comprised of only asphalt concrete (AC). In general, there were four to five different lifts of asphalt concrete to make up the 13 ½ inch thick structural section.

The fourth test section was comprised of AC and Portland Cement Concrete (PCC), with an overall thickness of 14 plus inches. This location has three distinct layers of AC totaling 5 inches, and 9 plus inches of PCC.

Because testing was completed at night, photographs were not taken that represent the physical condition of the median shoulder. From the field notes taken, the shoulder has

a minimal amount of transverse cracking present. CHEC Management Systems, Inc. did not see any alligator cracking or other structural defects present at the time the testing was completed.

CHEC's Design Recommendation

When developing this final rehabilitation design two major factors played a role. First we needed to satisfy the structural needs of the existing pavement section. Secondly, if possible, we needed to determine if there is a mill and overlay design that does not raise the vertical elevation higher than the current pavement section.

Based on CTM 356 analysis, the current structural requirement for these median sections are as follows:

- Test Section #1 MP 25.5 to 25.25 – 0.10 ft. HMAC Overlay
- Test Section #2 MP 25.0 to 24.75 – 0.00 ft. HMAC Overlay
- Test Section #3 MP 24.5 to 24.25 – 0.00 ft HMAC Overlay
- Test Section #4 MP 24.0 to 23.75 – 0.15 ft HMAC Overlay

For this project area, the fourth test section was determined to be the control for the overall design. This test section has a structural requirement of 0.15 ft. HMAC Overlay based on the CTM 356 and CALTRANS Flexible Pavement Rehabilitation Design Manual – June 2001. To control reflective cracking, the overlay thickness required would be much greater than the 0.15 structural requirement currently measured. With little to no defects present at the surface, CHEC Management Systems, Inc. feels that reflective crack control is not a controlling factor for this design. A Traffic Index factor (TI) of 13.0 was utilized for all analysis completed.

For this section of road, to satisfy both the structural and reflective cracking requirements of the design procedure, we recommend:

Mill the existing pavement surface 3.0 inches and overlay the remaining pavement with a 3.0 inch HMAC overlay utilizing a paving fabric to aid in the retardation of reflective cracks after milling. This design will be sufficient where there is both AC and PCC underlying the milled surface. The pavement thickness after milling will be between 10 and 11 inches of AC where there was only an AC structural section found. The composite pavement sections will still have 2 inches of AC over 9 inches of PCC after milling. With the recommended overlay thickness being less than one-half the remaining pavement thickness after milling, a paving fabric is recommended to help prevent reflective cracking. The overall elevation change for these pavement sections will be zero (0) inches higher than the existing surface elevation.

Figure 1 of this report shows the existing pavement thickness with existing layers for each test section, the CTM 356 overlay requirement, and the approximate location of each test section.

CHEC's Alternate Design

To help prevent reflective cracking better than the primary design, the use of RAC can be substituted for the standards HMAC overlay. If rubberized AC is utilized, then a standard paving fabric is not recommended because of the higher associated temperatures of rubberized AC. A better alternative is to utilize TruPave paving fabric instead. This material is a fiberglass material that has a very high temperature threshold of 400+ degrees F, which is well above the RAC temperatures. So the alternate design is as follows:

Mill the existing pavement surface 3.0 inches and overlay the remaining pavement with a 1.5 inch RAC overlay over 1.5 inch HMAC utilizing TruPave paving fabric by Owens Corning to aid in the retardation of reflective cracks after milling.

Both designs provide for the structural needs of the pavement sections. The Alternate design will provide better reflective crack control if deemed a major issue or concern.

Hwy 880 SB Median
MP 23.5 to MP 23.25
(SB: 10,560 to 11,880 ft.)

Section Limits: (Approx.)	MP 23.5 to MP 23.25	**Current Structural Section (both directions)**	MP 23.5 to MP 23.25 6 1/2" AC / 7 ½+" of PCC
Direction Tested	SB Median	**CTM 356 – T.I. 13.0**	0.25 ft. HMAC Overlay
CHEC Primary Recommendation	Mill 5.5" / 5.5" HMAC Overlay with Paving Fabric	**CHEC Alternate Recommendations**	NONE

This section of highway median starts at MP 23.5 which is about ¼ mile south of Davis Street overpass and continues southbound for ¼ mile. The median shoulder was found to be 14.0 plus inches thick and a composite section of pavement. This location has two distinct layers of AC totaling 6 ½ inches, and 7 ½ plus inches of PCC. During the coring process, the lowest section of PCC could not be extracted, the core broke at 7 ½ inches with more left in the hole.

CHEC Management Systems, Inc. did not see any alligator cracking or other structural defects present at the time the testing was completed. From the field notes taken by our technician, the shoulder has a minimal amount transverse cracking present.

CHEC's Design Recommendation

When developing this final rehabilitation design, two major factors played a role. First, we needed to satisfy the structural needs of the existing pavement section. Secondly, if possible, we needed to determine if there is a mill and overlay design that does not raise the vertical elevation higher than the current pavement section.

Based on CTM 356 analysis, the current structural requirement for these median sections are as follows:

- Test Section #5 MP 23.5 to 23.25 – 0.25 ft. HMAC Overlay

This test section has a structural requirement of 0.25 ft. HMAC overlay based on the CTM 356 and CALTRANS Flexible Pavement Rehabilitation Design Manual – June 2001. To control reflective cracking the overlay thickness required would be much greater than the 0.25 structural requirement currently measured. With little to no defects present at the surface, CHEC Management Systems, Inc. feels that reflective crack control is not a controlling factor for this design. A Traffic Index Factor (TI) of 13.0 was utilized for all analysis completed.

For this section of road, to satisfy both the structural and reflective cracking requirements of the design procedure, we recommend:

Mill the existing pavement surface 5.5 inches and overlay the remaining pavement with 5.5 inches of new HMAC overlay utilizing a paving fabric to aid in the retardation of reflective cracks after milling. The composite pavement sections will still have 1 ½ inches of AC over 7 ½+ inches of PCC after milling. With the recommended overlay thickness being less than one-half the remaining pavement thickness after milling, a paving fabric is recommended to help prevent reflective cracking of the composite section.

The overall elevation change for these pavement sections will be 0 inches higher than the existing surface elevation. Because of the extremely high deflections present for the existing structural section, a mill and overlay design that does not raise the vertical elevation is possible.

Figure 1 of this report shows the existing pavement thickness with existing layers for each test section, the CTM 356 overlay requirement, and the approximate location of each test section.

CHEC‘s Alternate Design

For this section of highway median there isn't an alternate design recommendation that will not raise the vertical elevation higher than the existing pavement section. The design recommendation mentioned earlier is the most cost effective approach available utilizing the stated design constraints.

Hwy 880 SB Median
MP 23.0 to MP 22.75
(SB: 13,200 to 14,520 ft.)

Section Limits: (Approx.)	MP 23.0 to MP 22.75	**Current Structural Section**	MP 23.0 to MP 22.75 7 ½ ” AC / 7 ½” PCC
Direction Tested	SB Median Shoulder	**CTM 356 – T.I. 13.0**	0.15 ft. HMAC Overlay
CHEC Primary Recommendation	Mill 4.0” / 4.0” HMAC Overlay with Paving Fabric	**CHEC Alternate Recommendations**	Mill 4.0” / 2.0” RAC Overlay over 2.0” HMAC Overlay with Paving Fabric

This section of highway median starts at MP 23.0 and continues southbound for ¼ mile. The median shoulder was found to be 14.0 plus inches thick, and a composite section of pavement. This location has two distinct layers of AC totaling 7 ½ inches on average, and 7½ inches of PCC on average. Under the PCC layer a CTB type material was found.

CHEC Management Systems, Inc. did not see any alligator cracking or other structural defects present at the time the testing was completed. From the field notes taken by our technician, the shoulder has a minimal amount transverse cracking present.

CHEC’s Design Recommendation

When developing this final rehabilitation design, two major factors played a role. First, we needed to satisfy the structural needs of the existing pavement section. Secondly, if possible, we needed to determine if there is a mill and overlay design that does not raise the vertical elevation higher than the current pavement section.

Based on CTM 356 analysis, the current structural requirement for these median sections are as follows:

- Test Section #6 MP 23.0 to 22.75 – 0.15 ft. HMAC Overlay

This test section has a structural requirement of 0.15 ft. HMAC overlay based on the CTM 356 and CALTRANS Flexible Pavement Rehabilitation Design Manual – June 2001. To control reflective cracking the overlay thickness required would be much greater than the 0.15 structural requirement currently measured. With little to no defects present at the surface CHEC Management Systems, Inc. feels that reflective crack control is not a controlling factor for this design. A Traffic Index Factor (TI) of 13.0 was utilized for all analysis completed.

For this section of road, to satisfy both the structural and reflective cracking requirements of the design procedure, we recommend:

Mill the existing pavement surface 4.0 inches and overlay the remaining pavement with 4.0 inches of new HMAC overlay utilizing a paving fabric to aid in the retardation of reflective cracks after milling. The composite pavement sections will still have 4 inches of AC over 7 inches of PCC after milling. With the recommended overlay thickness being less than one-half the remaining pavement thickness after milling, a paving fabric is recommended to help retard reflective cracking of the composite section.

The overall elevation change for these pavement sections will be one-half inch higher than the existing surface elevation. Because of the high deflections present for the existing structural section a mill and overlay design that does not raise the vertical elevation is not possible. The structural need is too great and is the overall controlling factor for this rehabilitation design.

Figure 1 of this report shows the existing pavement thickness with existing layers for each test section, the CTM 356 overlay requirement, and the approximate location of each test section.

CHEC's Alternate Design

For this section of highway median there isn't an alternative design that will not raise the vertical elevation higher than the existing pavement section. The design recommendation above is the most cost effective approach available utilizing the stated design constraints.

An alternate design that may provide better reflective crack control would be to mill the existing surface 4.0 inches and place a 2.0 inch RAC Overlay over a 2.0 inch HMAC overlay with the use of a paving fabric between the HMAC and the milled asphalt concrete surface.

The total elevation change is still one-half of an inch higher than the original surface elevations due to the structural needs, but the RAC provides better reflective crack control than the HMAC material alone.

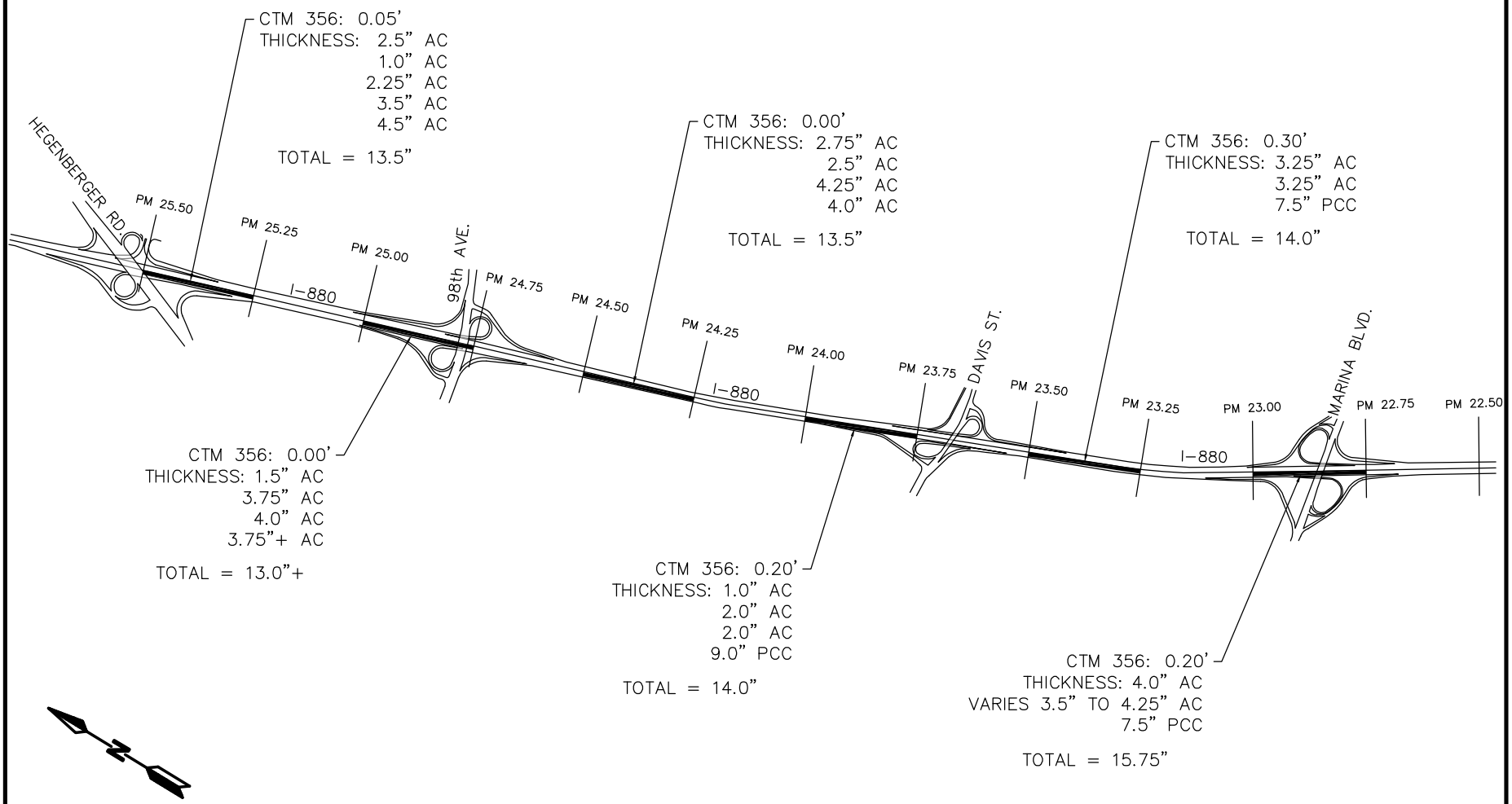
APPENDIX

Figures 1
Deflection Plots & Graph

HIGHWAY 880

S.B. MEDIAN TESTING

EXISTING THICKNESS



CHEC Management Systems, Inc.
20202 Charlanne Drive
Redding, CA 96002
(530) 222-3116

FIGURE 1

ENGINEER: JC
DWG2009\09088

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW
MP 25.5 - MP 25.25
SB: 0 - 1320

STATISTICAL ANALYSIS	80th %	90th %	Mean	Min	Max
	9	9	7	4	10

STRUCTURAL DATA **CTB:** N **Thickness:** 13.50 **TI:** 13.0

STRUCTURAL DESIGN	Deflec	Toler	% Reduction	Overlay
	9	8	8	0.05

ROAD: Hwy 880 HW
MP 25.0 - MP 24.75
SB: 2690 - 3960

STATISTICAL ANALYSIS	80th %	90th %	Mean	Min	Max
	6	7	6	4	7

STRUCTURAL DATA **CTB:** N **Thickness:** 13.50 **TI:** 13.0

STRUCTURAL DESIGN	Deflec	Toler	% Reduction	Overlay
	6	8	0	0.00

ROAD: Hwy 880 HW
MP 24.5 - MP 24.25
SB: 5280 - 6600

STATISTICAL ANALYSIS	80th %	90th %	Mean	Min	Max
	7	7	6	3	7

STRUCTURAL DATA **CTB:** N **Thickness:** 13.50 **TI:** 13.0

STRUCTURAL DESIGN	Deflec	Toler	% Reduction	Overlay
	7	8	0	0.00

ROAD: Hwy 880 HW
MP 24.0 - MP 23.75
SB: 7985 - 9240

STATISTICAL ANALYSIS	80th %	90th %	Mean	Min	Max
	9	9	8	6	10

STRUCTURAL DATA **CTB:** Y **Thickness:** 14.00 **TI:** 13.0

STRUCTURAL DESIGN	Deflec	Toler	% Reduction	Overlay
	9	7	22	0.10

ROAD: Hwy 880 HW
MP 23.5 - MP 23.25
SB: 10560 - 11880

STATISTICAL ANALYSIS	80th %	90th %	Mean	Min	Max
	11	12	10	8	13

STRUCTURAL DATA **CTB:** Y **Thickness:** 14.00 **TI:** 13.0

STRUCTURAL DESIGN	Deflec	Toler	% Reduction	Overlay
	11	7	37	0.20

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 23.0 - MP 22.75

SB: 13200 - 14520

STATISTICAL ANALYSIS

80th %	90th %	Mean	Min	Max
9	10	8	4	10

STRUCTURAL DATA **CTB:** Y **Thickness:** 14.50 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
9	7	25	0.10

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 25.5 - MP 25.25 ...x|....

SB: 0 - 1320	Reading	Plot	Comment
Interval 0	33.00	7	
Interval 50	44.00	10	
Interval 100	42.00	9	
Interval 150	40.00	9	
Interval 200	42.00	9	
Interval 250	43.00	9	
Interval 300	42.00	9	
Interval 350	37.00	8	
Interval 400	42.00	9	
Interval 450	39.00	8	
Interval 500	38.00	8	
Interval 550	34.00	7	
Interval 600	32.00	7	
Interval 650	36.00	8	
Interval 700	30.00	6	
Interval 750	33.00	7	
Interval 800	43.00	9	
Interval 850	29.00	6	
Interval 900	34.00	7	
Interval 950	31.00	7	
Interval 1000	20.00	4	
Interval 1050	19.00	4	
Interval 1100	32.00	7	
Interval 1150	26.00	6	
Interval 1200	29.00	6	
Interval 1250	30.00	6	
Interval 1300	27.00	6	

STATISTICAL ANALYSIS

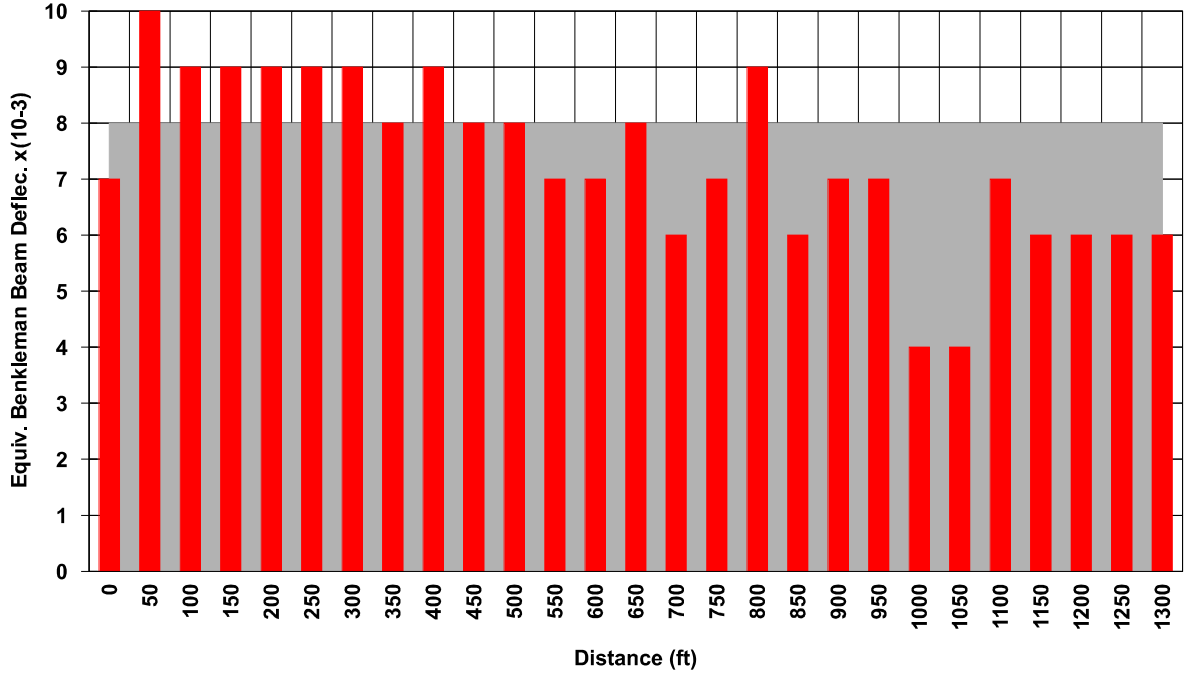
80th %	90th %	Mean	Min	Max
9	9	7	4	10

STRUCTURAL DATA **CTB:** N **Thickness:** 13.50 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
9	8	8	0.05

Dynaflect Analysis
Hwy 880
Parikh Eng. Services Dept.



Deflection Data Tolerable Limit

Road Name: Hwy 880 HW Direction: S(...x|....) Start: 0 Interval: 0 ft
Road Number: SB: 0 - 1320 From: MP 25.5 To: MP 22.5

STATISTICAL ANALYSIS AS TESTED 80th %: 9 90th %: 9 Mean: 7 Min: 4 Max: 10

STRUCTURAL DATA CTB: N Thickness: 13.50 TI: 13.0

STRUCTURAL DESIGN AS TESTED Deflection: 9 Tolerable: 8 % Reduction: 8 Overlay: 0.05 ft

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 25.0 - MP 24.75 ...x|....

SB: 2690 - 3960	Reading	Plot	Comment
Interval 2690	24.00	5	
Interval 2740	21.00	5	
Interval 2790	23.00	5	
Interval 2840	23.00	5	
Interval 2890	23.00	5	
Interval 2940	24.00	5	
Interval 2990	21.00	5	
Interval 3040	26.00	6	
Interval 3090	23.00	5	
Interval 3140	26.00	6	
Interval 3190	25.00	5	
Interval 3240	29.00	6	
Interval 3290	26.00	6	
Interval 3340	24.00	5	
Interval 3390	25.00	5	
Interval 3440	20.00	4	
Interval 3490	22.00	5	
Interval 3540	25.00	5	
Interval 3590	32.00	7	
Interval 3640	32.00	7	
Interval 3690	25.00	5	
Interval 3740	28.00	6	
Interval 3790	32.00	7	
Interval 3840	33.00	7	
Interval 3890	33.00	7	
Interval 3940	33.00	7	

STATISTICAL ANALYSIS

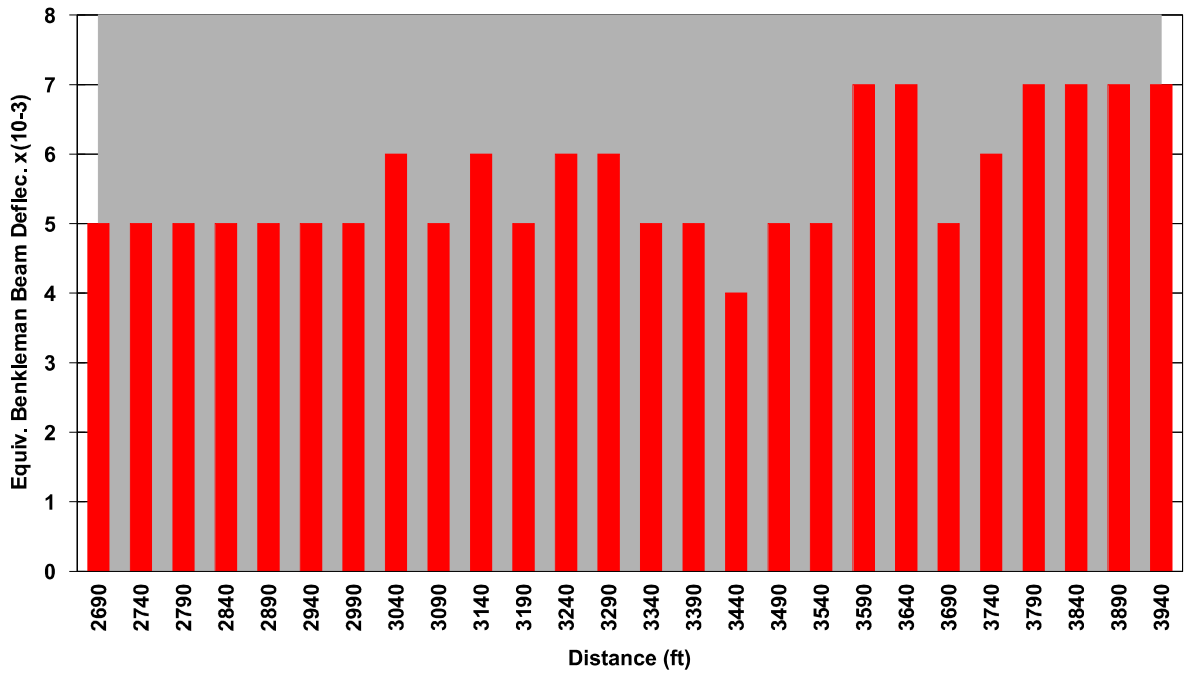
80th %	90th %	Mean	Min	Max
6	7	6	4	7

STRUCTURAL DATA **CTB:** N **Thickness:** 13.50 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
6	8	0	0.00

Dynaflect Analysis
Hwy 880
Parikh Eng. Services Dept.



Deflection Data Tolerable Limit

Road Name: Hwy 880 HW Direction: S(...x|....) Start: 0 Interval: 0 ft
Road Number: SB: 0 - 1320 From: MP 25.5 To: MP 22.5

STATISTICAL ANALYSIS AS TESTED 80th %: 9 90th %: 9 Mean: 7 Min: 4 Max: 10

STRUCTURAL DATA CTB: N Thickness: 13.50 TI: 13.0

STRUCTURAL DESIGN AS TESTED Deflection: 9 Tolerable: 8 % Reduction: 8 Overlay: 0.05 ft

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 24.5 - MP 24.25 ...x|....

SB: 5280 - 6600	Reading	Plot	Comment
Interval 5280	33.00	7	
Interval 5330	30.00	6	
Interval 5380	29.00	6	
Interval 5430	31.00	7	
Interval 5480	33.00	7	
Interval 5530	34.00	7	
Interval 5580	29.00	6	
Interval 5630	28.00	6	
Interval 5680	28.00	6	
Interval 5730	27.00	6	
Interval 5780	28.00	6	
Interval 5830	28.00	6	
Interval 5880	28.00	6	
Interval 5930	26.00	6	
Interval 5980	27.00	6	
Interval 6030	26.00	6	
Interval 6080	25.00	5	
Interval 6130	25.00	5	
Interval 6180	24.00	5	
Interval 6230	21.00	5	
Interval 6280	23.00	5	
Interval 6330	22.00	5	
Interval 6380	16.00	3	
Interval 6430	24.00	5	
Interval 6480	26.00	6	
Interval 6530	28.00	6	
Interval 6550	26.00	6	

STATISTICAL ANALYSIS

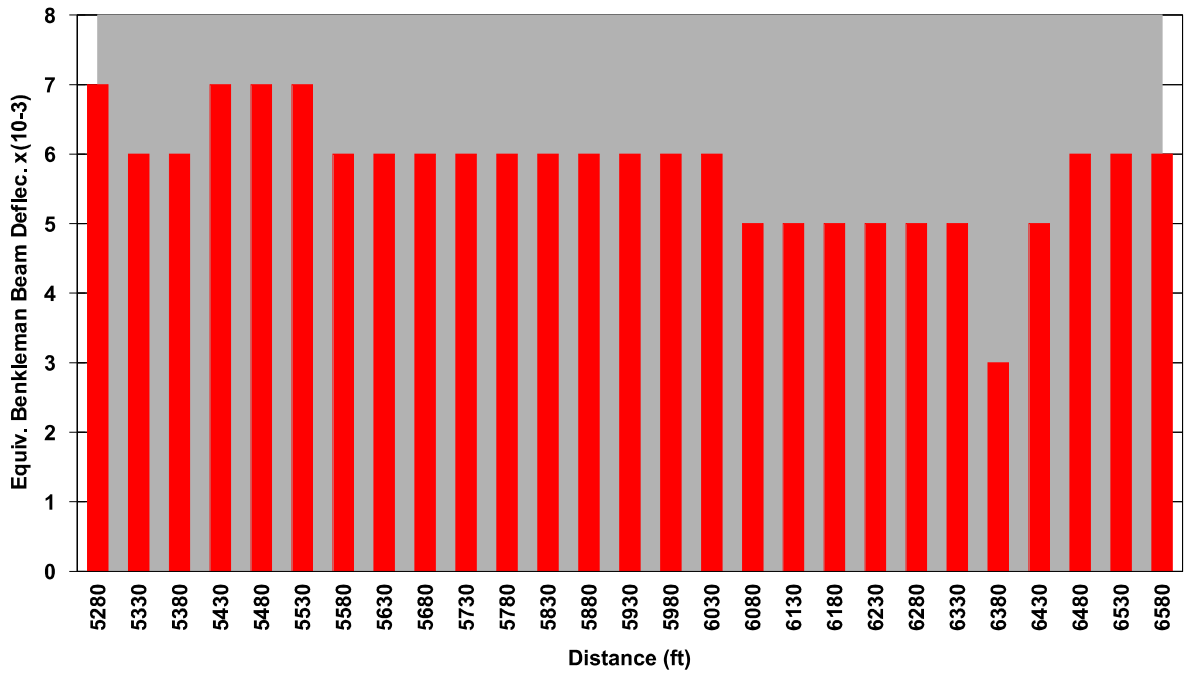
80th %	90th %	Mean	Min	Max
7	7	6	3	7

STRUCTURAL DATA **CTB:** N **Thickness:** 13.50 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
7	8	0	0.00

Dynaflect Analysis
Hwy 880
Parikh Eng. Services Dept.



Deflection Data Tolerable Limit

Road Name: Hwy 880 HW Direction: S(...x|....) Start: 0 Interval: 0 ft
Road Number: SB: 0 - 1320 From: MP 25.5 To: MP 22.5

STATISTICAL ANALYSIS AS TESTED 80th %: 9 90th %: 9 Mean: 7 Min: 4 Max: 10

STRUCTURAL DATA CTB: N Thickness: 13.50 TI: 13.0

STRUCTURAL DESIGN AS TESTED Deflection: 9 Tolerable: 8 % Reduction: 8 Overlay: 0.05 ft

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 24.0 - MP 23.75 ...x|....

SB: 7985 - 9240	Reading	Plot	Comment
Interval 7985	45.00	10	
Interval 8035	45.00	10	
Interval 8085	38.00	8	
Interval 8135	35.00	8	
Interval 8185	36.00	8	
Interval 8235	36.00	8	
Interval 8285	38.00	8	
Interval 8335	41.00	9	
Interval 8385	30.00	6	
Interval 8435	39.00	8	
Interval 8485	39.00	8	
Interval 8535	39.00	8	
Interval 8585	44.00	10	
Interval 8635	40.00	9	
Interval 8685	40.00	9	
Interval 8735	34.00	7	
Interval 8785	41.00	9	
Interval 8835	37.00	8	
Interval 8885	40.00	9	
Interval 8935	38.00	8	
Interval 8985	38.00	8	
Interval 9035	41.00	9	
Interval 9085	39.00	8	
Interval 9135	42.00	9	
Interval 9185	39.00	8	
Interval 9235	39.00	8	

STATISTICAL ANALYSIS

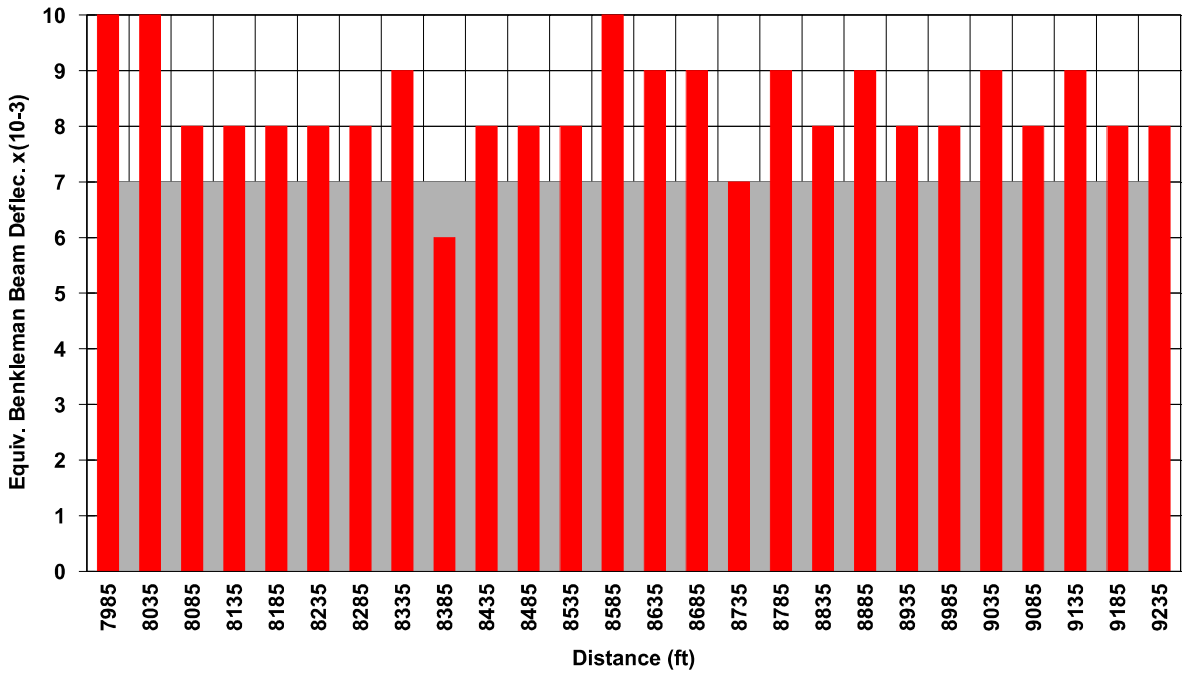
80th %	90th %	Mean	Min	Max
9	9	8	6	10

STRUCTURAL DATA **CTB:** Y **Thickness:** 14.00 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
9	7	22	0.10

Dynaflect Analysis
Hwy 880
Parikh Eng. Services Dept.



Deflection Data Tolerable Limit

Road Name: Hwy 880 HW Direction: S(...x|....) Start: 0 Interval: 0 ft
Road Number: SB: 0 - 1320 From: MP 25.5 To: MP 22.5

STATISTICAL ANALYSIS AS TESTED 80th %: 9 90th %: 9 Mean: 7 Min: 4 Max: 10

STRUCTURAL DATA CTB: N Thickness: 13.50 TI: 13.0

STRUCTURAL DESIGN AS TESTED Deflection: 9 Tolerable: 8 % Reduction: 8 Overlay: 0.05 ft

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 23.5 - MP 23.25 ...x|....

SB: 10560 - 11880	Reading	Plot	Comment
Interval 10560	47.00	10	
Interval 10610	46.00	10	
Interval 10660	48.00	10	
Interval 10710	49.00	11	
Interval 10760	50.00	11	
Interval 10810	39.00	8	
Interval 10860	43.00	9	
Interval 10910	46.00	10	
Interval 10960	61.00	13	
Interval 11010	54.00	12	
Interval 11060	41.00	9	
Interval 11110	38.00	8	
Interval 11160	42.00	9	
Interval 11210	38.00	8	
Interval 11260	47.00	10	
Interval 11310	54.00	12	
Interval 11360	46.00	10	
Interval 11410	57.00	12	
Interval 11460	45.00	10	
Interval 11510	48.00	10	
Interval 11560	51.00	11	
Interval 11610	50.00	11	
Interval 11660	48.00	10	
Interval 11710	47.00	10	
Interval 11760	41.00	9	
Interval 11810	40.00	9	
Interval 11860	41.00	9	

STATISTICAL ANALYSIS

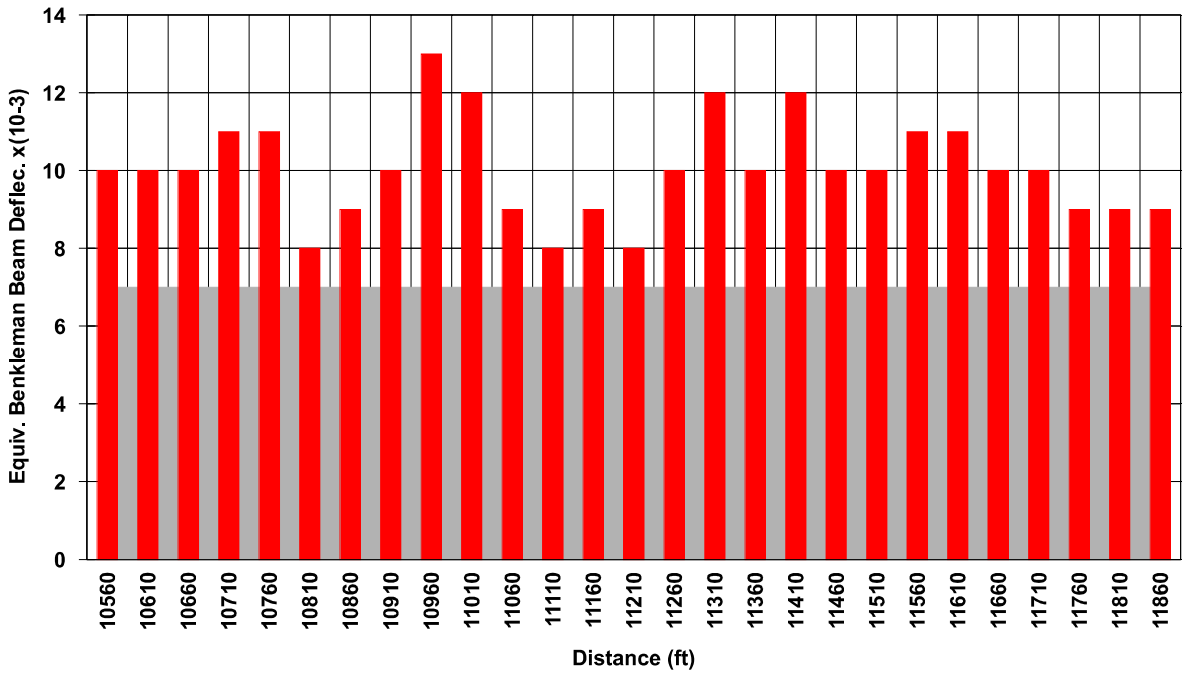
80th %	90th %	Mean	Min	Max
11	12	10	8	13

STRUCTURAL DATA **CTB:** Y **Thickness:** 14.00 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
11	7	37	0.20

Dynaflect Analysis
Hwy 880
Parikh Eng. Services Dept.



Deflection Data Tolerable Limit

Road Name: Hwy 880 HW Direction: S(...x|....) Start: 0 Interval: 0 ft
Road Number: SB: 0 - 1320 From: MP 25.5 To: MP 22.5

STATISTICAL ANALYSIS AS TESTED 80th %: 9 90th %: 9 Mean: 7 Min: 4 Max: 10

STRUCTURAL DATA CTB: N Thickness: 13.50 TI: 13.0

STRUCTURAL DESIGN AS TESTED Deflection: 9 Tolerable: 8 % Reduction: 8 Overlay: 0.05 ft

Dynaflect Analysis

Parikh Eng. Services Dept.

Hwy 880

ROAD: Hwy 880 HW

MP 23.0 - MP 22.75 ...x|....

SB: 13200 - 14520	Reading	Plot	Comment
Interval 13200	35.00	8	
Interval 13250	32.00	7	
Interval 13300	34.00	7	
Interval 13350	39.00	8	
Interval 13400	35.00	8	
Interval 13450	41.00	9	
Interval 13500	18.00	4	
Interval 13550	36.00	8	
Interval 13600	34.00	7	
Interval 13650	36.00	8	
Interval 13700	38.00	8	
Interval 13750	47.00	10	
Interval 13800	46.00	10	
Interval 13850	42.00	9	
Interval 13900	39.00	8	
Interval 13950	39.00	8	
Interval 14000	42.00	9	
Interval 14050	42.00	9	
Interval 14100	43.00	9	
Interval 14150	39.00	8	
Interval 14200	42.00	9	
Interval 14250	42.00	9	
Interval 14300	41.00	9	
Interval 14350	42.00	9	
Interval 14400	41.00	9	
Interval 14450	41.00	9	
Interval 14500	40.00	9	

STATISTICAL ANALYSIS

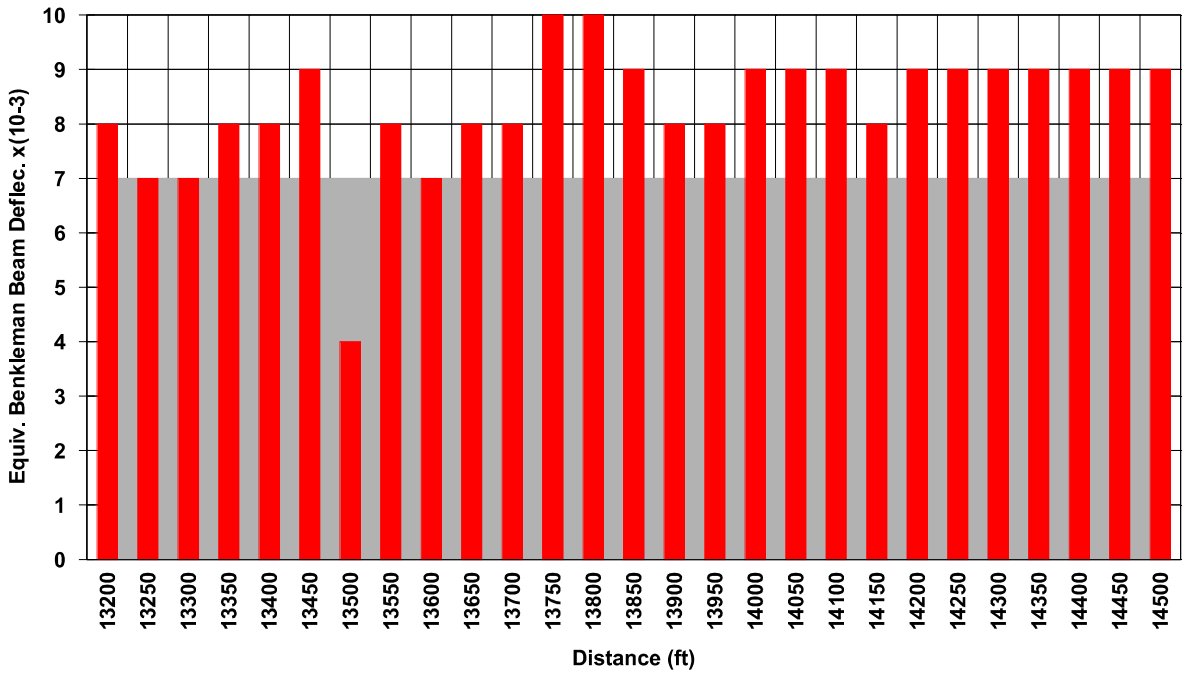
80th %	90th %	Mean	Min	Max
9	10	8	4	10

STRUCTURAL DATA **CTB:** Y **Thickness:** 14.50 **TI:** 13.0

STRUCTURAL DESIGN

Deflec	Toler	% Reduction	Overlay
9	7	25	0.10

Dynaflect Analysis
Hwy 880
Parikh Eng. Services Dept.



Deflection Data Tolerable Limit

Road Name: Hwy 880 HW Direction: S(...x|....) Start: 0 Interval: 0 ft
Road Number: SB: 0 - 1320 From: MP 25.5 To: MP 22.5

STATISTICAL ANALYSIS AS TESTED 80th %: 9 90th %: 9 Mean: 7 Min: 4 Max: 10

STRUCTURAL DATA CTB: N Thickness: 13.50 TI: 13.0

STRUCTURAL DESIGN AS TESTED Deflection: 9 Tolerable: 8 % Reduction: 8 Overlay: 0.05 ft

Typical Cross Sections
(Sheets X-1 thru X-15)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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RAJAPPAN & MEYER
CONSULTING ENGINEERS INC.
1038 LEIGH AVE, SUITE 100
SAN JOSE, CA 95126

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

NOTES:

1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATIONS ARE SHOWN ON THE SUPERELEVATION DAGRAMS.
3. FOR LOCATION AND TYPE OF HMA DIKE, Conc BARRIER, SEE LAYOUT PLANS.
4. FOR LOCATION OF SAWCUT/CONFORM LINES, SEE LAYOUT PLANS.
5. FOR LOCATION AND TYPE OF RETAINING WALL, SEE RETAINING WALL PLANS AND STRUCTURE PLANS.
6. FOR SOUND WALL LOCATION, SEE SOUND WALL PLANS.
7. FOR LOCATION AND ELEVATION OF DITCHES, SEE DRAINAGE PLANS.
8. THE HMA-O LAYER FOR WIDEN ROADWAY SECTION SHALL BE PLACED CONCURRENTLY WHEN ROADWAY STRUCTURAL SECTION [2] IS PLACED.
9. FOR SIDE SLOPE INFORMATION NOT SHOWN, SEE CONTOUR GRADING PLANS.
10. FOR SAFETY SHAPE BARRIER DETAIL, SEE CONSTRUCTION DETAILS PLANS.
11. GPI TYPE SHALL BE PAVING MAT.
12. SEG SHALL BE CLASS B2
13. FOR ROCK SLOPE PROTECTION SEE DRAINAGE PLANS.

ABBREVIATIONS:

GB	GRADE BREAK
RAC-G	RUBBERIZED ASPHALT CONCRETE (TYPE G)
S/C	SAWCUT AND CONFORM
SEG	SUBGRADE ENHANCEMENT GEOTEXTILE
RHMA-G	RUBBERIZED HOT MIXED ASPHALT (GAP GRADED)
HMA-O	HOT MIX ASPHALT OPEN GRADED FRICTION COURSE
GPI	GEOSYNTHETIC PAVEMENT INTERLAYER
MVP	MAINTANENCE VEHICLE PULLOUT

DESIGN DESIGNATION (ROUTE 880)

ADT (2012)	237,600	D	52%
ADT (2035)	263,700	T	8.7%
DHV	8,500	V	80 mph
ESAL	128,000,000	TI_{20}	15.0

LEGEND:

[No.] - NEW STRUCTURAL SECTION NUMBER

◇No.◇ - EXISTING STRUCTURAL SECTION NUMBER

STRUCTURAL SECTIONS

[1]
- 0.10' HMA-O
- 0.15' RHMA-G
- 0.65' HMA (TYPE A)
- 0.25' ATPB
- 0.65' LCB
- 1.35' CI 4 AS OVER SEG

[2]
- 0.10' COLD PLANE AC Pvmt
- 0.10' HMA-O

[3]
- 0.10' HMA-O
- 0.15' RHMA-G
- 0.10' HMA (TYPE A)
- 0.50' CI 2 AB

[4]
- 0.60' HMA (TYPE A)
- 0.65' LCB
- 0.90' CI 4 AS

[5]
- 0.35' Conc Pvmt
- 0.50' CI 2 AB

[6]
- 0.40' COLD PLANE AC Pvmt
- 0.10' HMA-O
- 0.30' HMA (TYPE A) WITH GPI

[7]
- 0.10' HMA-O
- 0.15' RHMA-G
- 0.65' HMA (TYPE A)
- 0.25' ATPB
- 0.65' LCB
- 1.35' CI 4 AS

[8]
- 0.35' HMA (TYPE A)
- 0.50' CI 2 AB

EXISTING STRUCTURAL SECTIONS

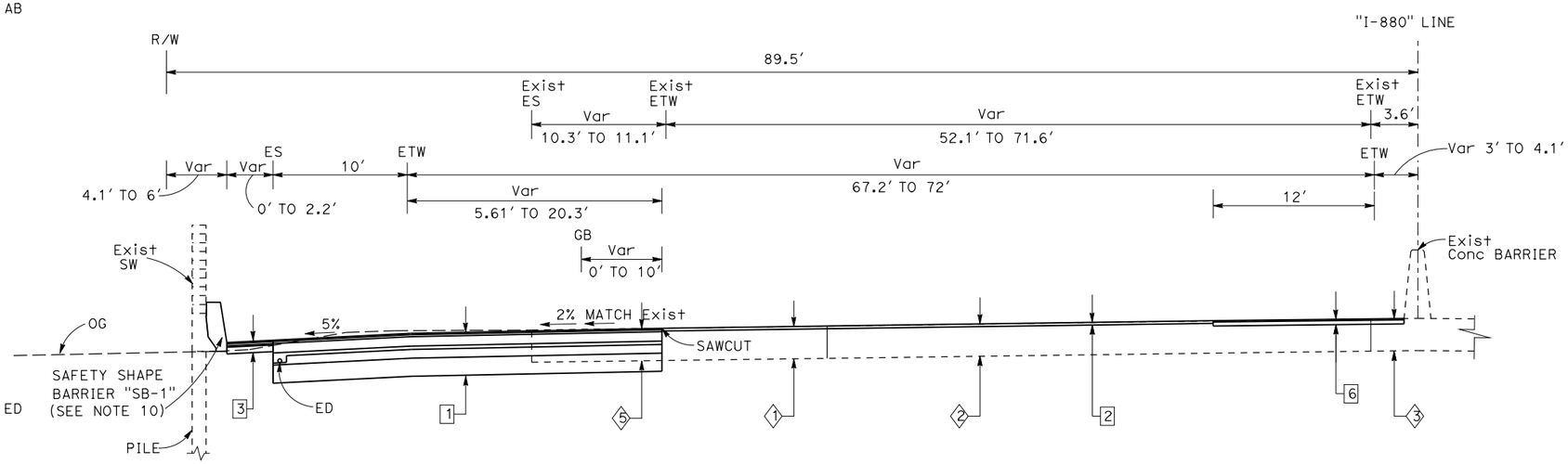
◇1◇ Exist #4 LANE
- 0.10' OGAC
- 0.15' RAC-G
- 0.65' AC
- 0.25' ATPB
- 1.00' CTB
- 1.55' AS

◇2◇ Exist #1,#2,#3 LANE
- 0.10' OGAC
- 0.15' RAC-G
- 0.10' OGAC
- Var 0.35'-0.50' AC
- 0.70' PCC
- 1.00' AS

◇3◇ Exist INSIDE SHOULDER
- 0.10' OGAC
- 0.15' RAC-G
- 0.85' AC
- 0.50' CTB
- 1.25' AS

◇4◇ Exist RAMPS
- 0.65' AC
- 0.25' ATPB WITH ED
- 0.70' AB
- 1.55' AS

◇5◇ Exist OUTSIDE SHOULDER
- 0.10' OGAC
- 0.15' RAC-G
- 0.65' AC
- 0.25' ATPB WITH ED
- 1.00' CTB
- 1.55' AS



SB ROUTE 880

"I-880" 385+00 TO 388+50

TYPICAL CROSS SECTIONS

NO SCALE

X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHA RAJOO

REVISED BY — DATE REVISED

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 17:45

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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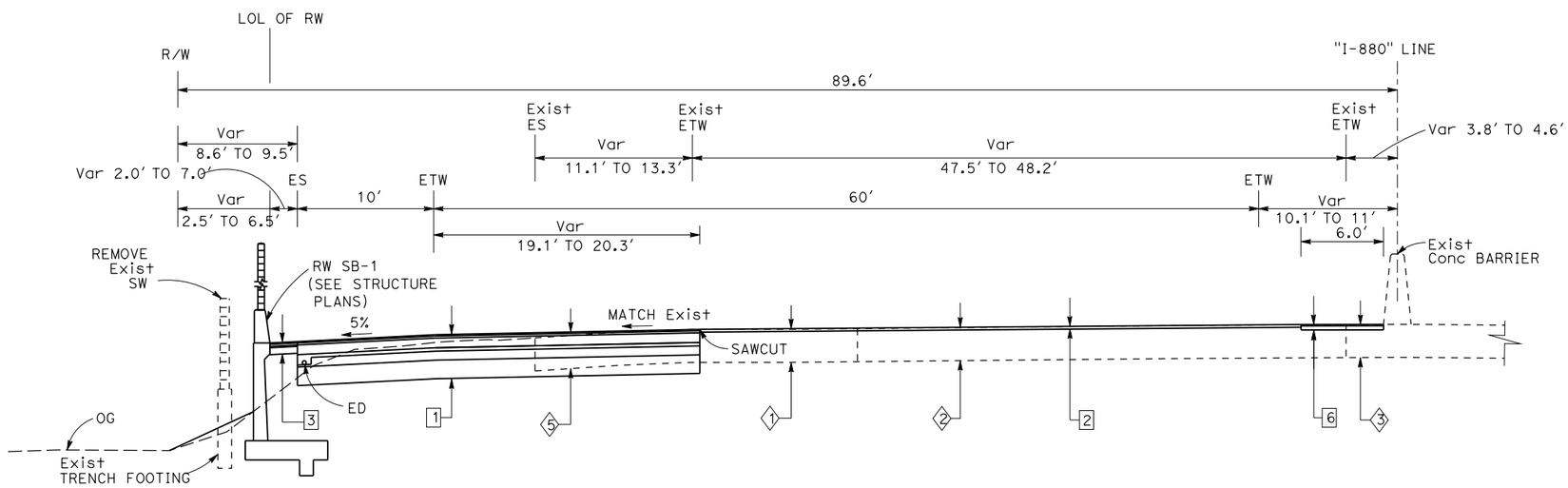
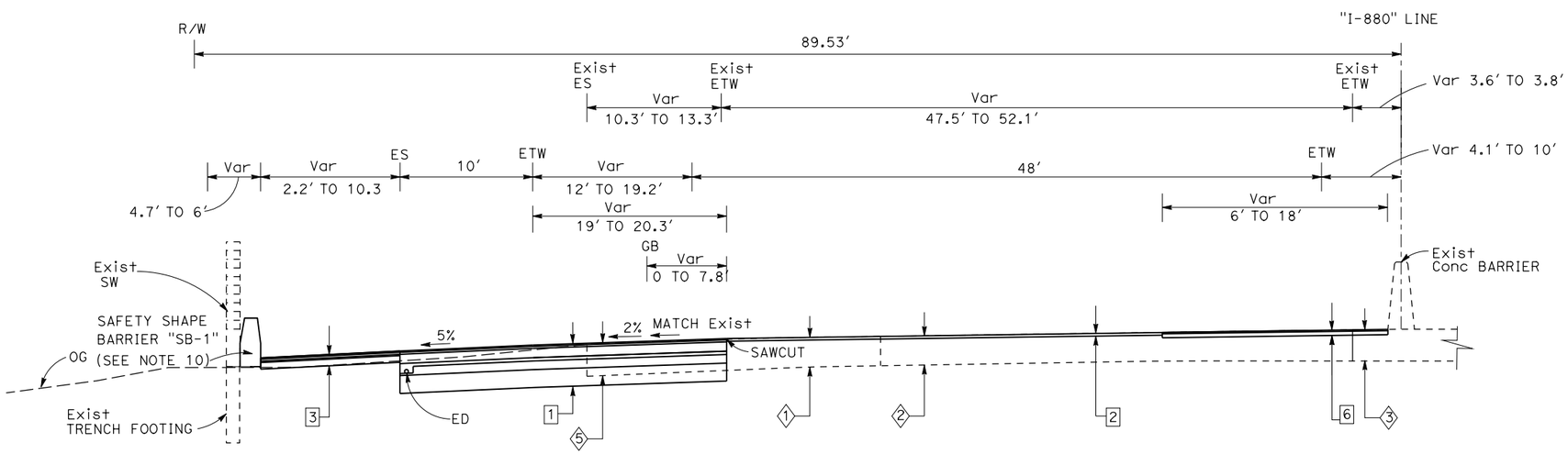


SB ROUTE 880

"I-880" 395+33.10 TO 396+65.54



SB ROUTE 880

"I-880" 388+50 TO 395+33.10

TYPICAL CROSS SECTIONS

NO SCALE

X-2

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

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CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHA RAJOO

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

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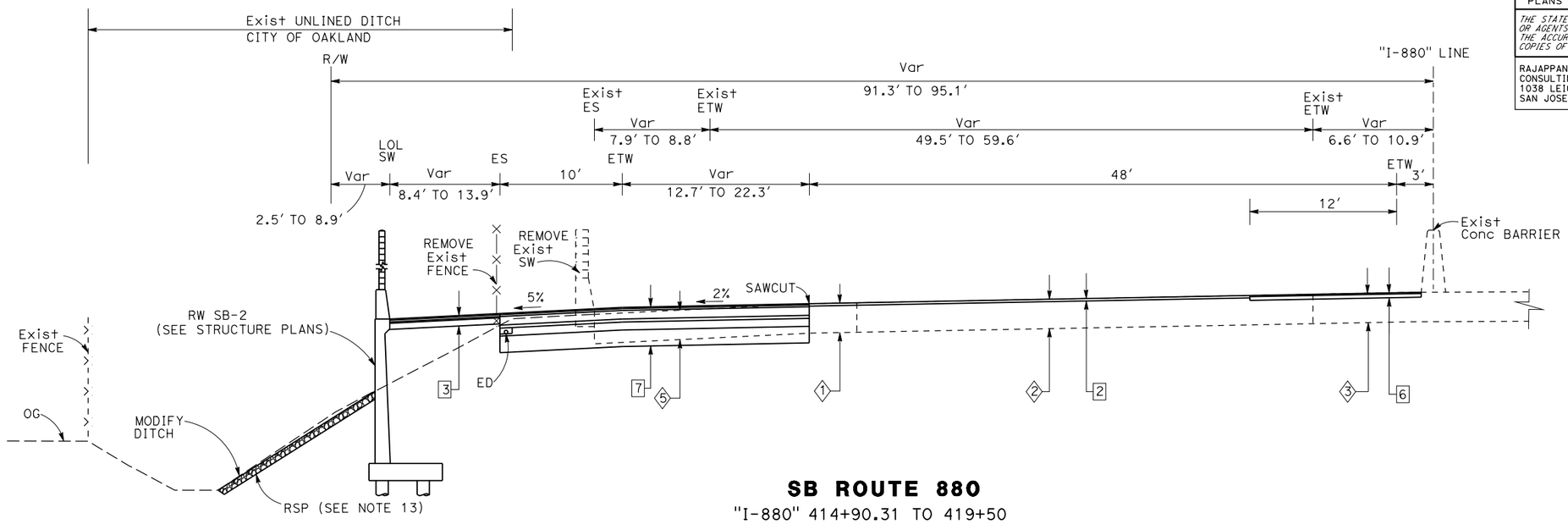
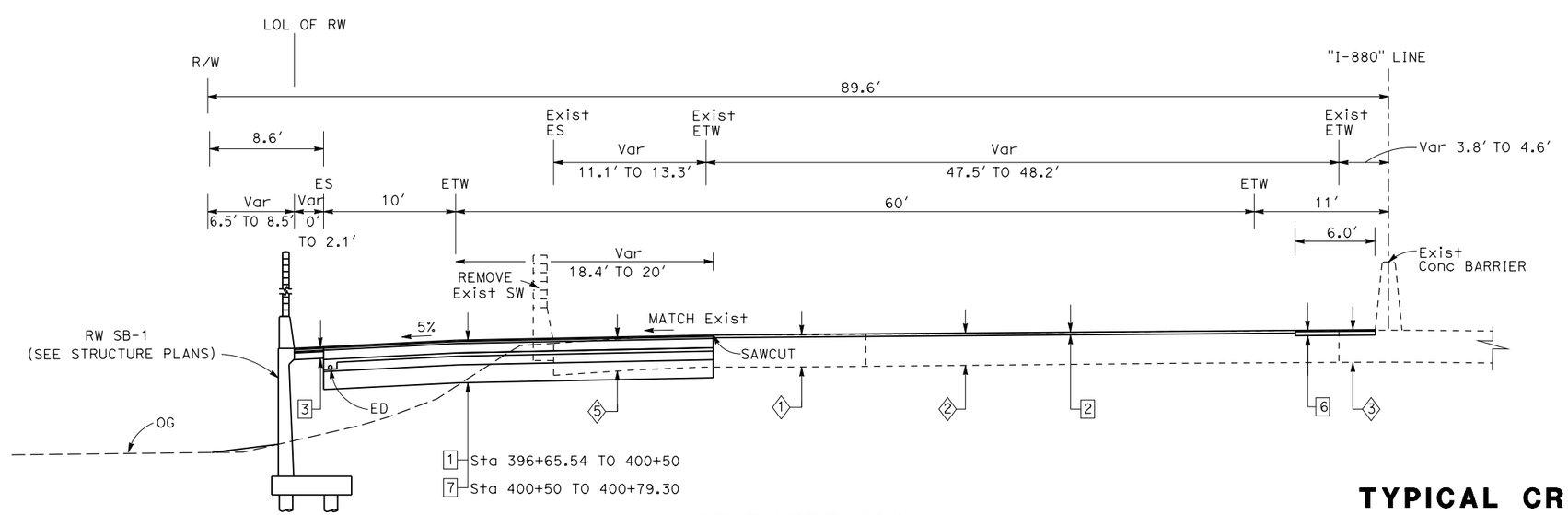


SB ROUTE 880

"I-880" 414+90.31 TO 419+50



SB ROUTE 880

"I-880" 396+65.54 TO 400+79.30

TYPICAL CROSS SECTIONS

NO SCALE

X-3

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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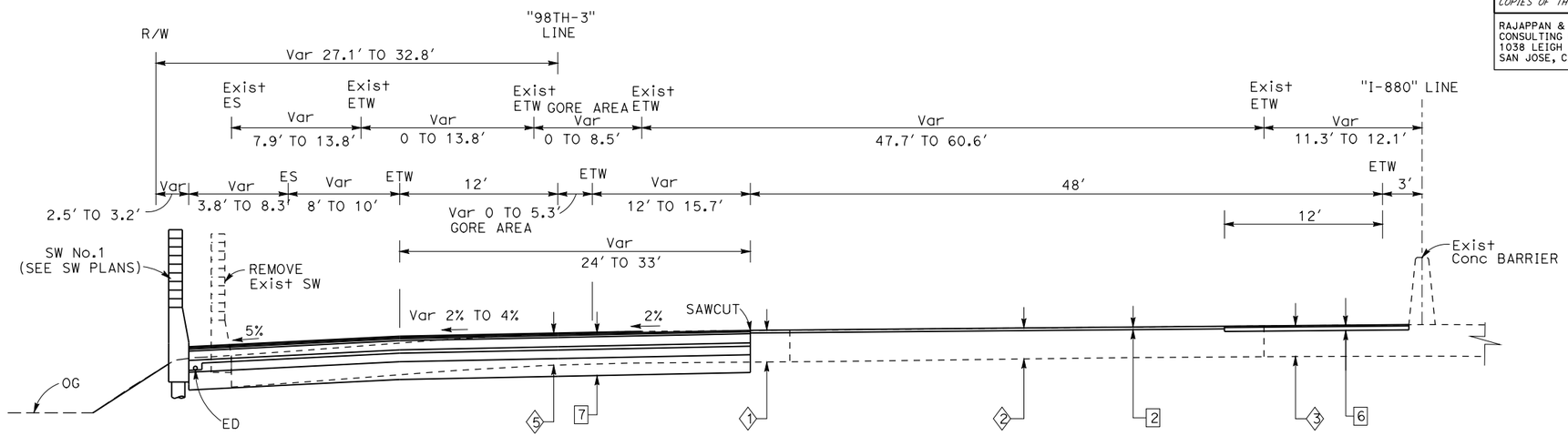
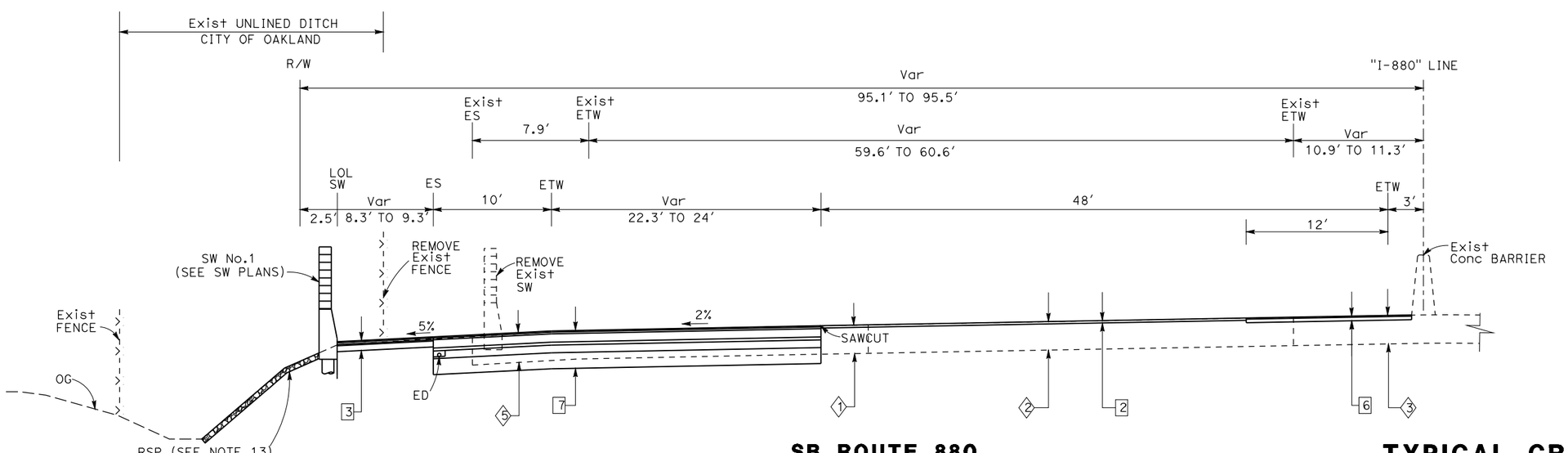


SB ROUTE 880

"I-880" 420+31.64 TO 422+84.87



SB ROUTE 880

"I-880" 419+50 TO 420+31.64

TYPICAL CROSS SECTIONS

NO SCALE

X-4

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

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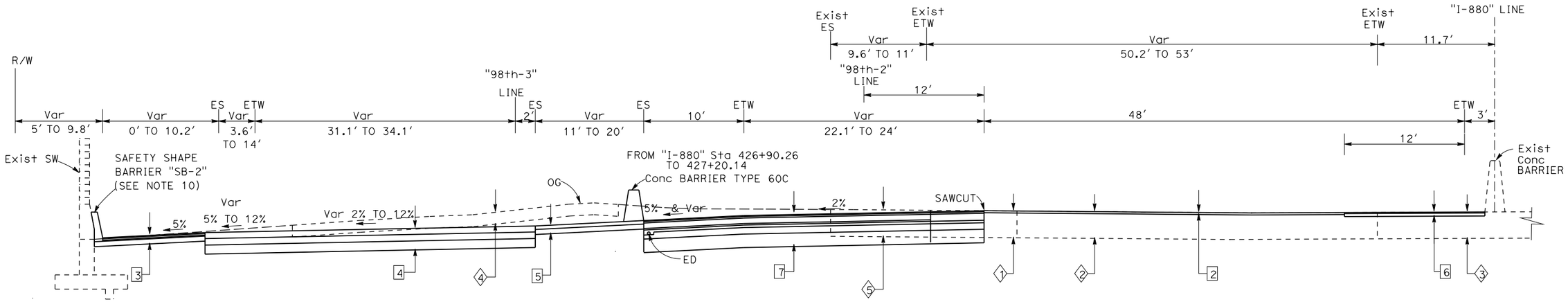
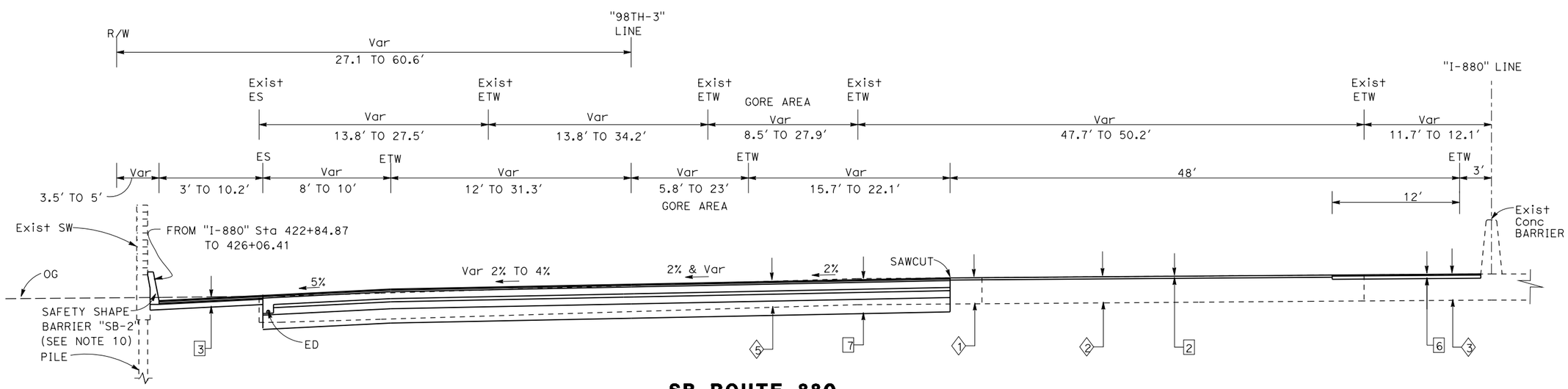
OAKLAND, CA 94612



SB ROUTE 880

"I-880" 426+06.41 TO 427+20.14



SB ROUTE 880

"I-880" 422+84.87 TO 426+06.41

TYPICAL CROSS SECTIONS

NO SCALE

X-5

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
S. JEYA	N. VARATHIA RAJOO

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

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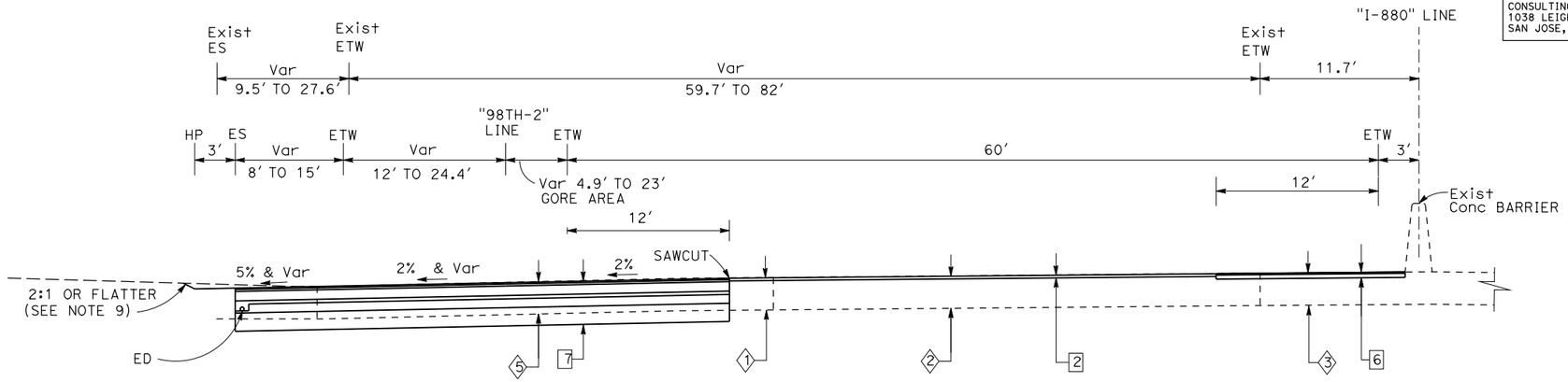
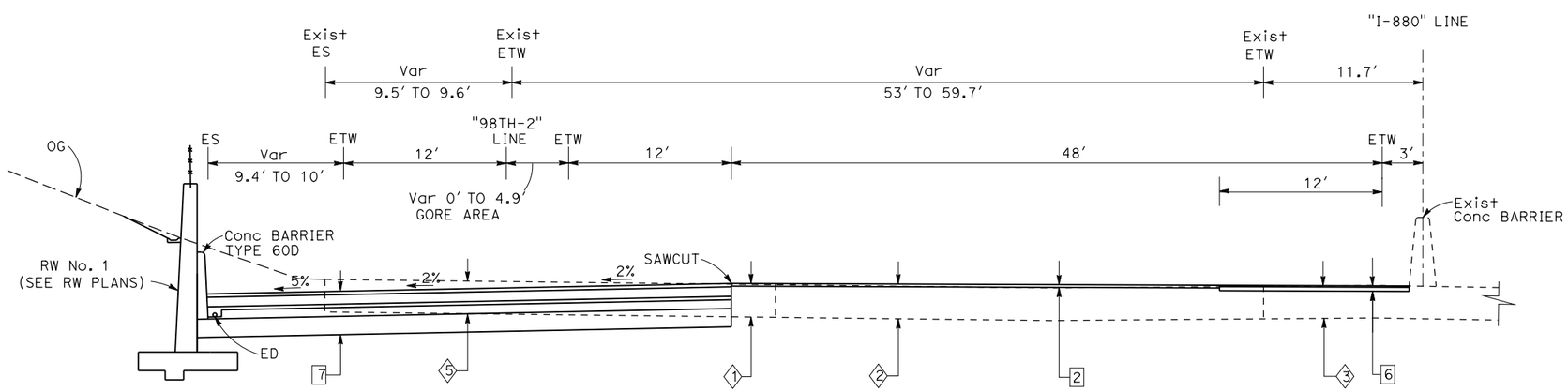


SB ROUTE 880
"I-880" 429+44.97 TO 432+48.13



SB ROUTE 880
"I-880" 427+20.14 TO 429+44.97

TYPICAL CROSS SECTIONS

NO SCALE

X-6

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

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LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 17:52

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

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PLANS APPROVAL DATE

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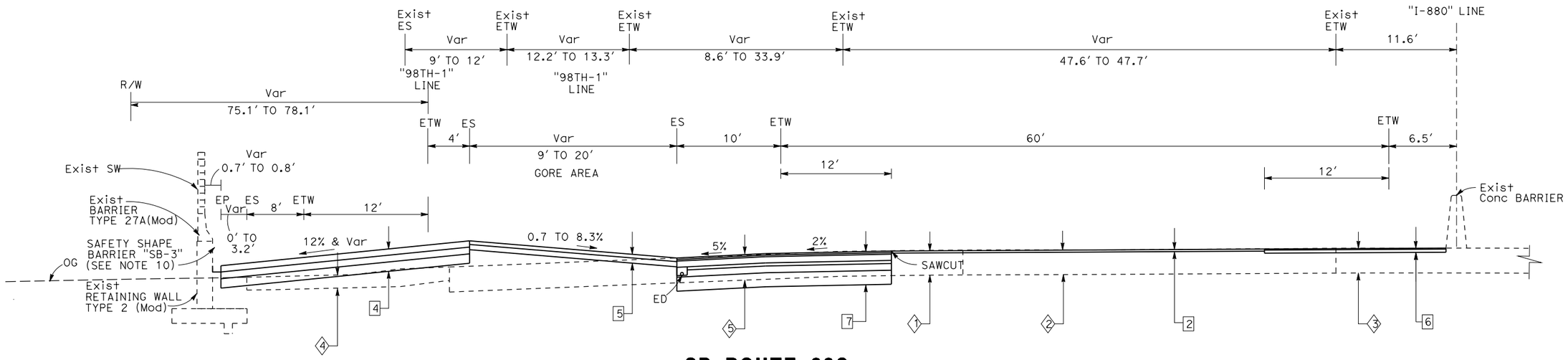
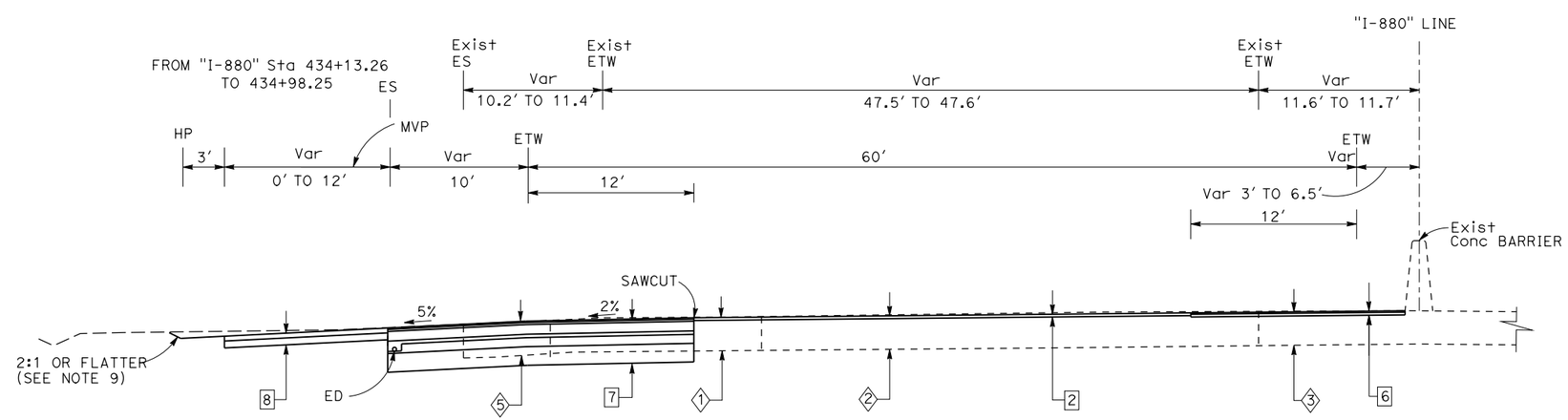


SB ROUTE 880
"I-880" 437+02.62 TO 437+95.41



SB ROUTE 880
"I-880" 432+48.13 TO 437+02.62

TYPICAL CROSS SECTIONS

NO SCALE

X-7

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHIA RAJOO

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

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LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 17:54

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

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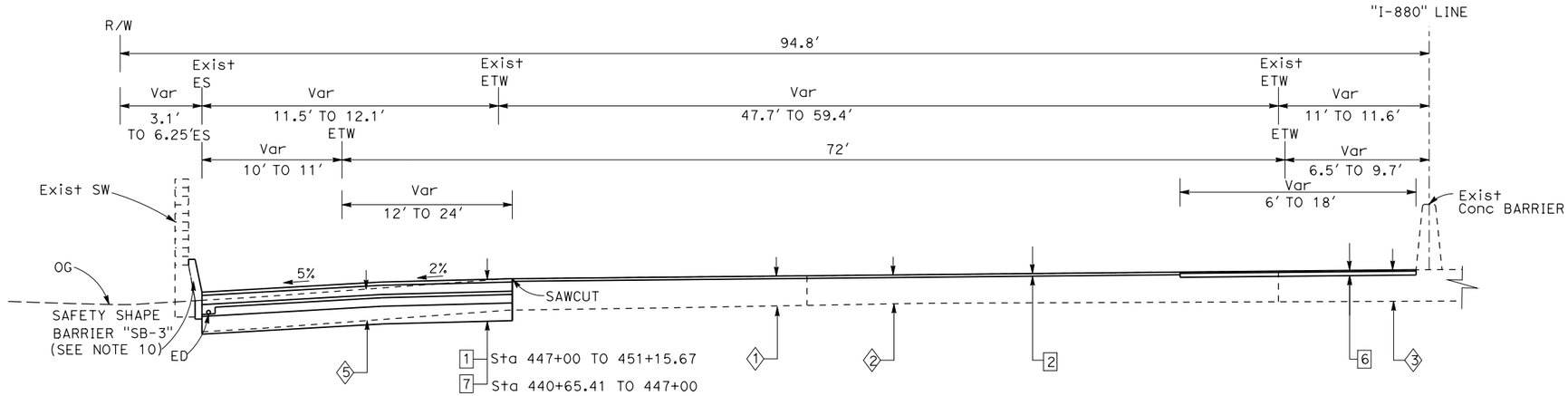
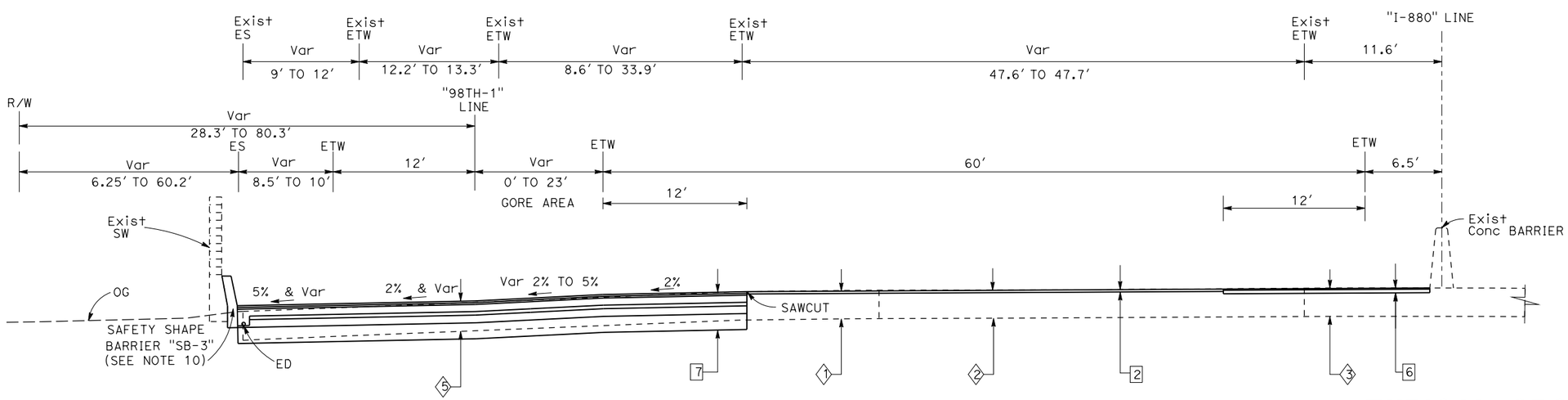


SB ROUTE 880
"I-880" 440+65.41 TO 451+15.67



SB ROUTE 880
"I-880" 437+95.41 TO 440+65.41

TYPICAL CROSS SECTIONS

NO SCALE

X-8

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

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REVISED BY — DATE REVISED

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 17:59

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

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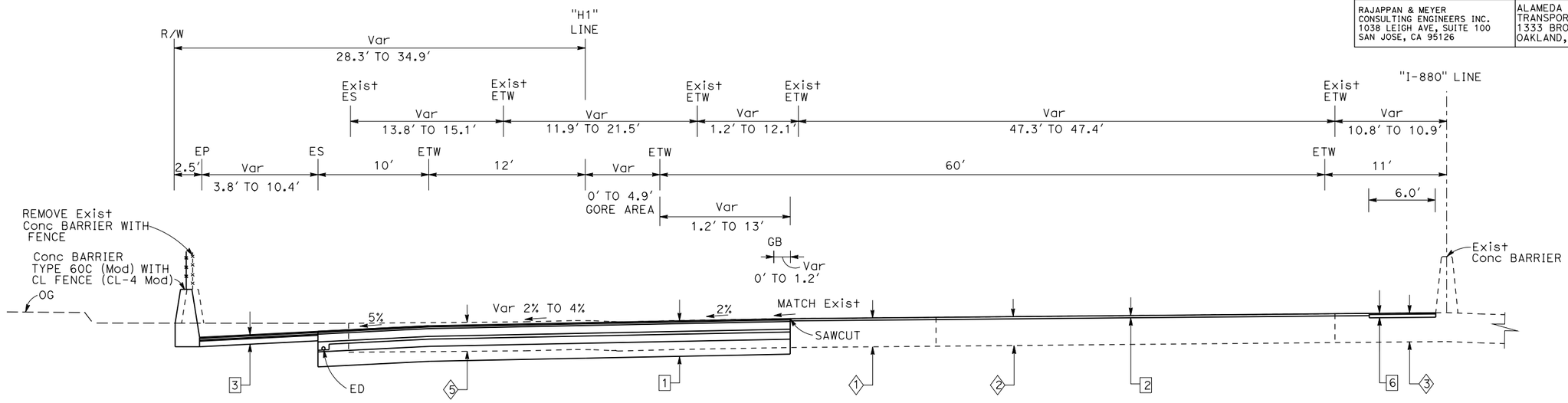
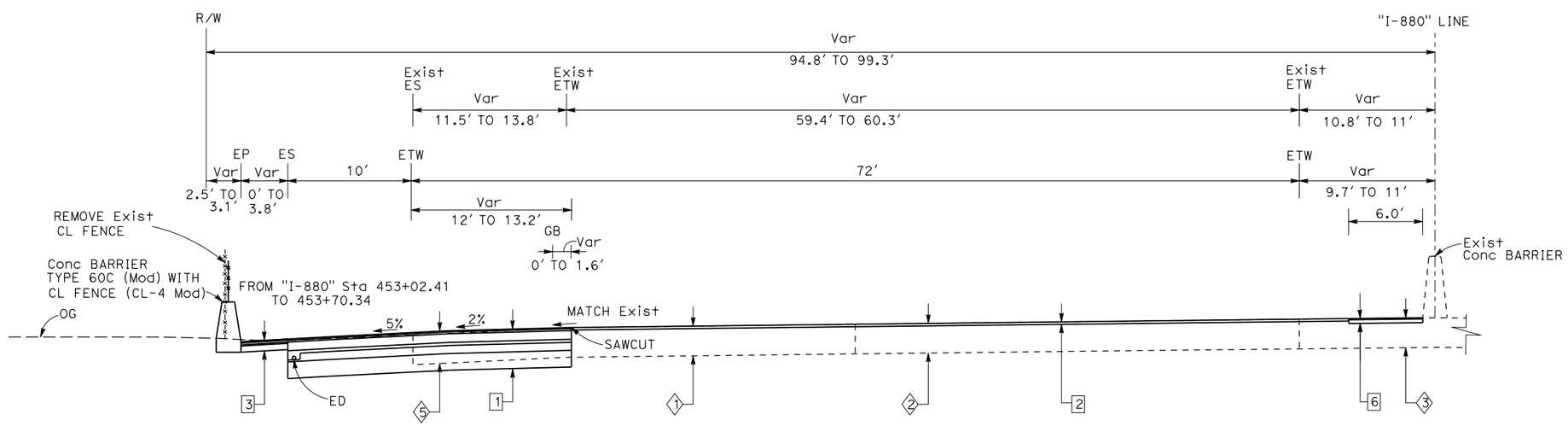


SB ROUTE 880
"I-880" 453+70.34 TO 456+17.58



SB ROUTE 880
"I-880" 451+15.67 TO 453+70.34

TYPICAL CROSS SECTIONS

NO SCALE

X-9

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHA RAJOO

REVISED BY — DATE REVISED

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 18:00

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

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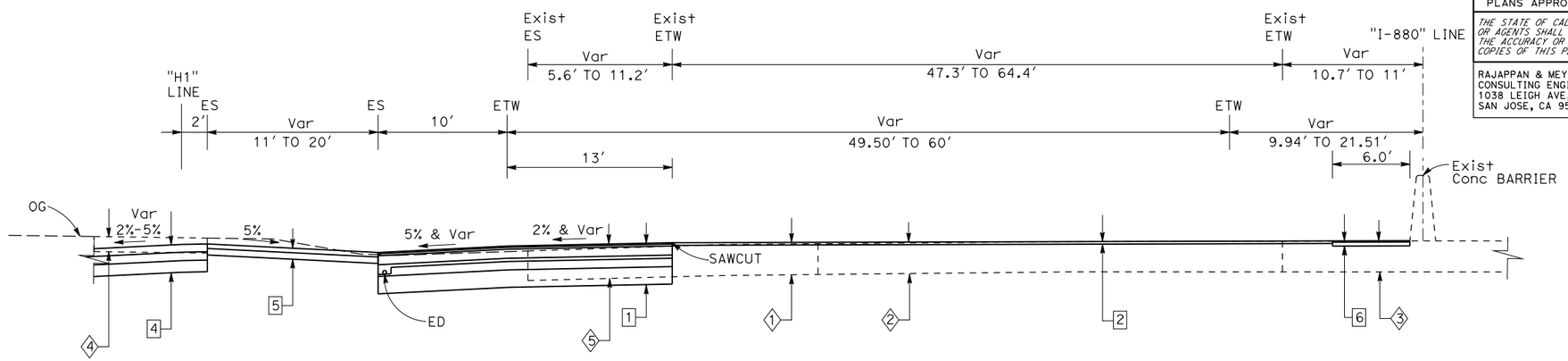
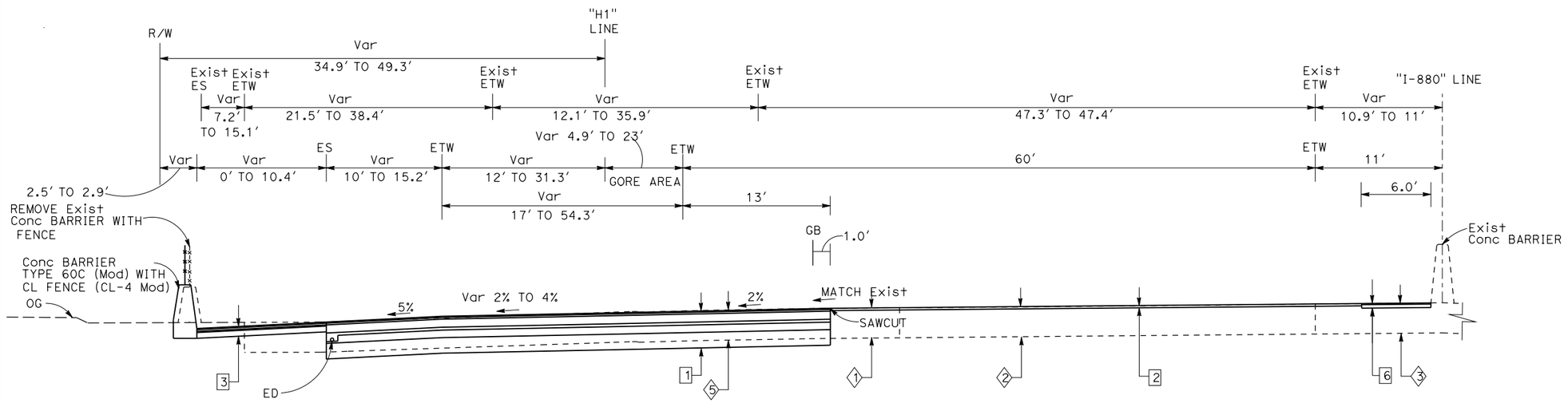
1333 BROADWAY, SUITE 220
OAKLAND, CA 94612



ROUTE 880

"I-880" 459+55.81 TO 460+74.47



ROUTE 880

"I-880" 456+17.58 TO 459+55.81

TYPICAL CROSS SECTIONS

NO SCALE

X-10

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHIA RAJOO

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 18:01

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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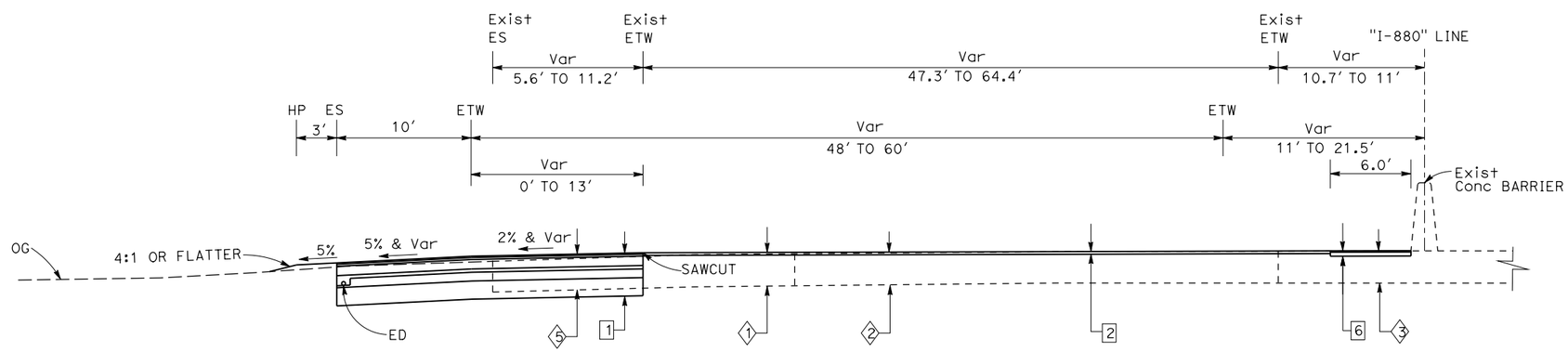
SAN JOSE, CA 95126

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



ROUTE 880

"I-880" 460+74.47 TO 468+27.13

TYPICAL CROSS SECTIONS

NO SCALE

X-11

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

CALCULATED-DESIGNED BY: S. JEYA

CHECKED BY: N. VARATHA RAJOO

REVISED BY

DATE REVISED

LAST REVISION 2-16-12

DATE PLOTTED => 12-FEB-2012
TIME PLOTTED => 18:02

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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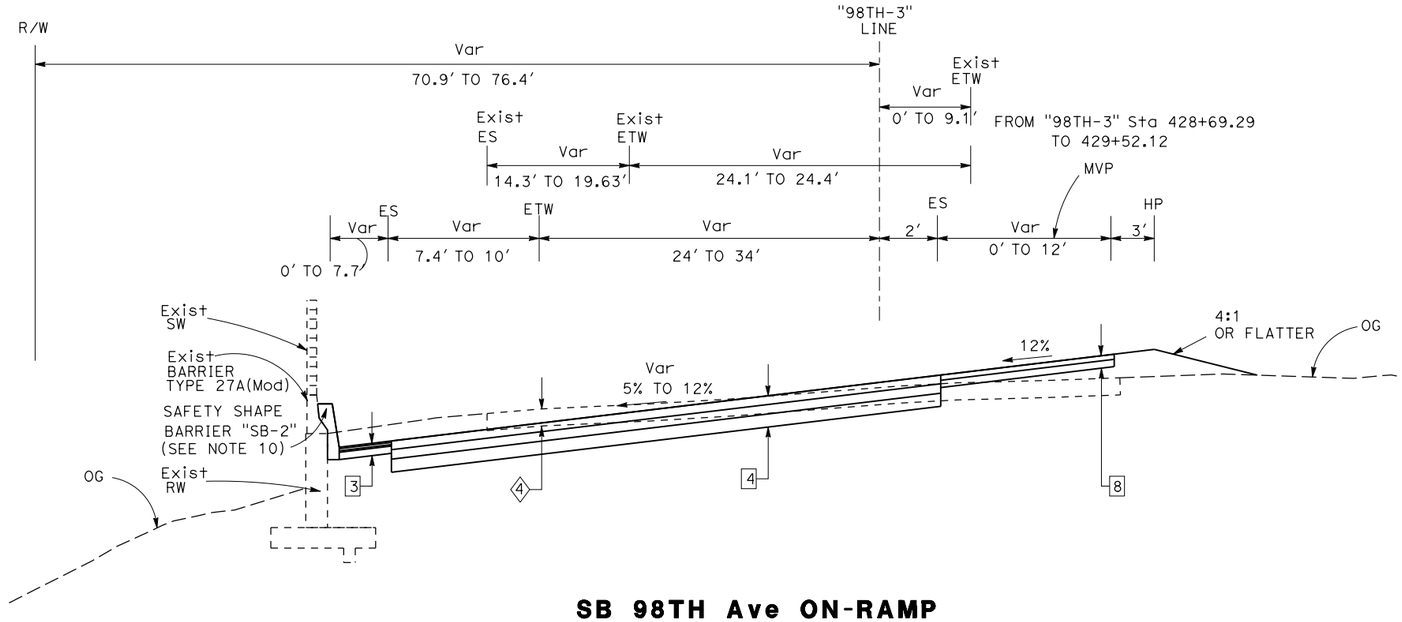
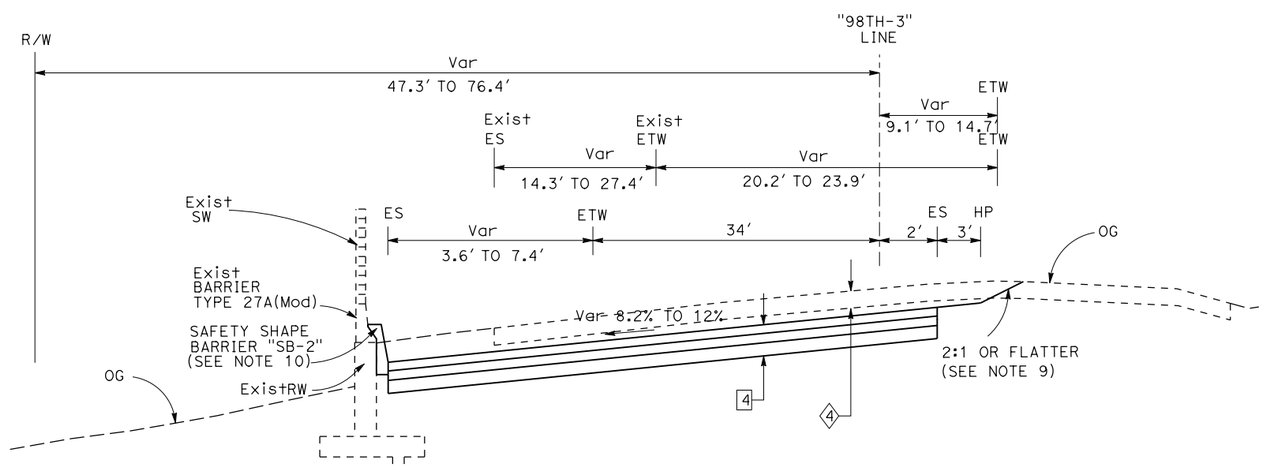


SB 98TH Ave ON-RAMP

"98TH-3" 428+69.26 TO 430+59.47



SB 98TH Ave ON-RAMP

"98TH-3" 427+20.14 TO 428+69.26

TYPICAL CROSS SECTIONS

NO SCALE

X-12

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

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CONSULTANT FUNCTIONAL SUPERVISOR | CALCULATED-DESIGNED BY | CHECKED BY | REVISED BY | DATE REVISED

LAST REVISION 2-16-12 | DATE PLOTTED => 12-FEB-2012 | TIME PLOTTED => 18:02

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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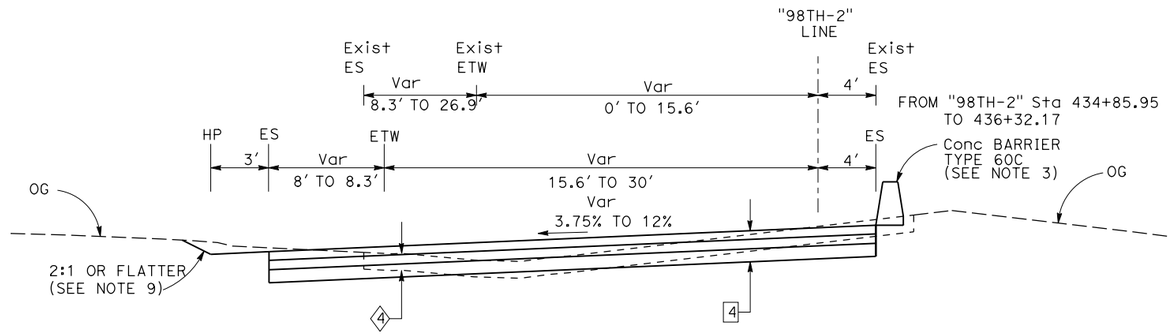
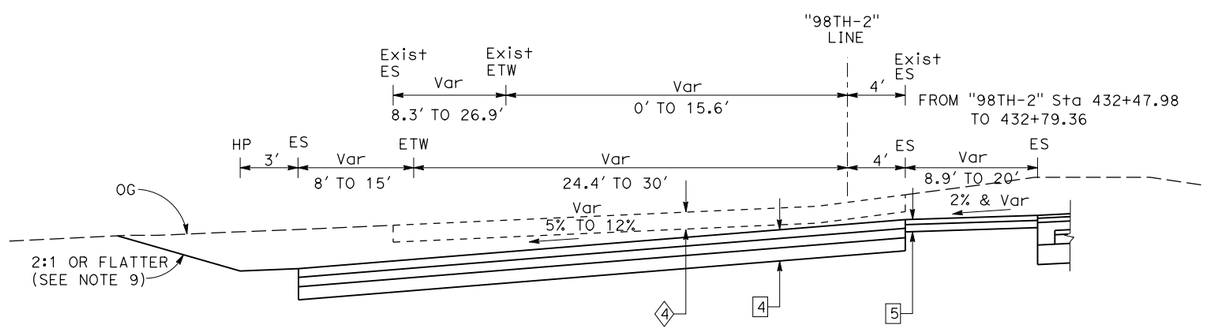
OAKLAND, CA 94612



SB 98TH Ave LOOP ON-RAMP
"98TH-2" 434+85.95 TO 438+04.20



SB 98TH Ave LOOP ON-RAMP
"98TH-2" 432+48.13 TO 434+85.95

TYPICAL CROSS SECTIONS

NO SCALE

X-13

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
S. JEYA	N. VARATHA RAJOO

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 18:05

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — Exp. 6/30/13 — CIVIL — STATE OF CALIFORNIA

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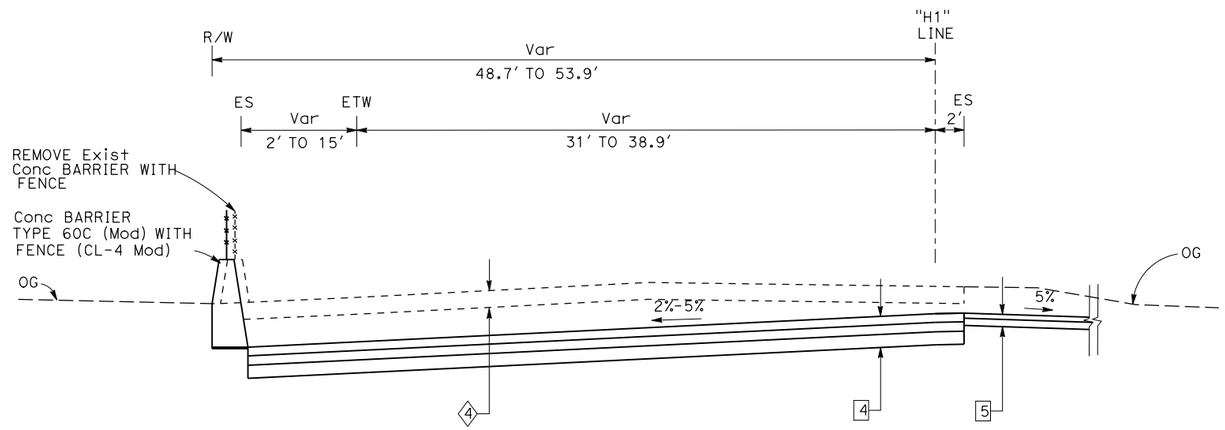
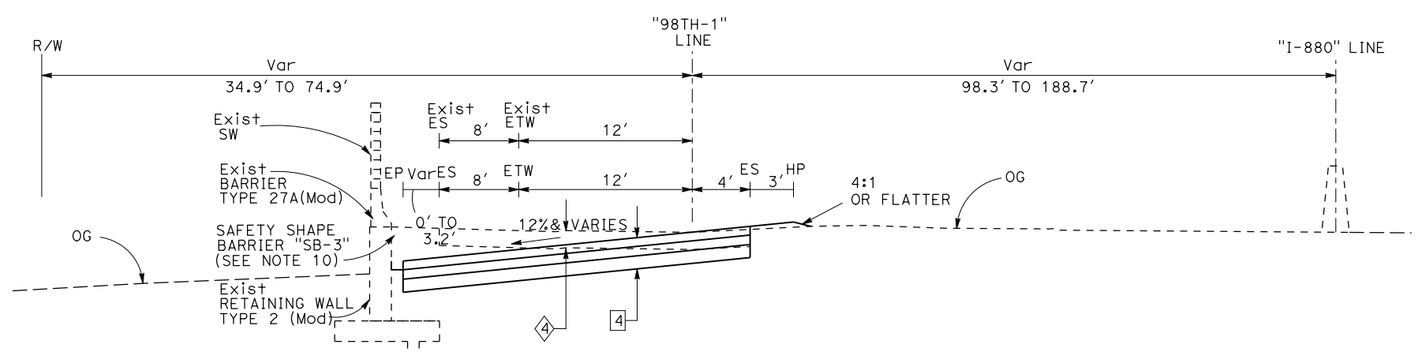
OAKLAND, CA 94612



SB HEGENBERGER ON-RAMP

"H1" 459+55.81 TO 460+74.47



SB 98TH Ave OFF-RAMP

"98TH-1" 434+70.61 TO 437+02.62

TYPICAL CROSS SECTIONS

NO SCALE

X-14

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHA RAJOO

REVISED BY — DATE REVISED

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 18:06

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	880	24.0/25.5		

REGISTERED CIVIL ENGINEER — DATE 2/16/12

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — BALA RAJAPPAN — No. C46802 — 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 SCANNED COPIES OF THIS PLAN SHEET.

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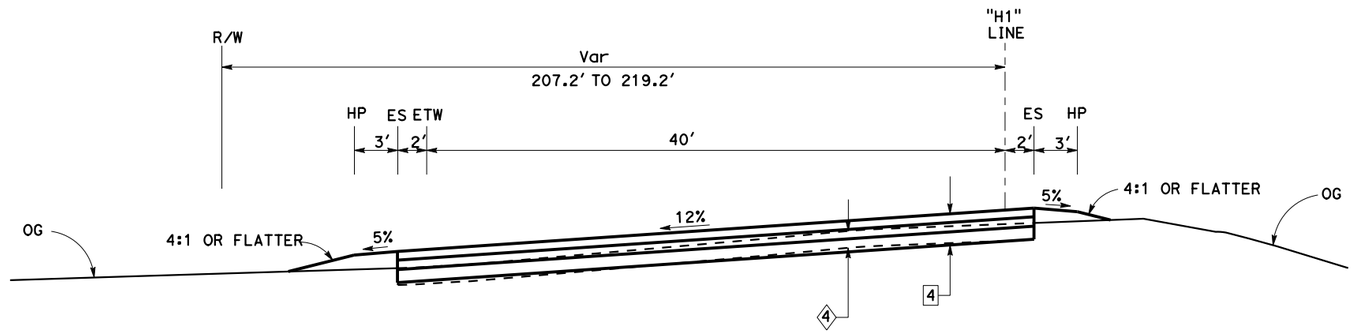
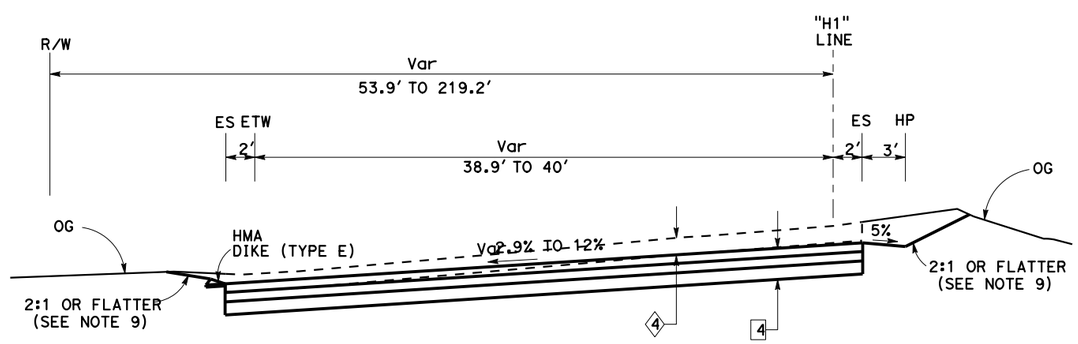
SAN JOSE, CA 95126

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



SB HEGENBERGER ON-RAMP
"H1" 462+44.23 TO 463+56.42



SB HEGENBERGER ON-RAMP
"H1" 460+74.47 TO 462+44.23

TYPICAL CROSS SECTIONS

NO SCALE

X-15

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET X-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: BALA RAJAPPAN

CALCULATED-DESIGNED BY: S. JEYA — CHECKED BY: N. VARATHA RAJOO

REVISED BY — DATE REVISED

LAST REVISION 2-16-12 — DATE PLOTTED => 12-FEB-2012 — TIME PLOTTED => 18:08

APPENDIX E

<u>RESPONSE TO COMMENTS OF 2/10/2012 by J. Moore & M. Momenzadeh</u>

(Comments Attached for Reference)

Comments: 1 & 2 on Special Provisions and Non-Standard Special Provisions (Pages 299 & 33). … the language should be corrected…

Response: The designer will address the comments on SSP & NSSP.

Comment: 3. Comments from Mr. Rifaat Nashed, Engineering Geologist, of the Office of Geotechnical Design-West.

Response: These comments have been delivered in the 1/20/12 correspondence and have been addressed (response attached in this appendix).

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. JERRY MA
Chief
Design Alameda I

Date: February 10, 2012

Attention: N. Gohil

File: 04-ALA-880, PM 22.5/25.5
04-3A9201
Geotechnical Design and
Materials Report, Plan, and
Special Provisions Review

From: JOHN C. MOORE
Transportation Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

MAHMOOD MOMENZADEH
Chief, Branch C
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: 100% PS&E Submittal - Geotechnical Design and Materials Report, Plan, and Special Provision Review for the Route I-880 SB HOV Lane Extension Project Between Marina Blvd. and Hegenburger Road Interchange, Alameda County, California, 04-ALA-880 22.5/25.5, EA 3A9201

Per your request we have reviewed the 100% PS&E Submittal, which includes the following: "Geotechnical Design & Materials Report for Route I-880 SB HOV Lane Extension Improvements Between Marina Blvd. and Hegenburger Road Interchange, Alameda County, California, 04-ALA-880 22.5/25.5 EA 3A920K", dated January 17, 2012, and prepared for Rajappan & Meyer Consulting Engineers, Inc. of San Jose, California, by Parikh Consultants, Inc. of Milpitas, California; Plans, Special Provisions; Non-standard Special Provisions, Engineer's Estimate 100% PS&E (Bid Items), "Response to General Comments, 95% Submittal, November 22, 2011", and "Response to Late Comments, 95% Submittal, November 22, 2011", dated January 23, 2012 and prepared by Rajappan & Meyer Consulting Engineers, Inc. of San Jose, California for the Alameda County Transportation Commission, Oakland, California.

We have the following comments:

1) Special Provisions – Page 299, Non-standard Special Provision – Temporary Retaining Wall, paragraph 4, second sentence currently reads as:

"It is Contractor's Engineer responsibility to interpretive data from this report for temporary retaining wall design."

The sentence should be written as follows:

"It is the responsibility of the Contractor's Engineer to interpret data from this report for temporary retaining wall design."

2) Non-Standard Special Provisions – Page 33, Non-standard Special Provision – Temporary Retaining Wall, paragraph 4, second sentence reads as:

It is Contractor's Engineer responsibility to interpretive data from this report for temporary retaining wall design.

The sentence should be written as follows:

It is the responsibility of the Contractor's Engineer to interpret data from this report for temporary retaining wall design.

3) The following comments regarding the Geotechnical Design & Materials Report were provided by Mr. Rifaat Nashed, Engineering Geologist, of the Office of Geotechnical Design – West:

Date	Comment By	Item No.	Drawing or Page No.	Review Comments	Design Responses
2/01/12	Office of Geotechnical Design- West Geotechnical Services. RNashed	1	**1.INTRODUCTION Page 8**	The paragraph "The purpose of this report.....scope of changed site conditions, if any", is repeated. Please remove.	
2/01/12	Office of Geotechnical Design- West Geotechnical Services. RNashed	2	**2. EXISTING FACILITIES AND PROPOSED IMPROVEMENTS Page 9**	To be consistent, please add the stationing and reference line of the beginning of the project (Hegenberger Road OC)	
2/01/12	Office of Geotechnical Design- West Geotechnical Services. R Nashed	3	**4.2.Topography and Drainage Page 11**	It should be noted that San Leandro Creek is one of the main drainage elements for the project area.	

Date	Comment By	Item No.	Drawing or Page No.	Review Comments	Design Responses
2/01/12	Office of Geotechnical Design- West Geotechnical Services. R Nashed	4	**4.4. Regional Geology and Seismicity** **Page 12**	In this section, it states that the potential for fault rupture is moderate to high, but under Item **7.4.2 Ground Rupture,** the potential for fault rupture is low, since no active fault intersects the project site. Please correct.	
2/01/12	Office of Geotechnical Design- West Geotechnical Services. R Nashed	5	**5.1 Drilling and Sampling - TABLE 1: BORING PROGRAM**	1- Please correct the boring depth for Borings No.: RW-32, R-33/RW-33, and OH-39. 2- Please correct the ground elevation for Borings No.: CPT-2, and RW-32.	
2/01/12	Office of Geotechnical Design- West Geotechnical Services. R Nashed	6	**7.3.1.3 Groundwater**	Please state the borings number where the shallowest level and the deepest level of the groundwater were encountered.	

If you have any questions, please contact me at (510) 622-8742 or Mahmood Momenzadeh at (510) 286-5732.

c: MMomenzadeh, TJPokrywka, Daily File, Route File, RNashed, GWilcox

JMoore/jm

<u>RESPONSE TO COMMENTS OF 2/8/2012 by L. Tachri on GDMR</u>

(Comments Attached for Reference)

I. Geotechnical Design and Materials Report

Comment: Page 13, Table 1. Insert column to show FG of proposed widening…

Response: Concur. An additional column has been inserted for Table 1 to show FG.

Comment: …Comments relate to "All Typical Cross Sections Sheets" regarding new Structural Sections No. 6 & 3...

Response: Concur. The comments regarding Structural Sections No. 6 & 3 have been incorporated in Section 9 (on Page 31) of the report.

Comment: Justification and backup for the proposed Structural Section No. 3.

Response: The pavement section for Structural Section No. 3 has been revised to include 0.10' HMA (O) and 0.15' RHMA-G per the comment. Verification of the section is attached with the response. Based on discussion with the designer, Section No. 3 will consist of 0.10' HMA (O) , 0.15' RHMA-G, 0.10' HMA (A) over 0.50' AB (Class 2). The area is between the ultimate outside shoulder and soundwall. No traffic is expected for the area. Nevertheless, pavement is needed to "fill the gap". The selection of the section is designer's choice and appears reasonable. Based on our evaluation, Section No. 3 is adequate for TI of 4.5 (for comparison and information sake).

Comment: Attach as-built data that reflect all original construction work and subsequent pavement rehabilitation, maintenance or widening work carried over the years.

Response: Concur. As-built plans are organized and attached in Appendix C of the report. The 2002 as-built plan shows the existing pavement section adjacent to the new widening.

Comment: Since there is no need for imported borrow per "Roadway Quantities" table on sheet Q-1, remove all imported-borrow-related language.

Response: Concur.

PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

Re Structural Section No. 3

PROJECT NAME: *Route 880*
PROJECT NO.: *2006-139-GDR*

Design Case: AC over AB

Design TI= ***4.5***
R_{BS}= ***20***
R_{AB}= 78

$GE_{AC+AB} = 0.0032*TI*(100-R_{BS}) =$ 1.15

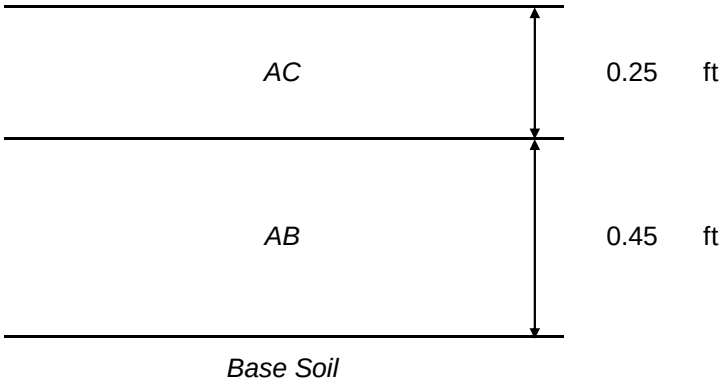
$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$ 0.32
=> GE'_{AC} = 0.52 (add 0.2 ft safety factor)
AC Thickness = 0.19 ft

=> AC Thickness = **0.25** ft (round up to the nearest 0.05 ft)
$G_{f,\,AC}$ = 2.67
GE_{AC} = 0.67

$GE_{AB} = GE_{AC+AB} - GE_{AC} =$ 0.48
AB thickness= 0.44 ft

=> AB Thickness= **0.45** ft (round up to the nearest 0.05 ft)
GE_{AB}= 0.50 $G_{f,\,AB}$=1.1

Design Section:



erification of Section 3 on -1 sheet
This is to verify the new Section #3 shown on X-1. The area is between soundwall and outside shoulder. No traffic is expected for this area. Pavement is needed to "fill the gap". The plan calls for 0.10' HMA(O), 0.15' RHMA-G & 0.10' HMA (A) over 0.50' AB. The upper 0.10' HMA(O) and 0.15' RHMA-G match the adjacent sections. The selection is designer's choice and appears reasonable. It is adequate for TI of 4.5 (for comparison and information sake).

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. TONY WONG
District Branch Chief
Design, Alameda I

Attention: N. Gohil

Date: February 8, 2012

File: 04-ALA-880 PM 24.0/25.5
EA 04-3A9221
Project No. 0412000340
SB HOV Lane Extension from
Davis St. to Hegenberger Rd.

From: LUIS TACURI, P.E.
Materials Design Engineer
Eng. Services I - Materials A

Subject: Review of GD&MR and 100% PS&E Submittal

Having reviewed the above-referenced documents for the southbound HOV lane extension on I-880 between Davis St. and Hegenberger Rd., below are our comments, which are either new or reiterations of those submitted previously to you via e-mails but that have not been addressed yet.

I. GEOTECHNICAL DESIGN AND MATERIALS REPORT (dated January 17, 2012)

- Page 13, Table 1: Insert a column to show the proposed (approximate) widening finished grade so that we can ascertain the depth of the groundwater in relation to the finished pavement grade and whether permeable material (blanket) and "pavement" underdrains are required at some locations.
- See comments below to project plans under subsection "All Typical Cross Sections Sheets". We recommend incorporating language within Section 9 of the GD&MR addressing our recommendations under said subsection.
- Include a justification and backup calculations for the proposed paved sliver widenings beyond the ultimate outside edge of shoulder, that is, for structural section No. 3, which according to the new X-1 sheet consists of 0.35' HMA (Type A) over 0.50' Class 2 AB.
- As-built data is missing, especially for existing structural sections adjacent to the new widenings. Perform a "thorough" As-Built plans research so that all pavement structural sections being shown as existing on the project plans reflect all original construction work and any subsequent pavement rehabilitation, maintenance, or widenings that had been carried out over the years.
- Based on the earthwork quantities shown on the current set of project plans (see "Roadway Quantities" table on sheet Q-1), there is no need for imported borrow; therefore, remove all imported-borrow-related language.

II. PLANS (dated January 2012)

1. Typical Cross Sections Sheets:

All Typical Cross Sections Sheets:

a) To ensure continuity of the new 0.10' HMA (O) surface layer across the mainline traffic lanes, median and outside shoulders:

- We recommend revising new structural section No. 6 to include a 0.10' HMA (O) surface layer ---to extend the 0.10' HMA (O) surface layer being placed already as part of new adjacent structural section No. 2. Thus, a revised structural section No. 6 would consist of 0.40' Cold Plane and 0.10' HMA (O) / 0.30' HMA (A) with GPI Paving Mat.
- We recommend extending the lateral limit of the above-mentioned revised structural section No. 6 to the bottom face of the existing median concrete barrier to remain in place. For your information, recently, a cold plane operation was carried out to the bottom face of an existing concrete barrier along westbound Ala I-80 PM 2.5/8.0 (see attached Title Sheet and Typical Cross Sections sheet X-4 for EA 04-1G3104).

b) To ensure continuity of the new mainline 0.10' HMA (O) surface layer and underlying 0.15' RHMA-G layer to the proposed paved sliver widenings beyond the ultimate outside edge of shoulders:

We recommend extending, within the lateral limits of the new structural section No. 3, the 0.10' HMA (O) and 0.15' RHMA-G layers of the adjoining new mainline structural sections No. 1 or No.7; otherwise, said mainline layers are being blocked by the new structural section No. 3, which according to the new X-1 sheet consists of 0.35' HMA (Type A) over 0.50' Class 2 AB.

Sheet X-1:
Design Designation block: Back on March 10, 2010, in our meeting with CT Design and upper management representatives, it was agreed that the proposed designs would be considered 20-year designs instead of 40-year designs. Therefore, delete the TI_{40} data and replaced it with the corresponding to a TI_{20} value.

2. Layout Sheets:

Sheet L-1:

- "Abbreviations" block: Be consistent. Add/specify the Class for the proposed SEG (refer to sheet X-1).
- Patterns corresponding to "Overlay" (structural section 2 and 6): Modify their descriptions to read "Cold Plane and Overlay...."

Sheet L-3:

- What is the significance of the dashed-box drawn around the UPRR tracks? Its meaning is not included in the "Legend" block on sheet L-1.
- What is the significance of the solid-box drawn south of the UPRR tracks? Its meaning is not included in the "Legend" block on sheet L-1.

Sheets L-5 and L-7:

Show the location and dimension the standard 23-foot offset between the mainline and ramp ETWs.

3. Construction Details Sheets:

Sheets C-9 thru C-13:

Once again, the locations where the excavated ADL is going to be placed should be shown on the plans.

4. Summary of Quantities Sheets:

Sheet Q-1, "Roadway Quantities" Table:

- "Geosynthetic Pavement Interlayer (Paving Mat) (N)" column heading: Delete the abbreviation (N) from the column heading. This is a separate bid item (refer to section 39-5.02, "Payment" of the most-current version of Amendments to the 2006 Standard Specifications). Besides, there is already a standard Bid Item in BEES (Item 393005).
- Insert a column for quantities of Bid Item 391007, "Paving Asphalt (Binder, Geosynthetic Pavement Interlayer)" –which is required to install the above-mentioned GPI (likewise, refer to the most-current version of Amendments to the 2006 Standard Specifications).
- Column headings should match Bid Item descriptions. Whereas on this table there is a "Portland Cement Concrete" column heading, in the Engineer's estimate you are using Bid Item 401000, "Concrete Pavement" for its compensation. Be consistent. Verify if this is the correct Bid Item for the proposed work shown on the plans.
- "Liquid Asphalt (Prime Coat)"quantities: Except for the quantity associated with the "HMA and PCC (Miscellaneous Area) from sheet Q-2", where are you going to use all of

those quantities shown on the rest of rows of this table? Keep in mind that prime coat should only be used on untreated bases prior to placement of first layer of HMA (refer to HDM).

- "Tack Coat" quantities: Verify them (refer to the most-current version of Amendments to the 2006 Standard Specifications) for guidance about where this material is required.

Sheet Q-2, "HMA and PCC (Miscellaneous Area)" Table:

- Again, column headings should match Bid Item descriptions. Whereas on this table there is a "Portland Cement Concrete" column heading, in the Engineer's estimate you are using Bid Item 401000, "Concrete Pavement" for its compensation. Be consistent. Verify if this is the correct Bid Item for the proposed work shown on the plans.
- Based on our comments above, update respective quantities.

II. SPECIAL PROVISIONS (100% PS&E Submittal, undated)

- SSP S8-M81: Delete original Para 1. Move what you have as Para 1 under Para 2 but change the Class to B instead of A --since according to the GD&MR (Page 28), the majority of the plasticity indexes are in the range of 15 to 20 and, therefore, per Para's 2 leading instructions, the filter fabric for edge drains shall be Class B.
- SSP 39-050, "Hot Mix Asphalt": Para 16 - edit it to specify that the aggregate for HMA Type A must comply with the ½-inch grading for layer thickness less than 0.20 foot and with the ¾-inch grading for layer thickness 0.20 foot and above.
- SSP 39-400, "Hot Mix Asphalt Aggregate Lime Treatment – Slurry Method": Delete Para 24 as our district does not treat aggregates for OGFC with lime.
- SSP 39-450, "Hot Mix Asphalt Aggregate Lime Treatment – Dry Lime Method": Delete Para 20 as our district does not treat aggregates for OGFC with lime.

IV. ENGINEER'S ESTIMATE (dated January 23, 2012)

- Bid Item No. 391007, "Paving Asphalt (Binder, Geosynthetic Pavement Interlayer)" is missing. Refer to our comments above to the Q- sheets.
- Bid Item No. 393005, "Geosynthetic Pavement Interlayer (Paving Mat)" is missing.
- Refer to all of our comments above and update Bid Items and quantities accordingly.

If you have questions, please contact me at 622-1755 or Tinu Mishra at 286-4841.

C: Daily File, Project File

Attachment:
Contract 04-1G3104 -- Title Sheet and Typical Cross Sections sheet X-4.

ACIM-080-1(112)E

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	80	2.5/8.0	1	63

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON

STATE HIGHWAY

IN ALAMEDA COUNTY

IN OAKLAND, EMERYVILLE, BERKELEY AND ALBANY

FROM PORT OF OAKLAND OVERCROSSING

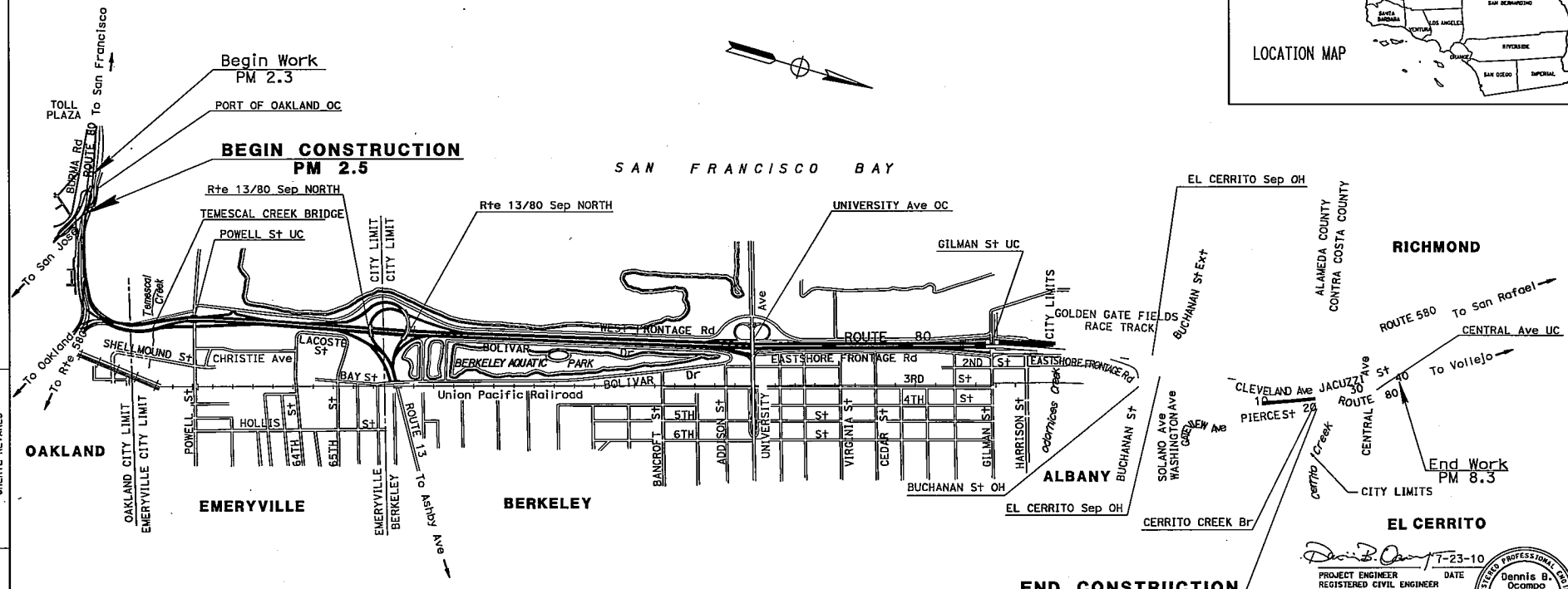
TO THE ALAMEDA/CONTRA COSTA COUNTY LINE

TO BE SUPPLEMENTED BY STANDARD PLANS DATED MAY 2006

INDEX OF PLANS

SHEET No.	DESCRIPTION
1	TITLE SHEET AND LOCATION MAP
2 - 7	TYPICAL CROSS SECTIONS
8 - 17	CONSTRUCTION DETAILS
18 - 32	CONSTRUCTION AREA SIGNS
33 - 44	PAVEMENT DELINEATION PLAN, DETAILS AND QUANTITIES
45 & 46	SUMMARY OF QUANTITIES
47 - 52	ELECTRICAL PLANS
53 - 63	REVISED AND NEW STANDARD PLANS

THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT IS INCLUDED IN THE NOTICE TO BIDDERS AND SPECIAL PROVISIONS BOOK.



THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

PROJECT MANAGER: CHERYL NEVARES

DESIGN ENGINEER: VINCE BONNER

7-23-10

PROJECT ENGINEER REGISTERED CIVIL ENGINEER — DATE

REGISTERED PROFESSIONAL ENGINEER — Dennis B. Ocampo — No. 53523 — Exp. 6-30-11 — CIVIL — STATE OF CALIFORNIA

July 27, 2010

PLANS APPROVAL DATE

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.

CONTRACT No.	04-1G3104
PROJECT ID	0400020028

LAST REVISION 07-26-10 — DATE PLOTTED => 17-NOV-2010 — TIME PLOTTED => 08:16

BORDER LAST REVISED 8/1/2008 | CALTRANS WEB SITE IS: HTTP//WWW.DOT.CA.GOV/ | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => s133721 DGN FILE => 41g310db001.dgn | CU 04271 | EA 1G3101

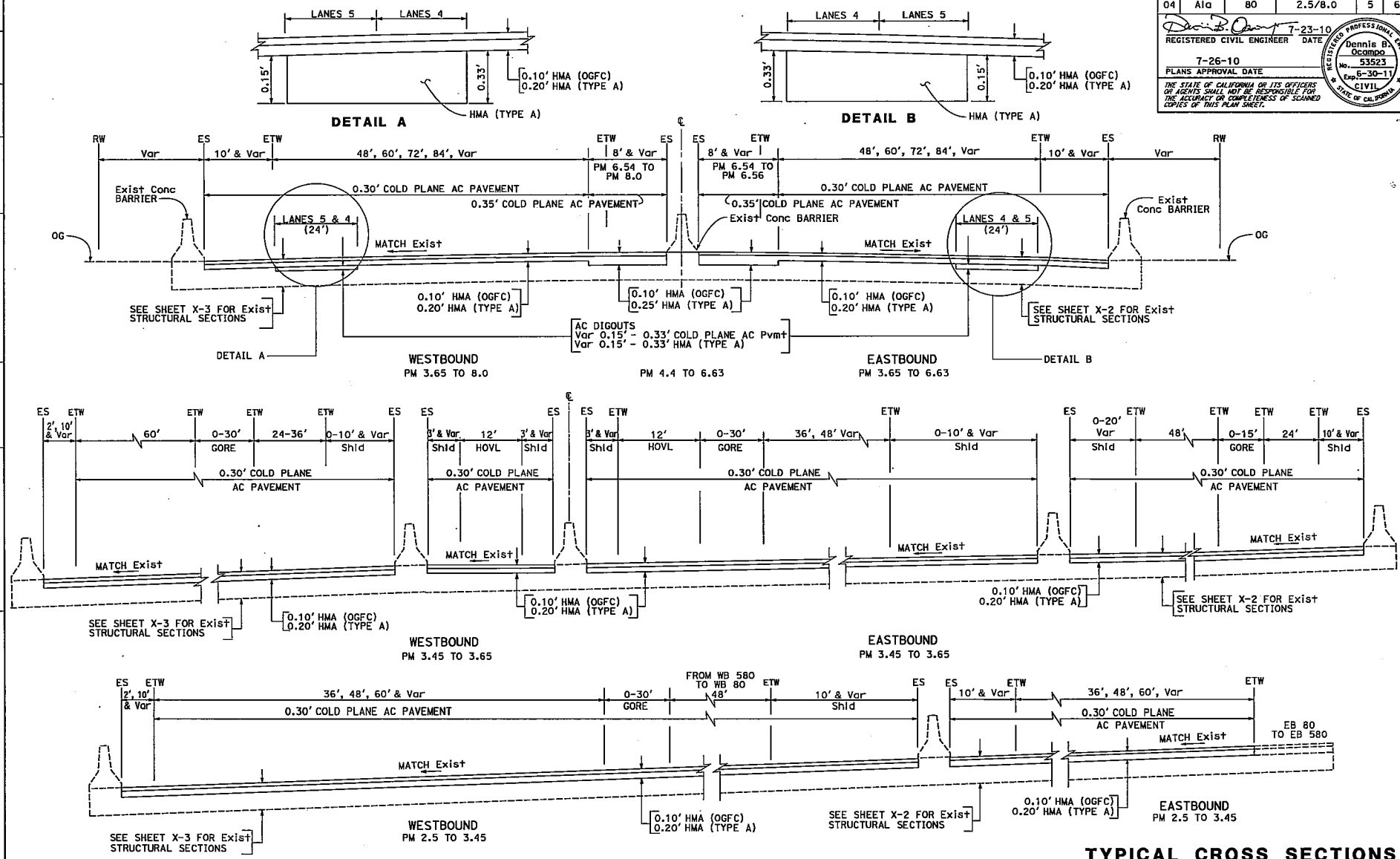
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	80	2.5/8.0	5	63

REGISTERED CIVIL ENGINEER 7-23-10 DATE

7-26-10
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Dennis B. Ocampo No. 53523 Exp. 6-30-11 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.



TYPICAL CROSS SECTIONS

NO SCALE

FOR NOTES AND ABBREVIATIONS, SEE SHEET X-1

X-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
DESIGN	VINCE BONNER	DENNIS OCAMPO	JAY FONG	DO	7/12/10

LAST REVISION 07-26-10 | DATE PLOTTED => 17-NOV-2010 | TIME PLOTTED => 08:17

BORDER LAST REVISED 4/11/2008 | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | USERNAME => s133721 | DGN FILE => 41g310ca004.dgn | CU 04271 | EA 1G3101

<u>RESPONSE TO COMMENTS OF 1/20/2012 by R. Nashed & G. Wilcox</u>

(Comments Attached for Reference)

Comment: 1. Introduction. Repeated sentence…

Response: The repeated sentence has been deleted.

Comment: 2. Existing Facilities and Proposed Improvements. Show stationing and reference line at the beginning of the project…

Response: Concur.

Comment: 3. Topography and Drainage. San Leandro Creek…one of the main drainage elements….

Response: Concur. We have added the statement in the text.

Comment: 4.4 Regional Geology. Fault rupture potential should be low.

Response: Concur. The text in Section 4.4 has been corrected.

Comment: 5.1 Drilling and Sampling. Table 1.. correct boring depth and ground elevation…

Response: Concur. Corrections have been made in Table 1 per the comment.

Comment: 7.3.1.3 Groundwater. State the borings number…the shallowest level and the deepest level …

Response: Concur. We have added the relevant borings number for the shallowest and the deepest level of the groundwater encountered.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. JERRY MA
District Branch Chief
Design Alameda I

Date: January 20, 2012

Attention: N. Gohil

File: 04-ALA-880 PM 23.8/25.5
04 – 3A9201
I-880 SB HOV Lane
Extension Project

From: RIFAAT NASHED RN
Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

GRANT WILCOX GW
Chief, Branch B
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject : Geotechnical Design and Material Report (GDMR) Review and Comments

These are additional comments in regards to the Geotechnical Design & Material Report, 95% PS&E – Geology and Seismicity Sections- which was provided by Rajappan & Meyer Consulting Engineers, Inc. of California and was submitted by Parikh Consultants, Inc. and dated November 2011. We have the following comments

1. INTRODUCTION

The paragraph " The purpose of this report.....scope of changed site conditions, if any." Is repeated. Please remove.

2. EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

To be consistent, please add the stationing and reference line of the beginning of the project (Hegenberger Road OC)

3. TOPOGRAPHY AND DRAINAGE

It should be noted that San Leandro Creek is one of the main drainage elements for the project area.

4.4 REGIONAL GEOLOGY

In this section, it states that the potential for fault rupture is moderate to high, but under Item **7.4.2 Ground Rupture,** the potential for fault rupture is low, since no active fault intersect the project site. Please correct.

5.1 DRILLING AND SAMPLING - TABLE 1: BORING PROGRAM

1- Please correct the boring depth for Borings No.: RW-32, R-33/RW-33, and OH-39.
2- Please correct the ground elevation for Borings No.: CPT-2, and RW-32.

7.3.1.3 GROUNDWATER

Please state the borings number where the shallowest level and the deepest level of the groundwater were encountered.

If you have any questions or need additional information, please call me at (510) 622-1773 or Grant Wilcox at (510) 286-4835.

c: TPokrywka, GWilcox, Project File, Daily File,

RNashed/mm

RESPONSE TO COMMENTS OF 1/3/12 (excerpted from email)

-----Original Message-----
From: Tony Wong [mailto:tony_wong@dot.ca.gov]
Sent: Tuesday, January 03, 2012 10:15 AM
To: William Devabalan; Gene Maryakhin; Keith Meyer
Cc: gsidhu@alamedactc.org; Val Ignacio
Subject: Fw: I-880 SB HOV Lane Extension GDMR Comments (EA 3A9221)

----- Forwarded by Tony Wong/D04/Caltrans/CAGov on 01/03/2012 10:14 AM-----

Leonardo Deleon/D04/Caltrans/CAGov To Del P Tabancay/D04/Caltrans/CAGov@DOT
01/03/2012 10:10 AM cc Tony Wong/D04/Caltrans/CAGov@DOT,
Nick Gohil/D04/Caltrans/CAGov@DOT,
Tinu Mishra/D04/Caltrans/CAGov@DOT,
Luis P Tacuri/D04/Caltrans/CAGov@DOT

Subject I-880 SB HOV Lane Extension GDMR Comments (EA 3A9221)

Leonardo Deleon
Engineering Services 1 - Materials A
Tel.510.622.5444

Del,

The following are our review comments to the Geotechnical Design & Materials Report (GDMR) submitted by Parikh Consultants, Inc. for the I-880 SB HOV Lane Extension Project (North Segment).

Comment: Section 8.5 Corrosion Investigation - Table 4 shows the summary of corrosion tests and a paragraph about the use of AltPipe computer program. This section or an appendix should incorporate the results of the AltPipe program. The GDMR should have recommendations for Alternative Pipe Culvert. e.g. Pipe thickness, service life, type of pipe material, etc.

Response: Analysis using AltPipe Program has been performed. AltPipe analysis results are attached in Appendix C. The results have been incorporated into the report and plans.

Comment: Section 9 Table 6: Summary of R-Value Test Results - Why are Boring Nos. R-3, R-6, R-9, R-12, R-13, R-16,etc., does not have R-Value results?

Response: The pavement subgrade consists of imported roadbed material that contains substantial amount of sand and gravel. A screening process was performed first. Some of the bulk samples did not have R-value tests done because they are similar or contain more sand and gravel that will yield higher R-values. We still list these sample locations in the table to show that we have verified the material along the alignment.

The project started in 2006 with Post Mile limits of 22.5/25.5. Subsequently, the project was made into two separate projects, i.e., 880 North Segment-PM 24.0/25.5 and 880 South Segment-PM 22.5/24.0. To avoid confusion, we have revised the table in Section 9 to show the summary of R-value tests relevant to the current limits (PM 24.0/25.5 for 880 North Segment).

Comment: Section 9 Design R-Value & Subgrade Enhancement Geotextile & Attenberg Limits- The recommended mainline stations to use the SEG, particularly Sta. 383+00 to Sta. 400+50 does not cover the low R-Value result on Sta 369+06. Revise the SEG station limits to include Sta 369+06.

Response: Please see the previous response regarding breaking the initial project (PM 22.5/25.5) into two projects (880 North Segment-PM 24.0/25.5 and 880 South Segment-PM 22.5/24.0). The current project, 880 North Segment-PM 24.0/25.5, starts at Sta. 385+00. SEG is also used for the low R-value area including Sta. 369+06, but it is presented in a separate GDMR for the 880 South Segment-PM 22.5/24.0).

Comment: Section 9 Use of OGFC - this paragraph should be revised. A separate paragraph for RHMA should be added. RHMA can be placed in this project since paving can be done during daytime as the work is done behind the k-rail.

Response: Concur. We have updated the section as commented regarding the use of HMA (O) and RHMA-G.

Comment: Section 9 Table 8 - Pavement Alternatives -Mainline Widening (TI = 16.5)
- The recommended flexible pavement options does not align with the layer of the existing ATPB. Revise these sections to match the existing ATPB layer while complying to the required gravel equivalent of the proposed pavement structure.

Response: The pavement section has been updated to match the as-built 0.10' OGFC & 0.15' RAC-G on top and 0.25' ATPB. The updated section has been provided to the designer.

Comment: Section 9 - There are typos on the Class of Aggregate Base (AB). Use only Class 2 AB and not Class 3.

Response: Will use Class 2 AB.

Comment: Section 11 Material Disposal - The statement that the "Disposal of ADLand other contaminated (if any) is beyond the scope of this project." is wrong. Any ADL found on the project site should be documented. Project specific disposal, staging, or borrow areas should be incorporated in the project report (DIB 85). Not only on ADL but also for any other surplus material.

Response: We have revised the language in the report. Additional information was provided by the designer and incorporated in Section 12.4 of the report.

Comment: Section 12.4 Hazardous Waste Considerations - It appears that ADL is present in the subgrade soil. The GDMR should have recommendations on where to place it (dispose) or if it can be reused, that is, if it is an "acceptable" backfill material in the project. (HDM 114.3)

Response: Per information provided by the designer, some of the ADL found on site will be reused for embankment construction. Limits where the ADL can be reused for embankment construction are shown on the project plan, namely Sheet Q-1. Details for ADL placement should be based on SSP 19-900, "Material Containing Hazardous Waste Concentrations of Aerially Deposited Lead". We have updated the report to reflect the reuse of ADL.

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

Title: I-880 Southbound HOV Lane Extension From North of Davis St to Hegenberger Rd.. 04-ALA-880-PM 23.8/25.5 04-3A9221				95% Submittal November 22 2011	Code: A – Will Comply B – Consultant to Evaluate C – Will Not Incorporate D – Local Agency to Evaluate (If no code is listed, only answer to question is provided.)			
Date	**Agency**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**			
11-27-2011	Luis Tacuri	1	X-1	New pavement structural sections adjacent to existing mainline RAC-G; To avoid a "bath tub section" that traps water beneath the surface of the existing traveled way --refer to Index 631.3 of HDM--, extend the existing RAC-G (now known as RHMA-G) under the new widenings. The new RHMA-G thickness and depth measured from the ultimate FG must match those of the existing.	A. The pavement section has been updated to address the concern and to match the as-built OGFC, RAC-G and ATPB layers. The section is: 0.10' HMA (O) 0.15' RHMA-G 0.65' HMA (A) 0.25' ATPB 0.65' LCB 1.35' AS (4)			
11-27-2011	Luis Tacuri	2	X-1	Adjust thicknesses of HMA-A to incorporate the RHMA-G layer.	See comment for item 1			
		3	X-1	New pavement structural sections adjacent to existing mainline ATPB: The new ATPB thickness and depth measured from the ultimate FG must match those of the existing.	See comment for item 1			
11-27-2011	Luis Tacuri	4	X-1	New pavement structural sections with OGFC as a top layer: To be consistent with the standard BEES item triggered by SSP 39-100, "Hot Mix asphalt Open Graded Friction Course," rename all occurrences of the proposed "OGFC" to read "HMA (OG)."	See comment for item 1			

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

Title: I-880 Southbound HOV Lane Extension From North of Davis St to Hegenberger Rd.. 04-ALA-880-PM 23.8/25.5 04-3A9221	95% Submittal November 22 2011	Code: A – Will Comply B – Consultant to Evaluate C – Will Not Incorporate D – Local Agency to Evaluate (If no code is listed, only answer to question is provided.)

Date	Agency	Item No.	Drawing or Page No.	Review Comments	Design Responses			
	Office of Geotechnical Design - West Geotechnical Services John. C. Moore	1	Geotechnical Design and Materials Report	In reference to Retaining Walls RW SB-l and RW SB-2, it is stated that due to right-of-way limitations that battered piles are not feasible where pile foundations are needed for both walls due to subsurface conditions; if this is the case, then should a lateral loaded analysis be performed for both walls? (See pages 24 & 25 of the report).	A. Parikh has performed lateral load analyses for the piles for Walls RW SB-1 and RW SB-2. The recommendations for the two walls have been included in the bridge Foundation Report for San Leandro Creek Bridge /OH (Br. No. 33-0100).			
	Office of Geotechnical Design - West Geotechnical Services John. C. Moore	2	Geotechnical Design and Materials Report	In reference to Section 8.5 Corrosion Investigation, please state, as defined by Caltrans Corrosion Guidelines, the conditions for a corrosive environment and whether each sample is corrosive or not	A. Parikh has updated the report to address the comment.			
	Office of Geotechnical Design - West Geotechnical Services John. C. Moore	3	Geotechnical Design and Materials Report	In reference to Section 8.6.2 Overhead Sign Structures; since the standard foundation for sign A is greater than 20-feet in depth, will a gassy/non-gassy evaluation be required?	A. Parikh has updated the report to address the comment. The site should be considered potentially gassy for constructing the 5-ft dia. sign foundations.			

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

Title: I-880 Southbound HOV Lane Extension From North of Davis St to Hegenberger Rd.. 04-ALA-880-PM 23.8/25.5 04-3A9221	95% Submittal November 22 2011	Code: A – Will Comply B – Consultant to Evaluate C – Will Not Incorporate D – Local Agency to Evaluate (If no code is listed, only answer to question is provided.)

Date	Agency	Item No.	Drawing or Page No.	Review Comments	Design Responses			
	Office of Geotechnical Design - West Geotechnical Services John. C. Moore	4	Geotechnical Design and Materials Report	Finally, due to the many "too-numerous-to-count" spelling, punctuation, and grammatical en-ors contained in this report, it is clear that the author of this report has not proofread their work. Although the content of the report, in general, appears to be sound, the way in which is presented is not. The author is encouraged to proofread their work and to have someone else proofread their work for formatting, spelling, punctuation, and grammatical errors. A professional organization such as Parikh Consultants, Inc. should not be issuing substandard products, such as this report, to their clients. A highlighted example is attached to this memo for reference.	A. Parikh and R&M will coordinate to make sure that final printout is not from a corrupted PDF file.			
	Office of Geotechnical Design - West Geotechnical Services John. C. Moore	5	Plans, 95% Submittal	From a geotechnical standpoint, we have no comment.	Noted			

I-880 SB HOV LANE PROJECT (Marina Blvd to Davis St)
PROJECT COMMENT REVIEW AND RESPONSE (95% Design SUBMITTAL)

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)			
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**	**Proposed Action**	**Incorporated**	**Agency Concurs**
8/3/2010	Luis Tacuri Materials Design	1	GD&MR	**Adequacy of using RHMA at this Location:** Will the required temperatures (atmospheric, surface, compaction, etc.) exist during the season(s) and times (traffic lane closures) the Contractor will be placing the RHMA? Have you checked the temperature historical data for this location? Should the use of RHMA be inappropriate due to temperature requirements, what are the options to be considered? This critical issue needs to be addressed in the GD&MR.	It is our understanding that the construction of RHMA can be done behind K-rail during daytime hours. Therefore, the use of RHMA is feasible.	A	A	

Relevant Pages of Comment & Response Form compiled from Route 880 South (PM 22.5/24.0) Design Segment

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)			
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**	**Proposed Action**	**Incorporated**	**Agency Concurs**
8/3/2010	Luis Tacuri Materials Design	2	GD&MR	**Structural Adequacy of Existing Shoulders:** Based on the proposed Stage Construction (SC-sheets), Traffic Handling (TH- sheets), and Pavement Delineation (PD- sheets), the existing median and outside shoulders will be subjected to traffic either temporarily (during stage construction) or permanently (a portion of the existing median shoulder will be converted to a portion ofthe new HOV lane): Within the limits of this project, has the structural adequacy of the existing shoulder pavement been analyzed to determine that its structural section is adequate to withstand the projected traffic? The existing shoulder structural sections might not be structurally adequate to support the projected traffic. Attach to the GD&MR the following calculations: •Specific/interim Traffic Index (TI), that is, based on the anticipated duration of the traffic shifting (1-, 2-, 3-year, etc), Our Traffic Forecasting Office will have to validate them. •Structural adequacy analysis of existing flexible shoulders to be converted either temporarily or permanently to a traffic lane. •Pavement design using the specific/interim TI.	It is planned to remove and reconstruct the outside shoulder. The structural adequacy of the existing median shoulder is discussed in a memo, prepared by WMH, dated September 23, 2010 and submitted to Caltrans. Following the coordination meeting with Materials Design Branch on 11/30/11, a rehabilitation strategy for the median shoulder was discussed and agreed upon. The revised GD&MR discusses the outcome of the studies and the plans have been updated to include the agreed upon rehab work.	A	A	

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)	Proposed Action	Incorporated	Agency Concurs
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**			
				Also, refer to our comments to the "Hwy 880 Median Deflection Testing and Analysis Report" --prepared by CHEC-- and submitted to you via e-mail on July 19, 2010, for additional considerations and comments directly related to the median pavement outstanding issue.	Please see response above			

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)			
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**	**Proposed Action**	**Incorporated**	**Agency Concurs**
8/3/2010	Luis Tacuri Materials Design	3	GD&MR	**Structural Pavement Sections of Temporary Facilities:** Submit pavement design backup calculations for all the proposed temporary facilities such as temporary ramps, detours, etc. Specific/interim Traffic Indexes (TIs) based on the anticipated duration of their use (1, 2, 3 years, etc.) need to be validated by CT D4 Traffic Forecasting Office. Incorporate said calculations in the corresponding Appendix.	The temporary pavement (temp ramps and local street widenings) will be designed for TI of 9 and using full depth HMA section. TI calculations have been accepted by the Office of Traffic.			
8/3/2010	Luis Tacuri Materials Design	4	GD&MR	**Subsections 8.5 and 8.6, Corrosion Investigation and Culverts:** Update corrosion analysis and culvert recommendations based on the AltPipe computer program (refer to HDM, 6th edition, last updated on November 2, 2009). Update Appendix C accordingly.	Will update the corrosion analysis and pipe design using AltPipe program.			
8/3/2010	Luis Tacuri Materials Design	5	GD&MR	**Section 9: Structural Pavement Sections** **As-Built Pavement Section** (last paragraph) Per your acknowledgment, the new HOV lane will encroach into the existing median shoulder; therefore, provide specific recommendations to make the median shoulder structurally adequate to withstand the permanent HOV traffic. Any uncertainties about the "existing median shoulder" and its capability to support traffic must be resolved.	We have reviewed the as-built data and compiled the information of the existing median shoulder sections in a memo (WMH, 9/23/10). The memo also discusses deflection test data and CHEC's reanalysis of the pavement recommendations. The findings will be included in the updated GDMR.	A	A	

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)	Proposed Action	Incorporated	Agency Concurs
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**			
8/3/2010	Luis Tacuri Materials Design	6	GD&MR	**Section 9: Structural Pavement Sections** **Findings and Recommendations** ATPB, Edge Drains & Underdrains (last sentence): Any uncertainties about any "existing underdrains" must be resolved and their recommendations must also be reflected in the project plans.	Will do. Please note that underdrains in the vicinity of Retaining Wall No. 1 are replaced by a back of wall drainage system as shown on the 95% PS&E plans.	A	A	
8/3/2010	Luis Tacuri Materials Design	7	GD&MR	**Section 9: Structural Section** **Findings and Recommendations** **Design R-value & Subgrade Enhancement** **Geotextile** (last sentence): Justify the use of SEG for the ramps.	The ramp area using SEG is only the ramp merging or diverging away from the mainline. The finish grades are similar and we like to improve the design R-value to 20.	A	A	
8/3/2010	Luis Tacuri Materials Design	8	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **Atterberg Limits** (last sentence): Justify the use of SEG for the ramps.	This is for ramps between mainline ("A" Line) Sta.365+00 and 383+00, near Davis Street/Rte 880 I.C. Similar to the previous comment, we like to improve the design R-value to 20.	A	A	
8/3/2010	Luis Tacuri Materials Design	9	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **Existing median shoulder:** See comments above.	Similar responses to Items 2 and 5.	A	A	

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)			
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**	**Proposed Action**	**Incorporated**	**Agency Concurs**
8/3/2010	Luis Tacuri Materials Design	10	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **40-year Flexible Pavement Design and Design Alternatives:** Back on March 10,2010, in our meeting with CT Design and upper management representatives, it was agreed that the proposed designs would be considered 20-year designs instead of 40-year designs and that all reports would reflect this change. Also, replace any proposed RHMA-O with Hot Mix Asphalt (Open Graded) PG 58-34 PM. See also comments below under "Appendices" and update structural sections shown in Tables 8 and 9 accordingly.	Will comply	A	A	
8/3/2010	Luis Tacuri Materials Design	11	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **Missing:** Reasons for proposed 0.10' Cold Plane AC Pavement / 0.10' RHMA-O (section No. 3 in the project plans). Also, see previous comment regarding replacing RHMA-O with HMA (OG).	The 0.10' RHMA-O is intended to match the as-built 0.10' OGAC (wearing surface) for surface drainage. Will use HMA (OG) instead per comment. The reason for the overlay is to clean up the roadway surface after all stage construction is complete.	A	A	
8/3/2010	Luis Tacuri Materials Design	12	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **Crossing City Streets Pavement Sections:** Submit backup calculations.Incorporate them in the corresponding Appendix.	Back-Up Calculations will be provided	A	A	

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)			
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**	**Proposed Action**	**Incorporated**	**Agency Concurs**
8/3/2010	Luis Tacuri Materials Design	13	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **Table 8** **Missing:** "Joint Trench" backfill/paving recommendations.	The open trench crossing of I-880 is no longer proposed. Instead utilities will be installed by jack and bore or similar construction method.	C	C	
8/3/2010	Luis Tacuri Materials Design	14	GD&MR	**Section 9: Structural Sections** **Findings and Recommendations** **Table 9** **Missing:** "Ramp Termini" recommendations. Even though ramp recommendations are included in the GD&MR, no rigid pavement is recommended for the exit ramp termini of the new/realigned flexible pavement ramps. A flexible section is proposed for the entire length of the new ramps. Per CT HDM Index 636.1(3): "At a minimum, rigid pavement termini should be used for exit ramp termini of flexible pavement ramps where a significant volume of trucks is anticipated (TI > 12.0)."	Not required since TI is not greater than 12. Ramp TI is 12 per HDM Table 613.5A for heavy ramp traffic and 20-year design life. Rigid pavement not practical due to complex stage construction	C	C	
8/3/2010	Luis Tacuri Materials Design	15	GD&MR	**Appendix C: Structural Pavement Design** **Mainline ATPB layer misalignment:** Based on the existing structural section information shown under "As-Built Pavement Sections" of the GD&MR, the new ATPB layer does not match with the existing ATPB layer to allow its continuity (i.e. whereas in the existing structural section the ATPB layer is at a depth of 1.00' below the FG, in the proposed structural sections its depth is assumed to be only at 0.90' below the FG). Verify this information and make corresponding corrections.	Design section has been revised to match up ATPB layers	A	A	

PROJECT COMMENT REVIEW AND RESPONSE MATRIX

I-880 Southbound HOV Lane Extension from Marina 04-Ala-880-PM 22.5/24.0 04-3A9211				95% Submittal Jun-10	Code: A – Will Comply B – Agency/Consultant to Evaluate C – No Action Required D – Response by Others (If no code is listed, only answer to question is provided.)			
Date	**Reviewer**	**Item No.**	**Drawing or Page No.**	**Review Comments**	**Design Responses**	**Proposed Action**	**Incorporated**	**Agency Concurs**
8/3/2010	Luis Tacuri Materials Design	16	GD&MR	**Appendix C: Structural Pavement Design** Include pavement design calculations supporting the proposed structural sections No. 1 and No. 5 (see project plans sheet X-1). Since you have removed the ATPB layer from the proposed mainline structural section No. 5, it seems that it is underdesigned (don't you need an equivalent HMA thickness in order to provide the required GE_{total}?). Consider replacing the 0.25' ATPB --you have removed-- with 0.25' HMA-A.	Will include Section No. 5 in revised GDMR. Concur with the comment of replacing with 0.25' HMA-A.	A	A	
8/3/2010	Luis Tacuri Materials Design	17	GD&MR	**Appendix C: Structural Pavement Design** Usually we don't recommend any open graded wearing surface course for the ramps. Remove the proposed OGFC from the ramps' backup calculations.	Will comply	A	A	
8/3/2010	Luis Tacuri Materials Design	18	GD&MR	**Appendix C: Structural Pavement Design** Missing: Pavement design backup calculations for the proposed structural sections for Marina Blvd. and Davis St.	Back-Up Calculations will be provided	A	A	
8/3/2010	Luis Tacuri Materials Design	19	GD&MR	**Appendix C: Structural Pavement Design** Replace the "Culvert4 Analysis and Report" with the corresponding AltPipe.	ALTPIPE calculations will be provided	A	A	
8/3/2010	Luis Tacuri Materials Design	20	GD&MR	**Appendix C: Structural Pavement Design** Incorporate a copy ofthe updated/revised "Hwy 880 Median Deflection Testing and Analysis Report" -- prepared by CHEC.	Will comply. WMH memo dated 9/23/10 will also be included	A	A	
8/3/2010	Luis Tacuri Materials Design	21	95% Plans	Update project plans based on recommendations to convert the existing median shoulders into portions of the new HOV lane. Refer to comments above.	Will comply	A	A	

DESIGN COMMENT REVIEW AND RESPONSE

Project Title: I-880 Southbound HOV Lane Extension	Submittal: Geotechnical Design & Materials Report	Location: San Leandro/ Oakland
By: Rajappan & Meyer Consulting Engineers, Inc. / Parikh Consultants Inc.	Date of Response: December 11, 2008	CODE: A-Will Comply; B-Consultant to Evaluate; C-Will Not Incorporate; D-CITY to Evaluate

Comment By	Item No.	Drawing/ Page No.	Review Comment	Design Response
Luis Tacuri	1	Section 9 & Appendix C	• Since no median pavement work is shown in the Typical Cross Sections, it can be inferred that it has been assumed – probably without any supporting study, documentation, deflection study, or pavement coring – that the existing median pavement structural section is structurally adequate to withstand the projected traffic loading and be converted to portions of the new HOV lane. Only mainline restriping to accommodate the new HOV lane is shown. **Deflection studies must be performed to determine the structural adequacy of an in-place shoulder to be converted to portions of a traffic lane. Should the existing median shoulder structural section be inadequate, it would have to be replaced.** • For your information and consideration, the as-built plans corresponding to contract EA 04-0C7024 – accepted in November 14, 2002 – show that the existing mainline inside shoulder, traffic lanes No. 1,2,3 and 4, auxiliary lanes, and outside shoulder have different pavement structural sections. Verify that said data is correct. Do a thorough as-built-plan research for mainline, ramps, and streets. Field verification can be performed by coring.	The prime designer (R&M) will have to discuss with ACCMA. The mainline pavement design and deflection testing are not included in current scope. Will double-check the as-built plans for as-built pavement sections. We already notice different sections on the "inside" and "outside" lanes, most likely due to widening & overlays through the years.
	2	Section 9 & Appendix C	Revise mainline and ramps' typical Crosss Section to depict accurately the existing pavement structural sections – **before and after the** aforementioned contract was completed. The existing 0.10' OGAC/0.15' RAC-G mainline overlay placed under said contract is not shown in the corresponding typicals.	The prime designer (R&M) will revise the typical cross sections.

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Comment By	Item No.	Drawing/ Page No.	Review Comment	Design Response
	3	Section 9 & Appendix C	• No supporting documentation, studies, calculations, etc. are included or provided to support the **TI** = 16 used for the mainline, and the **TI** = 12 used for the Interchange/ramps. **Provide traffic data and the TI calculations for each type of facility, that is, for the HOV lane, regular traffic lanes, auxiliary lane (if any is proposed), outside shoulder, ramps, and streets.** Also provide current, 20-year, and 40-year AADTs. • Request that the District office of Traffic Forecasting reviews and validates the traffic data and TI calculations. • Consider designing the ramps for heavy traffic (using a minimum 40-year TI = 14, per HDM Table 613.5A). • Also, keep in mind that per HDM Index 636.1(3) rigid pavement should be used for exit ramp termini of flexible pavement ramps when the TI is greater than 12.0. Minimum length guidelines for the rigid pavement ramp termini are spelled out in Index 626.1(3).	The TI values were provided by the designer. The prime designer (R&M) will address the comment and provide supporting documents. The prime designer (R&M) will make decision if the ramp should be designed for TI = 14 and consider rigid pavement section for exit ramp termini if TI>12.
	4	Section 9 & Appendix C	• Design factors such as Traffic Index and R–value need to be determined for each type of facility: mainline regular lanes, HOV lane, truck lane, auxiliary lane, shoulder, street, ramp, etc. • Per HDM Index 633.0(1)(c). **for TIs greater than 15, a rigid or composite pavement should be used. Use the catalog in HDM Index 623.1 to engineer rigid pavement alternatives for each type of facility.** Take into account all the requirements and the considerations spelled out in HDM Chapter 620, "Rigid Pavement."	We understand that the general guideline is to use rigid pavement when TI is over 15 (HDM 633.1). For the project, the as-built section contain ATPB layer, and the design has to continue the ATPB layer and connect to new edge drain on the outside. We cannot "dam/block" the ATPB layer in the travel lane. We cannot "sandwich" the ATPB in-between to layers of JPCP, but it is allowed to "sandwich" the ATPB in HMA layers. To use rigid pavement, there could be some connection details of the as-built ATPB and new ATPB. The JPCP thickness may have to be sacrificed/reduced at the edge within the travel lane, which is not desirable.

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	5	Section 9 & Appendix C	**Make sure that any proposed 40-year flexible structural section is designed according to HDM Index 633.1(3), "Modifications for Pavement Design Life greater than 20 years." Implement all the "enhancements" spelled out in said Index.**	Will looked at HDM 633.1 (3) for the enhancements. The designer selects multiple-layer flexible section (using RHMA-O, RHMA-G, and LCB) to match "in kind".
	6	Section 9 & Appendix C	**Perform and document Life Cycle Cost Analysis (LCAA) – for the mainline, ramps and streets – to compare life – cycle cost for different pavement types (rigid, flexible, and composite viable/buildable alternatives), different viable/buildable widening/rehabilitation strategies, and different pavement design lives (20 vs. 40 years). The designs with the lowest life–cycle cost have to be implemented. Submit the LCCAs, along with all pertinent supporting documentation, for our review.**	The prime designer (R&M) will have to perform a Life Cycle Cost analysis (LCCA) and determine TI for 20 and 40 years. It is our understanding that the design life was fixed to 40 years by Caltrans for the project. If required, we will provide different pavement types for cost analysis.
	7	Section 9 & Appendix C	• Should it be proven by the LCCA that a flexible structural section has the lowest-life cycle cost, you will need to extend the existing mainline 0.10'OAGC/0.15' RAC-G layers over the new widenings. Interrupting the RAC-G layer could cause that a "bathtub" section forms under the mainline surface – water can trap beneath the existing surface if it is not allowed to drain across the new widenings and can cause detrimental effect to the structural integrity of the pavement. To prevent this effect, RHMA-G (formerly known as RAC-G) should be placed over the whole cross section of the road (traveled way and shoulders). • **The proposed 40-year flexible design will be submitted to Caltrans HQ for their review and approval.** Provide all supporting documentation to submit a request for HQ approval.	We are using 0.10' RHMA-O and 0.15' RHMA-G as allowed by HDM (Table 633.1) for replacing HMA-A. The pavement design calculation is attached.

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	8	Section 9 & Appendix C	Per HDM Index 612.3, when widening a roadway, the existing pavement should be rehabilitated and brought up to the same life expectancy as the new widening portion. **Provide backup calculations supporting that the proposed 0.10' Cold Plane/0.10' OGFC over the existing mainline will meet the new widenings life expectancy.**	Per the comment, we have reviewed the as-built typical cross sections (Contract 04-0C7024) to evaluate the adequacy of the existing median/inside shoulder pavement sections for the project design life with TI = 13. For Davis St to Hegenberger Rd, the as-built sections consist of 30 mm OGAC & 45 mm RAC-G (2002 construction) over 260 mm AC, 150 mm CTB & 375 mm AS (Pre-2002). For Washington Ave – Marina Blvd- Davis St segment, the as-built sections consist of 30 mm OGAC & 45 mm RAC-G (2002 construction) over 30 mm OGAC, Var. 60-150 mm AC, 200 mm PCC, 100 mm CTB & 400 mm AB. We neglected the OGAC layer (wearing surface and no structural value) and evaluated the gravel equivalent for the anticipated design life of TI = 13. It appears that the existing median/inside shoulder pavement sections are adequate for the projected design life. The calculation is attached.
	9	Section 9 & Appendix C	Missing: • Minimum and maximum width dimensions of proposed outside widenings in all typical cross sections. • Existing median ETW in some sections. • Lateral clearance dimension from the existing median ETWs to the face of the existing median barrier. • Typical Cross Sections for approach/departure pavement to any existing or new structures (Marina Blvd, Davis St, etc.). • Typical Cross Sections for ramp termini.	The prime designer (R&M) will have to revise the typical sections.

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	10	Section 9 & Appendix C	Any new pavement construction, reconstruction, widening, lane replacement or rehabilitation has to be engineered using the standards and the guidance spelled out in Chapters 600 thru 670 of the most current Caltrans Highway Design Manual (HDM), that is, the 6th edition last revised on July 1, 2008. According to said manual, following are some of the principal factors to be considered in designing pavement structures: • The need for temporary pavement and detours should also be considered. Should they be warranted, they should be engineered – using the standards and procedures for new construction – for the anticipated traffic loading during the construction period. Provide structural sections for temporary pavement and detours – if any is anticipated. • Shoulder structural section should be designed as the adjacent traveled way – especially when the tracking width lines encroach onto paved shoulder. • The median pavement structure should be equivalent to the adjacent lanes when the median width is 14 feet or less. • Rigid or composite pavements should not be specified in areas with expansive soils (PI > 12) unless the pavement has been adequately treated to address soil expansion. Submit PI data. • Subgrade Enhancement Geotextile (SEG) is required for poor or weak soils (R-value < 20). • Rubberized hot Mix Asphalt (RHMA) must be considered as an alternative when flexible pavement is considered and there is no justified reason that RHMA is not viable for the location. If RHMA is found to be inappropriate it shall be documented in the report. • Deviations from **pavement-related Mandatory Standards** need to be documented and approved by the Chief, Office of pavement Design.	We have reviewed the latest Caltrans Highway Design Manual (Ch. 600-670), last revised on July 1, 2008 and modified the design. According to HDM 614.5, the use of SEG on weak subgrade can raise the effective R-value to 20. Based on the laboratory R-value test data obtained (Table 7), majority of lab data (12 out of 14) show R-value greater than 20; the only two tests show R-value of 14 & 16. Therefore, with the use of SEG, we recommend that the design R-value be raised to 20. The recommended R-value for design is 20. According to Caltrans Subgrade Enhancement Geotextiles Guide (April 28, 2009), it is recommended that the requirements for SEG conform to Stabilization Application (STAB), Class B2 of the guide. Based on the R-value test data and boring information, it is recommended that SEG be applied to the following segments of the mainline: (1) from Sta. 383+00 to Sta. 400+50 (south end of San Leandro Creek Bridge), and (2) from Sta. 447+00 to north end of project alignment. SEG is also recommended for the ramps. Plasticity Index (PI) data are presented in Appendix B of the report. Glancing through the data points at shallow depths (2 to 5 ft depths, relevant to pavement design), we found that majority of the PI are in the range of 15 to 20. The PI data per se, however, should not be construed to imply significant expansive clay condition for pavement design. The Atterberg Limits tests were performed in accordance with ASTM D4318, and the specimen is processed to remove any material retained on No. 40 sieve. Therefore, the effect of gravel and sand (coarser than No. 40 sieve) only manifests

DESIGN COMMENT REVIEW AND RESPONSE

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Comment By	Item No.	Drawing/ Page No.	Review Comment	Design Response
			• When feasible, consider engineering new widenings with structural sections similar to the adjacent ones in order to provide continuity of existing pavement and ensure consistency in maintenance operations.	in the R-value tests. For pure "clays" with such PI's and no presence of sand/gravel, the R-values would have been much lower, probably similar to that shown in HDM 623.1A (7/1/08). Majority portion of the Route 880 widening subgrade soils contain substantial amount of sand and gravel (imported material for roadway prism construction through the years), and therefore many R-values tested are over 20. Some segments of the subgrade soil tend to be more clayey (with less granular material) that showed R-values lower than 20. Per current HDM guidelines, the material with R-value less than 20 is still considered relatively poor and weak. Therefore, a layer of SEG for separation and stabilization is recommended for these segments (Sta. 383+00 to 400+50, north of Sta. 447+00, and ramps). The designer selects multiple-layer flexible sections to match "in-kind".
	11	Section 9 & Appendix C	Unless I overlooked it, the potential for differential settlements (between existing pavement and new widenings or new pavements) has not been addressed in the report.	Majority of the widening is in cut and near OG. The only fill area is near the San Leandro Creek where retaining walls are planned and wedge fill on existing sloping embankment (roadway prism). Based on the boring data, we do not expect significant different settlements between existing pavement and new widening.
	12	Section 9 & Appendix C	**Revise the report substantiating any proposed pavement structural section or rehabilitation strategies. Include deflection studies, rigid pavement alternatives, and LCCAs.**	Will revise as appropriate.
	13	Section 13.2	**Standard Specifications:** Language shall be consistent with the most – current specifications, that is, those included in the "Amendments to the Standard Specifications dated May 2006" (last revised/issued on December 5, 2008). Entire Section 90, "Portland Cement Concrete" was replaced on this date.	Will revise the language to indicate the there are most current specifications amendments (December 5, 2008) available in addition to May 2006 standard specifications.

DESIGN COMMENT REVIEW AND RESPONSE

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Comment By	Item No.	Drawing/ Page No.	Review Comment	Design Response
	14	Section 13.2	**[Standard] Special Provisions (SSPs):** Language shall be consistent with the most -current provisions, unless deviations from the SSPs are proposed, in which case HQ-approved NSSPs shall be submitted. The last update to some of the SSPs was issued on December 5, 2008. Include up-to-date SSPs for all pavement - related items to be used.	Will revise the language to indicate that there are most current standard special provisions (December 5, 2008) available.

LIMITED SITE INVESTIGATION REPORT

ROUTE 880 SOUTHBOUND IMPROVEMENTS PROJECT OAKLAND/SAN LEANDRO, CALIFORNIA

PREPARED FOR:
RAJAPPAN & MEYER CONSULTING ENGINEERS, INC.
1038 LEIGH AVENUE, SUITE 100
SAN JOSE, CALIFORNIA

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA

GEOCON

GEOCON PROJECT NO. E8449-06-01

DECEMBER 2008

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. E8449-06-01
December 15, 2008

Bala Rajappan
Rajappan & Meyer Consulting Engineers, Inc.
1038 Leigh Avenue, Suite 100
San Jose, California 95126

Subject: LIMITED SITE INVESTIGATION REPORT
ROUTE I-880 SOUTHBOUND IMPROVEMENTS
HEGENBERGER ROAD TO SOUTH OF MARINA BOULEVARD
ALAMEDA COUNTY, CALIFORNIA

Dear Mr. Rajappan:

Geocon has performed environmental engineering services at the subject site in general accordance with the scope of work outlined in our Revised Final workplan dated October 23, 2008. The subject site includes the southbound shoulder, and three overcorssings within the project limits of the Route I-880 Southbound Improvements Project in Oakland and San Leandro, Alameda County, California.

The accompanying report summarizes the services performed including limited soil sample collection from soil borings advanced using hand-auger and direct-push drilling equipment, and laboratory testing.

The contents of this report reflect the views of Geocon Consultants, Inc., who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

If there are any questions concerning the contents of this report, or if Geocon may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

PROFESSIONAL GEOLOGIST
RICHARD W. DAY
No. 5479
Exp. 09-30-13
STATE OF CALIFORNIA

Richard Day, CEG, CHG
Regional Manager

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LIMITED SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This *Limited Site Investigation Report* was prepared for the Route I-880 Southbound Improvements Project in Oakland and San Leandro, Alameda County, California. The Route I-880 Southbound Improvements Project limits extend from the Hegenberger Road interchange to south of the Marina Boulevard interchange and consists of an approximately three mile roadway segment.

This report documents the limited site investigation for metals, petroleum hydrocarbons, and volatile organic compounds (VOCs) in shallow soil and groundwater within the limits of the Route I-880 Southbound Improvements Project, as depicted on the Vicinity Map, Figure 1. Soil samples were collected along the southbound shoulders and at three interchanges within the project boundaries. The soil boring locations advanced during the site investigation within the project area are depicted on the Site Plans, Figures 2a through 2f.

1.1 Purpose

The purpose of the proposed scope of services was to evaluate whether impacts due to metals, including aerially deposited lead (ADL), petroleum hydrocarbon compounds, including benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl-tert-butyl ether (MTBE), exist in the surface and near surface soil at the Site, associated with historical automobile emissions from the use of leaded gasoline or historical agricultural activities. Grab-groundwater samples were also collected at locations where groundwater may be encountered during proposed project construction activities. Grab-groundwater samples were analyzed for metals, total petroleum hydrocarbons (TPH), and VOCs, including BTEX and MTBE.

The information obtained from this investigation will be used by the Client to coordinate interchange project activities, evaluate soil reuse and soil/groundwater disposal options, and for health, safety, and waste management purposes.

In addition, we conducted an asbestos containing materials/lead containing paint (ACM/LCP) survey of the three bridge structures located within the project boundaries, which is presented under separate cover.

1.2 Proposed Improvements

The I-880 Southbound Improvement Project is proposed to include the following:

- Construction of a new HOV lane between Hegenberger Road and south of Marina Boulevard;

- Widening of SB I-880 bridge over UPRR right-of-way (ROW) crossing;
- Construction of retaining walls north and south of UPRR bridge;
- Construction of soundwalls between Davis Street and 98th Avenue interchanges;
- Replacement of Davis Street bridge O/C
- Replacement of Marina Boulevard bridge O/C; and
- Construction of a retaining wall beneath Williams Street O/C;

The site investigation was performed on the southbound shoulders and three overcrossings (O/Cs) within the project limits, which extend from the I-880/Hegenberger Road interchange south to the I-880/Marina Boulevard interchange, consisting of approximately three miles. The site location is depicted on the Vicinity Map, Figure 1. A Site Plan, presented as Figures 2a through 2f, depicts proposed project improvement areas and the boring locations.

Soil borings were located along the southbound shoulder and at the interchanges of I-880 with 98th Avenue, Davis Street, and Marina Boulevard. ADL soil samples were collected from three depths at each boring for the purpose of evaluating potential vertical impacts of lead in soil and 20% of the soil samples were analyzed for CAM17 Metals. We advanced soil borings in the vicinity of proposed retaining walls to a depth of five feet using direct-push drilling methods. One soil boring at each of the retaining walls was further advanced to attempt to collect a grab-groundwater and/or saturated soil sample. Additionally, deeper soil borings were advanced in the vicinity of three overcrossing structures to attempt to collect grab-groundwater and/or saturated soil samples.

2.0 BACKGROUND

2.1 Previous Initial Site Assessment

Parikh Consultants, Inc. (Parikh) performed a Phase I Initial Site Assessment (ISA), dated November 30, 2006, which presented the following conclusions and recommendations:

- It is highly likely that the surface soils along I-880 are affected by deposition of aerial lead. Therefore it is recommended that surface samples of soil be collected and analyzed for total lead.
- There are existing structures (including bridges) within the proposed roadway improvements that will be either replaced or widened. Due to the age of these structures there is a potential for presence of ACM and lead based paint. Surveys for ACM and lead based paint should be conducted by a certified inspector.
- Soils below the railroad tracks may be impacted from historical operations with heavy metals due to possible presence of slag ballast, total petroleum hydrocarbons (TPH) as diesel and motor oil (TPHd/mo), polynuclear aromatic hydrocarbons (PAHs). It is

therefore recommended that the soils in the vicinity of the tracks be tested for these constituents. Prior to testing a workplan should be prepared detailing testing locations and analytical methods; testing locations should be similar to any proposed track realignment or soil excavation locations, so potentially excavated soils could be characterized.

The site investigation presented in this report was conducted to evaluate the items described above.

2.2 Aerially Deposited Lead

Ongoing testing by Caltrans throughout the State has indicated that ADL exists along major freeway routes due to emissions from vehicles powered by leaded gasoline. The ADL is generally limited to the upper two feet of soil material within the unpaved shoulder and median areas.

2.3 Hazardous Waste Determination Criteria

Regulatory criteria to classify a waste as California hazardous for handling and disposal purposes are contained in the CCR, Title 22, Division 4.5, Chapter 11, Article 3, §66261.24. Criteria to classify a waste as Resource, Conservation, and Recovery Act (RCRA) hazardous are contained in Chapter 40 of the Code of Federal Regulations (40 CFR), Section 261.

For waste containing metals, the waste is classified as California hazardous when: 1) the total metal content exceeds the respective Total Threshold Limit Concentration (TTLC); or 2) the soluble metal content exceeds the respective Soluble Threshold Limit Concentration (STLC) based on the standard Waste Extraction Test (WET). A waste has the potential of exceeding the STLC when the waste's total metal content is greater than or equal to ten times the respective STLC value since the WET uses a 1:10 dilution ratio. Hence, when a total metal is detected at a concentration greater than or equal to ten times the respective STLC, and assuming that 100 percent of the total metals are soluble, soluble metal analysis is required. A material is classified as RCRA hazardous, or Federal hazardous, when the soluble metal content exceeds the Federal regulatory level based on the Toxicity Characteristic Leaching Procedure (TCLP).

The above regulatory criteria are based on chemical concentrations. Wastes may also be classified as hazardous based on other criteria such as ignitability and corrosivity; however, for the purposes of this investigation, toxicity (i.e., lead concentrations) is the primary factor considered for waste classification since waste generated during the construction activities would not likely warrant testing for ignitability or other criteria. Waste that is classified as either California hazardous or RCRA hazardous requires management as a hazardous waste.

The Department of Toxic Substances Control (DTSC) regulates and interprets hazardous waste laws in California. The DTSC generally considers excavated or transported materials that exhibit "hazardous waste" characteristics to be a "waste" requiring proper management, treatment and

disposal. Soil that contains lead above hazardous waste thresholds and is left in-place would not be necessarily classified by DTSC as a "waste." The DTSC has provided site-specific determinations that "movement of wastes within an area of contamination does not constitute "land disposal" and, thus, does not trigger hazardous waste disposal requirements. Therefore, lead-impacted soil that is scarified in-place, moisture-conditioned, and re-compacted during landscaping improvement activities might not be considered a "waste;" DTSC should be consulted to confirm waste classification. It is noted that in addition to DTSC regulations, health and safety requirements and other local agency requirements may also apply to the handling and disposal of lead-impacted soil. Waste that is classified as either "California hazardous" or "RCRA hazardous," requires management as a hazardous waste and disposal at an appropriately permitted disposal facility.

2.4 DTSC Variance

The DTSC issued a variance on September 22, 2000 for Caltrans District 4 regarding the disposition of ADL-impacted soils within Caltrans projects. Review of the District 4 Variance, as modified by DTSC on September 12, 2003, and June 17, 2008, indicates the following conditions regarding reuse and management of ADL-impacted soil as fill material for construction and maintenance operations in Caltrans right-of-way.

Category 1 (Caltrans Type Y-1):

Soil exhibiting soluble lead concentrations less than or equal to 0.5 milligrams per liter (mg/l) [based on a modified waste extraction test using deionized water as the extractant (WET-DI)] and total lead concentrations of 1,411 mg/kg or less may be used as fill provided that the lead-impacted soil is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of clean soil.

Category 2 (Caltrans Type Y-2):

Soil exhibiting soluble lead concentrations greater than 0.5 mg/l and less than 50 mg/l (based on the WET-DI) and total lead concentrations greater than 1,411 mg/kg and less than 3,397 mg/kg may be used as fill provided that the lead-impacted soil is placed a minimum of 5 feet above the maximum water table elevation and protected from infiltration by a pavement structure maintained by Caltrans.

Category 3 (Caltrans Type Y-2):

Lead-impacted soil with a pH less than 5.0 shall only be used as fill material under the paved portion of the roadway.

2.5 Environmental Screening Levels

The San Francisco Bay Regional Water Quality Control Board (SFRWQCB) has prepared a technical report entitled *Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater, Interim Final* (November 2007), which presents Environmental Screening Levels (ESLs) for soil, groundwater, soil gas, and surface water, to assist in evaluating sites impacted by releases of hazardous chemicals. The ESLs are conservative values for more than 100 commonly detected contaminants, which may be used to compare with environmental data collected at a site. ESLs are strictly risk assessment tools and "not regulatory clean up standards." The presence of a chemical at concentrations in excess of an ESL does not necessarily indicate that adverse impacts to human health or the environment are occurring; this simply indicates that a potential for adverse risk may exist and that additional evaluation is or may be warranted (SFRWQCB, 2007). The most restrictive ESL table was used for this characterization: Table A – Shallow Soil (≤3 meters below ground surface; bgs) – Groundwater is a Current or Potential Source of Drinking Water.

The most restrictive ESL table was used for this characterization: Table A – Shallow Soil (≤3 meters below ground surface; bgs) – Groundwater is a Current or Potential Source of Drinking Water. The respective ESLs are listed at the end of Tables 3 through 6 for comparative purposes.

3.0 SCOPE OF SERVICES

The following scope of services was performed by Geocon:

3.1 Pre-Field Activities

- Prepared the *Revised Final Site Investigation Workplan, Route I-880 Southbound Improvements Project, Alameda County, California,* dated October 23, 2008. The Workplan was electronically transmitted to the client and Caltrans, and was formally approved by Caltrans in a memo dated November 4, 2008. The Revised Final Workplan was prepared in response to Caltrans comments provided via email dated September 4, 2008, on the Final Site Investigation Workplan (Final Workplan). The Final Workplan was submitted on September 2, 2008 to address Caltrans comments (dated July 23, 2008) on the Revised Site Investigation Workplan (Revised Workplan). The Revised Workplan was submitted on July 16, 2008, to address previous Caltrans comments (dated June 30, 2008) on the Site Investigation Workplan (dated June 16, 2008).
- Prepared a Health and Safety Plan (HSP) for the project that provided guidelines on the use of personal protective equipment and the health and safety procedures to be implemented during the investigation activities.
- Retained the services of a Gregg Drilling & Testing direct push drill rig to advance soil borings at the Site.

- Retained the services of Advanced Technology Laboratories (ATL) to perform the analyses of the soil samples.
- Notified Underground Service Alert (USA) at least 48 hours prior to fieldwork involving drilling or direct push sampling activities.

3.2 Field Activities

The field activities consisted of advancing soil borings along the southbound shoulder, and at the interchanges with 98th Avenue, Davis Street, and Marina Boulevard using hand-auger and direct-push methods. Soil samples were collected from the borings as follows:

- On November 4 and 5, 2008, we collected 177 soil samples from 59 soil borings (SB-1 through SB-18, and SB-28 through SB-68) at the following depth intervals: 0 foot to 0.5 foot, 1.0 foot to 1.5 feet (ft) and 2.0 ft to 2.5 ft. Note that boring ID's SB-19 through SB-27 were not utilized.
- On November 19 and 20, 2008, we collected 86 soil samples from 18 borings (RW1-1 through RW1-5, RW2-1 through RW2-2, RW3-2, RW3-3, RW4-1, RW4-2, RW5-1, RW8-1, and RW8-2. Soil samples from the nine of the retaining wall borings were collected at depth intervals of 1.0 ft to 1.5 ft and 5.0 ft to 5.5 ft. The remaining nine soil borings were further advanced to depths between 16 ft and 24 ft to attempt to collect grab-groundwater and/or saturated soil samples. Grab-groundwater samples were obtained from the following five borings: DSGW1, MBGW2, RW2-1, RW3-2, RW8-1, and UPRR1.

Soil boring coordinates were obtained using global positioning system (GPS) equipment. The GPS coordinates are presented in Table 1. The boring locations are depicted on the Site Plans, Figures 2a through 2f.

4.0 INVESTIGATIVE METHODS

4.1 Sampling Procedures

The soil samples collected for metals, TPH and VOCs analysis were retrieved using direct-push and hand-auger methods. Soil samples obtained from the direct-push borings were collected using 1.5-inch diameter acetate liners, which were secured with Teflon tape and plastic end caps. Soil samples collected using the hand auger were transferred from the auger bucket into individual polyethylene sample bags, with the exception of samples collected for CAM17 metals analysis, which were collected in stainless steel tubes secured with Teflon tape and plastic end caps. Grab-groundwater samples were collected using a clean stainless steel bailer into appropriate, pre-preserved, laboratory-supplied containers. Soil and grab-groundwater samples were labeled and placed in a chilled cooler for transport to the analytical laboratory. Completed shallow soil borings were backfilled to surface grade with soil cuttings, and soil borings advanced to groundwater were backfilled with neat cement grout.

Sampling equipment was cleansed by washing the equipment with a Liquinox solution followed by two successive rinses with distilled water. The decontamination water was returned to the site surface away from storm drains and inlets in a manner not to create runoff.

The soil samples were transported to ATL for analysis, under standard chain-of-custody documentation.

4.2 Laboratory Analyses

Laboratory analyses were performed under a 48-hour turn-around-time (TAT) for lead analyses, and standard TATs for the other analyses. Reproductions of the laboratory reports and chain-of-custody documentation are presented as Appendix A. The laboratory analyses performed are summarized below:

Soil

- A total of 138 soil samples were analyzed for total lead following Environmental Protection Agency (EPA) Test Method 6010
- A total of 86 soil samples were analyzed for CAM17 metals using EPA Test Methods 6010B/7471A
- A total of 81 soil samples with total lead concentrations greater than 50 mg/kg (i.e. ten times the STLC of 5 mg/l) were further analyzed for soluble WET lead
- A total of 38 soil samples with soluble WET lead concentrations greater than the STLC of 5 mg/l were further analyzed for soluble WET-DI lead
- A total of 31 soil samples with total and soluble WET lead concentrations greater than 100 mg/kg and 5 mg/l, respectively, were further analyzed for soluble TCLP lead
- A total of 20 soil samples were analyzed for total petroleum hydrocarbons (TPH) as diesel and as motor oil (TPHd/mo) using EPA Test Method 8015M
- A total of 29 soil samples were analyzed for TPH as gasoline (TPHg), BTEX, and MTBE using EPA Test Method 8021B
- Three soil samples were analyzed for VOCs using EPA Method 8260B
- Four soil samples (those collected from boring UPRR1) were analyzed for semi volatile organic compounds (SVOCs) using EPA Method 8270
- A total of 19 soil samples were analyzed for soil pH following EPA Test Method 9045

Grab-Groundwater

- Six grab-groundwater samples were analyzed for CAM17 metals using EPA Test Methods 6010B/7471A
- Six grab-groundwater samples were analyzed for TPHd/mo using EPA Test Method 8015M
- Six grab-groundwater samples were analyzed for TPHg, BTEX, and MTBE using EPA Test Method 8021B
- Six grab-groundwater samples were analyzed for VOCs using EPA Method 8260B
- One grab-groundwater sample (UPRR1) was analyzed for SVOCs using EPA Method 8270

4.3 QA/QC Procedures

Quality assurance/quality control (QA/QC) procedures were performed for each method of analysis with specificity for each analyte listed in the test method's QA/QC. The laboratory QA/QC procedures included the following:

- One method blank for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One sample analyzed in duplicate for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One spiked sample for every ten samples, batch of samples or type of matrix, whichever was more frequent, with spike made at ten times the detection limit or at the analyte level.

Prior to submitting the soil samples to the laboratory, the chain-of-custody documentation was reviewed for accuracy and completeness.

5.0 INVESTIGATIVE RESULTS

5.1 Shoulder Borings

Analytical results of the soil samples are summarized in Tables 2 through 4.

- Total lead concentrations ranged from less than (<) the laboratory reporting limit of 5 mg/kg to 2,000 mg/kg, with 74 samples having reported concentrations equal to or exceeding 50 mg/kg (i.e. ten times the STLC of 5 mg/l).
- Soluble WET lead was reported in the soil samples at concentrations ranging from <0.25 mg/l to 76 mg/l.
- Soluble WET-DI lead was reported in the soil samples at concentrations ranging from <0.25 mg/l to 1.8 mg/l.
- Soluble TLCP lead was reported in the soil samples at concentrations ranging from <0.25 mg/l to 3.3 mg/l.
- Chromium was reported in the soil samples at concentrations ranging from 9.3 mg/kg to 75 mg/kg, with two samples exceeding ten times the STLC of 5.0 mg/kg. Soluble WET chromium was not detected above the laboratory reporting limit of 1.0 mg/l in the two samples.
- Mercury was reported in the soil samples at concentrations ranging from <0.10 mg/kg to 20 mg/kg, with one sample (SB-10-0) exceeding ten time the STLC of 2.0 mg/kg. Soluble WET mercury was not detected above the laboratory reporting limit of 1.0 mg/l in the sample.
- Antimony, arsenic, barium, cadmium, cobalt, copper, nickel, selenium, vanadium, and zinc were reported in the soil samples at concentrations below ten times their respective STLC values. Beryllium, silver, and thallium were not detected above their respective laboratory reporting limits in the soil samples.
- Reported soil pH values in the soil samples ranged from 6.4 to 8.4.

5.2 Retaining Wall and Structure Borings

Analytical results for soil and grab-groundwater samples collected at locations adjacent to proposed retaining walls and bent/structures are presented below.

5.2.1 Soil Samples

Analytical results for soil samples are presented in Tables 2 through 4.

- Total lead concentrations ranged from <5 mg/kg to 150 mg/kg, with four samples exceeding 50 mg/kg.
- Soluble WET lead was reported in the soil samples at concentrations ranging from 0.90 mg/l to 4.1 mg/l.
- Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, mercury, nickel, selenium, vanadium, and zinc were reported in the soil samples at concentrations below ten times their

respective STLC values. Beryllium, silver, and thallium were not detected above their respective laboratory reporting limits in the soil samples.

- TPHd was reported in the soil samples at concentrations between 1.1 mg/kg and 1,100 mg/kg; TPHmo was reported in the soil samples at concentrations between 1.5 mg/kg and 1,600 mg/kg.
- TPHg, BTEX, MTBE, VOCs or SVOCs were not detected above their respective laboratory reporting limits in the soil samples analyzed for these constituents.

5.2.2 Grab-Groundwater Samples

Results for the grab-groundwater samples are presented in Tables 5 and 6.

- CAM17 metals were reported in the grab-groundwater samples as follows:
  - Arsenic was detected in two samples at concentrations of 0.011 mg/l and 0.021 mg/l
  - Barium was detected in the six samples at concentrations between 0.48 mg/l and 2.0 mg/l
  - Beryllium was detected in three samples at concentrations between 0.0038 mg/l and 0.0062 mg/l
  - Cadmium was detected in three samples at concentrations between 0.0061 mg/l and 0.0069 mg/l
  - Chromium was detected in five samples at concentrations between 0.0042 mg/l and 0.055 mg/l
  - Cobalt was detected in the six samples at concentrations between 0.023 mg/l and 0.11 mg/l
  - Copper was detected in the six samples at concentrations between 0.0072 mg/l and 0.089 mg/l
  - Lead was detected in sample DSGW1 at a concentration of 0.013 mg/l
  - Molybdenum was detected in sample MBGW2 at a concentration of 0.0077 mg/l
  - Nickel was detected in the six samples at concentrations between 0.025 mg/l and 0.39 mg/l
  - Selenium was detected in two samples at concentrations of 0.011 mg/l and 0.013 mg/l
  - Vanadium was detected in the six samples at concentrations between 0.038 mg/l and 0.082 mg/l
  - Zinc was detected in the six samples at concentrations between 0.049 mg/l and 0.38 mg/l
  - Antimony, mercury, silver, and thallium were not detected above their respective laboratory reporting limits in the grab-groundwater samples.
- TPHd was reported at concentrations between 0.060 mg/l and 0.25 mg/l
- TPHmo was reported at concentrations between 0.070 mg/l and 0.24 mg/l
- TPHg, BTEX, or MTBE were not detected above their respective laboratory reporting limits in the grab-groundwater samples
- VOCs were reported in three of the grab-groundwater samples as follows:

- 1,1-Dichloroethene (1,1-DCE) was detected in sample MBGW2 at a concentration of 0.53 micrograms per liter (µg/l)
- Dichlorodifluoromethane was detected in sample RW3-2 at a concentration of 1.8 µg/l
- Tetrachloroethene (PCE) was reported at concentrations between 3.8 µg/l and 32 µg/l
- Trichloroethene (TCE) was reported at concentrations between 0.57 µg/l and 5.5 µg/l

- SVOCs were not detected above their respective laboratory reporting limits the in grab-groundwater sample analyzed for these constituents

5.3 Laboratory Quality Assurance/Quality Control

We reviewed the laboratory QA/QC provided with the laboratory report. The data show acceptable surrogate recoveries and non-detect results for the method blanks.

The relative percent differences (RPDs) of the duplicate samples for three metals and one of the TPH analyses were outside criteria. Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) were outside recovery criteria for several analyses. The Case Narratives in the laboratory reports state that each analytical batch was validated by the Laboratory Control Sample (LCS). The data showed acceptable recoveries and RPDs for the remainder of the duplicates and matrix spikes.

Several samples required dilution due to sample matrix. The surrogate recovery for one of the laboratory duplicate sample was biased high, which was also likely due to matrix interferences. However, acceptable reporting limits were achieved and other laboratory QA/QC samples were within criteria.

Based on this limited data review, no additional qualifications of the soil data are necessary and the data are of sufficient quality for the purposes of this report.

5.4 Statistical Evaluation for Lead Detected in Soil Samples

Statistical methods were applied to the total lead data to evaluate: 1) the upper confidence limits (UCLs) of the arithmetic means of the total lead concentrations for each sampling depth; and 2) if an acceptable correlation between total and soluble lead concentrations exists that would allow the prediction of soluble lead concentrations based on calculated UCLs. The statistical methods used are discussed in a book entitled *Statistical Methods for Environmental Pollution Monitoring,* by Richard Gilbert; in an EPA *Technology Support Center Issue* document entitled, *The Lognormal Distribution in Environmental Applications,* by Ashok Singh et. al., dated December 1997; and in a book entitled *An Introduction to the Bootstrap,* by Bradley Efron and Robert J. Tibshirani.

The lead data for the Site were treated as five sample populations for statistical evaluation, which consisted of the following:

A) Soil samples collected from shoulder borings SB-1 through SB-7
B) Soil samples collected from shoulder borings SB-8 through SB-18 and retaining wall borings RW8-1 and RW8-2
C) Soil samples collected from shoulder borings SB-28 through SB-34 and retaining wall boring RW5-1
D) Soil samples collected from shoulder borings SB-35 through SB-50 and retaining wall/structure borings DSGW1, RW1-1 through RW1-5, RW2-1 RW2-2, RW3-2, RW3-3, RW4-1, and RW4-2
E) Soil samples collected from shoulder borings SB-51 through SB-68, and Marina Boulevard structure borings MBGW1 and MBGW2.

5.4.1 Calculating the UCLs for the Arithmetic Mean

The upper one-sided 90% and 95% UCLs of the arithmetic mean are defined as the values that, when calculated repeatedly for randomly drawn subsets of site data, equal or exceed the true mean 90% and 95% of the time, respectively. Statistical confidence limits are the classical tool for addressing uncertainties of a distribution mean. The UCLs of the arithmetic mean concentration are used as the mean concentrations because it is not possible to know the true mean due to the essentially infinite number of soil samples that could be collected from a site. The UCLs therefore account for uncertainties due to limited sampling data. As data become less limited at a site, uncertainties decrease, and the UCLs move closer to the true mean.

Non-parametric bootstrap techniques used to calculate the UCLs are discussed in the previously referenced EPA document and in *An Introduction to the Bootstrap.* For those samples in which total lead was not detected at concentrations exceeding the laboratory MRL, a value equal to one-half of the detection limit was used in the UCL calculation. In addition to the computation of 90% and 95% UCLs, outlier tests were performed on the total lead results for the samples collected at the Site. The statistical tests indicated that the total lead analytical result of 2,000 mg/kg reported for sample SB35-2 was determined to be an outlier; therefore, this sample was reanalyzed for total and soluble WET lead, with a reported result of 2,000 mg/kg. Therefore, the analytical results for this sample were not included in the calculation of lead UCLs. The bootstrap test results are included in Appendix B, and the following tables present the calculated UCLs and statistics for the data set.

Borings SB-1 through SB-7

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0 to 0.5	126.9	132.7	106.4	43	170
1.0 to 1.5	95.4	101.1	75.7	20	130
2.0 to 2.5	51.9	54.7	43.1	17	66

Borings SB-8 through SB-18, RW8-1, and RW8-2

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0 to 0.5	43.8	45.4	38.4	22	71
1.0 to 1.5	64.1	68.0	52.0	0.5	120
2.0 to 2.5	39.7	41.2	34.2	7.4	55

Borings SB-28 through SB-34 and RW5-1

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0 to 0.5	46.6	49.6	37.1	17	65
1.0 to 1.5	142.4	152.3	105.4	20	240
2.0 to 2.5	105.6	119.1	64.0	6.2	270

Borings SB-35 through SB-50, DSGW1, RW1-1 through RW1-5, RW2-1 RW2-2, RW3-2, RW3, RW4-1, and RW4-2 (excluding outlier sample SB35-2)

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0 to 0.5	62.6	65.3	51.9	2.5	160
1.0 to 1.5	48.1	50.7	38.4	0.5	150
2.0 to 2.5	45.8	49.4	32.8	2.5	150

Borings SB-51 through SB-68, MBGW1 and MBGW2

SAMPLE INTERVAL (feet)	90% TOTAL LEAD UCL (mg/kg)	95% TOTAL LEAD UCL (mg/kg)	TOTAL LEAD MEAN (mg/kg)	MINIMUM VALUE (mg/kg)	MAXIMUM VALUE (mg/kg)
0 to 0.5	221.2	238.2	165.2	6.4	670
1.0 to 1.5	64.1	68.5	50.1	6.1	180
2.0 to 2.5	172.0	191.6	107.8	5.3	970

5.4.2 Correlation of Total and Soluble Lead

Total and corresponding soluble WET lead concentrations are bivariate data with a linear structure. This linear structure should allow for the prediction of soluble WET lead concentrations based on the UCLs calculated above in Section 5.4.1.

To estimate the degree of interrelation between total and corresponding soluble WET lead values (x and y, respectively), the *correlation coefficient [r]* is used. The correlation coefficient is a ratio that ranges from +1 to –1. A *correlation coefficient* of +1 indicates a perfect direct relationship between two variables; a *correlation coefficient* of –1 indicates that one variable changes inversely with relation to the other. Between the two extremes is a spectrum of less-than-perfect relationships, including zero, which indicates the lack of any sort of linear relationship at all. The *correlation coefficient* was calculated for the 81 (x, y) data points (i.e., soil samples analyzed for both total lead [x] and soluble WET lead [y]). The resulting *coefficient of determination* (r^2) equaled 0.883, which yields a corresponding *correlation coefficient* (r) of 0.940. To achieve an acceptable correlation, data for the outlier sample SB35-2 was excluded from the regression.

For the *correlation coefficient* that indicates a linear relationship between total and soluble WET lead concentrations, it is possible to compute the line of dependence or a best-fit line between the two variables. A least squares method was used to find the equation of a best-fit line (regression line) by forcing the y-intercept equal to zero since that is a known point. The equation of the regression line was determined to be $y = 0.0678(x)$, where x represents total lead concentrations and y represents predicted soluble lead WET concentrations.

This equation was used to estimate the expected WET soluble lead concentrations for the UCLs calculated in for samples collected from the Site (see Section 5.4.1). Regression analysis results and a scatter plot depicting the (x, y) data points along with the regression line are included in Appendix C. The predicted soluble WET lead concentrations for the soil samples collected at the Site are summarized in Tables 7a through 7e.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Waste classifications are evaluated based on the 90% UCL of the lead content for the relevant excavation depths; this has historically been considered sufficient to satisfy a good faith effort by the EPA as discussed in SW-846. Risk assessment characterization is based on the 95% UCL of the lead content in the waste for the relevant depths; this is in accordance with the Risk Assessment Guidance for Superfund (RAGS) Volume 1 Documentation for Exposure Assessment. Per Caltrans, the 90% UCLs are to be used to evaluate onsite reuse and the 95% UCLs are to be used to evaluate offsite disposal.

6.1 Predicted Soluble Lead

6.1.1 Borings SB-1 through SB-7 (Station 468 to 443)

The following table summarizes the predicted soluble WET lead concentrations and the waste classification for excavated soil based on the calculated total lead UCLs and the relationship between total and soluble WET lead for data collected at the Site. The total and soluble WET lead calculations are summarized in Table 7a.

Excavation Depth	**90% UCL Total Lead (mg/kg)**	**90% UCL Predicted WET Lead (mg/l)**	**95% UCL Total Lead (mg/kg)**	**95% UCL Predicted WET Lead (mg/l)**	**Waste Classification**
0 to 1.0 ft	127	**8.6**	133	**9.0**	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*81*	***5.5***	*86*	***5.8***	***Hazardous***
0 to 2.0 ft	111	**7.6**	117	**7.9**	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*52*	*3.5*	*55*	*3.7*	*Non-Hazardous*
0 to 2.5 ft	99	**6.8**	104	**7.1**	**Hazardous**

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment.

Based on the data presented in the above table, soil excavated from the surface to a depth of 2.0 feet would be classified as a California hazardous waste since the 90% UCL-predicted soluble WET lead concentration is greater than the lead STLC of 5.0 mg/l. Underlying soil (i.e. deeper than 2.0 ft) may be reused as non-hazardous.

Based on the reported WET-DI results, soil excavated from the surface to a depth of 2.0 feet may be reused onsite in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement.

Based on the soluble TCLP lead concentrations, soil will not be classified as a RCRA hazardous waste.

6.1.2 Borings SB-8 through SB-18, and RW8 (Station 443 to 425)

The following table summarizes the predicted soluble WET lead concentrations and the waste classification for excavated soil based on the calculated total lead UCLs and the relationship between total and soluble WET lead for data collected at the Site. The total and soluble WET lead calculations are summarized in Table 7b.

Excavation Depth	**90% UCL Total Lead (mg/kg)**	**90% UCL Predicted WET Lead (mg/l)**	**95% UCL Total Lead (mg/kg)**	**95% UCL Predicted WET Lead (mg/l)**	**Waste Classification**
0 to 1.0 ft	44	3.0	45	3.1	Non-Hazardous
Underlying soil (1.0 to 2.5 ft)	*56*	*3.8*	*59*	*4.0*	*Non-Hazardous*
0 to 2.0 ft	54	3.7	57	3.9	Non-Hazardous
Underlying Soil (2.0 to 2.5 ft)	*40*	*2.7*	*41*	*2.8*	*Non-Hazardous*
0 to 2.5 ft	51	3.5	54	3.6	Non-Hazardous

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment.

Based on the data presented in the above table, soil excavated from this portion of the Site would not be classified as a California hazardous waste since the 90% UCL-predicted soluble WET lead concentrations are less than the lead STLC of 5.0 mg/l. Consequently, excavated soil may be reused onsite as non-hazardous with respect to lead content.

6.1.3 Borings SB-28 through SB-34, and RW5-1 (Station 398 to 377)

The following table summarizes the predicted soluble WET lead concentrations and the waste classification for excavated soil based on the calculated total lead UCLs and the relationship between total and soluble WET lead for data collected at the Site. The total and soluble WET lead calculations are summarized in Table 7c.

Excavation Depth	**90% UCL Total Lead (mg/kg)**	**90% UCL Predicted WET Lead (mg/l)**	**95% UCL Total Lead (mg/kg)**	**95% UCL Predicted WET Lead (mg/l)**	**Waste Classification**
0 to 1.0 ft	47	3.2	50	3.4	Non-Hazardous
Underlying soil (1.0 to 2.5 ft)	*130*	***8.8***	*141*	***9.6***	***Hazardous***
0 to 2.0 ft	94	**6.4**	101	**6.9**	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*106*	***7.2***	*119*	***8.1***	***Hazardous***
0 to 2.5 ft	97	**6.6**	105	**7.1**	**Hazardous**

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment.

Based on the data presented in the above table, if excavated as whole, soil from the surface to a depth of 2.5 feet would be classified as a California hazardous waste since the 90% UCL-predicted soluble WET lead concentration is greater than the lead STLC of 5.0 mg/l.

Based on the reported WET-DI lead results, soil excavated from the surface to a depth of 2.5 feet may be reused onsite in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement.

If excavated separately, soil between the surface and a depth of 1.0 foot would not be classified as a California hazardous waste since the 90% UCL-predicted soluble WET lead concentration is less than the lead STLC of 5.0 mg/l, and may be disposed as non-hazardous. Underlying soil excavated to a depth of 2.5 feet would be classified as a California hazardous waste.

Based on the soluble TCLP lead concentrations, soil will not be classified as a RCRA hazardous waste.

6.1.4 Borings SB-35 through SB-50, DSGW1, RW1, RW2, RW3, and RW4 (Station 377 to 340)

The following table summarizes the predicted soluble WET lead concentrations and the waste classification for excavated soil based on the calculated total lead UCLs and the relationship between total and soluble WET lead for data collected at the Site. The total and soluble WET lead calculations are summarized in Table 7d.

Excavation Depth	90% UCL Total Lead (mg/kg)	90% UCL Predicted WET Lead (mg/l)	95% UCL Total Lead (mg/kg)	95% UCL Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	63	4.3	65	4.4	Non-Hazardous
Underlying soil (1.0 to 2.5 ft)	*47*	*3.2*	*50*	*3.4*	*Non-Hazardous*
0 to 2.0 ft	55	3.8	58	3.9	Non-Hazardous
Underlying Soil (2.0 to 2.5 ft)	*46*	*3.1*	*49*	*3.4*	*Non-Hazardous*
0 to 2.5 ft	53	3.6	56	3.8	Non-Hazardous

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment.

Based on the data presented in the above table, soil excavated from the surface to a depth of at least 2.5 ft would not be classified as a California hazardous waste since the 90% UCL-predicted soluble WET lead concentrations are less than the lead STLC of 5.0 mg/l.

The total lead result for soil sample SB-35-2 was determined to be a statistical outlier and was removed from the above data set (see Section 5.4.1 and Appendix B). Soil in the vicinity of outlier sample SB-35-2 should be either 1) managed and disposed of as a California hazardous waste or 2) resampled to confirm waste classification in accordance with specific disposal facility acceptance criteria.

6.1.5 Borings SB-51 through SB-68, MBGW1 and MBGW2 (Station 340 to 314)

The following table summarizes the predicted soluble WET lead concentrations and the waste classification for excavated soil based on the calculated total lead UCLs and the relationship between total and soluble WET lead for data collected at the Site. The total and soluble WET lead calculations are summarized in Table 7e.

Excavation Depth	90% UCL Total Lead (mg/kg)	90% UCL Predicted WET Lead (mg/l)	95% UCL Total Lead (mg/kg)	95% UCL Predicted WET Lead (mg/l)	Waste Classification
0 to 1.0 ft	221	**15**	238	**16**	**Hazardous**
Underlying soil (1.0 to 2.5 ft)	*100*	***6.8***	*110*	***7.4***	***Hazardous***
0 to 2.0 ft	143	**9.7**	153	**10**	**Hazardous**
Underlying Soil (2.0 to 2.5 ft)	*172*	***12***	*192*	***13***	***Hazardous***
0 to 2.5 ft	149	**10**	161	**11**	**Hazardous**

90% UCL applicable for waste classification and onsite reuse; 95% UCL applicable for risk assessment.

Based on the data presented in the above table, soil excavated from the surface to a depth of 2.5 feet would be classified as a California hazardous waste since the 90% UCL-predicted soluble WET lead concentration is greater than the lead STLC of 5.0 mg/l.

Based on the reported WET-DI results, soil excavated from the surface to a depth of 2.5 feet may be reused onsite in accordance with the DTSC Variance by placing the excavated soil under clean fill or pavement.

Based on the soluble TCLP lead concentrations, soil will not be classified as a RCRA hazardous waste.

6.2 Soil

6.2.1 CAM17 Metals

The total CAM17 metal results for soil samples are summarized in Table 3. Based on the total CAM17 metals concentrations (with the exception of lead) and the reported levels of soluble WET chromium and mercury, soil excavated from the Site should not be considered a hazardous waste.

The CAM17 metals concentrations in soil were compared to ESLs (SFRWQCB, November 2007, Table A). Reported arsenic concentrations were between <1.0 mg/kg and 11 mg/kg in the soil samples, which exceed the residential and commercial/industrial land use ESLs of 0.38 mg/kg and 1.5 mg/kg, respectively. Reported vanadium concentrations were between 18 mg/kg and 93 mg/kg in the soil samples, exceeding the residential land use ESL of 15 mg/kg. Reported mercury concentrations were between <0.10 mg/kg and 20 mg/kg, with two samples exceeding the residential ESL of 1.0 mg/kg.

Upper one-sided 90% and 95% UCLs were calculated for the reported arsenic, mercury, and vanadium concentrations for the soil samples collected at the Site. The UCLs were compared with the residential and commercial/industrial land use ESLs and with published background levels typically present in California soils as presented in *Background Concentrations of Trace and Major Elements in California Soils* (Kearney Foundation of Soil Science, Division of Agriculture and Natural Resources, University of California, March 1996). The bootstrap results are included in Appendix B. The calculated standard bootstrap UCLs, ESLs and published background concentrations are summarized in the table below:

Metal	90% UCL	95% UCL	Residential ESL	Commercial/ Industrial ESL	PUBLISHED BACKGROUND MEAN[1]	PUBLISHED BACKGROUND RANGE [1]
Arsenic	4.7	4.8	0.38	1.5	3.5	0.6 to 11.0
Mercury	0.67	0.76	1.0	10	0.26	0.05 to 0.9
Vanadium	35.5	35.9	15	190	112	39 to 288

Concentrations reported in milligrams per kilogram (mg/kg); [1] Kearney Foundation of Soil Science, March 1996

The 90% and 95% UCL values for arsenic in the soil samples collected at the Site are greater than the ESLs; however are within the published background concentration range. The SFRWQCB *November 2007 Update to Environmental Screening Levels (ESLs) Technical Document* states that ambient background concentrations of arsenic typically exceed risk-based screening levels. In such instances, it may be more appropriate to compare site data to regionally-specific established background levels (Kearney Foundation of Soil Science, 1996).

The 90% and 95% UCL values for mercury in the soil samples collected at the Site are less than the residential ESL and are within the published background concentration range.

The 90% and 95% UCL values for vanadium in the soil samples collected at the Site are greater than the residential land use ESL, and are less than both the commercial/industrial land use ESL and published background concentrations.

Based on the calculated UCLs for arsenic, mercury, and vanadium, and comparisons to ESLs and the published background concentrations, offsite disposal of soil may be restricted based on metals content, depending on proposed use.

6.2.2 Petroleum Hydrocarbon Compounds

TPHg, BTEX, MTBE, VOCs or SVOCs were not detected above the laboratory reporting limit in the soil samples.

TPHd was detected above the laboratory reporting limit in the soil samples at concentrations between 1.1 mg/kg and 1,100 mg/kg, with four samples exceeding the residential and commercial/industrial land use ESL of 83 mg/kg for middle distillates in shallow soil (SFRWQCB, Table A). TPHmo was reported in the soil samples at concentrations between 1.4 mg/kg and 6,700 mg/kg, with exceeding the residential and commercial/industrial land use ESLs of 410 mg/kg and 2,500 mg/kg, respectively, for residual fuels in shallow soil (SFRWQCB, Table A).

Upper one-sided 90% and 95% upper confidence limits (UCLs) were calculated for the full set of TPHd/mo results for soil samples collected at the Site. For those samples in which TPHd/mo was not detected at concentrations exceeding the laboratory MRL, a value equal to one-half of the detection limit was used in the UCL calculation. The bootstrap results are included in Appendix B. The calculated standard bootstrap UCLs and ESLs for TPHd/mo are summarized in the following table:

Compound	90% UCL	95% UCL	Mean	Minimum	Maximum	Residential ESL	Commercial/ Industrial ESL
TPHd	266.5	293.7	167.5	1.1	1,100	83	83
TPHmo	1,360	1,511	833.7	1.4	6,700	410	2,500

Concentrations reported in milligrams per kilogram (mg/kg)

The calculated 90% and 95% UCLs for TPHd are greater than the residential and commercial/industrial land use ESL value of 83 mg/kg. The calculated UCLs for TPHmo exceed the residential land use ESL and are less than the commercial/industrial land use ESL. Therefore, offsite disposal of soil may be restricted based on petroleum hydrocarbon content, depending on proposed use.

6.3 Groundwater

6.3.1 CAM17 Metals

CAM17 metals were reported in the grab-groundwater samples collected at the Site at concentrations exceeding applicable standards. Specifically, barium, beryllium, cadmium,

chromium, nickel, and vanadium were reported above their respective ESLs for Groundwater that IS a Potential Drinking Water Source and Freshwater (SFRWQCB, Tables A and F, November 2007), Department of Health Services Maximum Contaminant Levels (DHS MCLs, Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003), and Water Quality Objectives (WQOs) for Municipal and Agricultural Supply (SFRWQCB Basin Plan, January 2007). The following CAM17 metals were reported in the grab-groundwater samples at concentrations below their respective ESLs, MCLs, and WQOs: antimony, arsenic, cobalt, copper, lead, mercury, molybdenum, selenium, silver, thallium, and zinc. Therefore, there may be restrictions for handling groundwater generated during the proposed project.

6.3.2 Organics

TPHg, BTEX, MTBE, and SVOCs were not detected above laboratory reporting limits in the samples. Reported concentrations of TPHd/mo in the grab-groundwater samples are below their respective ESLs, MCLs, and WQOs.

VOCs were and reported in the grab-groundwater samples at concentrations exceeding their respective ESLs, MCLs, and WQOs. Specifically, PCE and TCE were reported in grab-groundwater sample MBGW2 at concentrations of 32 µg/l and 5.5 µg/l, respectively. These reported values are greater than the ESLs for Groundwater That is a Current/Potential Source of Drinking Water (SFRWQCB, Tables A and F, November 2007), MCLs (Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003), and WQOs for Municipal Supply of 5.0 µg/l for each compound (SFRWQCB Basin Plan, January 2007). The detection of these compounds in the grab-groundwater samples is likely attributable to a well-documented regional plume of VOC-impacted groundwater. Therefore, there may be restrictions for handling groundwater generated during the proposed project.

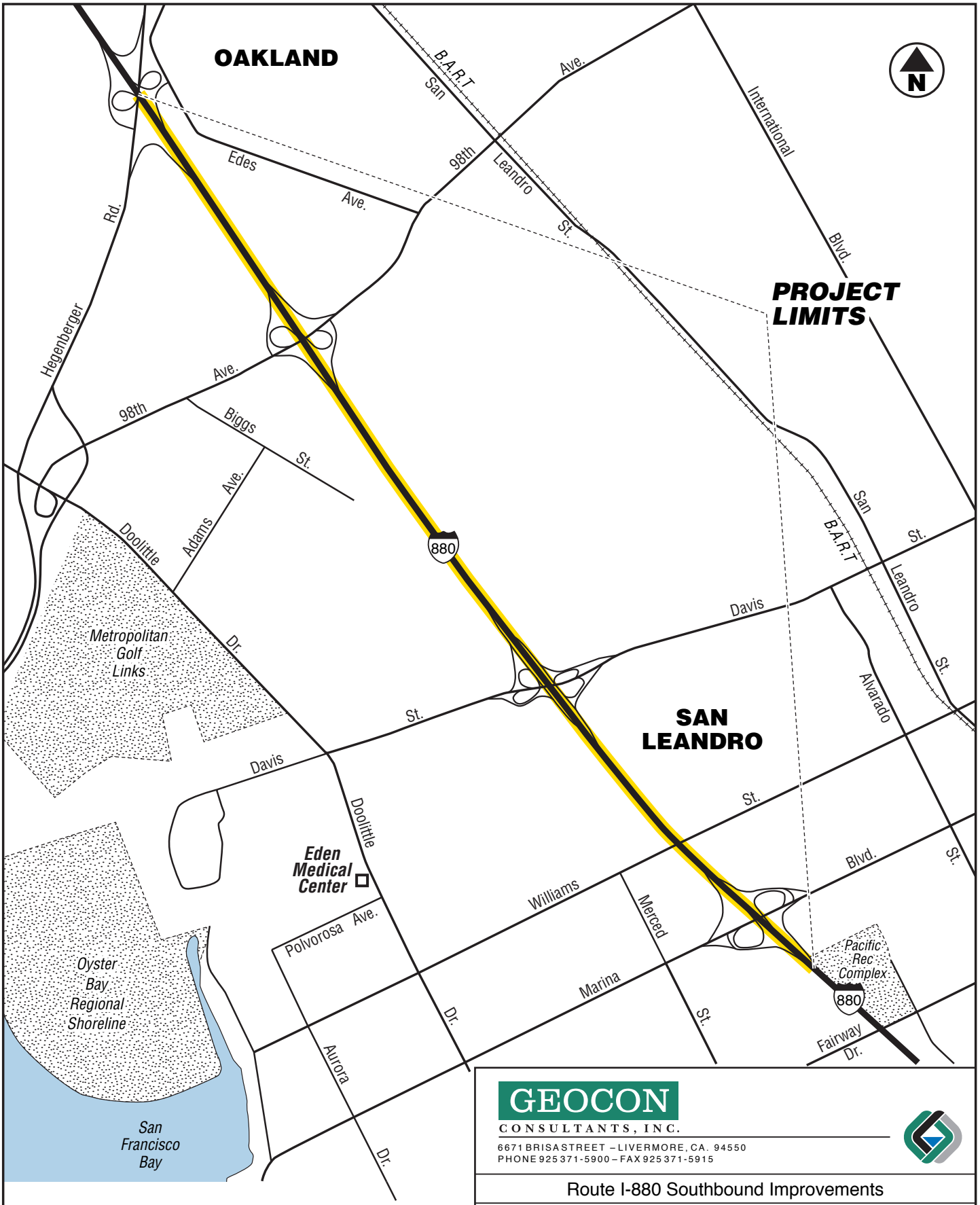
6.4 Worker Protection

Per Caltrans requirements, the contractor(s) should prepare a project-specific lead compliance plan (CCR Title 8, Section 1532.1, the “Lead in Construction” standard) to minimize worker exposure to lead-impacted soil. The plan should include protocols for environmental and personnel monitoring, requirements for personal protective equipment, and other health and safety protocols and procedures for the handling of lead-impacted soil.

7.0 REPORT LIMITATIONS

This report has been prepared exclusively for Rajappan & Meyer Consulting Engineers, Inc. The information contained herein is only valid as of the date of the field sampling, and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.



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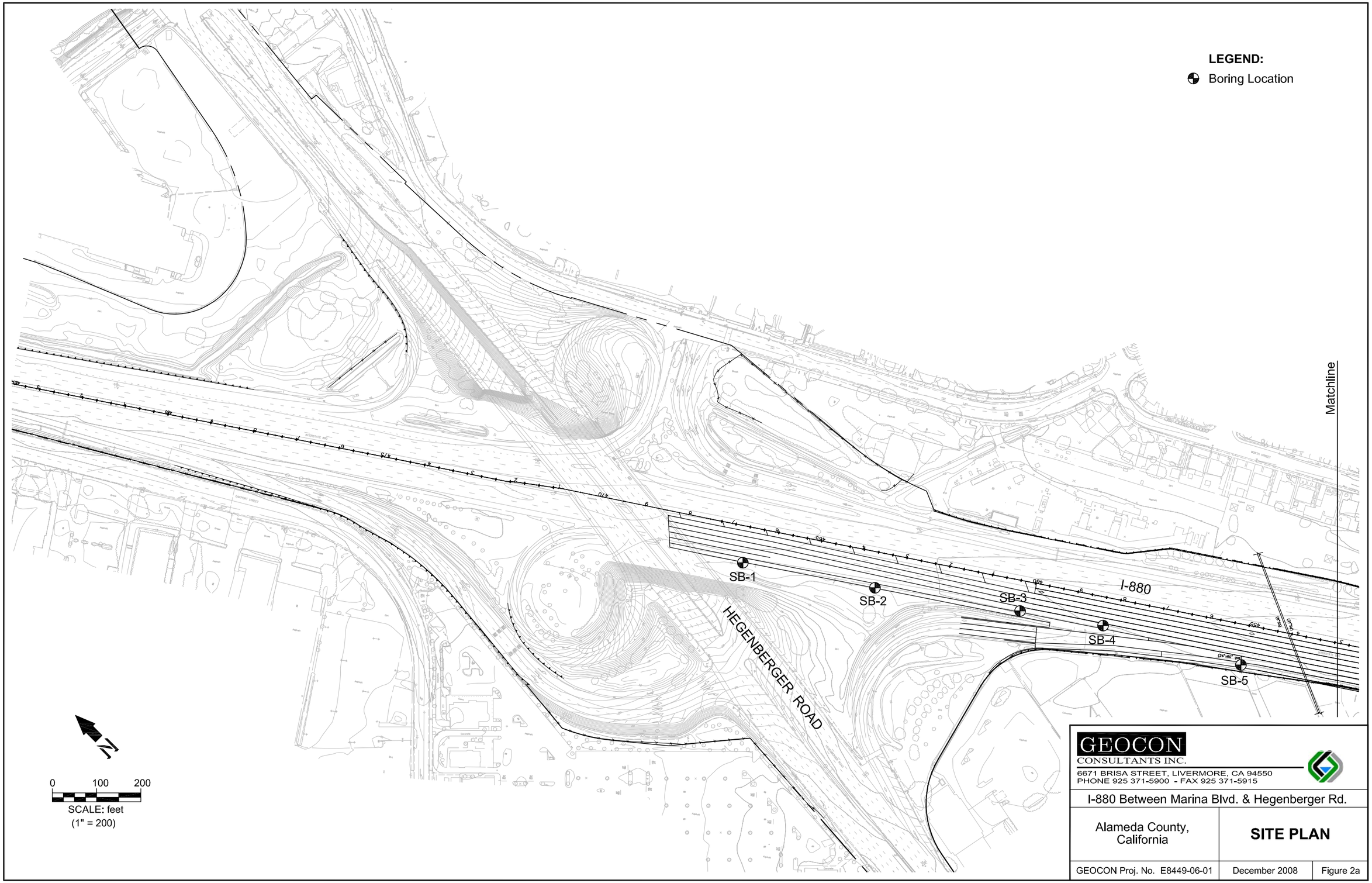
Route I-880 Southbound Improvements

Oakland & San Leandro,
California

VICINITY MAP

E8449-06-01	December 2008	Figure 1



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Alameda County, California

SITE PLAN

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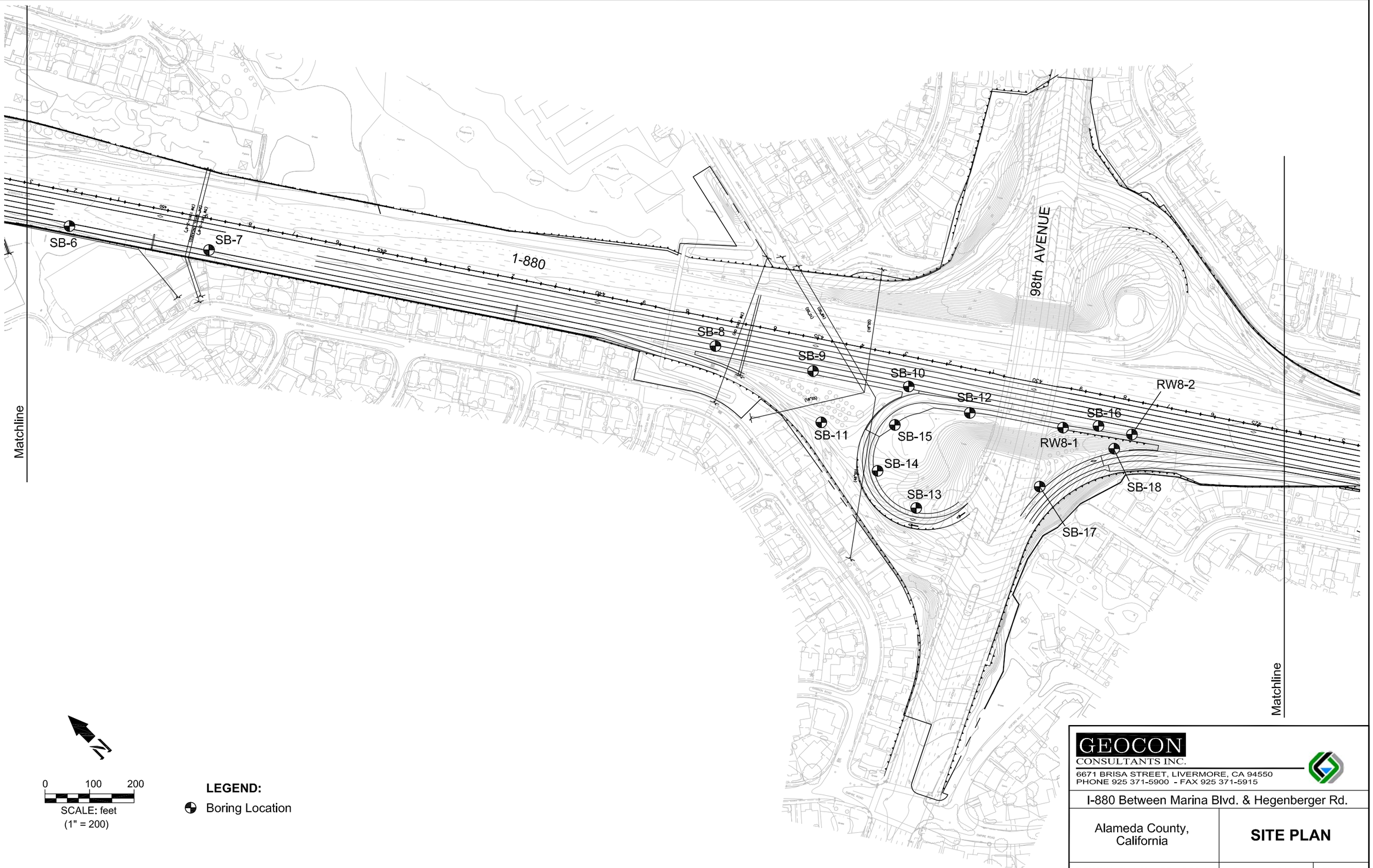
SITE1208



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SITE PLAN

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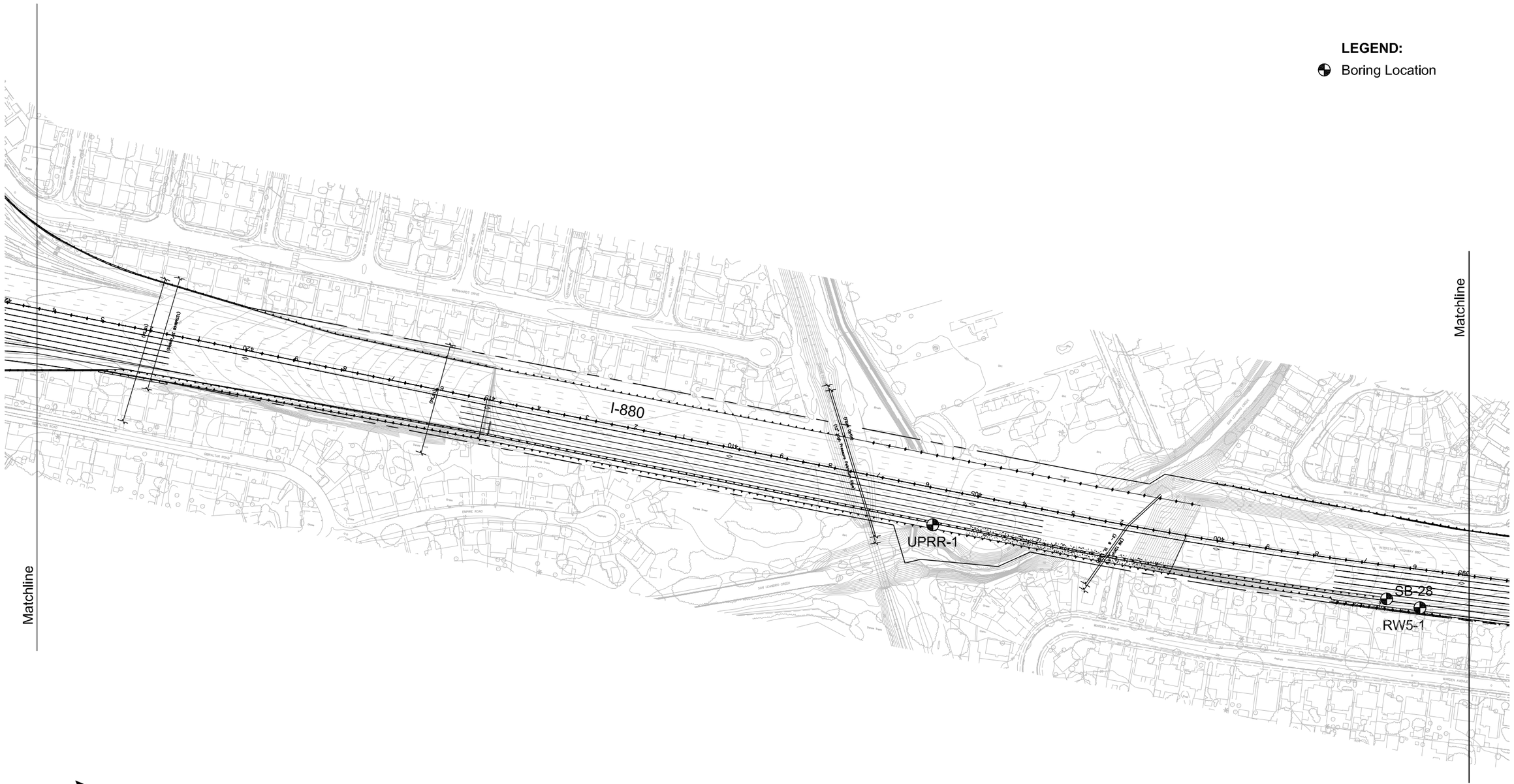
SITE1208



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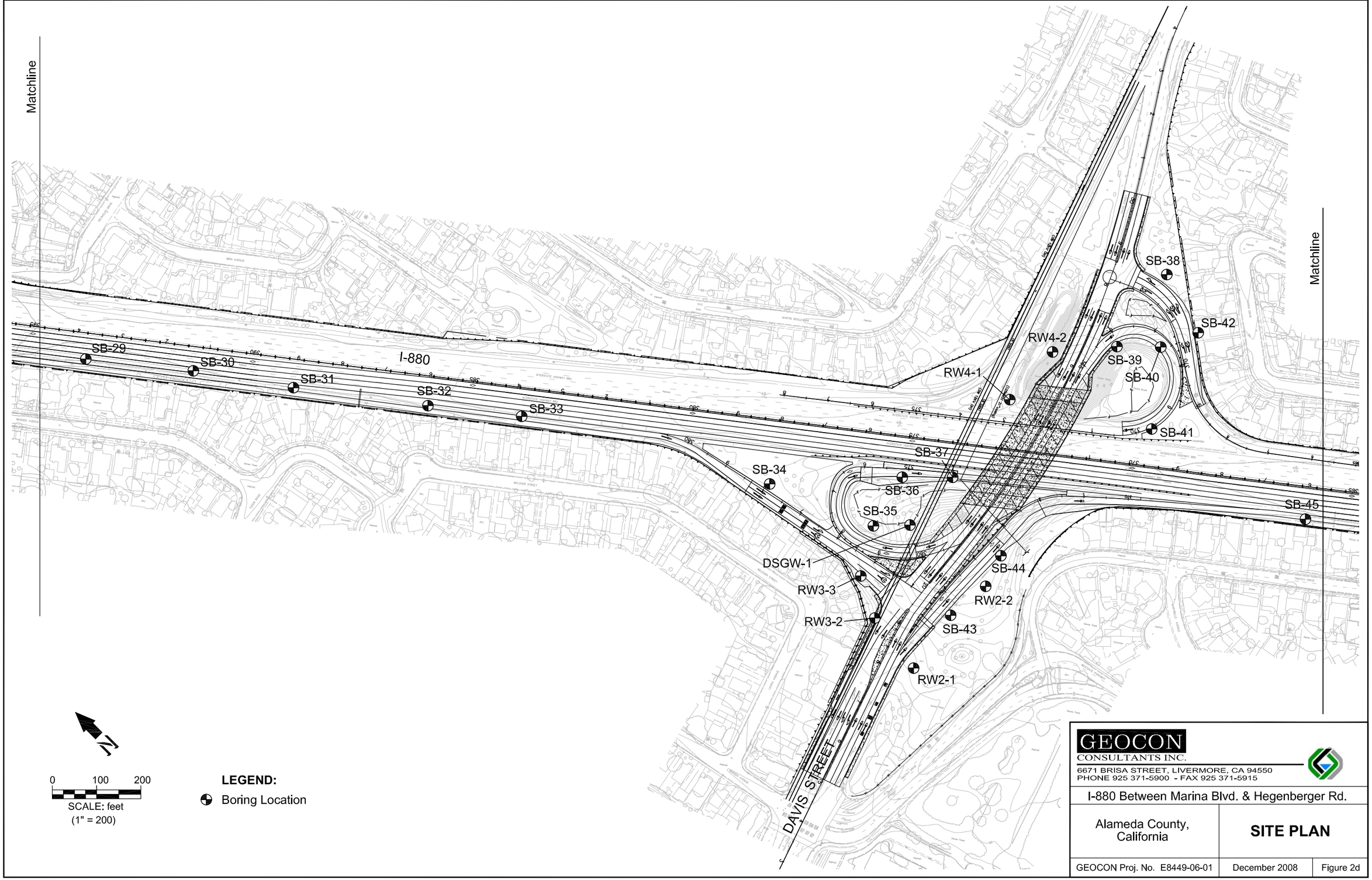
SITE1208



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SITE PLAN

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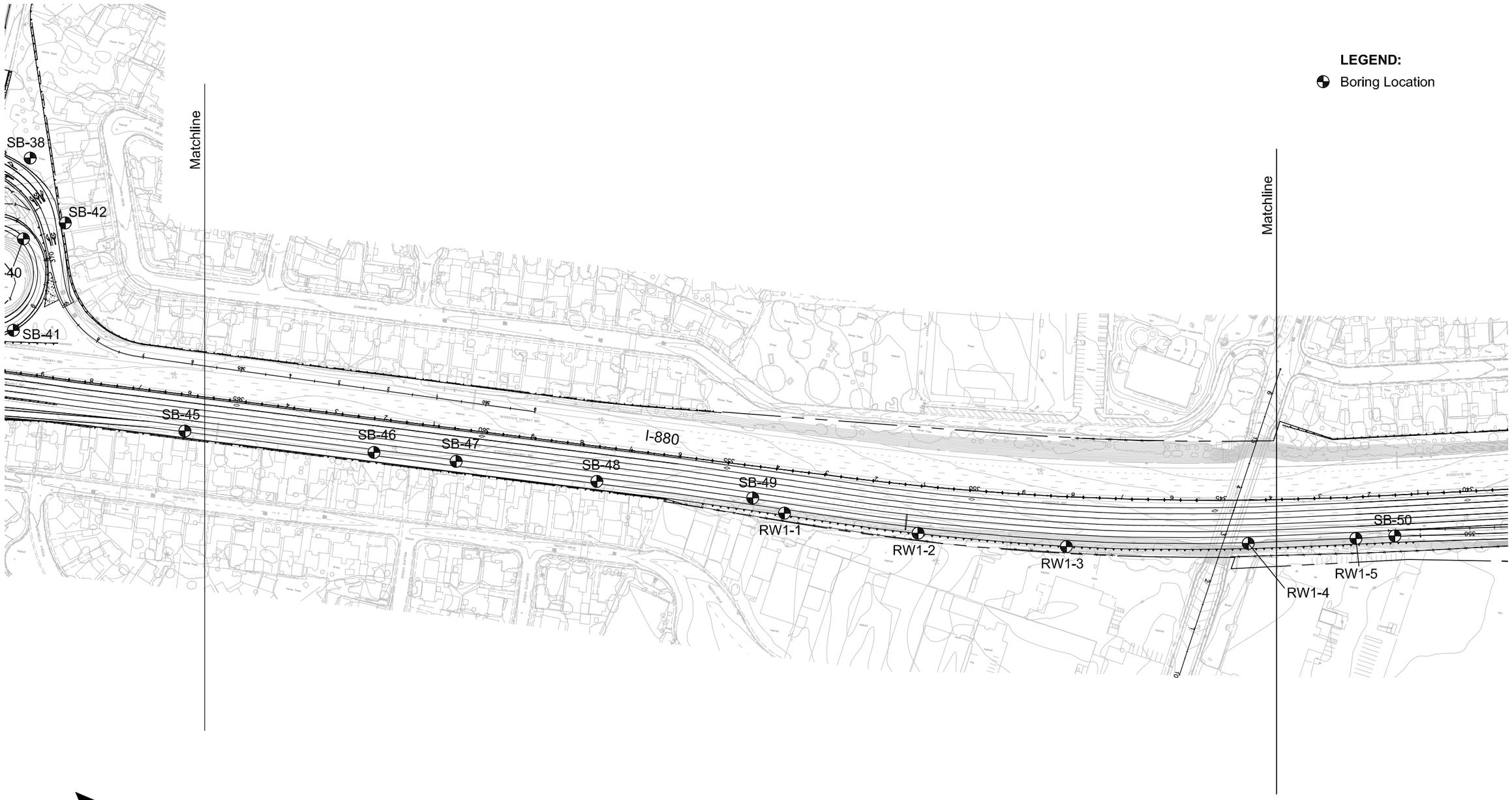
SITE1208



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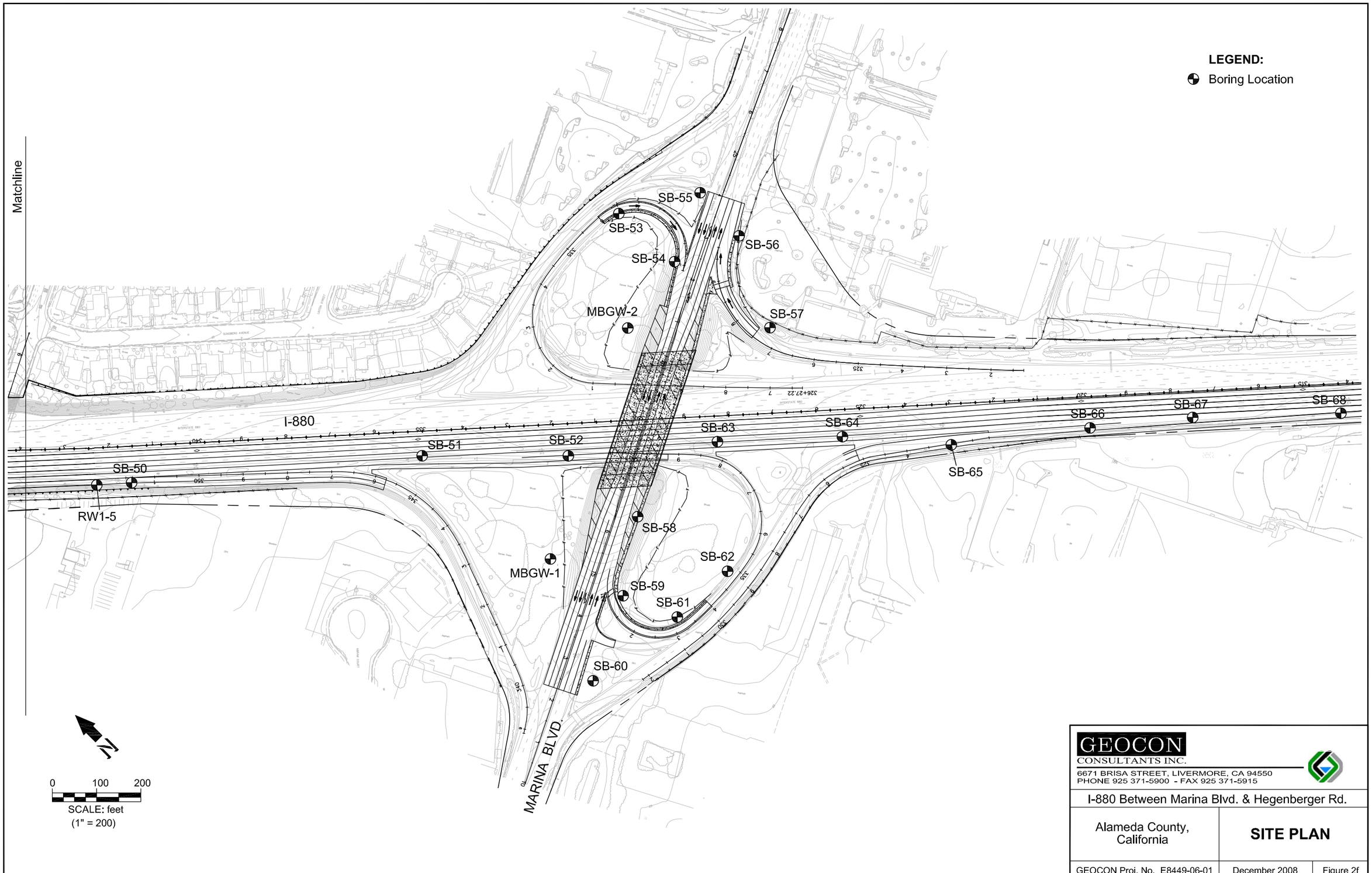
SITE PLAN

GEOCON Proj. No. E8449-06-01 | December 2008 | Figure 2e

SITE1208



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SITE PLAN

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SITE1208

TABLE 1
Boring Coordinates
Route I-880 Southbound Improvements Project
Alameda County, California

Boring	Northing	Easting
DSGW1	2,088,686.121	6,076,438.409
MBGW1	2,085,393.074	6,079,206.597
MBGW2	2,085,638.471	6,079,698.861
RW1-1	2,087,089.124	6,077,819.306
RW1-2	2,086,869.290	6,077,981.690
RW1-3	2,086,637.952	6,078,174.760
RW1-4	2,086,382.330	6,078,439.432
RW1-5	2,086,235.348	6,078,600.536
RW2-1	2,088,452.227	6,076,215.931
RW2-2	2,088,467.564	6,076,461.424
RW3-2	2,088,594.097	6,076,233.831
RW3-3	2,088,683.565	6,076,278.583
RW4-1	2,088,727.021	6,076,797.698
RW4-2	2,088,734.689	6,076,942.181
RW5-1	2,090,416.041	6,075,249.303
RW8-1	2,093,176.819	6,073,354.405
RW8-2	2,093,056.677	6,073,452.858
SB-01	2,096,285.597	6,071,278.507
SB-02	2,096,034.699	6,071,449.494
SB-03	2,095,766.096	6,071,644.067
SB-04	2,095,610.261	6,071,753.266
SB-05	2,095,327.419	6,071,910.469
SB-06	2,095,072.543	6,072,097.946
SB-07	2,094,813.354	6,072,281.484
SB-08	2,093,857.561	6,072,932.392
SB-09	2,093,662.998	6,073,047.477
SB-10	2,093,486.771	6,073,175.020
SB-11	2,093,568.587	6,072,979.260
SB-12	2,093,347.954	6,073,229.832
SB-13	2,093,282.113	6,072,993.874
SB-14	2,093,402.333	6,072,991.609
SB-15	2,093,447.692	6,073,091.750
SB-16	2,093,122.954	6,073,413.202
SB-17	2,093,120.100	6,073,223.842
SB-18	2,093,062.203	6,073,402.168
SB-28	2,090,476.200	6,075,214.284
SB-29	2,090,266.778	6,075,387.519
SB-30	2,090,076.334	6,075,540.425
SB-31	2,089,889.540	6,075,673.425
SB-32	2,089,646.202	6,075,859.434
SB-33	2,089,479.526	6,075,992.031
SB-34	2,088,975.800	6,076,280.066
SB-35	2,088,743.370	6,076,378.476
SB-36	2,088,774.803	6,076,502.430
SB-37	2,088,694.308	6,076,582.689
SB-38	2,088,675.928	6,077,247.949
SB-39	2,088,640.652	6,077,053.379
SB-40	2,088,570.009	6,077,122.719

TABLE 1
Boring Coordinates
Route I-880 Southbound Improvements Project
Alameda County, California

Boring	Northing	Easting
SB-41	2,088,453.656	6,076,977.522
SB-42	2,088,533.024	6,077,205.342
SB-43	2,088,477.359	6,076,359.265
SB-44	2,088,492.150	6,076,534.438
SB-45	2,088,064.339	6,077,079.030
SB-46	2,087,763.252	6,077,318.960
SB-47	2,087,632.904	6,077,423.531
SB-48	2,087,402.953	6,077,596.395
SB-49	2,087,156.310	6,077,795.725
SB-50	2,086,183.419	6,078,659.908
SB-51	2,085,762.565	6,079,166.617
SB-52	2,085,529.013	6,079,399.740
SB-53	2,085,835.451	6,079,867.259
SB-54	2,085,669.709	6,079,879.662
SB-55	2,085,738.768	6,080,030.446
SB-56	2,085,608.047	6,080,023.819
SB-57	2,085,412.004	6,079,926.358
SB-58	2,085,321.420	6,079,413.450
SB-59	2,085,218.338	6,079,263.922
SB-60	2,085,130.370	6,079,080.226
SB-61	2,085,097.944	6,079,316.274
SB-62	2,085,090.592	6,079,469.614
SB-63	2,085,313.809	6,079,660.335
SB-64	2,085,122.330	6,079,867.960
SB-65	2,084,935.475	6,080,028.752
SB-66	2,084,740.945	6,080,277.329
SB-67	2,084,593.835	6,080,457.905
SB-68	2,084,364.094	6,080,701.166
UPRR1	2,091,230.835	6,074,671.372

Boring Coordinates are in coordinate Zone 3, Datum NAD 83 (feet).

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
DSGW1-1	1	150	4.1	---	---	---
DSGW1-5	5	55	0.90	---	---	---
DSGW1-15.5	15.5	4.0	---	---	---	---
MBGW1-1	1	9.7	---	---	---	---
MBGW1-5	5	5.0	---	---	---	---
MBGW1-15.5	15.5	6.2	---	---	---	---
MBGW1-19.5	19.5	5.0	---	---	---	---
MBGW2-1	1	6.8	---	---	---	---
MBGW2-5	5	5.6	---	---	---	---
MBGW2-23.5	23.5	1.8	---	---	---	---
RW1-1-1	1	<1.0	---	---	---	---
RW1-1-5	5	4.9	---	---	---	---
RW1-2-1	1	22	---	---	---	---
RW1-2-5	5	29	---	---	---	---
RW1-3-1	1	28	---	---	---	---
RW1-3-5	5	37	---	---	---	---
RW1-4-1	1	7.0	---	---	---	---
RW1-4-5	5	15	---	---	---	---
RW1-4-19.5	19.5	5.6	---	---	---	---
RW1-5-1	1	4.8	---	---	---	---
RW1-5-5	5	12	---	---	---	---
RW2-1-1	1	33	---	---	---	---
RW2-1-5	5	4.6	---	---	---	---
RW2-1-14	14	3.2	---	---	---	---
RW2-2-1	1	71	2.7	---	---	---
RW2-2-5	5	9.3	---	---	---	---
RW3-2-1	1	50	---	---	---	---
RW3-2-5	5	5.9	---	---	---	---
RW3-3-1	1	27	---	---	---	---
RW3-3-5	5	6.7	---	---	---	---
RW4-1-1	1	3.0	---	---	---	---
RW4-1-5	5	5.1	---	---	---	---
RW4-2-1	1	89	2.6	---	---	---
RW4-2-5	5	4.4	---	---	---	---
RW4-2-19.5	19.5	6.3	---	---	---	---

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
RW5-1-1	1	120	2.4	---	---	---
RW5-1-5	5	6.5	---	---	---	---
RW5-1-19.5	19.5	2.1	---	---	---	---
RW8-1-1	1	60	3.4	---	---	---
RW8-1-5	5	6.1	---	---	---	---
RW8-1-16	15.5	11	---	---	---	---
RW8-2-1	1	<1.0	---	---	---	---
RW8-2-5	5	5.1	---	---	---	---
SB-1-0	0	92	2.5	---	---	---
SB-1-1	1	110	7.4	<0.25	<0.25	---
SB-1-2	2	66	11	<0.25	---	---
SB-2-0	0	43	---	---	---	7.5
SB-2-1	1	20	---	---	---	---
SB-2-2	2	17	---	---	---	---
SB-3-0	0	120	5.4	<0.25	<0.25	---
SB-3-1	1	120	8.0	<0.25	0.29	---
SB-3-2	2	49	---	---	---	---
SB-4-0	0	66	3.9	---	---	8.0
SB-4-1	1	43	---	---	---	---
SB-4-2	2	52	2.5	---	---	---
SB-5-0	0	170	7.8	<0.25	<0.25	---
SB-5-1	1	42	---	---	---	---
SB-5-2	2	35	---	---	---	---
SB-6-0	0	160	6.5	<0.25	<0.25	---
SB-6-1	1	130	9.3	<0.25	<0.25	---
SB-6-2	2	20	---	---	---	---
SB-7-0	0	94	6.9	<0.25	---	---
SB-7-1	1	65	2.4	---	---	7.6
SB-7-2	2	63	1.1	---	---	---
SB-8-0	0	51	3.3	---	---	---
SB-8-1	1	12	---	---	---	---
SB-8-2	2	7.4	---	---	---	---

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
SB-9-0	0	39	---	---	---	---
SB-9-1	1	35	---	---	---	---
SB-9-2	2	49	---	---	---	---
SB-10-0	0	71	1.6	---	---	---
SB-10-1	1	120	8.2	<0.25	<0.25	---
SB-10-2	2	45	---	---	---	---
SB-11-0	0	27	---	---	---	7.6
SB-11-1	1	56	3.2	---	---	---
SB-11-2	2	43	---	---	---	---
SB-12-0	0	36	---	---	---	---
SB-12-1	1	94	3.5	---	---	---
SB-12-2	2	55	3.6	---	---	---
SB-13-0	0	37	---	---	---	---
SB-13-1	1	36	---	---	---	---
SB-13-2	2	40	---	---	---	---
SB-14-0	0	22	---	---	---	7.2
SB-14-1	1	110	2.3	---	---	---
SB-14-2	2	44	---	---	---	---
SB-15-0	0	51	1.5	---	---	---
SB-15-1	1	42	---	---	---	---
SB-15-2	2	27	---	---	---	---
SB-16-0	0	37	---	---	---	---
SB-16-1	1	25	---	---	---	---
SB-16-2	2	18	---	---	---	---
SB-17-0	0	24	---	---	---	---
SB-17-1	1	52	0.36	---	---	8.4
SB-17-2	2	23	---	---	---	---
SB-18-0	0	27	---	---	---	---
SB-18-1	1	33	---	---	---	---
SB-18-2	2	25	---	---	---	---
SB-28-0	0	19	---	---	---	7.3
SB-28-1	1	20	---	---	---	---
SB-28-2	2	37	---	---	---	---
SB-29-0	0	65	2.8		---	---
SB-29-1	1	240	18	<0.25	2.4	---
SB-29-2	2	14	---	---	---	---

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
SB-30-0	0	17	---	---	---	---
SB-30-1	1	210	12	<0.25	1.4	---
SB-30-2	2	29	---	---	---	---
SB-31-0	0	60	6.4	<0.25	---	---
SB-31-1	1	30	---	---	---	7.6
SB-31-2	2	270	25	<0.25	3.3	---
SB-32-0	0	19	---	---	---	---
SB-32-1	1	140	11	<0.25	<0.25	---
SB-32-2	2	64	5.1	<0.25	---	---
SB-33-0	0	52	6.2	<0.25	---	---
SB-33-1	1	57	4.4	---	---	---
SB-33-2	2	6.2	---	---	---	---
SB-34-0	0	28	---	---	---	---
SB-34-1	1	26	---	---	---	---
SB-34-2	2	28	---	---	---	6.4
SB-35-0	0	36	---	---	---	---
SB-35-1	1	44	---	---	---	---
SB-35-2	2	2,000	45	0.76	1.3	---
SB-35-2	*2*	*2,000*	*38*	---	---	---
SB-36-0	0	33	---	---	---	---
SB-36-1	1	<5.0	---	---	---	---
SB-36-2	2	<5.0	---	---	---	7.1
SB-37-0	0	35	---	---	---	---
SB-37-1	1	8.0	---	---	---	---
SB-37-2	2	5.5	---	---	---	---
SB-38-0	0	31	---	---	---	---
SB-38-1	1	69	4.2	---	---	---
SB-38-2	2	42	---	---	---	---
SB-39-0	0	47	---	---	---	---
SB-39-1	1	44	---	---	---	---
SB-39-2	2	40	---	---	---	7.5
SB-40-0	0	83	2.8	---	---	---
SB-40-1	1	150	6.9	<0.25	<0.25	---
SB-40-2	2	150	7.5	<0.25	<0.25	---
SB-41-0	0	160	6.9	<0.25	<0.25	---
SB-41-1	1	61	4.3	---	---	---
SB-41-2	2	<5.0	---	---	---	---

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
SB-42-0	0	54	4.3	---	---	---
SB-42-1	1	17	---	---	---	---
SB-42-2	2	9.3	---	---	---	---
SB-43-0	0	39	---	---	---	---
SB-43-1	1	79	3.1	---	---	7.0
SB-43-2	2	87	3.8	---	---	---
SB-44-0	0	57	3.3	---	---	---
SB-44-1	1	23	---	---	---	---
SB-44-2	2	36	---	---	---	---
SB-45-0	0	37	---	---	---	---
SB-45-1	1	42	---	---	---	---
SB-45-2	2	59	<1.0	---	---	---
SB-46-0	0	59	5.1	<0.25	---	---
SB-46-1	1	14	---	---	---	---
SB-46-2	2	30	---	---	---	7.8
SB-47-0	0	<5.0	---	---	---	---
SB-47-1	1	13	---	---	---	---
SB-47-2	2	6.7	---	---	---	---
SB-48-0	0	35	---	---	---	---
SB-48-1	1	6.8	---	---	---	---
SB-48-2	2	14	---	---	---	---
SB-49-0	0	66	2.8	---	---	---
SB-49-1	1	12	---	---	---	---
SB-49-2	2	<5.0	---	---	---	7.4
SB-50-0	0	56	<1.0	---	---	---
SB-50-1	1	5.8	---	---	---	---
SB-50-2	2	5.4	---	---	---	---
SB-51-0	0	120	9.3	<0.25	<0.25	---
SB-51-1	1	36	---	---	---	---
SB-51-2	2	6.0	---	---	---	---
SB-52-0	0	380	34	<0.25	0.28	---
SB-52-1	1	15	---	---	---	---
SB-52-2	2	9.6	---	---	---	---
SB-53-0	0	130	5.7	<0.25	<0.25	7.4
SB-53-1	1	94	3.0	---	---	---
SB-53-2	2	14	---	---	---	---

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
SB-54-0	0	180	8.3	<0.25	<0.25	---
SB-54-1	1	40	---	---	---	---
SB-54-2	2	99	2.3	---	---	---
SB-55-0	0	79	3.6	---	---	---
SB-55-1	1	86	4.3	---	---	---
SB-55-2	2	92	4.1	---	---	---
SB-56-0	0	26	---	---	---	---
SB-56-1	1	13	---	---	---	7.3
SB-56-2	2	55	1.6	---	---	---
SB-57-0	0	35	---	---	---	---
SB-57-1	1	12	---	---	---	---
SB-57-2	2	11	---	---	---	---
SB-58-0	0	670	58	<0.25	0.65	---
SB-58-1	1	33	---	---	---	---
SB-58-2	2	150	8.8	<0.25	<0.25	---
SB-59-0	0	270	13	<0.25	0.29	---
SB-59-1	1	140	5.7	<0.25	<0.25	---
SB-59-2	2	130	8.0	1.8	<0.25	6.8
SB-60-0	0	570	25	<0.25	0.40	---
SB-60-1	1	40	---	---	---	---
SB-60-2	2	150	6.7	<0.25	<0.25	---
SB-61-0	0	190	9.2	<0.25	<0.25	---
SB-61-1	1	37	---	---	---	---
SB-61-2	2	5.9	---	---	---	---
SB-62-0	0	140	3.2	---	---	---
SB-62-1	1	11	---	---	---	---
SB-62-2	2	22	---	---	---	---
SB-63-0	0	120	5.4	<0.25	<0.25	7.2
SB-63-1	1	27	---	---	---	---
SB-63-2	2	12	---	---	---	---
SB-64-0	0	9.8	---	---	---	---
SB-64-1	1	56	2.9	---	---	---
SB-64-2	2	5.3	---	---	---	---
SB-65-0	0	52	1.7	---	---	---
SB-65-1	1	20	---	---	---	---
SB-65-2	2	42	---	---	---	---

TABLE 2
Summary of Lead and pH Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)	pH
SB-66-0	0	6.4	---	---	---	---
SB-66-1	1	6.1	---	---	---	---
SB-66-2	2	85	2.3	---	---	7.9
SB-67-0	0	67	4.7	---	---	---
SB-67-1	1	180	13	<0.25	<0.25	---
SB-67-2	2	970	76	0.44	1.4	---
SB-68-0	0	81	5.0	<0.25	---	---
SB-68-1	1	140	7.5	<0.25	<0.25	---
SB-68-2	2	81	4.9	---	---	---
UPRR1-1	1	93	3.6	---	---	---
UPRR1-5	5	6.7	---	---	---	---
UPRR1-12	12	32	---	---	---	---
UPRR1-23.5	23.5	5.1	---	---	---	---

Notes:

Result for sample SB35-2, shown in italics, is for replicate analysis.

WET = Waste Extraction Test
WET DI = Waste Extraction Test using de-ionized water
TCLP = Toxicity Characteristic Leaching Procedure
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
< = Not detected above the laboratory reporting limit
--- = Not analyzed

TABLE 3
Summary of CAM17 Metals Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
DSGW1-1	1	<2.0	4.9	210	<1.0	<1.0	22	7.9	31	150	<1.0	35	2.2	<1.0	<1.0	28	120	0.23
DSGW1-5	5	<2.0	4.1	110	<1.0	<1.0	26	6.7	21	55	<1.0	33	1.6	<1.0	<1.0	26	82	<0.10
DSGW1-15.5	15.5	<2.0	4.5	110	<1.0	<1.0	22	7.0	13	4.0	<1.0	40	1.4	<1.0	<1.0	26	33	<0.10
MBGW1-1	1	<2.0	4.9	160	<1.0	<1.0	29	7.4	18	9.7	<1.0	35	1.2	<1.0	<1.0	28	44	0.68
MBGW1-5	5	<2.0	4.2	130	<1.0	<1.0	29	7.8	14	5.0	<1.0	40	1.1	<1.0	<1.0	29	37	0.11
MBGW1-15.5	15.5	<2.0	5.1	150	<1.0	<1.0	33	9.2	21	6.2	<1.0	51	1.4	<1.0	<1.0	30	52	<0.10
MBGW1-19.5	19.5	<2.0	2.9	140	<1.0	<1.0	38	5.9	19	5.0	<1.0	43	1.3	<1.0	<1.0	29	47	<0.10
MBGW2-1	1	<2.0	5.1	140	<1.0	<1.0	35	9.6	18	6.8	<1.0	47	1.7	<1.0	<1.0	32	41	<0.10
MBGW2-5	5	<2.0	3.8	93	<1.0	<1.0	24	5.2	13	5.6	<1.0	32	1.1	<1.0	<1.0	24	33	<0.10
MBGW2-23.5	23.5	<2.0	2.5	58	<1.0	<1.0	17	4.3	9.9	1.8	<1.0	24	<1.0	<1.0	<1.0	18	26	<0.10
RW1-1-1	1	<2.0	<1.0	33	<1.0	<1.0	28	14	41	<1.0	<1.0	31	2.2	<1.0	<1.0	58	51	<0.10
RW1-1-5	5	<2.0	2.8	150	<1.0	<1.0	34	7.2	17	4.9	<1.0	43	1.5	<1.0	<1.0	26	43	<0.10
RW1-2-1	1	<2.0	1.7	71	<1.0	<1.0	17	5.3	17	22	<1.0	25	1.1	<1.0	<1.0	25	41	<0.10
RW1-2-5	5	<2.0	2.7	95	<1.0	<1.0	26	8.4	26	29	<1.0	36	1.3	<1.0	<1.0	32	65	0.23
RW1-3-1	1	<2.0	2.0	76	<1.0	<1.0	26	7.9	29	28	<1.0	35	1.3	<1.0	<1.0	37	52	<0.10
RW1-3-5	5	<2.0	2.5	99	<1.0	<1.0	25	7.4	63	37	<1.0	32	1.7	<1.0	<1.0	41	94	0.19
RW1-4-1	1	<2.0	4.6	110	<1.0	<1.0	29	8.9	18	7.0	<1.0	41	2.2	<1.0	<1.0	28	50	<0.10
RW1-4-5	5	<2.0	3.2	98	<1.0	<1.0	27	8.4	21	15	<1.0	35	1.3	<1.0	<1.0	24	64	<0.10
RW1-4-19.5	19.5	<2.0	3.7	140	<1.0	<1.0	26	7.9	16	5.6	<1.0	31	1.5	<1.0	<1.0	26	39	<0.10
RW1-5-1	1	<2.0	3.4	180	<1.0	<1.0	32	9.8	29	4.8	<1.0	41	2.3	<1.0	<1.0	34	44	<0.10
RW1-5-5	5	<2.0	3.4	92	<1.0	<1.0	26	8.8	21	12	<1.0	32	1.4	<1.0	<1.0	36	42	0.15
RW2-1-1	1	<2.0	5.0	110	<1.0	<1.0	25	8.3	24	33	<1.0	32	2.0	<1.0	<1.0	32	62	0.14
RW2-1-5	5	17	11	58	<1.0	<1.0	14	8.6	43	4.6	<1.0	24	1.7	<1.0	<1.0	30	36	<0.10
RW2-1-14	14	<2.0	3.3	65	<1.0	<1.0	18	4.5	9.5	3.2	<1.0	21	1.0	<1.0	<1.0	21	28	<0.10

TABLE 3
Summary of CAM17 Metals Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
RW2-2-1	1	<2.0	5.1	130	<1.0	<1.0	28	8.5	32	71	<1.0	37	1.9	<1.0	<1.0	34	76	0.11
RW2-2-5	5	7.1	8.6	90	<1.0	<1.0	26	11	57	9.3	<1.0	34	2.1	<1.0	<1.0	44	60	0.10
RW3-2-1	1	4.5	8.5	120	<1.0	<1.0	31	12	46	50	<1.0	39	2.3	<1.0	<1.0	46	78	<0.10
RW3-2-5	5	<2.0	3.4	120	<1.0	<1.0	23	6.4	14	5.9	<1.0	32	1.5	<1.0	<1.0	21	33	<0.10
RW3-3-1	1	<2.0	2.9	75	<1.0	<1.0	33	12	41	27	<1.0	31	1.8	<1.0	<1.0	48	51	<0.10
RW3-3-5	5	<4.0	3.5	130	<2.0	<2.0	27	8.0	17	6.7	<2.0	37	<2.0	<2.0	<2.0	26	39	<0.10
RW4-1-1	1	<2.0	2.7	88	<1.0	<1.0	20	5.3	11	3.0	<1.0	28	<1.0	<1.0	<1.0	20	28	<0.10
RW4-1-5	5	<2.0	3.1	87	<1.0	<1.0	19	6.1	12	5.1	<1.0	29	1.2	<1.0	<1.0	22	35	<0.10
RW4-2-1	1	<2.0	4.1	130	<1.0	<1.0	20	7.6	27	89	<1.0	30	1.5	<1.0	<1.0	27	100	0.10
RW4-2-5	5	<2.0	3.6	130	<1.0	<1.0	30	8.2	19	4.4	<1.0	44	1.5	<1.0	<1.0	26	53	<0.10
RW4-2-19.5	19.5	<2.0	5.7	150	<1.0	<1.0	33	8.8	19	6.3	<1.0	45	1.5	<1.0	<1.0	33	50	<0.10
RW5-1-1	1	<2.0	5.4	140	<1.0	<1.0	37	9.4	39	120	<1.0	43	1.4	<1.0	<1.0	33	110	0.16
RW5-1-5	5	<2.0	5.0	180	<1.0	<1.0	34	11	20	6.5	<1.0	58	1.8	<1.0	<1.0	33	42	<0.10
RW5-1-19.5	19.5	<2.0	3.3	110	<1.0	<1.0	30	6.4	13	2.1	<1.0	37	1.0	<1.0	<1.0	22	27	<0.10
RW8-1-1	1	<2.0	3.3	76	<1.0	<1.0	24	7.5	24	60	<1.0	28	1.6	<1.0	<1.0	28	45	<0.10
RW8-1-5	5	<2.0	3.1	160	<1.0	<1.0	43	8.0	27	6.1	<1.0	55	2.3	<1.0	<1.0	38	52	<0.10
RW8-1-16	15.5	<2.0	3.9	120	<1.0	<1.0	23	6.7	17	11	<1.0	33	1.6	<1.0	<1.0	26	34	<0.10
RW8-2-1	1	<2.0	2.6	24	<1.0	<1.0	23	13	55	<1.0	<1.0	21	2.1	<1.0	<1.0	56	42	1.5
RW8-2-5	5	<2.0	3.7	120	<1.0	<1.0	26	9.1	17	5.1	<1.0	38	1.4	<1.0	<1.0	30	36	<0.10
SB-1-0	0	<2.0	7.1	170	<1.0	<1.0	35	11	48	92	<1.0	37	<1.0	<1.0	<1.0	46	160	0.15
SB-1-1	1	<2.0	5.7	160	<1.0	<1.0	36	9.1	29	110	<1.0	42	<1.0	<1.0	<1.0	34	65	0.20
SB-1-2	2	<2.0	4.0	130	<1.0	<1.0	33	8.5	31	66	<1.0	36	<1.0	<1.0	<1.0	51	53	0.21
SB-5-0	0	<2.0	7.8	170	<1.0	1.2	36	12	45	170	<1.0	42	<1.0	<1.0	<1.0	39	190	0.91
SB-5-1	1	<2.0	5.5	160	<1.0	<1.0	46	9.6	27	42	<1.0	57	<1.0	<1.0	<1.0	40	67	<0.10
SB-5-2	2	<2.0	3.8	160	<1.0	<1.0	28	6.7	23	35	<1.0	32	<1.0	<1.0	<1.0	36	67	0.15

TABLE 3
Summary of CAM17 Metals Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
SB-10-0	0	<2.0	2.8	160	<1.0	<1.0	35	7.4	210	71	<1.0	36	<1.0	<1.0	<1.0	36	220	20
																		<1.0
SB-10-1	1	<2.0	4.0	130	<1.0	1.1	35	7.6	35	120	<1.0	37	<1.0	<1.0	<1.0	36	190	0.24
SB-10-2	2	<2.0	3.6	100	<1.0	<1.0	35	10	40	45	<1.0	37	<1.0	<1.0	<1.0	44	58	0.11
SB-15-0	0	<2.0	3.9	160	<1.0	<1.0	38	8.4	40	51	<1.0	45	<1.0	<1.0	<1.0	38	250	0.18
SB-15-1	1	<2.0	2.6	89	<1.0	<1.0	23	6.0	32	42	<1.0	27	<1.0	<1.0	<1.0	35	50	<0.10
SB-15-2	2	<2.0	2.8	140	<1.0	<1.0	43	7.5	23	27	<1.0	46	<1.0	<1.0	<1.0	35	53	<0.10
SB-30-0	0	<2.0	3.2	49	<1.0	<1.0	9.3	6.2	53	17	<1.0	10	2.3	<1.0	<1.0	26	120	0.20
SB-30-1	1	<2.0	5.3	91	<1.0	<1.0	32	9.6	46	210	<1.0	34	2.1	<1.0	<1.0	39	130	0.11
SB-30-2	2	<2.0	4.5	33	<1.0	<1.0	75	19	150	29	<1.0	44	2.4	<1.0	<1.0	43	36	0.10
							<1.0											
SB-35-0	0	<2.0	3.6	95	<1.0	<1.0	22	5.8	20	36	<1.0	28	<1.0	<1.0	<1.0	23	82	0.11
SB-35-1	1	<2.0	4.6	140	<1.0	<1.0	32	8.9	24	44	<1.0	42	<1.0	<1.0	<1.0	33	57	0.13
SB-35-2	2	<2.0	5.5	490	<1.0	1.5	30	7.6	42	2,000	<1.0	39	<1.0	<1.0	<1.0	28	510	0.14
SB-40-0	0	<2.0	4.2	120	<1.0	<1.0	34	8.6	32	83	<1.0	39	<1.0	<1.0	<1.0	33	97	0.15
SB-40-1	1	<2.0	5.1	120	<1.0	<1.0	35	9.8	46	150	<1.0	39	<1.0	<1.0	<1.0	37	100	0.21
SB-40-2	2	<2.0	5.0	97	<1.0	<1.0	30	8.5	47	150	<1.0	32	<1.0	<1.0	<1.0	35	110	0.21
SB-45-0	0	<2.0	2.7	100	<1.0	<1.0	29	5.4	42	37	1.2	36	<1.0	<1.0	<1.0	23	230	0.33
SB-45-1	1	<2.0	5.6	160	<1.0	<1.0	41	9.0	34	42	<1.0	46	<1.0	<1.0	<1.0	37	89	0.14
SB-45-2	2	<2.0	6.5	170	<1.0	<1.0	39	9.3	27	59	<1.0	44	<1.0	<1.0	<1.0	37	80	<0.10
SB-50-0	0	<2.0	4.0	150	<1.0	1.1	44	12	58	56	1.7	44	<1.0	<1.0	<1.0	29	250	0.14
SB-50-1	1	<2.0	4.9	160	<1.0	<1.0	40	11	22	5.8	<1.0	54	<1.0	<1.0	<1.0	35	50	<0.10
SB-50-2	2	<2.0	4.2	130	<1.0	<1.0	38	6.6	19	5.4	<1.0	42	<1.0	<1.0	<1.0	32	43	<0.10
SB-55-0	0	6.0	11	180	<1.0	<1.0	23	11	48	79	<1.0	35	1.1	<1.0	<1.0	36	200	0.29
SB-55-1	1	8.5	11	280	<1.0	<1.0	18	13	50	86	<1.0	27	1.7	<1.0	<1.0	38	110	0.17
SB-55-2	2	7.5	9.7	180	<1.0	<1.0	27	12	50	92	<1.0	36	1.2	<1.0	<1.0	41	100	0.14

TABLE 3
Summary of CAM17 Metals Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury
SB-60-0	0	<2.0	3.9	190	<1.0	1.3	35	7.0	63	570	2.9	36	1.1	<1.0	<1.0	29	430	0.20
SB-60-1	1	<2.0	4.2	120	<1.0	<1.0	45	10	24	40	<1.0	78	<1.0	<1.0	<1.0	30	56	0.11
SB-60-2	2	<2.0	4.2	120	<1.0	<1.0	26	12	27	150	<1.0	36	<1.0	<1.0	<1.0	30	89	0.17
SB-65-0	0	<2.0	5.2	150	<1.0	<1.0	34	9.5	30	52	<1.0	42	1.1	<1.0	<1.0	38	100	0.11
SB-65-1	1	<2.0	4.7	140	<1.0	<1.0	39	10	43	20	<1.0	53	1.4	<1.0	<1.0	42	78	0.12
SB-65-2	2	3.2	7.0	140	<1.0	<1.0	30	9.1	31	42	<1.0	38	1.0	<1.0	<1.0	35	60	<0.10
SB-68-0	0	<2.0	4.1	170	<1.0	1.2	58 *<1.0*	7.7	81	81	4.3	36	<1.0	<1.0	<1.0	37	290	0.20
SB-68-1	1	<2.0	4.0	79	<1.0	<1.0	28	14	53	140	<1.0	26	1.3	<1.0	<1.0	93	62	0.28
SB-68-2	2	<2.0	2.9	78	<1.0	<1.0	15	9.5	35	81	<1.0	22	1.1	<1.0	<1.0	65	73	0.52
UPRR1-1	1	<2.0	4.0	110	<1.0	<1.0	35	8.2	31	93	<1.0	41	1.4	<1.0	<1.0	34	59	0.34
UPRR1-5	5	<2.0	4.6	170	<1.0	<1.0	37	9.7	22	6.7	<1.0	51	1.8	<1.0	<1.0	33	45	<0.10
UPRR1-12	12	<2.0	3.0	130	<1.0	<1.0	25	6.8	20	32	<1.0	31	1.3	<1.0	<1.0	30	52	<0.10
UPRR1-23.5	23.5	<2.0	2.9	150	<1.0	<1.0	30	13	15	5.1	<1.0	48	1.3	<1.0	<1.0	25	32	<0.10
ESLs																		
Shallow Soils (≤3 m bgs)																		
Residential Land Use		6.1	0.38	750	4.0	1.7	750*	40	230	200	40	150	10	20	1.2	15	600	1.0
Comm/Ind Land Use		40	1.5	1,500	8.0	7.4	750*	80	230	750	40	150	10	40	15	190	600	10

Notes:

Results are shown in milligrams per kilogram (mg/kg)

Results in italics are soluble metal concentrations analyzed using the Waste Extraction Test (WET), shown in units of milligrams per liter (mg/l), with the exception of mercury results, which are presented in micrograms per liter (ug/l).

<= Analyte was not detected above the laboratory reporting limit

ESLs = Environmental Screening Levels, SFRWQCB, November 2007, Tables A and C.

* = Value is for Chromium III, no standard for total chromium

TABLE 4
Summary of Organics Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	TPHd (mg/kg)	TPHg (mg/kg)	TPHmo (mg/kg)	BTEX (ug/kg)	MTBE (ug/kg)	VOCs (ug/kg)	SVOCs (mg/kg)
DSGW1-1	1	14	---	40	---	---	---	---
DSGW1-5	5	---	<1.0	---	ND	<5.0	---	---
DSGW1-15.5	15.5	---	<1.0	---	ND	<5.0	---	---
MBGW1-1	1	16	---	54	---	---	---	---
MBGW1-5	5	---	<1.0	---	ND	<5.0	---	---
MBGW1-15.5	15.5	---	<1.0	---	ND	<5.0	---	---
MBGW1-19.5	19.5	---	<1.0	---	ND	<5.0	---	---
MBGW2-1	1	1.6	---	3.0	---	---	---	---
MBGW2-5	5		<1.0	---	ND	<5.0	---	---
MBGW2-23.5	23.5	1.1	<1.0	1.5	ND	<5.0	---	---
RW1-1-1	1	1,100	---	6,700	---	---	---	---
RW1-1-5	5	---	<1.0	---	ND	<5.0	---	---
RW1-2-1	1	760	---	3,400	---	---	---	---
RW1-2-5	5	---	<1.0	---	ND	<5.0	---	---
RW1-3-1	1	910	---	4,100	---	---	---	---
RW1-3-5	5	---	<1.0	---	ND	<5.0	---	---
RW1-4-1	1	11	---	32	---	---	---	---
RW1-4-5	5	---	<1.0	---	ND	<5.0	---	---
RW1-4-19.5	19.5	1.1	<1.0	1.4	ND	<5.0	ND	---
RW1-5-1	1	21	---	81	---	---	---	---
RW1-5-5	5	---	<1.0	---	ND	<5.0	---	---
RW2-1-1	1	24	---	120	---	---	---	---
RW2-1-5	5	---	<1.0	---	ND	<5.0	---	---
RW2-1-14	14	---	<1.0	---	ND	<5.0	---	---
RW2-2-1	1	33	---	130	---	---	---	---
RW2-2-5	5	---	<1.0	---	ND	<5.0	---	---
RW3-2-1	1	68	---	280	---	---	---	---
RW3-2-5	5	---	<1.0	---	ND	<5.0	---	---
RW3-3-1	1	43	---	140	---	---	---	---
RW3-3-5	5	---	<1.0	---	ND	<5.0	---	---
RW4-1-1	1	8.9	---	25	---	---	---	---
RW4-1-5	5	---	<1.0	---	ND	<5.0	---	---

TABLE 4
Summary of Organics Results
Route I-880 Southbound Improvements Project
Alameda County, California

Sample ID	Sample Depth (ft)	TPHd (mg/kg)	TPHg (mg/kg)	TPHmo (mg/kg)	BTEX (ug/kg)	MTBE (ug/kg)	VOCs (ug/kg)	SVOCs (mg/kg)
RW4-2-1	1	88	---	390	---	---	---	---
RW4-2-5	5	---	<1.0	---	ND	<5.0	---	---
RW4-2-19.5	19.5	---	<1.0	---	ND	<5.0	ND	---
RW5-1-1	1	27	---	140	---	---	---	---
RW5-1-5	5	---	<1.0	---	ND	<5.0	---	---
RW5-1-19.5	19.5	---	<1.0	---	ND	---	ND	---
RW8-1-1	1	46	---	180	---	---	---	---
RW8-1-5	5	---	<1.0	---	ND	<5.0	---	---
RW8-1-16	15.5	---	<1.0	---	ND	<5.0	---	---
RW8-2-1	1	8.8	---	22	---	---	---	---
RW8-2-5	5	---	<1.0	---	ND	<5.0	---	---
UPRR1-1	1	10	---	21	---	---	---	ND
UPRR1-5	5	---	<1.0	---	ND	<5.0	---	ND
UPRR1-12	12	---	<1.0	---	ND	<5.0	---	ND
UPRR1-23.5	23.5	---	<1.0	---	ND	<5.0	---	ND
ESLs								
Shallow Soils (≤3 m bgs)								
Residential Land Use		83	83	410	---	23	---	---
Commercial/Industrial Land Use		83	83	2,500	---	23	---	---

Notes:
TPHmo = Total Petroleum Hydrocarbons as motor oil
TPHd = Total Petroleum Hydrocarbons as diesel
TPHg = Total Petroleum Hydrocarbons as gasoline
VOCs = Volatile Organic Compounds
mg/kg = milligrams per kilogram
ND = Not Detected above laboratory reporting limit
--- = Not Analyzed or Not Applicable
< = Not detected above the stated laboratory reporting limit
ESLs = Environmental Screening Levels, SFRWQCB, November 2007, Table A.
BTEX = Benzene, toluene, ethylbenzene, and xylenes
MTBE = Methyl-tert-butyl ether
SVOCs = Semi-volatile organic compounds
ug/kg = micrograms per kilogram

TABLE 5
Summary of CAM 17 Metals Results - Groundwater
Route I-880 Southbound Improvements Project
Alameda County, California

Sample I.D.	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury (ug/l)
DSGW1	<0.0050	<0.010	1.0	0.0038	0.0069	0.055	0.091	0.044	0.013	<0.0050	0.39	0.011	<0.0030	<0.015	0.057	0.38	<0.20
MBGW2	<0.0050	<0.010	1.9	<0.0030	<0.0030	0.022	0.027	0.043	<0.0050	0.0077	0.068	<0.010	<0.0030	<0.015	0.082	0.11	<0.20
RW2-1	<0.0050	<0.010	1.5	0.0062	0.0061	0.033	0.11	0.089	<0.0050	<0.0050	0.34	<0.010	<0.0030	<0.015	0.061	0.23	<0.20
RW3-2	<0.0050	0.021	1.5	0.0058	0.0062	0.0065	0.084	0.036	<0.0050	<0.0050	0.17	<0.010	<0.0030	<0.015	0.053	0.091	<0.20
RW8-1	<0.0050	0.011	0.48	<0.0030	<0.0030	<0.0030	0.029	0.019	<0.0050	<0.0050	0.058	<0.010	<0.0030	<0.015	0.038	0.049	<0.20
UPRR1	<0.0050	<0.010	2.0	<0.0030	<0.0030	0.0042	0.023	0.0072	<0.0050	<0.0050	0.025	0.013	<0.0030	<0.015	0.040	0.074	<0.20
WQOs																	
Municipal Supply	0.006	0.05	1.0	0.004	0.005	0.05	---	1.0	0.05	---	0.1	0.05	0.1	0.002	---	5.0	0.002
Agricultural Supply	---	2.0	---	0.5	0.5	1.0	5.0	5.0	10.0	0.05	2.0	0.02	---	---	1.0	10.0	---
California MCLs																	
Primary	0.006	0.05	1.0	0.004	0.005	0.05	---	---	---	---	0.1	0.05	---	0.002	---	---	2.0
Secondary	---	---	---	---	---	---	---	1.0	---	---	---	---	0.1	---	---	5.0	---
ESLs																	
GW IS Current/Potential Source of Drinking Water	0.006	0.050	1.0	0.004	0.005	0.05	0.14	1.0	0.015	0.035	0.1	0.050	0.035	0.002	0.015	5.0	2.0
GW IS NOT Current/Potential Source of Drinking Water	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Surface Water Bodies																	
Freshwater	6	0.14	1.0	0.004	0.005	0.05	0.14	1.0	0.015	0.035	0.1	0.05	0.035	0.002	0.015	5.0	5.1E-05
Marine	4,300	0.14	50	50	50	50	50	50	50	50	4.6	50	50	0.0063	50	50	5.1E-05
Estuarine	4,300	0.14	50	50	50	50	50	50	50	50	4.6	50	50	0.0063	50	50	5.1E-05

Notes:

Data are shown in units of milligrams per liter (mg/l), with the exception of mercury, which is presented in micrograms per liter (ug/l).
< = Not detected above the stated laboratory reporting limit
WQOs = Water Quality Objectives, SFRWQCB Basin Plan, Table 3-5 - WQO for Municipal Supply, January 2007.
MCLs = Maximum Contaminant Levels, Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003.
ESLs = Environmental Screening Levels, San Francisco Regional Water Quality Control Board (SFRWQCB), November 2007, Tables A, C and F.
GW = Groundwater
--- = Not Analyzed or No Standard

TABLE 6
Summary of Organics Results - Groundwater
Route I-880 Southbound Improvements Project
Alameda County, California

Sample I.D.	TPHd (mg/l)	TPHg (mg/l)	TPHmo (mg/l)	BTEX (ug/l)	MTBE (ug/l)	VOCs (ug/l)	SVOCs (ug/l)
DSGW1	0.10	<0.050	0.12	ND	<0.50	Tetrachloroethene=3.8 Trichloroethene=0.57	---
MBGW2	0.060	<0.050	0.070	ND	<0.50	1,1-Dichloroethene=0.53 Tetrachloroethene=32 Trichloroethene=5.5	---
RW2-1	0.079	<0.050	0.099	ND	<0.50	ND	---
RW3-2	0.078	<0.050	0.089	ND	<0.50	Dichlorodifluoromethane=1.8 Tetrachloroethene=13 Trichloroethene=2.5	---
RW8-1	0.25	<0.050	0.24	ND	<0.50	ND	---
UPRR1	0.078	<0.050	0.090	ND	<0.50	ND	ND
WQOs Municipal Supply	---	---	---	---	---	1,1-Dichloroethene=6.0 Tetrachloroethene=5.0 Trichloroethene=5.0	---
California MCLs Primary Standards	---	---	---	---	---	1,1-Dichloroethene=6.0 Tetrachloroethene=5.0 Trichloroethene=5.0	---
ESLs GW IS Current/Potential Source of Drinking Water	1.0	1.0	1.0	---	---	1,1-Dichloroethene=6.0 Tetrachloroethene=5.0 Trichloroethene=5.0	---
Surface Water Bodies Freshwater	1.0	1.0	1.0	---	---	1,1-Dichloroethene=3.2 Tetrachloroethene=5.0 Trichloroethene=5.0	--- ---
Marine/Estuarine	2.5	5.0	2.5	---	---	1,1-Dichloroethene=3.2 Tetrachloroethene=8.9 Trichloroethene=81	---

Notes:

mg/l = milligrams per liter
TPHd = Total Petroleum Hydrocarbons as diesel
TPHg = Total Petroleum Hydrocarbons as gasoline
TPHmo = Total Petroleum Hydrocarbons as motor oil
ND = No analytes detected above the method detection limit
< = Analyte was not detected above the laboratory reporting limit
WQOs = Water Quality Objective, SFRWQCB Basin Plan, Table 3-5 - WQO for Municipal Supply, January 2007
MCLs = Maximum Contaminant Levels, Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003
ESLs = Environmental Screening Levels, SFRWQCB, November 2007, Tables A, C and F.

ug/l = micrograms per liter
VOCs = Volatile organic compounds
SVOCs = Semi-volatile organic compounds
--- = No Standard

TABLE 7a
Summary of Statistical Analysis
Route I-880 Southbound Improvements Project
Alameda County, California

Shoulder Borings SB1 through SB7

TOTAL LEAD UCLs

	Total Lead (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	126.9	132.7
1 to 1.5 ft	95.4	101.1
2 to 2.5 ft	51.9	54.7

EXCAVATION SCENARIOS

	90% UCL		95% UCL	
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)
0 to 1 ft	127	8.6	133	9.0
Underlying Soil (1 to 2.5 ft)	*81*	*5.5*	*86*	*5.8*
0 to 2 ft	111	7.5	117	7.9
Underlying Soil (2 to 2.5 ft)	*52*	*3.5*	*55*	*3.7*
0 to 2.5 ft	99	6.7	104	7.1

Notes:

UCL = Upper Confidence Level (90% UCL is applicable for onsite reuse; 95% UCL is applicable for offsite reuse/disposal)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.0678\ x$

TABLE 7b
Summary of Statistical Analysis
Route I-880 Southbound Improvements Project
Alameda County, California

Shoulder Borings SB8 through SB18 and Retaining Wall Borings RW8-1 and RW8-2

TOTAL LEAD UCLs

	Total Lead (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	43.8	45.4
1 to 1.5 ft	64.1	68.0
2 to 2.5 ft	39.7	41.2

EXCAVATION SCENARIOS

	90% UCL		95% UCL	
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)
0 to 1 ft	44	3.0	45	3.1
Underlying Soil (1 to 2.5 ft)	*56*	*3.8*	*59*	*4.0*
0 to 2 ft	54	3.7	57	3.8
Underlying Soil (2 to 2.5 ft)	*40*	*2.7*	*41*	*2.8*
0 to 2.5 ft	51	3.5	54	3.6

Notes:

UCL = Upper Confidence Level (90% UCL is applicable for onsite reuse; 95% UCL is applicable for offsite reuse/disposal)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.0678\ x$

TABLE 7c
Summary of Statistical Analysis
Route I-880 Southbound Improvements Project
Alameda County, California

Shoulder Borings SB28 through SB34 and Retaining Wall Boring RW5-1

TOTAL LEAD UCLs

	Total Lead (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	46.6	49.6
1 to 1.5 ft	142.4	152.3
2 to 2.5 ft	105.6	119.1

EXCAVATION SCENARIOS

	90% UCL		95% UCL	
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)
0 to 1 ft	47	3.2	50	3.4
Underlying Soil (1 to 2.5 ft)	*130*	*8.8*	*141*	*9.6*
0 to 2 ft	94	6.4	101	6.8
Underlying Soil (2 to 2.5 ft)	*106*	*7.2*	*119*	*8.1*
0 to 2.5 ft	97	6.6	105	7.1

Notes:

UCL = Upper Confidence Level (90% UCL is applicable for onsite reuse; 95% UCL is applicable for offsite reuse/disposal)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.0678\ x$

TABLE 7d*
Summary of Statistical Analysis
Route I-880 Southbound Improvements Project
Alameda County, California

Shoulder Borings SB35 through SB50, and Retaining Wall/Structure Borings DSGW1, RW1-1 through RW1-5, RW2-1, RW2-2, RW3-2, RW3-3, RW4-1, and RW4-2 (*excluding outlier sample SB35-2)

TOTAL LEAD UCLs

	Total Lead (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	62.6	65.3
1 to 1.5 ft	48.1	50.7
2 to 2.5 ft	45.8	49.4

EXCAVATION SCENARIOS

	90% UCL		95% UCL	
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)
0 to 1 ft	63	4.2	65	4.4
Underlying Soil (1 to 2.5 ft)	*47*	*3.2*	*50*	*3.4*
0 to 2 ft	55	3.8	58	3.9
Underlying Soil (2 to 2.5 ft)	*46*	*3.1*	*49*	*3.3*
0 to 2.5 ft	53	3.6	56	3.8

Notes:

UCL = Upper Confidence Level (90% UCL is applicable for onsite reuse; 95% UCL is applicable for offsite reuse/disposal)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
* = Soluble (WET) lead concentrations are predicted using slope of regression line, where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.0678\ x$

TABLE 7e
Summary of Statistical Analysis
Route I-880 Southbound Improvements Project
Alameda County, California

Shoulder Borings SB51 through SB68 and Marina Boulevard Structure Borings MBGW1 and MBGW2

TOTAL LEAD UCLs

	Total Lead (mg/kg)	
	90% UCL	95% UCL
0 to 0.5 ft	221.2	238.2
1 to 1.5 ft	64.1	68.5
2 to 2.5 ft	172.0	191.6

EXCAVATION SCENARIOS

	90% UCL		95% UCL	
Excavation Depth	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)	Total Lead (mg/kg)	Soluble (WET) Lead* (mg/l)
0 to 1 ft	221	15	238	16
Underlying Soil (1 to 2.5 ft)	*100*	*6.8*	*110*	*7.4*
0 to 2 ft	143	9.7	153	10
Underlying Soil (2 to 2.5 ft)	*172*	*12*	*192*	*13*
0 to 2.5 ft	149	10	161	11

Notes:

UCL = Upper Confidence Level (90% UCL is applicable for onsite reuse; 95% UCL is applicable for offsite reuse/disposal)
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
* = Soluble (WET) lead concentrations are predicted using slope of regression line,
where y = predicted soluble (WET) lead and x = total lead.

Regression Line Slope: $y = 0.0678\ x$

APPENDIX A

November 18, 2008

Lauren Wincze
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102020

RE: I-880 SB HOV, E8449-06-01

Attention: Lauren Wincze

Enclosed are the results for sample(s) received on November 05, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CASE NARRATIVE

Analytical Comments for Method 6010

Dilution was necessary for samples 102020-001A, 102020-002A, 102020-003A, 102020-013A, 102020-028A, 102020-029A, 102020-043A, 102020-057A, 102020-070A, 102020-071A, 102020-072A, 102020-087A, 102020-100A, 102020-115A, 102020-116A, 102020-117A, 102020-130A, 102020-132A, 102020-145A, 102020-154A, 102020-155A and 102020-156A, due to sample matrix.

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for samples 102020-009AMS, 102020-009AMSD, 102020-043AMS, 102020-043AMSD, 102020-057AMS, 102020-132AMS and 102020-153AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

RPD for Duplicate (DUP) and/or Matrix Spike (MS)/Matrix Spike Duplicate (MSD) are outside criteria for samples 102020-009AMSD, 102020-016ADUP, 102020-039ADUP, 102020-043ADUP, 102020-057ADUP, 102020-078ADUP, 102020-086ADUP, 102020-091ADUP, 102020-104ADUP, 102020-114ADUP, 102020-132ADUP, 102020-140ADUP, 102020-156ADUP and 102134-003ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Analytical Comments for Method 7420

Dilution was necessary for samples 102020-106A, 102020-124A, 102020-127A, 102020-152A and 102020-153A, due to sample matrix.

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for samples 102020-153AMS and 102020-153AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Analytical Comments for Method 7471

Dilution was necessary for sample 102020-028A, due to sample matrix.

RPD for Sample Duplicate (DUP) is outside criteria for samples 102020-043ADUP and 102020-132ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-004A	SB-2-0	43	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-005A	SB-2-1	20	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-006A	SB-2-2	17	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-007A	SB-3-0	120	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-008A	SB-3-1	120	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-009A	SB-3-2	49	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-010A	SB-4-0	66	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-011A	SB-4-1	43	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-012A	SB-4-2	52	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-016A	SB-6-0	160	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-017A	SB-6-1	130	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-018A	SB-6-2	20	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-019A	SB-7-0	94	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-020A	SB-7-1	65	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-021A	SB-7-2	63	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-022A	SB-8-0	51	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-023A	SB-8-1	12	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-024A	SB-8-2	7.4	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-025A	SB-9-0	39	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-026A	SB-9-1	35	mg/Kg	49924	5.0	1	11/4/2008	11/6/2008
102020-027A	SB-9-2	49	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-031A	SB-11-0	27	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-032A	SB-11-1	56	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-033A	SB-11-2	43	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-034A	SB-12-0	36	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-035A	SB-12-1	94	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-036A	SB-12-2	55	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-037A	SB-13-0	37	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-038A	SB-13-1	36	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-039A	SB-13-2	40	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-040A	SB-14-0	22	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-041A	SB-14-1	110	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-042A	SB-14-2	44	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-046A	SB-16-0	37	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-047A	SB-16-1	25	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-048A	SB-16-2	18	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-049A	SB-17-0	24	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-050A	SB-17-1	52	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-051A	SB-17-2	23	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-052A	SB-18-0	27	mg/Kg	49925	5.0	1	11/4/2008	11/6/2008
102020-053A	SB-18-1	33	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-054A	SB-18-2	25	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-058A	SB36-0	33	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-059A	SB36-1	ND	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-060A	SB36-2	ND	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-061A	SB37-0	35	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-062A	SB37-1	8.0	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-063A	SB37-2	5.5	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-064A	SB38-0	31	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-065A	SB38-1	69	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-066A	SB38-2	42	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-067A	SB39-0	47	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-068A	SB39-1	44	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-069A	SB39-2	40	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-073A	SB41-0	160	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-074A	SB41-1	61	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-075A	SB41-2	ND	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-076A	SB42-0	54	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-077A	SB42-1	17	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-078A	SB42-2	9.3	mg/Kg	49926	5.0	1	11/4/2008	11/6/2008
102020-079A	SB43-0	39	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-080A	SB43-1	79	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-081A	SB43-2	87	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-082A	SB44-0	57	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-083A	SB44-1	23	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-084A	SB44-2	36	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-088A	SB46-0	59	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-089A	SB46-1	14	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-090A	SB46-2	30	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-091A	SB47-0	ND	mg/Kg	49927	5.0	1	11/4/2008	11/6/2008
102020-092A	SB47-1	13	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-093A	SB47-2	6.7	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-094A	SB48-0	35	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-095A	SB48-1	6.8	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-096A	SB48-2	14	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-097A	SB49-0	66	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-098A	SB49-1	12	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-099A	SB49-2	ND	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-103A	SB51-0	120	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-104A	SB51-1	36	mg/Kg	49927	5.0	1	11/4/2008	11/7/2008
102020-105A	SB51-2	6.0	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-106A	SB52-0	380	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-107A	SB52-1	15	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-108A	SB52-2	9.6	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-109A	SB53-0	130	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-110A	SB53-1	94	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-111A	SB53-2	14	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-112A	SB54-0	180	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-113A	SB54-1	40	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-114A	SB54-2	99	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-118A	SB56-0	26	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-119A	SB56-1	13	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-120A	SB56-2	55	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-121A	SB57-0	35	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-122A	SB57-1	12	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-123A	SB57-2	11	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-124A	SB58-0	670	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-125A	SB58-1	33	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-126A	SB58-2	150	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-127A	SB59-0	270	mg/Kg	49928	5.0	1	11/4/2008	11/7/2008
102020-128A	SB59-1	140	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-129A	SB59-2	130	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-133A	SB61-0	190	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-134A	SB61-1	37	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-135A	SB61-2	5.9	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-136A	SB62-0	140	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-137A	SB62-1	11	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-138A	SB62-2	22	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-139A	SB63-0	120	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-140A	SB63-1	27	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-141A	SB63-2	12	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-142A	SB64-0	9.8	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-143A	SB64-1	56	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-144A	SB64-2	5.3	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-148A	SB66-0	6.4	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-149A	SB66-1	6.1	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-150A	SB66-2	85	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-151A	SB67-0	67	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-152A	SB67-1	180	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008
102020-153A	SB67-2	1000	mg/Kg	50029	5.0	1	11/4/2008	11/7/2008
102020-153A	SB67-2	970	mg/Kg	49929	5.0	1	11/4/2008	11/7/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-007A	SB-3-0	5.4	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-008A	SB-3-1	8.0	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-010A	SB-4-0	3.9	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-012A	SB-4-2	2.5	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-016A	SB-6-0	6.5	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-017A	SB-6-1	9.3	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-019A	SB-7-0	6.9	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-020A	SB-7-1	2.4	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-021A	SB-7-2	1.1	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-022A	SB-8-0	3.3	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-032A	SB-11-1	3.2	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-035A	SB-12-1	3.5	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-036A	SB-12-2	3.6	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-041A	SB-14-1	2.3	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-050A	SB-17-1	0.36	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-065A	SB38-1	4.2	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-073A	SB41-0	6.9	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-074A	SB41-1	4.3	mg/L	50065	0.25	1	11/4/2008	11/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-076A	SB42-0	4.3	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-080A	SB43-1	3.1	mg/L	50065	0.25	1	11/4/2008	11/13/2008
102020-081A	SB43-2	3.8	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-082A	SB44-0	3.3	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-088A	SB46-0	5.1	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-097A	SB49-0	2.8	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-103A	SB51-0	9.3	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-106A	SB52-0	34	mg/L	50066	1.0	4	11/4/2008	11/13/2008
102020-109A	SB53-0	5.7	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-110A	SB53-1	3.0	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-112A	SB54-0	8.3	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-114A	SB54-2	2.3	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-120A	SB56-2	1.6	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-124A	SB58-0	58	mg/L	50066	2.5	10	11/4/2008	11/13/2008
102020-126A	SB58-2	8.8	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-127A	SB59-0	13	mg/L	50066	0.50	2	11/4/2008	11/13/2008
102020-128A	SB59-1	5.7	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-129A	SB59-2	8.0	mg/L	50066	0.25	1	11/4/2008	11/13/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-133A	SB61-0	9.2	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-136A	SB62-0	3.2	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-139A	SB63-0	5.4	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-143A	SB64-1	2.9	mg/L	50066	0.25	1	11/4/2008	11/13/2008
102020-150A	SB66-2	2.3	mg/L	50067	0.25	1	11/4/2008	11/13/2008
102020-151A	SB67-0	4.7	mg/L	50067	0.25	1	11/4/2008	11/13/2008
102020-152A	SB67-1	13	mg/L	50067	0.50	2	11/4/2008	11/13/2008
102020-153A	SB67-2	76	mg/L	50067	2.5	10	11/4/2008	11/13/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

pH
EPA 9045C

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	pH	**Analyst:**	MFP

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-004A	SB-2-0	7.5	pH Units	R101348	0.10	1	11/4/2008	11/6/2008
102020-010A	SB-4-0	8.0	pH Units	R101348	0.10	1	11/4/2008	11/6/2008
102020-020A	SB-7-1	7.6	pH Units	R101348	0.10	1	11/4/2008	11/6/2008
102020-031A	SB-11-0	7.6	pH Units	R101348	0.10	1	11/4/2008	11/6/2008
102020-040A	SB-14-0	7.2	pH Units	R101348	0.10	1	11/4/2008	11/6/2008
102020-050A	SB-17-1	8.4	pH Units	R101348	0.10	1	11/4/2008	11/6/2008
102020-060A	SB36-2	7.1	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-069A	SB39-2	7.5	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-080A	SB43-1	7.0	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-090A	SB46-2	7.8	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-099A	SB49-2	7.4	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-109A	SB53-0	7.4	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-119A	SB56-1	7.3	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-129A	SB59-2	6.8	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-139A	SB63-0	7.2	pH Units	R101349	0.10	1	11/4/2008	11/6/2008
102020-150A	SB66-2	7.9	pH Units	R101349	0.10	1	11/4/2008	11/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-1-0
Lab Order:	102020	**Collection Date:**	11/4/2008 10:15:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-001A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 05:25 PM
Arsenic	7.1	1.0		mg/Kg	1	11/8/2008 05:25 PM
Barium	170	1.0		mg/Kg	1	11/8/2008 05:25 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 05:25 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 05:25 PM
Chromium	35	1.0		mg/Kg	1	11/8/2008 05:25 PM
Cobalt	11	1.0		mg/Kg	1	11/8/2008 05:25 PM
Copper	48	2.0		mg/Kg	1	11/8/2008 05:25 PM
Lead	92	1.0		mg/Kg	1	11/8/2008 05:25 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 05:25 PM
Nickel	37	1.0		mg/Kg	1	11/8/2008 05:25 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 05:25 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 05:25 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 05:25 PM
Vanadium	46	1.0		mg/Kg	1	11/8/2008 05:25 PM
Zinc	160	1.0		mg/Kg	1	11/8/2008 05:25 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	2.5	1.0		mg/L	20	11/17/2008 01:35 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.15	0.10		mg/Kg	1	11/7/2008 01:28 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-1-1
Lab Order:	102020	**Collection Date:**	11/4/2008 10:15:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-002A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 05:30 PM
Arsenic	5.7	1.0		mg/Kg	1	11/8/2008 05:30 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 05:30 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 05:30 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 05:30 PM
Chromium	36	1.0		mg/Kg	1	11/8/2008 05:30 PM
Cobalt	9.1	1.0		mg/Kg	1	11/8/2008 05:30 PM
Copper	29	2.0		mg/Kg	1	11/8/2008 05:30 PM
Lead	110	1.0		mg/Kg	1	11/8/2008 05:30 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 05:30 PM
Nickel	42	1.0		mg/Kg	1	11/8/2008 05:30 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 05:30 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 05:30 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 05:30 PM
Vanadium	34	1.0		mg/Kg	1	11/8/2008 05:30 PM
Zinc	65	1.0		mg/Kg	1	11/8/2008 05:30 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	7.4	1.0		mg/L	20	11/17/2008 01:38 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.20	0.10		mg/Kg	1	11/7/2008 01:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-1-2
Lab Order:	102020	**Collection Date:**	11/4/2008 10:15:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-003A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 05:34 PM
Arsenic	4.0	1.0		mg/Kg	1	11/8/2008 05:34 PM
Barium	130	1.0		mg/Kg	1	11/8/2008 05:34 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 05:34 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 05:34 PM
Chromium	33	1.0		mg/Kg	1	11/8/2008 05:34 PM
Cobalt	8.5	1.0		mg/Kg	1	11/8/2008 05:34 PM
Copper	31	2.0		mg/Kg	1	11/8/2008 05:34 PM
Lead	66	1.0		mg/Kg	1	11/8/2008 05:34 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 05:34 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 05:34 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 05:34 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 05:34 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 05:34 PM
Vanadium	51	1.0		mg/Kg	1	11/8/2008 05:34 PM
Zinc	53	1.0		mg/Kg	1	11/8/2008 05:34 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	11	1.0		mg/L	20	11/17/2008 01:40 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.21	0.10		mg/Kg	1	11/7/2008 01:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102020
Project: I-880 SB HOV, E8449-06-01
Lab ID: 102020-013A

Client Sample ID: SB-5-0
Collection Date: 11/4/2008 10:45:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 05:39 PM
Arsenic	7.8	1.0		mg/Kg	1	11/8/2008 05:39 PM
Barium	170	1.0		mg/Kg	1	11/8/2008 05:39 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 05:39 PM
Cadmium	1.2	1.0		mg/Kg	1	11/8/2008 05:39 PM
Chromium	36	1.0		mg/Kg	1	11/8/2008 05:39 PM
Cobalt	12	1.0		mg/Kg	1	11/8/2008 05:39 PM
Copper	45	2.0		mg/Kg	1	11/8/2008 05:39 PM
Lead	170	1.0		mg/Kg	1	11/8/2008 05:39 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 05:39 PM
Nickel	42	1.0		mg/Kg	1	11/8/2008 05:39 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 05:39 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 05:39 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 05:39 PM
Vanadium	39	1.0		mg/Kg	1	11/8/2008 05:39 PM
Zinc	190	1.0		mg/Kg	1	11/8/2008 05:39 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	7.8	1.2		mg/L	25	11/17/2008 04:17 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.91	0.10		mg/Kg	1	11/7/2008 01:37 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-5-1
Lab Order:	102020	**Collection Date:**	11/4/2008 10:45:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-014A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 05:52 PM
Arsenic	5.5	1.0		mg/Kg	1	11/8/2008 05:52 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 05:52 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 05:52 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 05:52 PM
Chromium	46	1.0		mg/Kg	1	11/8/2008 05:52 PM
Cobalt	9.6	1.0		mg/Kg	1	11/8/2008 05:52 PM
Copper	27	2.0		mg/Kg	1	11/8/2008 05:52 PM
Lead	42	1.0		mg/Kg	1	11/8/2008 05:52 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 05:52 PM
Nickel	57	1.0		mg/Kg	1	11/8/2008 05:52 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 05:52 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 05:52 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 05:52 PM
Vanadium	40	1.0		mg/Kg	1	11/8/2008 05:52 PM
Zinc	67	1.0		mg/Kg	1	11/8/2008 05:52 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/7/2008 01:39 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-5-2
Lab Order:	102020	**Collection Date:**	11/4/2008 10:45:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-015A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 05:56 PM
Arsenic	3.8	1.0		mg/Kg	1	11/8/2008 05:56 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 05:56 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 05:56 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 05:56 PM
Chromium	28	1.0		mg/Kg	1	11/8/2008 05:56 PM
Cobalt	6.7	1.0		mg/Kg	1	11/8/2008 05:56 PM
Copper	23	2.0		mg/Kg	1	11/8/2008 05:56 PM
Lead	35	1.0		mg/Kg	1	11/8/2008 05:56 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 05:56 PM
Nickel	32	1.0		mg/Kg	1	11/8/2008 05:56 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 05:56 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 05:56 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 05:56 PM
Vanadium	36	1.0		mg/Kg	1	11/8/2008 05:56 PM
Zinc	67	1.0		mg/Kg	1	11/8/2008 05:56 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.15	0.10		mg/Kg	1	11/7/2008 01:41 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-10-0
Lab Order:	102020	**Collection Date:**	11/4/2008 12:25:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-028A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 06:01 PM
Arsenic	2.8	1.0		mg/Kg	1	11/8/2008 06:01 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 06:01 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 06:01 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 06:01 PM
Chromium	35	1.0		mg/Kg	1	11/8/2008 06:01 PM
Cobalt	7.4	1.0		mg/Kg	1	11/8/2008 06:01 PM
Copper	210	2.0		mg/Kg	1	11/8/2008 06:01 PM
Lead	71	1.0		mg/Kg	1	11/8/2008 06:01 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 06:01 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 06:01 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 06:01 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 06:01 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 06:01 PM
Vanadium	36	1.0		mg/Kg	1	11/8/2008 06:01 PM
Zinc	220	1.0		mg/Kg	1	11/8/2008 06:01 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	1.6	1.0		mg/L	20	11/17/2008 01:45 PM
MERCURY BY WET EXTRACTION						
				WET/ EPA 7470A		
RunID: AA5_081117C	QC Batch: 50235				PrepDate: 11/14/2008	Analyst: **AMT**
Mercury	ND	1.0		µg/L	1	11/17/2008 01:57 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	20	2.0		mg/Kg	20	11/7/2008 02:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-10-1
Lab Order:	102020	**Collection Date:**	11/4/2008 12:25:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-029A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 06:05 PM
Arsenic	4.0	1.0		mg/Kg	1	11/8/2008 06:05 PM
Barium	130	1.0		mg/Kg	1	11/8/2008 06:05 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 06:05 PM
Cadmium	1.1	1.0		mg/Kg	1	11/8/2008 06:05 PM
Chromium	35	1.0		mg/Kg	1	11/8/2008 06:05 PM
Cobalt	7.6	1.0		mg/Kg	1	11/8/2008 06:05 PM
Copper	35	2.0		mg/Kg	1	11/8/2008 06:05 PM
Lead	120	1.0		mg/Kg	1	11/8/2008 06:05 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 06:05 PM
Nickel	37	1.0		mg/Kg	1	11/8/2008 06:05 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 06:05 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 06:05 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 06:05 PM
Vanadium	36	1.0		mg/Kg	1	11/8/2008 06:05 PM
Zinc	190	1.0		mg/Kg	1	11/8/2008 06:05 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	8.2	1.0		mg/L	20	11/17/2008 01:52 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.24	0.10		mg/Kg	1	11/7/2008 01:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-10-2
Lab Order:	102020	**Collection Date:**	11/4/2008 12:25:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-030A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 06:10 PM
Arsenic	3.6	1.0		mg/Kg	1	11/8/2008 06:10 PM
Barium	100	1.0		mg/Kg	1	11/8/2008 06:10 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 06:10 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 06:10 PM
Chromium	35	1.0		mg/Kg	1	11/8/2008 06:10 PM
Cobalt	10	1.0		mg/Kg	1	11/8/2008 06:10 PM
Copper	40	2.0		mg/Kg	1	11/8/2008 06:10 PM
Lead	45	1.0		mg/Kg	1	11/8/2008 06:10 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 06:10 PM
Nickel	37	1.0		mg/Kg	1	11/8/2008 06:10 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 06:10 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 06:10 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 06:10 PM
Vanadium	44	1.0		mg/Kg	1	11/8/2008 06:10 PM
Zinc	58	1.0		mg/Kg	1	11/8/2008 06:10 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/7/2008 01:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102020
Project: I-880 SB HOV, E8449-06-01
Lab ID: 102020-043A

Client Sample ID: SB-15-0
Collection Date: 11/4/2008 1:30:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108C	QC Batch: 49952				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 06:15 PM
Arsenic	3.9	1.0		mg/Kg	1	11/8/2008 06:15 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 06:15 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 06:15 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 06:15 PM
Chromium	38	1.0		mg/Kg	1	11/8/2008 06:15 PM
Cobalt	8.4	1.0		mg/Kg	1	11/8/2008 06:15 PM
Copper	40	2.0		mg/Kg	1	11/8/2008 06:15 PM
Lead	51	1.0		mg/Kg	1	11/8/2008 06:15 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 06:15 PM
Nickel	45	1.0		mg/Kg	1	11/8/2008 06:15 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 06:15 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 06:15 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 06:15 PM
Vanadium	38	1.0		mg/Kg	1	11/8/2008 06:15 PM
Zinc	250	1.0		mg/Kg	1	11/8/2008 06:15 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	1.5	1.0		mg/L	20	11/17/2008 01:54 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107D	QC Batch: 49948				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.18	0.10		mg/Kg	1	11/7/2008 01:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-15-1
Lab Order:	102020	**Collection Date:**	11/4/2008 1:30:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-044A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 06:56 PM
Arsenic	2.6	1.0		mg/Kg	1	11/8/2008 06:56 PM
Barium	89	1.0		mg/Kg	1	11/8/2008 06:56 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 06:56 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 06:56 PM
Chromium	23	1.0		mg/Kg	1	11/8/2008 06:56 PM
Cobalt	6.0	1.0		mg/Kg	1	11/8/2008 06:56 PM
Copper	32	2.0		mg/Kg	1	11/8/2008 06:56 PM
Lead	42	1.0		mg/Kg	1	11/8/2008 06:56 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 06:56 PM
Nickel	27	1.0		mg/Kg	1	11/8/2008 06:56 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 06:56 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 06:56 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 06:56 PM
Vanadium	35	1.0		mg/Kg	1	11/8/2008 06:56 PM
Zinc	50	1.0		mg/Kg	1	11/8/2008 06:56 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/7/2008 02:36 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-15-2
Lab Order:	102020	**Collection Date:**	11/4/2008 1:30:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-045A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:00 PM
Arsenic	2.8	1.0		mg/Kg	1	11/8/2008 07:00 PM
Barium	140	1.0		mg/Kg	1	11/8/2008 07:00 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:00 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:00 PM
Chromium	43	1.0		mg/Kg	1	11/8/2008 07:00 PM
Cobalt	7.5	1.0		mg/Kg	1	11/8/2008 07:00 PM
Copper	23	2.0		mg/Kg	1	11/8/2008 07:00 PM
Lead	27	1.0		mg/Kg	1	11/8/2008 07:00 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:00 PM
Nickel	46	1.0		mg/Kg	1	11/8/2008 07:00 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:00 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:00 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:00 PM
Vanadium	35	1.0		mg/Kg	1	11/8/2008 07:00 PM
Zinc	53	1.0		mg/Kg	1	11/8/2008 07:00 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/7/2008 02:38 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB35-0
Lab Order:	102020	**Collection Date:**	11/4/2008 10:27:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-055A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:05 PM
Arsenic	3.6	1.0		mg/Kg	1	11/8/2008 07:05 PM
Barium	95	1.0		mg/Kg	1	11/8/2008 07:05 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:05 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:05 PM
Chromium	22	1.0		mg/Kg	1	11/8/2008 07:05 PM
Cobalt	5.8	1.0		mg/Kg	1	11/8/2008 07:05 PM
Copper	20	2.0		mg/Kg	1	11/8/2008 07:05 PM
Lead	36	1.0		mg/Kg	1	11/8/2008 07:05 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:05 PM
Nickel	28	1.0		mg/Kg	1	11/8/2008 07:05 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:05 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:05 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:05 PM
Vanadium	23	1.0		mg/Kg	1	11/8/2008 07:05 PM
Zinc	82	1.0		mg/Kg	1	11/8/2008 07:05 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/7/2008 02:40 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB35-1
Lab Order:	102020	**Collection Date:**	11/4/2008 10:27:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-056A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:09 PM
Arsenic	4.6	1.0		mg/Kg	1	11/8/2008 07:09 PM
Barium	140	1.0		mg/Kg	1	11/8/2008 07:09 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:09 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:09 PM
Chromium	32	1.0		mg/Kg	1	11/8/2008 07:09 PM
Cobalt	8.9	1.0		mg/Kg	1	11/8/2008 07:09 PM
Copper	24	2.0		mg/Kg	1	11/8/2008 07:09 PM
Lead	44	1.0		mg/Kg	1	11/8/2008 07:09 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:09 PM
Nickel	42	1.0		mg/Kg	1	11/8/2008 07:09 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:09 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:09 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:09 PM
Vanadium	33	1.0		mg/Kg	1	11/8/2008 07:09 PM
Zinc	57	1.0		mg/Kg	1	11/8/2008 07:09 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.13	0.10		mg/Kg	1	11/7/2008 02:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB35-2
Lab Order:	102020	**Collection Date:**	11/4/2008 10:27:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-057A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953			PrepDate:	11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:14 PM
Arsenic	5.5	1.0		mg/Kg	1	11/8/2008 07:14 PM
Barium	490	1.0		mg/Kg	1	11/8/2008 07:14 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:14 PM
Cadmium	1.5	1.0		mg/Kg	1	11/8/2008 07:14 PM
Chromium	30	1.0		mg/Kg	1	11/8/2008 07:14 PM
Cobalt	7.6	1.0		mg/Kg	1	11/8/2008 07:14 PM
Copper	42	2.0		mg/Kg	1	11/8/2008 07:14 PM
Lead	2000	1.0		mg/Kg	1	11/8/2008 07:14 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:14 PM
Nickel	39	1.0		mg/Kg	1	11/8/2008 07:14 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:14 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:14 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:14 PM
Vanadium	28	1.0		mg/Kg	1	11/8/2008 07:14 PM
Zinc	510	1.0		mg/Kg	1	11/8/2008 07:14 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160			PrepDate:	11/12/2008	Analyst: **AMT**
Lead	45	1.0		mg/L	20	11/17/2008 01:56 PM
ICP METALS BY TCLP EXTRACTION						
	EPA3010A			**EPA 1311/ 6010B**		
RunID: ICP6_081117C	QC Batch: 50287			PrepDate:	11/17/2008	Analyst: **CL**
Lead	1.3	0.050		mg/L	1	11/17/2008 05:07 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949			PrepDate:	11/6/2008	Analyst: **AMT**
Mercury	0.14	0.10		mg/Kg	1	11/7/2008 02:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB40-0
Lab Order:	102020	**Collection Date:**	11/4/2008 9:54:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-070A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:18 PM
Arsenic	4.2	1.0		mg/Kg	1	11/8/2008 07:18 PM
Barium	120	1.0		mg/Kg	1	11/8/2008 07:18 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:18 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:18 PM
Chromium	34	1.0		mg/Kg	1	11/8/2008 07:18 PM
Cobalt	8.6	1.0		mg/Kg	1	11/8/2008 07:18 PM
Copper	32	2.0		mg/Kg	1	11/8/2008 07:18 PM
Lead	83	1.0		mg/Kg	1	11/8/2008 07:18 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:18 PM
Nickel	39	1.0		mg/Kg	1	11/8/2008 07:18 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:18 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:18 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:18 PM
Vanadium	33	1.0		mg/Kg	1	11/8/2008 07:18 PM
Zinc	97	1.0		mg/Kg	1	11/8/2008 07:18 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	2.8	1.0		mg/L	20	11/17/2008 02:06 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.15	0.10		mg/Kg	1	11/7/2008 02:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB40-1
Lab Order:	102020	**Collection Date:**	11/4/2008 9:54:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-071A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:23 PM
Arsenic	5.1	1.0		mg/Kg	1	11/8/2008 07:23 PM
Barium	120	1.0		mg/Kg	1	11/8/2008 07:23 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:23 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:23 PM
Chromium	35	1.0		mg/Kg	1	11/8/2008 07:23 PM
Cobalt	9.8	1.0		mg/Kg	1	11/8/2008 07:23 PM
Copper	46	2.0		mg/Kg	1	11/8/2008 07:23 PM
Lead	150	1.0		mg/Kg	1	11/8/2008 07:23 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:23 PM
Nickel	39	1.0		mg/Kg	1	11/8/2008 07:23 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:23 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:23 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:23 PM
Vanadium	37	1.0		mg/Kg	1	11/8/2008 07:23 PM
Zinc	100	1.0		mg/Kg	1	11/8/2008 07:23 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	6.9	1.0		mg/L	20	11/17/2008 02:09 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.21	0.10		mg/Kg	1	11/7/2008 02:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB40-2
Lab Order:	102020	**Collection Date:**	11/4/2008 9:54:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-072A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:27 PM
Arsenic	5.0	1.0		mg/Kg	1	11/8/2008 07:27 PM
Barium	97	1.0		mg/Kg	1	11/8/2008 07:27 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:27 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:27 PM
Chromium	30	1.0		mg/Kg	1	11/8/2008 07:27 PM
Cobalt	8.5	1.0		mg/Kg	1	11/8/2008 07:27 PM
Copper	47	2.0		mg/Kg	1	11/8/2008 07:27 PM
Lead	150	1.0		mg/Kg	1	11/8/2008 07:27 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:27 PM
Nickel	32	1.0		mg/Kg	1	11/8/2008 07:27 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:27 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:27 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:27 PM
Vanadium	35	1.0		mg/Kg	1	11/8/2008 07:27 PM
Zinc	110	1.0		mg/Kg	1	11/8/2008 07:27 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	7.5	1.0		mg/L	20	11/17/2008 02:11 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.21	0.10		mg/Kg	1	11/7/2008 02:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB45-0
Lab Order:	102020	**Collection Date:**	11/4/2008 11:11:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-085A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:40 PM
Arsenic	2.7	1.0		mg/Kg	1	11/8/2008 07:40 PM
Barium	100	1.0		mg/Kg	1	11/8/2008 07:40 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:40 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:40 PM
Chromium	29	1.0		mg/Kg	1	11/8/2008 07:40 PM
Cobalt	5.4	1.0		mg/Kg	1	11/8/2008 07:40 PM
Copper	42	2.0		mg/Kg	1	11/8/2008 07:40 PM
Lead	37	1.0		mg/Kg	1	11/8/2008 07:40 PM
Molybdenum	1.2	1.0		mg/Kg	1	11/8/2008 07:40 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 07:40 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:40 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:40 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:40 PM
Vanadium	23	1.0		mg/Kg	1	11/8/2008 07:40 PM
Zinc	230	1.0		mg/Kg	1	11/8/2008 07:40 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.33	0.10		mg/Kg	1	11/7/2008 02:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB45-1
Lab Order:	102020	**Collection Date:**	11/4/2008 11:11:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-086A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108D	QC Batch: 49953				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 07:45 PM
Arsenic	5.6	1.0		mg/Kg	1	11/8/2008 07:45 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 07:45 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 07:45 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 07:45 PM
Chromium	41	1.0		mg/Kg	1	11/8/2008 07:45 PM
Cobalt	9.0	1.0		mg/Kg	1	11/8/2008 07:45 PM
Copper	34	2.0		mg/Kg	1	11/8/2008 07:45 PM
Lead	42	1.0		mg/Kg	1	11/8/2008 07:45 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 07:45 PM
Nickel	46	1.0		mg/Kg	1	11/8/2008 07:45 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 07:45 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 07:45 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 07:45 PM
Vanadium	37	1.0		mg/Kg	1	11/8/2008 07:45 PM
Zinc	89	1.0		mg/Kg	1	11/8/2008 07:45 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107E	QC Batch: 49949				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.14	0.10		mg/Kg	1	11/7/2008 02:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB45-2
Lab Order:	102020	**Collection Date:**	11/4/2008 11:11:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-087A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954			PrepDate:	11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 08:17 PM
Arsenic	6.5	1.0		mg/Kg	1	11/8/2008 08:17 PM
Barium	170	1.0		mg/Kg	1	11/8/2008 08:17 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:17 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 08:17 PM
Chromium	39	1.0		mg/Kg	1	11/8/2008 08:17 PM
Cobalt	9.3	1.0		mg/Kg	1	11/8/2008 08:17 PM
Copper	27	2.0		mg/Kg	1	11/8/2008 08:17 PM
Lead	59	1.0		mg/Kg	1	11/8/2008 08:17 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 08:17 PM
Nickel	44	1.0		mg/Kg	1	11/8/2008 08:17 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 08:17 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:17 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:17 PM
Vanadium	37	1.0		mg/Kg	1	11/8/2008 08:17 PM
Zinc	80	1.0		mg/Kg	1	11/8/2008 08:17 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160			PrepDate:	11/12/2008	Analyst: **AMT**
Lead	ND	1.0		mg/L	20	11/17/2008 02:13 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107F	QC Batch: 49950			PrepDate:	11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/7/2008 05:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB50-0
Lab Order:	102020	**Collection Date:**	11/4/2008 11:49:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-100A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 08:22 PM
Arsenic	4.0	1.0		mg/Kg	1	11/8/2008 08:22 PM
Barium	150	1.0		mg/Kg	1	11/8/2008 08:22 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:22 PM
Cadmium	1.1	1.0		mg/Kg	1	11/8/2008 08:22 PM
Chromium	44	1.0		mg/Kg	1	11/8/2008 08:22 PM
Cobalt	12	1.0		mg/Kg	1	11/8/2008 08:22 PM
Copper	58	2.0		mg/Kg	1	11/8/2008 08:22 PM
Lead	56	1.0		mg/Kg	1	11/8/2008 08:22 PM
Molybdenum	1.7	1.0		mg/Kg	1	11/8/2008 08:22 PM
Nickel	44	1.0		mg/Kg	1	11/8/2008 08:22 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 08:22 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:22 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:22 PM
Vanadium	29	1.0		mg/Kg	1	11/8/2008 08:22 PM
Zinc	250	1.0		mg/Kg	1	11/8/2008 08:22 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	ND	1.0		mg/L	20	11/17/2008 02:20 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107F	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.14	0.10		mg/Kg	1	11/7/2008 05:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB50-1
Lab Order:	102020	**Collection Date:**	11/4/2008 11:49:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-101A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954			PrepDate:	11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 08:35 PM
Arsenic	4.9	1.0		mg/Kg	1	11/8/2008 08:35 PM
Barium	160	1.0		mg/Kg	1	11/8/2008 08:35 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:35 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 08:35 PM
Chromium	40	1.0		mg/Kg	1	11/8/2008 08:35 PM
Cobalt	11	1.0		mg/Kg	1	11/8/2008 08:35 PM
Copper	22	2.0		mg/Kg	1	11/8/2008 08:35 PM
Lead	5.8	1.0		mg/Kg	1	11/8/2008 08:35 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 08:35 PM
Nickel	54	1.0		mg/Kg	1	11/8/2008 08:35 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 08:35 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:35 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:35 PM
Vanadium	35	1.0		mg/Kg	1	11/8/2008 08:35 PM
Zinc	50	1.0		mg/Kg	1	11/8/2008 08:35 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107F	QC Batch: 49950			PrepDate:	11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/7/2008 05:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB50-2
Lab Order:	102020	**Collection Date:**	11/4/2008 11:49:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-102A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 08:39 PM
Arsenic	4.2	1.0		mg/Kg	1	11/8/2008 08:39 PM
Barium	130	1.0		mg/Kg	1	11/8/2008 08:39 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:39 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 08:39 PM
Chromium	38	1.0		mg/Kg	1	11/8/2008 08:39 PM
Cobalt	6.6	1.0		mg/Kg	1	11/8/2008 08:39 PM
Copper	19	2.0		mg/Kg	1	11/8/2008 08:39 PM
Lead	5.4	1.0		mg/Kg	1	11/8/2008 08:39 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 08:39 PM
Nickel	42	1.0		mg/Kg	1	11/8/2008 08:39 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 08:39 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:39 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:39 PM
Vanadium	32	1.0		mg/Kg	1	11/8/2008 08:39 PM
Zinc	43	1.0		mg/Kg	1	11/8/2008 08:39 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110C	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/10/2008 01:42 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB55-0
Lab Order:	102020	**Collection Date:**	11/4/2008 2:01:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-115A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	6.0	2.0		mg/Kg	1	11/8/2008 08:44 PM
Arsenic	11	1.0		mg/Kg	1	11/8/2008 08:44 PM
Barium	180	1.0		mg/Kg	1	11/8/2008 08:44 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:44 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 08:44 PM
Chromium	23	1.0		mg/Kg	1	11/8/2008 08:44 PM
Cobalt	11	1.0		mg/Kg	1	11/8/2008 08:44 PM
Copper	48	2.0		mg/Kg	1	11/8/2008 08:44 PM
Lead	79	1.0		mg/Kg	1	11/8/2008 08:44 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 08:44 PM
Nickel	35	1.0		mg/Kg	1	11/8/2008 08:44 PM
Selenium	1.1	1.0		mg/Kg	1	11/8/2008 08:44 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:44 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:44 PM
Vanadium	36	1.0		mg/Kg	1	11/8/2008 08:44 PM
Zinc	200	1.0		mg/Kg	1	11/8/2008 08:44 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	3.6	1.0		mg/L	20	11/17/2008 02:23 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110C	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.29	0.10		mg/Kg	1	11/10/2008 01:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102020
Project: I-880 SB HOV, E8449-06-01
Lab ID: 102020-116A

Client Sample ID: SB55-1
Collection Date: 11/4/2008 2:01:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	8.5	2.0		mg/Kg	1	11/8/2008 08:49 PM
Arsenic	11	1.0		mg/Kg	1	11/8/2008 08:49 PM
Barium	280	1.0		mg/Kg	1	11/8/2008 08:49 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:49 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 08:49 PM
Chromium	18	1.0		mg/Kg	1	11/8/2008 08:49 PM
Cobalt	13	1.0		mg/Kg	1	11/8/2008 08:49 PM
Copper	50	2.0		mg/Kg	1	11/8/2008 08:49 PM
Lead	86	1.0		mg/Kg	1	11/8/2008 08:49 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 08:49 PM
Nickel	27	1.0		mg/Kg	1	11/8/2008 08:49 PM
Selenium	1.7	1.0		mg/Kg	1	11/8/2008 08:49 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:49 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:49 PM
Vanadium	38	1.0		mg/Kg	1	11/8/2008 08:49 PM
Zinc	110	1.0		mg/Kg	1	11/8/2008 08:49 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	4.3	1.0		mg/L	20	11/17/2008 02:25 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110C	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.17	0.10		mg/Kg	1	11/10/2008 01:46 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102020
Project: I-880 SB HOV, E8449-06-01
Lab ID: 102020-117A

Client Sample ID: SB55-2
Collection Date: 11/4/2008 2:01:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	7.5	2.0		mg/Kg	1	11/8/2008 08:53 PM
Arsenic	9.7	1.0		mg/Kg	1	11/8/2008 08:53 PM
Barium	180	1.0		mg/Kg	1	11/8/2008 08:53 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:53 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 08:53 PM
Chromium	27	1.0		mg/Kg	1	11/8/2008 08:53 PM
Cobalt	12	1.0		mg/Kg	1	11/8/2008 08:53 PM
Copper	50	2.0		mg/Kg	1	11/8/2008 08:53 PM
Lead	92	1.0		mg/Kg	1	11/8/2008 08:53 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 08:53 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 08:53 PM
Selenium	1.2	1.0		mg/Kg	1	11/8/2008 08:53 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:53 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:53 PM
Vanadium	41	1.0		mg/Kg	1	11/8/2008 08:53 PM
Zinc	100	1.0		mg/Kg	1	11/8/2008 08:53 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	4.1	1.0		mg/L	20	11/17/2008 02:28 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110C	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.14	0.10		mg/Kg	1	11/10/2008 01:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB60-0
Lab Order:	102020	**Collection Date:**	11/4/2008 12:21:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-130A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 08:58 PM
Arsenic	3.9	1.0		mg/Kg	1	11/8/2008 08:58 PM
Barium	190	1.0		mg/Kg	1	11/8/2008 08:58 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 08:58 PM
Cadmium	1.3	1.0		mg/Kg	1	11/8/2008 08:58 PM
Chromium	35	1.0		mg/Kg	1	11/8/2008 08:58 PM
Cobalt	7.0	1.0		mg/Kg	1	11/8/2008 08:58 PM
Copper	63	2.0		mg/Kg	1	11/8/2008 08:58 PM
Lead	570	1.0		mg/Kg	1	11/8/2008 08:58 PM
Molybdenum	2.9	1.0		mg/Kg	1	11/8/2008 08:58 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 08:58 PM
Selenium	1.1	1.0		mg/Kg	1	11/8/2008 08:58 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 08:58 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 08:58 PM
Vanadium	29	1.0		mg/Kg	1	11/8/2008 08:58 PM
Zinc	430	1.0		mg/Kg	1	11/8/2008 08:58 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	25	1.0		mg/L	20	11/17/2008 02:30 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110C	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.20	0.10		mg/Kg	1	11/10/2008 01:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB60-1
Lab Order:	102020	**Collection Date:**	11/4/2008 12:21:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-131A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 09:02 PM
Arsenic	4.2	1.0		mg/Kg	1	11/8/2008 09:02 PM
Barium	120	1.0		mg/Kg	1	11/8/2008 09:02 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 09:02 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 09:02 PM
Chromium	45	1.0		mg/Kg	1	11/8/2008 09:02 PM
Cobalt	10	1.0		mg/Kg	1	11/8/2008 09:02 PM
Copper	24	2.0		mg/Kg	1	11/8/2008 09:02 PM
Lead	40	1.0		mg/Kg	1	11/8/2008 09:02 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 09:02 PM
Nickel	78	1.0		mg/Kg	1	11/8/2008 09:02 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 09:02 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 09:02 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 09:02 PM
Vanadium	30	1.0		mg/Kg	1	11/8/2008 09:02 PM
Zinc	56	1.0		mg/Kg	1	11/8/2008 09:02 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110C	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/10/2008 01:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB60-2
Lab Order:	102020	**Collection Date:**	11/4/2008 12:21:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-132A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108E	QC Batch: 49954				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 09:07 PM
Arsenic	4.2	1.0		mg/Kg	1	11/8/2008 09:07 PM
Barium	120	1.0		mg/Kg	1	11/8/2008 09:07 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 09:07 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 09:07 PM
Chromium	26	1.0		mg/Kg	1	11/8/2008 09:07 PM
Cobalt	12	1.0		mg/Kg	1	11/8/2008 09:07 PM
Copper	27	2.0		mg/Kg	1	11/8/2008 09:07 PM
Lead	150	1.0		mg/Kg	1	11/8/2008 09:07 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 09:07 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 09:07 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 09:07 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 09:07 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 09:07 PM
Vanadium	30	1.0		mg/Kg	1	11/8/2008 09:07 PM
Zinc	89	1.0		mg/Kg	1	11/8/2008 09:07 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117A	QC Batch: 50160				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	6.7	1.0		mg/L	20	11/17/2008 02:32 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081107F	QC Batch: 49950				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.17	0.10		mg/Kg	1	11/7/2008 05:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102020
Project: I-880 SB HOV, E8449-06-01
Lab ID: 102020-145A

Client Sample ID: SB65-0
Collection Date: 11/4/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108F	QC Batch: 49955				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 09:48 PM
Arsenic	5.2	1.0		mg/Kg	1	11/8/2008 09:48 PM
Barium	150	1.0		mg/Kg	1	11/8/2008 09:48 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 09:48 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 09:48 PM
Chromium	34	1.0		mg/Kg	1	11/8/2008 09:48 PM
Cobalt	9.5	1.0		mg/Kg	1	11/8/2008 09:48 PM
Copper	30	2.0		mg/Kg	1	11/8/2008 09:48 PM
Lead	52	1.0		mg/Kg	1	11/8/2008 09:48 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 09:48 PM
Nickel	42	1.0		mg/Kg	1	11/8/2008 09:48 PM
Selenium	1.1	1.0		mg/Kg	1	11/8/2008 09:48 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 09:48 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 09:48 PM
Vanadium	38	1.0		mg/Kg	1	11/8/2008 09:48 PM
Zinc	100	1.0		mg/Kg	1	11/8/2008 09:48 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117B	QC Batch: 50161				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	1.7	1.0		mg/L	20	11/17/2008 06:34 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110D	QC Batch: 49951				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/10/2008 02:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB65-1
Lab Order:	102020	**Collection Date:**	11/4/2008 1:00:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-146A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108F	QC Batch: 49955				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 09:53 PM
Arsenic	4.7	1.0		mg/Kg	1	11/8/2008 09:53 PM
Barium	140	1.0		mg/Kg	1	11/8/2008 09:53 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 09:53 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 09:53 PM
Chromium	39	1.0		mg/Kg	1	11/8/2008 09:53 PM
Cobalt	10	1.0		mg/Kg	1	11/8/2008 09:53 PM
Copper	43	2.0		mg/Kg	1	11/8/2008 09:53 PM
Lead	20	1.0		mg/Kg	1	11/8/2008 09:53 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 09:53 PM
Nickel	53	1.0		mg/Kg	1	11/8/2008 09:53 PM
Selenium	1.4	1.0		mg/Kg	1	11/8/2008 09:53 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 09:53 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 09:53 PM
Vanadium	42	1.0		mg/Kg	1	11/8/2008 09:53 PM
Zinc	78	1.0		mg/Kg	1	11/8/2008 09:53 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110D	QC Batch: 49951				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.12	0.10		mg/Kg	1	11/10/2008 02:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB65-2
Lab Order:	102020	**Collection Date:**	11/4/2008 1:00:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-147A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108F	QC Batch: 49955				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	3.2	2.0		mg/Kg	1	11/8/2008 09:58 PM
Arsenic	7.0	1.0		mg/Kg	1	11/8/2008 09:58 PM
Barium	140	1.0		mg/Kg	1	11/8/2008 09:58 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 09:58 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 09:58 PM
Chromium	30	1.0		mg/Kg	1	11/8/2008 09:58 PM
Cobalt	9.1	1.0		mg/Kg	1	11/8/2008 09:58 PM
Copper	31	2.0		mg/Kg	1	11/8/2008 09:58 PM
Lead	42	1.0		mg/Kg	1	11/8/2008 09:58 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 09:58 PM
Nickel	38	1.0		mg/Kg	1	11/8/2008 09:58 PM
Selenium	1.0	1.0		mg/Kg	1	11/8/2008 09:58 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 09:58 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 09:58 PM
Vanadium	35	1.0		mg/Kg	1	11/8/2008 09:58 PM
Zinc	60	1.0		mg/Kg	1	11/8/2008 09:58 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110D	QC Batch: 49951				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/10/2008 02:31 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB68-0
Lab Order:	102020	**Collection Date:**	11/4/2008 1:11:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-154A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108F	QC Batch: 49955			PrepDate:	11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 10:03 PM
Arsenic	4.1	1.0		mg/Kg	1	11/8/2008 10:03 PM
Barium	170	1.0		mg/Kg	1	11/8/2008 10:03 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 10:03 PM
Cadmium	1.2	1.0		mg/Kg	1	11/8/2008 10:03 PM
Chromium	58	1.0		mg/Kg	1	11/8/2008 10:03 PM
Cobalt	7.7	1.0		mg/Kg	1	11/8/2008 10:03 PM
Copper	81	2.0		mg/Kg	1	11/8/2008 10:03 PM
Lead	81	1.0		mg/Kg	1	11/8/2008 10:03 PM
Molybdenum	4.3	1.0		mg/Kg	1	11/8/2008 10:03 PM
Nickel	36	1.0		mg/Kg	1	11/8/2008 10:03 PM
Selenium	ND	1.0		mg/Kg	1	11/8/2008 10:03 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 10:03 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 10:03 PM
Vanadium	37	1.0		mg/Kg	1	11/8/2008 10:03 PM
Zinc	290	1.0		mg/Kg	1	11/8/2008 10:03 PM
ICP METALS BY STLC						
				WET/ EPA 6010B		
RunID: ICP8_081117A	QC Batch: R101801			PrepDate:		Analyst: **CL**
Chromium	ND	1.0		mg/L	20	11/17/2008 10:34 AM
Lead	5.0	1.0		mg/L	20	11/17/2008 10:34 AM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110D	QC Batch: 49951			PrepDate:	11/6/2008	Analyst: **AMT**
Mercury	0.20	0.10		mg/Kg	1	11/10/2008 02:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102020
Project: I-880 SB HOV, E8449-06-01
Lab ID: 102020-155A

Client Sample ID: SB68-1
Collection Date: 11/4/2008 1:11:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108F	QC Batch: 49955				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 10:07 PM
Arsenic	4.0	1.0		mg/Kg	1	11/8/2008 10:07 PM
Barium	79	1.0		mg/Kg	1	11/8/2008 10:07 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 10:07 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 10:07 PM
Chromium	28	1.0		mg/Kg	1	11/8/2008 10:07 PM
Cobalt	14	1.0		mg/Kg	1	11/8/2008 10:07 PM
Copper	53	2.0		mg/Kg	1	11/8/2008 10:07 PM
Lead	140	1.0		mg/Kg	1	11/8/2008 10:07 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 10:07 PM
Nickel	26	1.0		mg/Kg	1	11/8/2008 10:07 PM
Selenium	1.3	1.0		mg/Kg	1	11/8/2008 10:07 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 10:07 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 10:07 PM
Vanadium	93	1.0		mg/Kg	1	11/8/2008 10:07 PM
Zinc	62	1.0		mg/Kg	1	11/8/2008 10:07 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117B	QC Batch: 50161				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	7.5	1.0		mg/L	20	11/17/2008 06:38 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110D	QC Batch: 49951				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.28	0.10		mg/Kg	1	11/10/2008 02:35 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB68-2
Lab Order:	102020	**Collection Date:**	11/4/2008 1:11:00 PM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-156A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081108F	QC Batch: 49955				PrepDate: 11/6/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/8/2008 10:13 PM
Arsenic	2.9	1.0		mg/Kg	1	11/8/2008 10:13 PM
Barium	78	1.0		mg/Kg	1	11/8/2008 10:13 PM
Beryllium	ND	1.0		mg/Kg	1	11/8/2008 10:13 PM
Cadmium	ND	1.0		mg/Kg	1	11/8/2008 10:13 PM
Chromium	15	1.0		mg/Kg	1	11/8/2008 10:13 PM
Cobalt	9.5	1.0		mg/Kg	1	11/8/2008 10:13 PM
Copper	35	2.0		mg/Kg	1	11/8/2008 10:13 PM
Lead	81	1.0		mg/Kg	1	11/8/2008 10:13 PM
Molybdenum	ND	1.0		mg/Kg	1	11/8/2008 10:13 PM
Nickel	22	1.0		mg/Kg	1	11/8/2008 10:13 PM
Selenium	1.1	1.0		mg/Kg	1	11/8/2008 10:13 PM
Silver	ND	1.0		mg/Kg	1	11/8/2008 10:13 PM
Thallium	ND	1.0		mg/Kg	1	11/8/2008 10:13 PM
Vanadium	65	1.0		mg/Kg	1	11/8/2008 10:13 PM
Zinc	73	1.0		mg/Kg	1	11/8/2008 10:13 PM
ICP METALS BY STLC						
	WET			**WET/ EPA 6010B**		
RunID: ICP6_081117B	QC Batch: 50161				PrepDate: 11/12/2008	Analyst: **AMT**
Lead	4.9	1.0		mg/L	20	11/17/2008 06:41 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081110D	QC Batch: 49951				PrepDate: 11/6/2008	Analyst: **AMT**
Mercury	0.52	0.10		mg/Kg	1	11/10/2008 02:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-49952** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **PBS** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578572**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	0.148	1.0									
Molybdenum	ND	1.0									
Nickel	0.034	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-49952** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **LCSS** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578573**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	50.740	2.0	50.00	0	101	80	120				
Arsenic	47.480	1.0	50.00	0	95.0	80	120				
Barium	53.349	1.0	50.00	0	107	80	120				
Beryllium	50.798	1.0	50.00	0	102	80	120				
Cadmium	50.527	1.0	50.00	0	101	80	120				
Chromium	49.170	1.0	50.00	0	98.3	80	120				
Cobalt	52.824	1.0	50.00	0	106	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-49952** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **LCSS** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578573**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	52.789	2.0	50.00	0	106	80	120				
Lead	56.041	1.0	50.00	0.1483	112	80	120				
Molybdenum	52.284	1.0	50.00	0	105	80	120				
Nickel	51.159	1.0	50.00	0.03392	102	80	120				
Selenium	47.062	1.0	50.00	0	94.1	80	120				
Silver	51.445	1.0	50.00	0	103	80	120				
Thallium	46.787	1.0	50.00	0	93.6	80	120				
Vanadium	54.377	1.0	50.00	0	109	80	120				
Zinc	49.608	1.0	50.00	0	99.2	80	120				

Sample ID: **102020-043ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **SB-15-0** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.553	2.0						1.013	0	20	
Arsenic	3.270	1.0						3.924	18.2	20	
Barium	146.031	1.0						163.4	11.2	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.578	1.0						0.7943	0	20	
Chromium	37.434	1.0						38.36	2.46	20	
Cobalt	8.445	1.0						8.409	0.423	20	
Copper	25.967	2.0						39.52	41.4	20	R
Lead	26.262	1.0						51.15	64.3	20	R
Molybdenum	ND	1.0						0.6327	0	20	
Nickel	52.856	1.0						45.21	15.6	20	
Selenium	ND	1.0						0.6038	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	32.954	1.0						37.68	13.4	20	
Zinc	86.297	1.0						252.6	98.1	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-043AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **SB-15-0** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578585**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	68.507	2.0	125.0	1.013	54.0	25	106				
Arsenic	98.870	1.0	125.0	3.924	76.0	42	113				
Barium	275.971	1.0	125.0	163.4	90.0	19	140				
Beryllium	102.912	1.0	125.0	0	82.3	50	109				
Cadmium	96.695	1.0	125.0	0.7943	76.7	48	106				
Chromium	138.585	1.0	125.0	38.36	80.2	44	116				
Cobalt	108.576	1.0	125.0	8.409	80.1	47	107				
Copper	146.648	2.0	125.0	39.52	85.7	49	124				
Lead	144.005	1.0	125.0	51.15	74.3	33	120				
Molybdenum	102.563	1.0	125.0	0.6327	81.5	46	111				
Nickel	150.357	1.0	125.0	45.21	84.1	43	111				
Selenium	96.490	1.0	125.0	0.6038	76.7	43	104				
Silver	107.425	1.0	125.0	0	85.9	53	114				
Thallium	92.108	1.0	125.0	0	73.7	41	107				
Vanadium	145.048	1.0	125.0	37.68	85.9	48	116				
Zinc	234.910	1.0	125.0	252.6	-14.2	24	129				S

Sample ID: **102020-043AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **SB-15-0** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578586**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	71.067	2.0	125.0	1.013	56.0	25	106	68.51	3.67	20	
Arsenic	101.263	1.0	125.0	3.924	77.9	42	113	98.87	2.39	20	
Barium	282.522	1.0	125.0	163.4	95.3	19	140	276.0	2.35	20	
Beryllium	105.195	1.0	125.0	0	84.2	50	109	102.9	2.19	20	
Cadmium	99.038	1.0	125.0	0.7943	78.6	48	106	96.70	2.39	20	
Chromium	139.344	1.0	125.0	38.36	80.8	44	116	138.6	0.546	20	
Cobalt	113.666	1.0	125.0	8.409	84.2	47	107	108.6	4.58	20	
Copper	153.869	2.0	125.0	39.52	91.5	49	124	146.6	4.81	20	
Lead	160.114	1.0	125.0	51.15	87.2	33	120	144.0	10.6	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-043AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101450**
Client ID: **SB-15-0** Batch ID: **49952** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578586**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	105.893	1.0	125.0	0.6327	84.2	46	111	102.6	3.19	20	
Nickel	149.118	1.0	125.0	45.21	83.1	43	111	150.4	0.827	20	
Selenium	99.045	1.0	125.0	0.6038	78.8	43	104	96.49	2.61	20	
Silver	109.428	1.0	125.0	0	87.5	53	114	107.4	1.85	20	
Thallium	94.416	1.0	125.0	0	75.5	41	107	92.11	2.47	20	
Vanadium	148.580	1.0	125.0	37.68	88.7	48	116	145.0	2.41	20	
Zinc	270.733	1.0	125.0	252.6	14.5	24	129	234.9	14.2	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-49953** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **PBS** Batch ID: **49953** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578587**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	0.193	1.0									
Molybdenum	ND	1.0									
Nickel	0.034	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-49953** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **LCSS** Batch ID: **49953** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	51.342	2.0	50.00	0	103	80	120				
Arsenic	48.263	1.0	50.00	0	96.5	80	120				
Barium	53.566	1.0	50.00	0	107	80	120				
Beryllium	50.803	1.0	50.00	0	102	80	120				
Cadmium	50.455	1.0	50.00	0	101	80	120				
Chromium	49.203	1.0	50.00	0	98.4	80	120				
Cobalt	53.004	1.0	50.00	0	106	80	120				
Copper	52.717	2.0	50.00	0	105	80	120				
Lead	56.351	1.0	50.00	0.1933	112	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-49953** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **LCSS** Batch ID: **49953** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	52.584	1.0	50.00	0	105	80	120				
Nickel	51.231	1.0	50.00	0.03376	102	80	120				
Selenium	47.397	1.0	50.00	0	94.8	80	120				
Silver	51.310	1.0	50.00	0	103	80	120				
Thallium	47.488	1.0	50.00	0	95.0	80	120				
Vanadium	54.245	1.0	50.00	0	108	80	120				
Zinc	49.505	1.0	50.00	0	99.0	80	120				

Sample ID: **102020-086ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **SB45-1** Batch ID: **49953** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578599**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.960	2.0						0.7769	0	20	
Arsenic	5.784	1.0						5.559	3.96	20	
Barium	164.280	1.0						163.9	0.234	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.738	1.0						0.7802	0	20	
Chromium	39.255	1.0						41.23	4.92	20	
Cobalt	9.078	1.0						9.001	0.852	20	
Copper	33.163	2.0						33.64	1.42	20	
Lead	53.088	1.0						41.91	23.5	20	R
Molybdenum	ND	1.0						0	0	20	
Nickel	43.251	1.0						45.75	5.62	20	
Selenium	0.735	1.0						0	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	37.377	1.0						37.08	0.794	20	
Zinc	92.783	1.0						88.69	4.51	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-086AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **SB45-1** Batch ID: **49953** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578600**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	73.214	2.0	125.0	0.7769	57.9	25	106				
Arsenic	103.626	1.0	125.0	5.559	78.5	42	113				
Barium	301.091	1.0	125.0	163.9	110	19	140				
Beryllium	104.565	1.0	125.0	0	83.7	50	109				
Cadmium	98.793	1.0	125.0	0.7802	78.4	48	106				
Chromium	141.996	1.0	125.0	41.23	80.6	44	116				
Cobalt	111.192	1.0	125.0	9.001	81.8	47	107				
Copper	148.047	2.0	125.0	33.64	91.5	49	124				
Lead	155.285	1.0	125.0	41.91	90.7	33	120				
Molybdenum	105.092	1.0	125.0	0	84.1	46	111				
Nickel	144.310	1.0	125.0	45.75	78.8	43	111				
Selenium	98.321	1.0	125.0	0	78.7	43	104				
Silver	109.358	1.0	125.0	0	87.5	53	114				
Thallium	94.540	1.0	125.0	0	75.6	41	107				
Vanadium	146.847	1.0	125.0	37.08	87.8	48	116				
Zinc	180.920	1.0	125.0	88.69	73.8	24	129				

Sample ID: **102020-086AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **SB45-1** Batch ID: **49953** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578601**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	71.890	2.0	125.0	0.7769	56.9	25	106	73.21	1.82	20	
Arsenic	103.010	1.0	125.0	5.559	78.0	42	113	103.6	0.596	20	
Barium	281.150	1.0	125.0	163.9	93.8	19	140	301.1	6.85	20	
Beryllium	103.779	1.0	125.0	0	83.0	50	109	104.6	0.754	20	
Cadmium	98.173	1.0	125.0	0.7802	77.9	48	106	98.79	0.630	20	
Chromium	143.250	1.0	125.0	41.23	81.6	44	116	142.0	0.879	20	
Cobalt	111.123	1.0	125.0	9.001	81.7	47	107	111.2	0.0620	20	
Copper	149.305	2.0	125.0	33.64	92.5	49	124	148.0	0.846	20	
Lead	151.906	1.0	125.0	41.91	88.0	33	120	155.3	2.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-086AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101451**
Client ID: **SB45-1** Batch ID: **49953** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578601**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	104.274	1.0	125.0	0	83.4	46	111	105.1	0.781	20	
Nickel	145.990	1.0	125.0	45.75	80.2	43	111	144.3	1.16	20	
Selenium	97.364	1.0	125.0	0	77.9	43	104	98.32	0.978	20	
Silver	108.835	1.0	125.0	0	87.1	53	114	109.4	0.479	20	
Thallium	93.548	1.0	125.0	0	74.8	41	107	94.54	1.06	20	
Vanadium	147.972	1.0	125.0	37.08	88.7	48	116	146.8	0.763	20	
Zinc	186.440	1.0	125.0	88.69	78.2	24	129	180.9	3.01	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-49954** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **PBS** Batch ID: **49954** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578602**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	0.018	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	0.306	1.0									
Molybdenum	ND	1.0									
Nickel	0.058	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	0.219	1.0									

Sample ID: **LCS-49954** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **LCSS** Batch ID: **49954** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578603**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	52.564	2.0	50.00	0	105	80	120				
Arsenic	49.475	1.0	50.00	0	99.0	80	120				
Barium	55.057	1.0	50.00	0	110	80	120				
Beryllium	52.605	1.0	50.00	0	105	80	120				
Cadmium	51.660	1.0	50.00	0.01781	103	80	120				
Chromium	50.730	1.0	50.00	0	101	80	120				
Cobalt	54.386	1.0	50.00	0	109	80	120				
Copper	55.047	2.0	50.00	0	110	80	120				
Lead	56.239	1.0	50.00	0.3059	112	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-49954** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **LCSS** Batch ID: **49954** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578603**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	54.181	1.0	50.00	0	108	80	120				
Nickel	52.386	1.0	50.00	0.05789	105	80	120				
Selenium	48.004	1.0	50.00	0	96.0	80	120				
Silver	54.046	1.0	50.00	0	108	80	120				
Thallium	48.201	1.0	50.00	0	96.4	80	120				
Vanadium	56.196	1.0	50.00	0	112	80	120				
Zinc	51.057	1.0	50.00	0.2193	102	80	120				

Sample ID: **102020-132ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **SB60-2** Batch ID: **49954** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578614**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.549	2.0						0.5292	0	20	
Arsenic	4.491	1.0						4.179	7.20	20	
Barium	124.595	1.0						123.4	0.948	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.802	1.0						0.6985	0	20	
Chromium	26.770	1.0						25.97	3.02	20	
Cobalt	8.852	1.0						11.93	29.6	20	R
Copper	29.812	2.0						27.45	8.27	20	
Lead	185.582	1.0						153.9	18.6	20	
Molybdenum	0.302	1.0						0.1433	0	20	
Nickel	35.263	1.0						36.30	2.91	20	
Selenium	1.039	1.0						0.4951	70.9	20	R
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	29.172	1.0						29.51	1.15	20	
Zinc	105.143	1.0						89.04	16.6	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-132AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **SB60-2** Batch ID: **49954** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578615**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	76.077	2.0	125.0	0.5292	60.4	25	106				
Arsenic	92.196	1.0	125.0	4.179	70.4	42	113				
Barium	207.000	1.0	125.0	123.4	66.9	19	140				
Beryllium	95.581	1.0	125.0	0	76.5	50	109				
Cadmium	90.812	1.0	125.0	0.6985	72.1	48	106				
Chromium	112.723	1.0	125.0	25.97	69.4	44	116				
Cobalt	101.194	1.0	125.0	11.93	71.4	47	107				
Copper	136.267	2.0	125.0	27.45	87.1	49	124				
Lead	212.812	1.0	125.0	153.9	47.1	33	120				
Molybdenum	96.768	1.0	125.0	0.1433	77.3	46	111				
Nickel	120.136	1.0	125.0	36.30	67.1	43	111				
Selenium	89.359	1.0	125.0	0.4951	71.1	43	104				
Silver	99.861	1.0	125.0	0	79.9	53	114				
Thallium	86.186	1.0	125.0	0	68.9	41	107				
Vanadium	126.284	1.0	125.0	29.51	77.4	48	116				
Zinc	169.724	1.0	125.0	89.04	64.5	24	129				

Sample ID: **102020-132AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **SB60-2** Batch ID: **49954** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578616**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	76.720	2.0	125.0	0.5292	61.0	25	106	76.08	0.842	20	
Arsenic	100.615	1.0	125.0	4.179	77.1	42	113	92.20	8.73	20	
Barium	223.948	1.0	125.0	123.4	80.4	19	140	207.0	7.87	20	
Beryllium	102.988	1.0	125.0	0	82.4	50	109	95.58	7.46	20	
Cadmium	97.221	1.0	125.0	0.6985	77.2	48	106	90.81	6.82	20	
Chromium	129.365	1.0	125.0	25.97	82.7	44	116	112.7	13.7	20	
Cobalt	108.374	1.0	125.0	11.93	77.2	47	107	101.2	6.85	20	
Copper	145.276	2.0	125.0	27.45	94.3	49	124	136.3	6.40	20	
Lead	256.969	1.0	125.0	153.9	82.4	33	120	212.8	18.8	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-132AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101452**
Client ID: **SB60-2** Batch ID: **49954** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578616**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	104.161	1.0	125.0	0.1433	83.2	46	111	96.77	7.36	20	
Nickel	137.475	1.0	125.0	36.30	80.9	43	111	120.1	13.5	20	
Selenium	97.137	1.0	125.0	0.4951	77.3	43	104	89.36	8.34	20	
Silver	106.748	1.0	125.0	0	85.4	53	114	99.86	6.67	20	
Thallium	92.429	1.0	125.0	0	73.9	41	107	86.19	6.99	20	
Vanadium	139.138	1.0	125.0	29.51	87.7	48	116	126.3	9.69	20	
Zinc	181.719	1.0	125.0	89.04	74.1	24	129	169.7	6.83	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-49955**	SampType: **MBLK**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **11/6/2008**	RunNo: **101453**
Client ID: **PBS**	Batch ID: **49955**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **11/8/2008**	SeqNo: **1578617**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.286	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	0.015	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	0.384	1.0									
Molybdenum	0.047	1.0									
Nickel	0.047	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	0.045	1.0									
Zinc	0.372	1.0									

Sample ID: **LCS-49955**	SampType: **LCS**	TestCode: **6010_S**	Units: **mg/Kg**	Prep Date: **11/6/2008**	RunNo: **101453**
Client ID: **LCSS**	Batch ID: **49955**	TestNo: **EPA 6010B**	**EPA 3050B**	Analysis Date: **11/8/2008**	SeqNo: **1578618**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	49.458	2.0	50.00	0.2864	98.3	80	120				
Arsenic	46.632	1.0	50.00	0	93.3	80	120				
Barium	51.883	1.0	50.00	0	104	80	120				
Beryllium	49.745	1.0	50.00	0	99.5	80	120				
Cadmium	48.837	1.0	50.00	0.01529	97.6	80	120				
Chromium	47.557	1.0	50.00	0	95.1	80	120				
Cobalt	51.290	1.0	50.00	0	103	80	120				
Copper	51.715	2.0	50.00	0	103	80	120				
Lead	53.017	1.0	50.00	0.3841	105	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-49955** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101453**
Client ID: **LCSS** Batch ID: **49955** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578618**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	51.076	1.0	50.00	0.04663	102	80	120				
Nickel	49.373	1.0	50.00	0.04663	98.7	80	120				
Selenium	45.392	1.0	50.00	0	90.8	80	120				
Silver	50.995	1.0	50.00	0	102	80	120				
Thallium	45.492	1.0	50.00	0	91.0	80	120				
Vanadium	52.777	1.0	50.00	0.04470	105	80	120				
Zinc	47.936	1.0	50.00	0.3723	95.1	80	120				

Sample ID: **102020-156ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101453**
Client ID: **SB68-2** Batch ID: **49955** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578625**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0.4155	0	20	
Arsenic	2.561	1.0						2.937	13.7	20	
Barium	84.661	1.0						78.15	8.00	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.744	1.0						0.7296	0	20	
Chromium	19.605	1.0						15.36	24.3	20	R
Cobalt	9.325	1.0						9.510	1.97	20	
Copper	30.378	2.0						34.99	14.1	20	
Lead	41.982	1.0						80.51	62.9	20	R
Molybdenum	0.063	1.0						0	0	20	
Nickel	25.831	1.0						21.76	17.1	20	
Selenium	1.218	1.0						1.071	12.9	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	62.313	1.0						65.14	4.44	20	
Zinc	71.424	1.0						73.37	2.69	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-156AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101453**
Client ID: **SB68-2** Batch ID: **49955** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	71.448	2.0	125.0	0.4155	56.8	25	106				
Arsenic	100.473	1.0	125.0	2.937	78.0	42	113				
Barium	187.683	1.0	125.0	78.15	87.6	19	140				
Beryllium	101.276	1.0	125.0	0	81.0	50	109				
Cadmium	94.024	1.0	125.0	0.7296	74.6	48	106				
Chromium	113.555	1.0	125.0	15.36	78.6	44	116				
Cobalt	107.079	1.0	125.0	9.510	78.1	47	107				
Copper	153.642	2.0	125.0	34.99	94.9	49	124				
Lead	143.383	1.0	125.0	80.51	50.3	33	120				
Molybdenum	103.788	1.0	125.0	0	83.0	46	111				
Nickel	118.234	1.0	125.0	21.76	77.2	43	111				
Selenium	97.749	1.0	125.0	1.071	77.3	43	104				
Silver	108.092	1.0	125.0	0	86.5	53	114				
Thallium	90.505	1.0	125.0	0	72.4	41	107				
Vanadium	180.130	1.0	125.0	65.14	92.0	48	116				
Zinc	165.052	1.0	125.0	73.37	73.3	24	129				

Sample ID: **102020-156AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101453**
Client ID: **SB68-2** Batch ID: **49955** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578627**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	66.952	2.0	125.0	0.4155	53.2	25	106	71.45	6.50	20	
Arsenic	99.544	1.0	125.0	2.937	77.3	42	113	100.5	0.929	20	
Barium	187.441	1.0	125.0	78.15	87.4	19	140	187.7	0.129	20	
Beryllium	100.104	1.0	125.0	0	80.1	50	109	101.3	1.16	20	
Cadmium	92.474	1.0	125.0	0.7296	73.4	48	106	94.02	1.66	20	
Chromium	111.264	1.0	125.0	15.36	76.7	44	116	113.6	2.04	20	
Cobalt	105.375	1.0	125.0	9.510	76.7	47	107	107.1	1.60	20	
Copper	162.950	2.0	125.0	34.99	102	49	124	153.6	5.88	20	
Lead	137.747	1.0	125.0	80.51	45.8	33	120	143.4	4.01	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102020-156AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101453**
Client ID: **SB68-2** Batch ID: **49955** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/8/2008** SeqNo: **1578627**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	101.567	1.0	125.0	0	81.3	46	111	103.8	2.16	20	
Nickel	119.296	1.0	125.0	21.76	78.0	43	111	118.2	0.894	20	
Selenium	96.324	1.0	125.0	1.071	76.2	43	104	97.75	1.47	20	
Silver	107.112	1.0	125.0	0	85.7	53	114	108.1	0.911	20	
Thallium	87.761	1.0	125.0	0	70.2	41	107	90.50	3.08	20	
Vanadium	177.709	1.0	125.0	65.14	90.1	48	116	180.1	1.35	20	
Zinc	161.067	1.0	125.0	73.37	70.2	24	129	165.1	2.44	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49924A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **PBS** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576194**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-49924** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **LCSS** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576195**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	293.613	5.0	250.0	0	117	80	120				

Sample ID: **102020-016ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **SB-6-0** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576206**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	103.772	5.0						155.8	40.1	20	R

Sample ID: **102020-016AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **SB-6-0** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576207**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	333.347	5.0	250.0	155.8	71.0	33	120				

Sample ID: **MB-49924B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **PBS** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576208**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102020-026ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **SB-9-1** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576219**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	37.591	5.0						35.06	6.96	20	

Sample ID: **102020-026AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **SB-9-1** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576220**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	211.271	5.0	250.0	35.06	70.5	33	120				

Sample ID: **102020-026AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101327**
Client ID: **SB-9-1** Batch ID: **49924** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	237.110	5.0	250.0	35.06	80.8	33	120	211.3	11.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49925A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **PBS** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-49925** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **LCSS** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	281.566	5.0	250.0	0	113	80	120				

Sample ID: **102020-039ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **SB-13-2** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576690**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	67.181	5.0						39.52	51.8	20	R

Sample ID: **102020-039AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **SB-13-2** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576691**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	186.083	5.0	250.0	39.52	58.6	33	120				

Sample ID: **MB-49925B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **PBS** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576692**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102020-052ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **SB-18-0** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576703**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	22.679	5.0						26.54	15.7	20	

Sample ID: **102020-052AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **SB-18-0** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576704**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	193.156	5.0	250.0	26.54	66.6	33	120				

Sample ID: **102020-052AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101357**
Client ID: **SB-18-0** Batch ID: **49925** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576705**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	187.246	5.0	250.0	26.54	64.3	33	120	193.2	3.11	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49926A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **PBS** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576966**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.312	5.0									

Sample ID: **LCS-49926** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **LCSS** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576967**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	251.348	5.0	250.0	0.3116	100	80	120				

Sample ID: **102020-065ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **SB38-1** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576978**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	65.121	5.0						68.68	5.32	20	

Sample ID: **102020-065AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **SB38-1** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576979**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	243.516	5.0	250.0	68.68	69.9	33	120				

Sample ID: **MB-49926B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **PBS** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576980**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102020-078ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **SB42-2** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576991**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.275	5.0						9.293	24.4	20	R

Sample ID: **102020-078AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **SB42-2** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576993**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	158.229	5.0	250.0	9.293	59.6	33	120				

Sample ID: **102020-078AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101373**
Client ID: **SB42-2** Batch ID: **49926** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576994**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	159.589	5.0	250.0	9.293	60.1	33	120	158.2	0.856	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49927A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **PBS** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576926**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-49927** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **LCSS** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576927**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	254.203	5.0	250.0	0	102	80	120				

Sample ID: **102020-091ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **SB47-0** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576938**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.965	5.0						4.588	89.1	20	R

Sample ID: **102020-091AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **SB47-0** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576939**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	172.139	5.0	250.0	4.588	67.0	33	120				

Sample ID: **MB-49927B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **PBS** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/6/2008** SeqNo: **1576940**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102020-104ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **SB51-1** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577030**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	22.114	5.0						35.75	47.1	20	R

Sample ID: **102020-104AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **SB51-1** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577031**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	230.071	5.0	250.0	35.75	77.7	33	120				

Sample ID: **102020-104AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101371**
Client ID: **SB51-1** Batch ID: **49927** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	240.184	5.0	250.0	35.75	81.8	33	120	230.1	4.30	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49928A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **PBS** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577209**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-49928** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **LCSS** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577210**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	287.634	5.0	250.0	0	115	80	120				

Sample ID: **102020-114ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **SB54-2** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	70.956	5.0						98.71	32.7	20	R

Sample ID: **102020-114AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **SB54-2** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577222**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	251.409	5.0	250.0	98.71	61.1	33	120				

Sample ID: **MB-49928B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **PBS** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577223**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.162	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102020-127ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **SB59-0** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577234**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	262.812	5.0						273.1	3.85	20	

Sample ID: **102020-127AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **SB59-0** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577235**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	362.062	5.0	250.0	273.1	35.6	33	120				

Sample ID: **102020-127AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101387**
Client ID: **SB59-0** Batch ID: **49928** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577236**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	398.282	5.0	250.0	273.1	50.1	33	120	362.1	9.53	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49929A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **PBS** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577324**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-49929** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **LCSS** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577325**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	288.133	5.0	250.0	0	115	80	120				

Sample ID: **102020-140ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **SB63-1** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577336**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.590	5.0						26.86	47.3	20	R

Sample ID: **102020-140AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **SB63-1** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577337**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	200.571	5.0	250.0	26.86	69.5	33	120				

Sample ID: **MB-49929B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **PBS** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577338**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102020-153ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **SB67-2** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577349**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1049.198	5.0						975.0	7.33	20	

Sample ID: **102020-153AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **SB67-2** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577350**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1255.515	5.0	250.0	975.0	112	33	120				

Sample ID: **102020-153AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101390**
Client ID: **SB67-2** Batch ID: **49929** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1577351**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1343.192	5.0	250.0	975.0	147	33	120	1256	6.75	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-50029** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/7/2008** RunNo: **101430**
Client ID: **PBS** Batch ID: **50029** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578097**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-50029** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/7/2008** RunNo: **101430**
Client ID: **LCSS** Batch ID: **50029** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578098**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	262.038	5.0	250.0	0	105	80	120				

Sample ID: **102020-153ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101430**
Client ID: **SB67-2** Batch ID: **50029** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578100**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1031.329	5.0						1021	1.05	20	

Sample ID: **102020-153AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101430**
Client ID: **SB67-2** Batch ID: **50029** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578101**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1212.733	5.0	250.0	1021	76.9	33	120				

Sample ID: **102020-153AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/5/2008** RunNo: **101430**
Client ID: **SB67-2** Batch ID: **50029** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578102**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1170.894	5.0	250.0	1021	60.1	33	120	1213	3.51	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-50160A** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **PBS** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585948**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.005	0.050									

Sample ID: **LCS-50160** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **LCSS** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585949**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.000	0.050	1.000	0.005488	99.4	85	115				

Sample ID: **102020-057A-DUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **SB35-2** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585959**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	64.330	1.0						44.66	36.1	20	R

Sample ID: **102020-057A-MS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **SB35-2** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585960**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	53.091	1.0	2.500	44.66	337	71	121				S

Sample ID: **MB-50160B** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **PBS** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585961**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **102020-132A-DUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **SB60-2** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.065	1.0						6.749	4.57	20	

Sample ID: **102020-132A-MS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **SB60-2** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.207	1.0	2.500	6.749	58.3	71	121				S

Sample ID: **102020-132A-MSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101843**
Client ID: **SB60-2** Batch ID: **50160** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1585974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.697	1.0	2.500	6.749	77.9	71	121	8.207	5.80	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-50161A** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **PBS** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586051**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-50161** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **LCSS** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586052**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.010	0.050	1.000	0	101	85	115				

Sample ID: **102050-009A-DUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **ZZZZZZ** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	17.320	1.0						15.54	10.8	20	

Sample ID: **102050-009A-MS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **ZZZZZZ** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	21.246	1.0	2.500	15.54	228	71	121				S

Sample ID: **102050-009A-MSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **ZZZZZZ** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586061**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.910	1.0	2.500	15.54	54.6	71	121	21.25	22.7	20	SR

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-50161** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **PBS** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585234**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									
Lead	ND	0.050									

Sample ID: **102020-154ADUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **SB68-0** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585236**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.452	1.0						0.4445	0	20	
Lead	4.745	1.0						4.971	4.65	20	

Sample ID: **102020-154AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **SB68-0** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585237**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.687	1.0	2.500	0.4445	89.7	77	116				
Lead	7.144	1.0	2.500	4.971	86.9	71	121				

Sample ID: **102020-154AMSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **SB68-0** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.796	1.0	2.500	0.4445	94.0	77	116	2.687	3.96	20	
Lead	7.413	1.0	2.500	4.971	97.7	71	121	7.144	3.70	20	

Sample ID: **LCS-50161** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **LCSS** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.880	0.050	1.000	0	88.0	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **LCS-50161** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **LCSS** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.982	0.050	1.000	0	98.2	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **MB-50240ATC** SampType: **MBLK** TestCode: **6010_TC** Units: **mg/L** Prep Date: **11/17/2008** RunNo: **101845**
Client ID: **PBS** Batch ID: **50287** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **11/17/2008** SeqNo: **1585990**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **MB-50197ATC** SampType: **MBLK** TestCode: **6010_TC** Units: **mg/L** Prep Date: **11/17/2008** RunNo: **101845**
Client ID: **PBS** Batch ID: **50287** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **11/17/2008** SeqNo: **1585991**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **102134-003ADUP** SampType: **DUP** TestCode: **6010_TC** Units: **mg/L** Prep Date: **11/17/2008** RunNo: **101845**
Client ID: **ZZZZZZ** Batch ID: **50287** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **11/17/2008** SeqNo: **1585995**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.607	0.050						0.7993	27.3	20	R

Sample ID: **102134-003AMS** SampType: **MS** TestCode: **6010_TC** Units: **mg/L** Prep Date: **11/17/2008** RunNo: **101845**
Client ID: **ZZZZZZ** Batch ID: **50287** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **11/17/2008** SeqNo: **1585996**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.874	0.050	2.500	0.7993	83.0	71	121				

Sample ID: **102134-003AMSD** SampType: **MSD** TestCode: **6010_TC** Units: **mg/L** Prep Date: **11/17/2008** RunNo: **101845**
Client ID: **ZZZZZZ** Batch ID: **50287** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **11/17/2008** SeqNo: **1585997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.896	0.050	2.500	0.7993	83.9	71	121	3.491	18.6	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **LCS-50287** SampType: **LCS** TestCode: **6010_TC** Units: **mg/L** Prep Date: **11/17/2008** RunNo: **101845**
Client ID: **LCSS** Batch ID: **50287** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **11/17/2008** SeqNo: **1586000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.874	0.050	1.000	0	87.4	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50065A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **PBS** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583191**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.160	0.25									

Sample ID: **LCS-50065** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **LCSS** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583192**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.128	0.25	5.000	0.1599	99.4	80	120				

Sample ID: **102020-022A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **SB-8-0** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583203**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.473	0.25						3.262	6.28	20	

Sample ID: **102020-022A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **SB-8-0** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583204**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.669	0.25	5.000	3.262	88.1	80	120				

Sample ID: **102020-080A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **SB43-1** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583216**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.089	0.25						3.056	1.07	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **102020-080A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **SB43-1** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583217**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.643	0.25	5.000	3.056	91.7	80	120				

Sample ID: **102020-080A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101694**
Client ID: **SB43-1** Batch ID: **50065** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583218**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.728	0.25	5.000	3.056	93.4	80	120	7.643	1.10	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50066A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **PBS** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583221**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50066** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **LCSS** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583222**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.035	0.25	5.000	0	101	80	120				

Sample ID: **102020-114A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **SB54-2** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.118	0.25						2.297	8.11	20	

Sample ID: **102020-114A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **SB54-2** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583234**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	6.624	0.25	5.000	2.297	86.5	80	120				

Sample ID: **102020-143A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **SB64-1** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.774	0.25						2.909	4.76	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **102020-143A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **SB64-1** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583247**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.363	0.25	5.000	2.909	89.1	80	120				

Sample ID: **102020-143A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101695**
Client ID: **SB64-1** Batch ID: **50066** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583248**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.448	0.25	5.000	2.909	90.8	80	120	7.363	1.15	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50067A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101696**
Client ID: **PBS** Batch ID: **50067** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583249**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50067** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101696**
Client ID: **LCSS** Batch ID: **50067** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583250**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.167	0.25	5.000	0	103	80	120				

Sample ID: **102020-153A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101696**
Client ID: **SB67-2** Batch ID: **50067** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583255**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	75.574	2.5						76.33	0.999	20	

Sample ID: **102020-153A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101696**
Client ID: **SB67-2** Batch ID: **50067** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583256**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	83.902	2.5	5.000	76.33	151	80	120				S

Sample ID: **102020-153A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/10/2008** RunNo: **101696**
Client ID: **SB67-2** Batch ID: **50067** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/13/2008** SeqNo: **1583257**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	83.095	2.5	5.000	76.33	135	80	120	83.90	0.967	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7470_ST

Sample ID: **MB-50235A** SampType: **MBLK** TestCode: **7470_ST** Units: **µg/L** Prep Date: **11/14/2008** RunNo: **101828**
Client ID: **PBS** Batch ID: **50235** TestNo: **WET/ EPA 74** Analysis Date: **11/17/2008** SeqNo: **1585740**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.20									

Sample ID: **MB-50160A STLC** SampType: **MBLK** TestCode: **7470_ST** Units: **µg/L** Prep Date: **11/14/2008** RunNo: **101828**
Client ID: **PBS** Batch ID: **50235** TestNo: **WET/ EPA 74** Analysis Date: **11/17/2008** SeqNo: **1585741**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	1.0									

Sample ID: **LCS-50235** SampType: **LCS** TestCode: **7470_ST** Units: **µg/L** Prep Date: **11/14/2008** RunNo: **101828**
Client ID: **LCSS** Batch ID: **50235** TestNo: **WET/ EPA 74** Analysis Date: **11/17/2008** SeqNo: **1585742**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	10.251	0.20	10.00	0	103	85	115				

Sample ID: **102020-028A-MS** SampType: **MS** TestCode: **7470_ST** Units: **µg/L** Prep Date: **11/14/2008** RunNo: **101828**
Client ID: **SB-10-0** Batch ID: **50235** TestNo: **WET/ EPA 74** Analysis Date: **11/17/2008** SeqNo: **1585743**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	40.304	1.0	50.00	0.4310	79.7	70	130				

Sample ID: **102020-028A-MSD** SampType: **MSD** TestCode: **7470_ST** Units: **µg/L** Prep Date: **11/14/2008** RunNo: **101828**
Client ID: **SB-10-0** Batch ID: **50235** TestNo: **WET/ EPA 74** Analysis Date: **11/17/2008** SeqNo: **1585744**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	36.768	1.0	50.00	0.4310	72.7	70	130	40.30	9.17	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7470_ST

Sample ID: **102020-028A-DUP** SampType: **DUP** TestCode: **7470_ST** Units: **µg/L** Prep Date: **11/14/2008** RunNo: **101828**
Client ID: **SB-10-0** Batch ID: **50235** TestNo: **WET/ EPA 74** Analysis Date: **11/17/2008** SeqNo: **1585746**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	1.0						0.4310	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-49948** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101513**
Client ID: **PBS** Batch ID: **49948** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579828**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-49948** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101513**
Client ID: **LCSS** Batch ID: **49948** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.847	0.10	0.8300	0	102	80	120				

Sample ID: **102020-043A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101513**
Client ID: **SB-15-0** Batch ID: **49948** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.126	0.10	0.8300	0.1805	114	70	130				

Sample ID: **102020-043A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101513**
Client ID: **SB-15-0** Batch ID: **49948** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579831**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.200	0.10	0.8300	0.1805	123	70	130	1.126	6.36	20	

Sample ID: **102020-043A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101513**
Client ID: **SB-15-0** Batch ID: **49948** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.121	0.10						0.1805	39.2	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-49949** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101514**
Client ID: **PBS** Batch ID: **49949** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579843**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-49949** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101514**
Client ID: **LCSS** Batch ID: **49949** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579844**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.694	0.10	0.8300	0	83.6	80	120				

Sample ID: **102020-086A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101514**
Client ID: **SB45-1** Batch ID: **49949** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579845**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.135	0.10	0.8300	0.1396	120	70	130				

Sample ID: **102020-086A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101514**
Client ID: **SB45-1** Batch ID: **49949** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579846**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.123	0.10	0.8300	0.1396	118	70	130	1.135	1.04	20	

Sample ID: **102020-086A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101514**
Client ID: **SB45-1** Batch ID: **49949** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579848**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.129	0.10						0.1396	7.48	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-49950** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101515**
Client ID: **PBS** Batch ID: **49950** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-49950** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101515**
Client ID: **LCSS** Batch ID: **49950** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579859**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.749	0.10	0.8300	0	90.3	80	120				

Sample ID: **102020-132A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101515**
Client ID: **SB60-2** Batch ID: **49950** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579860**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.156	0.10	0.8300	0.1697	119	70	130				

Sample ID: **102020-132A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101515**
Client ID: **SB60-2** Batch ID: **49950** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579861**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.091	0.10	0.8300	0.1697	111	70	130	1.156	5.79	20	

Sample ID: **102020-132A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101515**
Client ID: **SB60-2** Batch ID: **49950** TestNo: **EPA 7471A** Analysis Date: **11/7/2008** SeqNo: **1579863**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.129	0.10						0.1697	27.4	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-49951** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101528**
Client ID: **PBS** Batch ID: **49951** TestNo: **EPA 7471A** Analysis Date: **11/10/2008** SeqNo: **1580041**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-49951** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101528**
Client ID: **LCSS** Batch ID: **49951** TestNo: **EPA 7471A** Analysis Date: **11/10/2008** SeqNo: **1580042**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.842	0.10	0.8300	0	101	80	120				

Sample ID: **102020-156A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101528**
Client ID: **SB68-2** Batch ID: **49951** TestNo: **EPA 7471A** Analysis Date: **11/10/2008** SeqNo: **1580043**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.244	0.20	1.660	0.5198	104	70	130	2.222	0.985	20	

Sample ID: **102020-156A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101528**
Client ID: **SB68-2** Batch ID: **49951** TestNo: **EPA 7471A** Analysis Date: **11/10/2008** SeqNo: **1580044**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.222	0.20	1.660	0.5198	103	70	130				

Sample ID: **102020-156A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101528**
Client ID: **SB68-2** Batch ID: **49951** TestNo: **EPA 7471A** Analysis Date: **11/10/2008** SeqNo: **1580046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.580	0.10						0.5198	11.0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **102020-050ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **101348**
Client ID: **SB-17-1** Batch ID: **R101348** TestNo: **EPA 9045C** Analysis Date: **11/6/2008** SeqNo: **1576514**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	8.380	0.10						8.360	0.239	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **102020-150ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **101349**
Client ID: **SB66-2** Batch ID: **R101349** TestNo: **EPA 9045C** Analysis Date: **11/6/2008** SeqNo: **1576525**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	7.890	0.10						7.880	0.127	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:

Logged By: K Date: 11/5/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☒ FEDEX ☐ Other: GSO

Sample Condition Upon Receipt
1. CHILLED 2.4, 3.4 Y☑ N☐ 4. SEALED Y☐ N☑
2. HEADSPACE (VOA) Y☐ N☐ N/A 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☑ N☐ 6. PRESERVED Y☐ N☑

Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB HOV Project #: E8449-06-01 Sampler: (Printed Name) Lauren Wincze (Signature) [signature] 11/4/08 1630

Relinquished by: (Signature and Printed Name) [signature] Date: 11/4/08 Time: 1630 Received by: (Signature and Printed Name) Kabel Date: 11/5/08 Time: 8 am

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/4/08 (Print Name, Date) [signature] (Signature)

Send Report To: Attn: Co: SAME AS ABOVE Address: City State Zip

Bill To: Attn: Co: SAME AS ABOVE Address: City State Zip

Special Instructions/Comments:
TOTAL LEAD → 48-HR TAT
CAM17 METALS - ROUTINE TAT
10% pH (random - LAB), DO NOT COMPOSITE SAMPLE SETS

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal), 8015B (GRO) / BTEX, 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000) - TAT = E, Total LEAD - TAT = C

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	Total LEAD	SOIL	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
102026	1,2,3	SB-1 - 0, 1, 2	11/4/08	1015	X	X	C	3	T	C	
	4,5,6	SB-2 - 0, 1, 2		1000	X		E		P		
	7,8,9	SB-3 - 0, 1, 2		1030	X		E		P		
	10,11,12	SB-4 - 0, 1, 2		1040	X		E		P		
	13,14,15	SB-5 - 0, 1, 2		1045	X		C		T		
	16,17,18	SB-6 - 0, 1, 2		1115	X		E		P		
	19,20,21	SB-7 - 0, 1, 2		1120	X		E		P		
	22,23,24	SB-8 - 0, 1, 2		1215	X		E		P		
	25,26,27	SB-9 - 0, 1, 2		1215	X		E		P		
	28,29,30	SB-10 - 0, 1, 2		1225	X		C		T		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☒ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: L. Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB HOV Project #: E8449-06-01 Sampler: (Printed Name) Lauren Wincze (Signature) [signature]

Relinquished by: (Signature and Printed Name) [signature] Date: 11/4/08 Time: 1630 Received by: (Signature and Printed Name) [signature] Date: 11/5/08 Time: 8 AM
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/4/08 (Print Name, Date) [signature] (Signature)

Send Report To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Bill To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Special Instructions/Comments:
TOTAL LEAD - 48HR TAT
CAM17 metals - ROUTINE TAT
10% pH (random-lab)
Do not composite sample sets

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.
Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal), 8015B (GRO) / BTEX, 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000), TOTAL LEAD

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000) TOTAL LEAD	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
10 20 30	31,32,33	SB-11-0,1,2	11/4/08	1245									X	X				E	3	P		
	34,35,36	SB-12-0,1,2		1300									X					E				
	37,38,39	SB-13-0,1,2		1315									X					C				
	40,41,42	SB-14-0,1,2		1325									X					C				
	43,44,45	SB-15-0,1,2		1330								X						E		TM		
	46,47,48	SB-16-0,1,2		1350									X					C		P		
	49,50,51	SB-17-0,1,2		1400									X					C				
	52,53,54	SB-18-0,1,2		1420									X					C				

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 4. SEALED Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: L. WINCZE
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: HWY 880 Project #: E8449-06-01 Sampler: (Printed Name) D. WATTS (Signature)

Relinquished by: (Signature and Printed Name) Date: 4NOV2008 Time: Received by: (Signature and Printed Name) Date: 11/5/08 Time: 8 AM

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr / Submitter:
D. WATTS 4NOV2008
Print Name Date
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
10% pH (RANDOM - LAB)
DO NOT COMPOSITE SAMPLE SETS

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) - PB, 8015B (GRO) / BTEX, 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) - PB	8015B (GRO) / BTEX	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
102020	55,56,57	SB35-0,1,2	4NOV08	1027								X		X				E	3	T m	C	
	58,59,60	36-		1026				X										48Hr	1	Bg P		
	61,62,63	37-		1036																		
	64,65,66	38-		1001																		
	67,68,69	39-		1001																		
	70,71,72	40-		0954								X						E		T m		
	73,74,75	41-		1014				X										48Hr		Bg P		
	76,77,78	42-		0953																		
	79,80,81	43-		1044																		
	82,83,84	44-		1047																		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: G. WINCZE
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: HWY 880
Project #: E8449-06-01
Sampler: (Printed Name) D. WATTS (Signature) Watts

Relinquished by: (Signature and Printed Name) Watts Date: 4 NOV 2008 Time: 1030
Received by: (Signature and Printed Name) Kalsy Date: 11/5/08 Time: 8 AM

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time:
Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr/Submitter:
D. WATTS 4 NOV 2008
Print Name Date
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
10% pH (RANDOM - LAB)
DO NOT COMPOSITE SAMPLE SETS

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) - Pb, 8015B (GRO) / BTEX, 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) - Pb	8015B (GRO) / BTEX	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
102020	85,86,87	E8445-0,1,2	4 NOV 08	1111								X		X				E	3	T M	C	
	88,89,90	46-		1109				X										48 Hrs	1	B P		
	91,92,93	47-		1123																		
	94,95,96	48-		1127																		
	97,98,99	49-		1135																		
	100,101,102	50-		1149								X						E		T M		
	103,104,105	51-		1157				X										48 Hrs		B P		
	106,107,108	52-		1209																		
	109,110,111	53-		1341																		
	112,113,114	54-		1351																		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: L. WINCZE
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: HWY 880 Project #: E8449-06-01 Sampler: (Printed Name) D. WATTS (Signature) [signature]

Relinquished by: (Signature and Printed Name) [signature] Date: 4 NOV 2008 Time: 1030 Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: D. WATTS / 4 NOV 2008
Print Name Date
Signature: [signature]

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
10% pH (RANDOM - LAB)
DO NOT COMPOSITE SAMPLE SETS

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides) | 8082 (PCB) | 8260B (Volatiles) | 8270C (BNA) | 6010B (Total Metal) - Pb | 8015B (GRO) / BTEX | 8015B (DRO) | 8021 (BTEX) | TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL | WATER | GROUND WATER | WASTEWATER

QA/QC: RTNE ☐ CT ☑ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B (Pb)	8015B (GRO)	8015B (DRO)	8021	TITLE 22 / CAM 17	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
102020	115,116,117	SB55 - 0,1,2	4 NOV 08	1401									X	X				E	3	T m	C	
	118,119,120	56 -		1352					X									48 Hr		B g P		
	121,122,123	57 -		1332																		
	124,125,126	58 -		1237																		
	127,128,129	59 -		1231																		
	130,131,132	60 -		1221									X					E		T m		
	133,134,135	61 -		1238					X									48 Hr		B g P		
	136,137,138	62 -		1230																		
	139,140,141	63 -		1207																		
	142,143,144	64 -		1219																		

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Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

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DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: _____

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: L. WINCZE
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: Hwy 880 Project #: E8449-06-01 Sampler: (Printed Name) D. WATTS (Signature) [signature]

Relinquished by: (Signature and Printed Name) [signature] Date: 4 NOV 2008 Time: 1630 Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:
D. WATTS 4 NOV 2008
Print Name Date
[signature]
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments:
10% pH (RANDOM - LAB)
DO NOT COMPOSITE SAMPLE SETS

Sample/Records - Archival & Disposal
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Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal) - Pb	8015B (GRO) / BTEX	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
10 2020	145,146,147	SB65 - 0, 1, 2	4 NOV 08	1300								X		X				E	3	T m	C	
	148,149,150	66 -		1310				X										48 HR		Bg P		
	151,152,153	67 -		1323																		
	154,155,156	68 -		1311								X						E		T m		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode _____ OTHER _____

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Thursday, November 06, 2008 8:32 AM
To: Carmen Aguila
Cc: Diane Galvan; Bing Roura; Edric Caballero; Puri Romualdo
Subject: RE: I-880 SB HOV, E8449-06-01

Routine TAT for pH analysis for all of the samples for the project, including the ones sent out yesterday - to arrive at the lab this morning. Thank you.

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

From: Carmen Aguila [mailto:Carmen@atlglobal.com]
Sent: Wednesday, November 05, 2008 7:32 PM
To: wincze@geoconinc.com
Cc: Diane Galvan; Bing Roura; Edric Caballero; Puri Romualdo
Subject: I-880 SB HOV, E8449-06-01

Hi Lauren,

The special instruction does not indicate the TAT for the pH analysis. Please advise.

Thank you,

Carmen Aguila
Sample Control Manager

Advanced Technology Laboratories
www.atlglobal.com
Tel: (562) 989-4045 ext. 245
Fax: (562) 989-4040

Advanced Technology Laboratories is a full-service environmental lab providing organic and inorganic analyses of soil, water, wastewater, storm water and hazardous waste samples. ATL is accredited by the State of California, NELAP and State of Nevada and holds various SBE, DBE and MBE certificates and a USDA soil permit. ATL takes pride in providing our customers with quick turnaround time, excellent customer service and defensible data while offering very competitive rates. *Advanced Technology Labs - Your Partner for Quality Environmental Testing*

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Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Friday, November 07, 2008 11:13 AM
To: Diane Galvan; 'Rick Day'
Cc: livermore@geoconinc.com
Subject: RE: More Preliminary Results - I-880 SB HOV (102020)

Hi Diane:
Thanks for the results thus far. Once final results are obtained, I would like to request soluble WET lead analysis on any samples with total lead concentrations that are equal to or greater than 50 mg/kg for the above referenced project. Please run WET lead under standard turnaround time. Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

Diane Galvan

From: Rick Day [day@geoconinc.com]
Sent: Friday, November 07, 2008 3:48 PM
To: 'Lauren Wincze'; Diane Galvan
Subject: RE: WO#102020

FYI - ATL Sample ID is 102020-153A

Standard TAT

From: Lauren Wincze [mailto:wincze@geoconinc.com]
Sent: Friday, November 07, 2008 3:49 PM
To: 'Diane Galvan'
Cc: 'Rick Day'
Subject: WO#102020

Hi Diane:
I would like to request that sample SB67-2 be re-homogenized and reanalyzed for total lead. Thank you.

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Wednesday, November 12, 2008 11:05 AM
To: Diane Galvan; 'Rick Day'
Subject: RE: CAM17 & pH Results - I-880 SB HOV (102020)

Hi Diane:
Thanks for the results. Once data have been QA'ed, please run the following samples for soluble WET metals, for the above work order, under standard TAT:

Lead (Samples with total lead greater than or equal to 50mg/kg)– SB1-0, SB1-1, SB1-2, SB5-0, SB10-0, SB10-1, SB15-0, SB40-0, SB40-1, SB40-2, SB45-2, SB50-0, SB55-0, SB55-1, SB55-2, SB60-0, SB60-2, SB65-0, SB68-0, SB68-1, SB68-2

Mercury (samples with total concentration >2.0mg/kg) – SB10-0

Chromium (samples with total concentrations >50mg/kg) – SB68-0

Please also run sample SB35-2 for TCLP lead.
Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

November 26, 2008

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102020

Lauren Wincze
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

RE: I-880 SB HOV, E8449-06-01

Attention: Lauren Wincze

Enclosed are the results for sample(s) received on November 05, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Project: I-880 SB HOV, E8449-06-01
Lab Order: 102020

CASE NARRATIVE

Analytical Comments for Method 7420

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for samples 102020-153AMS and 102020-153AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

RPD for Duplicate (DUP) are outside criteria for sample 102020-124ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Advanced Technology Laboratories

Date: 11/26/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION
WET DI/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	admin

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-002A	SB-1-1	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-003A	SB-1-2	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-007A	SB-3-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-008A	SB-3-1	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-013A	SB-5-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-016A	SB-6-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-017A	SB-6-1	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-019A	SB-7-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-029A	SB-10-1	ND	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-057A	SB35-2	0.76	mg/L	R102184	0.25	1	11/4/2008	11/24/2008
102020-071A	SB40-1	ND	mg/L	R102184	0.25	1	11/4/2008	11/25/2008
102020-072A	SB40-2	ND	mg/L	R102184	0.25	1	11/4/2008	11/25/2008
102020-073A	SB41-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/25/2008
102020-088A	SB46-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/25/2008
102020-103A	SB51-0	ND	mg/L	R102184	0.25	1	11/4/2008	11/25/2008
102020-106A	SB52-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-109A	SB53-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-112A	SB54-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/26/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION
WET DI/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	admin

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-124A	SB58-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-126A	SB58-2	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-127A	SB59-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-128A	SB59-1	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-129A	SB59-2	1.8	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-130A	SB60-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-132A	SB60-2	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-133A	SB61-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-139A	SB63-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-152A	SB67-1	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-153A	SB67-2	0.44	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-154A	SB68-0	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008
102020-155A	SB68-1	ND	mg/L	R102187	0.25	1	11/4/2008	11/25/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/26/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-002A	SB-1-1	ND	mg/L	50440	0.25	1	11/4/2008	11/21/2008
102020-007A	SB-3-0	ND	mg/L	50440	0.25	1	11/4/2008	11/21/2008
102020-008A	SB-3-1	0.29	mg/L	50440	0.25	1	11/4/2008	11/21/2008
102020-013A	SB-5-0	ND	mg/L	50440	0.25	1	11/4/2008	11/21/2008
102020-016A	SB-6-0	ND	mg/L	50440	0.25	1	11/4/2008	11/21/2008
102020-017A	SB-6-1	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-029A	SB-10-1	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-071A	SB40-1	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-072A	SB40-2	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-073A	SB41-0	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-103A	SB51-0	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-106A	SB52-0	0.28	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-109A	SB53-0	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-112A	SB54-0	ND	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-124A	SB58-0	0.65	mg/L	50441	0.25	1	11/4/2008	11/21/2008
102020-126A	SB58-2	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-127A	SB59-0	0.29	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-128A	SB59-1	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/26/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102020
Project:	I-880 SB HOV, E8449-06-01	**Date Received**	11/5/2008 8:00:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102020-129A	SB59-2	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-130A	SB60-0	0.40	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-132A	SB60-2	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-133A	SB61-0	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-139A	SB63-0	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-152A	SB67-1	ND	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-153A	SB67-2	1.4	mg/L	50442	0.25	1	11/4/2008	11/21/2008
102020-155A	SB68-1	ND	mg/L	50436	0.25	1	11/4/2008	11/21/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_DI_GEOCON

Sample ID: **MB-50371A** SampType: **MBLK** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102184**
Client ID: **PBS** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/24/2008** SeqNo: **1592244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50371** SampType: **LCS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102184**
Client ID: **LCSS** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/24/2008** SeqNo: **1592245**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.143	0.25	5.000	0	103	80	120				

Sample ID: **102020-013A-DUP** SampType: **DUP** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102184**
Client ID: **SB-5-0** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/24/2008** SeqNo: **1592256**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **102020-013A-MS** SampType: **MS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102184**
Client ID: **SB-5-0** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/24/2008** SeqNo: **1592257**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.967	0.25	5.000	0	99.3	70	130				

Sample ID: **MB-50371B** SampType: **MBLK** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102184**
Client ID: **PBS** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/24/2008** SeqNo: **1592258**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.193	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_DI_GEOCON

Sample ID: **102020-103A-DUP** SampType: **DUP** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102186**
Client ID: **SB51-0** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592329**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **102020-103A-MS** SampType: **MS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102186**
Client ID: **SB51-0** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592330**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.719	0.25	5.000	0	94.4	70	130				

Sample ID: **102020-103A-MSD** SampType: **MSD** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102186**
Client ID: **SB51-0** Batch ID: **R102184** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592331**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.770	0.25	5.000	0	95.4	70	130	4.719	1.07	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_DI_GEOCON

Sample ID: **MB-50372A** SampType: **MBLK** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **PBS** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592334**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50372** SampType: **LCS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **LCSS** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592335**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.861	0.25	5.000	0	97.2	80	120				

Sample ID: **102020-132A-DUP** SampType: **DUP** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **SB60-2** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592346**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **102020-132A-MS** SampType: **MS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **SB60-2** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592347**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.769	0.25	5.000	0	95.4	70	130				

Sample ID: **MB-50372B** SampType: **MBLK** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **PBS** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592348**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_DI_GEOCON

Sample ID: **102020-155A-DUP** SampType: **DUP** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **SB68-1** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592355**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **102020-156A-MS** SampType: **MS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **SB68-2** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592356**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.966	0.25	5.000	0	99.3	70	130				

Sample ID: **102020-156A-MSD** SampType: **MSD** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: RunNo: **102187**
Client ID: **SB68-2** Batch ID: **R102187** TestNo: **WET DI/ EPA** Analysis Date: **11/25/2008** SeqNo: **1592357**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.909	0.25	5.000	0	98.2	70	130	4.966	1.14	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **MB-50440A** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102204**
Client ID: **PBS** Batch ID: **50440** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592585**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.088	0.25									

Sample ID: **MB-50412A TCLP** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102204**
Client ID: **PBS** Batch ID: **50440** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592586**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.132	0.25									

Sample ID: **LCS-50440** SampType: **LCS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102204**
Client ID: **LCSS** Batch ID: **50440** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592587**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.898	0.25	1.000	0.08835	81.0	80	120				

Sample ID: **102020-016A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102204**
Client ID: **SB-6-0** Batch ID: **50440** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592598**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.219	0.25						0.1388	0	20	

Sample ID: **102020-016A-MS** SampType: **MS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102204**
Client ID: **SB-6-0** Batch ID: **50440** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592599**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.997	0.25	2.500	0.1388	74.3	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **102020-016A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102204**
Client ID: **SB-6-0** Batch ID: **50440** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592600**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.193	0.25	2.500	0.1388	82.2	70	130	1.997	9.34	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **MB-50441A** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102206**
Client ID: **PBS** Batch ID: **50441** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592629**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-50412A TCLP** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102206**
Client ID: **PBS** Batch ID: **50441** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592630**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50441** SampType: **LCS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102206**
Client ID: **LCSS** Batch ID: **50441** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592631**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.950	0.25	1.000	0	95.0	80	120				

Sample ID: **102020-124A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102206**
Client ID: **SB58-0** Batch ID: **50441** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592642**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.509	0.25						0.6507	24.4	20	R

Sample ID: **102020-124A-MS** SampType: **MS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102206**
Client ID: **SB58-0** Batch ID: **50441** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.769	0.25	2.500	0.6507	84.7	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **102020-124A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102206**
Client ID: **SB58-0** Batch ID: **50441** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592644**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.792	0.25	2.500	0.6507	85.7	70	130	2.769	0.837	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **MB-50442A** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102208**
Client ID: **PBS** Batch ID: **50442** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.115	0.25									

Sample ID: **MB-50413A TCLP** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102208**
Client ID: **PBS** Batch ID: **50442** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.117	0.25									

Sample ID: **LCS-50442** SampType: **LCS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102208**
Client ID: **LCSS** Batch ID: **50442** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592675**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.857	0.25	1.000	0	85.7	80	120				

Sample ID: **102020-153A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102208**
Client ID: **SB67-2** Batch ID: **50442** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592686**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.430	0.25						1.437	0.514	20	

Sample ID: **102020-153A-MS** SampType: **MS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102208**
Client ID: **SB67-2** Batch ID: **50442** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592687**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.128	0.25	2.500	1.437	67.7	70	130				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **102020-153A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/21/2008** RunNo: **102208**
Client ID: **SB67-2** Batch ID: **50442** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/21/2008** SeqNo: **1592688**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	3.103	0.25	2.500	1.437	66.6	70	130	3.128	0.807	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Tuesday, November 18, 2008 5:04 PM
To: Diane Galvan
Cc: 'Rick Day'
Subject: RE: Results - I-880 SB HOV (102020)
Attachments: Soluble lead request table.xls

Hi Diane:
Per the referenced work order, please analyze for soluble (WET-DI and TCLP) lead as indicated (with an "X" in the corresponding column) on the attached excel worksheet. Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)	WET-DI Lead (mg/l)	TCLP Lead (mg/l)
SB-10-1	1	120	8.2	X	X
SB-1-1	1	110	7.4	X	X
SB-1-2	2	66	11	X	
SB-3-0	0	120	5.4	X	X
SB-3-1	1	120	8.0	X	X
SB-35-2	2	2,000	45	X	
SB-40-1	1	150	6.9	X	X
SB-40-2	2	150	7.5	X	X
SB-41-0	0	160	6.9	X	X
SB-46-0	0	59	5.1	X	
SB-5-0	0	170	7.8	X	X
SB-51-0	0	120	9.3	X	X
SB-52-0	0	380	34	X	X
SB-53-0	0	130	5.7	X	X
SB-54-0	0	180	8.3	X	X
SB-58-0	0	670	58	X	X
SB-58-2	2	150	8.8	X	X
SB-59-0	0	270	13	X	X
SB-59-1	1	140	5.7	X	X
SB-59-2	2	130	8.0	X	X
SB-6-0	0	160	6.5	X	X
SB-60-0	0	570	25	X	X
SB-60-2	2	150	6.7	X	X
SB-6-1	1	130	9.3	X	X
SB-61-0	0	190	9.2	X	X
SB-63-0	0	120	5.4	X	X
SB-67-1	1	180	13	X	X
SB-67-2	2	970	76	X	X
SB-68-0	0	81	5.0	X	
SB-68-1	1	140	7.5	X	X
SB-7-0	0	94	6.9	X	

December 11, 2008

Lauren Vigliotti
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102020

RE: I-880 SB HOV, E8449-06-01

Attention: Lauren Vigliotti

Enclosed are the results for sample(s) received on November 05, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Project: I-880 SB HOV, E8449-06-01
Lab Order: 102020

CASE NARRATIVE

Analytical Comments for Method 6010

Dilution was necessary for sample 102020-057A, due to sample matrix.

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *11-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB35-2
Lab Order:	102020	**Collection Date:**	11/4/2008 10:27:00 AM
Project:	I-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102020-057A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081209D	QC Batch: 50899			PrepDate:	12/9/2008	Analyst: **CL**
Lead	2000	5.0		mg/Kg	5	12/9/2008 04:17 PM
ICP METALS BY TCLP EXTRACTION						
EPA3010A			**EPA 1311/ 6010B**			
RunID: ICP8_081210B	QC Batch: 50946			PrepDate:	12/10/2008	Analyst: **CL**
Lead	38	0.25		mg/L	1	12/10/2008 02:30 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50899** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/9/2008** RunNo: **102699**
Client ID: **LCSS** Batch ID: **50899** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/9/2008** SeqNo: **1600957**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	48.221	1.0	50.00	0	96.4	80	120				

Sample ID: **MB-50899** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/9/2008** RunNo: **102699**
Client ID: **PBS** Batch ID: **50899** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/9/2008** SeqNo: **1600958**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.0									

Sample ID: **102563-001ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/9/2008** RunNo: **102699**
Client ID: **ZZZZZZ** Batch ID: **50899** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/9/2008** SeqNo: **1600964**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	387.289	400						297.1	0	20	

Sample ID: **102579-001AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/9/2008** RunNo: **102699**
Client ID: **ZZZZZZ** Batch ID: **50899** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/9/2008** SeqNo: **1600966**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	154.999	1.0	125.0	88.22	53.4	33	120				

Sample ID: **102579-001AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/9/2008** RunNo: **102699**
Client ID: **ZZZZZZ** Batch ID: **50899** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/9/2008** SeqNo: **1600967**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	177.002	1.0	125.0	88.22	71.0	33	120	155.0	13.3	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **MB-50946** SampType: **MBLK** TestCode: **6010_TC** Units: **mg/L** Prep Date: **12/10/2008** RunNo: **102751**
Client ID: **PBS** Batch ID: **50946** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **12/10/2008** SeqNo: **1601849**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **MB-50916TCLP** SampType: **MBLK** TestCode: **6010_TC** Units: **mg/L** Prep Date: **12/10/2008** RunNo: **102751**
Client ID: **PBS** Batch ID: **50946** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **12/10/2008** SeqNo: **1601850**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.050									

Sample ID: **LCS-50946** SampType: **LCS** TestCode: **6010_TC** Units: **mg/L** Prep Date: **12/10/2008** RunNo: **102751**
Client ID: **LCSS** Batch ID: **50946** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **12/10/2008** SeqNo: **1601851**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.960	0.050	1.000	0	96.0	85	115				

Sample ID: **102581-001ADUP** SampType: **DUP** TestCode: **6010_TC** Units: **mg/L** Prep Date: **12/10/2008** RunNo: **102751**
Client ID: **ZZZZZZ** Batch ID: **50946** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **12/10/2008** SeqNo: **1601856**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **102581-001AMS** SampType: **MS** TestCode: **6010_TC** Units: **mg/L** Prep Date: **12/10/2008** RunNo: **102751**
Client ID: **ZZZZZZ** Batch ID: **50946** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **12/10/2008** SeqNo: **1601857**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.424	0.25	12.50	0	91.4	71	121				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102020
Project: I-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_TC

Sample ID: **102581-001AMSD** SampType: **MSD** TestCode: **6010_TC** Units: **mg/L** Prep Date: **12/10/2008** RunNo: **102751**
Client ID: **ZZZZZZ** Batch ID: **50946** TestNo: **EPA 1311/ 60 EPA3010A** Analysis Date: **12/10/2008** SeqNo: **1601858**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	11.370	0.25	12.50	0	91.0	71	121	11.42	0.470	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Thursday, December 04, 2008 3:58 PM
To: Diane Galvan
Subject: RE: WO#102311

Hi Diane:
All under standard TAT:

Please also analyze soil sample RW2-2-1 for soluble WET lead.

And, please re-homogenize, and reanalyze total and TCLP lead in soil sample SB35-2 in WO#102020.
Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

November 18, 2008

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102050

Lauren Wincze
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

RE: 1-880 SB HOV, E8449-06-01

Attention: Lauren Wincze

Enclosed are the results for sample(s) received on November 06, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Project: 1-880 SB HOV, E8449-06-01
Lab Order: 102050

CASE NARRATIVE

Analytical Comments for Method 6010

Dilution was necessary for sample 102050-009A, due to sample matrix.

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for samples 102050-009AMS and 102050-009AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

RPD for Duplicate (DUP) and/or Matrix Spike (MS)/Matrix Spike Duplicate (MSD) is outside criteria for samples 102050-009ADUP, 102050-009AMSD and 102050-021ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Analytical Comments for Method 7420

Dilution was necessary for samples 102050-005A, 102050-008A, 102050-012A and 102050-014A, due to sample matrix.

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for samples 102050-009AMS and 102050-009AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Analytical Comments for Method 7471

RPD for Sample Duplicate (DUP) is outside criteria for sample 102050-009ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ICP
EPA 6010B

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102050
Project:	1-880 SB HOV, E8449-06-01	**Date Received**	11/6/2008 8:30:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	CL

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102050-001A	SB-28-0	19	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-002A	SB-28-1	20	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-003A	SB-28-2	37	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-004A	SB-29-0	65	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-005A	SB-29-1	240	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-006A	SB-29-2	14	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-010A	SB-31-0	60	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-011A	SB-31-1	30	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-012A	SB-31-2	270	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-013A	SB-32-0	19	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-014A	SB-32-1	140	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-015A	SB-32-2	64	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-016A	SB-33-0	52	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-017A	SB-33-1	57	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-018A	SB-33-2	6.2	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-019A	SB-34-0	28	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-020A	SB-34-1	26	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008
102050-021A	SB-34-2	28	mg/Kg	49984	5.0	1	11/5/2008	11/7/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102050
Project:	1-880 SB HOV, E8449-06-01	**Date Received**	11/6/2008 8:30:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102050-005A	SB-29-1	18	mg/L	50133	0.50	2	11/5/2008	11/14/2008
102050-008A	SB-30-1	12	mg/L	50161	0.50	2	11/5/2008	11/18/2008
102050-010A	SB-31-0	6.4	mg/L	50133	0.25	1	11/5/2008	11/14/2008
102050-012A	SB-31-2	25	mg/L	50133	1.0	4	11/5/2008	11/14/2008
102050-014A	SB-32-1	11	mg/L	50133	0.50	2	11/5/2008	11/14/2008
102050-015A	SB-32-2	5.1	mg/L	50133	0.25	1	11/5/2008	11/14/2008
102050-016A	SB-33-0	6.2	mg/L	50133	0.25	1	11/5/2008	11/14/2008
102050-017A	SB-33-1	4.4	mg/L	50133	0.25	1	11/5/2008	11/14/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/18/2008

ANALYTICAL RESULTS

pH
EPA 9045C

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102050
Project:	1-880 SB HOV, E8449-06-01	**Date Received**	11/6/2008 8:30:00 AM
Project No:		**Matrix:**	Soil
Analyte:	pH	**Analyst:**	MFP

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102050-001A	SB-28-0	7.3	pH Units	R101410	0.10	1	11/5/2008	11/7/2008
102050-011A	SB-31-1	7.6	pH Units	R101410	0.10	1	11/5/2008	11/7/2008
102050-021A	SB-34-2	6.4	pH Units	R101410	0.10	1	11/5/2008	11/7/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-30-0
Lab Order:	102050	**Collection Date:**	11/5/2008 11:41:00 AM
Project:	1-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102050-007A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081112A	QC Batch: 50079			PrepDate:	11/11/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/12/2008 11:10 AM
Arsenic	3.2	1.0		mg/Kg	1	11/12/2008 11:10 AM
Barium	49	1.0		mg/Kg	1	11/12/2008 11:10 AM
Beryllium	ND	1.0		mg/Kg	1	11/12/2008 11:10 AM
Cadmium	ND	1.0		mg/Kg	1	11/12/2008 11:10 AM
Chromium	9.3	1.0		mg/Kg	1	11/12/2008 11:10 AM
Cobalt	6.2	1.0		mg/Kg	1	11/12/2008 11:10 AM
Copper	53	2.0		mg/Kg	1	11/12/2008 11:10 AM
Lead	17	1.0		mg/Kg	1	11/12/2008 11:10 AM
Molybdenum	ND	1.0		mg/Kg	1	11/12/2008 11:10 AM
Nickel	10	1.0		mg/Kg	1	11/12/2008 11:10 AM
Selenium	2.3	1.0		mg/Kg	1	11/12/2008 11:10 AM
Silver	ND	1.0		mg/Kg	1	11/12/2008 11:10 AM
Thallium	ND	1.0		mg/Kg	1	11/12/2008 11:10 AM
Vanadium	26	1.0		mg/Kg	1	11/12/2008 11:10 AM
Zinc	120	1.0		mg/Kg	1	11/12/2008 11:10 AM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081111E	QC Batch: 50078			PrepDate:	11/11/2008	Analyst: **AMT**
Mercury	0.20	0.10		mg/Kg	1	11/11/2008 06:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-30-1
Lab Order:	102050	**Collection Date:**	11/5/2008 11:41:00 AM
Project:	1-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102050-008A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081112A	QC Batch: 50079			PrepDate:	11/11/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/12/2008 11:14 AM
Arsenic	5.3	1.0		mg/Kg	1	11/12/2008 11:14 AM
Barium	91	1.0		mg/Kg	1	11/12/2008 11:14 AM
Beryllium	ND	1.0		mg/Kg	1	11/12/2008 11:14 AM
Cadmium	ND	1.0		mg/Kg	1	11/12/2008 11:14 AM
Chromium	32	1.0		mg/Kg	1	11/12/2008 11:14 AM
Cobalt	9.6	1.0		mg/Kg	1	11/12/2008 11:14 AM
Copper	46	2.0		mg/Kg	1	11/12/2008 11:14 AM
Lead	210	1.0		mg/Kg	1	11/12/2008 11:14 AM
Molybdenum	ND	1.0		mg/Kg	1	11/12/2008 11:14 AM
Nickel	34	1.0		mg/Kg	1	11/12/2008 11:14 AM
Selenium	2.1	1.0		mg/Kg	1	11/12/2008 11:14 AM
Silver	ND	1.0		mg/Kg	1	11/12/2008 11:14 AM
Thallium	ND	1.0		mg/Kg	1	11/12/2008 11:14 AM
Vanadium	39	1.0		mg/Kg	1	11/12/2008 11:14 AM
Zinc	130	1.0		mg/Kg	1	11/12/2008 11:14 AM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081111E	QC Batch: 50078			PrepDate:	11/11/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/11/2008 06:27 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *18-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	SB-30-2
Lab Order:	102050	**Collection Date:**	11/5/2008 11:41:00 AM
Project:	1-880 SB HOV, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102050-009A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081112A	QC Batch: 50079			PrepDate:	11/11/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	11/12/2008 11:19 AM
Arsenic	4.5	1.0		mg/Kg	1	11/12/2008 11:19 AM
Barium	33	1.0		mg/Kg	1	11/12/2008 11:19 AM
Beryllium	ND	1.0		mg/Kg	1	11/12/2008 11:19 AM
Cadmium	ND	1.0		mg/Kg	1	11/12/2008 11:19 AM
Chromium	75	1.0		mg/Kg	1	11/12/2008 11:19 AM
Cobalt	19	1.0		mg/Kg	1	11/12/2008 11:19 AM
Copper	150	2.0		mg/Kg	1	11/12/2008 11:19 AM
Lead	29	1.0		mg/Kg	1	11/12/2008 11:19 AM
Molybdenum	ND	1.0		mg/Kg	1	11/12/2008 11:19 AM
Nickel	44	1.0		mg/Kg	1	11/12/2008 11:19 AM
Selenium	2.4	1.0		mg/Kg	1	11/12/2008 11:19 AM
Silver	ND	1.0		mg/Kg	1	11/12/2008 11:19 AM
Thallium	ND	1.0		mg/Kg	1	11/12/2008 11:19 AM
Vanadium	43	1.0		mg/Kg	1	11/12/2008 11:19 AM
Zinc	36	1.0		mg/Kg	1	11/12/2008 11:19 AM
ICP METALS BY STLC						
				WET/ EPA 6010B		
RunID: ICP8_081117A	QC Batch: R101801			PrepDate:		Analyst: **CL**
Chromium	ND	1.0		mg/L	20	11/17/2008 10:51 AM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081111E	QC Batch: 50078			PrepDate:	11/11/2008	Analyst: **AMT**
Mercury	0.10	0.10		mg/Kg	1	11/11/2008 06:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102050-009ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **SB-30-2** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581746**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	1.398	2.0						1.759	0	20	
Arsenic	3.387	1.0						4.516	28.6	20	R
Barium	26.627	1.0						32.65	20.3	20	R
Beryllium	ND	1.0						0	0	20	
Cadmium	0.447	1.0						0.4655	0	20	
Chromium	58.209	1.0						75.14	25.4	20	R
Cobalt	15.160	1.0						18.53	20.0	20	R
Copper	99.257	2.0						147.0	38.8	20	R
Lead	24.728	1.0						29.19	16.6	20	
Molybdenum	ND	1.0						0	0	20	
Nickel	35.318	1.0						43.61	21.0	20	R
Selenium	2.413	1.0						2.399	0.573	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	32.115	1.0						42.86	28.7	20	R
Zinc	33.558	1.0						35.65	6.06	20	

Sample ID: **102050-009AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **SB-30-2** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581747**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	94.386	2.0	125.0	1.759	74.1	25	106				
Arsenic	113.470	1.0	125.0	4.516	87.2	42	113				
Barium	137.813	1.0	125.0	32.65	84.1	19	140				
Beryllium	109.005	1.0	125.0	0	87.2	50	109				
Cadmium	99.741	1.0	125.0	0.4655	79.4	48	106				
Chromium	154.647	1.0	125.0	75.14	63.6	44	116				
Cobalt	114.393	1.0	125.0	18.53	76.7	47	107				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102050-009AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **SB-30-2** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581747**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	216.438	2.0	125.0	147.0	55.5	49	124				
Lead	126.247	1.0	125.0	29.19	77.6	33	120				
Molybdenum	107.387	1.0	125.0	0	85.9	46	111				
Nickel	136.653	1.0	125.0	43.61	74.4	43	111				
Selenium	109.034	1.0	125.0	2.399	85.3	43	104				
Silver	115.949	1.0	125.0	0	92.8	53	114				
Thallium	92.072	1.0	125.0	0	73.7	41	107				
Vanadium	148.676	1.0	125.0	42.86	84.7	48	116				
Zinc	131.138	1.0	125.0	35.65	76.4	24	129				

Sample ID: **102050-009AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **SB-30-2** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581748**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	86.145	2.0	125.0	1.759	67.5	25	106	94.39	9.13	20	
Arsenic	105.988	1.0	125.0	4.516	81.2	42	113	113.5	6.82	20	
Barium	134.086	1.0	125.0	32.65	81.1	19	140	137.8	2.74	20	
Beryllium	101.649	1.0	125.0	0	81.3	50	109	109.0	6.98	20	
Cadmium	94.050	1.0	125.0	0.4655	74.9	48	106	99.74	5.87	20	
Chromium	147.651	1.0	125.0	75.14	58.0	44	116	154.6	4.63	20	
Cobalt	109.777	1.0	125.0	18.53	73.0	47	107	114.4	4.12	20	
Copper	220.821	2.0	125.0	147.0	59.0	49	124	216.4	2.00	20	
Lead	129.209	1.0	125.0	29.19	80.0	33	120	126.2	2.32	20	
Molybdenum	100.048	1.0	125.0	0	80.0	46	111	107.4	7.08	20	
Nickel	131.057	1.0	125.0	43.61	70.0	43	111	136.7	4.18	20	
Selenium	102.466	1.0	125.0	2.399	80.1	43	104	109.0	6.21	20	
Silver	109.304	1.0	125.0	0	87.4	53	114	115.9	5.90	20	
Thallium	86.866	1.0	125.0	0	69.5	41	107	92.07	5.82	20	
Vanadium	136.920	1.0	125.0	42.86	75.2	48	116	148.7	8.23	20	
Zinc	133.556	1.0	125.0	35.65	78.3	24	129	131.1	1.83	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50079** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **PBS** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581749**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	0.345	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	0.221	1.0									
Cobalt	0.020	1.0									
Copper	ND	2.0									
Lead	0.145	1.0									
Molybdenum	ND	1.0									
Nickel	0.057	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	0.075	1.0									
Zinc	0.260	1.0									

Sample ID: **LCS-50079** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **LCSS** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581750**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	50.687	2.0	50.00	0	101	80	120				
Arsenic	49.841	1.0	50.00	0	99.7	80	120				
Barium	51.864	1.0	50.00	0.3453	103	80	120				
Beryllium	49.841	1.0	50.00	0	99.7	80	120				
Cadmium	50.063	1.0	50.00	0	100	80	120				
Chromium	47.531	1.0	50.00	0.2205	94.6	80	120				
Cobalt	51.922	1.0	50.00	0.01999	104	80	120				
Copper	51.269	2.0	50.00	0	103	80	120				
Lead	51.326	1.0	50.00	0.1449	102	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50079** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101624**
Client ID: **LCSS** Batch ID: **50079** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/12/2008** SeqNo: **1581750**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	51.589	1.0	50.00	0	103	80	120				
Nickel	49.807	1.0	50.00	0.05678	99.5	80	120				
Selenium	47.757	1.0	50.00	0	95.5	80	120				
Silver	49.272	1.0	50.00	0	98.5	80	120				
Thallium	45.241	1.0	50.00	0	90.5	80	120				
Vanadium	52.102	1.0	50.00	0.07495	104	80	120				
Zinc	49.595	1.0	50.00	0.2599	98.7	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **MB-49984A** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **PBS** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	5.0									

Sample ID: **LCS-49984** SampType: **LCS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **LCSS** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	263.828	5.0	250.0	0	106	80	120				

Sample ID: **102050-012ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **SB-31-2** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	243.559	5.0						267.5	9.36	20	

Sample ID: **102050-012AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **SB-31-2** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	517.533	5.0	250.0	267.5	100	33	120				

Sample ID: **MB-49984B** SampType: **MBLK** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **PBS** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578060**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.217	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_SPB

Sample ID: **102050-021ADUP** SampType: **DUP** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **SB-34-2** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578070**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	19.448	5.0						28.43	37.5	20	R

Sample ID: **102050-021AMS** SampType: **MS** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **SB-34-2** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578071**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	177.123	5.0	250.0	28.43	59.5	33	120				

Sample ID: **102050-021AMSD** SampType: **MSD** TestCode: **6010_SPB** Units: **mg/Kg** Prep Date: **11/6/2008** RunNo: **101428**
Client ID: **SB-34-2** Batch ID: **49984** TestNo: **EPA 6010B** **EPA 3050M** Analysis Date: **11/7/2008** SeqNo: **1578072**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	198.726	5.0	250.0	28.43	68.1	33	120	177.1	11.5	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **102050-009A-DUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **SB-30-2** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	17.320	1.0						15.54	10.8	20	

Sample ID: **102050-009A-MS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **SB-30-2** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	21.246	1.0	2.500	15.54	228	71	121				S

Sample ID: **102050-009A-MSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101844**
Client ID: **SB-30-2** Batch ID: **50161** TestNo: **WET/ EPA 60 WET** Analysis Date: **11/17/2008** SeqNo: **1586061**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	16.910	1.0	2.500	15.54	54.6	71	121	21.25	22.7	20	SR

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-50161** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **PBS** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585234**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.050									

Sample ID: **102020-154ADUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **ZZZZZZ** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585236**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.452	1.0						0.4445	0	20	

Sample ID: **102020-154AMS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **ZZZZZZ** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585237**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.687	1.0	2.500	0.4445	89.7	77	116				

Sample ID: **102020-154AMSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **ZZZZZZ** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.796	1.0	2.500	0.4445	94.0	77	116	2.687	3.96	20	

Sample ID: **LCS-50161** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **101801**
Client ID: **LCSS** Batch ID: **R101801** TestNo: **WET/ EPA 60** Analysis Date: **11/17/2008** SeqNo: **1585240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.880	0.050	1.000	0	88.0	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50133A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **PBS** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50133** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **LCSS** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584012**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.129	0.25	5.000	0	103	80	120				

Sample ID: **102050-015A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-32-2** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.162	0.25						5.056	2.08	20	

Sample ID: **102050-015A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-32-2** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.318	0.25	5.000	5.056	85.2	80	120				

Sample ID: **102050-017A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-33-1** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.433	0.25						4.382	1.17	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **102050-017A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-33-1** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584029**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.825	0.25	5.000	4.382	88.9	80	120				

Sample ID: **102050-017A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-33-1** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584030**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.836	0.25	5.000	4.382	89.1	80	120	8.825	0.134	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50161A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101897**
Client ID: **PBS** Batch ID: **50161** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/18/2008** SeqNo: **1586757**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50161** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101897**
Client ID: **LCSS** Batch ID: **50161** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/18/2008** SeqNo: **1586758**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.100	0.25	5.000	0	102	80	120				

Sample ID: **102050-009A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101897**
Client ID: **SB-30-2** Batch ID: **50161** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/18/2008** SeqNo: **1586761**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	15.089	0.50						15.28	1.27	20	

Sample ID: **102050-009A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101897**
Client ID: **SB-30-2** Batch ID: **50161** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/18/2008** SeqNo: **1586762**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	19.008	1.0	5.000	15.28	74.5	80	120				S

Sample ID: **102050-009A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/12/2008** RunNo: **101897**
Client ID: **SB-30-2** Batch ID: **50161** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/18/2008** SeqNo: **1586763**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	18.794	1.0	5.000	15.28	70.3	80	120	19.01	1.13	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50078** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101605**
Client ID: **PBS** Batch ID: **50078** TestNo: **EPA 7471A** Analysis Date: **11/11/2008** SeqNo: **1581514**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50078** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101605**
Client ID: **LCSS** Batch ID: **50078** TestNo: **EPA 7471A** Analysis Date: **11/11/2008** SeqNo: **1581515**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.781	0.10	0.8300	0	94.1	80	120				

Sample ID: **102050-009A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101605**
Client ID: **SB-30-2** Batch ID: **50078** TestNo: **EPA 7471A** Analysis Date: **11/11/2008** SeqNo: **1581516**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.919	0.10	0.8300	0.1041	98.2	70	130				

Sample ID: **102050-009A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101605**
Client ID: **SB-30-2** Batch ID: **50078** TestNo: **EPA 7471A** Analysis Date: **11/11/2008** SeqNo: **1581517**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.995	0.10	0.8300	0.1041	107	70	130	0.9191	7.89	20	

Sample ID: **102050-009A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/11/2008** RunNo: **101605**
Client ID: **SB-30-2** Batch ID: **50078** TestNo: **EPA 7471A** Analysis Date: **11/11/2008** SeqNo: **1581519**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.188	0.10						0.1041	57.5	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 9045_S

Sample ID: **102050-021ADUP** SampType: **DUP** TestCode: **9045_S** Units: **pH Units** Prep Date: RunNo: **101410**
Client ID: **SB-34-2** Batch ID: **R101410** TestNo: **EPA 9045C** Analysis Date: **11/7/2008** SeqNo: **1577733**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
pH	6.390	0.10						6.420	0.468	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:
Logged By: fl Date: 11/6/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☒ FEDEX ☐ Other: G50

Sample Condition Upon Receipt: 1. CHILLED 3.4 Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB FOV Project #: E8449-06-01 Sampler: (Printed Name) Lauren Wincze (Signature) Lauren Wincze

Relinquished by: (Signature and Printed Name) Lauren Wincze Date: 11/5/08 Time: 1630 Received by: (Signature and Printed Name) Margo Date: 11/6/08 Time: 8:30
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/5/08 (Print Name, Date)
Lauren Wincze (Signature)

Send Report To: Attn: Co: SAME AS ABOVE Address City State Zip

Bill To: Attn: Co: SAME AS ABOVE Address City State Zip

Special Instructions/Comments:
10% QPH (random-lab)
do not composite sample sets.
CAM17 → standard TAT
TOTAL LEAD → 48 HR TAT

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal) LEAD, 8015B (GRO) / BTEX, 8015B (DRO), 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

Q A / Q C: RTNE ☐ CT ☒ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A	8082	8260B	8270C	6010B	8015B (GRO)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	102050 - 001/03	SB-28-0,1,2	11/5/08	1100					X					X				C	3	P P	C	
	- 4/6	SB-29-0,1,2		1120					X									C		P P		
	- 7/9	SB-30-0,1,2		1141								X						E		T M		
	- 10/12	SB-31-0,1,2		1127					X									C		P P		
	- 13/15	SB-32-0,1,2		1111					X									C		P P		
	- 16/18	SB-33-0,1,2		1119					X									C		P P		
	- 19/21	SB-34-0,1,2		1200					X									C		P P		

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr; B= Emergency Next workday; C= Critical - LEAD 2 Workdays; D= Urgent 3 Workdays; E= Routine - CAM17 7 Workdays

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

DISTRIBUTION: White with report, Yellow to folder, Pink to submitter.

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Monday, November 10, 2008 9:49 AM
To: Diane Galvan; 'Rick Day'
Cc: livermore@geoconinc.com
Subject: RE: Partial/Preliminary Results - 1-880 SB HOV (102050)

Hi Diane:
As with the previous sample results for this project, once data have been QA'ed. please proceed with soluble WET lead analyses on samples with total lead concentrations that are equal to or greater than 50 mg/kg, under standard TAT. Thank you!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Wednesday, November 12, 2008 1:44 PM
To: Diane Galvan; 'Rick Day'
Cc: livermore@geoconinc.com
Subject: RE: CAM17 & pH Results - 1-880 SB HOV (102050)

Thanks, Diane. Please run sample SB30-1 for WET lead and sample SB30-2 for WET chromium, standard TAT, once data have been QA'ed. Thanks!

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

December 09, 2008

Lauren Wincze
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102050

RE: 1-880 SB HOV, E8449-06-01

Attention: Lauren Wincze

Enclosed are the results for sample(s) received on November 06, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *09-Dec-08*

CLIENT: Geocon Consultants, Inc.
Project: 1-880 SB HOV, E8449-06-01
Lab Order: 102050

Lab ID: 102050-004 **Collection Date:** 11/5/2008 11:20:00 AM
Client Sample ID: SB-29-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
			WET/ EPA 7420			
RunID: AA2_081209A	QC Batch: R102692			PrepDate:		Analyst: **AMT**
Lead	2.8	0.25		mg/L	1	12/9/2008 11:44 AM

Lab ID: 102050-005 **Collection Date:** 11/5/2008 11:20:00 AM
Client Sample ID: SB-29-1 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
	WET		**WET DI/ EPA 7420**			
RunID: AA2_081209B	QC Batch: 50848			PrepDate:	12/7/2008	Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:37 PM
LEAD BY ATOMIC ABSORPTION (TCLP)						
	EPA3010A		**EPA 1311/ 7420**			
RunID: AA2_081208B	QC Batch: 50835			PrepDate:	12/5/2008	Analyst: **AMT**
Lead	2.4	0.25		mg/L	1	12/8/2008 01:49 PM

Lab ID: 102050-008 **Collection Date:** 11/5/2008 11:41:00 AM
Client Sample ID: SB-30-1 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
	WET		**WET DI/ EPA 7420**			
RunID: AA2_081209B	QC Batch: 50848			PrepDate:	12/7/2008	Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:37 PM
LEAD BY ATOMIC ABSORPTION (TCLP)						
	EPA3010A		**EPA 1311/ 7420**			
RunID: AA2_081208B	QC Batch: 50835			PrepDate:	12/5/2008	Analyst: **AMT**
Lead	1.4	0.25		mg/L	1	12/8/2008 01:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *10-Dec-08*

CLIENT: Geocon Consultants, Inc.
Project: 1-880 SB HOV, E8449-06-01
Lab Order: 102050

Lab ID: 102050-010 **Collection Date:** 11/5/2008 11:27:00 AM
Client Sample ID: SB-31-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
WET			**WET DI/ EPA 7420**			
RunID: AA2_081209B QC Batch: 50848				PrepDate: 12/7/2008		Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:38 PM

Lab ID: 102050-012 **Collection Date:** 11/5/2008 11:27:00 AM
Client Sample ID: SB-31-2 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
WET			**WET DI/ EPA 7420**			
RunID: AA2_081209B QC Batch: 50848				PrepDate: 12/7/2008		Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:38 PM
LEAD BY ATOMIC ABSORPTION (TCLP)						
EPA3010A			**EPA 1311/ 7420**			
RunID: AA2_081208B QC Batch: 50835				PrepDate: 12/5/2008		Analyst: **AMT**
Lead	3.3	0.25		mg/L	1	12/8/2008 01:50 PM

Lab ID: 102050-014 **Collection Date:** 11/5/2008 11:11:00 AM
Client Sample ID: SB-32-1 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
WET			**WET DI/ EPA 7420**			
RunID: AA2_081209B QC Batch: 50848				PrepDate: 12/7/2008		Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:39 PM
LEAD BY ATOMIC ABSORPTION (TCLP)						
EPA3010A			**EPA 1311/ 7420**			
RunID: AA2_081208B QC Batch: 50835				PrepDate: 12/5/2008		Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/8/2008 01:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *10-Dec-08*

CLIENT: Geocon Consultants, Inc.
Project: 1-880 SB HOV, E8449-06-01

Lab Order: 102050

Lab ID: 102050-015 **Collection Date:** 11/5/2008 11:11:00 AM
Client Sample ID: SB-32-2 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
WET			**WET DI/ EPA 7420**			
RunID: AA2_081209B	QC Batch: 50848				PrepDate: 12/7/2008	Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:39 PM

Lab ID: 102050-016 **Collection Date:** 11/5/2008 11:19:00 AM
Client Sample ID: SB-33-0 **Matrix:** SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION						
WET			**WET DI/ EPA 7420**			
RunID: AA2_081209B	QC Batch: 50848				PrepDate: 12/7/2008	Analyst: **AMT**
Lead	ND	0.25		mg/L	1	12/9/2008 02:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_DI_GEOCON

Sample ID: **MB-50848** SampType: **MBLK** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: **12/7/2008** RunNo: **102693**
Client ID: **PBS** Batch ID: **50848** TestNo: **WET DI/ EPA WET** Analysis Date: **12/9/2008** SeqNo: **1600806**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50848** SampType: **LCS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: **12/7/2008** RunNo: **102693**
Client ID: **LCSS** Batch ID: **50848** TestNo: **WET DI/ EPA WET** Analysis Date: **12/9/2008** SeqNo: **1600807**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.978	0.25	5.000	0	99.6	80	120				

Sample ID: **102050-016A-DUP** SampType: **DUP** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: **12/7/2008** RunNo: **102693**
Client ID: **SB-33-0** Batch ID: **50848** TestNo: **WET DI/ EPA WET** Analysis Date: **12/9/2008** SeqNo: **1600815**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **102050-016A-MS** SampType: **MS** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: **12/7/2008** RunNo: **102693**
Client ID: **SB-33-0** Batch ID: **50848** TestNo: **WET DI/ EPA WET** Analysis Date: **12/9/2008** SeqNo: **1600816**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.938	0.25	5.000	0	98.8	70	130				

Sample ID: **102050-016A-MSD** SampType: **MSD** TestCode: **7420_DI_GE** Units: **mg/L** Prep Date: **12/7/2008** RunNo: **102693**
Client ID: **SB-33-0** Batch ID: **50848** TestNo: **WET DI/ EPA WET** Analysis Date: **12/9/2008** SeqNo: **1600817**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.904	0.25	5.000	0	98.1	70	130	4.938	0.696	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50133A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **PBS** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50133** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **LCSS** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584012**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.129	0.25	5.000	0	103	80	120				

Sample ID: **102050-015A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-32-2** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.162	0.25						5.056	2.08	20	

Sample ID: **102050-015A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-32-2** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584024**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.318	0.25	5.000	5.056	85.2	80	120				

Sample ID: **102050-017A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-33-1** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584028**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.433	0.25						4.382	1.17	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **102050-017A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-33-1** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584029**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.825	0.25	5.000	4.382	88.9	80	120				

Sample ID: **102050-017A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/11/2008** RunNo: **101742**
Client ID: **SB-33-1** Batch ID: **50133** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/14/2008** SeqNo: **1584030**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	8.836	0.25	5.000	4.382	89.1	80	120	8.825	0.134	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50849** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **PBS** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600754**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50849** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **LCSS** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600755**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.360	0.25	5.000	0	107	80	120				

Sample ID: **102336-051A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.806	0.25						2.840	1.23	20	

Sample ID: **102336-051A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600767**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.196	0.25	5.000	2.840	87.1	80	120				

Sample ID: **MB-50849B** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **PBS** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600768**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **102401-001A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0.1814	0	20	

Sample ID: **102401-001A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.767	0.25	5.000	0.1814	91.7	80	120				

Sample ID: **102401-001A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600777**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.448	0.25	5.000	0.1814	85.3	80	120	4.767	6.94	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **MB-50835** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **12/5/2008** RunNo: **102642**
Client ID: **PBS** Batch ID: **50835** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **12/8/2008** SeqNo: **1599879**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.103	0.25									

Sample ID: **MB-50816 TCLP** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **12/5/2008** RunNo: **102642**
Client ID: **PBS** Batch ID: **50835** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **12/8/2008** SeqNo: **1599880**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.207	0.25									

Sample ID: **LCS-50835** SampType: **LCS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **12/5/2008** RunNo: **102642**
Client ID: **LCSS** Batch ID: **50835** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **12/8/2008** SeqNo: **1599881**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.963	0.25	1.000	0.1026	86.1	80	120				

Sample ID: **102050-014A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **12/5/2008** RunNo: **102642**
Client ID: **SB-32-1** Batch ID: **50835** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **12/8/2008** SeqNo: **1599886**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.177	0.25						0.1878	0	20	

Sample ID: **102050-014A-MS** SampType: **MS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **12/5/2008** RunNo: **102642**
Client ID: **SB-32-1** Batch ID: **50835** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **12/8/2008** SeqNo: **1599887**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.393	0.25	2.500	0.1878	88.2	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102050
Project: 1-880 SB HOV, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **102050-014A-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **12/5/2008** RunNo: **102642**
Client ID: **SB-32-1** Batch ID: **50835** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **12/8/2008** SeqNo: **1599888**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.187	0.25	2.500	0.1878	80.0	70	130	2.393	9.02	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Wednesday, December 03, 2008 1:41 PM
To: Diane Galvan
Subject: RE: Results - I-880 SB Improvements (102050)

Hi Diane:
Please run the following soluble lead analyses (standard TAT)

WET – SB29-0

WET-DI – SB-31-0, SB-32-2, SB-33-0

WET-DI and TCLP – SB-29-1, SB-30-1, SB-31-2, SB-32-1.

Thanks!

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

December 03, 2008

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102311

Lauren Wincze
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

RE: I-880 SB Improvements, E8449-06-01

Attention: Lauren Wincze

Enclosed are the results for sample(s) received on November 21, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Project: I-880 SB Improvements, E8449-06-01
Lab Order: 102311

CASE NARRATIVE

Analytical Comments for Method 6010

Dilution was necessary for sample 102311-011A, due to sample matrix.

RPD for Duplicate (DUP) is outside criteria for samples 102311-024ADUP, 102311-035ADUP, 102311-048ADUP and 102311-054DDUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Analytical Comments for Method 8015 (DRO/ORO)

Dilution was necessary for samples 102311-001A, 102311-007A, 102311-010A, 102311-012A, 102311-015A, 102311-019A, 102311-021A, 102311-029A, 102311-030A, 102311-032A, 102311-034A, 102311-038A, 102311-040A and 102311-049A, due to sample matrix.

Surrogate recovery was diluted out for samples 102311-001A, 102311-007A, 102311-012A, 102311-015A, 102311-019A, 102311-021A, 102311-029A, 102311-030A, 102311-032A, 102311-034A, 102311-038A, 102311-040A and 102311-049A, due to sample matrix.

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for sample 102311-010AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

RPD for Duplicate (DUP) and/or Matrix Spike (MS)/Matrix Spike Duplicate (MSD) is outside criteria for samples 102311-010ADUP, 102311-010AMSD and 102311-048ADUP; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Analytical Comments for Method 8021

RPD for Matrix Spike (MS)/Matrix Spike Duplicate (MSD) is outside criteria for sample 102336-042AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Analytical Comments for Method 8260

Surrogate recovery biased high for sample 102311-018ADUP, possibly due to matrix interferences.

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-001A

Client Sample ID: RW8-1-1
Collection Date: 11/19/2008 9:20:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081201D	QC Batch: 50508			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 12:14 PM
Arsenic	3.3	1.0		mg/Kg	1	12/1/2008 12:14 PM
Barium	76	1.0		mg/Kg	1	12/1/2008 12:14 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 12:14 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 12:14 PM
Chromium	24	1.0		mg/Kg	1	12/1/2008 12:14 PM
Cobalt	7.5	1.0		mg/Kg	1	12/1/2008 12:14 PM
Copper	24	2.0		mg/Kg	1	12/1/2008 12:14 PM
Lead	60	1.0		mg/Kg	1	12/1/2008 12:14 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 12:14 PM
Nickel	28	1.0		mg/Kg	1	12/1/2008 12:14 PM
Selenium	1.6	1.0		mg/Kg	1	12/1/2008 12:14 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 12:14 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 12:14 PM
Vanadium	28	1.0		mg/Kg	1	12/1/2008 12:14 PM
Zinc	45	1.0		mg/Kg	1	12/1/2008 12:14 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	46	20		mg/Kg	20	11/26/2008 06:47 PM
ORO	180	20		mg/Kg	20	11/26/2008 06:47 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	20	11/26/2008 06:47 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:24 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-002A

Client Sample ID: RW8-1
Collection Date: 11/19/2008 9:45:00 AM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,1,1-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,1,2-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,1-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,1-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,1-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2,3-Trichloropropane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2-Dibromoethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,3-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,3-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
1,4-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
2,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
2-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
4-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
4-Isopropyltoluene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Benzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Bromobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Bromodichloromethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Bromoform	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Bromomethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Carbon tetrachloride	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Chlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Chloroethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Chloroform	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Chloromethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
cis-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 04:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW8-1
Lab Order:	102311	**Collection Date:**	11/19/2008 9:45:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-002A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Dibromochloromethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Dibromomethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Dichlorodifluoromethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Ethylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Hexachlorobutadiene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Isopropylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
m,p-Xylene	ND	1.0		µg/L	1	11/21/2008 04:31 PM
Methylene chloride	ND	1.0		µg/L	1	11/21/2008 04:31 PM
n-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
n-Propylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Naphthalene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
o-Xylene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
sec-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Styrene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
tert-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Tetrachloroethene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Toluene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
trans-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Trichloroethene	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Trichlorofluoromethane	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Vinyl chloride	ND	0.50		µg/L	1	11/21/2008 04:31 PM
Surr: 1,2-Dichloroethane-d4	109	70-130		%REC	1	11/21/2008 04:31 PM
Surr: 4-Bromofluorobenzene	90.4	70-130		%REC	1	11/21/2008 04:31 PM
Surr: Dibromofluoromethane	109	70-130		%REC	1	11/21/2008 04:31 PM
Surr: Toluene-d8	112	70-130		%REC	1	11/21/2008 04:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW8-1
Lab Order:	102311	**Collection Date:**	11/19/2008 9:45:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-002B		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
GRO	ND	0.050		mg/L	1	11/25/2008 05:25 PM
Surr: Bromofluorobenzene (FID)	103	71-130		%REC	1	11/25/2008 05:25 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
Benzene	ND	0.50		µg/L	1	11/25/2008 05:25 PM
Ethylbenzene	ND	0.50		µg/L	1	11/25/2008 05:25 PM
m,p-Xylene	ND	1.0		µg/L	1	11/25/2008 05:25 PM
Methyl tert-butyl ether	ND	0.50		µg/L	1	11/25/2008 05:25 PM
o-Xylene	ND	0.50		µg/L	1	11/25/2008 05:25 PM
Toluene	ND	0.50		µg/L	1	11/25/2008 05:25 PM
Surr: Bromofluorobenzene (PID)	91.8	73-127		%REC	1	11/25/2008 05:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW8-1
Lab Order:	102311	**Collection Date:**	11/19/2008 9:45:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-002C		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3510C				**EPA 8015B(M)**		
RunID: GC16_081125A	QC Batch: 50546			PrepDate:	11/24/2008	Analyst: **CBR**
DRO	0.25	0.062		mg/L	1	11/25/2008 10:20 AM
ORO	0.24	0.062		mg/L	1	11/25/2008 10:20 AM
Surr: p-Terphenyl	102	35-131		%REC	1	11/25/2008 10:20 AM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-002D

Client Sample ID: RW8-1
Collection Date: 11/19/2008 9:45:00 AM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP8_081124D	QC Batch: 50521				PrepDate: 11/24/2008	Analyst: **CL**
Antimony	ND	0.0050		mg/L	1	11/24/2008 02:04 PM
Arsenic	0.011	0.010		mg/L	1	11/24/2008 02:04 PM
Barium	0.48	0.0030		mg/L	1	11/24/2008 02:04 PM
Beryllium	ND	0.0030		mg/L	1	11/24/2008 02:04 PM
Cadmium	ND	0.0030		mg/L	1	11/24/2008 02:04 PM
Chromium	ND	0.0030		mg/L	1	11/24/2008 02:04 PM
Cobalt	0.029	0.0030		mg/L	1	11/24/2008 02:04 PM
Copper	0.019	0.0050		mg/L	1	11/24/2008 02:04 PM
Lead	ND	0.0050		mg/L	1	11/24/2008 02:04 PM
Lead	ND	0.0050		mg/L	1	11/28/2008 11:58 AM
Molybdenum	ND	0.0050		mg/L	1	11/24/2008 02:04 PM
Nickel	0.058	0.0050		mg/L	1	11/24/2008 02:04 PM
Selenium	ND	0.010		mg/L	1	11/24/2008 02:04 PM
Silver	ND	0.0030		mg/L	1	11/24/2008 02:04 PM
Thallium	ND	0.015		mg/L	1	11/24/2008 02:04 PM
Vanadium	0.038	0.0030		mg/L	1	11/24/2008 02:04 PM
Zinc	0.049	0.010		mg/L	1	11/24/2008 02:04 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA5_081124E	QC Batch: 50520				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	ND	0.20		µg/L	1	11/24/2008 05:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-003A

Client Sample ID: RW8-1-5
Collection Date: 11/19/2008 9:30:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201D	QC Batch: 50508			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 12:18 PM
Arsenic	3.1	1.0		mg/Kg	1	12/1/2008 12:18 PM
Barium	160	1.0		mg/Kg	1	12/1/2008 12:18 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 12:18 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 12:18 PM
Chromium	43	1.0		mg/Kg	1	12/1/2008 12:18 PM
Cobalt	8.0	1.0		mg/Kg	1	12/1/2008 12:18 PM
Copper	27	2.0		mg/Kg	1	12/1/2008 12:18 PM
Lead	6.1	1.0		mg/Kg	1	12/1/2008 12:18 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 12:18 PM
Nickel	55	1.0		mg/Kg	1	12/1/2008 12:18 PM
Selenium	2.3	1.0		mg/Kg	1	12/1/2008 12:18 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 12:18 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 12:18 PM
Vanadium	38	1.0		mg/Kg	1	12/1/2008 12:18 PM
Zinc	52	1.0		mg/Kg	1	12/1/2008 12:18 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 10:33 PM
Surr: Bromofluorobenzene (FID)	90.6	59-145		%REC	1	11/24/2008 10:33 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 10:33 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 10:33 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 10:33 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 10:33 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 10:33 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 10:33 PM
Surr: Bromofluorobenzene (PID)	94.9	65-140		%REC	1	11/24/2008 10:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW8-1-5
Lab Order:	102311	**Collection Date:**	11/19/2008 9:30:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-003A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate: 11/24/2008		Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:26 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-004A

Client Sample ID: RW8-1-16
Collection Date: 11/19/2008 9:48:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201D	QC Batch: 50508			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 02:42 PM
Arsenic	3.9	1.0		mg/Kg	1	12/1/2008 02:42 PM
Barium	120	1.0		mg/Kg	1	12/1/2008 02:42 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 02:42 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 02:42 PM
Chromium	23	1.0		mg/Kg	1	12/1/2008 02:42 PM
Cobalt	6.7	1.0		mg/Kg	1	12/1/2008 02:42 PM
Copper	17	2.0		mg/Kg	1	12/1/2008 02:42 PM
Lead	11	1.0		mg/Kg	1	12/1/2008 02:42 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 02:42 PM
Nickel	33	1.0		mg/Kg	1	12/1/2008 02:42 PM
Selenium	1.6	1.0		mg/Kg	1	12/1/2008 02:42 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 02:42 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 02:42 PM
Vanadium	26	1.0		mg/Kg	1	12/1/2008 02:42 PM
Zinc	34	1.0		mg/Kg	1	12/1/2008 02:42 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 04:51 PM
Surr: Bromofluorobenzene (FID)	86.8	59-145		%REC	1	11/24/2008 04:51 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 04:51 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 04:51 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 04:51 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 04:51 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 04:51 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 04:51 PM
Surr: Bromofluorobenzene (PID)	89.9	65-140		%REC	1	11/24/2008 04:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW8-1-16
Lab Order:	102311	**Collection Date:**	11/19/2008 9:48:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-004A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125C	QC Batch: 50502				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:28 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-005A

Client Sample ID: RW8-2-1
Collection Date: 11/19/2008 10:25:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081201D	QC Batch: 50508			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 06:08 PM
Arsenic	2.6	1.0		mg/Kg	1	12/1/2008 06:08 PM
Barium	24	1.0		mg/Kg	1	12/1/2008 06:08 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 06:08 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 06:08 PM
Chromium	23	1.0		mg/Kg	1	12/1/2008 06:08 PM
Cobalt	13	1.0		mg/Kg	1	12/1/2008 06:08 PM
Copper	55	2.0		mg/Kg	1	12/1/2008 06:08 PM
Lead	ND	1.0		mg/Kg	1	12/1/2008 06:08 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 06:08 PM
Nickel	21	1.0		mg/Kg	1	12/1/2008 06:08 PM
Selenium	2.1	1.0		mg/Kg	1	12/1/2008 06:08 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 06:08 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 06:08 PM
Vanadium	56	1.0		mg/Kg	1	12/1/2008 06:08 PM
Zinc	42	1.0		mg/Kg	1	12/1/2008 06:08 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	8.8	1.0		mg/Kg	1	11/26/2008 05:53 PM
ORO	22	1.0		mg/Kg	1	11/26/2008 05:53 PM
Surr: p-Terphenyl	90.5	30-130		%REC	1	11/26/2008 05:53 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	1.5	0.10		mg/Kg	1	11/25/2008 12:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-006A

Client Sample ID: RW8-2-5
Collection Date: 11/19/2008 10:30:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201D	QC Batch: 50508			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 06:13 PM
Arsenic	3.7	1.0		mg/Kg	1	12/1/2008 06:13 PM
Barium	120	1.0		mg/Kg	1	12/1/2008 06:13 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 06:13 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 06:13 PM
Chromium	26	1.0		mg/Kg	1	12/1/2008 06:13 PM
Cobalt	9.1	1.0		mg/Kg	1	12/1/2008 06:13 PM
Copper	17	2.0		mg/Kg	1	12/1/2008 06:13 PM
Lead	5.1	1.0		mg/Kg	1	12/1/2008 06:13 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 06:13 PM
Nickel	38	1.0		mg/Kg	1	12/1/2008 06:13 PM
Selenium	1.4	1.0		mg/Kg	1	12/1/2008 06:13 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 06:13 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 06:13 PM
Vanadium	30	1.0		mg/Kg	1	12/1/2008 06:13 PM
Zinc	36	1.0		mg/Kg	1	12/1/2008 06:13 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 05:05 PM
Surr: Bromofluorobenzene (FID)	90.9	59-145		%REC	1	11/24/2008 05:05 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 05:05 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 05:05 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 05:05 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 05:05 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 05:05 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 05:05 PM
Surr: Bromofluorobenzene (PID)	94.5	65-140		%REC	1	11/24/2008 05:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW8-2-5
Lab Order:	102311	**Collection Date:**	11/19/2008 10:30:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-006A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:32 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-007A

Client Sample ID: RW5-1-1
Collection Date: 11/19/2008 10:55:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081201D	QC Batch: 50508			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 06:35 PM
Arsenic	5.4	1.0		mg/Kg	1	12/1/2008 06:35 PM
Barium	140	1.0		mg/Kg	1	12/1/2008 06:35 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 06:35 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 06:35 PM
Chromium	37	1.0		mg/Kg	1	12/1/2008 06:35 PM
Cobalt	9.4	1.0		mg/Kg	1	12/1/2008 06:35 PM
Copper	39	2.0		mg/Kg	1	12/1/2008 06:35 PM
Lead	120	1.0		mg/Kg	1	12/1/2008 06:35 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 06:35 PM
Nickel	43	1.0		mg/Kg	1	12/1/2008 06:35 PM
Selenium	1.4	1.0		mg/Kg	1	12/1/2008 06:35 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 06:35 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 06:35 PM
Vanadium	33	1.0		mg/Kg	1	12/1/2008 06:35 PM
Zinc	110	1.0		mg/Kg	1	12/1/2008 06:35 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	27	10		mg/Kg	10	11/26/2008 06:20 PM
ORO	140	10		mg/Kg	10	11/26/2008 06:20 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 06:20 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	0.16	0.10		mg/Kg	1	11/25/2008 12:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-008A

Client Sample ID: RW5-1-5
Collection Date: 11/19/2008 11:05:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081201D	QC Batch: 50508			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 06:39 PM
Arsenic	5.0	1.0		mg/Kg	1	12/1/2008 06:39 PM
Barium	180	1.0		mg/Kg	1	12/1/2008 06:39 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 06:39 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 06:39 PM
Chromium	34	1.0		mg/Kg	1	12/1/2008 06:39 PM
Cobalt	11	1.0		mg/Kg	1	12/1/2008 06:39 PM
Copper	20	2.0		mg/Kg	1	12/1/2008 06:39 PM
Lead	6.5	1.0		mg/Kg	1	12/1/2008 06:39 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 06:39 PM
Nickel	58	1.0		mg/Kg	1	12/1/2008 06:39 PM
Selenium	1.8	1.0		mg/Kg	1	12/1/2008 06:39 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 06:39 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 06:39 PM
Vanadium	33	1.0		mg/Kg	1	12/1/2008 06:39 PM
Zinc	42	1.0		mg/Kg	1	12/1/2008 06:39 PM
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 10:48 PM
Surr: Bromofluorobenzene (FID)	91.7	59-145		%REC	1	11/24/2008 10:48 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 10:48 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 10:48 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 10:48 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 10:48 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 10:48 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 10:48 PM
Surr: Bromofluorobenzene (PID)	95.9	65-140		%REC	1	11/24/2008 10:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW5-1-5
Lab Order:	102311	**Collection Date:**	11/19/2008 11:05:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-008A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125C	QC Batch: 50502				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:40 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-009A

Client Sample ID: RW5-1-19.5
Collection Date: 11/19/2008 11:15:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201D	QC Batch: 50508			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 06:44 PM
Arsenic	3.3	1.0		mg/Kg	1	12/1/2008 06:44 PM
Barium	110	1.0		mg/Kg	1	12/1/2008 06:44 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 06:44 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 06:44 PM
Chromium	30	1.0		mg/Kg	1	12/1/2008 06:44 PM
Cobalt	6.4	1.0		mg/Kg	1	12/1/2008 06:44 PM
Copper	13	2.0		mg/Kg	1	12/1/2008 06:44 PM
Lead	2.1	1.0		mg/Kg	1	12/1/2008 06:44 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 06:44 PM
Nickel	37	1.0		mg/Kg	1	12/1/2008 06:44 PM
Selenium	1.0	1.0		mg/Kg	1	12/1/2008 06:44 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 06:44 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 06:44 PM
Vanadium	22	1.0		mg/Kg	1	12/1/2008 06:44 PM
Zinc	27	1.0		mg/Kg	1	12/1/2008 06:44 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 05:34 PM
Surr: Bromofluorobenzene (FID)	100	59-145		%REC	1	11/24/2008 05:34 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 05:34 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 05:34 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 05:34 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 05:34 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 05:34 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 05:34 PM
Surr: Bromofluorobenzene (PID)	104	65-140		%REC	1	11/24/2008 05:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-009A

Client Sample ID: RW5-1-19.5
Collection Date: 11/19/2008 11:15:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471A						
RunID: AA5_081125C QC Batch: 50502 PrepDate: 11/24/2008 Analyst: **AMT**						
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:42 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 8260B						
RunID: MS4_081121A QC Batch: K08VS485 PrepDate: Analyst: **BD**						
1,1,1,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,1,1-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,1,2,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,1,2-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,1-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,1-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,1-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2,3-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2,3-Trichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2,4-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2,4-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2-Dibromo-3-chloropropane	ND	10		µg/Kg	1	11/21/2008 03:09 PM
1,2-Dibromoethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,3,5-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,3-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,3-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
1,4-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
2,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
2-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
4-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
4-Isopropyltoluene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Benzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Bromobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Bromodichloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Bromoform	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Bromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Carbon tetrachloride	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Chlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-009A

Client Sample ID: RW5-1-19.5
Collection Date: 11/19/2008 11:15:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS4_081121A	QC Batch: K08VS485			PrepDate:		Analyst: **BD**
Chloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Chloroform	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Chloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
cis-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
cis-1,3-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Dibromochloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Dibromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Dichlorodifluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Hexachlorobutadiene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Isopropylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
m,p-Xylene	ND	10		µg/Kg	1	11/21/2008 03:09 PM
Methylene chloride	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
n-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
n-Propylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Naphthalene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
o-Xylene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
sec-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Styrene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
tert-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Tetrachloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Toluene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
trans-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Trichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Trichlorofluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Vinyl chloride	ND	5.0		µg/Kg	1	11/21/2008 03:09 PM
Surr: 1,2-Dichloroethane-d4	110	70-130		%REC	1	11/21/2008 03:09 PM
Surr: 4-Bromofluorobenzene	96.4	70-130		%REC	1	11/21/2008 03:09 PM
Surr: Dibromofluoromethane	99.6	70-130		%REC	1	11/21/2008 03:09 PM
Surr: Toluene-d8	103	70-130		%REC	1	11/21/2008 03:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-010A

Client Sample ID: RW3-3-1
Collection Date: 11/19/2008 11:40:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081201D	QC Batch: 50508			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 06:49 PM
Arsenic	2.9	1.0		mg/Kg	1	12/1/2008 06:49 PM
Barium	75	1.0		mg/Kg	1	12/1/2008 06:49 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 06:49 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 06:49 PM
Chromium	33	1.0		mg/Kg	1	12/1/2008 06:49 PM
Cobalt	12	1.0		mg/Kg	1	12/1/2008 06:49 PM
Copper	41	2.0		mg/Kg	1	12/1/2008 06:49 PM
Lead	27	1.0		mg/Kg	1	12/1/2008 06:49 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 06:49 PM
Nickel	31	1.0		mg/Kg	1	12/1/2008 06:49 PM
Selenium	1.8	1.0		mg/Kg	1	12/1/2008 06:49 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 06:49 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 06:49 PM
Vanadium	48	1.0		mg/Kg	1	12/1/2008 06:49 PM
Zinc	51	1.0		mg/Kg	1	12/1/2008 06:49 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	43	20		mg/Kg	20	11/26/2008 11:57 AM
ORO	140	20		mg/Kg	20	11/26/2008 11:57 AM
Surr: p-Terphenyl	54.2	30-130		%REC	20	11/26/2008 11:57 AM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-011A

Client Sample ID: RW3-3-5
Collection Date: 11/19/2008 11:45:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201D	QC Batch: 50508			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	4.0		mg/Kg	2	12/1/2008 06:53 PM
Arsenic	3.5	2.0		mg/Kg	2	12/1/2008 06:53 PM
Barium	130	2.0		mg/Kg	2	12/1/2008 06:53 PM
Beryllium	ND	2.0		mg/Kg	2	12/1/2008 06:53 PM
Cadmium	ND	2.0		mg/Kg	2	12/1/2008 06:53 PM
Chromium	27	2.0		mg/Kg	2	12/1/2008 06:53 PM
Cobalt	8.0	2.0		mg/Kg	2	12/1/2008 06:53 PM
Copper	17	4.0		mg/Kg	2	12/1/2008 06:53 PM
Lead	6.7	2.0		mg/Kg	2	12/1/2008 06:53 PM
Molybdenum	ND	2.0		mg/Kg	2	12/1/2008 06:53 PM
Nickel	37	2.0		mg/Kg	2	12/1/2008 06:53 PM
Selenium	ND	2.0		mg/Kg	2	12/1/2008 06:53 PM
Silver	ND	2.0		mg/Kg	2	12/1/2008 06:53 PM
Thallium	ND	2.0		mg/Kg	2	12/1/2008 06:53 PM
Vanadium	26	2.0		mg/Kg	2	12/1/2008 06:53 PM
Zinc	39	2.0		mg/Kg	2	12/1/2008 06:53 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 06:02 PM
Surr: Bromofluorobenzene (FID)	87.4	59-145		%REC	1	11/24/2008 06:02 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 06:02 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 06:02 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 06:02 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 06:02 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 06:02 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 06:02 PM
Surr: Bromofluorobenzene (PID)	91.7	65-140		%REC	1	11/24/2008 06:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-3-5
Lab Order:	102311	**Collection Date:**	11/19/2008 11:45:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-011A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125C	QC Batch: 50502			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 12:21 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 12:15:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-012A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	68	20		mg/Kg	20	11/26/2008 07:05 PM
ORO	280	20		mg/Kg	20	11/26/2008 07:05 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	20	11/26/2008 07:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-013A

Client Sample ID: RW3-2-5
Collection Date: 11/19/2008 12:20:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202C	QC Batch: 50510			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:01 AM
Arsenic	3.4	1.0		mg/Kg	1	12/2/2008 11:01 AM
Barium	120	1.0		mg/Kg	1	12/2/2008 11:01 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:01 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:01 AM
Chromium	23	1.0		mg/Kg	1	12/2/2008 11:01 AM
Cobalt	6.4	1.0		mg/Kg	1	12/2/2008 11:01 AM
Copper	14	2.0		mg/Kg	1	12/2/2008 11:01 AM
Lead	5.9	1.0		mg/Kg	1	12/2/2008 11:01 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:01 AM
Nickel	32	1.0		mg/Kg	1	12/2/2008 11:01 AM
Selenium	1.5	1.0		mg/Kg	1	12/2/2008 11:01 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:01 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:01 AM
Vanadium	21	1.0		mg/Kg	1	12/2/2008 11:01 AM
Zinc	33	1.0		mg/Kg	1	12/2/2008 11:01 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 06:17 PM
Surr: Bromofluorobenzene (FID)	89.0	59-145		%REC	1	11/24/2008 06:17 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 06:17 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 06:17 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 06:17 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 06:17 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 06:17 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 06:17 PM
Surr: Bromofluorobenzene (PID)	92.2	65-140		%REC	1	11/24/2008 06:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2-5
Lab Order:	102311	**Collection Date:**	11/19/2008 12:20:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-013A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125D	QC Batch: 50503				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:06 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2
Lab Order:	102311	**Collection Date:**	11/19/2008 12:30:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-014A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,1,1-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,1,2-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,1-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,1-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,1-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2,3-Trichloropropane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2-Dibromoethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,3-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,3-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
1,4-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
2,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
2-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
4-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
4-Isopropyltoluene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Benzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Bromobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Bromodichloromethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Bromoform	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Bromomethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Carbon tetrachloride	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Chlorobenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Chloroethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Chloroform	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Chloromethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
cis-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 04:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2
Lab Order:	102311	**Collection Date:**	11/19/2008 12:30:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-014A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Dibromochloromethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Dibromomethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Dichlorodifluoromethane	1.8	0.50		µg/L	1	11/21/2008 04:52 PM
Ethylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Hexachlorobutadiene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Isopropylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
m,p-Xylene	ND	1.0		µg/L	1	11/21/2008 04:52 PM
Methylene chloride	ND	1.0		µg/L	1	11/21/2008 04:52 PM
n-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
n-Propylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Naphthalene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
o-Xylene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
sec-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Styrene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
tert-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Tetrachloroethene	13	0.50		µg/L	1	11/21/2008 04:52 PM
Toluene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
trans-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Trichloroethene	2.5	0.50		µg/L	1	11/21/2008 04:52 PM
Trichlorofluoromethane	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Vinyl chloride	ND	0.50		µg/L	1	11/21/2008 04:52 PM
Surr: 1,2-Dichloroethane-d4	111	70-130		%REC	1	11/21/2008 04:52 PM
Surr: 4-Bromofluorobenzene	90.9	70-130		%REC	1	11/21/2008 04:52 PM
Surr: Dibromofluoromethane	110	70-130		%REC	1	11/21/2008 04:52 PM
Surr: Toluene-d8	112	70-130		%REC	1	11/21/2008 04:52 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2
Lab Order:	102311	**Collection Date:**	11/19/2008 12:30:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-014B		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC6_081126A	QC Batch: I08VW213			PrepDate:		Analyst: **DDL**
GRO	ND	0.050		mg/L	1	11/26/2008 12:54 PM
Surr: Bromofluorobenzene (FID)	98.1	71-130		%REC	1	11/26/2008 12:54 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC6_081126A	QC Batch: I08VW213			PrepDate:		Analyst: **DDL**
Benzene	ND	0.50		µg/L	1	11/26/2008 12:54 PM
Ethylbenzene	ND	0.50		µg/L	1	11/26/2008 12:54 PM
m,p-Xylene	ND	1.0		µg/L	1	11/26/2008 12:54 PM
Methyl tert-butyl ether	ND	0.50		µg/L	1	11/26/2008 12:54 PM
o-Xylene	ND	0.50		µg/L	1	11/26/2008 12:54 PM
Toluene	ND	0.50		µg/L	1	11/26/2008 12:54 PM
Surr: Bromofluorobenzene (PID)	89.2	73-127		%REC	1	11/26/2008 12:54 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2
Lab Order:	102311	**Collection Date:**	11/19/2008 12:30:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-014C		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3510C				**EPA 8015B(M)**		
RunID: GC16_081125C	QC Batch: 50580			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	0.078	0.050		mg/L	1	11/25/2008 03:29 PM
ORO	0.089	0.050		mg/L	1	11/25/2008 03:29 PM
Surr: p-Terphenyl	127	35-131		%REC	1	11/25/2008 03:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2
Lab Order:	102311	**Collection Date:**	11/19/2008 12:30:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-014D		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP8_081124D	QC Batch: 50521			PrepDate:	11/24/2008	Analyst: **CL**
Antimony	ND	0.0050		mg/L	1	11/24/2008 02:17 PM
Arsenic	0.021	0.010		mg/L	1	11/24/2008 02:17 PM
Barium	1.5	0.0030		mg/L	1	11/24/2008 02:17 PM
Beryllium	0.0058	0.0030		mg/L	1	11/24/2008 02:17 PM
Cadmium	0.0062	0.0030		mg/L	1	11/24/2008 02:17 PM
Chromium	0.0065	0.0030		mg/L	1	11/24/2008 02:17 PM
Cobalt	0.084	0.0030		mg/L	1	11/24/2008 02:17 PM
Copper	0.036	0.0050		mg/L	1	11/24/2008 02:17 PM
Lead	ND	0.0050		mg/L	1	11/28/2008 12:02 PM
Molybdenum	ND	0.0050		mg/L	1	11/24/2008 02:17 PM
Nickel	0.17	0.0050		mg/L	1	11/24/2008 02:17 PM
Selenium	ND	0.010		mg/L	1	11/24/2008 02:17 PM
Silver	ND	0.0030		mg/L	1	11/24/2008 02:17 PM
Thallium	ND	0.015		mg/L	1	11/24/2008 02:17 PM
Vanadium	0.053	0.0030		mg/L	1	11/24/2008 02:17 PM
Zinc	0.091	0.010		mg/L	1	11/24/2008 02:17 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA5_081124E	QC Batch: 50520			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.20		µg/L	1	11/24/2008 05:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-015A

Client Sample ID: RW2-1-1
Collection Date: 11/19/2008 2:30:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202C	QC Batch: 50510			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:19 AM
Arsenic	5.0	1.0		mg/Kg	1	12/2/2008 11:19 AM
Barium	110	1.0		mg/Kg	1	12/2/2008 11:19 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:19 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:19 AM
Chromium	25	1.0		mg/Kg	1	12/2/2008 11:19 AM
Cobalt	8.3	1.0		mg/Kg	1	12/2/2008 11:19 AM
Copper	24	2.0		mg/Kg	1	12/2/2008 11:19 AM
Lead	33	1.0		mg/Kg	1	12/2/2008 11:19 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:19 AM
Nickel	32	1.0		mg/Kg	1	12/2/2008 11:19 AM
Selenium	2.0	1.0		mg/Kg	1	12/2/2008 11:19 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:19 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:19 AM
Vanadium	32	1.0		mg/Kg	1	12/2/2008 11:19 AM
Zinc	62	1.0		mg/Kg	1	12/2/2008 11:19 AM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	24	10		mg/Kg	10	11/26/2008 06:38 PM
ORO	120	10		mg/Kg	10	11/26/2008 06:38 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 06:38 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125D	QC Batch: 50503			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	0.14	0.10		mg/Kg	1	11/25/2008 01:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-016A

Client Sample ID: RW2-1-5
Collection Date: 11/19/2008 2:35:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202C	QC Batch: 50510			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	17	2.0		mg/Kg	1	12/2/2008 11:23 AM
Arsenic	11	1.0		mg/Kg	1	12/2/2008 11:23 AM
Barium	58	1.0		mg/Kg	1	12/2/2008 11:23 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:23 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:23 AM
Chromium	14	1.0		mg/Kg	1	12/2/2008 11:23 AM
Cobalt	8.6	1.0		mg/Kg	1	12/2/2008 11:23 AM
Copper	43	2.0		mg/Kg	1	12/2/2008 11:23 AM
Lead	4.6	1.0		mg/Kg	1	12/2/2008 11:23 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:23 AM
Nickel	24	1.0		mg/Kg	1	12/2/2008 11:23 AM
Selenium	1.7	1.0		mg/Kg	1	12/2/2008 11:23 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:23 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:23 AM
Vanadium	30	1.0		mg/Kg	1	12/2/2008 11:23 AM
Zinc	36	1.0		mg/Kg	1	12/2/2008 11:23 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 12:20 PM
Surr: Bromofluorobenzene (FID)	84.4	59-145		%REC	1	11/24/2008 12:20 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 12:20 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 12:20 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 12:20 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 12:20 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 12:20 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 12:20 PM
Surr: Bromofluorobenzene (PID)	87.3	65-140		%REC	1	11/24/2008 12:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-1-5
Lab Order:	102311	**Collection Date:**	11/19/2008 2:35:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-016A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125D	QC Batch: 50503			PrepDate: 11/24/2008		Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:10 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-017A

Client Sample ID: RW2-1-14
Collection Date: 11/19/2008 2:45:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202C	QC Batch: 50510			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:28 AM
Arsenic	3.3	1.0		mg/Kg	1	12/2/2008 11:28 AM
Barium	65	1.0		mg/Kg	1	12/2/2008 11:28 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:28 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:28 AM
Chromium	18	1.0		mg/Kg	1	12/2/2008 11:28 AM
Cobalt	4.5	1.0		mg/Kg	1	12/2/2008 11:28 AM
Copper	9.5	2.0		mg/Kg	1	12/2/2008 11:28 AM
Lead	3.2	1.0		mg/Kg	1	12/2/2008 11:28 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:28 AM
Nickel	21	1.0		mg/Kg	1	12/2/2008 11:28 AM
Selenium	1.0	1.0		mg/Kg	1	12/2/2008 11:28 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:28 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:28 AM
Vanadium	21	1.0		mg/Kg	1	12/2/2008 11:28 AM
Zinc	28	1.0		mg/Kg	1	12/2/2008 11:28 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 12:34 PM
Surr: Bromofluorobenzene (FID)	91.8	59-145		%REC	1	11/24/2008 12:34 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 12:34 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 12:34 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 12:34 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 12:34 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 12:34 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 12:34 PM
Surr: Bromofluorobenzene (PID)	94.7	65-140		%REC	1	11/24/2008 12:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-1-14
Lab Order:	102311	**Collection Date:**	11/19/2008 2:45:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-017A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125D	QC Batch: 50503			PrepDate: 11/24/2008		Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:12 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-018A

Client Sample ID: RW2-1
Collection Date: 11/19/2008 2:50:00 PM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,1,1-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,1,2-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,1-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,1-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,1-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2,3-Trichloropropane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2-Dibromoethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,3-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,3-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
1,4-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
2,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
2-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
4-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
4-Isopropyltoluene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Benzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Bromobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Bromodichloromethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Bromoform	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Bromomethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Carbon tetrachloride	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Chlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Chloroethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Chloroform	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Chloromethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
cis-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 2:50:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-018A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Dibromochloromethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Dibromomethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Dichlorodifluoromethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Ethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Hexachlorobutadiene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Isopropylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
m,p-Xylene	ND	1.0		µg/L	1	11/21/2008 05:13 PM
Methylene chloride	ND	1.0		µg/L	1	11/21/2008 05:13 PM
n-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
n-Propylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Naphthalene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
o-Xylene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
sec-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Styrene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
tert-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Tetrachloroethene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Toluene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
trans-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Trichloroethene	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Trichlorofluoromethane	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Vinyl chloride	ND	0.50		µg/L	1	11/21/2008 05:13 PM
Surr: 1,2-Dichloroethane-d4	109	70-130		%REC	1	11/21/2008 05:13 PM
Surr: 4-Bromofluorobenzene	90.1	70-130		%REC	1	11/21/2008 05:13 PM
Surr: Dibromofluoromethane	109	70-130		%REC	1	11/21/2008 05:13 PM
Surr: Toluene-d8	113	70-130		%REC	1	11/21/2008 05:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 2:50:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-018B		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
GRO	ND	0.050		mg/L	1	11/25/2008 07:56 PM
Surr: Bromofluorobenzene (FID)	110	71-130		%REC	1	11/25/2008 07:56 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
Benzene	ND	0.50		µg/L	1	11/25/2008 07:56 PM
Ethylbenzene	ND	0.50		µg/L	1	11/25/2008 07:56 PM
m,p-Xylene	ND	1.0		µg/L	1	11/25/2008 07:56 PM
Methyl tert-butyl ether	ND	0.50		µg/L	1	11/25/2008 07:56 PM
o-Xylene	ND	0.50		µg/L	1	11/25/2008 07:56 PM
Toluene	ND	0.50		µg/L	1	11/25/2008 07:56 PM
Surr: Bromofluorobenzene (PID)	99.3	73-127		%REC	1	11/25/2008 07:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 2:50:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-018C		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3510C				**EPA 8015B(M)**		
RunID: GC16_081125C	QC Batch: 50580			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	0.079	0.050		mg/L	1	11/25/2008 02:34 PM
ORO	0.099	0.050		mg/L	1	11/25/2008 02:34 PM
Surr: p-Terphenyl	111	35-131		%REC	1	11/25/2008 02:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 2:50:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-018D		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP8_081124D	QC Batch: 50521			PrepDate:	11/24/2008	Analyst: **CL**
Antimony	ND	0.0050		mg/L	1	11/24/2008 02:22 PM
Arsenic	ND	0.010		mg/L	1	11/24/2008 02:22 PM
Barium	1.5	0.0030		mg/L	1	11/24/2008 02:22 PM
Beryllium	0.0062	0.0030		mg/L	1	11/24/2008 02:22 PM
Cadmium	0.0061	0.0030		mg/L	1	11/24/2008 02:22 PM
Chromium	0.033	0.0030		mg/L	1	11/24/2008 02:22 PM
Cobalt	0.11	0.0030		mg/L	1	11/24/2008 02:22 PM
Copper	0.089	0.0050		mg/L	1	11/24/2008 02:22 PM
Lead	ND	0.0050		mg/L	1	11/28/2008 12:17 PM
Molybdenum	ND	0.0050		mg/L	1	11/24/2008 02:22 PM
Nickel	0.34	0.0050		mg/L	1	11/24/2008 02:22 PM
Selenium	ND	0.010		mg/L	1	11/24/2008 02:22 PM
Silver	ND	0.0030		mg/L	1	11/24/2008 02:22 PM
Thallium	ND	0.015		mg/L	1	11/24/2008 02:22 PM
Vanadium	0.061	0.0030		mg/L	1	11/24/2008 02:22 PM
Zinc	0.23	0.010		mg/L	1	11/24/2008 02:22 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA5_081124E	QC Batch: 50520			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.20		µg/L	1	11/24/2008 05:33 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-019A

Client Sample ID: RW2-2-1
Collection Date: 11/19/2008 3:10:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202C	QC Batch: 50510			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:42 AM
Arsenic	5.1	1.0		mg/Kg	1	12/2/2008 11:42 AM
Barium	130	1.0		mg/Kg	1	12/2/2008 11:42 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:42 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:42 AM
Chromium	28	1.0		mg/Kg	1	12/2/2008 11:42 AM
Cobalt	8.5	1.0		mg/Kg	1	12/2/2008 11:42 AM
Copper	32	2.0		mg/Kg	1	12/2/2008 11:42 AM
Lead	71	1.0		mg/Kg	1	12/2/2008 11:42 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:42 AM
Nickel	37	1.0		mg/Kg	1	12/2/2008 11:42 AM
Selenium	1.9	1.0		mg/Kg	1	12/2/2008 11:42 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:42 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:42 AM
Vanadium	34	1.0		mg/Kg	1	12/2/2008 11:42 AM
Zinc	76	1.0		mg/Kg	1	12/2/2008 11:42 AM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	33	10		mg/Kg	10	11/26/2008 06:29 PM
ORO	130	10		mg/Kg	10	11/26/2008 06:29 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 06:29 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125D	QC Batch: 50503			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/25/2008 01:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-020A

Client Sample ID: RW2-2-5
Collection Date: 11/19/2008 3:20:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202C	QC Batch: 50510			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	7.1	2.0		mg/Kg	1	12/2/2008 11:46 AM
Arsenic	8.6	1.0		mg/Kg	1	12/2/2008 11:46 AM
Barium	90	1.0		mg/Kg	1	12/2/2008 11:46 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:46 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:46 AM
Chromium	26	1.0		mg/Kg	1	12/2/2008 11:46 AM
Cobalt	11	1.0		mg/Kg	1	12/2/2008 11:46 AM
Copper	57	2.0		mg/Kg	1	12/2/2008 11:46 AM
Lead	9.3	1.0		mg/Kg	1	12/2/2008 11:46 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:46 AM
Nickel	34	1.0		mg/Kg	1	12/2/2008 11:46 AM
Selenium	2.1	1.0		mg/Kg	1	12/2/2008 11:46 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:46 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:46 AM
Vanadium	44	1.0		mg/Kg	1	12/2/2008 11:46 AM
Zinc	60	1.0		mg/Kg	1	12/2/2008 11:46 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 12:48 PM
Surr: Bromofluorobenzene (FID)	86.1	59-145		%REC	1	11/24/2008 12:48 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 12:48 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 12:48 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 12:48 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 12:48 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 12:48 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 12:48 PM
Surr: Bromofluorobenzene (PID)	89.2	65-140		%REC	1	11/24/2008 12:48 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-2-5
Lab Order:	102311	**Collection Date:**	11/19/2008 3:20:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-020A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125D	QC Batch: 50503				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	0.10	0.10		mg/Kg	1	11/25/2008 01:16 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-021A

Client Sample ID: RW4-2-1
Collection Date: 11/19/2008 1:15:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202C	QC Batch: 50510			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:50 AM
Arsenic	4.1	1.0		mg/Kg	1	12/2/2008 11:50 AM
Barium	130	1.0		mg/Kg	1	12/2/2008 11:50 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:50 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:50 AM
Chromium	20	1.0		mg/Kg	1	12/2/2008 11:50 AM
Cobalt	7.6	1.0		mg/Kg	1	12/2/2008 11:50 AM
Copper	27	2.0		mg/Kg	1	12/2/2008 11:50 AM
Lead	89	1.0		mg/Kg	1	12/2/2008 11:50 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:50 AM
Nickel	30	1.0		mg/Kg	1	12/2/2008 11:50 AM
Selenium	1.5	1.0		mg/Kg	1	12/2/2008 11:50 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:50 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:50 AM
Vanadium	27	1.0		mg/Kg	1	12/2/2008 11:50 AM
Zinc	100	1.0		mg/Kg	1	12/2/2008 11:50 AM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126A	QC Batch: 50597			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	88	20		mg/Kg	20	11/26/2008 06:56 PM
ORO	390	20		mg/Kg	20	11/26/2008 06:56 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	20	11/26/2008 06:56 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125D	QC Batch: 50503			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	0.10	0.10		mg/Kg	1	11/25/2008 01:18 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-022A

Client Sample ID: RW4-2-5
Collection Date: 11/19/2008 1:30:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202C	QC Batch: 50510			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:54 AM
Arsenic	3.6	1.0		mg/Kg	1	12/2/2008 11:54 AM
Barium	130	1.0		mg/Kg	1	12/2/2008 11:54 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:54 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:54 AM
Chromium	30	1.0		mg/Kg	1	12/2/2008 11:54 AM
Cobalt	8.2	1.0		mg/Kg	1	12/2/2008 11:54 AM
Copper	19	2.0		mg/Kg	1	12/2/2008 11:54 AM
Lead	4.4	1.0		mg/Kg	1	12/2/2008 11:54 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:54 AM
Nickel	44	1.0		mg/Kg	1	12/2/2008 11:54 AM
Selenium	1.5	1.0		mg/Kg	1	12/2/2008 11:54 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:54 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:54 AM
Vanadium	26	1.0		mg/Kg	1	12/2/2008 11:54 AM
Zinc	53	1.0		mg/Kg	1	12/2/2008 11:54 AM
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 01:03 PM
Surr: Bromofluorobenzene (FID)	87.6	59-145		%REC	1	11/24/2008 01:03 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 01:03 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 01:03 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 01:03 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 01:03 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 01:03 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 01:03 PM
Surr: Bromofluorobenzene (PID)	90.8	65-140		%REC	1	11/24/2008 01:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW4-2-5
Lab Order:	102311	**Collection Date:**	11/19/2008 1:30:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-022A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125D	QC Batch: 50503			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:20 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-023A

Client Sample ID: RW4-2-19.5'
Collection Date: 11/19/2008 1:45:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202C	QC Batch: 50510			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 11:58 AM
Arsenic	5.7	1.0		mg/Kg	1	12/2/2008 11:58 AM
Barium	150	1.0		mg/Kg	1	12/2/2008 11:58 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 11:58 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 11:58 AM
Chromium	33	1.0		mg/Kg	1	12/2/2008 11:58 AM
Cobalt	8.8	1.0		mg/Kg	1	12/2/2008 11:58 AM
Copper	19	2.0		mg/Kg	1	12/2/2008 11:58 AM
Lead	6.3	1.0		mg/Kg	1	12/2/2008 11:58 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 11:58 AM
Nickel	45	1.0		mg/Kg	1	12/2/2008 11:58 AM
Selenium	1.5	1.0		mg/Kg	1	12/2/2008 11:58 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 11:58 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 11:58 AM
Vanadium	33	1.0		mg/Kg	1	12/2/2008 11:58 AM
Zinc	50	1.0		mg/Kg	1	12/2/2008 11:58 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 01:17 PM
Surr: Bromofluorobenzene (FID)	86.7	59-145		%REC	1	11/24/2008 01:17 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 01:17 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 01:17 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 01:17 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 01:17 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 01:17 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 01:17 PM
Surr: Bromofluorobenzene (PID)	89.9	65-140		%REC	1	11/24/2008 01:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-023A

Client Sample ID: RW4-2-19.5'
Collection Date: 11/19/2008 1:45:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471A						
RunID: AA5_081125D QC Batch: 50503 PrepDate: 11/24/2008 Analyst: **AMT**						
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:22 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 8260B						
RunID: MS4_081121A QC Batch: K08VS485 PrepDate: Analyst: **BD**						
1,1,1,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,1,1-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,1,2,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,1,2-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,1-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,1-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,1-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2,3-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2,3-Trichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2,4-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2,4-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2-Dibromo-3-chloropropane	ND	10		µg/Kg	1	11/21/2008 03:26 PM
1,2-Dibromoethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,3,5-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,3-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,3-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
1,4-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
2,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
2-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
4-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
4-Isopropyltoluene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Benzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Bromobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Bromodichloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Bromoform	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Bromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Carbon tetrachloride	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Chlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW4-2-19.5'
Lab Order:	102311	**Collection Date:**	11/19/2008 1:45:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-023A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS4_081121A	QC Batch: K08VS485			PrepDate:		Analyst: **BD**
Chloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Chloroform	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Chloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
cis-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
cis-1,3-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Dibromochloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Dibromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Dichlorodifluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Hexachlorobutadiene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Isopropylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
m,p-Xylene	ND	10		µg/Kg	1	11/21/2008 03:26 PM
Methylene chloride	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
n-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
n-Propylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Naphthalene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
o-Xylene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
sec-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Styrene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
tert-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Tetrachloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Toluene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
trans-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Trichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Trichlorofluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Vinyl chloride	ND	5.0		µg/Kg	1	11/21/2008 03:26 PM
Surr: 1,2-Dichloroethane-d4	110	70-130		%REC	1	11/21/2008 03:26 PM
Surr: 4-Bromofluorobenzene	87.1	70-130		%REC	1	11/21/2008 03:26 PM
Surr: Dibromofluoromethane	104	70-130		%REC	1	11/21/2008 03:26 PM
Surr: Toluene-d8	101	70-130		%REC	1	11/21/2008 03:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1-1
Lab Order:	102311	**Collection Date:**	11/19/2008 3:55:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-024A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202C	QC Batch: 50510				PrepDate: 11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:02 PM
Arsenic	4.9	1.0		mg/Kg	1	12/2/2008 12:02 PM
Barium	210	1.0		mg/Kg	1	12/2/2008 12:02 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:02 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:02 PM
Chromium	22	1.0		mg/Kg	1	12/2/2008 12:02 PM
Cobalt	7.9	1.0		mg/Kg	1	12/2/2008 12:02 PM
Copper	31	2.0		mg/Kg	1	12/2/2008 12:02 PM
Lead	150	1.0		mg/Kg	1	12/2/2008 12:02 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:02 PM
Nickel	35	1.0		mg/Kg	1	12/2/2008 12:02 PM
Selenium	2.2	1.0		mg/Kg	1	12/2/2008 12:02 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:02 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:02 PM
Vanadium	28	1.0		mg/Kg	1	12/2/2008 12:02 PM
Zinc	120	1.0		mg/Kg	1	12/2/2008 12:02 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC16_081126A	QC Batch: 50597				PrepDate: 11/25/2008	Analyst: **CBR**
DRO	14	1.0		mg/Kg	1	11/26/2008 06:02 PM
ORO	40	1.0		mg/Kg	1	11/26/2008 06:02 PM
Surr: p-Terphenyl	65.7	30-130		%REC	1	11/26/2008 06:02 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125D	QC Batch: 50503				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	0.23	0.10		mg/Kg	1	11/25/2008 12:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-025A

Client Sample ID: DSGW1-5
Collection Date: 11/19/2008 4:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202B	QC Batch: 50511			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:43 PM
Arsenic	4.1	1.0		mg/Kg	1	12/2/2008 12:43 PM
Barium	110	1.0		mg/Kg	1	12/2/2008 12:43 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:43 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:43 PM
Chromium	26	1.0		mg/Kg	1	12/2/2008 12:43 PM
Cobalt	6.7	1.0		mg/Kg	1	12/2/2008 12:43 PM
Copper	21	2.0		mg/Kg	1	12/2/2008 12:43 PM
Lead	55	1.0		mg/Kg	1	12/2/2008 12:43 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:43 PM
Nickel	33	1.0		mg/Kg	1	12/2/2008 12:43 PM
Selenium	1.6	1.0		mg/Kg	1	12/2/2008 12:43 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:43 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:43 PM
Vanadium	26	1.0		mg/Kg	1	12/2/2008 12:43 PM
Zinc	82	1.0		mg/Kg	1	12/2/2008 12:43 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 01:31 PM
Surr: Bromofluorobenzene (FID)	86.1	59-145		%REC	1	11/24/2008 01:31 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 01:31 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 01:31 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 01:31 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 01:31 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 01:31 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 01:31 PM
Surr: Bromofluorobenzene (PID)	88.7	65-140		%REC	1	11/24/2008 01:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1-5
Lab Order:	102311	**Collection Date:**	11/19/2008 4:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-025A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:44 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-026A

Client Sample ID: DSGW1-15.5
Collection Date: 11/19/2008 4:15:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202B	QC Batch: 50511			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:47 PM
Arsenic	4.5	1.0		mg/Kg	1	12/2/2008 12:47 PM
Barium	110	1.0		mg/Kg	1	12/2/2008 12:47 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:47 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:47 PM
Chromium	22	1.0		mg/Kg	1	12/2/2008 12:47 PM
Cobalt	7.0	1.0		mg/Kg	1	12/2/2008 12:47 PM
Copper	13	2.0		mg/Kg	1	12/2/2008 12:47 PM
Lead	4.0	1.0		mg/Kg	1	12/2/2008 12:47 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:47 PM
Nickel	40	1.0		mg/Kg	1	12/2/2008 12:47 PM
Selenium	1.4	1.0		mg/Kg	1	12/2/2008 12:47 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:47 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:47 PM
Vanadium	26	1.0		mg/Kg	1	12/2/2008 12:47 PM
Zinc	33	1.0		mg/Kg	1	12/2/2008 12:47 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 02:28 PM
Surr: Bromofluorobenzene (FID)	91.5	59-145		%REC	1	11/24/2008 02:28 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 02:28 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 02:28 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 02:28 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 02:28 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 02:28 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 02:28 PM
Surr: Bromofluorobenzene (PID)	94.8	65-140		%REC	1	11/24/2008 02:28 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1-15.5
Lab Order:	102311	**Collection Date:**	11/19/2008 4:15:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-026A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:45 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1
Lab Order:	102311	**Collection Date:**	11/19/2008 4:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-027A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,1,1-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,1,2-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,1-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,1-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,1-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2,3-Trichloropropane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2-Dibromoethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,3-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,3-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
1,4-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
2,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
2-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
4-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
4-Isopropyltoluene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Benzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Bromobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Bromodichloromethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Bromoform	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Bromomethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Carbon tetrachloride	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Chlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Chloroethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Chloroform	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Chloromethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
cis-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1
Lab Order:	102311	**Collection Date:**	11/19/2008 4:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-027A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Dibromochloromethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Dibromomethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Dichlorodifluoromethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Ethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Hexachlorobutadiene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Isopropylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
m,p-Xylene	ND	1.0		µg/L	1	11/21/2008 05:34 PM
Methylene chloride	ND	1.0		µg/L	1	11/21/2008 05:34 PM
n-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
n-Propylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Naphthalene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
o-Xylene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
sec-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Styrene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
tert-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Tetrachloroethene	3.8	0.50		µg/L	1	11/21/2008 05:34 PM
Toluene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
trans-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Trichloroethene	0.57	0.50		µg/L	1	11/21/2008 05:34 PM
Trichlorofluoromethane	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Vinyl chloride	ND	0.50		µg/L	1	11/21/2008 05:34 PM
Surr: 1,2-Dichloroethane-d4	110	70-130		%REC	1	11/21/2008 05:34 PM
Surr: 4-Bromofluorobenzene	90.3	70-130		%REC	1	11/21/2008 05:34 PM
Surr: Dibromofluoromethane	109	70-130		%REC	1	11/21/2008 05:34 PM
Surr: Toluene-d8	112	70-130		%REC	1	11/21/2008 05:34 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1
Lab Order:	102311	**Collection Date:**	11/19/2008 4:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-027B		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
GRO	ND	0.050		mg/L	1	11/25/2008 08:26 PM
Surr: Bromofluorobenzene (FID)	97.6	71-130		%REC	1	11/25/2008 08:26 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
Benzene	ND	0.50		µg/L	1	11/25/2008 08:26 PM
Ethylbenzene	ND	0.50		µg/L	1	11/25/2008 08:26 PM
m,p-Xylene	ND	1.0		µg/L	1	11/25/2008 08:26 PM
Methyl tert-butyl ether	ND	0.50		µg/L	1	11/25/2008 08:26 PM
o-Xylene	ND	0.50		µg/L	1	11/25/2008 08:26 PM
Toluene	ND	0.50		µg/L	1	11/25/2008 08:26 PM
Surr: Bromofluorobenzene (PID)	87.5	73-127		%REC	1	11/25/2008 08:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1
Lab Order:	102311	**Collection Date:**	11/19/2008 4:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-027C		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3510C				**EPA 8015B(M)**		
RunID: GC16_081125C	QC Batch: 50580			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	0.10	0.050		mg/L	1	11/25/2008 02:25 PM
ORO	0.12	0.050		mg/L	1	11/25/2008 02:25 PM
Surr: p-Terphenyl	113	35-131		%REC	1	11/25/2008 02:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	DSGW1
Lab Order:	102311	**Collection Date:**	11/19/2008 4:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-027D		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP8_081124D	QC Batch: 50521			PrepDate:	11/24/2008	Analyst: **CL**
Antimony	ND	0.0050		mg/L	1	11/24/2008 02:28 PM
Arsenic	ND	0.010		mg/L	1	11/24/2008 02:28 PM
Barium	1.0	0.0030		mg/L	1	11/24/2008 02:28 PM
Beryllium	0.0038	0.0030		mg/L	1	11/24/2008 02:28 PM
Cadmium	0.0069	0.0030		mg/L	1	11/24/2008 02:28 PM
Chromium	0.055	0.0030		mg/L	1	11/24/2008 02:28 PM
Cobalt	0.091	0.0030		mg/L	1	11/24/2008 02:28 PM
Copper	0.044	0.0050		mg/L	1	11/24/2008 02:28 PM
Lead	0.013	0.0050		mg/L	1	11/28/2008 12:22 PM
Molybdenum	ND	0.0050		mg/L	1	11/24/2008 02:28 PM
Nickel	0.39	0.0050		mg/L	1	11/24/2008 02:28 PM
Selenium	0.011	0.010		mg/L	1	11/24/2008 02:28 PM
Silver	ND	0.0030		mg/L	1	11/24/2008 02:28 PM
Thallium	ND	0.015		mg/L	1	11/24/2008 02:28 PM
Vanadium	0.057	0.0030		mg/L	1	11/24/2008 02:28 PM
Zinc	0.38	0.010		mg/L	1	11/24/2008 02:28 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA5_081124E	QC Batch: 50520			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.20		µg/L	1	11/24/2008 05:40 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-028A

Client Sample ID: RW1-1-5
Collection Date: 11/20/2008 8:30:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202B	QC Batch: 50511			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:51 PM
Arsenic	2.8	1.0		mg/Kg	1	12/2/2008 12:51 PM
Barium	150	1.0		mg/Kg	1	12/2/2008 12:51 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:51 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:51 PM
Chromium	34	1.0		mg/Kg	1	12/2/2008 12:51 PM
Cobalt	7.2	1.0		mg/Kg	1	12/2/2008 12:51 PM
Copper	17	2.0		mg/Kg	1	12/2/2008 12:51 PM
Lead	4.9	1.0		mg/Kg	1	12/2/2008 12:51 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:51 PM
Nickel	43	1.0		mg/Kg	1	12/2/2008 12:51 PM
Selenium	1.5	1.0		mg/Kg	1	12/2/2008 12:51 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:51 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:51 PM
Vanadium	26	1.0		mg/Kg	1	12/2/2008 12:51 PM
Zinc	43	1.0		mg/Kg	1	12/2/2008 12:51 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 06:31 PM
Surr: Bromofluorobenzene (FID)	92.0	59-145		%REC	1	11/24/2008 06:31 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 06:31 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 06:31 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 06:31 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 06:31 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 06:31 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 06:31 PM
Surr: Bromofluorobenzene (PID)	95.6	65-140		%REC	1	11/24/2008 06:31 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW1-1-5
Lab Order:	102311	**Collection Date:**	11/20/2008 8:30:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-028A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:51 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-029A

Client Sample ID: RW1-1-1
Collection Date: 11/20/2008 8:25:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202B	QC Batch: 50511			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:55 PM
Arsenic	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Barium	33	1.0		mg/Kg	1	12/2/2008 12:55 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Chromium	28	1.0		mg/Kg	1	12/2/2008 12:55 PM
Cobalt	14	1.0		mg/Kg	1	12/2/2008 12:55 PM
Copper	41	2.0		mg/Kg	1	12/2/2008 12:55 PM
Lead	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Nickel	31	1.0		mg/Kg	1	12/2/2008 12:55 PM
Selenium	2.2	1.0		mg/Kg	1	12/2/2008 12:55 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:55 PM
Vanadium	58	1.0		mg/Kg	1	12/2/2008 12:55 PM
Zinc	51	1.0		mg/Kg	1	12/2/2008 12:55 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	1100	500		mg/Kg	50	11/26/2008 07:23 PM
ORO	6700	500		mg/Kg	50	11/26/2008 07:23 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	50	11/26/2008 07:23 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-030A

Client Sample ID: RW1-2-1
Collection Date: 11/20/2008 8:40:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202B	QC Batch: 50511			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 01:01 PM
Arsenic	1.7	1.0		mg/Kg	1	12/2/2008 01:01 PM
Barium	71	1.0		mg/Kg	1	12/2/2008 01:01 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 01:01 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 01:01 PM
Chromium	17	1.0		mg/Kg	1	12/2/2008 01:01 PM
Cobalt	5.3	1.0		mg/Kg	1	12/2/2008 01:01 PM
Copper	17	2.0		mg/Kg	1	12/2/2008 01:01 PM
Lead	22	1.0		mg/Kg	1	12/2/2008 01:01 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 01:01 PM
Nickel	25	1.0		mg/Kg	1	12/2/2008 01:01 PM
Selenium	1.1	1.0		mg/Kg	1	12/2/2008 01:01 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 01:01 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 01:01 PM
Vanadium	25	1.0		mg/Kg	1	12/2/2008 01:01 PM
Zinc	41	1.0		mg/Kg	1	12/2/2008 01:01 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	760	200		mg/Kg	50	11/26/2008 07:32 PM
ORO	3400	200		mg/Kg	50	11/26/2008 07:32 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	50	11/26/2008 07:32 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-031A

Client Sample ID: RW1-2-5
Collection Date: 11/20/2008 8:45:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202B	QC Batch: 50511			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 01:05 PM
Arsenic	2.7	1.0		mg/Kg	1	12/2/2008 01:05 PM
Barium	95	1.0		mg/Kg	1	12/2/2008 01:05 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 01:05 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 01:05 PM
Chromium	26	1.0		mg/Kg	1	12/2/2008 01:05 PM
Cobalt	8.4	1.0		mg/Kg	1	12/2/2008 01:05 PM
Copper	26	2.0		mg/Kg	1	12/2/2008 01:05 PM
Lead	29	1.0		mg/Kg	1	12/2/2008 01:05 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 01:05 PM
Nickel	36	1.0		mg/Kg	1	12/2/2008 01:05 PM
Selenium	1.3	1.0		mg/Kg	1	12/2/2008 01:05 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 01:05 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 01:05 PM
Vanadium	32	1.0		mg/Kg	1	12/2/2008 01:05 PM
Zinc	65	1.0		mg/Kg	1	12/2/2008 01:05 PM
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 06:45 PM
Surr: Bromofluorobenzene (FID)	91.5	59-145		%REC	1	11/24/2008 06:45 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC2_081124B	QC Batch: E08VS313			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 06:45 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 06:45 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 06:45 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 06:45 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 06:45 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 06:45 PM
Surr: Bromofluorobenzene (PID)	95.1	65-140		%REC	1	11/24/2008 06:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW1-2-5
Lab Order:	102311	**Collection Date:**	11/20/2008 8:45:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-031A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125E	QC Batch: 50504				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	0.23	0.10		mg/Kg	1	11/25/2008 01:57 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-032A

Client Sample ID: RW1-3-1
Collection Date: 11/20/2008 8:55:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202B	QC Batch: 50511			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 01:09 PM
Arsenic	2.0	1.0		mg/Kg	1	12/2/2008 01:09 PM
Barium	76	1.0		mg/Kg	1	12/2/2008 01:09 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 01:09 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 01:09 PM
Chromium	26	1.0		mg/Kg	1	12/2/2008 01:09 PM
Cobalt	7.9	1.0		mg/Kg	1	12/2/2008 01:09 PM
Copper	29	2.0		mg/Kg	1	12/2/2008 01:09 PM
Lead	28	1.0		mg/Kg	1	12/2/2008 01:09 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 01:09 PM
Nickel	35	1.0		mg/Kg	1	12/2/2008 01:09 PM
Selenium	1.3	1.0		mg/Kg	1	12/2/2008 01:09 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 01:09 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 01:09 PM
Vanadium	37	1.0		mg/Kg	1	12/2/2008 01:09 PM
Zinc	52	1.0		mg/Kg	1	12/2/2008 01:09 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	910	200		mg/Kg	50	11/26/2008 07:14 PM
ORO	4100	200		mg/Kg	50	11/26/2008 07:14 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	50	11/26/2008 07:14 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:59 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-033A

Client Sample ID: RW1-3-5
Collection Date: 11/20/2008 9:00:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202B	QC Batch: 50511			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 01:13 PM
Arsenic	2.5	1.0		mg/Kg	1	12/2/2008 01:13 PM
Barium	99	1.0		mg/Kg	1	12/2/2008 01:13 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 01:13 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 01:13 PM
Chromium	25	1.0		mg/Kg	1	12/2/2008 01:13 PM
Cobalt	7.4	1.0		mg/Kg	1	12/2/2008 01:13 PM
Copper	63	2.0		mg/Kg	1	12/2/2008 01:13 PM
Lead	37	1.0		mg/Kg	1	12/2/2008 01:13 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 01:13 PM
Nickel	32	1.0		mg/Kg	1	12/2/2008 01:13 PM
Selenium	1.7	1.0		mg/Kg	1	12/2/2008 01:13 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 01:13 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 01:13 PM
Vanadium	41	1.0		mg/Kg	1	12/2/2008 01:13 PM
Zinc	94	1.0		mg/Kg	1	12/2/2008 01:13 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081125B	QC Batch: E08VS316			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/25/2008 08:25 PM
Surr: Bromofluorobenzene (FID)	60.9	59-145		%REC	1	11/25/2008 08:25 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081125B	QC Batch: E08VS316			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/25/2008 08:25 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/25/2008 08:25 PM
m,p-Xylene	ND	10		µg/Kg	1	11/25/2008 08:25 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/25/2008 08:25 PM
o-Xylene	ND	5.0		µg/Kg	1	11/25/2008 08:25 PM
Toluene	ND	5.0		µg/Kg	1	11/25/2008 08:25 PM
Surr: Bromofluorobenzene (PID)	62.2	65-140	S	%REC	1	11/25/2008 08:25 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW1-3-5
Lab Order:	102311	**Collection Date:**	11/20/2008 9:00:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-033A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125E	QC Batch: 50504				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	0.19	0.10		mg/Kg	1	11/25/2008 02:01 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-034A

Client Sample ID: RW1-4-1
Collection Date: 11/20/2008 9:10:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202B	QC Batch: 50511			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 01:26 PM
Arsenic	4.6	1.0		mg/Kg	1	12/2/2008 01:26 PM
Barium	110	1.0		mg/Kg	1	12/2/2008 01:26 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 01:26 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 01:26 PM
Chromium	29	1.0		mg/Kg	1	12/2/2008 01:26 PM
Cobalt	8.9	1.0		mg/Kg	1	12/2/2008 01:26 PM
Copper	18	2.0		mg/Kg	1	12/2/2008 01:26 PM
Lead	7.0	1.0		mg/Kg	1	12/2/2008 01:26 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 01:26 PM
Nickel	41	1.0		mg/Kg	1	12/2/2008 01:26 PM
Selenium	2.2	1.0		mg/Kg	1	12/2/2008 01:26 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 01:26 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 01:26 PM
Vanadium	28	1.0		mg/Kg	1	12/2/2008 01:26 PM
Zinc	50	1.0		mg/Kg	1	12/2/2008 01:26 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	11	10		mg/Kg	10	11/26/2008 05:18 PM
ORO	32	10		mg/Kg	10	11/26/2008 05:18 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 05:18 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-035A

Client Sample ID: RW1-4-5
Collection Date: 11/20/2008 9:15:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202B	QC Batch: 50511			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 01:30 PM
Arsenic	3.2	1.0		mg/Kg	1	12/2/2008 01:30 PM
Barium	98	1.0		mg/Kg	1	12/2/2008 01:30 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 01:30 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 01:30 PM
Chromium	27	1.0		mg/Kg	1	12/2/2008 01:30 PM
Cobalt	8.4	1.0		mg/Kg	1	12/2/2008 01:30 PM
Copper	21	2.0		mg/Kg	1	12/2/2008 01:30 PM
Lead	15	1.0		mg/Kg	1	12/2/2008 01:30 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 01:30 PM
Nickel	35	1.0		mg/Kg	1	12/2/2008 01:30 PM
Selenium	1.3	1.0		mg/Kg	1	12/2/2008 01:30 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 01:30 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 01:30 PM
Vanadium	24	1.0		mg/Kg	1	12/2/2008 01:30 PM
Zinc	64	1.0		mg/Kg	1	12/2/2008 01:30 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 11:02 PM
Surr: Bromofluorobenzene (FID)	91.7	59-145		%REC	1	11/24/2008 11:02 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 11:02 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 11:02 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 11:02 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 11:02 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 11:02 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 11:02 PM
Surr: Bromofluorobenzene (PID)	96.5	65-140		%REC	1	11/24/2008 11:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW1-4-5
Lab Order:	102311	**Collection Date:**	11/20/2008 9:15:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-035A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125E	QC Batch: 50504			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 01:40 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-037A

Client Sample ID: RW1-4-19.5
Collection Date: 11/20/2008 9:40:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 02:03 PM
Arsenic	3.7	1.0		mg/Kg	1	12/2/2008 02:03 PM
Barium	140	1.0		mg/Kg	1	12/2/2008 02:03 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 02:03 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 02:03 PM
Chromium	26	1.0		mg/Kg	1	12/2/2008 02:03 PM
Cobalt	7.9	1.0		mg/Kg	1	12/2/2008 02:03 PM
Copper	16	2.0		mg/Kg	1	12/2/2008 02:03 PM
Lead	5.6	1.0		mg/Kg	1	12/2/2008 02:03 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 02:03 PM
Nickel	31	1.0		mg/Kg	1	12/2/2008 02:03 PM
Selenium	1.5	1.0		mg/Kg	1	12/2/2008 02:03 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 02:03 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 02:03 PM
Vanadium	26	1.0		mg/Kg	1	12/2/2008 02:03 PM
Zinc	39	1.0		mg/Kg	1	12/2/2008 02:03 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	1.1	1.0		mg/Kg	1	11/26/2008 04:50 PM
ORO	1.4	1.0		mg/Kg	1	11/26/2008 04:50 PM
Surr: p-Terphenyl	103	30-130		%REC	1	11/26/2008 04:50 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 01:45 PM
Surr: Bromofluorobenzene (FID)	93.4	59-145		%REC	1	11/24/2008 01:45 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 01:45 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 01:45 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 01:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-037A

Client Sample ID: RW1-4-19.5
Collection Date: 11/20/2008 9:40:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
EPA 8021B						
RunID: GC2_081124A QC Batch: E08VS312 PrepDate: Analyst: **KHN**						
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 01:45 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 01:45 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 01:45 PM
Surr: Bromofluorobenzene (PID)	97.0	65-140		%REC	1	11/24/2008 01:45 PM
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471A						
RunID: AA5_081125F QC Batch: 50506 PrepDate: 11/24/2008 Analyst: **AMT**						
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:39 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 8260B						
RunID: MS4_081121A QC Batch: K08VS485 PrepDate: Analyst: **BD**						
1,1,1,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,1,1-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,1,2,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,1,2-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,1-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,1-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,1-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2,3-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2,3-Trichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2,4-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2,4-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2-Dibromo-3-chloropropane	ND	10		µg/Kg	1	11/21/2008 03:42 PM
1,2-Dibromoethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,3,5-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,3-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,3-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
1,4-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
2,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
2-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
4-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-037A

Client Sample ID: RW1-4-19.5
Collection Date: 11/20/2008 9:40:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS4_081121A	QC Batch: K08VS485			PrepDate:		Analyst: **BD**
4-Isopropyltoluene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Benzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Bromobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Bromodichloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Bromoform	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Bromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Carbon tetrachloride	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Chlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Chloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Chloroform	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Chloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
cis-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
cis-1,3-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Dibromochloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Dibromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Dichlorodifluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Hexachlorobutadiene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Isopropylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
m,p-Xylene	ND	10		µg/Kg	1	11/21/2008 03:42 PM
Methylene chloride	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
n-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
n-Propylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Naphthalene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
o-Xylene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
sec-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Styrene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
tert-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Tetrachloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Toluene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
trans-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Trichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Trichlorofluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Vinyl chloride	ND	5.0		µg/Kg	1	11/21/2008 03:42 PM
Surr: 1,2-Dichloroethane-d4	115	70-130		%REC	1	11/21/2008 03:42 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW1-4-19.5
Lab Order:	102311	**Collection Date:**	11/20/2008 9:40:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-037A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
				EPA 8260B		
RunID: MS4_081121A	QC Batch: K08VS485			PrepDate:		Analyst: **BD**
Surr: 4-Bromofluorobenzene	93.2	70-130		%REC	1	11/21/2008 03:42 PM
Surr: Dibromofluoromethane	109	70-130		%REC	1	11/21/2008 03:42 PM
Surr: Toluene-d8	102	70-130		%REC	1	11/21/2008 03:42 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-038A

Client Sample ID: RW1-5-1
Collection Date: 11/20/2008 9:55:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202E	QC Batch: 50513			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 02:07 PM
Arsenic	3.4	1.0		mg/Kg	1	12/2/2008 02:07 PM
Barium	180	1.0		mg/Kg	1	12/2/2008 02:07 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 02:07 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 02:07 PM
Chromium	32	1.0		mg/Kg	1	12/2/2008 02:07 PM
Cobalt	9.8	1.0		mg/Kg	1	12/2/2008 02:07 PM
Copper	29	2.0		mg/Kg	1	12/2/2008 02:07 PM
Lead	4.8	1.0		mg/Kg	1	12/2/2008 02:07 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 02:07 PM
Nickel	41	1.0		mg/Kg	1	12/2/2008 02:07 PM
Selenium	2.3	1.0		mg/Kg	1	12/2/2008 02:07 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 02:07 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 02:07 PM
Vanadium	34	1.0		mg/Kg	1	12/2/2008 02:07 PM
Zinc	44	1.0		mg/Kg	1	12/2/2008 02:07 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	21	10		mg/Kg	10	11/26/2008 05:36 PM
ORO	81	10		mg/Kg	10	11/26/2008 05:36 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 05:36 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125F	QC Batch: 50506			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-039A

Client Sample ID: RW1-5-5
Collection Date: 11/20/2008 10:05:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:13 PM
Arsenic	3.4	1.0		mg/Kg	1	12/2/2008 03:13 PM
Barium	92	1.0		mg/Kg	1	12/2/2008 03:13 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:13 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:13 PM
Chromium	26	1.0		mg/Kg	1	12/2/2008 03:13 PM
Cobalt	8.8	1.0		mg/Kg	1	12/2/2008 03:13 PM
Copper	21	2.0		mg/Kg	1	12/2/2008 03:13 PM
Lead	12	1.0		mg/Kg	1	12/2/2008 03:13 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:13 PM
Nickel	32	1.0		mg/Kg	1	12/2/2008 03:13 PM
Selenium	1.4	1.0		mg/Kg	1	12/2/2008 03:13 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:13 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:13 PM
Vanadium	36	1.0		mg/Kg	1	12/2/2008 03:13 PM
Zinc	42	1.0		mg/Kg	1	12/2/2008 03:13 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 08:54 PM
Surr: Bromofluorobenzene (FID)	90.2	59-145		%REC	1	11/24/2008 08:54 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 08:54 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 08:54 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 08:54 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 08:54 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 08:54 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 08:54 PM
Surr: Bromofluorobenzene (PID)	93.9	65-140		%REC	1	11/24/2008 08:54 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW1-5-5
Lab Order:	102311	**Collection Date:**	11/20/2008 10:05:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-039A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125F	QC Batch: 50506				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	0.15	0.10		mg/Kg	1	11/25/2008 02:43 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-040A

Client Sample ID: MBGW1-1
Collection Date: 11/20/2008 10:30:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202E	QC Batch: 50513			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:17 PM
Arsenic	4.9	1.0		mg/Kg	1	12/2/2008 03:17 PM
Barium	160	1.0		mg/Kg	1	12/2/2008 03:17 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:17 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:17 PM
Chromium	29	1.0		mg/Kg	1	12/2/2008 03:17 PM
Cobalt	7.4	1.0		mg/Kg	1	12/2/2008 03:17 PM
Copper	18	2.0		mg/Kg	1	12/2/2008 03:17 PM
Lead	9.7	1.0		mg/Kg	1	12/2/2008 03:17 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:17 PM
Nickel	35	1.0		mg/Kg	1	12/2/2008 03:17 PM
Selenium	1.2	1.0		mg/Kg	1	12/2/2008 03:17 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:17 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:17 PM
Vanadium	28	1.0		mg/Kg	1	12/2/2008 03:17 PM
Zinc	44	1.0		mg/Kg	1	12/2/2008 03:17 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	16	10		mg/Kg	10	11/26/2008 05:27 PM
ORO	54	10		mg/Kg	10	11/26/2008 05:27 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 05:27 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125F	QC Batch: 50506			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	0.68	0.10		mg/Kg	1	11/25/2008 02:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-041A

Client Sample ID: MBGW1-5
Collection Date: 11/20/2008 10:35:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:21 PM
Arsenic	4.2	1.0		mg/Kg	1	12/2/2008 03:21 PM
Barium	130	1.0		mg/Kg	1	12/2/2008 03:21 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:21 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:21 PM
Chromium	29	1.0		mg/Kg	1	12/2/2008 03:21 PM
Cobalt	7.8	1.0		mg/Kg	1	12/2/2008 03:21 PM
Copper	14	2.0		mg/Kg	1	12/2/2008 03:21 PM
Lead	5.0	1.0		mg/Kg	1	12/2/2008 03:21 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:21 PM
Nickel	40	1.0		mg/Kg	1	12/2/2008 03:21 PM
Selenium	1.1	1.0		mg/Kg	1	12/2/2008 03:21 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:21 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:21 PM
Vanadium	29	1.0		mg/Kg	1	12/2/2008 03:21 PM
Zinc	37	1.0		mg/Kg	1	12/2/2008 03:21 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 09:08 PM
Surr: Bromofluorobenzene (FID)	93.1	59-145		%REC	1	11/24/2008 09:08 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 09:08 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 09:08 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 09:08 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 09:08 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 09:08 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 09:08 PM
Surr: Bromofluorobenzene (PID)	98.0	65-140		%REC	1	11/24/2008 09:08 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW1-5
Lab Order:	102311	**Collection Date:**	11/20/2008 10:35:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-041A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125F	QC Batch: 50506				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	0.11	0.10		mg/Kg	1	11/25/2008 02:47 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-042A

Client Sample ID: MBGW1-15.5
Collection Date: 11/20/2008 10:45:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:35 PM
Arsenic	5.1	1.0		mg/Kg	1	12/2/2008 03:35 PM
Barium	150	1.0		mg/Kg	1	12/2/2008 03:35 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:35 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:35 PM
Chromium	33	1.0		mg/Kg	1	12/2/2008 03:35 PM
Cobalt	9.2	1.0		mg/Kg	1	12/2/2008 03:35 PM
Copper	21	2.0		mg/Kg	1	12/2/2008 03:35 PM
Lead	6.2	1.0		mg/Kg	1	12/2/2008 03:35 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:35 PM
Nickel	51	1.0		mg/Kg	1	12/2/2008 03:35 PM
Selenium	1.4	1.0		mg/Kg	1	12/2/2008 03:35 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:35 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:35 PM
Vanadium	30	1.0		mg/Kg	1	12/2/2008 03:35 PM
Zinc	52	1.0		mg/Kg	1	12/2/2008 03:35 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 09:22 PM
Surr: Bromofluorobenzene (FID)	93.5	59-145		%REC	1	11/24/2008 09:22 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 09:22 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 09:22 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 09:22 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 09:22 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 09:22 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 09:22 PM
Surr: Bromofluorobenzene (PID)	95.9	65-140		%REC	1	11/24/2008 09:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW1-15.5
Lab Order:	102311	**Collection Date:**	11/20/2008 10:45:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-042A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125F	QC Batch: 50506			PrepDate: 11/24/2008		Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:53 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-043A

Client Sample ID: MBGW1-19.5
Collection Date: 11/20/2008 10:50:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513				PrepDate: 11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:39 PM
Arsenic	2.9	1.0		mg/Kg	1	12/2/2008 03:39 PM
Barium	140	1.0		mg/Kg	1	12/2/2008 03:39 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:39 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:39 PM
Chromium	38	1.0		mg/Kg	1	12/2/2008 03:39 PM
Cobalt	5.9	1.0		mg/Kg	1	12/2/2008 03:39 PM
Copper	19	2.0		mg/Kg	1	12/2/2008 03:39 PM
Lead	5.0	1.0		mg/Kg	1	12/2/2008 03:39 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:39 PM
Nickel	43	1.0		mg/Kg	1	12/2/2008 03:39 PM
Selenium	1.3	1.0		mg/Kg	1	12/2/2008 03:39 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:39 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:39 PM
Vanadium	29	1.0		mg/Kg	1	12/2/2008 03:39 PM
Zinc	47	1.0		mg/Kg	1	12/2/2008 03:39 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125F	QC Batch: 50506				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2-1
Lab Order:	102311	**Collection Date:**	11/20/2008 11:30:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-044A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:43 PM
Arsenic	5.1	1.0		mg/Kg	1	12/2/2008 03:43 PM
Barium	140	1.0		mg/Kg	1	12/2/2008 03:43 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:43 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:43 PM
Chromium	35	1.0		mg/Kg	1	12/2/2008 03:43 PM
Cobalt	9.6	1.0		mg/Kg	1	12/2/2008 03:43 PM
Copper	18	2.0		mg/Kg	1	12/2/2008 03:43 PM
Lead	6.8	1.0		mg/Kg	1	12/2/2008 03:43 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:43 PM
Nickel	47	1.0		mg/Kg	1	12/2/2008 03:43 PM
Selenium	1.7	1.0		mg/Kg	1	12/2/2008 03:43 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:43 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:43 PM
Vanadium	32	1.0		mg/Kg	1	12/2/2008 03:43 PM
Zinc	41	1.0		mg/Kg	1	12/2/2008 03:43 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	1.6	1.0		mg/Kg	1	11/26/2008 04:59 PM
ORO	3.0	1.0		mg/Kg	1	11/26/2008 04:59 PM
Surr: p-Terphenyl	113	30-130		%REC	1	11/26/2008 04:59 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125F	QC Batch: 50506			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-045A

Client Sample ID: MBGW2-5
Collection Date: 11/20/2008 11:35:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081202E	QC Batch: 50513			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:47 PM
Arsenic	3.8	1.0		mg/Kg	1	12/2/2008 03:47 PM
Barium	93	1.0		mg/Kg	1	12/2/2008 03:47 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:47 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:47 PM
Chromium	24	1.0		mg/Kg	1	12/2/2008 03:47 PM
Cobalt	5.2	1.0		mg/Kg	1	12/2/2008 03:47 PM
Copper	13	2.0		mg/Kg	1	12/2/2008 03:47 PM
Lead	5.6	1.0		mg/Kg	1	12/2/2008 03:47 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:47 PM
Nickel	32	1.0		mg/Kg	1	12/2/2008 03:47 PM
Selenium	1.1	1.0		mg/Kg	1	12/2/2008 03:47 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:47 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:47 PM
Vanadium	24	1.0		mg/Kg	1	12/2/2008 03:47 PM
Zinc	33	1.0		mg/Kg	1	12/2/2008 03:47 PM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 09:36 PM
Surr: Bromofluorobenzene (FID)	94.2	59-145		%REC	1	11/24/2008 09:36 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 09:36 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 09:36 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 09:36 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 09:36 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 09:36 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 09:36 PM
Surr: Bromofluorobenzene (PID)	98.6	65-140		%REC	1	11/24/2008 09:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2-5
Lab Order:	102311	**Collection Date:**	11/20/2008 11:35:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-045A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125F	QC Batch: 50506				PrepDate: 11/24/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:59 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-048A

Client Sample ID: MBGW2-23.5
Collection Date: 11/20/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081202E	QC Batch: 50513			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 03:51 PM
Arsenic	2.5	1.0		mg/Kg	1	12/2/2008 03:51 PM
Barium	58	1.0		mg/Kg	1	12/2/2008 03:51 PM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 03:51 PM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 03:51 PM
Chromium	17	1.0		mg/Kg	1	12/2/2008 03:51 PM
Cobalt	4.3	1.0		mg/Kg	1	12/2/2008 03:51 PM
Copper	9.9	2.0		mg/Kg	1	12/2/2008 03:51 PM
Lead	1.8	1.0		mg/Kg	1	12/2/2008 03:51 PM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 03:51 PM
Nickel	24	1.0		mg/Kg	1	12/2/2008 03:51 PM
Selenium	ND	1.0		mg/Kg	1	12/2/2008 03:51 PM
Silver	ND	1.0		mg/Kg	1	12/2/2008 03:51 PM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 03:51 PM
Vanadium	18	1.0		mg/Kg	1	12/2/2008 03:51 PM
Zinc	26	1.0		mg/Kg	1	12/2/2008 03:51 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate: 11/25/2008		Analyst: **CBR**
DRO	1.1	1.0		mg/Kg	1	11/26/2008 04:41 PM
ORO	1.5	1.0		mg/Kg	1	11/26/2008 04:41 PM
Surr: p-Terphenyl	97.3	30-130		%REC	1	11/26/2008 04:41 PM
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 02:00 PM
Surr: Bromofluorobenzene (FID)	94.0	59-145		%REC	1	11/24/2008 02:00 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 02:00 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 02:00 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 02:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-048A

Client Sample ID: MBGW2-23.5
Collection Date: 11/20/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
EPA 8021B						
RunID: GC2_081124A QC Batch: E08VS312 PrepDate: Analyst: **KHN**						
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 02:00 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 02:00 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 02:00 PM
Surr: Bromofluorobenzene (PID)	97.6	65-140		%REC	1	11/24/2008 02:00 PM
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471A						
RunID: AA5_081125F QC Batch: 50506 PrepDate: 11/24/2008 Analyst: **AMT**						
Mercury	ND	0.10		mg/Kg	1	11/25/2008 02:35 PM
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 8260B						
RunID: MS4_081121A QC Batch: K08VS485 PrepDate: Analyst: **BD**						
1,1,1,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,1,1-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,1,2,2-Tetrachloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,1,2-Trichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,1-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,1-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,1-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2,3-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2,3-Trichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2,4-Trichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2,4-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2-Dibromo-3-chloropropane	ND	10		µg/Kg	1	11/21/2008 03:58 PM
1,2-Dibromoethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2-Dichloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,3,5-Trimethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,3-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,3-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
1,4-Dichlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
2,2-Dichloropropane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
2-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
4-Chlorotoluene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-048A

Client Sample ID: MBGW2-23.5
Collection Date: 11/20/2008 11:55:00 AM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS4_081121A	QC Batch: K08VS485			PrepDate:		Analyst: **BD**
4-Isopropyltoluene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Benzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Bromobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Bromodichloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Bromoform	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Bromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Carbon tetrachloride	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Chlorobenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Chloroethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Chloroform	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Chloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
cis-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
cis-1,3-Dichloropropene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Dibromochloromethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Dibromomethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Dichlorodifluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Hexachlorobutadiene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Isopropylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
m,p-Xylene	ND	10		µg/Kg	1	11/21/2008 03:58 PM
Methylene chloride	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
n-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
n-Propylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Naphthalene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
o-Xylene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
sec-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Styrene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
tert-Butylbenzene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Tetrachloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Toluene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
trans-1,2-Dichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Trichloroethene	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Trichlorofluoromethane	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Vinyl chloride	ND	5.0		µg/Kg	1	11/21/2008 03:58 PM
Surr: 1,2-Dichloroethane-d4	105	70-130		%REC	1	11/21/2008 03:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2-23.5
Lab Order:	102311	**Collection Date:**	11/20/2008 11:55:00 AM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-048A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
				EPA 8260B		
RunID: MS4_081121A	QC Batch: K08VS485			PrepDate:		Analyst: **BD**
Surr: 4-Bromofluorobenzene	93.4	70-130		%REC	1	11/21/2008 03:58 PM
Surr: Dibromofluoromethane	105	70-130		%REC	1	11/21/2008 03:58 PM
Surr: Toluene-d8	101	70-130		%REC	1	11/21/2008 03:58 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS
Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-049A

Client Sample ID: UPRR1-1
Collection Date: 11/20/2008 12:55:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
EPA 3050B			**EPA 6010B**			
RunID: ICP8_081201A	QC Batch: 50514			PrepDate:	11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/1/2008 11:47 PM
Arsenic	4.0	1.0		mg/Kg	1	12/1/2008 11:47 PM
Barium	110	1.0		mg/Kg	1	12/1/2008 11:47 PM
Beryllium	ND	1.0		mg/Kg	1	12/1/2008 11:47 PM
Cadmium	ND	1.0		mg/Kg	1	12/1/2008 11:47 PM
Chromium	35	1.0		mg/Kg	1	12/1/2008 11:47 PM
Cobalt	8.2	1.0		mg/Kg	1	12/1/2008 11:47 PM
Copper	31	2.0		mg/Kg	1	12/1/2008 11:47 PM
Lead	93	1.0		mg/Kg	1	12/1/2008 11:47 PM
Molybdenum	ND	1.0		mg/Kg	1	12/1/2008 11:47 PM
Nickel	41	1.0		mg/Kg	1	12/1/2008 11:47 PM
Selenium	1.4	1.0		mg/Kg	1	12/1/2008 11:47 PM
Silver	ND	1.0		mg/Kg	1	12/1/2008 11:47 PM
Thallium	ND	1.0		mg/Kg	1	12/1/2008 11:47 PM
Vanadium	34	1.0		mg/Kg	1	12/1/2008 11:47 PM
Zinc	59	1.0		mg/Kg	1	12/1/2008 11:47 PM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3550B			**EPA 8015B(M)**			
RunID: GC16_081126B	QC Batch: 50606			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	10	10		mg/Kg	10	11/26/2008 05:09 PM
ORO	21	10		mg/Kg	10	11/26/2008 05:09 PM
Surr: p-Terphenyl	0	30-130	SDO	%REC	10	11/26/2008 05:09 PM
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125G	QC Batch: 50507			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	0.34	0.10		mg/Kg	1	11/25/2008 03:20 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B			**EPA 8270C**			
RunID: MS6_081125A	QC Batch: 50577			PrepDate:	11/25/2008	Analyst: **DMP**
1,2,4-Trichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
1,2-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
1,3-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
1,4-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1-1
Lab Order:	102311	**Collection Date:**	11/20/2008 12:55:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-049A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A	QC Batch: 50577				PrepDate: 11/25/2008	Analyst: **DMP**
2,4,5-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2,4,6-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2,4-Dichlorophenol	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
2,4-Dimethylphenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2,4-Dinitrophenol	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
2,4-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2,6-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2-Chloronaphthalene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2-Chlorophenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2-Methylnaphthalene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2-Methylphenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
2-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
2-Nitrophenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
3,3´-Dichlorobenzidine	ND	660		µg/Kg	1	11/25/2008 06:17 PM
3-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
4,6-Dinitro-2-methylphenol	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
4-Bromophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 06:17 PM
4-Chloro-3-methylphenol	ND	660		µg/Kg	1	11/25/2008 06:17 PM
4-Chloroaniline	ND	660		µg/Kg	1	11/25/2008 06:17 PM
4-Chlorophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 06:17 PM
4-Methylphenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
4-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
4-Nitrophenol	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
Acenaphthene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Acenaphthylene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Anthracene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Benzidine (M)	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
Benzo(a)anthracene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Benzo(a)pyrene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Benzo(b)fluoranthene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Benzo(g,h,i)perylene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Benzo(k)fluoranthene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Benzoic acid	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
Benzyl alcohol	ND	660		µg/Kg	1	11/25/2008 06:17 PM
Bis(2-chloroethoxy)methane	ND	330		µg/Kg	1	11/25/2008 06:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS
Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-049A

Client Sample ID: UPRR1-1
Collection Date: 11/20/2008 12:55:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A	QC Batch: 50577				PrepDate: 11/25/2008	Analyst: **DMP**
Bis(2-chloroethyl)ether	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Bis(2-chloroisopropyl)ether	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Bis(2-ethylhexyl)phthalate	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Butylbenzylphthalate	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Chrysene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Di-n-butylphthalate	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Di-n-octylphthalate	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Dibenz(a,h)anthracene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Dibenzofuran	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Diethylphthalate	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Dimethylphthalate	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Fluoranthene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Fluorene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Hexachlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Hexachlorobutadiene	ND	660		µg/Kg	1	11/25/2008 06:17 PM
Hexachlorocyclopentadiene	ND	660		µg/Kg	1	11/25/2008 06:17 PM
Hexachloroethane	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Indeno(1,2,3-cd)pyrene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Isophorone	ND	330		µg/Kg	1	11/25/2008 06:17 PM
N-Nitrosodi-n-propylamine	ND	330		µg/Kg	1	11/25/2008 06:17 PM
N-Nitrosodiphenylamine	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Naphthalene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Nitrobenzene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Pentachlorophenol	ND	1600		µg/Kg	1	11/25/2008 06:17 PM
Phenanthrene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Phenol	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Pyrene	ND	330		µg/Kg	1	11/25/2008 06:17 PM
Surr: 1,2-Dichlorobenzene-d4	70.3	49-103		%REC	1	11/25/2008 06:17 PM
Surr: 2,4,6-Tribromophenol	87.0	47-129		%REC	1	11/25/2008 06:17 PM
Surr: 2-Chlorophenol-d4	79.8	54-109		%REC	1	11/25/2008 06:17 PM
Surr: 2-Fluorobiphenyl	81.9	59-108		%REC	1	11/25/2008 06:17 PM
Surr: 2-Fluorophenol	78.1	50-111		%REC	1	11/25/2008 06:17 PM
Surr: 4-Terphenyl-d14	98.1	58-135		%REC	1	11/25/2008 06:17 PM
Surr: Nitrobenzene-d5	70.9	54-115		%REC	1	11/25/2008 06:17 PM
Surr: Phenol-d5	82.7	58-112		%REC	1	11/25/2008 06:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-050A

Client Sample ID: UPRR1-5
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201A	QC Batch: 50514			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:01 AM
Arsenic	4.6	1.0		mg/Kg	1	12/2/2008 12:01 AM
Barium	170	1.0		mg/Kg	1	12/2/2008 12:01 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:01 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:01 AM
Chromium	37	1.0		mg/Kg	1	12/2/2008 12:01 AM
Cobalt	9.7	1.0		mg/Kg	1	12/2/2008 12:01 AM
Copper	22	2.0		mg/Kg	1	12/2/2008 12:01 AM
Lead	6.7	1.0		mg/Kg	1	12/2/2008 12:01 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:01 AM
Nickel	51	1.0		mg/Kg	1	12/2/2008 12:01 AM
Selenium	1.8	1.0		mg/Kg	1	12/2/2008 12:01 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:01 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:01 AM
Vanadium	33	1.0		mg/Kg	1	12/2/2008 12:01 AM
Zinc	45	1.0		mg/Kg	1	12/2/2008 12:01 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 09:51 PM
Surr: Bromofluorobenzene (FID)	96.8	59-145		%REC	1	11/24/2008 09:51 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 09:51 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 09:51 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 09:51 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 09:51 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 09:51 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 09:51 PM
Surr: Bromofluorobenzene (PID)	100	65-140		%REC	1	11/24/2008 09:51 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-050A

Client Sample ID: UPRR1-5
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471A						
RunID: AA5_081125G QC Batch: 50507 PrepDate: 11/24/2008 Analyst: **AMT**						
Mercury	ND	0.10		mg/Kg	1	11/25/2008 03:22 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A QC Batch: 50577 PrepDate: 11/25/2008 Analyst: **DMP**						
1,2,4-Trichlorobenzene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
1,2-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
1,3-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
1,4-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2,4,5-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2,4,6-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2,4-Dichlorophenol	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
2,4-Dimethylphenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2,4-Dinitrophenol	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
2,4-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2,6-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2-Chloronaphthalene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2-Chlorophenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2-Methylnaphthalene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2-Methylphenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
2-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
2-Nitrophenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
3,3´-Dichlorobenzidine	ND	660		µg/Kg	1	11/25/2008 05:21 PM
3-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
4,6-Dinitro-2-methylphenol	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
4-Bromophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 05:21 PM
4-Chloro-3-methylphenol	ND	660		µg/Kg	1	11/25/2008 05:21 PM
4-Chloroaniline	ND	660		µg/Kg	1	11/25/2008 05:21 PM
4-Chlorophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 05:21 PM
4-Methylphenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
4-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
4-Nitrophenol	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
Acenaphthene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Acenaphthylene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Anthracene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Benzidine (M)	ND	1600		µg/Kg	1	11/25/2008 05:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-050A

Client Sample ID: UPRR1-5
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A	QC Batch: 50577				PrepDate: 11/25/2008	Analyst: **DMP**
Benzo(a)anthracene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Benzo(a)pyrene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Benzo(b)fluoranthene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Benzo(g,h,i)perylene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Benzo(k)fluoranthene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Benzoic acid	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
Benzyl alcohol	ND	660		µg/Kg	1	11/25/2008 05:21 PM
Bis(2-chloroethoxy)methane	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Bis(2-chloroethyl)ether	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Bis(2-chloroisopropyl)ether	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Bis(2-ethylhexyl)phthalate	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Butylbenzylphthalate	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Chrysene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Di-n-butylphthalate	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Di-n-octylphthalate	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Dibenz(a,h)anthracene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Dibenzofuran	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Diethylphthalate	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Dimethylphthalate	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Fluoranthene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Fluorene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Hexachlorobenzene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Hexachlorobutadiene	ND	660		µg/Kg	1	11/25/2008 05:21 PM
Hexachlorocyclopentadiene	ND	660		µg/Kg	1	11/25/2008 05:21 PM
Hexachloroethane	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Indeno(1,2,3-cd)pyrene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Isophorone	ND	330		µg/Kg	1	11/25/2008 05:21 PM
N-Nitrosodi-n-propylamine	ND	330		µg/Kg	1	11/25/2008 05:21 PM
N-Nitrosodiphenylamine	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Naphthalene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Nitrobenzene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Pentachlorophenol	ND	1600		µg/Kg	1	11/25/2008 05:21 PM
Phenanthrene	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Phenol	ND	330		µg/Kg	1	11/25/2008 05:21 PM
Pyrene	ND	330		µg/Kg	1	11/25/2008 05:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1-5
Lab Order:	102311	**Collection Date:**	11/20/2008 1:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-050A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A	QC Batch: 50577				PrepDate: 11/25/2008	Analyst: **DMP**
Surr: 1,2-Dichlorobenzene-d4	76.8	49-103		%REC	1	11/25/2008 05:21 PM
Surr: 2,4,6-Tribromophenol	89.2	47-129		%REC	1	11/25/2008 05:21 PM
Surr: 2-Chlorophenol-d4	84.3	54-109		%REC	1	11/25/2008 05:21 PM
Surr: 2-Fluorobiphenyl	84.0	59-108		%REC	1	11/25/2008 05:21 PM
Surr: 2-Fluorophenol	82.3	50-111		%REC	1	11/25/2008 05:21 PM
Surr: 4-Terphenyl-d14	99.0	58-135		%REC	1	11/25/2008 05:21 PM
Surr: Nitrobenzene-d5	76.4	54-115		%REC	1	11/25/2008 05:21 PM
Surr: Phenol-d5	86.6	58-112		%REC	1	11/25/2008 05:21 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-051A

Client Sample ID: UPRR1-12
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201A	QC Batch: 50514			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:05 AM
Arsenic	3.0	1.0		mg/Kg	1	12/2/2008 12:05 AM
Barium	130	1.0		mg/Kg	1	12/2/2008 12:05 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:05 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:05 AM
Chromium	25	1.0		mg/Kg	1	12/2/2008 12:05 AM
Cobalt	6.8	1.0		mg/Kg	1	12/2/2008 12:05 AM
Copper	20	2.0		mg/Kg	1	12/2/2008 12:05 AM
Lead	32	1.0		mg/Kg	1	12/2/2008 12:05 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:05 AM
Nickel	31	1.0		mg/Kg	1	12/2/2008 12:05 AM
Selenium	1.3	1.0		mg/Kg	1	12/2/2008 12:05 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:05 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:05 AM
Vanadium	30	1.0		mg/Kg	1	12/2/2008 12:05 AM
Zinc	52	1.0		mg/Kg	1	12/2/2008 12:05 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 10:05 PM
Surr: Bromofluorobenzene (FID)	87.9	59-145		%REC	1	11/24/2008 10:05 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 10:05 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 10:05 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 10:05 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 10:05 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 10:05 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 10:05 PM
Surr: Bromofluorobenzene (PID)	92.9	65-140		%REC	1	11/24/2008 10:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-051A

Client Sample ID: UPRR1-12
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471A						
RunID: AA5_081125G QC Batch: 50507 PrepDate: 11/24/2008 Analyst: **AMT**						
Mercury	ND	0.10		mg/Kg	1	11/25/2008 03:24 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A QC Batch: 50577 PrepDate: 11/25/2008 Analyst: **DMP**						
1,2,4-Trichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
1,2-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
1,3-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
1,4-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2,4,5-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2,4,6-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2,4-Dichlorophenol	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
2,4-Dimethylphenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2,4-Dinitrophenol	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
2,4-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2,6-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2-Chloronaphthalene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2-Chlorophenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2-Methylnaphthalene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2-Methylphenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
2-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
2-Nitrophenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
3,3´-Dichlorobenzidine	ND	660		µg/Kg	1	11/25/2008 06:45 PM
3-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
4,6-Dinitro-2-methylphenol	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
4-Bromophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 06:45 PM
4-Chloro-3-methylphenol	ND	660		µg/Kg	1	11/25/2008 06:45 PM
4-Chloroaniline	ND	660		µg/Kg	1	11/25/2008 06:45 PM
4-Chlorophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 06:45 PM
4-Methylphenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
4-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
4-Nitrophenol	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
Acenaphthene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Acenaphthylene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Anthracene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Benzidine (M)	ND	1600		µg/Kg	1	11/25/2008 06:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1-12
Lab Order:	102311	**Collection Date:**	11/20/2008 1:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-051A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B			**EPA 8270C**			
RunID: MS6_081125A	QC Batch: 50577			PrepDate:	11/25/2008	Analyst: **DMP**
Benzo(a)anthracene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Benzo(a)pyrene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Benzo(b)fluoranthene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Benzo(g,h,i)perylene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Benzo(k)fluoranthene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Benzoic acid	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
Benzyl alcohol	ND	660		µg/Kg	1	11/25/2008 06:45 PM
Bis(2-chloroethoxy)methane	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Bis(2-chloroethyl)ether	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Bis(2-chloroisopropyl)ether	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Bis(2-ethylhexyl)phthalate	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Butylbenzylphthalate	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Chrysene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Di-n-butylphthalate	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Di-n-octylphthalate	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Dibenz(a,h)anthracene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Dibenzofuran	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Diethylphthalate	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Dimethylphthalate	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Fluoranthene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Fluorene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Hexachlorobenzene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Hexachlorobutadiene	ND	660		µg/Kg	1	11/25/2008 06:45 PM
Hexachlorocyclopentadiene	ND	660		µg/Kg	1	11/25/2008 06:45 PM
Hexachloroethane	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Indeno(1,2,3-cd)pyrene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Isophorone	ND	330		µg/Kg	1	11/25/2008 06:45 PM
N-Nitrosodi-n-propylamine	ND	330		µg/Kg	1	11/25/2008 06:45 PM
N-Nitrosodiphenylamine	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Naphthalene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Nitrobenzene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Pentachlorophenol	ND	1600		µg/Kg	1	11/25/2008 06:45 PM
Phenanthrene	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Phenol	ND	330		µg/Kg	1	11/25/2008 06:45 PM
Pyrene	ND	330		µg/Kg	1	11/25/2008 06:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1-12
Lab Order:	102311	**Collection Date:**	11/20/2008 1:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-051A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A	QC Batch: 50577				PrepDate: 11/25/2008	Analyst: **DMP**
Surr: 1,2-Dichlorobenzene-d4	72.3	49-103		%REC	1	11/25/2008 06:45 PM
Surr: 2,4,6-Tribromophenol	86.6	47-129		%REC	1	11/25/2008 06:45 PM
Surr: 2-Chlorophenol-d4	80.6	54-109		%REC	1	11/25/2008 06:45 PM
Surr: 2-Fluorobiphenyl	80.2	59-108		%REC	1	11/25/2008 06:45 PM
Surr: 2-Fluorophenol	79.4	50-111		%REC	1	11/25/2008 06:45 PM
Surr: 4-Terphenyl-d14	94.9	58-135		%REC	1	11/25/2008 06:45 PM
Surr: Nitrobenzene-d5	71.7	54-115		%REC	1	11/25/2008 06:45 PM
Surr: Phenol-d5	82.9	58-112		%REC	1	11/25/2008 06:45 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-052A

Client Sample ID: UPRR1-23.5'
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201A	QC Batch: 50514			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:09 AM
Arsenic	2.9	1.0		mg/Kg	1	12/2/2008 12:09 AM
Barium	150	1.0		mg/Kg	1	12/2/2008 12:09 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:09 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:09 AM
Chromium	30	1.0		mg/Kg	1	12/2/2008 12:09 AM
Cobalt	13	1.0		mg/Kg	1	12/2/2008 12:09 AM
Copper	15	2.0		mg/Kg	1	12/2/2008 12:09 AM
Lead	5.1	1.0		mg/Kg	1	12/2/2008 12:09 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:09 AM
Nickel	48	1.0		mg/Kg	1	12/2/2008 12:09 AM
Selenium	1.3	1.0		mg/Kg	1	12/2/2008 12:09 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:09 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:09 AM
Vanadium	25	1.0		mg/Kg	1	12/2/2008 12:09 AM
Zinc	32	1.0		mg/Kg	1	12/2/2008 12:09 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 10:19 PM
Surr: Bromofluorobenzene (FID)	89.7	59-145		%REC	1	11/24/2008 10:19 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124C	QC Batch: E08VS314			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 10:19 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 10:19 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 10:19 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 10:19 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 10:19 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 10:19 PM
Surr: Bromofluorobenzene (PID)	93.8	65-140		%REC	1	11/24/2008 10:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-052A

Client Sample ID: UPRR1-23.5'
Collection Date: 11/20/2008 1:00:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7471A			
RunID: AA5_081125B	QC Batch: 50594			PrepDate:	11/25/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 04:38 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
	EPA 3550B		**EPA 8270C**			
RunID: MS6_081125A	QC Batch: 50577			PrepDate:	11/25/2008	Analyst: **DMP**
1,2,4-Trichlorobenzene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
1,2-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
1,3-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
1,4-Dichlorobenzene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2,4,5-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2,4,6-Trichlorophenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2,4-Dichlorophenol	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
2,4-Dimethylphenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2,4-Dinitrophenol	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
2,4-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2,6-Dinitrotoluene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2-Chloronaphthalene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2-Chlorophenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2-Methylnaphthalene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2-Methylphenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
2-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
2-Nitrophenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
3,3´-Dichlorobenzidine	ND	660		µg/Kg	1	11/25/2008 04:53 PM
3-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
4,6-Dinitro-2-methylphenol	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
4-Bromophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 04:53 PM
4-Chloro-3-methylphenol	ND	660		µg/Kg	1	11/25/2008 04:53 PM
4-Chloroaniline	ND	660		µg/Kg	1	11/25/2008 04:53 PM
4-Chlorophenyl-phenylether	ND	330		µg/Kg	1	11/25/2008 04:53 PM
4-Methylphenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
4-Nitroaniline	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
4-Nitrophenol	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
Acenaphthene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Acenaphthylene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Anthracene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Benzidine (M)	ND	1600		µg/Kg	1	11/25/2008 04:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1-23.5'
Lab Order:	102311	**Collection Date:**	11/20/2008 1:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-052A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B			**EPA 8270C**			
RunID: MS6_081125A	QC Batch: 50577			PrepDate:	11/25/2008	Analyst: **DMP**
Benzo(a)anthracene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Benzo(a)pyrene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Benzo(b)fluoranthene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Benzo(g,h,i)perylene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Benzo(k)fluoranthene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Benzoic acid	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
Benzyl alcohol	ND	660		µg/Kg	1	11/25/2008 04:53 PM
Bis(2-chloroethoxy)methane	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Bis(2-chloroethyl)ether	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Bis(2-chloroisopropyl)ether	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Bis(2-ethylhexyl)phthalate	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Butylbenzylphthalate	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Chrysene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Di-n-butylphthalate	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Di-n-octylphthalate	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Dibenz(a,h)anthracene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Dibenzofuran	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Diethylphthalate	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Dimethylphthalate	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Fluoranthene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Fluorene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Hexachlorobenzene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Hexachlorobutadiene	ND	660		µg/Kg	1	11/25/2008 04:53 PM
Hexachlorocyclopentadiene	ND	660		µg/Kg	1	11/25/2008 04:53 PM
Hexachloroethane	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Indeno(1,2,3-cd)pyrene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Isophorone	ND	330		µg/Kg	1	11/25/2008 04:53 PM
N-Nitrosodi-n-propylamine	ND	330		µg/Kg	1	11/25/2008 04:53 PM
N-Nitrosodiphenylamine	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Naphthalene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Nitrobenzene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Pentachlorophenol	ND	1600		µg/Kg	1	11/25/2008 04:53 PM
Phenanthrene	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Phenol	ND	330		µg/Kg	1	11/25/2008 04:53 PM
Pyrene	ND	330		µg/Kg	1	11/25/2008 04:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1-23.5'
Lab Order:	102311	**Collection Date:**	11/20/2008 1:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-052A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				**EPA 8270C**		
RunID: MS6_081125A	QC Batch: 50577				PrepDate: 11/25/2008	Analyst: **DMP**
Surr: 1,2-Dichlorobenzene-d4	74.5	49-103		%REC	1	11/25/2008 04:53 PM
Surr: 2,4,6-Tribromophenol	86.9	47-129		%REC	1	11/25/2008 04:53 PM
Surr: 2-Chlorophenol-d4	83.6	54-109		%REC	1	11/25/2008 04:53 PM
Surr: 2-Fluorobiphenyl	81.1	59-108		%REC	1	11/25/2008 04:53 PM
Surr: 2-Fluorophenol	82.0	50-111		%REC	1	11/25/2008 04:53 PM
Surr: 4-Terphenyl-d14	97.7	58-135		%REC	1	11/25/2008 04:53 PM
Surr: Nitrobenzene-d5	73.8	54-115		%REC	1	11/25/2008 04:53 PM
Surr: Phenol-d5	86.0	58-112		%REC	1	11/25/2008 04:53 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-053A

Client Sample ID: UPRR1
Collection Date: 11/20/2008 1:10:00 PM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,1,1-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,1,2-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,1-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,1-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,1-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2,3-Trichloropropane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2-Dibromoethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,3-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,3-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
1,4-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
2,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
2-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
4-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
4-Isopropyltoluene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Benzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Bromobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Bromodichloromethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Bromoform	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Bromomethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Carbon tetrachloride	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Chlorobenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Chloroethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Chloroform	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Chloromethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
cis-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-053A

Client Sample ID: UPRR1
Collection Date: 11/20/2008 1:10:00 PM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Dibromochloromethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Dibromomethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Dichlorodifluoromethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Ethylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Hexachlorobutadiene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Isopropylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
m,p-Xylene	ND	1.0		µg/L	1	11/21/2008 05:55 PM
Methylene chloride	ND	1.0		µg/L	1	11/21/2008 05:55 PM
n-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
n-Propylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Naphthalene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
o-Xylene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
sec-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Styrene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
tert-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Tetrachloroethene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Toluene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
trans-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Trichloroethene	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Trichlorofluoromethane	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Vinyl chloride	ND	0.50		µg/L	1	11/21/2008 05:55 PM
Surr: 1,2-Dichloroethane-d4	109	70-130		%REC	1	11/21/2008 05:55 PM
Surr: 4-Bromofluorobenzene	90.6	70-130		%REC	1	11/21/2008 05:55 PM
Surr: Dibromofluoromethane	110	70-130		%REC	1	11/21/2008 05:55 PM
Surr: Toluene-d8	113	70-130		%REC	1	11/21/2008 05:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1
Lab Order:	102311	**Collection Date:**	11/20/2008 1:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-053B		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
GRO	ND	0.050		mg/L	1	11/25/2008 08:56 PM
Surr: Bromofluorobenzene (FID)	126	71-130		%REC	1	11/25/2008 08:56 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
Benzene	ND	0.50		µg/L	1	11/25/2008 08:56 PM
Ethylbenzene	ND	0.50		µg/L	1	11/25/2008 08:56 PM
m,p-Xylene	ND	1.0		µg/L	1	11/25/2008 08:56 PM
Methyl tert-butyl ether	ND	0.50		µg/L	1	11/25/2008 08:56 PM
o-Xylene	ND	0.50		µg/L	1	11/25/2008 08:56 PM
Toluene	ND	0.50		µg/L	1	11/25/2008 08:56 PM
Surr: Bromofluorobenzene (PID)	113	73-127		%REC	1	11/25/2008 08:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1
Lab Order:	102311	**Collection Date:**	11/20/2008 1:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-053C		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3510C				**EPA 8015B(M)**		
RunID: GC16_081125C	QC Batch: 50580			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	0.078	0.050		mg/L	1	11/25/2008 03:20 PM
ORO	0.090	0.050		mg/L	1	11/25/2008 03:20 PM
Surr: p-Terphenyl	111	35-131		%REC	1	11/25/2008 03:20 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1
Lab Order:	102311	**Collection Date:**	11/20/2008 1:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-053D		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP8_081124D	QC Batch: 50521			PrepDate:	11/24/2008	Analyst: **CL**
Antimony	ND	0.0050		mg/L	1	11/24/2008 02:34 PM
Arsenic	ND	0.010		mg/L	1	11/24/2008 02:34 PM
Barium	2.0	0.0030		mg/L	1	11/24/2008 02:34 PM
Beryllium	ND	0.0030		mg/L	1	11/24/2008 02:34 PM
Cadmium	ND	0.0030		mg/L	1	11/24/2008 02:34 PM
Chromium	0.0042	0.0030		mg/L	1	11/24/2008 02:34 PM
Cobalt	0.023	0.0030		mg/L	1	11/24/2008 02:34 PM
Copper	0.0072	0.0050		mg/L	1	11/24/2008 02:34 PM
Lead	ND	0.0050		mg/L	1	11/28/2008 12:28 PM
Molybdenum	ND	0.0050		mg/L	1	11/24/2008 02:34 PM
Nickel	0.025	0.0050		mg/L	1	11/24/2008 02:34 PM
Selenium	0.013	0.010		mg/L	1	11/24/2008 02:34 PM
Silver	ND	0.0030		mg/L	1	11/24/2008 02:34 PM
Thallium	ND	0.015		mg/L	1	11/24/2008 02:34 PM
Vanadium	0.040	0.0030		mg/L	1	11/24/2008 02:34 PM
Zinc	0.074	0.010		mg/L	1	11/24/2008 02:34 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA5_081124E	QC Batch: 50520			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.20		µg/L	1	11/24/2008 05:42 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-053E

Client Sample ID: UPRR1
Collection Date: 11/20/2008 1:10:00 PM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3510C			**EPA 8270C**			
RunID: MS 13_081124B	QC Batch: 50531			PrepDate:	11/24/2008	Analyst: **SMH**
1,2,4-Trichlorobenzene	ND	12		µg/L	1	11/25/2008 12:58 PM
1,2-Dichlorobenzene	ND	12		µg/L	1	11/25/2008 12:58 PM
1,3-Dichlorobenzene	ND	12		µg/L	1	11/25/2008 12:58 PM
1,4-Dichlorobenzene	ND	12		µg/L	1	11/25/2008 12:58 PM
2,4,5-Trichlorophenol	ND	12		µg/L	1	11/25/2008 12:58 PM
2,4,6-Trichlorophenol	ND	12		µg/L	1	11/25/2008 12:58 PM
2,4-Dichlorophenol	ND	12		µg/L	1	11/25/2008 12:58 PM
2,4-Dimethylphenol	ND	12		µg/L	1	11/25/2008 12:58 PM
2,4-Dinitrophenol	ND	59		µg/L	1	11/25/2008 12:58 PM
2,4-Dinitrotoluene	ND	12		µg/L	1	11/25/2008 12:58 PM
2,6-Dinitrotoluene	ND	12		µg/L	1	11/25/2008 12:58 PM
2-Chloronaphthalene	ND	12		µg/L	1	11/25/2008 12:58 PM
2-Chlorophenol	ND	12		µg/L	1	11/25/2008 12:58 PM
2-Methylnaphthalene	ND	12		µg/L	1	11/25/2008 12:58 PM
2-Methylphenol	ND	12		µg/L	1	11/25/2008 12:58 PM
2-Nitroaniline	ND	59		µg/L	1	11/25/2008 12:58 PM
2-Nitrophenol	ND	12		µg/L	1	11/25/2008 12:58 PM
3,3´-Dichlorobenzidine	ND	24		µg/L	1	11/25/2008 12:58 PM
3-Nitroaniline	ND	59		µg/L	1	11/25/2008 12:58 PM
4,6-Dinitro-2-methylphenol	ND	59		µg/L	1	11/25/2008 12:58 PM
4-Bromophenyl-phenylether	ND	12		µg/L	1	11/25/2008 12:58 PM
4-Chloro-3-methylphenol	ND	59		µg/L	1	11/25/2008 12:58 PM
4-Chloroaniline	ND	24		µg/L	1	11/25/2008 12:58 PM
4-Chlorophenyl-phenylether	ND	12		µg/L	1	11/25/2008 12:58 PM
4-Methylphenol	ND	12		µg/L	1	11/25/2008 12:58 PM
4-Nitroaniline	ND	24		µg/L	1	11/25/2008 12:58 PM
4-Nitrophenol	ND	59		µg/L	1	11/25/2008 12:58 PM
Acenaphthene	ND	12		µg/L	1	11/25/2008 12:58 PM
Acenaphthylene	ND	12		µg/L	1	11/25/2008 12:58 PM
Anthracene	ND	12		µg/L	1	11/25/2008 12:58 PM
Benzidine (M)	ND	59		µg/L	1	11/25/2008 12:58 PM
Benzo(a)anthracene	ND	12		µg/L	1	11/25/2008 12:58 PM
Benzo(a)pyrene	ND	12		µg/L	1	11/25/2008 12:58 PM
Benzo(b)fluoranthene	ND	12		µg/L	1	11/25/2008 12:58 PM
Benzo(g,h,i)perylene	ND	12		µg/L	1	11/25/2008 12:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS
Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-053E

Client Sample ID: UPRR1
Collection Date: 11/20/2008 1:10:00 PM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3510C			**EPA 8270C**			
RunID: MS 13_081124B	QC Batch: 50531			PrepDate: 11/24/2008		Analyst: **SMH**
Benzo(k)fluoranthene	ND	12		µg/L	1	11/25/2008 12:58 PM
Benzoic acid	ND	59		µg/L	1	11/25/2008 12:58 PM
Benzyl alcohol	ND	24		µg/L	1	11/25/2008 12:58 PM
Bis(2-chloroethoxy)methane	ND	12		µg/L	1	11/25/2008 12:58 PM
Bis(2-chloroethyl)ether	ND	12		µg/L	1	11/25/2008 12:58 PM
Bis(2-chloroisopropyl)ether	ND	12		µg/L	1	11/25/2008 12:58 PM
Bis(2-ethylhexyl)phthalate	ND	12		µg/L	1	11/25/2008 12:58 PM
Butylbenzylphthalate	ND	12		µg/L	1	11/25/2008 12:58 PM
Chrysene	ND	12		µg/L	1	11/25/2008 12:58 PM
Di-n-butylphthalate	ND	12		µg/L	1	11/25/2008 12:58 PM
Di-n-octylphthalate	ND	12		µg/L	1	11/25/2008 12:58 PM
Dibenz(a,h)anthracene	ND	12		µg/L	1	11/25/2008 12:58 PM
Dibenzofuran	ND	12		µg/L	1	11/25/2008 12:58 PM
Diethylphthalate	ND	12		µg/L	1	11/25/2008 12:58 PM
Dimethylphthalate	ND	12		µg/L	1	11/25/2008 12:58 PM
Fluoranthene	ND	12		µg/L	1	11/25/2008 12:58 PM
Fluorene	ND	12		µg/L	1	11/25/2008 12:58 PM
Hexachlorobenzene	ND	12		µg/L	1	11/25/2008 12:58 PM
Hexachlorobutadiene	ND	24		µg/L	1	11/25/2008 12:58 PM
Hexachlorocyclopentadiene	ND	12		µg/L	1	11/25/2008 12:58 PM
Hexachloroethane	ND	12		µg/L	1	11/25/2008 12:58 PM
Indeno(1,2,3-cd)pyrene	ND	12		µg/L	1	11/25/2008 12:58 PM
Isophorone	ND	12		µg/L	1	11/25/2008 12:58 PM
N-Nitrosodi-n-propylamine	ND	12		µg/L	1	11/25/2008 12:58 PM
N-Nitrosodiphenylamine	ND	12		µg/L	1	11/25/2008 12:58 PM
Naphthalene	ND	12		µg/L	1	11/25/2008 12:58 PM
Nitrobenzene	ND	12		µg/L	1	11/25/2008 12:58 PM
Pentachlorophenol	ND	59		µg/L	1	11/25/2008 12:58 PM
Phenanthrene	ND	12		µg/L	1	11/25/2008 12:58 PM
Phenol	ND	12		µg/L	1	11/25/2008 12:58 PM
Pyrene	ND	12		µg/L	1	11/25/2008 12:58 PM
Surr: 1,2-Dichlorobenzene-d4	73.9	42-98		%REC	1	11/25/2008 12:58 PM
Surr: 2,4,6-Tribromophenol	86.0	60-128		%REC	1	11/25/2008 12:58 PM
Surr: 2-Chlorophenol-d4	65.4	43-102		%REC	1	11/25/2008 12:58 PM
Surr: 2-Fluorobiphenyl	81.5	50-108		%REC	1	11/25/2008 12:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	UPRR1
Lab Order:	102311	**Collection Date:**	11/20/2008 1:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-053E		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3510C				**EPA 8270C**		
RunID: MS 13_081124B	QC Batch: 50531				PrepDate: 11/24/2008	Analyst: **SMH**
Surr: 2-Fluorophenol	39.5	22-69		%REC	1	11/25/2008 12:58 PM
Surr: 4-Terphenyl-d14	93.9	66-130		%REC	1	11/25/2008 12:58 PM
Surr: Nitrobenzene-d5	77.7	47-117		%REC	1	11/25/2008 12:58 PM
Surr: Phenol-d5	29.2	16-50		%REC	1	11/25/2008 12:58 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2
Lab Order:	102311	**Collection Date:**	11/20/2008 12:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-054A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,1,1-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,1,2-Trichloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,1-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,1-Dichloroethene	0.53	0.50		µg/L	1	11/21/2008 06:16 PM
1,1-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2,3-Trichloropropane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2-Dibromoethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2-Dichloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,3-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,3-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
1,4-Dichlorobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
2,2-Dichloropropane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
2-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
4-Chlorotoluene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
4-Isopropyltoluene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Benzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Bromobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Bromodichloromethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Bromoform	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Bromomethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Carbon tetrachloride	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Chlorobenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Chloroethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Chloroform	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Chloromethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
cis-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 06:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2
Lab Order:	102311	**Collection Date:**	11/20/2008 12:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-054A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS BY GC/MS						
			EPA 8260B			
RunID: MS11_081121A	QC Batch: A08VW317			PrepDate:		Analyst: **SLL**
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Dibromochloromethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Dibromomethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Dichlorodifluoromethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Ethylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Hexachlorobutadiene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Isopropylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
m,p-Xylene	ND	1.0		µg/L	1	11/21/2008 06:16 PM
Methylene chloride	ND	1.0		µg/L	1	11/21/2008 06:16 PM
n-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
n-Propylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Naphthalene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
o-Xylene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
sec-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Styrene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
tert-Butylbenzene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Tetrachloroethene	32	0.50		µg/L	1	11/21/2008 06:16 PM
Toluene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
trans-1,2-Dichloroethene	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Trichloroethene	5.5	0.50		µg/L	1	11/21/2008 06:16 PM
Trichlorofluoromethane	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Vinyl chloride	ND	0.50		µg/L	1	11/21/2008 06:16 PM
Surr: 1,2-Dichloroethane-d4	111	70-130		%REC	1	11/21/2008 06:16 PM
Surr: 4-Bromofluorobenzene	90.7	70-130		%REC	1	11/21/2008 06:16 PM
Surr: Dibromofluoromethane	110	70-130		%REC	1	11/21/2008 06:16 PM
Surr: Toluene-d8	112	70-130		%REC	1	11/21/2008 06:16 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2
Lab Order:	102311	**Collection Date:**	11/20/2008 12:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-054B		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
GASOLINE RANGE ORGANICS BY GC/FID						
			EPA 8015B(M)			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
GRO	ND	0.050		mg/L	1	11/25/2008 09:26 PM
Surr: Bromofluorobenzene (FID)	103	71-130		%REC	1	11/25/2008 09:26 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
			EPA 8021B			
RunID: GC6_081125A	QC Batch: I08VW212			PrepDate:		Analyst: **DDL**
Benzene	ND	0.50		µg/L	1	11/25/2008 09:26 PM
Ethylbenzene	ND	0.50		µg/L	1	11/25/2008 09:26 PM
m,p-Xylene	ND	1.0		µg/L	1	11/25/2008 09:26 PM
Methyl tert-butyl ether	ND	0.50		µg/L	1	11/25/2008 09:26 PM
o-Xylene	ND	0.50		µg/L	1	11/25/2008 09:26 PM
Toluene	ND	0.50		µg/L	1	11/25/2008 09:26 PM
Surr: Bromofluorobenzene (PID)	91.0	73-127		%REC	1	11/25/2008 09:26 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2
Lab Order:	102311	**Collection Date:**	11/20/2008 12:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-054C		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
EPA 3510C				**EPA 8015B(M)**		
RunID: GC16_081125C	QC Batch: 50580			PrepDate:	11/25/2008	Analyst: **CBR**
DRO	0.060	0.050		mg/L	1	11/25/2008 03:02 PM
ORO	0.070	0.050		mg/L	1	11/25/2008 03:02 PM
Surr: p-Terphenyl	117	35-131		%REC	1	11/25/2008 03:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	MBGW2
Lab Order:	102311	**Collection Date:**	11/20/2008 12:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	GROUNDWATER
Lab ID:	102311-054D		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP8_081124D	QC Batch: 50521			PrepDate:	11/24/2008	Analyst: **CL**
Antimony	ND	0.0050		mg/L	1	11/24/2008 02:39 PM
Arsenic	ND	0.010		mg/L	1	11/24/2008 02:39 PM
Barium	1.9	0.0030		mg/L	1	11/24/2008 02:39 PM
Beryllium	ND	0.0030		mg/L	1	11/24/2008 02:39 PM
Cadmium	ND	0.0030		mg/L	1	11/24/2008 02:39 PM
Chromium	0.022	0.0030		mg/L	1	11/24/2008 02:39 PM
Cobalt	0.027	0.0030		mg/L	1	11/24/2008 02:39 PM
Copper	0.043	0.0050		mg/L	1	11/24/2008 02:39 PM
Lead	ND	0.0050		mg/L	1	11/28/2008 12:32 PM
Molybdenum	0.0077	0.0050		mg/L	1	11/24/2008 02:39 PM
Nickel	0.068	0.0050		mg/L	1	11/24/2008 02:39 PM
Selenium	ND	0.010		mg/L	1	11/24/2008 02:39 PM
Silver	ND	0.0030		mg/L	1	11/24/2008 02:39 PM
Thallium	ND	0.015		mg/L	1	11/24/2008 02:39 PM
Vanadium	0.082	0.0030		mg/L	1	11/24/2008 02:39 PM
Zinc	0.11	0.010		mg/L	1	11/24/2008 02:39 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA5_081124E	QC Batch: 50520			PrepDate:	11/24/2008	Analyst: **AMT**
Mercury	ND	0.20		µg/L	1	11/24/2008 05:20 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW4-1-1
Lab Order:	102311	**Collection Date:**	11/19/2008 2:00:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-055A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201A	QC Batch: 50514				PrepDate: 11/25/2008	Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:13 AM
Arsenic	2.7	1.0		mg/Kg	1	12/2/2008 12:13 AM
Barium	88	1.0		mg/Kg	1	12/2/2008 12:13 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:13 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:13 AM
Chromium	20	1.0		mg/Kg	1	12/2/2008 12:13 AM
Cobalt	5.3	1.0		mg/Kg	1	12/2/2008 12:13 AM
Copper	11	2.0		mg/Kg	1	12/2/2008 12:13 AM
Lead	3.0	1.0		mg/Kg	1	12/2/2008 12:13 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:13 AM
Nickel	28	1.0		mg/Kg	1	12/2/2008 12:13 AM
Selenium	ND	1.0		mg/Kg	1	12/2/2008 12:13 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:13 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:13 AM
Vanadium	20	1.0		mg/Kg	1	12/2/2008 12:13 AM
Zinc	28	1.0		mg/Kg	1	12/2/2008 12:13 AM
DIESEL & MOTOR OIL RANGE ORGANICS BY GC/FID						
	EPA 3550B			**EPA 8015B(M)**		
RunID: GC16_081126A	QC Batch: 50597				PrepDate: 11/25/2008	Analyst: **CBR**
DRO	8.9	1.0		mg/Kg	1	11/26/2008 06:11 PM
ORO	25	1.0		mg/Kg	1	11/26/2008 06:11 PM
Surr: p-Terphenyl	89.1	30-130		%REC	1	11/26/2008 06:11 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125B	QC Batch: 50594				PrepDate: 11/25/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 04:40 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT: Geocon Consultants, Inc.
Lab Order: 102311
Project: I-880 SB Improvements, E8449-06-01
Lab ID: 102311-056A

Client Sample ID: RW4-1-5
Collection Date: 11/19/2008 2:05:00 PM
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081201A	QC Batch: 50514			PrepDate: 11/25/2008		Analyst: **CL**
Antimony	ND	2.0		mg/Kg	1	12/2/2008 12:17 AM
Arsenic	3.1	1.0		mg/Kg	1	12/2/2008 12:17 AM
Barium	87	1.0		mg/Kg	1	12/2/2008 12:17 AM
Beryllium	ND	1.0		mg/Kg	1	12/2/2008 12:17 AM
Cadmium	ND	1.0		mg/Kg	1	12/2/2008 12:17 AM
Chromium	19	1.0		mg/Kg	1	12/2/2008 12:17 AM
Cobalt	6.1	1.0		mg/Kg	1	12/2/2008 12:17 AM
Copper	12	2.0		mg/Kg	1	12/2/2008 12:17 AM
Lead	5.1	1.0		mg/Kg	1	12/2/2008 12:17 AM
Molybdenum	ND	1.0		mg/Kg	1	12/2/2008 12:17 AM
Nickel	29	1.0		mg/Kg	1	12/2/2008 12:17 AM
Selenium	1.2	1.0		mg/Kg	1	12/2/2008 12:17 AM
Silver	ND	1.0		mg/Kg	1	12/2/2008 12:17 AM
Thallium	ND	1.0		mg/Kg	1	12/2/2008 12:17 AM
Vanadium	22	1.0		mg/Kg	1	12/2/2008 12:17 AM
Zinc	35	1.0		mg/Kg	1	12/2/2008 12:17 AM
GASOLINE RANGE ORGANICS BY GC/FID						
				EPA 8015B(M)		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
GRO	ND	1.0		mg/Kg	1	11/24/2008 02:14 PM
Surr: Bromofluorobenzene (FID)	88.3	59-145		%REC	1	11/24/2008 02:14 PM
VOLATILE ORGANIC COMPOUNDS BY GC/PID						
				EPA 8021B		
RunID: GC2_081124A	QC Batch: E08VS312			PrepDate:		Analyst: **KHN**
Benzene	ND	5.0		µg/Kg	1	11/24/2008 02:14 PM
Ethylbenzene	ND	5.0		µg/Kg	1	11/24/2008 02:14 PM
m,p-Xylene	ND	10		µg/Kg	1	11/24/2008 02:14 PM
Methyl tert-butyl ether	ND	5.0		µg/Kg	1	11/24/2008 02:14 PM
o-Xylene	ND	5.0		µg/Kg	1	11/24/2008 02:14 PM
Toluene	ND	5.0		µg/Kg	1	11/24/2008 02:14 PM
Surr: Bromofluorobenzene (PID)	91.4	65-140		%REC	1	11/24/2008 02:14 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *03-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW4-1-5
Lab Order:	102311	**Collection Date:**	11/19/2008 2:05:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-056A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081125G	QC Batch: 50507			PrepDate: 11/24/2008		Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	11/25/2008 03:16 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50508** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **PBS** Batch ID: **50508** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595832**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-50508** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **LCSS** Batch ID: **50508** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	50.274	2.0	50.00	0	101	80	120				
Arsenic	48.750	1.0	50.00	0	97.5	80	120				
Barium	52.266	1.0	50.00	0	105	80	120				
Beryllium	50.295	1.0	50.00	0	101	80	120				
Cadmium	50.536	1.0	50.00	0	101	80	120				
Chromium	47.910	1.0	50.00	0	95.8	80	120				
Cobalt	52.395	1.0	50.00	0	105	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50508** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **LCSS** Batch ID: **50508** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	52.869	2.0	50.00	0	106	80	120				
Lead	50.560	1.0	50.00	0	101	80	120				
Molybdenum	52.074	1.0	50.00	0	104	80	120				
Nickel	50.268	1.0	50.00	0	101	80	120				
Selenium	45.246	1.0	50.00	0	90.5	80	120				
Silver	50.637	1.0	50.00	0	101	80	120				
Thallium	45.849	1.0	50.00	0	91.7	80	120				
Vanadium	52.506	1.0	50.00	0	105	80	120				
Zinc	49.683	1.0	50.00	0	99.4	80	120				

Sample ID: **102311-011ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **RW3-3-5** Batch ID: **50508** TestNo: **EPA 6010B EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	4.0						0	0	20	
Arsenic	3.506	2.0						3.531	0.716	20	
Barium	155.398	2.0						128.9	18.6	20	
Beryllium	ND	2.0						0	0	20	
Cadmium	0.488	2.0						0.4790	0	20	
Chromium	26.563	2.0						26.92	1.32	20	
Cobalt	7.378	2.0						8.031	8.48	20	
Copper	17.128	4.0						16.51	3.65	20	
Lead	6.607	2.0						6.657	0.751	20	
Molybdenum	ND	2.0						0	0	20	
Nickel	36.524	2.0						37.04	1.40	20	
Selenium	1.692	2.0						1.040	0	20	
Silver	ND	2.0						0	0	20	
Thallium	ND	2.0						0	0	20	
Vanadium	24.880	2.0						25.62	2.91	20	
Zinc	40.354	2.0						39.16	2.99	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-011AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **RW3-3-5** Batch ID: **50508** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1596000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	78.001	4.0	125.0	0	62.4	25	106				
Arsenic	105.489	2.0	125.0	3.531	81.6	42	113				
Barium	255.986	2.0	125.0	128.9	102	19	140				
Beryllium	108.290	2.0	125.0	0	86.6	50	109				
Cadmium	105.367	2.0	125.0	0.4790	83.9	48	106				
Chromium	128.117	2.0	125.0	26.92	81.0	44	116				
Cobalt	115.615	2.0	125.0	8.031	86.1	47	107				
Copper	132.968	4.0	125.0	16.51	93.2	49	124				
Lead	118.054	2.0	125.0	6.657	89.1	33	120				
Molybdenum	108.043	2.0	125.0	0	86.4	46	111				
Nickel	143.509	2.0	125.0	37.04	85.2	43	111				
Selenium	102.450	2.0	125.0	1.040	81.1	43	104				
Silver	111.121	2.0	125.0	0	88.9	53	114				
Thallium	101.466	2.0	125.0	0	81.2	41	107				
Vanadium	133.992	2.0	125.0	25.62	86.7	48	116				
Zinc	142.691	2.0	125.0	39.16	82.8	24	129				

Sample ID: **102311-011AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **RW3-3-5** Batch ID: **50508** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1596001**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	70.531	4.0	125.0	0	56.4	25	106	78.00	10.1	20	
Arsenic	94.028	2.0	125.0	3.531	72.4	42	113	105.5	11.5	20	
Barium	223.359	2.0	125.0	128.9	75.6	19	140	256.0	13.6	20	
Beryllium	96.515	2.0	125.0	0	77.2	50	109	108.3	11.5	20	
Cadmium	94.059	2.0	125.0	0.4790	74.9	48	106	105.4	11.3	20	
Chromium	113.734	2.0	125.0	26.92	69.5	44	116	128.1	11.9	20	
Cobalt	102.838	2.0	125.0	8.031	75.8	47	107	115.6	11.7	20	
Copper	117.739	4.0	125.0	16.51	81.0	49	124	133.0	12.1	20	
Lead	106.846	2.0	125.0	6.657	80.2	33	120	118.1	9.97	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-011AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102366**
Client ID: **RW3-3-5** Batch ID: **50508** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1596001**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	95.353	2.0	125.0	0	76.3	46	111	108.0	12.5	20	
Nickel	127.667	2.0	125.0	37.04	72.5	43	111	143.5	11.7	20	
Selenium	91.647	2.0	125.0	1.040	72.5	43	104	102.5	11.1	20	
Silver	98.544	2.0	125.0	0	78.8	53	114	111.1	12.0	20	
Thallium	90.037	2.0	125.0	0	72.0	41	107	101.5	11.9	20	
Vanadium	118.624	2.0	125.0	25.62	74.4	48	116	134.0	12.2	20	
Zinc	130.797	2.0	125.0	39.16	73.3	24	129	142.7	8.70	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50510** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **PBS** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	0.018	1.0									
Copper	ND	2.0									
Lead	0.119	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-50510** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **LCSS** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596585**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	45.296	2.0	50.00	0	90.6	80	120				
Arsenic	44.271	1.0	50.00	0	88.5	80	120				
Barium	46.933	1.0	50.00	0	93.9	80	120				
Beryllium	44.974	1.0	50.00	0	89.9	80	120				
Cadmium	45.481	1.0	50.00	0	91.0	80	120				
Chromium	42.937	1.0	50.00	0	85.9	80	120				
Cobalt	47.027	1.0	50.00	0.01786	94.0	80	120				
Copper	46.715	2.0	50.00	0	93.4	80	120				
Lead	47.920	1.0	50.00	0.1186	95.6	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50510** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **LCSS** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596585**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	46.262	1.0	50.00	0	92.5	80	120				
Nickel	45.398	1.0	50.00	0	90.8	80	120				
Selenium	42.053	1.0	50.00	0	84.1	80	120				
Silver	44.548	1.0	50.00	0	89.1	80	120				
Thallium	41.479	1.0	50.00	0	83.0	80	120				
Vanadium	47.134	1.0	50.00	0	94.3	80	120				
Zinc	44.981	1.0	50.00	0	90.0	80	120				

Sample ID: **102311-024ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **DSGW1-1** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596596**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.448	2.0						0.5694	0	20	
Arsenic	3.416	1.0						4.859	34.9	20	R
Barium	169.539	1.0						210.1	21.4	20	R
Beryllium	ND	1.0						0	0	20	
Cadmium	0.635	1.0						0.7616	0	20	
Chromium	19.730	1.0						21.53	8.73	20	
Cobalt	5.985	1.0						7.868	27.2	20	R
Copper	26.171	2.0						30.82	16.3	20	
Lead	112.335	1.0						147.6	27.1	20	R
Molybdenum	ND	1.0						0	0	20	
Nickel	27.451	1.0						35.22	24.8	20	R
Selenium	1.719	1.0						2.234	26.1	20	R
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	21.419	1.0						27.71	25.6	20	R
Zinc	96.281	1.0						116.8	19.2	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-024AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **DSGW1-1** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596597**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	71.185	2.0	125.0	0.5694	56.5	25	106				
Arsenic	96.007	1.0	125.0	4.859	72.9	42	113				
Barium	268.420	1.0	125.0	210.1	46.7	19	140				
Beryllium	95.994	1.0	125.0	0	76.8	50	109				
Cadmium	93.160	1.0	125.0	0.7616	73.9	48	106				
Chromium	113.628	1.0	125.0	21.53	73.7	44	116				
Cobalt	102.504	1.0	125.0	7.868	75.7	47	107				
Copper	136.038	2.0	125.0	30.82	84.2	49	124				
Lead	206.223	1.0	125.0	147.6	46.9	33	120				
Molybdenum	96.597	1.0	125.0	0	77.3	46	111				
Nickel	123.839	1.0	125.0	35.22	70.9	43	111				
Selenium	91.444	1.0	125.0	2.234	71.4	43	104				
Silver	99.189	1.0	125.0	0	79.4	53	114				
Thallium	86.615	1.0	125.0	0	69.3	41	107				
Vanadium	133.056	1.0	125.0	27.71	84.3	48	116				
Zinc	193.007	1.0	125.0	116.8	61.0	24	129				

Sample ID: **102311-024AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **DSGW1-1** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596598**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	66.576	2.0	125.0	0.5694	52.8	25	106	71.18	6.69	20	
Arsenic	95.441	1.0	125.0	4.859	72.5	42	113	96.01	0.592	20	
Barium	296.666	1.0	125.0	210.1	69.3	19	140	268.4	10.0	20	
Beryllium	95.339	1.0	125.0	0	76.3	50	109	95.99	0.685	20	
Cadmium	91.617	1.0	125.0	0.7616	72.7	48	106	93.16	1.67	20	
Chromium	116.452	1.0	125.0	21.53	75.9	44	116	113.6	2.46	20	
Cobalt	101.974	1.0	125.0	7.868	75.3	47	107	102.5	0.518	20	
Copper	138.538	2.0	125.0	30.82	86.2	49	124	136.0	1.82	20	
Lead	220.912	1.0	125.0	147.6	58.6	33	120	206.2	6.88	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-024AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102424**
Client ID: **DSGW1-1** Batch ID: **50510** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596598**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	94.924	1.0	125.0	0	75.9	46	111	96.60	1.75	20	
Nickel	128.336	1.0	125.0	35.22	74.5	43	111	123.8	3.57	20	
Selenium	91.124	1.0	125.0	2.234	71.1	43	104	91.44	0.351	20	
Silver	98.421	1.0	125.0	0	78.7	53	114	99.19	0.777	20	
Thallium	84.872	1.0	125.0	0	67.9	41	107	86.61	2.03	20	
Vanadium	125.508	1.0	125.0	27.71	78.2	48	116	133.1	5.84	20	
Zinc	202.025	1.0	125.0	116.8	68.2	24	129	193.0	4.57	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50511** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **PBS** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596555**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	0.426	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-50511** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **LCSS** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	45.748	2.0	50.00	0	91.5	80	120				
Arsenic	44.774	1.0	50.00	0	89.5	80	120				
Barium	47.396	1.0	50.00	0	94.8	80	120				
Beryllium	45.489	1.0	50.00	0	91.0	80	120				
Cadmium	45.957	1.0	50.00	0	91.9	80	120				
Chromium	43.257	1.0	50.00	0	86.5	80	120				
Cobalt	47.495	1.0	50.00	0	95.0	80	120				
Copper	46.868	2.0	50.00	0	93.7	80	120				
Lead	48.068	1.0	50.00	0.4260	95.3	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50511** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **LCSS** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	46.676	1.0	50.00	0	93.4	80	120				
Nickel	45.760	1.0	50.00	0	91.5	80	120				
Selenium	42.365	1.0	50.00	0	84.7	80	120				
Silver	44.839	1.0	50.00	0	89.7	80	120				
Thallium	41.954	1.0	50.00	0	83.9	80	120				
Vanadium	47.457	1.0	50.00	0	94.9	80	120				
Zinc	45.444	1.0	50.00	0	90.9	80	120				

Sample ID: **102311-035ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **RW1-4-5** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596567**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.411	2.0						0.4414	0	20	
Arsenic	3.284	1.0						3.199	2.60	20	
Barium	79.570	1.0						98.22	21.0	20	R
Beryllium	ND	1.0						0	0	20	
Cadmium	0.408	1.0						0.5611	0	20	
Chromium	26.182	1.0						26.68	1.87	20	
Cobalt	6.591	1.0						8.410	24.2	20	R
Copper	17.657	2.0						20.61	15.4	20	
Lead	13.780	1.0						14.51	5.18	20	
Molybdenum	0.260	1.0						0.3981	0	20	
Nickel	31.523	1.0						34.94	10.3	20	
Selenium	1.193	1.0						1.279	6.97	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	21.605	1.0						23.70	9.24	20	
Zinc	52.684	1.0						64.14	19.6	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-035AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **RW1-4-5** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596568**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	78.226	2.0	125.0	0.4414	62.2	25	106				
Arsenic	100.034	1.0	125.0	3.199	77.5	42	113				
Barium	184.646	1.0	125.0	98.22	69.1	19	140				
Beryllium	102.124	1.0	125.0	0	81.7	50	109				
Cadmium	98.963	1.0	125.0	0.5611	78.7	48	106				
Chromium	121.403	1.0	125.0	26.68	75.8	44	116				
Cobalt	107.515	1.0	125.0	8.410	79.3	47	107				
Copper	129.008	2.0	125.0	20.61	86.7	49	124				
Lead	116.297	1.0	125.0	14.51	81.4	33	120				
Molybdenum	102.799	1.0	125.0	0.3981	81.9	46	111				
Nickel	130.551	1.0	125.0	34.94	76.5	43	111				
Selenium	95.179	1.0	125.0	1.279	75.1	43	104				
Silver	104.149	1.0	125.0	0	83.3	53	114				
Thallium	93.130	1.0	125.0	0	74.5	41	107				
Vanadium	129.275	1.0	125.0	23.70	84.5	48	116				
Zinc	150.610	1.0	125.0	64.14	69.2	24	129				

Sample ID: **102311-035AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **RW1-4-5** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596569**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	76.829	2.0	125.0	0.4414	61.1	25	106	78.23	1.80	20	
Arsenic	99.153	1.0	125.0	3.199	76.8	42	113	100.0	0.884	20	
Barium	185.451	1.0	125.0	98.22	69.8	19	140	184.6	0.435	20	
Beryllium	100.645	1.0	125.0	0	80.5	50	109	102.1	1.46	20	
Cadmium	96.783	1.0	125.0	0.5611	77.0	48	106	98.96	2.23	20	
Chromium	122.491	1.0	125.0	26.68	76.7	44	116	121.4	0.892	20	
Cobalt	105.875	1.0	125.0	8.410	78.0	47	107	107.5	1.54	20	
Copper	129.656	2.0	125.0	20.61	87.2	49	124	129.0	0.501	20	
Lead	118.098	1.0	125.0	14.51	82.9	33	120	116.3	1.54	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-035AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102421**
Client ID: **RW1-4-5** Batch ID: **50511** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596569**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	101.327	1.0	125.0	0.3981	80.7	46	111	102.8	1.44	20	
Nickel	131.575	1.0	125.0	34.94	77.3	43	111	130.6	0.781	20	
Selenium	94.376	1.0	125.0	1.279	74.5	43	104	95.18	0.848	20	
Silver	101.788	1.0	125.0	0	81.4	53	114	104.1	2.29	20	
Thallium	91.360	1.0	125.0	0	73.1	41	107	93.13	1.92	20	
Vanadium	125.187	1.0	125.0	23.70	81.2	48	116	129.3	3.21	20	
Zinc	155.301	1.0	125.0	64.14	72.9	24	129	150.6	3.07	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50513** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **PBS** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596752**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	0.428	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-50513** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **LCSS** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596753**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	45.846	2.0	50.00	0	91.7	80	120				
Arsenic	44.804	1.0	50.00	0	89.6	80	120				
Barium	47.617	1.0	50.00	0	95.2	80	120				
Beryllium	45.684	1.0	50.00	0	91.4	80	120				
Cadmium	46.132	1.0	50.00	0	92.3	80	120				
Chromium	43.366	1.0	50.00	1.518	83.7	80	120				
Cobalt	47.702	1.0	50.00	0.01884	95.4	80	120				
Copper	46.851	2.0	50.00	0	93.7	80	120				
Lead	48.116	1.0	50.00	0	96.2	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50513** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **LCSS** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596753**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	46.639	1.0	50.00	0	93.3	80	120				
Nickel	45.957	1.0	50.00	0.5799	90.8	80	120				
Selenium	42.443	1.0	50.00	0	84.9	80	120				
Silver	44.812	1.0	50.00	0.01914	89.6	80	120				
Thallium	42.024	1.0	50.00	0	84.0	80	120				
Vanadium	47.511	1.0	50.00	0	95.0	80	120				
Zinc	45.637	1.0	50.00	0	91.3	80	120				

Sample ID: **102311-048ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **MBGW2-23.5** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596764**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	3.908	1.0						2.491	44.3	20	R
Barium	59.913	1.0						57.86	3.49	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.373	1.0						0.2954	0	20	
Chromium	18.979	1.0						17.34	9.01	20	
Cobalt	4.015	1.0						4.295	6.75	20	
Copper	12.810	2.0						9.914	25.5	20	R
Lead	2.211	1.0						1.770	22.2	20	R
Molybdenum	0.124	1.0						0.1048	0	20	
Nickel	26.666	1.0						23.74	11.6	20	
Selenium	0.885	1.0						0.6811	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	23.272	1.0						18.02	25.4	20	R
Zinc	27.776	1.0						26.21	5.80	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-048AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **MBGW2-23.5** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596765**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	89.664	2.0	125.0	0	71.7	25	106				
Arsenic	101.443	1.0	125.0	2.491	79.2	42	113				
Barium	176.403	1.0	125.0	57.86	94.8	19	140				
Beryllium	103.649	1.0	125.0	0	82.9	50	109				
Cadmium	101.055	1.0	125.0	0.2954	80.6	48	106				
Chromium	118.437	1.0	125.0	17.34	80.9	44	116				
Cobalt	106.962	1.0	125.0	4.295	82.1	47	107				
Copper	124.060	2.0	125.0	9.914	91.3	49	124				
Lead	109.762	1.0	125.0	1.770	86.4	33	120				
Molybdenum	103.258	1.0	125.0	0.1048	82.5	46	111				
Nickel	127.800	1.0	125.0	23.74	83.2	43	111				
Selenium	97.283	1.0	125.0	0.6811	77.3	43	104				
Silver	104.597	1.0	125.0	0	83.7	53	114				
Thallium	96.968	1.0	125.0	0	77.6	41	107				
Vanadium	126.338	1.0	125.0	18.02	86.7	48	116				
Zinc	126.736	1.0	125.0	26.21	80.4	24	129				

Sample ID: **102311-048AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **MBGW2-23.5** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	85.967	2.0	125.0	0	68.8	25	106	89.66	4.21	20	
Arsenic	97.588	1.0	125.0	2.491	76.1	42	113	101.4	3.87	20	
Barium	159.511	1.0	125.0	57.86	81.3	19	140	176.4	10.1	20	
Beryllium	99.187	1.0	125.0	0	79.3	50	109	103.6	4.40	20	
Cadmium	96.751	1.0	125.0	0.2954	77.2	48	106	101.1	4.35	20	
Chromium	113.527	1.0	125.0	17.34	76.9	44	116	118.4	4.23	20	
Cobalt	102.550	1.0	125.0	4.295	78.6	47	107	107.0	4.21	20	
Copper	117.997	2.0	125.0	9.914	86.5	49	124	124.1	5.01	20	
Lead	104.683	1.0	125.0	1.770	82.3	33	120	109.8	4.74	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-048AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102438**
Client ID: **MBGW2-23.5** Batch ID: **50513** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1596766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	98.884	1.0	125.0	0.1048	79.0	46	111	103.3	4.33	20	
Nickel	125.881	1.0	125.0	23.74	81.7	43	111	127.8	1.51	20	
Selenium	92.456	1.0	125.0	0.6811	73.4	43	104	97.28	5.09	20	
Silver	100.088	1.0	125.0	0	80.1	53	114	104.6	4.41	20	
Thallium	92.829	1.0	125.0	0	74.3	41	107	96.97	4.36	20	
Vanadium	122.985	1.0	125.0	18.02	84.0	48	116	126.3	2.69	20	
Zinc	121.796	1.0	125.0	26.21	76.5	24	129	126.7	3.98	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50514** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **PBS** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595967**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	0.031	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **LCS-50514** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **LCSS** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595968**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	45.047	2.0	50.00	0	90.1	80	120				
Arsenic	42.633	1.0	50.00	0	85.3	80	120				
Barium	46.326	1.0	50.00	0	92.7	80	120				
Beryllium	44.809	1.0	50.00	0	89.6	80	120				
Cadmium	44.141	1.0	50.00	0	88.3	80	120				
Chromium	42.533	1.0	50.00	0	85.1	80	120				
Cobalt	46.004	1.0	50.00	0	92.0	80	120				
Copper	47.548	2.0	50.00	0	95.1	80	120				
Lead	47.826	1.0	50.00	0	95.7	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-50514** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **LCSS** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/1/2008** SeqNo: **1595968**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	46.310	1.0	50.00	0	92.6	80	120				
Nickel	44.563	1.0	50.00	0	89.1	80	120				
Selenium	40.408	1.0	50.00	0	80.8	80	120				
Silver	45.133	1.0	50.00	0.03055	90.2	80	120				
Thallium	41.421	1.0	50.00	0	82.8	80	120				
Vanadium	47.382	1.0	50.00	0	94.8	80	120				
Zinc	43.509	1.0	50.00	0	87.0	80	120				

Sample ID: **102311-056ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **RW4-1-5** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1595975**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	2.884	1.0						3.060	5.90	20	
Barium	79.309	1.0						86.95	9.19	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.482	1.0						0.4698	0	20	
Chromium	16.423	1.0						19.48	17.0	20	
Cobalt	5.839	1.0						6.079	4.03	20	
Copper	12.634	2.0						11.75	7.23	20	
Lead	4.251	1.0						5.113	18.4	20	
Molybdenum	ND	1.0						0	0	20	
Nickel	24.610	1.0						28.80	15.7	20	
Selenium	1.444	1.0						1.215	17.2	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	22.390	1.0						22.02	1.66	20	
Zinc	37.729	1.0						35.21	6.90	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-056AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **RW4-1-5** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1595976**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	74.809	2.0	125.0	0	59.8	25	106				
Arsenic	91.148	1.0	125.0	3.060	70.5	42	113				
Barium	167.848	1.0	125.0	86.95	64.7	19	140				
Beryllium	94.594	1.0	125.0	0	75.7	50	109				
Cadmium	90.038	1.0	125.0	0.4698	71.7	48	106				
Chromium	111.724	1.0	125.0	19.48	73.8	44	116				
Cobalt	98.932	1.0	125.0	6.079	74.3	47	107				
Copper	118.839	2.0	125.0	11.75	85.7	49	124				
Lead	101.019	1.0	125.0	5.113	76.7	33	120				
Molybdenum	95.473	1.0	125.0	0	76.4	46	111				
Nickel	120.008	1.0	125.0	28.80	73.0	43	111				
Selenium	86.397	1.0	125.0	1.215	68.1	43	104				
Silver	98.971	1.0	125.0	0	79.2	53	114				
Thallium	88.524	1.0	125.0	0	70.8	41	107				
Vanadium	118.203	1.0	125.0	22.02	76.9	48	116				
Zinc	117.291	1.0	125.0	35.21	65.7	24	129				

Sample ID: **102311-056AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **RW4-1-5** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1595977**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	75.623	2.0	125.0	0	60.5	25	106	74.81	1.08	20	
Arsenic	92.083	1.0	125.0	3.060	71.2	42	113	91.15	1.02	20	
Barium	178.963	1.0	125.0	86.95	73.6	19	140	167.8	6.41	20	
Beryllium	95.447	1.0	125.0	0	76.4	50	109	94.59	0.898	20	
Cadmium	90.734	1.0	125.0	0.4698	72.2	48	106	90.04	0.769	20	
Chromium	112.226	1.0	125.0	19.48	74.2	44	116	111.7	0.448	20	
Cobalt	100.124	1.0	125.0	6.079	75.2	47	107	98.93	1.20	20	
Copper	120.974	2.0	125.0	11.75	87.4	49	124	118.8	1.78	20	
Lead	102.927	1.0	125.0	5.113	78.3	33	120	101.0	1.87	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-056AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102317**
Client ID: **RW4-1-5** Batch ID: **50514** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/2/2008** SeqNo: **1595977**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	96.281	1.0	125.0	0	77.0	46	111	95.47	0.842	20	
Nickel	126.110	1.0	125.0	28.80	77.9	43	111	120.0	4.96	20	
Selenium	87.504	1.0	125.0	1.215	69.0	43	104	86.40	1.27	20	
Silver	99.863	1.0	125.0	0	79.9	53	114	98.97	0.897	20	
Thallium	89.488	1.0	125.0	0	71.6	41	107	88.52	1.08	20	
Vanadium	120.572	1.0	125.0	22.02	78.8	48	116	118.2	1.98	20	
Zinc	118.222	1.0	125.0	35.21	66.4	24	129	117.3	0.791	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **MB-50521** SampType: **MBLK** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **PBW** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590667**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.0050									
Arsenic	ND	0.010									
Barium	ND	0.0030									
Beryllium	ND	0.0030									
Cadmium	ND	0.0030									
Chromium	ND	0.0030									
Cobalt	ND	0.0030									
Copper	ND	0.0050									
Lead	ND	0.0050									
Molybdenum	ND	0.0050									
Nickel	ND	0.0050									
Selenium	ND	0.010									
Silver	ND	0.0030									
Thallium	ND	0.015									
Vanadium	ND	0.0030									
Zinc	ND	0.010									

Sample ID: **LCS-50521** SampType: **LCS** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **LCSW** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.970	0.0050	1.000	0	97.0	85	115				
Arsenic	0.961	0.010	1.000	0	96.1	85	115				
Barium	0.992	0.0030	1.000	0	99.2	85	115				
Beryllium	0.972	0.0030	1.000	0	97.2	85	115				
Cadmium	0.989	0.0030	1.000	0	98.9	85	115				
Chromium	0.906	0.0030	1.000	0	90.6	85	115				
Cobalt	1.003	0.0030	1.000	0	100	85	115				
Copper	0.955	0.0050	1.000	0	95.5	85	115				
Lead	1.041	0.0050	1.000	0	104	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **LCS-50521** SampType: **LCS** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **LCSW** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	0.966	0.0050	1.000	0	96.6	85	115				
Nickel	0.974	0.0050	1.000	0	97.4	85	115				
Selenium	0.933	0.010	1.000	0	93.3	85	115				
Silver	0.944	0.0030	1.000	0	94.4	85	115				
Thallium	0.924	0.015	1.000	0	92.4	85	115				
Vanadium	0.981	0.0030	1.000	0	98.1	85	115				
Zinc	0.982	0.010	1.000	0	98.2	85	115				

Sample ID: **102311-054DDUP** SampType: **DUP** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590677**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.0050						0	0	20	
Arsenic	ND	0.010						0	0	20	
Barium	2.037	0.0030						1.885	7.75	20	
Beryllium	0.003	0.0030						0.002613	17.1	20	
Cadmium	0.003	0.0030						0.002263	0	20	
Chromium	0.033	0.0030						0.02165	40.4	20	R
Cobalt	0.033	0.0030						0.02714	19.4	20	
Copper	0.051	0.0050						0.04278	17.0	20	
Molybdenum	0.007	0.0050						0.007730	8.82	20	
Nickel	0.089	0.0050						0.06752	27.3	20	R
Selenium	ND	0.010						0	0	20	
Silver	ND	0.0030						0	0	20	
Thallium	ND	0.015						0	0	20	
Vanadium	0.097	0.0030						0.08217	16.3	20	
Zinc	0.133	0.010						0.1096	19.1	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **102311-054DMS** SampType: **MS** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590678**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	2.341	0.0050	2.500	0	93.6	64	130				
Arsenic	2.313	0.010	2.500	0	92.5	66	128				
Barium	4.147	0.0030	2.500	1.885	90.5	60	129				
Beryllium	2.373	0.0030	2.500	0.002613	94.8	77	118				
Cadmium	2.226	0.0030	2.500	0.002263	88.9	72	122				
Chromium	2.224	0.0030	2.500	0.02165	88.1	77	116				
Cobalt	2.209	0.0030	2.500	0.02714	87.3	66	124				
Copper	2.426	0.0050	2.500	0.04278	95.3	70	130				
Molybdenum	2.326	0.0050	2.500	0.007730	92.7	64	129				
Nickel	2.282	0.0050	2.500	0.06752	88.6	63	125				
Selenium	2.339	0.010	2.500	0	93.6	73	124				
Silver	2.364	0.0030	2.500	0	94.5	60	138				
Thallium	2.094	0.015	2.500	0	83.7	66	125				
Vanadium	2.509	0.0030	2.500	0.08217	97.1	79	118				
Zinc	2.333	0.010	2.500	0.1096	88.9	71	120				

Sample ID: **102311-054DMSD** SampType: **MSD** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	2.371	0.0050	2.500	0	94.9	64	130	2.341	1.30	20	
Arsenic	2.347	0.010	2.500	0	93.9	66	128	2.313	1.50	20	
Barium	4.352	0.0030	2.500	1.885	98.7	60	129	4.147	4.81	20	
Beryllium	2.424	0.0030	2.500	0.002613	96.8	77	118	2.373	2.09	20	
Cadmium	2.264	0.0030	2.500	0.002263	90.5	72	122	2.226	1.71	20	
Chromium	2.277	0.0030	2.500	0.02165	90.2	77	116	2.224	2.37	20	
Cobalt	2.256	0.0030	2.500	0.02714	89.2	66	124	2.209	2.12	20	
Copper	2.481	0.0050	2.500	0.04278	97.5	70	130	2.426	2.21	20	
Molybdenum	2.371	0.0050	2.500	0.007730	94.5	64	129	2.326	1.90	20	
Nickel	2.333	0.0050	2.500	0.06752	90.6	63	125	2.282	2.20	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **102311-054DMSD** SampType: **MSD** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102106**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/24/2008** SeqNo: **1590679**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Selenium	2.372	0.010	2.500	0	94.9	73	124	2.339	1.40	20	
Silver	2.420	0.0030	2.500	0	96.8	60	138	2.364	2.35	20	
Thallium	2.127	0.015	2.500	0	85.1	66	125	2.094	1.56	20	
Vanadium	2.575	0.0030	2.500	0.08217	99.7	79	118	2.509	2.59	20	
Zinc	2.383	0.010	2.500	0.1096	90.9	71	120	2.333	2.11	20	

Sample ID: **MB-50521** SampType: **MBLK** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102288**
Client ID: **PBW** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/28/2008** SeqNo: **1594317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.0050									

Sample ID: **LCS-50521** SampType: **LCS** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102288**
Client ID: **LCSW** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/28/2008** SeqNo: **1594318**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.991	0.0050	1.000	0	99.1	85	115				

Sample ID: **102311-054DDUP** SampType: **DUP** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102288**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/28/2008** SeqNo: **1594327**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	411.121	0.50						390.3	5.18	20	
Lead	ND	0.0050						0	0	20	
Magnesium	116.979	0.10						110.9	5.37	20	
Manganese	1.655	0.50						1.404	16.4	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **102311-054DMS** SampType: **MS** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102288**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/28/2008** SeqNo: **1594328**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	403.518	0.50	20.00	390.3	65.8	23	168				
Lead	2.353	0.0050	2.500	0	94.1	71	121				
Magnesium	126.842	0.10	20.00	110.9	79.9	51	145				
Manganese	18.754	0.50	20.00	1.404	86.8	75	112				

Sample ID: **102311-054DMSD** SampType: **MSD** TestCode: **6010_W** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102288**
Client ID: **MBGW2** Batch ID: **50521** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **11/28/2008** SeqNo: **1594329**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	420.905	0.50	20.00	390.3	153	23	168	403.5	4.22	20	
Lead	2.305	0.0050	2.500	0	92.2	71	121	2.353	2.04	20	
Magnesium	131.082	0.10	20.00	110.9	101	51	145	126.8	3.29	20	
Manganese	18.826	0.50	20.00	1.404	87.1	75	112	18.75	0.384	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7470_W

Sample ID: **MB-50520** SampType: **MBLK** TestCode: **7470_W** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102240**
Client ID: **PBW** Batch ID: **50520** TestNo: **EPA 7470A** Analysis Date: **11/24/2008** SeqNo: **1593312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.20									

Sample ID: **LCS-50520** SampType: **LCS** TestCode: **7470_W** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102240**
Client ID: **LCSW** Batch ID: **50520** TestNo: **EPA 7470A** Analysis Date: **11/24/2008** SeqNo: **1593313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	10.358	0.20	10.00	0	104	85	115				

Sample ID: **102311-054D-MS** SampType: **MS** TestCode: **7470_W** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102240**
Client ID: **MBGW2** Batch ID: **50520** TestNo: **EPA 7470A** Analysis Date: **11/24/2008** SeqNo: **1593314**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	11.116	0.20	10.00	0.09231	110	70	130				

Sample ID: **102311-054D-MSD** SampType: **MSD** TestCode: **7470_W** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102240**
Client ID: **MBGW2** Batch ID: **50520** TestNo: **EPA 7470A** Analysis Date: **11/24/2008** SeqNo: **1593315**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	11.257	0.20	10.00	0.09231	112	70	130	11.12	1.26	20	

Sample ID: **102311-054D-DUP** SampType: **DUP** TestCode: **7470_W** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102240**
Client ID: **MBGW2** Batch ID: **50520** TestNo: **EPA 7470A** Analysis Date: **11/24/2008** SeqNo: **1593317**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.183	0.20						0.09231	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50502** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102295**
Client ID: **PBS** Batch ID: **50502** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594460**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50502** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102295**
Client ID: **LCSS** Batch ID: **50502** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594461**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.966	0.10	0.8300	0	116	80	120				

Sample ID: **102311-011A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102295**
Client ID: **RW3-3-5** Batch ID: **50502** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594462**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.981	0.10	0.8300	0.05208	112	70	130				

Sample ID: **102311-011A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102295**
Client ID: **RW3-3-5** Batch ID: **50502** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594463**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.964	0.10	0.8300	0.05208	110	70	130	0.9809	1.77	20	

Sample ID: **102311-011A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102295**
Client ID: **RW3-3-5** Batch ID: **50502** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594465**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.055	0.10						0.05208	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50503** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102296**
Client ID: **PBS** Batch ID: **50503** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594475**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50503** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102296**
Client ID: **LCSS** Batch ID: **50503** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594476**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.943	0.10	0.8300	0	114	80	120				

Sample ID: **102311-024A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102296**
Client ID: **DSGW1-1** Batch ID: **50503** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594477**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.084	0.10	0.8300	0.2251	103	70	130				

Sample ID: **102311-024A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102296**
Client ID: **DSGW1-1** Batch ID: **50503** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594478**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.071	0.10	0.8300	0.2251	102	70	130	1.084	1.22	20	

Sample ID: **102311-024A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102296**
Client ID: **DSGW1-1** Batch ID: **50503** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594480**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.212	0.10						0.2251	5.88	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50504** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102297**
Client ID: **PBS** Batch ID: **50504** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594490**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50504** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102297**
Client ID: **LCSS** Batch ID: **50504** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.959	0.10	0.8300	0	116	80	120				

Sample ID: **102311-035A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102297**
Client ID: **RW1-4-5** Batch ID: **50504** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594492**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.993	0.10	0.8300	0	120	70	130				

Sample ID: **102311-035A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102297**
Client ID: **RW1-4-5** Batch ID: **50504** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594493**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.013	0.10	0.8300	0	122	70	130	0.9926	1.99	20	

Sample ID: **102311-035A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102297**
Client ID: **RW1-4-5** Batch ID: **50504** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594495**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50506** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102299**
Client ID: **PBS** Batch ID: **50506** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594505**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50506** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102299**
Client ID: **LCSS** Batch ID: **50506** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594506**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.960	0.10	0.8300	0	116	80	120				

Sample ID: **102311-048A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102299**
Client ID: **MBGW2-23.5** Batch ID: **50506** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594507**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.121	0.10	0.8300	0.06219	128	70	130				

Sample ID: **102311-048A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102299**
Client ID: **MBGW2-23.5** Batch ID: **50506** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594508**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.041	0.10	0.8300	0.06219	118	70	130	1.121	7.43	20	

Sample ID: **102311-048A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102299**
Client ID: **MBGW2-23.5** Batch ID: **50506** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594510**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.039	0.10						0.06219	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50507** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102300**
Client ID: **PBS** Batch ID: **50507** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594520**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50507** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102300**
Client ID: **LCSS** Batch ID: **50507** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594521**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.951	0.10	0.8300	0	115	80	120				

Sample ID: **102311-056A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102300**
Client ID: **RW4-1-5** Batch ID: **50507** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594522**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.033	0.10	0.8300	0.04871	119	70	130				

Sample ID: **102311-056A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102300**
Client ID: **RW4-1-5** Batch ID: **50507** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594523**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.036	0.10	0.8300	0.04871	119	70	130	1.033	0.294	20	

Sample ID: **102311-056A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/24/2008** RunNo: **102300**
Client ID: **RW4-1-5** Batch ID: **50507** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1594525**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.056	0.10						0.04871	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50594** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102217**
Client ID: **PBS** Batch ID: **50594** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1592832**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50594** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102217**
Client ID: **LCSS** Batch ID: **50594** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1592833**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.806	0.10	0.8300	0	97.1	80	120				

Sample ID: **102374-001A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102217**
Client ID: **ZZZZZZ** Batch ID: **50594** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1592834**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.887	0.10	0.8300	0	107	70	130				

Sample ID: **102374-001A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102217**
Client ID: **ZZZZZZ** Batch ID: **50594** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1592835**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.920	0.10	0.8300	0	111	70	130	0.8866	3.72	20	

Sample ID: **102374-001A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102217**
Client ID: **ZZZZZZ** Batch ID: **50594** TestNo: **EPA 7471A** Analysis Date: **11/25/2008** SeqNo: **1592837**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.050	0.10						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **MB-50597** SampType: **MBLK** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102239**
Client ID: **PBS** Batch ID: **50597** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1593301**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	1.0									
ORO	ND	1.0									
Surr: p-Terphenyl	3.054		2.670		114	30	130				

Sample ID: **LCS-50597** SampType: **LCS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102239**
Client ID: **LCSS** Batch ID: **50597** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1593302**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	25.426	1.0	33.00	0	77.0	35	124				
Surr: p-Terphenyl	2.877		2.670		108	30	130				

Sample ID: **102311-010ADUP** SampType: **DUP** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102239**
Client ID: **RW3-3-1** Batch ID: **50597** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1593309**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	52.287	20						43.03	19.4	20	
ORO	201.060	20						144.5	32.8	20	R
Surr: p-Terphenyl	1.867		2.670		69.9	30	130		0	0	

Sample ID: **102311-010AMS** SampType: **MS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102239**
Client ID: **RW3-3-1** Batch ID: **50597** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1593310**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	71.913	20	33.00	43.03	87.5	12	125				
Surr: p-Terphenyl	1.913		2.670		71.7	30	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **102311-010AMSD** SampType: **MSD** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102239**
Client ID: **RW3-3-1** Batch ID: **50597** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1593311**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	91.587	20	33.00	43.03	147	12	125	71.91	24.1	20	SR
Surr: p-Terphenyl	2.173		2.670		81.4	30	130		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **MB-50606** SampType: **MBLK** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102273**
Client ID: **PBS** Batch ID: **50606** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1594140**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	1.0									
ORO	ND	1.0									
Surr: p-Terphenyl	2.636		2.670		98.7	30	130				

Sample ID: **LCS-50606** SampType: **LCS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102273**
Client ID: **LCSS** Batch ID: **50606** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1594141**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	24.862	1.0	33.00	0	75.3	35	124				
Surr: p-Terphenyl	2.462		2.670		92.2	30	130				

Sample ID: **102311-048AMS** SampType: **MS** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102273**
Client ID: **MBGW2-23.5** Batch ID: **50606** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1594142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	28.954	1.0	33.00	1.076	84.5	12	125				
Surr: p-Terphenyl	3.258		2.670		122	30	130				

Sample ID: **102311-048AMSD** SampType: **MSD** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102273**
Client ID: **MBGW2-23.5** Batch ID: **50606** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1594143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	24.465	1.0	33.00	1.076	70.9	12	125	28.95	16.8	20	
Surr: p-Terphenyl	2.660		2.670		99.6	30	130		0	0	

Sample ID: **102311-048ADUP** SampType: **DUP** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102273**
Client ID: **MBGW2-23.5** Batch ID: **50606** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1594144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_DM LL

Sample ID: **102311-048ADUP** SampType: **DUP** TestCode: **8015_S_DM L** Units: **mg/Kg** Prep Date: **11/25/2008** RunNo: **102273**
Client ID: **MBGW2-23.5** Batch ID: **50606** TestNo: **EPA 8015B(M EPA 3550B** Analysis Date: **11/26/2008** SeqNo: **1594144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	1.566	1.0						1.076	37.1	20	R
ORO	2.189	1.0						1.546	34.4	20	R
Surr: p-Terphenyl	2.596		2.670		97.2	30	130		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081124MB1** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102151**
Client ID: **PBS** Batch ID: **E08VS312** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1591914**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	88.789		100.0		88.8	59	145				

Sample ID: **102311-026ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1591930**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	88.278		100.0		88.3	59	145		0	0	

Sample ID: **102311-026AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1591931**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.870	1.0	5.000	0	77.4	39	135				
Surr: Bromofluorobenzene (FID)	94.110		100.0		94.1	59	145				

Sample ID: **102311-026AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1591932**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.263	1.0	5.000	0	85.3	39	135	3.870	9.66	20	
Surr: Bromofluorobenzene (FID)	95.364		100.0		95.4	59	145		0	0	

Sample ID: **E081124LCS1** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102151**
Client ID: **LCSS** Batch ID: **E08VS312** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1591933**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.422	1.0	5.000	0	88.4	73	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081124LCS1** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102151**
Client ID: **LCSS** Batch ID: **E08VS312** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1591933**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	92.099		100.0		92.1	59	145				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081124MB2** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102169**
Client ID: **PBS** Batch ID: **E08VS313** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592021**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	93.737		100.0		93.7	59	145				

Sample ID: **102311-009ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW5-1-19.5** Batch ID: **E08VS313** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592026**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	99.990		100.0		100	59	145		0	0	

Sample ID: **102311-033AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW1-3-5** Batch ID: **E08VS313** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592032**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	2.294	1.0	5.000	0	45.9	39	135				
Surr: Bromofluorobenzene (FID)	67.835		100.0		67.8	59	145				

Sample ID: **102311-033AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW1-3-5** Batch ID: **E08VS313** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592033**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	2.323	1.0	5.000	0	46.5	39	135	2.294	1.26	20	
Surr: Bromofluorobenzene (FID)	64.728		100.0		64.7	59	145		0	0	

Sample ID: **E081124LCS3** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102169**
Client ID: **LCSS** Batch ID: **E08VS313** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.424	1.0	5.000	0	88.5	73	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081124LCS3** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102169**
Client ID: **LCSS** Batch ID: **E08VS313** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592034**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	90.266		100.0		90.3	59	145				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081124MB3** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102176**
Client ID: **PBS** Batch ID: **E08VS314** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592049**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	87.899		100.0		87.9	59	145				

Sample ID: **102311-035ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592060**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (FID)	94.763		100.0		94.8	59	145		0	0	

Sample ID: **102311-035AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592061**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.836	1.0	5.000	0	76.7	39	135				
Surr: Bromofluorobenzene (FID)	94.784		100.0		94.8	59	145				

Sample ID: **102311-035AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592062**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	3.799	1.0	5.000	0	76.0	39	135	3.836	0.969	20	
Surr: Bromofluorobenzene (FID)	94.200		100.0		94.2	59	145		0	0	

Sample ID: **E081124LCS5** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102176**
Client ID: **LCSS** Batch ID: **E08VS314** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.287	1.0	5.000	0	85.7	73	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081124LCS5** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102176**
Client ID: **LCSS** Batch ID: **E08VS314** TestNo: **EPA 8015B(M** Analysis Date: **11/24/2008** SeqNo: **1592063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	99.053		100.0		99.1	59	145				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **E081125MB2** SampType: **MBLK** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102232**
Client ID: **PBS** Batch ID: **E08VS316** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1593131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0									
Surr: Bromofluorobenzene (FID)	89.674		100.0		89.7	59	145				

Sample ID: **102336-042AMS** SampType: **MS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1593142**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.100	1.0	5.000	0	82.0	39	135				
Surr: Bromofluorobenzene (FID)	87.440		100.0		87.4	59	145				

Sample ID: **102336-042AMSD** SampType: **MSD** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1593143**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.038	1.0	5.000	0	80.8	39	135	4.100	1.52	20	
Surr: Bromofluorobenzene (FID)	91.408		100.0		91.4	59	145		0	0	

Sample ID: **E081125LCS2** SampType: **LCS** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102232**
Client ID: **LCSS** Batch ID: **E08VS316** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1593144**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	4.460	1.0	5.000	0	89.2	73	120				
Surr: Bromofluorobenzene (FID)	100.127		100.0		100	59	145				

Sample ID: **102336-042ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1593146**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	1.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_S_GAS

Sample ID: **102336-042ADUP** SampType: **DUP** TestCode: **8015_S_GAS** Units: **mg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1593146**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	87.094		100.0		87.1	59	145		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_W_DM_LL

Sample ID: **MB-50546** SampType: **MBLK** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102164**
Client ID: **PBW** Batch ID: **50546** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1594184**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	0.050									
ORO	ND	0.050									
Surr: p-Terphenyl	0.059		0.08000		73.8	35	131				

Sample ID: **LCS-50546** SampType: **LCS** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102164**
Client ID: **LCSW** Batch ID: **50546** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1594185**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	0.705	0.050	1.000	0	70.5	42	118				
Surr: p-Terphenyl	0.046		0.08000		57.0	35	131				

Sample ID: **MB-50546MS** SampType: **MS** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102164**
Client ID: **ZZZZZZ** Batch ID: **50546** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1594187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	0.902	0.050	1.000	0	90.2	42	118				
Surr: p-Terphenyl	0.071		0.08000		88.2	35	131				

Sample ID: **MB-50546MSD** SampType: **MSD** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/24/2008** RunNo: **102164**
Client ID: **ZZZZZZ** Batch ID: **50546** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1594198**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	0.872	0.050	1.000	0	87.2	42	118	0.9022	3.44	20	
Surr: p-Terphenyl	0.064		0.08000		80.6	35	131		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_W_DM_LL

Sample ID: **MB-50580** SampType: **MBLK** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/25/2008** RunNo: **102224**
Client ID: **PBW** Batch ID: **50580** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1592981**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	ND	0.050									
ORO	ND	0.050									
Surr: p-Terphenyl	0.071		0.08000		88.9	35	131				

Sample ID: **LCS-50580** SampType: **LCS** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/25/2008** RunNo: **102224**
Client ID: **LCSW** Batch ID: **50580** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1592982**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	0.950	0.050	1.000	0	95.0	42	118				
Surr: p-Terphenyl	0.081		0.08000		101	35	131				

Sample ID: **MB-50580MS** SampType: **MS** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/25/2008** RunNo: **102224**
Client ID: **ZZZZZZ** Batch ID: **50580** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1592983**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	0.916	0.050	1.000	0	91.6	42	118				
Surr: p-Terphenyl	0.085		0.08000		106	35	131				

Sample ID: **MB-50580MSD** SampType: **MSD** TestCode: **8015_W_DM_** Units: **mg/L** Prep Date: **11/25/2008** RunNo: **102224**
Client ID: **ZZZZZZ** Batch ID: **50580** TestNo: **EPA 8015B(M EPA 3510C** Analysis Date: **11/25/2008** SeqNo: **1592984**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
DRO	0.898	0.050	1.000	0	89.8	42	118	0.9162	2.03	20	
Surr: p-Terphenyl	0.081		0.08000		101	35	131		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_W_GP LL

Sample ID: **I081125LCS3** SampType: **LCS** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102219**
Client ID: **LCSW** Batch ID: **I08VW212** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1592861**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.919	0.050	1.000	0	91.9	69	125				
Surr: Bromofluorobenzene (FID)	98.382		100.0		98.4	71	130				

Sample ID: **I081125MB1MS** SampType: **MS** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102219**
Client ID: **ZZZZZZ** Batch ID: **I08VW212** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1592862**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.900	0.050	1.000	0	90.0	69	125				
Surr: Bromofluorobenzene (FID)	97.190		100.0		97.2	71	130				

Sample ID: **I081125MB1** SampType: **MBLK** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102219**
Client ID: **PBW** Batch ID: **I08VW212** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1592863**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	0.050									
Surr: Bromofluorobenzene (FID)	89.888		100.0		89.9	71	130				

Sample ID: **I081125MB1MSD** SampType: **MSD** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102219**
Client ID: **ZZZZZZ** Batch ID: **I08VW212** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1592864**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.929	0.050	1.000	0	92.9	69	125	0.9000	3.17	20	
Surr: Bromofluorobenzene (FID)	106.810		100.0		107	71	130		0	0	

Sample ID: **102311-002BDUP** SampType: **DUP** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102219**
Client ID: **RW8-1** Batch ID: **I08VW212** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1592867**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	0.050						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_W_GP LL

Sample ID: **102311-002BDUP** SampType: **DUP** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102219**
Client ID: **RW8-1** Batch ID: **I08VW212** TestNo: **EPA 8015B(M** Analysis Date: **11/25/2008** SeqNo: **1592867**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	112.304		100.0		112	71	130		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_W_GP LL

Sample ID: **I081126LCS2** SampType: **LCS** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102274**
Client ID: **LCSW** Batch ID: **I08VW213** TestNo: **EPA 8015B(M** Analysis Date: **11/26/2008** SeqNo: **1593996**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	1.025	0.050	1.000	0	103	69	125				
Surr: Bromofluorobenzene (FID)	106.551		100.0		107	71	130				

Sample ID: **I081126MB1MS** SampType: **MS** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8015B(M** Analysis Date: **11/26/2008** SeqNo: **1593997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	0.911	0.050	1.000	0	91.1	69	125				
Surr: Bromofluorobenzene (FID)	104.318		100.0		104	71	130				

Sample ID: **I081126MB1MSD** SampType: **MSD** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8015B(M** Analysis Date: **11/26/2008** SeqNo: **1593998**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	1.008	0.050	1.000	0	101	69	125	0.9110	10.1	20	
Surr: Bromofluorobenzene (FID)	106.989		100.0		107	71	130		0	0	

Sample ID: **I081126MB1** SampType: **MBLK** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102274**
Client ID: **PBW** Batch ID: **I08VW213** TestNo: **EPA 8015B(M** Analysis Date: **11/26/2008** SeqNo: **1593999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	0.050									
Surr: Bromofluorobenzene (FID)	110.446		100.0		110	71	130				

Sample ID: **102363-012ADUP** SampType: **DUP** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8015B(M** Analysis Date: **11/26/2008** SeqNo: **1594001**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
GRO	ND	0.050						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8015_W_GP LL

Sample ID: **102363-012ADUP** SampType: **DUP** TestCode: **8015_W_GP** Units: **mg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8015B(M** Analysis Date: **11/26/2008** SeqNo: **1594001**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (FID)	108.127		100.0		108	71	130		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **E081124MB1** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102151**
Client ID: **PBS** Batch ID: **E08VS312** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1591935**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
Methyl tert-butyl ether	ND	5.0									
o-Xylene	ND	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	91.575		100.0		91.6	65	140				

Sample ID: **102311-026ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1591946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: Bromofluorobenzene (PID)	92.210		100.0		92.2	65	140		0	0	

Sample ID: **102311-026AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1591947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	27.650	5.0	35.75	0	77.3	22	132				
Ethylbenzene	37.567	5.0	49.65	0	75.7	15	133				
m,p-Xylene	152.146	10	199.6	0	76.2	30	118				
Methyl tert-butyl ether	482.869	5.0	578.9	0	83.4	38	136				
o-Xylene	51.761	5.0	78.40	0	66.0	21	119				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **102311-026AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1591947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	136.941	5.0	172.2	0	79.5	36	129				
Xylenes, Total	203.907	15	278.0	0	73.4	70	130				
Surr: Bromofluorobenzene (PID)	99.286		100.0		99.3	65	140				

Sample ID: **102311-026AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102151**
Client ID: **DSGW1-15.5** Batch ID: **E08VS312** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1591948**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	30.394	5.0	35.75	0	85.0	22	132	27.65	9.45	20	
Ethylbenzene	41.735	5.0	49.65	0	84.1	15	133	37.57	10.5	20	
m,p-Xylene	169.257	10	199.6	0	84.8	30	118	152.1	10.6	20	
Methyl tert-butyl ether	527.240	5.0	578.9	0	91.1	38	136	482.9	8.79	20	
o-Xylene	55.719	5.0	78.40	0	71.1	21	119	51.76	7.37	20	
Toluene	151.774	5.0	172.2	0	88.1	36	129	136.9	10.3	20	
Xylenes, Total	224.976	15	278.0	0	80.9	70	130	203.9	9.83	20	
Surr: Bromofluorobenzene (PID)	100.520		100.0		101	65	140		0	20	

Sample ID: **E081124LCS2** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102151**
Client ID: **LCSS** Batch ID: **E08VS312** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1591949**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	104.703	5.0	100.0	0	105	80	121				
Ethylbenzene	104.501	5.0	100.0	0	105	84	120				
m,p-Xylene	212.978	10	200.0	0	106	84	122				
Methyl tert-butyl ether	99.920	5.0	100.0	0	99.9	66	128				
o-Xylene	105.505	5.0	100.0	0	106	84	123				
Toluene	105.957	5.0	100.0	0	106	84	120				
Surr: Bromofluorobenzene (PID)	95.190		100.0		95.2	65	140				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **E081124MB2** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102169**
Client ID: **PBS** Batch ID: **E08VS313** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592035**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
Methyl tert-butyl ether	ND	5.0									
o-Xylene	1.161	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	97.012		100.0		97.0	65	140				

Sample ID: **102311-009ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW5-1-19.5** Batch ID: **E08VS313** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592040**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: Bromofluorobenzene (PID)	104.021		100.0		104	65	140		0	0	

Sample ID: **102311-033AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW1-3-5** Batch ID: **E08VS313** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	20.669	5.0	35.75	0	57.8	22	132				
Ethylbenzene	21.324	5.0	49.65	0	42.9	15	133				
m,p-Xylene	84.544	10	199.6	0	42.4	30	118				
Methyl tert-butyl ether	421.943	5.0	578.9	0	72.9	38	136				
o-Xylene	26.630	5.0	78.40	0	34.0	21	119				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **102311-033AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW1-3-5** Batch ID: **E08VS313** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592046**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	93.612	5.0	172.2	0	54.3	36	129				
Surr: Bromofluorobenzene (PID)	68.687		100.0		68.7	65	140				

Sample ID: **102311-033AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102169**
Client ID: **RW1-3-5** Batch ID: **E08VS313** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592047**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	21.140	5.0	35.75	0	59.1	22	132	20.67	2.25	20	
Ethylbenzene	21.609	5.0	49.65	0	43.5	15	133	21.32	1.33	20	
m,p-Xylene	87.748	10	199.6	0	44.0	30	118	84.54	3.72	20	
Methyl tert-butyl ether	459.583	5.0	578.9	0	79.4	38	136	421.9	8.54	20	
o-Xylene	29.052	5.0	78.40	0	37.1	21	119	26.63	8.70	20	
Toluene	96.001	5.0	172.2	0	55.7	36	129	93.61	2.52	20	
Surr: Bromofluorobenzene (PID)	66.587		100.0		66.6	65	140		0	20	

Sample ID: **E081124LCS4** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102169**
Client ID: **LCSS** Batch ID: **E08VS313** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592048**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	107.720	5.0	100.0	0	108	80	121				
Ethylbenzene	106.051	5.0	100.0	0	106	84	120				
m,p-Xylene	214.867	10	200.0	0	107	84	122				
Methyl tert-butyl ether	103.579	5.0	100.0	0	104	66	128				
o-Xylene	106.489	5.0	100.0	0	106	84	123				
Toluene	107.722	5.0	100.0	0	108	84	120				
Surr: Bromofluorobenzene (PID)	96.205		100.0		96.2	65	140				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **E081124MB3** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102176**
Client ID: **PBS** Batch ID: **E08VS314** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
Methyl tert-butyl ether	ND	5.0									
o-Xylene	ND	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	92.262		100.0		92.3	65	140				

Sample ID: **102311-035ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592075**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Xylenes, Total	ND	15						0	0	20	
Surr: Bromofluorobenzene (PID)	99.266		100.0		99.3	65	140		0	0	

Sample ID: **102311-035AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	27.348	5.0	35.75	0	76.5	22	132				
Ethylbenzene	37.868	5.0	49.65	0	76.3	15	133				
m,p-Xylene	153.397	10	199.6	0	76.9	30	118				
Methyl tert-butyl ether	487.103	5.0	578.9	0	84.1	38	136				
o-Xylene	49.515	5.0	78.40	0	63.2	21	119				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **102311-035AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592076**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	137.329	5.0	172.2	0	79.7	36	129				
Xylenes, Total	202.912	15	278.0	0	73.0	70	130				
Surr: Bromofluorobenzene (PID)	100.647		100.0		101	65	140				

Sample ID: **102311-035AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102176**
Client ID: **RW1-4-5** Batch ID: **E08VS314** TestNo: **EPA 8021B** Analysis Date: **11/24/2008** SeqNo: **1592077**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	26.810	5.0	35.75	0	75.0	22	132	27.35	1.99	20	
Ethylbenzene	37.304	5.0	49.65	0	75.1	15	133	37.87	1.50	20	
m,p-Xylene	151.537	10	199.6	0	75.9	30	118	153.4	1.22	20	
Methyl tert-butyl ether	477.209	5.0	578.9	0	82.4	38	136	487.1	2.05	20	
o-Xylene	49.152	5.0	78.40	0	62.7	21	119	49.52	0.736	20	
Toluene	134.197	5.0	172.2	0	77.9	36	129	137.3	2.31	20	
Xylenes, Total	200.689	15	278.0	0	72.2	70	130	202.9	1.10	20	
Surr: Bromofluorobenzene (PID)	100.070		100.0		100	65	140		0	20	

Sample ID: **E081124LCS6** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102176**
Client ID: **LCSS** Batch ID: **E08VS314** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592078**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	107.118	5.0	100.0	0	107	80	121				
Ethylbenzene	103.865	5.0	100.0	0	104	84	120				
m,p-Xylene	209.823	10	200.0	0	105	84	122				
Methyl tert-butyl ether	109.448	5.0	100.0	0	109	66	128				
o-Xylene	104.375	5.0	100.0	0	104	84	123				
Toluene	106.871	5.0	100.0	0	107	84	120				
Surr: Bromofluorobenzene (PID)	94.065		100.0		94.1	65	140				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **E081125MB2** SampType: **MBLK** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102232**
Client ID: **PBS** Batch ID: **E08VS316** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1593149**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0									
Ethylbenzene	ND	5.0									
m,p-Xylene	ND	10									
Methyl tert-butyl ether	ND	5.0									
o-Xylene	ND	5.0									
Toluene	ND	5.0									
Surr: Bromofluorobenzene (PID)	90.632		100.0		90.6	65	140				

Sample ID: **102336-042ADUP** SampType: **DUP** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1593151**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methyl tert-butyl ether	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
Surr: Bromofluorobenzene (PID)	88.243		100.0		88.2	65	140		0	0	

Sample ID: **102336-042AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1593152**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	22.068	5.0	35.75	0	61.7	22	132				
Ethylbenzene	36.658	5.0	49.65	0	73.8	15	133				
m,p-Xylene	162.300	10	199.6	0	81.3	30	118				
Methyl tert-butyl ether	563.299	5.0	578.9	0	97.3	38	136				
o-Xylene	52.869	5.0	78.40	0	67.4	21	119				
Toluene	115.828	5.0	172.2	0	67.2	36	129				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_S_BTEX

Sample ID: **102336-042AMS** SampType: **MS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1593152**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (PID)	91.200		100.0		91.2	65	140				

Sample ID: **102336-042AMSD** SampType: **MSD** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102232**
Client ID: **ZZZZZZ** Batch ID: **E08VS316** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1593153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	24.879	5.0	35.75	0	69.6	22	132	22.07	12.0	20	
Ethylbenzene	29.662	5.0	49.65	0	59.7	15	133	36.66	21.1	20	R
m,p-Xylene	161.162	10	199.6	0	80.8	30	118	162.3	0.704	20	
Methyl tert-butyl ether	587.694	5.0	578.9	0	102	38	136	563.3	4.24	20	
o-Xylene	53.345	5.0	78.40	0	68.0	21	119	52.87	0.896	20	
Toluene	125.884	5.0	172.2	0	73.1	36	129	115.8	8.32	20	
Surr: Bromofluorobenzene (PID)	95.216		100.0		95.2	65	140		0	20	

Sample ID: **E081125LCS3** SampType: **LCS** TestCode: **8021_S_BTE** Units: **µg/Kg** Prep Date: RunNo: **102232**
Client ID: **LCSS** Batch ID: **E08VS316** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1593154**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	109.136	5.0	100.0	0	109	80	121				
Ethylbenzene	105.160	5.0	100.0	0	105	84	120				
m,p-Xylene	213.333	10	200.0	0	107	84	122				
Methyl tert-butyl ether	103.369	5.0	100.0	0	103	66	128				
o-Xylene	103.833	5.0	100.0	0	104	84	123				
Toluene	109.026	5.0	100.0	0	109	84	120				
Surr: Bromofluorobenzene (PID)	92.016		100.0		92.0	65	140				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_WP_BTEX

Sample ID: **I081125LCS1** SampType: **LCS** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102219**
Client ID: **LCSW** Batch ID: **I08VW212** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592882**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	91.861	0.50	100.0	0	91.9	49	131				
Toluene	95.236	0.50	100.0	0	95.2	64	125				
Ethylbenzene	95.621	0.50	100.0	0	95.6	63	128				
m,p-Xylene	191.103	1.0	200.0	0	95.6	68	122				
o-Xylene	96.270	0.50	100.0	0	96.3	60	124				
Methyl tert-butyl ether	86.182	0.50	100.0	0	86.2	53	141				
Surr: Bromofluorobenzene (PID)	87.888		100.0		87.9	73	127				

Sample ID: **I081125MB1MS** SampType: **MS** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102219**
Client ID: **ZZZZZZ** Batch ID: **I08VW212** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592883**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	6.304	0.50	7.150	0	88.2	49	131				
Toluene	27.901	0.50	34.45	0	81.0	64	125				
Ethylbenzene	9.204	0.50	9.930	0	92.7	63	128				
m,p-Xylene	33.314	1.0	39.91	0	83.5	68	122				
o-Xylene	12.864	0.50	15.68	0	82.0	60	124				
Methyl tert-butyl ether	89.202	0.50	107.0	0	83.4	53	141				
Surr: Bromofluorobenzene (PID)	86.204		100.0		86.2	73	127				

Sample ID: **I081125MB1** SampType: **MBLK** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102219**
Client ID: **PBW** Batch ID: **I08VW212** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592884**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	0.50									
Toluene	ND	0.50									
Ethylbenzene	ND	0.50									
m,p-Xylene	ND	1.0									
o-Xylene	ND	0.50									
Methyl tert-butyl ether	ND	0.50									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_WP_BTEX

Sample ID: **I081125MB1** SampType: **MBLK** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102219**
Client ID: **PBW** Batch ID: **I08VW212** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592884**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (PID)	82.287		100.0		82.3	73	127				

Sample ID: **I081125MB1MSD** SampType: **MSD** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102219**
Client ID: **ZZZZZZ** Batch ID: **I08VW212** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592885**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	5.636	0.50	7.150	0	78.8	49	131	6.304	11.2	20	
Toluene	28.523	0.50	34.45	0	82.8	64	125	27.90	2.20	20	
Ethylbenzene	8.716	0.50	9.930	0	87.8	63	128	9.204	5.45	20	
m,p-Xylene	32.759	1.0	39.91	0	82.1	68	122	33.31	1.68	20	
o-Xylene	12.496	0.50	15.68	0	79.7	60	124	12.86	2.90	20	
Methyl tert-butyl ether	96.063	0.50	107.0	0	89.8	53	141	89.20	7.41	20	
Surr: Bromofluorobenzene (PID)	95.487		100.0		95.5	73	127		0	0	

Sample ID: **102311-002BDUP** SampType: **DUP** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102219**
Client ID: **RW8-1** Batch ID: **I08VW212** TestNo: **EPA 8021B** Analysis Date: **11/25/2008** SeqNo: **1592887**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	0.50						0	0	20	
Toluene	ND	0.50						0	0	20	
Ethylbenzene	ND	0.50						0	0	20	
m,p-Xylene	ND	1.0						0	0	20	
o-Xylene	ND	0.50						0	0	20	
Methyl tert-butyl ether	ND	0.50						0	0	20	
Xylenes, Total	ND	1.0						0	0	20	
Surr: Bromofluorobenzene (PID)	99.752		100.0		99.8	73	127		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_WP_BTEX

Sample ID: **I081126LCS1** SampType: **LCS** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102274**
Client ID: **LCSW** Batch ID: **I08VW213** TestNo: **EPA 8021B** Analysis Date: **11/26/2008** SeqNo: **1594011**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	91.505	0.50	100.0	0	91.5	49	131				
Toluene	94.714	0.50	100.0	0	94.7	64	125				
Ethylbenzene	94.123	0.50	100.0	0	94.1	63	128				
m,p-Xylene	187.861	1.0	200.0	0	93.9	68	122				
o-Xylene	94.428	0.50	100.0	0	94.4	60	124				
Methyl tert-butyl ether	85.834	0.50	100.0	0	85.8	53	141				
Surr: Bromofluorobenzene (PID)	93.414		100.0		93.4	73	127				

Sample ID: **I081126MB1MS** SampType: **MS** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8021B** Analysis Date: **11/26/2008** SeqNo: **1594012**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	5.550	0.50	7.150	0	77.6	49	131				
Toluene	28.005	0.50	34.45	0	81.3	64	125				
Ethylbenzene	8.494	0.50	9.930	0	85.5	63	128				
m,p-Xylene	32.374	1.0	39.91	0	81.1	68	122				
o-Xylene	12.339	0.50	15.68	0	78.7	60	124				
Methyl tert-butyl ether	95.769	0.50	107.0	0	89.5	53	141				
Surr: Bromofluorobenzene (PID)	91.968		100.0		92.0	73	127				

Sample ID: **I081126MB1MSD** SampType: **MSD** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8021B** Analysis Date: **11/26/2008** SeqNo: **1594013**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	5.877	0.50	7.150	0	82.2	49	131	5.550	5.72	20	
Toluene	29.636	0.50	34.45	0	86.0	64	125	28.00	5.66	20	
Ethylbenzene	9.222	0.50	9.930	0	92.9	63	128	8.494	8.22	20	
m,p-Xylene	34.523	1.0	39.91	0	86.5	68	122	32.37	6.42	20	
o-Xylene	13.133	0.50	15.68	0	83.8	60	124	12.34	6.23	20	
Methyl tert-butyl ether	100.108	0.50	107.0	0	93.6	53	141	95.77	4.43	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8021_WP_BTEX

Sample ID: **I081126MB1MSD** SampType: **MSD** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8021B** Analysis Date: **11/26/2008** SeqNo: **1594013**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Bromofluorobenzene (PID)	93.901		100.0		93.9	73	127		0	0	

Sample ID: **I081126MB1** SampType: **MBLK** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102274**
Client ID: **PBW** Batch ID: **I08VW213** TestNo: **EPA 8021B** Analysis Date: **11/26/2008** SeqNo: **1594014**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	0.50									
Toluene	ND	0.50									
Ethylbenzene	ND	0.50									
m,p-Xylene	ND	1.0									
o-Xylene	ND	0.50									
Methyl tert-butyl ether	ND	0.50									
Surr: Bromofluorobenzene (PID)	98.291		100.0		98.3	73	127				

Sample ID: **102363-012ADUP** SampType: **DUP** TestCode: **8021_WP_BT** Units: **µg/L** Prep Date: RunNo: **102274**
Client ID: **ZZZZZZ** Batch ID: **I08VW213** TestNo: **EPA 8021B** Analysis Date: **11/26/2008** SeqNo: **1594016**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	0.50						0	0	20	
Toluene	ND	0.50						0	0	20	
Ethylbenzene	ND	0.50						0	0	20	
m,p-Xylene	ND	1.0						0	0	20	
o-Xylene	ND	0.50						0	0	20	
Methyl tert-butyl ether	ND	0.50						0	0	20	
Surr: Bromofluorobenzene (PID)	97.422		100.0		97.4	73	127		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **KO81121LC1** SampType: **LCS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **LCSS** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590241**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	43.410	5.0	50.00	0	86.8	70	130				
Benzene	90.850	5.0	100.0	0	90.8	70	130				
Chlorobenzene	48.490	5.0	50.00	0	97.0	70	130				
MTBE	50.250	5.0	50.00	0	101	70	130				
Toluene	93.700	5.0	100.0	0	93.7	70	130				
Trichloroethene	45.560	5.0	50.00	0	91.1	70	130				
Surr: 1,2-Dichloroethane-d4	57.380		50.00		115	70	130				
Surr: 4-Bromofluorobenzene	45.010		50.00		90.0	70	130				
Surr: Dibromofluoromethane	53.310		50.00		107	70	130				
Surr: Toluene-d8	49.550		50.00		99.1	70	130				

Sample ID: **KO81121MB2MS** SampType: **MS** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **ZZZZZZ** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590242**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	42.350	5.0	50.00	0	84.7	70	130				
Benzene	92.450	5.0	100.0	0	92.4	70	130				
Chlorobenzene	49.450	5.0	50.00	0	98.9	70	130				
Toluene	96.370	5.0	100.0	0	96.4	70	130				
Trichloroethene	45.000	5.0	50.00	0	90.0	70	130				
Surr: 1,2-Dichloroethane-d4	54.550		50.00		109	70	130				
Surr: 4-Bromofluorobenzene	48.820		50.00		97.6	70	130				
Surr: Dibromofluoromethane	53.220		50.00		106	70	130				
Surr: Toluene-d8	49.410		50.00		98.8	70	130				

Sample ID: **KO81121MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **ZZZZZZ** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590243**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	43.390	5.0	50.00	0	86.8	70	130	42.35	2.43	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **KO81121MB2MSD** SampType: **MSD** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **ZZZZZZ** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590243**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	89.290	5.0	100.0	0	89.3	70	130	92.45	3.48	20	
Chlorobenzene	49.980	5.0	50.00	0	100	70	130	49.45	1.07	20	
Toluene	93.030	5.0	100.0	0	93.0	70	130	96.37	3.53	20	
Trichloroethene	45.800	5.0	50.00	0	91.6	70	130	45.00	1.76	20	
Surr: 1,2-Dichloroethane-d4	52.900		50.00		106	70	130		0	20	
Surr: 4-Bromofluorobenzene	48.210		50.00		96.4	70	130		0	20	
Surr: Dibromofluoromethane	50.180		50.00		100	70	130		0	20	
Surr: Toluene-d8	49.640		50.00		99.3	70	130		0	20	

Sample ID: **K081121MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **PBS** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0									
1,1,1-Trichloroethane	ND	5.0									
1,1,2,2-Tetrachloroethane	ND	5.0									
1,1,2-Trichloroethane	ND	5.0									
1,1-Dichloroethane	ND	5.0									
1,1-Dichloroethene	ND	5.0									
1,1-Dichloropropene	ND	5.0									
1,2,3-Trichlorobenzene	ND	5.0									
1,2,3-Trichloropropane	ND	5.0									
1,2,4-Trichlorobenzene	ND	5.0									
1,2,4-Trimethylbenzene	ND	5.0									
1,2-Dibromo-3-chloropropane	ND	10									
1,2-Dibromoethane	ND	5.0									
1,2-Dichlorobenzene	ND	5.0									
1,2-Dichloroethane	ND	5.0									
1,2-Dichloropropane	ND	5.0									
1,3,5-Trimethylbenzene	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K081121MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **PBS** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,3-Dichlorobenzene	ND	5.0									
1,3-Dichloropropane	ND	5.0									
1,4-Dichlorobenzene	ND	5.0									
2,2-Dichloropropane	ND	5.0									
2-Chlorotoluene	ND	5.0									
4-Chlorotoluene	ND	5.0									
4-Isopropyltoluene	ND	5.0									
Benzene	ND	5.0									
Bromobenzene	ND	5.0									
Bromodichloromethane	ND	5.0									
Bromoform	ND	5.0									
Bromomethane	ND	5.0									
Carbon tetrachloride	ND	5.0									
Chlorobenzene	ND	5.0									
Chloroethane	ND	5.0									
Chloroform	ND	5.0									
Chloromethane	ND	5.0									
cis-1,2-Dichloroethene	ND	5.0									
cis-1,3-Dichloropropene	ND	5.0									
Dibromochloromethane	ND	5.0									
Dibromomethane	ND	5.0									
Dichlorodifluoromethane	ND	5.0									
Ethylbenzene	ND	5.0									
Hexachlorobutadiene	ND	5.0									
Isopropylbenzene	ND	5.0									
m,p-Xylene	ND	10									
Methylene chloride	ND	5.0									
n-Butylbenzene	ND	5.0									
n-Propylbenzene	ND	5.0									
Naphthalene	ND	5.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **K081121MB2** SampType: **MBLK** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **PBS** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590244**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	ND	5.0									
sec-Butylbenzene	ND	5.0									
Styrene	ND	5.0									
tert-Butylbenzene	ND	5.0									
Tetrachloroethene	ND	5.0									
Toluene	ND	5.0									
trans-1,2-Dichloroethene	ND	5.0									
Trichloroethene	ND	5.0									
Trichlorofluoromethane	ND	5.0									
Vinyl chloride	ND	5.0									
Surr: 1,2-Dichloroethane-d4	52.370		50.00		105	70	130				
Surr: 4-Bromofluorobenzene	46.020		50.00		92.0	70	130				
Surr: Dibromofluoromethane	51.360		50.00		103	70	130				
Surr: Toluene-d8	51.130		50.00		102	70	130				

Sample ID: **102268-007ADUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **ZZZZZZ** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,1-Trichloroethane	ND	5.0						0	0	20	
1,1,2,2-Tetrachloroethane	ND	5.0						0	0	20	
1,1,2-Trichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethane	ND	5.0						0	0	20	
1,1-Dichloroethene	ND	5.0						0	0	20	
1,1-Dichloropropene	ND	5.0						0	0	20	
1,2,3-Trichlorobenzene	ND	5.0						0	0	20	
1,2,3-Trichloropropane	ND	5.0						0	0	20	
1,2,4-Trichlorobenzene	ND	5.0						0	0	20	
1,2,4-Trimethylbenzene	ND	5.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **102268-007ADUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **ZZZZZZ** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dibromo-3-chloropropane	ND	10						0	0	20	
1,2-Dibromoethane	ND	5.0						0	0	20	
1,2-Dichlorobenzene	ND	5.0						0	0	20	
1,2-Dichloroethane	ND	5.0						0	0	20	
1,2-Dichloropropane	ND	5.0						0	0	20	
1,3,5-Trimethylbenzene	ND	5.0						0	0	20	
1,3-Dichlorobenzene	ND	5.0						0	0	20	
1,3-Dichloropropane	ND	5.0						0	0	20	
1,4-Dichlorobenzene	ND	5.0						0	0	20	
2,2-Dichloropropane	ND	5.0						0	0	20	
2-Chlorotoluene	ND	5.0						0	0	20	
4-Chlorotoluene	ND	5.0						0	0	20	
4-Isopropyltoluene	ND	5.0						0	0	20	
Benzene	ND	5.0						0	0	20	
Bromobenzene	ND	5.0						0	0	20	
Bromodichloromethane	ND	5.0						0	0	20	
Bromoform	ND	5.0						0	0	20	
Bromomethane	ND	5.0						0	0	20	
Carbon tetrachloride	ND	5.0						0	0	20	
Chlorobenzene	ND	5.0						0	0	20	
Chloroethane	ND	5.0						0	0	20	
Chloroform	ND	5.0						0	0	20	
Chloromethane	ND	5.0						0	0	20	
cis-1,2-Dichloroethene	ND	5.0						0	0	20	
cis-1,3-Dichloropropene	ND	5.0						0	0	20	
Dibromochloromethane	ND	5.0						0	0	20	
Dibromomethane	ND	5.0						0	0	20	
Dichlorodifluoromethane	ND	5.0						0	0	20	
Ethylbenzene	ND	5.0						0	0	20	
Hexachlorobutadiene	ND	5.0						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_S

Sample ID: **102268-007ADUP** SampType: **DUP** TestCode: **8260_S** Units: **µg/Kg** Prep Date: RunNo: **102083**
Client ID: **ZZZZZZ** Batch ID: **K08VS485** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590246**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Isopropylbenzene	ND	5.0						0	0	20	
m,p-Xylene	ND	10						0	0	20	
Methylene chloride	ND	5.0						0	0	20	
n-Butylbenzene	ND	5.0						0	0	20	
n-Propylbenzene	ND	5.0						0	0	20	
Naphthalene	ND	5.0						0	0	20	
o-Xylene	ND	5.0						0	0	20	
sec-Butylbenzene	ND	5.0						0	0	20	
Styrene	ND	5.0						0	0	20	
tert-Butylbenzene	ND	5.0						0	0	20	
Tetrachloroethene	ND	5.0						0	0	20	
Toluene	ND	5.0						0	0	20	
trans-1,2-Dichloroethene	ND	5.0						0	0	20	
Trichloroethene	ND	5.0						0	0	20	
Trichlorofluoromethane	ND	5.0						0	0	20	
Vinyl chloride	ND	5.0						0	0	20	
Surr: 1,2-Dichloroethane-d4	55.590		50.00		111	70	130		0	20	
Surr: 4-Bromofluorobenzene	47.120		50.00		94.2	70	130		0	20	
Surr: Dibromofluoromethane	52.290		50.00		105	70	130		0	20	
Surr: Toluene-d8	50.330		50.00		101	70	130		0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **A081121LCS1** SampType: **LCS** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **LCSW** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590155**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	15.010	0.50	20.00	0	75.0	70	130				
Benzene	36.210	0.50	40.00	0	90.5	70	130				
Chlorobenzene	18.540	0.50	20.00	0	92.7	70	130				
MTBE	18.740	0.50	20.00	0	93.7	70	130				
Toluene	37.510	0.50	40.00	0	93.8	70	130				
Trichloroethene	17.210	0.50	20.00	0	86.1	70	130				
Surr: 1,2-Dichloroethane-d4	27.450		25.00		110	70	130				
Surr: 4-Bromofluorobenzene	25.280		25.00		101	70	130				
Surr: Dibromofluoromethane	28.430		25.00		114	70	130				
Surr: Toluene-d8	28.840		25.00		115	70	130				

Sample ID: **A081121MB2MS** SampType: **MS** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **ZZZZZZ** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590156**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	15.190	0.50	20.00	0	76.0	70	130				
Benzene	36.460	0.50	40.00	0	91.2	70	130				
Chlorobenzene	18.680	0.50	20.00	0	93.4	70	130				
Toluene	37.430	0.50	40.00	0	93.6	70	130				
Trichloroethene	17.410	0.50	20.00	0	87.1	70	130				
Surr: 1,2-Dichloroethane-d4	27.540		25.00		110	70	130				
Surr: 4-Bromofluorobenzene	25.200		25.00		101	70	130				
Surr: Dibromofluoromethane	28.140		25.00		113	70	130				
Surr: Toluene-d8	29.030		25.00		116	70	130				

Sample ID: **A081121MB2MSD** SampType: **MSD** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **ZZZZZZ** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590157**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	16.410	0.50	20.00	0	82.0	70	130	15.19	7.72	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **A081121MB2MSD** SampType: **MSD** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **ZZZZZZ** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590157**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	37.570	0.50	40.00	0	93.9	70	130	36.46	3.00	20	
Chlorobenzene	19.440	0.50	20.00	0	97.2	70	130	18.68	3.99	20	
Toluene	38.690	0.50	40.00	0	96.7	70	130	37.43	3.31	20	
Trichloroethene	17.730	0.50	20.00	0	88.6	70	130	17.41	1.82	20	
Surr: 1,2-Dichloroethane-d4	27.390		25.00		110	70	130		0	20	
Surr: 4-Bromofluorobenzene	25.320		25.00		101	70	130		0	20	
Surr: Dibromofluoromethane	27.820		25.00		111	70	130		0	20	
Surr: Toluene-d8	28.860		25.00		115	70	130		0	20	

Sample ID: **A081121MB2** SampType: **MBLK** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **PBW** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590158**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	0.50									
1,1,1-Trichloroethane	ND	0.50									
1,1,2,2-Tetrachloroethane	ND	0.50									
1,1,2-Trichloroethane	ND	0.50									
1,1-Dichloroethane	ND	0.50									
1,1-Dichloroethene	ND	0.50									
1,1-Dichloropropene	ND	0.50									
1,2,3-Trichlorobenzene	ND	0.50									
1,2,3-Trichloropropane	ND	0.50									
1,2,4-Trichlorobenzene	ND	0.50									
1,2,4-Trimethylbenzene	ND	0.50									
1,2-Dibromo-3-chloropropane	ND	0.50									
1,2-Dibromoethane	ND	0.50									
1,2-Dichlorobenzene	ND	0.50									
1,2-Dichloroethane	ND	0.50									
1,2-Dichloropropane	ND	0.50									
1,3,5-Trimethylbenzene	ND	0.50									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **A081121MB2** SampType: **MBLK** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **PBW** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590158**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,3-Dichlorobenzene	ND	0.50									
1,3-Dichloropropane	ND	0.50									
1,4-Dichlorobenzene	ND	0.50									
2,2-Dichloropropane	ND	0.50									
2-Chlorotoluene	ND	0.50									
4-Chlorotoluene	ND	0.50									
4-Isopropyltoluene	ND	0.50									
Benzene	ND	0.50									
Bromobenzene	ND	0.50									
Bromodichloromethane	ND	0.50									
Bromoform	ND	0.50									
Bromomethane	ND	0.50									
Carbon tetrachloride	ND	0.50									
Chlorobenzene	ND	0.50									
Chloroethane	ND	0.50									
Chloroform	ND	0.50									
Chloromethane	ND	0.50									
cis-1,2-Dichloroethene	ND	0.50									
cis-1,3-Dichloropropene	ND	0.50									
Dibromochloromethane	ND	0.50									
Dibromomethane	ND	0.50									
Dichlorodifluoromethane	ND	0.50									
Ethylbenzene	ND	0.50									
Hexachlorobutadiene	ND	0.50									
Isopropylbenzene	ND	0.50									
m,p-Xylene	ND	1.0									
Methylene chloride	ND	1.0									
n-Butylbenzene	ND	0.50									
n-Propylbenzene	ND	0.50									
Naphthalene	ND	0.50									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **A081121MB2** SampType: **MBLK** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **PBW** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590158**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	ND	0.50									
sec-Butylbenzene	ND	0.50									
Styrene	ND	0.50									
tert-Butylbenzene	ND	0.50									
Tetrachloroethene	ND	0.50									
Toluene	ND	0.50									
trans-1,2-Dichloroethene	ND	0.50									
Trichloroethene	ND	0.50									
Trichlorofluoromethane	ND	0.50									
Vinyl chloride	ND	0.50									
Surr: 1,2-Dichloroethane-d4	25.440		25.00		102	70	130				
Surr: 4-Bromofluorobenzene	23.170		25.00		92.7	70	130				
Surr: Dibromofluoromethane	26.270		25.00		105	70	130				
Surr: Toluene-d8	28.020		25.00		112	70	130				

Sample ID: **102311-018A** SampType: **DUP** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **RW2-1** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590165**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	0.50						0	0	20	
1,1,1-Trichloroethane	ND	0.50						0	0	20	
1,1,2,2-Tetrachloroethane	ND	0.50						0	0	20	
1,1,2-Trichloroethane	ND	0.50						0	0	20	
1,1-Dichloroethane	ND	0.50						0	0	20	
1,1-Dichloroethene	ND	0.50						0	0	20	
1,1-Dichloropropene	ND	0.50						0	0	20	
1,2,3-Trichlorobenzene	ND	0.50						0	0	20	
1,2,3-Trichloropropane	ND	0.50						0	0	20	
1,2,4-Trichlorobenzene	ND	0.50						0	0	20	
1,2,4-Trimethylbenzene	ND	0.50						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **102311-018A** SampType: **DUP** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **RW2-1** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590165**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dibromo-3-chloropropane	ND	0.50						0	0	20	
1,2-Dibromoethane	ND	0.50						0	0	20	
1,2-Dichlorobenzene	ND	0.50						0	0	20	
1,2-Dichloroethane	ND	0.50						0	0	20	
1,2-Dichloropropane	ND	0.50						0	0	20	
1,3,5-Trimethylbenzene	ND	0.50						0	0	20	
1,3-Dichlorobenzene	ND	0.50						0	0	20	
1,3-Dichloropropane	ND	0.50						0	0	20	
1,4-Dichlorobenzene	ND	0.50						0	0	20	
2,2-Dichloropropane	ND	0.50						0	0	20	
2-Butanone	ND	10						0	0	20	
2-Chloroethyl vinyl ether	ND	0.50						0	0	20	
2-Chlorotoluene	ND	0.50						0	0	20	
2-Hexanone	ND	10						0	0	20	
4-Chlorotoluene	ND	0.50						0	0	20	
4-Isopropyltoluene	ND	0.50						0	0	20	
4-Methyl-2-pentanone	ND	10						0	0	20	
Acetone	ND	10						0	0	20	
Acrolein	ND	10						0	0	20	
Acrylonitrile	ND	10						0	0	20	
Benzene	ND	0.50						0	0	20	
Bromobenzene	ND	0.50						0	0	20	
Bromochloromethane	ND	0.50						0	0	20	
Bromodichloromethane	ND	0.50						0	0	20	
Bromoform	ND	0.50						0	0	20	
Bromomethane	ND	0.50						0	0	20	
Carbon disulfide	ND	2.0						0	0	20	
Carbon tetrachloride	ND	0.50						0	0	20	
Chlorobenzene	ND	0.50						0	0	20	
Chloroethane	ND	0.50						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **102311-018A** SampType: **DUP** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **RW2-1** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590165**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloroform	ND	0.50						0	0	20	
Chloromethane	ND	0.50						0.3000	0	20	
cis-1,2-Dichloroethene	ND	0.50						0	0	20	
cis-1,3-Dichloropropene	ND	0.50						0	0	20	
Cyclohexanone	ND	50						0	0	20	
Di-isopropyl ether	ND	0.50						0	0	0	
Dibromochloromethane	ND	0.50						0	0	20	
Dibromomethane	ND	0.50						0	0	20	
Dichlorodifluoromethane	ND	0.50						0	0	20	
Ethyl Acetate	ND	10						0	0	20	
Ethyl Ether	ND	10						0	0	20	
Ethyl tert-butyl ether	ND	0.50						0	0	0	
Ethylbenzene	ND	0.50						0	0	20	
Freon-113	ND	0.50						0	0	20	
Hexachlorobutadiene	ND	0.50						0	0	20	
Iodomethane	ND	0.50						0	0	20	
Isopropylbenzene	ND	0.50						0	0	20	
m,p-Xylene	ND	1.0						0	0	20	
Methylene chloride	ND	1.0						0	0	20	
MTBE	ND	0.50						0	0	20	
n-Butylbenzene	ND	0.50						0	0	20	
n-Propylbenzene	ND	0.50						0	0	20	
Naphthalene	ND	0.50						0	0	20	
o-Xylene	ND	0.50						0	0	20	
sec-Butylbenzene	ND	0.50						0	0	20	
Styrene	ND	0.50						0	0	20	
Tert-amyl methyl ether	ND	0.50						0	0	0	
Tert-Butanol	ND	10						0	0	0	
tert-Butylbenzene	ND	0.50						0	0	20	
Tetrachloroethene	ND	0.50						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_WP_LL

Sample ID: **102311-018A** SampType: **DUP** TestCode: **8260_WP_LL** Units: **µg/L** Prep Date: RunNo: **102079**
Client ID: **RW2-1** Batch ID: **A08VW317** TestNo: **EPA 8260B** Analysis Date: **11/21/2008** SeqNo: **1590165**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	ND	0.50						0	0	20	
trans-1,2-Dichloroethene	ND	0.50						0	0	20	
trans-1,3-Dichloropropene	ND	0.50						0	0	20	
Trichloroethene	ND	0.50						0	0	20	
Trichlorofluoromethane	ND	0.50						0	0	20	
Vinyl acetate	ND	10						0	0	20	
Vinyl chloride	ND	0.50						0	0	20	
Xylenes, Total	ND	1.5						0	0	0	
Surr: 1,2-Dichloroethane-d4	33.510		25.00		134	70	130		0	0	S
Surr: 4-Bromofluorobenzene	23.290		25.00		93.2	70	130		0	0	
Surr: Dibromofluoromethane	27.940		25.00		112	70	130		0	0	
Surr: Toluene-d8	28.450		25.00		114	70	130		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID:	**MB-50577**	SampType:	**MBLK**	TestCode:	**8270_S_FUL**	Units:	**µg/Kg**	Prep Date:	**11/25/2008**	RunNo:	**102197**		
Client ID:	**PBS**	Batch ID:	**50577**	TestNo:	**EPA 8270C**		**EPA 3550B**	Analysis Date:	**11/25/2008**	SeqNo:	**1592489**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	330									
1,2-Dichlorobenzene	ND	330									
1,3-Dichlorobenzene	ND	330									
1,4-Dichlorobenzene	ND	330									
2,4,5-Trichlorophenol	ND	330									
2,4,6-Trichlorophenol	ND	330									
2,4-Dichlorophenol	ND	1600									
2,4-Dimethylphenol	ND	330									
2,4-Dinitrophenol	ND	1600									
2,4-Dinitrotoluene	ND	330									
2,6-Dinitrotoluene	ND	330									
2-Chloronaphthalene	ND	330									
2-Chlorophenol	ND	330									
2-Methylnaphthalene	ND	330									
2-Methylphenol	ND	330									
2-Nitroaniline	ND	1600									
2-Nitrophenol	ND	330									
3,3´-Dichlorobenzidine	ND	660									
3-Nitroaniline	ND	1600									
4,6-Dinitro-2-methylphenol	ND	1600									
4-Bromophenyl-phenylether	ND	330									
4-Chloro-3-methylphenol	ND	660									
4-Chloroaniline	ND	660									
4-Chlorophenyl-phenylether	ND	330									
4-Methylphenol	ND	330									
4-Nitroaniline	ND	1600									
4-Nitrophenol	ND	1600									
Acenaphthene	ND	330									
Acenaphthylene	ND	330									
Anthracene	ND	330									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID:	**MB-50577**	SampType:	**MBLK**	TestCode:	**8270_S_FUL**	Units:	**µg/Kg**	Prep Date:	**11/25/2008**	RunNo:	**102197**		
Client ID:	**PBS**	Batch ID:	**50577**	TestNo:	**EPA 8270C**		**EPA 3550B**	Analysis Date:	**11/25/2008**	SeqNo:	**1592489**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzidine (M)	ND	1600									
Benzo(a)anthracene	ND	330									
Benzo(a)pyrene	ND	330									
Benzo(b)fluoranthene	ND	330									
Benzo(g,h,i)perylene	ND	330									
Benzo(k)fluoranthene	ND	330									
Benzoic acid	ND	1600									
Benzyl alcohol	ND	660									
Bis(2-chloroethoxy)methane	ND	330									
Bis(2-chloroethyl)ether	ND	330									
Bis(2-chloroisopropyl)ether	ND	330									
Bis(2-ethylhexyl)phthalate	ND	330									
Butylbenzylphthalate	ND	330									
Chrysene	ND	330									
Di-n-butylphthalate	ND	330									
Di-n-octylphthalate	ND	330									
Dibenz(a,h)anthracene	ND	330									
Dibenzofuran	ND	330									
Diethylphthalate	ND	330									
Dimethylphthalate	ND	330									
Fluoranthene	ND	330									
Fluorene	ND	330									
Hexachlorobenzene	ND	330									
Hexachlorobutadiene	ND	660									
Hexachlorocyclopentadiene	ND	660									
Hexachloroethane	ND	330									
Indeno(1,2,3-cd)pyrene	ND	330									
Isophorone	ND	330									
N-Nitrosodi-n-propylamine	ND	330									
N-Nitrosodiphenylamine	ND	330									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **MB-50577** SampType: **MBLK** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **PBS** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592489**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	330									
Nitrobenzene	ND	330									
Pentachlorophenol	ND	1600									
Phenanthrene	ND	330									
Phenol	ND	330									
Pyrene	ND	330									
Surr: 1,2-Dichlorobenzene-d4	2962.000		3330		88.9	49	103				
Surr: 2,4,6-Tribromophenol	3083.667		3330		92.6	47	129				
Surr: 2-Chlorophenol-d4	3116.333		3330		93.6	54	109				
Surr: 2-Fluorobiphenyl	2983.667		3330		89.6	59	108				
Surr: 2-Fluorophenol	3087.000		3330		92.7	50	111				
Surr: 4-Terphenyl-d14	3508.333		3330		105	58	135				
Surr: Nitrobenzene-d5	2866.667		3330		86.1	54	115				
Surr: Phenol-d5	3202.000		3330		96.2	58	112				

Sample ID: **LCS-50577** SampType: **LCS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **LCSS** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592490**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	2862.000	330	3330	0	85.9	61	107				
1,4-Dichlorobenzene	2710.667	330	3330	0	81.4	56	100				
2,4-Dinitrotoluene	3198.000	330	3330	0	96.0	72	130				
2-Chlorophenol	2842.000	330	3330	0	85.3	64	105				
4-Chloro-3-methylphenol	3218.667	660	3330	0	96.7	74	125				
4-Nitrophenol	3232.667	1600	3330	0	97.1	77	137				
Acenaphthene	2912.667	330	3330	0	87.5	63	117				
N-Nitrosodi-n-propylamine	3060.333	330	3330	0	91.9	71	121				
Pentachlorophenol	3247.667	1600	3330	0	97.5	69	125				
Phenol	2943.333	330	3330	0	88.4	67	111				
Pyrene	3040.333	330	3330	0	91.3	60	122				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **LCS-50577** SampType: **LCS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **LCSS** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592490**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 1,2-Dichlorobenzene-d4	2736.667		3330		82.2	49	103				
Surr: 2,4,6-Tribromophenol	3269.667		3330		98.2	47	129				
Surr: 2-Chlorophenol-d4	2907.000		3330		87.3	54	109				
Surr: 2-Fluorobiphenyl	2878.333		3330		86.4	59	108				
Surr: 2-Fluorophenol	2831.667		3330		85.0	50	111				
Surr: 4-Terphenyl-d14	3145.333		3330		94.5	58	135				
Surr: Nitrobenzene-d5	2866.667		3330		86.1	54	115				
Surr: Phenol-d5	2880.333		3330		86.5	58	112				

Sample ID: **102311-052AMS** SampType: **MS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **UPRR1-23.5'** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592746**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	2915.000	330	3330	0	87.5	60	105				
1,4-Dichlorobenzene	2693.667	330	3330	0	80.9	50	99				
2,4-Dinitrotoluene	3431.333	330	3330	0	103	70	130				
2-Chlorophenol	2912.333	330	3330	0	87.5	58	107				
4-Chloro-3-methylphenol	3372.667	660	3330	0	101	72	124				
4-Nitrophenol	3508.333	1600	3330	0	105	69	139				
Acenaphthene	3004.333	330	3330	0	90.2	59	118				
N-Nitrosodi-n-propylamine	3161.667	330	3330	0	94.9	61	125				
Pentachlorophenol	3403.333	1600	3330	0	102	56	131				
Phenol	2983.333	330	3330	0	89.6	60	113				
Pyrene	3242.000	330	3330	0	97.4	51	130				
Surr: 1,2-Dichlorobenzene-d4	2733.333		3330		82.1	49	103				
Surr: 2,4,6-Tribromophenol	3473.333		3330		104	47	129				
Surr: 2-Chlorophenol-d4	2982.333		3330		89.6	54	109				
Surr: 2-Fluorobiphenyl	2920.667		3330		87.7	59	108				
Surr: 2-Fluorophenol	2906.667		3330		87.3	50	111				
Surr: 4-Terphenyl-d14	3273.667		3330		98.3	58	135				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **102311-052AMS** SampType: **MS** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **UPRR1-23.5'** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592746**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	2885.000		3330		86.6	54	115				
Surr: Phenol-d5	2975.667		3330		89.4	58	112				

Sample ID: **102311-052AMSD** SampType: **MSD** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **UPRR1-23.5'** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592747**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	2883.667	330	3330	0	86.6	60	105	2915	1.08	20	
1,4-Dichlorobenzene	2703.667	330	3330	0	81.2	50	99	2694	0.371	20	
2,4-Dinitrotoluene	3303.667	330	3330	0	99.2	70	130	3431	3.79	20	
2-Chlorophenol	2888.333	330	3330	0	86.7	58	107	2912	0.827	20	
4-Chloro-3-methylphenol	3263.667	660	3330	0	98.0	72	124	3373	3.28	20	
4-Nitrophenol	3310.333	1600	3330	0	99.4	69	139	3508	5.81	20	
Acenaphthene	2944.000	330	3330	0	88.4	59	118	3004	2.03	20	
N-Nitrosodi-n-propylamine	3082.667	330	3330	0	92.6	61	125	3162	2.53	20	
Pentachlorophenol	3349.000	1600	3330	0	101	56	131	3403	1.61	20	
Phenol	2957.333	330	3330	0	88.8	60	113	2983	0.875	20	
Pyrene	3156.667	330	3330	0	94.8	51	130	3242	2.67	20	
Surr: 1,2-Dichlorobenzene-d4	2754.333		3330		82.7	49	103		0	0	
Surr: 2,4,6-Tribromophenol	3373.000		3330		101	47	129		0	0	
Surr: 2-Chlorophenol-d4	2943.000		3330		88.4	54	109		0	0	
Surr: 2-Fluorobiphenyl	2964.000		3330		89.0	59	108		0	0	
Surr: 2-Fluorophenol	2895.667		3330		87.0	50	111		0	0	
Surr: 4-Terphenyl-d14	3191.333		3330		95.8	58	135		0	0	
Surr: Nitrobenzene-d5	2887.000		3330		86.7	54	115		0	0	
Surr: Phenol-d5	2971.000		3330		89.2	58	112		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **102311-050ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **UPRR1-5** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592812**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	330						0	0	20	
1,2-Dichlorobenzene	ND	330						0	0	20	
1,2-Diphenylhydrazine	ND	330						0	0	20	
1,3-Dichlorobenzene	ND	330						0	0	20	
1,4-Dichlorobenzene	ND	330						0	0	20	
1,4-Dioxane	ND	330						0	0	20	
2,4,5-Trichlorophenol	ND	330						0	0	20	
2,4,6-Trichlorophenol	ND	330						0	0	20	
2,4-Dichlorophenol	ND	1600						0	0	20	
2,4-Dimethylphenol	ND	330						0	0	20	
2,4-Dinitrophenol	ND	1600						0	0	20	
2,4-Dinitrotoluene	ND	330						0	0	20	
2,6-Dinitrotoluene	ND	330						0	0	20	
2-Chloronaphthalene	ND	330						0	0	20	
2-Chlorophenol	ND	330						0	0	20	
2-Methylnaphthalene	ND	330						0	0	20	
2-Methylphenol	ND	330						0	0	20	
2-Nitroaniline	ND	1600						0	0	20	
2-Nitrophenol	ND	330						0	0	20	
3,3´-Dichlorobenzidine	ND	660						0	0	20	
3-Nitroaniline	ND	1600						0	0	20	
4,6-Dinitro-2-methylphenol	ND	1600						0	0	20	
4-Bromophenyl-phenylether	ND	330						0	0	20	
4-Chloro-3-methylphenol	ND	660						0	0	20	
4-Chloroaniline	ND	660						0	0	20	
4-Chlorophenyl-phenylether	ND	330						0	0	20	
3/4-Methylphenol	ND	330						0	0	20	
4-Methylphenol	ND	330						0	0	20	
4-Nitroaniline	ND	1600						0	0	20	
4-Nitrophenol	ND	1600						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **102311-050ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **UPRR1-5** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592812**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	ND	330						0	0	20	
Acenaphthylene	ND	330						0	0	20	
Aniline	ND	330						0	0	20	
Anthracene	ND	330						0	0	20	
Benzidine (M)	ND	1600						0	0	20	
Benzo(a)anthracene	ND	330						0	0	20	
Benzo(a)pyrene	ND	330						0	0	20	
Benzo(b)fluoranthene	ND	330						0	0	20	
Benzo(g,h,i)perylene	ND	330						0	0	20	
Benzo(k)fluoranthene	ND	330						0	0	20	
Benzoic acid	ND	1600						0	0	20	
Benzyl alcohol	ND	660						0	0	20	
Bis(2-chloroethoxy)methane	ND	330						0	0	20	
Bis(2-chloroethyl)ether	ND	330						0	0	20	
Bis(2-chloroisopropyl)ether	ND	330						0	0	20	
Bis(2-ethylhexyl)phthalate	ND	330						0	0	20	
Butylbenzylphthalate	ND	330						0	0	20	
Carbazole	ND	330						0	0	20	
Chrysene	ND	330						0	0	20	
Di-n-butylphthalate	ND	330						0	0	20	
Di-n-octylphthalate	ND	330						0	0	20	
Dibenz(a,h)anthracene	ND	330						0	0	20	
Dibenzofuran	ND	330						0	0	20	
Diethylphthalate	ND	330						0	0	20	
Dimethylphthalate	ND	330						0	0	20	
Fluoranthene	ND	330						0	0	20	
Fluorene	ND	330						0	0	20	
Hexachlorobenzene	ND	330						0	0	20	
Hexachlorobutadiene	ND	660						0	0	20	
Hexachlorocyclopentadiene	ND	660						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_FULL

Sample ID: **102311-050ADUP** SampType: **DUP** TestCode: **8270_S_FUL** Units: **µg/Kg** Prep Date: **11/25/2008** RunNo: **102197**
Client ID: **UPRR1-5** Batch ID: **50577** TestNo: **EPA 8270C** **EPA 3550B** Analysis Date: **11/25/2008** SeqNo: **1592812**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachloroethane	ND	330						0	0	20	
Indeno(1,2,3-cd)pyrene	ND	330						0	0	20	
Isophorone	ND	330						0	0	20	
N-Nitrosodi-n-propylamine	ND	330						0	0	20	
N-Nitrosodimethylamine	ND	330						0	0	20	
N-Nitrosodiphenylamine	ND	330						0	0	20	
Naphthalene	ND	330						0	0	20	
Nitrobenzene	ND	330						0	0	20	
Pentachlorophenol	ND	1600						0	0	20	
Phenanthrene	ND	330						0	0	20	
Phenol	ND	330						0	0	20	
Pyrene	ND	330						0	0	20	
Pyridine	ND	1600						0	0	20	
Surr: 1,2-Dichlorobenzene-d4	2554.333		3330		76.7	49	103		0	0	
Surr: 2,4,6-Tribromophenol	3023.333		3330		90.8	47	129		0	0	
Surr: 2-Chlorophenol-d4	2861.333		3330		85.9	54	109		0	0	
Surr: 2-Fluorobiphenyl	2790.000		3330		83.8	59	108		0	0	
Surr: 2-Fluorophenol	2816.000		3330		84.6	50	111		0	0	
Surr: 4-Terphenyl-d14	3397.667		3330		102	58	135		0	0	
Surr: Nitrobenzene-d5	2541.000		3330		76.3	54	115		0	0	
Surr: Phenol-d5	2937.667		3330		88.2	58	112		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_W_FULL

Sample ID:	**MB-50531**	SampType:	**MBLK**	TestCode:	**8270_W_FUL**	Units:	**µg/L**	Prep Date:	**11/24/2008**	RunNo:	**102115**		
Client ID:	**PBW**	Batch ID:	**50531**	TestNo:	**EPA 8270C**	**EPA 3510C**		Analysis Date:	**11/24/2008**	SeqNo:	**1590913**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	10									
1,2-Dichlorobenzene	ND	10									
1,3-Dichlorobenzene	ND	10									
1,4-Dichlorobenzene	ND	10									
2,4,5-Trichlorophenol	ND	10									
2,4,6-Trichlorophenol	ND	10									
2,4-Dichlorophenol	ND	10									
2,4-Dimethylphenol	ND	10									
2,4-Dinitrophenol	ND	50									
2,4-Dinitrotoluene	ND	10									
2,6-Dinitrotoluene	ND	10									
2-Chloronaphthalene	ND	10									
2-Chlorophenol	ND	10									
2-Methylnaphthalene	ND	10									
2-Methylphenol	ND	10									
2-Nitroaniline	ND	50									
2-Nitrophenol	ND	10									
3,3´-Dichlorobenzidine	ND	20									
3-Nitroaniline	ND	50									
4,6-Dinitro-2-methylphenol	ND	50									
4-Bromophenyl-phenylether	ND	10									
4-Chloro-3-methylphenol	ND	50									
4-Chloroaniline	ND	20									
4-Chlorophenyl-phenylether	ND	10									
4-Methylphenol	ND	10									
4-Nitroaniline	ND	20									
4-Nitrophenol	ND	50									
Acenaphthene	ND	10									
Acenaphthylene	ND	10									
Anthracene	ND	10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_W_FULL

Sample ID:	**MB-50531**	SampType:	**MBLK**	TestCode:	**8270_W_FUL**	Units:	**µg/L**	Prep Date:	**11/24/2008**	RunNo:	**102115**		
Client ID:	**PBW**	Batch ID:	**50531**	TestNo:	**EPA 8270C**	**EPA 3510C**		Analysis Date:	**11/24/2008**	SeqNo:	**1590913**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzidine (M)	ND	50									
Benzo(a)anthracene	ND	10									
Benzo(a)pyrene	ND	10									
Benzo(b)fluoranthene	ND	10									
Benzo(g,h,i)perylene	ND	10									
Benzo(k)fluoranthene	ND	10									
Benzoic acid	ND	50									
Benzyl alcohol	ND	20									
Bis(2-chloroethoxy)methane	ND	10									
Bis(2-chloroethyl)ether	ND	10									
Bis(2-chloroisopropyl)ether	ND	10									
Bis(2-ethylhexyl)phthalate	ND	10									
Butylbenzylphthalate	ND	10									
Chrysene	ND	10									
Di-n-butylphthalate	ND	10									
Di-n-octylphthalate	ND	10									
Dibenz(a,h)anthracene	ND	10									
Dibenzofuran	ND	10									
Diethylphthalate	ND	10									
Dimethylphthalate	ND	10									
Fluoranthene	ND	10									
Fluorene	ND	10									
Hexachlorobenzene	ND	10									
Hexachlorobutadiene	ND	20									
Hexachlorocyclopentadiene	ND	10									
Hexachloroethane	ND	10									
Indeno(1,2,3-cd)pyrene	ND	10									
Isophorone	ND	10									
N-Nitrosodi-n-propylamine	ND	10									
N-Nitrosodiphenylamine	ND	10									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_W_FULL

Sample ID: **MB-50531** SampType: **MBLK** TestCode: **8270_W_FUL** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102115**
Client ID: **PBW** Batch ID: **50531** TestNo: **EPA 8270C** **EPA 3510C** Analysis Date: **11/24/2008** SeqNo: **1590913**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	10									
Nitrobenzene	ND	10									
Pentachlorophenol	ND	50									
Phenanthrene	ND	10									
Phenol	ND	10									
Pyrene	ND	10									
Surr: 1,2-Dichlorobenzene-d4	71.640		100.0		71.6	42	98				
Surr: 2,4,6-Tribromophenol	83.170		100.0		83.2	60	128				
Surr: 2-Chlorophenol-d4	59.880		100.0		59.9	43	102				
Surr: 2-Fluorobiphenyl	82.120		100.0		82.1	50	108				
Surr: 2-Fluorophenol	36.380		100.0		36.4	22	69				
Surr: 4-Terphenyl-d14	95.650		100.0		95.6	66	130				
Surr: Nitrobenzene-d5	77.300		100.0		77.3	47	117				
Surr: Phenol-d5	26.620		100.0		26.6	16	50				

Sample ID: **LCS-50531** SampType: **LCS** TestCode: **8270_W_FUL** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102115**
Client ID: **LCSW** Batch ID: **50531** TestNo: **EPA 8270C** **EPA 3510C** Analysis Date: **11/24/2008** SeqNo: **1590914**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	79.920	10	100.0	0	79.9	54	110				
1,4-Dichlorobenzene	74.390	10	100.0	0	74.4	48	103				
2,4-Dinitrotoluene	87.920	10	100.0	0	87.9	69	136				
2-Chlorophenol	63.350	10	100.0	0	63.4	53	100				
4-Chloro-3-methylphenol	72.900	50	100.0	0	72.9	70	124				
4-Nitrophenol	34.240	50	100.0	0	34.2	32	69				
Acenaphthene	84.230	10	100.0	0	84.2	64	118				
N-Nitrosodi-n-propylamine	84.660	10	100.0	0	84.7	62	130				
Pentachlorophenol	83.470	50	100.0	0	83.5	64	130				
Phenol	28.840	10	100.0	0	28.8	25	50				
Pyrene	85.640	10	100.0	0	85.6	66	123				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_W_FULL

Sample ID: **LCS-50531** SampType: **LCS** TestCode: **8270_W_FUL** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102115**
Client ID: **LCSW** Batch ID: **50531** TestNo: **EPA 8270C** **EPA 3510C** Analysis Date: **11/24/2008** SeqNo: **1590914**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: 1,2-Dichlorobenzene-d4	73.550		100.0		73.6	42	98				
Surr: 2,4,6-Tribromophenol	81.980		100.0		82.0	60	128				
Surr: 2-Chlorophenol-d4	61.690		100.0		61.7	43	102				
Surr: 2-Fluorobiphenyl	81.200		100.0		81.2	50	108				
Surr: 2-Fluorophenol	37.640		100.0		37.6	22	69				
Surr: 4-Terphenyl-d14	81.830		100.0		81.8	66	130				
Surr: Nitrobenzene-d5	78.640		100.0		78.6	47	117				
Surr: Phenol-d5	27.710		100.0		27.7	16	50				

Sample ID: **MB-50531MS** SampType: **MS** TestCode: **8270_W_FUL** Units: **µg/L** Prep Date: **11/24/2008** RunNo: **102115**
Client ID: **ZZZZZZ** Batch ID: **50531** TestNo: **EPA 8270C** **EPA 3510C** Analysis Date: **11/24/2008** SeqNo: **1591163**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	79.440	10	100.0	0	79.4	54	110				
1,4-Dichlorobenzene	71.880	10	100.0	0	71.9	48	103				
2,4-Dinitrotoluene	90.980	10	100.0	0	91.0	69	136				
2-Chlorophenol	63.300	10	100.0	0	63.3	53	100				
4-Chloro-3-methylphenol	78.290	50	100.0	0	78.3	70	124				
4-Nitrophenol	36.340	50	100.0	0	36.3	32	69				
Acenaphthene	87.360	10	100.0	0	87.4	64	118				
N-Nitrosodi-n-propylamine	86.060	10	100.0	0	86.1	62	130				
Pentachlorophenol	84.340	50	100.0	0	84.3	64	130				
Phenol	29.000	10	100.0	0	29.0	25	50				
Pyrene	87.060	10	100.0	0	87.1	66	123				
Surr: 1,2-Dichlorobenzene-d4	69.190		100.0		69.2	42	98				
Surr: 2,4,6-Tribromophenol	83.820		100.0		83.8	60	128				
Surr: 2-Chlorophenol-d4	60.780		100.0		60.8	43	102				
Surr: 2-Fluorobiphenyl	81.210		100.0		81.2	50	108				
Surr: 2-Fluorophenol	36.670		100.0		36.7	22	69				
Surr: 4-Terphenyl-d14	85.990		100.0		86.0	66	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_W_FULL

Sample ID: **MB-50531MS**	SampType: **MS**	TestCode: **8270_W_FUL**	Units: **µg/L**	Prep Date: **11/24/2008**	RunNo: **102115**
Client ID: **ZZZZZZ**	Batch ID: **50531**	TestNo: **EPA 8270C**	**EPA 3510C**	Analysis Date: **11/24/2008**	SeqNo: **1591163**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	76.460		100.0		76.5	47	117				
Surr: Phenol-d5	27.640		100.0		27.6	16	50				

Sample ID: **MB-50531MSD**	SampType: **MSD**	TestCode: **8270_W_FUL**	Units: **µg/L**	Prep Date: **11/24/2008**	RunNo: **102115**
Client ID: **ZZZZZZ**	Batch ID: **50531**	TestNo: **EPA 8270C**	**EPA 3510C**	Analysis Date: **11/24/2008**	SeqNo: **1591164**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	86.990	10	100.0	0	87.0	54	110	79.44	9.07	20	
1,4-Dichlorobenzene	81.930	10	100.0	0	81.9	48	103	71.88	13.1	20	
2,4-Dinitrotoluene	92.660	10	100.0	0	92.7	69	136	90.98	1.83	20	
2-Chlorophenol	72.620	10	100.0	0	72.6	53	100	63.30	13.7	20	
4-Chloro-3-methylphenol	82.240	50	100.0	0	82.2	70	124	78.29	4.92	20	
4-Nitrophenol	39.340	50	100.0	0	39.3	32	69	36.34	0	20	
Acenaphthene	93.090	10	100.0	0	93.1	64	118	87.36	6.35	20	
N-Nitrosodi-n-propylamine	91.780	10	100.0	0	91.8	62	130	86.06	6.43	20	
Pentachlorophenol	89.880	50	100.0	0	89.9	64	130	84.34	6.36	20	
Phenol	33.690	10	100.0	0	33.7	25	50	29.00	15.0	20	
Pyrene	90.690	10	100.0	0	90.7	66	123	87.06	4.08	20	
Surr: 1,2-Dichlorobenzene-d4	77.650		100.0		77.6	42	98		0	0	
Surr: 2,4,6-Tribromophenol	86.080		100.0		86.1	60	128		0	0	
Surr: 2-Chlorophenol-d4	67.810		100.0		67.8	43	102		0	0	
Surr: 2-Fluorobiphenyl	85.460		100.0		85.5	50	108		0	0	
Surr: 2-Fluorophenol	43.320		100.0		43.3	22	69		0	0	
Surr: 4-Terphenyl-d14	85.930		100.0		85.9	66	130		0	0	
Surr: Nitrobenzene-d5	82.850		100.0		82.8	47	117		0	0	
Surr: Phenol-d5	32.000		100.0		32.0	16	50		0	0	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____
Logged By: f Date: 11/21/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☒ FEDEX ☐ Other: GSO

Sample Condition Upon Receipt: 1. CHILLED 3.4 3.6 Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 4. SEALED Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB Improvements Project #: E8449-06-01 Sampler: (Printed Name) Lauren Wincze (Signature)

Relinquished by: (Signature and Printed Name) [signature] Date: 11/20/08 Time: 1630 Received by: (Signature and Printed Name) [signature] Date: 11/21/08 Time: 9:25
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/21/08 (Print Name, Date) [signature] (Signature)

Send Report To: Attn: ____ Co: SAME AS ABOVE Address ____ City ____ State ____ Zip ____

Bill To: Attn: ____ Co: SAME AS ABOVE Address ____ City ____ State ____ Zip ____

Special Instructions/Comments: homogenize soil before taking aliquot. Do not composite.

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal), 8015B (GRO) / BTEX + MTBE, 8015B (DRO) + MO, 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX + MTBE	8015B (DRO) + MO	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	102311-01	RW8-1-1	11/19/08	0920						X		X		X				E	1	T	P	C
	-2	RW8-1		0945			X		X	X		X				X			6	V/L	P	#/N
	-3	RW8-1-5		0930					X			X		X					1	T	P	C
	-4	RW8-1-16		0948					X			X		X					1			
	-5	RW8-2-1		1025						X		X		X								
	-6	RW8-2-5		1030					X			X		X								
	-7	RW5-1-1		1055						X		X		X								
	-8	RW5-1-5		1105					X			X		X								
	-9	RW5-1-19.5		1115			X		X			X		X								
	-10	RW3-3-1		1140						X		X		X								

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 11/20/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☑ FEDEX ☐ Other: _____

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐
2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐
3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Winczo
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB Project #: 8449-06-01 Sampler: (Printed Name) Lauren Winczo (Signature)

Relinquished by: (Signature and Printed Name) [signature] Date: Time: Received by: (Signature and Printed Name) [signature] Date: 11/20/08 Time: 8:25
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Winczo 11/20/08 (Print Name, Date) [signature] (Signature)

Send Report To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Bill To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Special Instructions/Comments: See page 1

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested: 8081A (Pesticides), 8082 (PCB), 8260B (Volatiles), 8270C (BNA), 6010B (Total Metal), 8015B (GRO) / BTEX + HMTBE, 8015B (DRO) + MG, 8021 (BTEX), TITLE 22 / CAM 17 (6010 / 7000)

SPECIFY APPROPRIATE MATRIX: SOIL, WATER, GROUND WATER, WASTEWATER

QA/QC: RTNE ☐ CT ☑ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX + HMTBE	8015B (DRO) + MG	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	102311 - 011	RW3-3-5	11/19/08	1145					X			X		X				E	1	P T	C	
	- 12	RW3-2-1		1215						X				X								
	- 13	RW3-2-5		1220					X			X		X								
	- 14	RW3-2		1230			X		X	X		X			X				6	V/L P	H/N	
	- 15	RW2-1-1		1430						X		X		X						P T	C	
	- 16	RW2-1-5		1435					X			X		X								
	- 17	RW2-1-14		1445					X			X		X								
	- 18	RW2-1		1450			X		X	X		X			X							
	- 19	RW2-2-1		1510						X		X		X					6	V/L P	H/N	
	- 20	RW2-2-5		1520					X			X		X					1	P T	C	

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: f Date: 11/21/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☒ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 4. SEALED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB Improvements Project #: E8449-06-01 Sampler: (Printed Name) Lauren Wincze (Signature)

Relinquished by: (Signature and Printed Name) Date: 11/20/08 Time: 1630 Received by: (Signature and Printed Name) Date: 11/21/08 Time: 8:25
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/20/08 (Print Name, Date)
Signature

Send Report To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Bill To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Special Instructions/Comments: See page 1

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- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8032 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX + MTBE	8015B (DRO) + HV	8021 (BTEX) + HV	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Type	PRESERVATION	REMARKS
	102311-21	RW4-2-1	11/19/08	1315						X		X		X				E	1	P	T	C
	-22	RW4-2-5		1330					X			X										
	-23	RW4-2-19.5'		1345			X		X			X										
	-24	DSGW1-1		1555						X		X										
	-25	DSGW1-5		1600					X			X										
	-26	DSGW1-15.5		1615					X			X										
	-27	DSGW1		1610			X		X	X		X				X			6	V/L	P	H/N
	-28	RW1-1-5	11/20/08	0830					X			X		X					1	P	T	C
	-29	RW1-1-1		0825						X		X										
	-30	RW1-2-1		0840						X		X										

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TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=HCl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 11/21/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☒ FEDEX ☐ Other: _____

Sample Condition Upon Receipt: 1. CHILLED Y☐ N☐ 2. HEADSPACE (VOA) Y☐ N☐ 3. CONTAINER INTACT Y☐ N☐ 4. SEALED Y☐ N☐ 5. # OF SPLS MATCH COC Y☐ N☐ 6. PRESERVED Y☐ N☐

Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I 880 SB
Project #: E8449-06-01
Sampler: (Printed Name) Lauren Wincze (Signature)

Relinquished by: (Signature and Printed Name) [signature] Date: 11/20/08 Time: 1630 Received by: (Signature and Printed Name) [signature] Date: 11/21/08 Time: 8:25
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/20/08 (Print Name, Date)
[signature] (Signature)

Send Report To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Bill To: Attn: _____ Co: SAME AS ABOVE Address _____ City _____ State _____ Zip _____

Special Instructions/Comments: See page 1

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Circle or Add Analysis(es) Requested

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX + MTBE	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	102311-31	RW1-2-5	11/20/08	0845					X			X		X				E	1	P	T	C
	-32	RW1-3-1		0855						X		X										
	-33	RW1-3-5		0900					X			X										
	-34	RW1-4-1		0910						X		X										
	-35	RW1-4-5		0915					X			X										
	-36	RW1-4-15.5		0930	← HOLD							X										
	-37	RW1-4-19.5		0940		X			X	X		X										
	-38	RW1-5-1		0955						X		X										
	-39	RW1-5-5		1005					X			X										
	-40	MBGW1-1		1030						X		X										

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Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

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CHAIN OF CUSTODY RECORD

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Signal Hill, CA 90755
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FOR LABORATORY USE ONLY:

P.O.#: _____

Logged By: _____ Date: 11/21/08

Method of Transport: Client ☐ ATL ☐ CA OverN ■ FEDEX ☐ Other: _____

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Client: GEOCON CONSULTANTS, INC.
Attn: Lauren Wincze
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 SB Project #: E8449-06-01 Sampler: (Printed Name) Lauren Wincze (Signature)

Relinquished by: (Signature and Printed Name) [signature] Date: 11/20/08 Time: 1630 Received by: (Signature and Printed Name) [signature] Date: 11/21/08 Time: 8:25
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:
Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Lauren Wincze 11/20/08
Print Name Date
[signature]
Signature

Send Report To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Bill To:
Attn: _____
Co: SAME AS ABOVE
Address _____
City _____ State _____ Zip _____

Special Instructions/Comments: See page 1.

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Circle or Add Analysis(es) Requested

QA/QC: RTNE ☐ CT ■ SWRCB ☐ Logcode _____ OTHER _____

ITEM	LAB USE ONLY: Batch #: / Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX + MTBE	8015B (DRO) + MO	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	SOIL	WATER	GROUND WATER	WASTEWATER	TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS
	102311-41	MBGW1-5	11/20/08	1035					X			X		X				E	1	P T	C	
	-42	MBGW1-15.5		1045					X			X										
	-43	MBGW1-19.5		1050								X										
	-44	MBGW2-1		1130						X		X										
	-45	MBGW2-5		1135					X			X										
	-46,47	MBGW2-15.5,-19.5		1140	← HOLD																	
	48	MBGW2-23.5		1155		X			X	X		X										
	49	UPRR1-1		1255			X		■	X		X										
	50,51,52	UPRR1-5,-12,-23.5'		1300			X		X			X							3			
	53	UPRR1 MBGW2-1		1310 1210		X	X		X	X		X			X				7	V L P	H N	

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Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

Fernando Diwa

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Friday, November 21, 2008 2:48 PM
To: Fernando Diwa
Cc: Carmen Aguila; Diane Galvan; Bing Roura; Edric Caballero; Puri Romualdo
Subject: RE: I-880 SB IMPROVEMENTS, E8449-06-01

Hi Fernando: Here is clarification regarding the issues stated in your message:

1. Analyze sample RW4-1-1 for CAM17 metals and TPHd/mo
2. Analyze sample RW4-1-5 for CAM17 metals and TPHg/BTEX/MTBE
3. The water sample MBGW2 should be labeled as such, not as "MBGW2-1", that is the ID for the soil sample only; Please analyze the water sample MBGW2 for TPHd/mo, not SVOCs.

Let me know if you need further information. Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

From: Fernando Diwa [mailto:fernando@atlglobal.com]
Sent: Friday, November 21, 2008 1:43 PM
To: wincze@geoconinc.com
Cc: Carmen Aguila; Diane Galvan; Bing Roura; Edric Caballero; Puri Romualdo
Subject: I-880 SB IMPROVEMENTS, E8449-06-01

Hi Lauren,

This is to inform you that we received two (2) extra soil samples labelled as RW4-1-1 and RW4-1-5, collected on 11/19/08 @ 1400 and 1405, respectively. Also, the water samples for MBGW2-1 were labelled as MBGW2. We only received one 32oz liter amber for this sample ID but in your COC you are requesting both 8270 and 8015DM, both requiring a 1-liter of sample.

Please advise.

Regards

Fernando Diwa
Sample Control

Advanced Technology Laboratories
www.atlglobal.com
Tel: (562) 989-4045 ext. 237
Fax: (562) 989-4040

Advanced Technology Laboratories is a full-service environmental lab providing organic and inorganic analyses of soil, water, wastewater, storm water and hazardous waste samples. ATL is accredited by the State of California, NELAP and State of Nevada and holds various SBE, DBE and MBE certificates and a USDA soil permit. ATL takes pride in providing our customers with quick turnaround time, excellent customer service and defensible

data while offering very competitive rates. *Advanced Technology Labs - Your Partner for Quality Environmental Testing*

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December 09, 2008

Lauren Wincze
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102311

RE: I-880 SB Improvements, E8449-06-01

Attention: Lauren Wincze

Enclosed are the results for sample(s) received on November 21, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

CLIENT: Geocon Consultants, Inc.
Project: I-880 SB Improvements, E8449-06-01
Lab Order: 102311

CASE NARRATIVE

Analytical Comments for Method 6010

RPD for Duplicate (DUP) is outside criteria for sample 102311-012ADUP; however, the Laboratory Control Sample (LCS) validated the analytical batch.

Analytical Comments for Method 7471

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for sample 102502-001AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Advanced Technology Laboratories

Date: 12/10/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	102311
Project:	I-880 SB Improvements, E8449-06-01	**Date Received**	11/21/2008 8:25:00 AM
Project No:		**Matrix:**	Soil
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
102311-001A	RW8-1-1	3.4	mg/L	R102692	0.25	1	11/19/2008	12/9/2008
102311-007A	RW5-1-1	2.4	mg/L	R102692	0.25	1	11/19/2008	12/9/2008
102311-021A	RW4-2-1	2.6	mg/L	R102692	0.25	1	11/19/2008	12/9/2008
102311-024A	DSGW1-1	4.1	mg/L	R102692	0.25	1	11/19/2008	12/9/2008
102311-025A	DSGW1-5	0.90	mg/L	R102692	0.25	1	11/19/2008	12/9/2008
102311-049A	UPRR1-1	3.6	mg/L	R102692	0.25	1	11/20/2008	12/9/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *09-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW3-2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 12:15:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-012A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP8_081205B	QC Batch: 50825			PrepDate:	12/4/2008	Analyst: **CL**
Antimony	4.5	2.0		mg/Kg	1	12/5/2008 12:26 PM
Arsenic	8.5	1.0		mg/Kg	1	12/5/2008 12:26 PM
Barium	120	1.0		mg/Kg	1	12/5/2008 12:26 PM
Beryllium	ND	1.0		mg/Kg	1	12/5/2008 12:26 PM
Cadmium	ND	1.0		mg/Kg	1	12/5/2008 12:26 PM
Chromium	31	1.0		mg/Kg	1	12/5/2008 12:26 PM
Cobalt	12	1.0		mg/Kg	1	12/5/2008 12:26 PM
Copper	46	2.0		mg/Kg	1	12/5/2008 12:26 PM
Lead	50	1.0		mg/Kg	1	12/5/2008 12:26 PM
Molybdenum	ND	1.0		mg/Kg	1	12/5/2008 12:26 PM
Nickel	39	1.0		mg/Kg	1	12/5/2008 12:26 PM
Selenium	2.3	1.0		mg/Kg	1	12/5/2008 12:26 PM
Silver	ND	1.0		mg/Kg	1	12/5/2008 12:26 PM
Thallium	ND	1.0		mg/Kg	1	12/5/2008 12:26 PM
Vanadium	46	1.0		mg/Kg	1	12/5/2008 12:26 PM
Zinc	78	1.0		mg/Kg	1	12/5/2008 12:26 PM
MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7471A		
RunID: AA5_081205A	QC Batch: 50826			PrepDate:	12/4/2008	Analyst: **AMT**
Mercury	ND	0.10		mg/Kg	1	12/5/2008 02:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50849** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **PBS** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600754**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50849** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **LCSS** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600755**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.360	0.25	5.000	0	107	80	120				

Sample ID: **102336-051A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600766**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.806	0.25						2.840	1.23	20	

Sample ID: **102336-051A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600767**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.196	0.25	5.000	2.840	87.1	80	120				

Sample ID: **MB-50849B** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **PBS** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600768**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **102401-001A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600775**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0.1814	0	20	

Sample ID: **102401-001A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600776**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.767	0.25	5.000	0.1814	91.7	80	120				

Sample ID: **102401-001A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102692**
Client ID: **ZZZZZZ** Batch ID: **R102692** TestNo: **WET/ EPA 74** Analysis Date: **12/9/2008** SeqNo: **1600777**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.448	0.25	5.000	0.1814	85.3	80	120	4.767	6.94	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-50825** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102590**
Client ID: **PBS** Batch ID: **50825** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/5/2008** SeqNo: **1599111**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	0.018	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	0.017	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Sample ID: **102311-012ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102590**
Client ID: **RW3-2-1** Batch ID: **50825** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/5/2008** SeqNo: **1599113**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	5.329	2.0						4.527	16.3	20	
Arsenic	7.904	1.0						8.479	7.02	20	
Barium	125.389	1.0						124.4	0.804	20	
Beryllium	ND	1.0						0	0	20	
Cadmium	0.668	1.0						0.7312	0	20	
Chromium	30.613	1.0						31.40	2.55	20	
Cobalt	10.925	1.0						11.53	5.40	20	
Copper	44.584	2.0						46.38	3.95	20	
Lead	37.881	1.0						49.55	26.7	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-012ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102590**
Client ID: **RW3-2-1** Batch ID: **50825** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/5/2008** SeqNo: **1599113**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	0.074	1.0						0	0	20	
Nickel	36.062	1.0						38.77	7.23	20	
Selenium	2.158	1.0						2.337	7.99	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	44.961	1.0						46.11	2.52	20	
Zinc	72.887	1.0						77.94	6.70	20	

Sample ID: **102311-012AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102590**
Client ID: **RW3-2-1** Batch ID: **50825** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/5/2008** SeqNo: **1599114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	85.910	2.0	125.0	4.527	65.1	25	106				
Arsenic	108.316	1.0	125.0	8.479	79.9	42	113				
Barium	202.128	1.0	125.0	124.4	62.2	19	140				
Beryllium	105.292	1.0	125.0	0	84.2	50	109				
Cadmium	100.420	1.0	125.0	0.7312	79.8	48	106				
Chromium	120.623	1.0	125.0	31.40	71.4	44	116				
Cobalt	111.176	1.0	125.0	11.53	79.7	47	107				
Copper	164.560	2.0	125.0	46.38	94.5	49	124				
Lead	131.412	1.0	125.0	49.55	65.5	33	120				
Molybdenum	104.891	1.0	125.0	0	83.9	46	111				
Nickel	128.249	1.0	125.0	38.77	71.6	43	111				
Selenium	98.340	1.0	125.0	2.337	76.8	43	104				
Silver	109.428	1.0	125.0	0	87.5	53	114				
Thallium	92.132	1.0	125.0	0	73.7	41	107				
Vanadium	152.027	1.0	125.0	46.11	84.7	48	116				
Zinc	168.864	1.0	125.0	77.94	72.7	24	129				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **102311-012AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102590**
Client ID: **RW3-2-1** Batch ID: **50825** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **12/5/2008** SeqNo: **1599115**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	75.975	2.0	125.0	4.527	57.2	25	106	85.91	12.3	20	
Arsenic	101.660	1.0	125.0	8.479	74.5	42	113	108.3	6.34	20	
Barium	229.679	1.0	125.0	124.4	84.2	19	140	202.1	12.8	20	
Beryllium	97.740	1.0	125.0	0	78.2	50	109	105.3	7.44	20	
Cadmium	93.020	1.0	125.0	0.7312	73.8	48	106	100.4	7.65	20	
Chromium	126.306	1.0	125.0	31.40	75.9	44	116	120.6	4.60	20	
Cobalt	104.609	1.0	125.0	11.53	74.5	47	107	111.2	6.09	20	
Copper	145.124	2.0	125.0	46.38	79.0	49	124	164.6	12.6	20	
Lead	129.325	1.0	125.0	49.55	63.8	33	120	131.4	1.60	20	
Molybdenum	96.483	1.0	125.0	0	77.2	46	111	104.9	8.35	20	
Nickel	132.667	1.0	125.0	38.77	75.1	43	111	128.2	3.39	20	
Selenium	92.127	1.0	125.0	2.337	71.8	43	104	98.34	6.52	20	
Silver	101.827	1.0	125.0	0	81.5	53	114	109.4	7.20	20	
Thallium	84.266	1.0	125.0	0	67.4	41	107	92.13	8.92	20	
Vanadium	136.098	1.0	125.0	46.11	72.0	48	116	152.0	11.1	20	
Zinc	161.030	1.0	125.0	77.94	66.5	24	129	168.9	4.75	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **MB-50826** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102614**
Client ID: **PBS** Batch ID: **50826** TestNo: **EPA 7471A** Analysis Date: **12/5/2008** SeqNo: **1599440**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **LCS-50826** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102614**
Client ID: **LCSS** Batch ID: **50826** TestNo: **EPA 7471A** Analysis Date: **12/5/2008** SeqNo: **1599441**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.923	0.10	0.8300	0	111	80	120				

Sample ID: **102502-001A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102614**
Client ID: **ZZZZZZ** Batch ID: **50826** TestNo: **EPA 7471A** Analysis Date: **12/5/2008** SeqNo: **1599442**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.019	0.10	0.8300	0	123	70	130				

Sample ID: **102502-001A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102614**
Client ID: **ZZZZZZ** Batch ID: **50826** TestNo: **EPA 7471A** Analysis Date: **12/5/2008** SeqNo: **1599443**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	1.091	0.10	0.8300	0	131	70	130	1.019	6.77	20	S

Sample ID: **102502-001A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **12/4/2008** RunNo: **102614**
Client ID: **ZZZZZZ** Batch ID: **50826** TestNo: **EPA 7471A** Analysis Date: **12/5/2008** SeqNo: **1599445**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Wednesday, December 03, 2008 5:00 PM
To: Diane Galvan
Subject: WO#102311

Hi Diane:
Please run the following soil samples for soluble (WET) lead, under standard TAT, for the referenced work order –

RW4-2-1, RW5-1-1, RW8-1-1, UPRR1-1, DSGW1-1, and DSGW1-5

Also, please run soil sample RW3-2-1 for CAM17 metals, standard TAT.

Thanks!
****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Thursday, December 04, 2008 3:58 PM
To: Diane Galvan
Subject: RE: WO#102311

Hi Diane:
All under standard TAT:

Please also analyze soil sample RW2-2-1 for soluble WET lead.

And, please re-homogenize, and reanalyze total and TCLP lead in soil sample SB35-2 in WO#102020.
Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

December 15, 2008

Lauren Vigliotti
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 102311

RE: I-880 SB Improvements, E8449-06-01

Attention: Lauren Vigliotti

Enclosed are the results for sample(s) received on November 21, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *15-Dec-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	RW2-2-1
Lab Order:	102311	**Collection Date:**	11/19/2008 3:10:00 PM
Project:	I-880 SB Improvements, E8449-06-01	**Matrix:**	SOIL
Lab ID:	102311-019A		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
LEAD BY ATOMIC ABSORPTION (STLC)						
			WET/ EPA 7420			
RunID: AA2_081215A	QC Batch: R102913			PrepDate:		Analyst: **AMT**
Lead	2.7	0.25		mg/L	1	12/15/2008 11:21 AM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

CLIENT: Geocon Consultants, Inc.
Work Order: 102311
Project: I-880 SB Improvements, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-50987A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102913**
Client ID: **PBS** Batch ID: **R102913** TestNo: **WET/ EPA 74** Analysis Date: **12/15/2008** SeqNo: **1604847**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-50987** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102913**
Client ID: **LCSS** Batch ID: **R102913** TestNo: **WET/ EPA 74** Analysis Date: **12/15/2008** SeqNo: **1604848**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.188	0.25	5.000	0	104	80	120				

Sample ID: **102311-019A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102913**
Client ID: **RW2-2-1** Batch ID: **R102913** TestNo: **WET/ EPA 74** Analysis Date: **12/15/2008** SeqNo: **1604851**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	2.712	0.25						2.694	0.655	20	

Sample ID: **102311-019A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102913**
Client ID: **RW2-2-1** Batch ID: **R102913** TestNo: **WET/ EPA 74** Analysis Date: **12/15/2008** SeqNo: **1604852**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.215	0.25	5.000	2.694	90.4	80	120				

Sample ID: **102311-019A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: RunNo: **102913**
Client ID: **RW2-2-1** Batch ID: **R102913** TestNo: **WET/ EPA 74** Analysis Date: **12/15/2008** SeqNo: **1604853**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	7.198	0.25	5.000	2.694	90.1	80	120	7.215	0.246	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Lauren Wincze [wincze@geoconinc.com]
Sent: Thursday, December 04, 2008 3:58 PM
To: Diane Galvan
Subject: RE: WO#102311

Hi Diane:
All under standard TAT:

Please also analyze soil sample RW2-2-1 for soluble WET lead.

And, please re-homogenize, and reanalyze total and TCLP lead in soil sample SB35-2 in WO#102020.
Thanks!
-Lauren

****

Lauren Wincze
Senior Staff Geologist
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
925.371.5900-p
925.371.5915-f

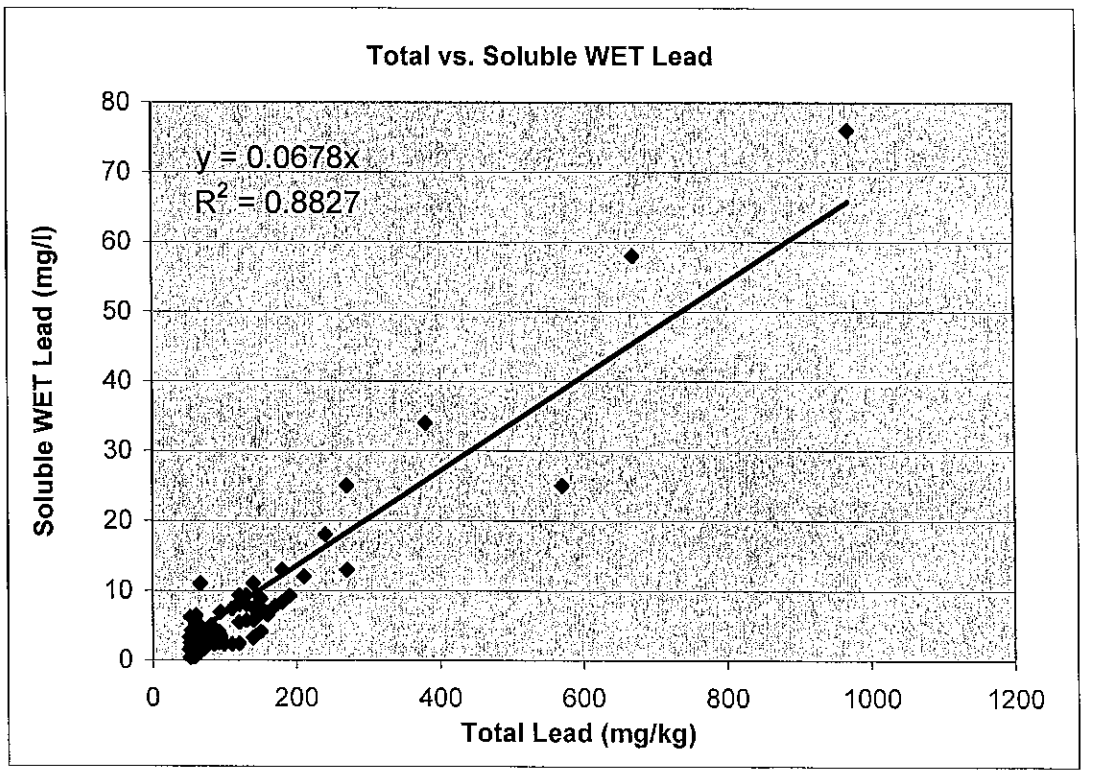
APPENDIX B

APPENDIX B - LEAD REGRESSION

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)
SB-1-2	2	66	11
SB-33-0	0	52	6.2
SB-31-0	0	60	6.4
SB-31-2	2	270	25
SB-52-0	0	380	34
SB-58-0	0	670	58
SB-46-0	0	59	5.1
SB-32-2	2	64	5.1
SB-42-0	0	54	4.3
SB-32-1	1	140	11
SB-67-2	2	970	76
SB-51-0	0	120	9.3
SB-33-1	1	57	4.4
SB-29-1	1	240	18
SB-7-0	0	94	6.9
SB-67-1	1	180	13
SB-6-1	1	130	9.3
SB-41-1	1	61	4.3
SB-67-0	0	67	4.7
SB-10-1	1	120	8.2
SB-1-1	1	110	7.4
SB-3-1	1	120	8.0
SB-12-2	2	55	3.6
SB-8-0	0	51	3.3
SB-68-0	0	81	5.0
SB-59-2	2	130	8.0
SB-38-1	1	69	4.2
SB-68-2	2	81	4.9
SB-4-0	0	66	3.9
SB-58-2	2	150	8.8
SB-44-0	0	57	3.3
SB-11-1	1	56	3.2
SB-30-1	1	210	12
RW8-1-1	1	60	3.4
SB-68-1	1	140	7.5
SB-64-1	1	56	2.9
SB-55-1	1	86	4.3
SB-40-2	2	150	7.5
SB-61-0	0	190	9.2
SB-59-0	0	270	13
SB-4-2	2	52	2.5
SB-54-0	0	180	8.3
SB-40-1	1	150	6.9
SB-5-0	0	170	7.8
SB-55-0	0	79	3.6
SB-3-0	0	120	5.4
SB-63-0	0	120	5.4
SB-60-2	2	150	6.7
SB-55-2	2	92	4.1
SB-60-0	0	570	25
SB-53-0	0	130	5.7
SB-43-2	2	87	3.8
SB-41-0	0	160	6.9
SB-29-0	0	65	2.8
SB-49-0	0	66	2.8
SB-59-1	1	140	5.7

APPENDIX B - LEAD REGRESSION

Sample ID	Sample Depth (ft)	Total Lead (mg/kg)	WET Lead (mg/l)
SB-6-0	0	160	6.5
SB-43-1	1	79	3.1
UPRR1-1	1	93	3.6
SB-12-1	1	94	3.5
SB-7-1	1	65	2.4
SB-40-0	0	83	2.8
SB-65-0	0	52	1.7
SB-53-1	1	94	3.0
SB-15-0	0	51	1.5
RW4-2-1	1	89	2.6
SB-56-2	2	55	1.6
DSGW1-1	1	150	4.1
SB-1-0	0	92	2.5
SB-66-2	2	85	2.3
SB-54-2	2	99	2.3
SB-62-0	0	140	3.2
SB-10-0	0	71	1.6
SB-14-1	1	110	2.3
RW5-1-1	1	120	2.4
SB-7-2	2	63	1.1
DSGW1-5	5	55	0.90
SB-50-0	0	56	0.5
RW2-2-1	1	71	2.7
SB-45-2	2	59	0.5
SB-17-1	1	52	0.36
Not Included			
SB-35-2	2	2,000	45



APPENDIX B

TOTAL LEAD RESULTS OUTLIER TESTS

Outlier Tests for Selected Variables

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1

Rosner's Outlier Test for All 0

Number of data: 59
Number of suspected outliers: 1

#	Mean	sd	Potential outlier	Test value	Critical value (5%)	Critical value (1%)
1	88.66	118.75	670	4.9	3.193	3.552

For 5% Significance Level, there is 1 Potential Outlier
Therefore, Observation 670 is a Potential Statistical Outlier

For 1% Significance Level, there is 1 Potential Outlier
Therefore, Observation 670 is a Potential Statistical Outlier

Rosner's Outlier Test for All 1

Number of data: 59
Number of suspected outliers: 1

#	Mean	sd	Potential outlier	Test value	Critical value (5%)	Critical value (1%)
1	58.39	53.42	240	3.4	3.193	3.552

For 5% Significance Level, there is 1 Potential Outlier
Therefore, Observation 240 is a Potential Statistical Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for All 2

Number of data: 59
Number of suspected outliers: 1

#	Mean	sd	Potential outlier	Test value	Critical value (5%)	Critical value (1%)
1	94.22	281.26	2000	6.78	3.193	3.552

For 5% Significance Level, there is 1 Potential Outlier
Therefore, Observation 2000 is a Potential Statistical Outlier

For 1% Significance Level, there is 1 Potential Outlier
Therefore, Observation 2000 is a Potential Statistical Outlier

APPENDIX B

TOTAL LEAD RESULTS OUTLIER TESTS

Outlier Tests for Selected Variables

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1

Rosner's Outlier Test for All data

Number of data: 224
Number of suspected outliers: 1

#	Mean	sd	Potential outlier	Test value	Critical value (5%)	Critical value (1%)
1	69.06	162.27	2000	11.9	3.63776	4.0088

For 5% Significance Level, there is 1 Potential Outlier
Therefore, Observation 2000 is a Potential Statistical Outlier

For 1% Significance Level, there is 1 Potential Outlier
Therefore, Observation 2000 is a Potential Statistical Outlier

APPENDIX B - TOTAL LEAD UCLs

Nonparametric UCL Statistics for Full Data Sets

User Selected Options		
From File	WorkSheet.wst	
Full Precision	OFF	
Confidence Coefficient	90%	95%
Number of Bootstrap Operations	2000	

A-0

Number of Valid Observations	7
Number of Distinct Observations	7
Minimum	43
Maximum	170
Mean	106.4
Median	94
SD	46.75
Variance	2186
Coefficient of Variation	0.439
Skewness	0.199
Mean of log data	4.573
SD of log data	0.487
90% Standard Bootstrap UCL	126.9
95% Standard Bootstrap UCL	132.7

A-1

Number of Valid Observations	7
Number of Distinct Observations	7
Minimum	20
Maximum	130
Mean	75.71
Median	65
SD	43.8
Variance	1918
Coefficient of Variation	0.578
Skewness	0.11
Mean of log data	4.146
SD of log data	0.693
90% Standard Bootstrap UCL	95.38
95% Standard Bootstrap UCL	101.1

A-2

Number of Valid Observations	7
Number of Distinct Observations	7
Minimum	17
Maximum	66
Mean	43.14
Median	49
SD	19.64
Variance	385.8
Coefficient of Variation	0.455
Skewness	-0.312
Mean of log data	3.651
SD of log data	0.546
90% Standard Bootstrap UCL	51.92
95% Standard Bootstrap UCL	54.65

B-0

Number of Valid Observations	11
Number of Distinct Observations	8
Minimum	22
Maximum	71
Mean	38.36
Median	37
SD	14.58
Variance	212.7
Coefficient of Variation	0.38
Skewness	1.123
Mean of log data	3.587
SD of log data	0.358
90% Standard Bootstrap UCL	43.76
95% Standard Bootstrap UCL	45.35

B-1

Number of Valid Observations	13
Number of Distinct Observations	13
Minimum	0.5
Maximum	120
Mean	51.96
Median	42
SD	36.31
Variance	1318
Coefficient of Variation	0.699
Skewness	0.718
Mean of log data	3.499
SD of log data	1.408
90% Standard Bootstrap UCL	64.08
95% Standard Bootstrap UCL	67.96

B-2

Number of Valid Observations	11
Number of Distinct Observations	11
Minimum	7.4
Maximum	55
Mean	34.22
Median	40
SD	14.89
Variance	221.8
Coefficient of Variation	0.435
Skewness	-0.402
Mean of log data	3.407
SD of log data	0.589
90% Standard Bootstrap UCL	39.66
95% Standard Bootstrap UCL	41.22

C-0

Number of Valid Observations	7
Number of Distinct Observations	6
Minimum	17
Maximum	65
Mean	37.14
Median	28
SD	21.08

Variance	444.5
Coefficient of Variation	0.568
Skewness	0.397
Mean of log data	3.468
SD of log data	0.591
90% Standard Bootstrap UCL	46.58
95% Standard Bootstrap UCL	49.55

C-1

Number of Valid Observations	8
Number of Distinct Observations	8
Minimum	20
Maximum	240
Mean	105.4
Median	88.5
SD	86.27
Variance	7442
Coefficient of Variation	0.819
Skewness	0.583
Mean of log data	4.282
SD of log data	0.985
90% Standard Bootstrap UCL	142.4
95% Standard Bootstrap UCL	152.3

C-2

Number of Valid Observations	7
Number of Distinct Observations	7
Minimum	6.2
Maximum	270
Mean	64.03
Median	29
SD	92.67
Variance	8588
Coefficient of Variation	1.447
Skewness	2.436
Mean of log data	3.504
SD of log data	1.186
90% Standard Bootstrap UCL	105.6
95% Standard Bootstrap UCL	119.1

D-0

Number of Valid Observations	16
Number of Distinct Observations	15
Minimum	2.5
Maximum	160
Mean	51.91
Median	43
SD	34.08
Variance	1161
Coefficient of Variation	0.657
Skewness	2.196
Mean of log data	3.718
SD of log data	0.858
90% Standard Bootstrap UCL	62.59
95% Standard Bootstrap UCL	65.3

D-1

Number of Valid Observations	28
Number of Distinct Observations	26
Minimum	0.5
Maximum	150
Mean	38.44
Median	25
SD	40.41
Variance	1633
Coefficient of Variation	1.051
Skewness	1.614
Mean of log data	3.006
SD of log data	1.341
90% Standard Bootstrap UCL	48.06
95% Standard Bootstrap UCL	50.66

D-2

Number of Valid Observations	16
Number of Distinct Observations	14
Minimum	2.5
Maximum	2000
Mean	155.8
Median	22
SD	493.4
Variance	243417
Coefficient of Variation	3.167
Skewness	3.957
Mean of log data	3.03
SD of log data	1.796
90% Standard Bootstrap UCL	310.2
95% Standard Bootstrap UCL	356.1

E-0

Number of Valid Observations	18
Number of Distinct Observations	17
Minimum	6.4
Maximum	670
Mean	165.2
Median	100.5
SD	191.1
Variance	36535
Coefficient of Variation	1.157
Skewness	1.776
Mean of log data	4.47
SD of log data	1.265
90% Standard Bootstrap UCL	221.2
95% Standard Bootstrap UCL	238.2

E-1

Number of Valid Observations	20
Number of Distinct Observations	18
Minimum	6.1
Maximum	180
Mean	50.13
Median	34.5

SD	51.11
Variance	2612
Coefficient of Variation	1.019
Skewness	1.436
Mean of log data	3.431
SD of log data	1.031
90% Standard Bootstrap UCL	64.14
95% Standard Bootstrap UCL	68.45

E-2

Number of Valid Observations	18
Number of Distinct Observations	17
Minimum	5.3
Maximum	970
Mean	107.8
Median	48.5
SD	221.2
Variance	48925
Coefficient of Variation	2.052
Skewness	3.873
Mean of log data	3.643
SD of log data	1.448
90% Standard Bootstrap UCL	172
95% Standard Bootstrap UCL	191.6

All 0

Number of Valid Observations	59
Number of Distinct Observations	44
Minimum	2.5
Maximum	670
Mean	88.66
Median	52
SD	119.8
Variance	14346
Coefficient of Variation	1.351
Skewness	3.472
Mean of log data	3.995
SD of log data	0.969
90% Standard Bootstrap UCL	108.4
95% Standard Bootstrap UCL	114.1

All-1

Number of Valid Observations	76
Number of Distinct Observations	53
Minimum	0.5
Maximum	240
Mean	54.31
Median	36.5
SD	52.24
Variance	2729
Coefficient of Variation	0.962
Skewness	1.461
Mean of log data	3.441
SD of log data	1.247
90% Standard Bootstrap UCL	62
95% Standard Bootstrap UCL	64.28

All 2

Number of Valid Observations	59
Number of Distinct Observations	49
Minimum	2.5
Maximum	2000
Mean	94.22
Median	36
SD	283.7
Variance	80469
Coefficient of Variation	3.011
Skewness	5.928
Mean of log data	3.417
SD of log data	1.323
90% Standard Bootstrap UCL	142.5
95% Standard Bootstrap UCL	153.7

D-2-no outlier

Number of Valid Observations	15
Number of Distinct Observations	13
Minimum	2.5
Maximum	150
Mean	32.83
Median	14
SD	40.84
Variance	1668
Coefficient of Variation	1.244
Skewness	1.965
Mean of log data	2.725
SD of log data	1.365
90% Standard Bootstrap UCL	45.81
95% Standard Bootstrap UCL	49.4

Nonparametric UCL Statistics for Full Data Sets
User Selected Options

From File	WorkSheet.wst	
Full Precision	OFF	
Confidence Coefficient	90%	95
Number of Bootstrap Operations	2000	

As

Number of Valid Observations	86
Number of Distinct Observations	41
Minimum	0.5
Maximum	11
Mean	4.444
Median	4
SD	1.957
Variance	3.828
Coefficient of Variation	0.44
Skewness	1.656
Mean of log data	1.405
SD of log data	0.433
90% Standard Bootstrap UCL	4.708
95% Standard Bootstrap UCL	4.798

V

Number of Valid Observations	86
Number of Distinct Observations	32
Minimum	18
Maximum	93
Mean	34.06
Median	33
SD	10.62
Variance	112.7
Coefficient of Variation	0.312
Skewness	2.484
Mean of log data	3.49
SD of log data	0.268
90% Standard Bootstrap UCL	35.54
95% Standard Bootstrap UCL	35.9

Hg

Number of Valid Observations	86
Number of Distinct Observations	24
Minimum	0.05
Maximum	20
Mean	0.378
Median	0.1
SD	2.15
Variance	4.623
Coefficient of Variation	5.686
Skewness	9.155
Mean of log data	-2.249
SD of log data	0.97
90% Standard Bootstrap UCL	0.673
95% Standard Bootstrap UCL	0.757

APPENDIX B - TPH UCLs

Nonparametric UCL Statistics for Full Data Sets

User Selected Options		
From File	WorkSheet.wst	
Full Precision	OFF	
Confidence Coefficient	0.90	0.95
Number of Bootstrap Operations	2000.00	

TPHd

Number of Valid Observations	19.00
Number of Distinct Observations	18.00
Minimum	1.10
Maximum	1100.00
Mean	167.50
Median	24.00
SD	341.80
Variance	116807.00
Coefficient of Variation	2.04
Skewness	2.15
Mean of log data	3.29
SD of log data	2.01
90% Standard Bootstrap UCL	266.50
95% Standard Bootstrap UCL	293.70

TPHmo

Number of Valid Observations	19.00
Number of Distinct Observations	18.00
Minimum	1.40
Maximum	6700.00
Mean	833.70
Median	120.00
SD	1832.00
Variance	3355624.00
Coefficient of Variation	2.20
Skewness	2.50
Mean of log data	4.49
SD of log data	2.38
90% Standard Bootstrap UCL	1360.00
95% Standard Bootstrap UCL	1511.00

ASBESTOS AND LEAD-CONTAINING PAINT SURVEY

HIGHWAY 880 SOUTHBOUND IMPROVEMENTS PROJECT OAKLAND AND SAN LEANDRO, CALIFORNIA

PREPARED FOR:
RAJAPPAN & MEYER CONSULTING ENGINEERS, INC.
1038 LEIGH AVENUE, SUITE 100
SAN JOSE, CALIFORNIA

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA

GEOCON

DECEMBER 2008

GEOCON PROJECT NO. E8449-06-01

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. E8449-06-01
December 16, 2008

Bala Rajappan
Rajappan & Meyer Consulting Engineers, Inc.
1038 Leigh Avenue, Suite 100
San Jose, California 95126

Subject: ASBESTOS AND LEAD-CONTAINING PAINT SURVEY
HIGHWAY 880 SOUTHBOUND IMPROVEMENTS PROJECT
HEGENBERGER ROAD TO SOUTH OF MARINA BOULEVARD
ALAMEDA COUNTY, CALIFORNIA

Dear Mr. Rajappan:

We have performed an asbestos and lead-containing paint (LCP) survey of the subject location in Alameda County, California. The scope of services provided by Geocon included surveying three bridge structures and associated soundwalls indicated for renovation or demolition at the subject location for suspect asbestos-containing materials and LCP, collecting bulk samples, and submitting the samples to laboratories for analyses.

The accompanying report summarizes the services performed and the results of laboratory testing.

The contents of this report reflect the views of Geocon, who are responsible for the facts and accuracy of the data presented herein. This report does not constitute a standard, specification, or regulation.

If there are any questions concerning the contents of this report, or if Geocon may be of further service, please contact me at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

Chris Giuntoli, CAC
Senior Project Scientist

David Watts, CAC
Senior Project Scientist

CGG:DAW

(1) Addressee [pdf]

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FIGURES
1. Vicinity Map
2A-2C. Site Plans

SITE PHOTOGRAPHS (1 through 23)

TABLES
1. Summary of Analytical Laboratory Test Results – Asbestos
2. Summary of Analytical Laboratory Test Results – Paint

APPENDIX
A. Laboratory Reports and Chains-of-Custody

ASBESTOS AND LEAD PAINT SURVEY REPORT

1.0 INTRODUCTION

1.1 Site Description

The project consists of the Marina Boulevard Overcrossing (OC) [Bridge No. 33-0167], the Davis Street OC (Bridge No. 33-0168), the San Leandro Creek Bridge (Bridge No. 33-0100), and soundwalls designated for renovation or demolition within the project area associated with the Highway 880 Southbound Improvements project located in Alameda County, California (the project location). The approximate project location is depicted on the Vicinity Map, Figure 1, and Site Plans, Figures 2A through 2C.

1.2 Objectives

Our objectives were to assess the potential presence and quantity of asbestos and lead-containing paint (LCP) at the project location prior to planned demolition activities. The information obtained from this investigation will be used by Rajappan & Meyer Consulting Engineers, Inc. for waste profiling, determining California Occupational Safety and Health Administration (Cal/OSHA) applicability, and coordinating asbestos and LCP disturbance activities.

> *It was <u>not</u> Geocon's intent during this inspection to conduct an evaluation of lead-based paint hazards in accordance with HUD guidelines. HUD protocol generally requires a very extensive sampling strategy that includes sampling of paint on each surface type (e.g., wall, ceiling, window sill, window frame, door frame, molding, etc.) in each room.*

2.0 BACKGROUND

2.1 Asbestos

The *Code of Federal Regulations (CFR),* 40 CFR 61, Subpart M, National Emissions Standards for Hazardous Air Pollutants (NESHAP) and Federal Occupational Safety and Health Administration (FED OSHA) classify asbestos-containing material (ACM) as any material or product that contains *more than* 1% asbestos. Nonfriable ACM is classified by NESHAP as either Category I or Category II material defined as follows:

- **Category I** – asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products.
- **Category II** – all remaining types of non-friable asbestos-containing material not included in Category I that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Regulated asbestos-containing material (RACM), a hazardous waste when friable, is classified as any manufactured material that contains *greater than* 1% asbestos by dry weight *and* is:

- Friable; or
- Category I material that has become friable; or
- Category I material that has been subjected to sanding grinding, cutting or abrading; or
- Category II non-friable material that has a high probability of becoming crumbled, pulverized, or reduced to a powder during demolition or renovation activities.

Activities that disturb materials containing *any* amount of asbestos are subject to certain requirements of the Cal/OSHA asbestos standard contained in Title 8, California Code of Regulations (CCR) Section 1529. Typically, removal or disturbance of more than 100 square feet of material containing more than 0.1% asbestos must be performed by a registered asbestos abatement contractor, but associated waste labeling is not required if the material contains 1% or less asbestos. When the asbestos content of a material exceeds 1%, virtually all requirements of the standard become effective.

Materials containing more than 1% asbestos are also subject to NESHAP regulations (40 CFR Part 61, Subpart M). RACM (friable ACM and nonfriable ACM that will become friable during demolition or renovation operations) must be removed from buildings prior to demolition or renovation. Certain nonfriable ACM and materials containing 1% or less asbestos may remain in buildings during demolition; however, there are waste handling/disposal issues and Cal/OSHA work requirements that must be followed. Contractors are responsible for segregating and characterizing waste streams prior to disposal.

With respect to potential worker exposure, notification, and registration requirements, Cal/OSHA defines asbestos-containing construction material (ACCM) as construction material that contains more than 0.1% asbestos (Title 8, CCR 341.6).

2.2 Lead Paint

Construction activities (including demolition) that disturb materials or paints containing *any* amount of lead are subject to certain requirements of the Cal/OSHA lead standard contained in Title 8, CCR, Section 1532.1. Deteriorated paint is defined by Title 17, CCR, Division 1, Chapter 8, §35022 as a surface coating that is cracking, chalking, flaking, chipping, peeling, non-intact, failed, or otherwise separating from a component. Demolition of a deteriorated LCP component would require waste characterization and appropriate disposal. Intact LCP on a component is currently accepted by most landfill facilities; however, contractors are responsible for segregating and characterizing waste streams prior to disposal.

For a solid waste containing lead, the waste is classified as California hazardous when: 1) the total lead content exceeds the respective Total Threshold Limit Concentration (TTLC) of 1,000 milligrams per kilogram (mg/kg); or 2) the soluble lead content exceeds the respective Soluble Threshold Limit Concentration (STLC) of 5 milligrams per liter (mg/l) based on the standard Waste Extraction Test

(WET). A waste has the potential for exceeding the lead STLC when the waste's total lead content is greater than or equal to ten times the respective STLC value since the WET uses a 1:10 dilution ratio. Hence, when total lead is detected at a concentration greater than or equal to 50 mg/kg, and assuming that 100 percent of the total lead is soluble, soluble lead analysis is required. Lead-containing waste is classified as "Resource, Conservation, and Recovery Act" (RCRA) hazardous, or Federal hazardous, when the soluble lead content exceeds the Federal regulatory level of 5 mg/l based on the Toxicity Characteristic Leaching Procedure (TCLP).

The above regulatory criteria are based on chemical concentrations. Wastes may also be classified as hazardous based on other criteria such as ignitability; however, for the purposes of this investigation, toxicity (i.e., lead concentrations) is the primary factor considered for waste classification since waste generated during the construction activities would not likely warrant testing for ignitability or other criteria. Waste that is classified as either California hazardous or RCRA hazardous requires management as a hazardous waste.

Potential hazards exist to workers who remove or cut through LCP coatings during demolition. Dust containing hazardous concentrations of lead may be generated during scraping or cutting materials coated with lead-containing paint. Torching of these materials may produce lead oxide fumes. Therefore, air monitoring and/or respiratory protection may be required during the demolition of materials coated with LCP. Guidelines regarding regulatory provisions for construction work where workers may be exposed to lead are presented in the Title 8, CCR, Section 1532.1.

3.0 HISTORY

3.1 Previous Survey Activities

Previous asbestos or LCP survey reports of the project location were not available for our review.

3.2 Architectural Plans

Architectural plans of the project location were not available for our review.

4.0 SCOPE OF SERVICES

Mr. Chris Giuntoli, a California-Certified Asbestos Consultant (CAC), certification No. 02-3163 (expiration June 19, 2009), and Certified Lead Paint Inspector/Assessor with the California Department of Public Health (DPH), certification number I-5502 (expiration June 14, 2009) completed an asbestos and LCP survey of the project location on November 3, 2008.

4.1 Asbestos

Suspect ACM were grouped into homogeneous areas with representative samples randomly collected from each. In addition, each potential ACM was evaluated for quantity and friability. A total of 19 bulk asbestos samples were collected from the project location.

Our procedures for inspection and sampling are discussed below:

- Collected bulk asbestos samples after first wetting friable material with a light mist of water. The samples were then cut from the substrate and transferred to a labeled container. Note that when multiple samples were collected, the sampling locations were distributed throughout the homogeneous area (spaces where the material was observed).
- Relinquished bulk asbestos samples to EMSL Analytical, Inc., a California-licensed laboratory, for asbestos analysis in accordance with EPA Test Method 600/R-93/116 using polarized light microscopy (PLM) under standard chain-of-custody procedures. EMSL Analytical, Inc. is a laboratory accredited by the National Institute of Standards and Technology National Voluntary Laboratory Accreditation Program (NIST-NVLAP) for bulk asbestos fiber analysis. The laboratory analyses were requested on a 24-hour turn-around-time.

Sample locations are presented on the Site Plans, Figures 2A through 2C. Geocon sample group identification numbers, material descriptions, approximate quantities, friability assessments, and photo references are summarized in Table 1. Photos of suspect asbestos-containing materials are presented with the Site Photographs.

4.2 LCP

A total of seven bulk paint samples were collected from the project location. Our sampling procedures are discussed below:

- Collected representative bulk samples of suspect LCP using techniques presented in HUD guidelines. In addition, each painted area was evaluated for evidence of deterioration such as flaking or cracking.
- Relinquished LCP samples to Advanced Technology Laboratories, a California-licensed laboratory, for lead analyses in accordance with EPA Test Method 6010 under standard chain-of-custody procedures. Advanced Technology Laboratories is accredited by the DPH for lead analysis. The laboratory analyses were requested on a 24-hour turn-around-time.

Sample locations are presented on the Site Plans, Figures 2A through 2C. Geocon paint sample identification numbers, paint descriptions, approximate peeling/flaking quantities, and photo references are summarized on Table 2. Photos of paints sampled by Geocon are presented with the Site Photographs.

5.0 INVESTIGATIVE RESULTS

5.1 Asbestos Analytical Results

Chrysotile asbestos at concentrations of 5% and 6% was detected in samples representing an undetermined quantity of nonfriable bolt thread compound used on the guard rail system of the Marina Boulevard OC (Bridge No. 33-0167).

Chrysotile asbestos at a concentration of 40% was detected in samples representing approximately 15 square feet of rail shims used on the guard rail system of the Marina Boulevard OC (Bridge No. 33-0167).

No asbestos fibers were observed in samples of the remaining suspect materials at the project location. Summaries of the analytical laboratory test results for asbestos are presented on Table 1.

5.2 Paint Analytical Results

Samples of intact green paint used on the bridge girder system at the Marina Boulevard OC (Bridge No. 33-0167) exhibited total lead concentrations of 32 mg/kg and 290,000 mg/kg and a soluble (TCLP) lead concentration of 110 mg/l.

Samples of intact green paint used on the bridge girder system at the Davis Street OC (Bridge No. 33-0168) exhibited total lead concentrations of 180,000 mg/kg and 300,000 mg/kg and soluble (TCLP) lead concentrations of 830 mg/l and 150 mg/l.

A sample of intact white paint used on the bridge bents of the Davis Street OC (Bridge No. 33-0168) exhibited a total lead concentration of 89 mg/kg and a soluble (WET) lead concentration of less than 0.25 mg/l.

Samples of intact green paint used on the bridge girder system at the San Leandro Creek Bridge (Bridge No. 33-0100) exhibited total lead concentrations of 24,000 mg/kg and 50,000 mg/kg and soluble (TCLP) lead concentrations of 3.1 mg/l and 16 mg/l.

Summaries of the analytical laboratory test results for paint are presented on Table 2.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Asbestos

NESHAP regulations do not require that asbestos-containing bolt thread compound or rail shims (Category I nonfriable/nonhazardous materials) identified during our survey be removed prior to renovation or demolition, or treated as hazardous waste. However, the disturbance of these materials is still covered by the Cal/OSHA asbestos standard. We recommend that a licensed contractor registered with Cal/OSHA for asbestos-related work perform any activities that will disturb the barrier rail shims or thread compound. Contractors are responsible for segregating and characterizing waste streams prior to disposal. Contractors are responsible for informing the landfill of the contractor's intent to dispose of asbestos-containing waste.

We also recommend the notification of contractors (that will be conducting demolition, or related activities) of the presence of asbestos in their areas (i.e., provide the contractor[s] with a copy of this report and a list of asbestos removed during subsequent activities). Contractors who are not trained for asbestos-related work should be instructed not to disturb asbestos.

In accordance with Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2, written notification is required ten working days prior to commencement of *any* demolition activity (whether asbestos is present or not). In accordance with Title 8, CCR 341.9, written notification to the nearest Cal/OSHA district office is required at least 24 hours prior to certain asbestos-related work.

6.2 Lead Paint

Intact LCP identified during our survey would be considered a California and Federal hazardous waste based on lead content if it were stripped, blasted, or otherwise separated from the substrate. We recommend that all paints at the project location be treated as lead-containing for purposes of determining the applicability of the Cal/OSHA lead standard during any future maintenance, renovation, and demolition activities. This recommendation is based on LCP sample results and the fact that lead was a common ingredient of paints manufactured before 1978 and is still an ingredient of some industrial paints. In accordance with Title 8, CCR, Section 1532.1(p), written notification to the nearest Cal/OSHA district office is required at least 24 hours prior to certain lead-related work.

7.0 REPORT LIMITATIONS

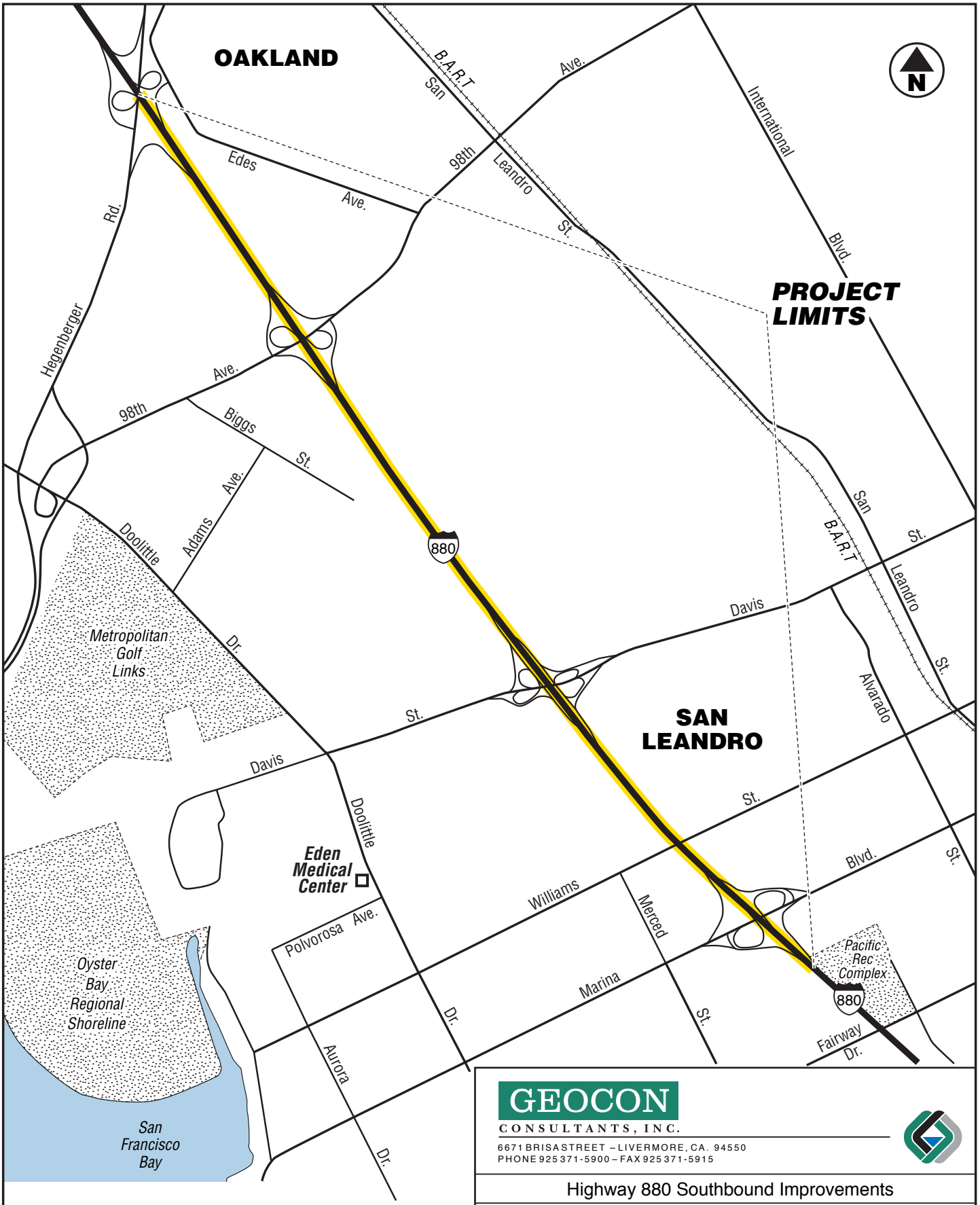
This report has been prepared exclusively for Rajappan & Meyer Consulting Engineers, Inc. The information contained herein is only valid as of the date of the report, and will require an update to reflect additional information obtained.

The asbestos and deteriorated LCP survey was conducted in conformance with generally accepted standards of practice for identifying and evaluating asbestos and LCP in structures. The survey addressed only the structures identified in Section 1.1. Due to the nature of building surveys, asbestos and LCP use, and laboratory analytical limitations, some asbestos or deteriorated LCP in the structures may not have been identified. Building spaces, such as wall cavities, crawlspaces, voids, and pipe chases, may have been concealed to Geocon's investigator. Previous renovation work may have concealed or covered spaces or materials, or may have partially demolished materials and left debris in inaccessible areas. Additionally, renovation activities may have partially replaced asbestos with indistinguishable non-asbestos. Asbestos and/or LCP may exist in areas not accessible or sampled in conjunction with our scope of services.

During renovation or demolition operations, suspect materials may be uncovered which are different from those accessible for sampling during this assessment. Personnel in charge of renovation/demolition should be alerted to note materials uncovered during such activities that differ substantially from those included in this or previous assessment reports. If additional suspect materials are found, they should be treated as ACM until/unless sampling and analysis indicate otherwise.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence, or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. This report does not constitute a standard, specification, or regulation.



GEOCON
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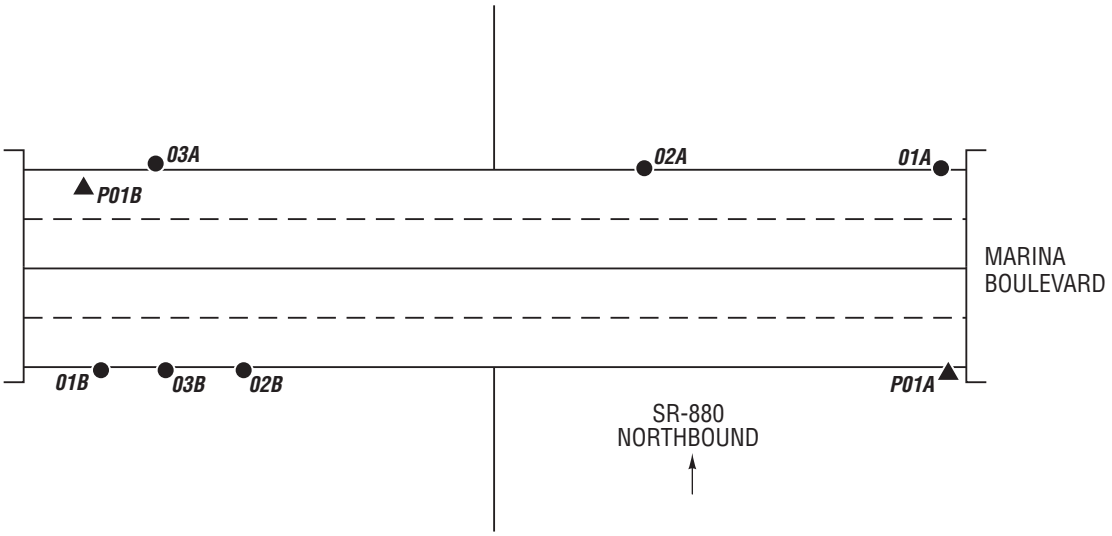
6671 BRISA STREET – LIVERMORE, CA. 94550
PHONE 925 371-5900 – FAX 925 371-5915

Highway 880 Southbound Improvements

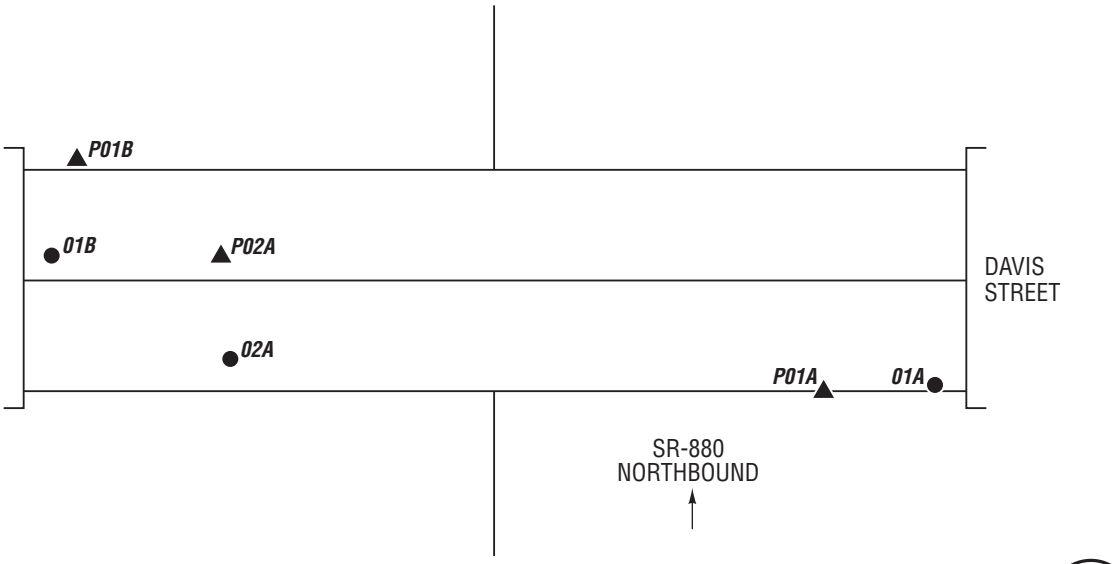
Oakland & San Leandro, California

VICINITY MAP

E8449-06-01	December 2008	Figure 1



BRIDGE NO. 33-0167



BRIDGE NO. 33-0168

NOT TO SCALE

LEGEND:

- ● Approximate Asbestos Sample Location
- ▲ Approximate Paint Sample Location

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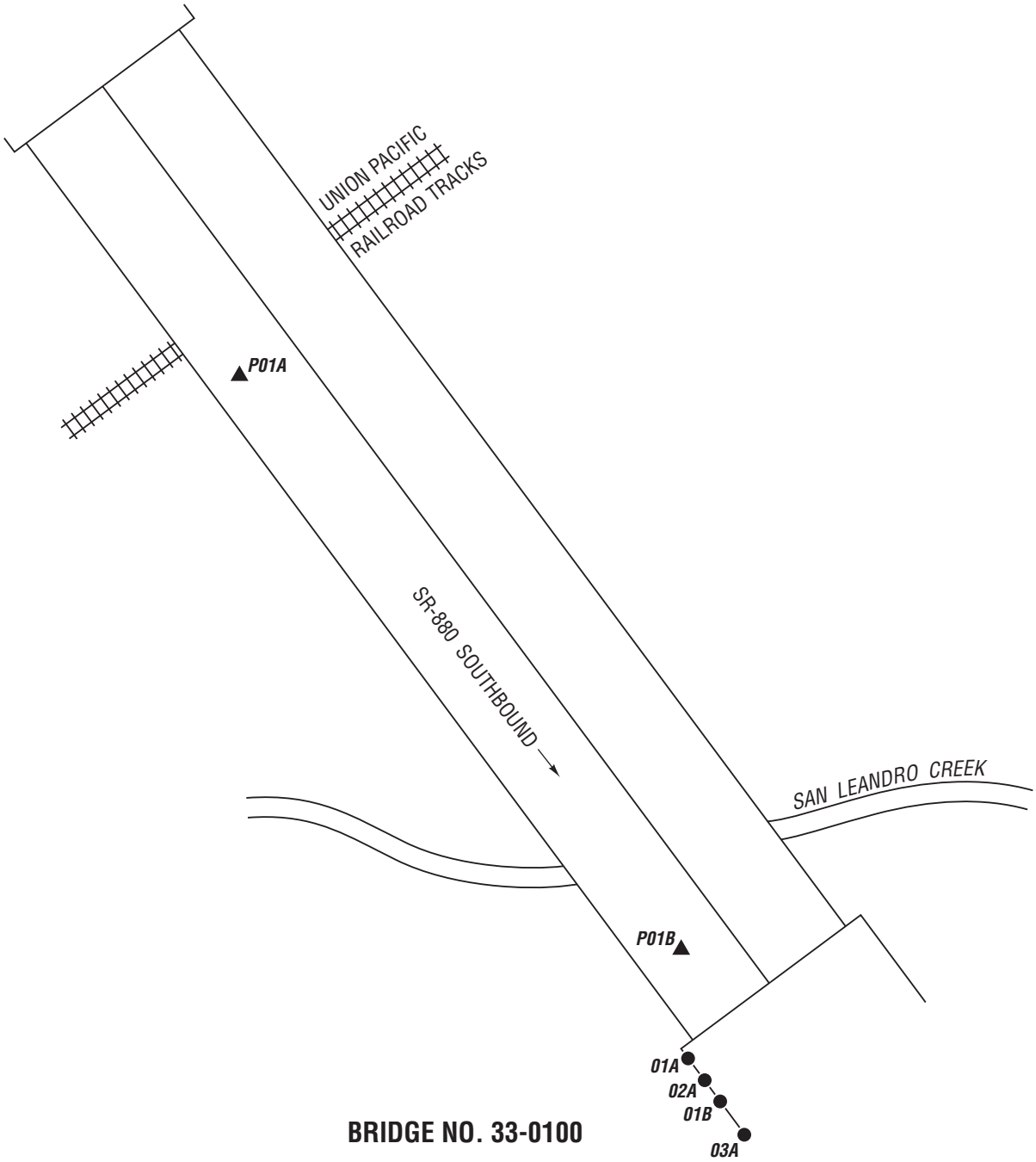
Highway 880 Southbound Improvements Project

Oakland/San Leandro,
California

SITE PLAN

E8449-06-01	December 2008	Figure 2A



BRIDGE NO. 33-0100

N

NOT TO SCALE

LEGEND:

- ● Approximate Asbestos Sample Location
- ▲ Approximate Paint Sample Location

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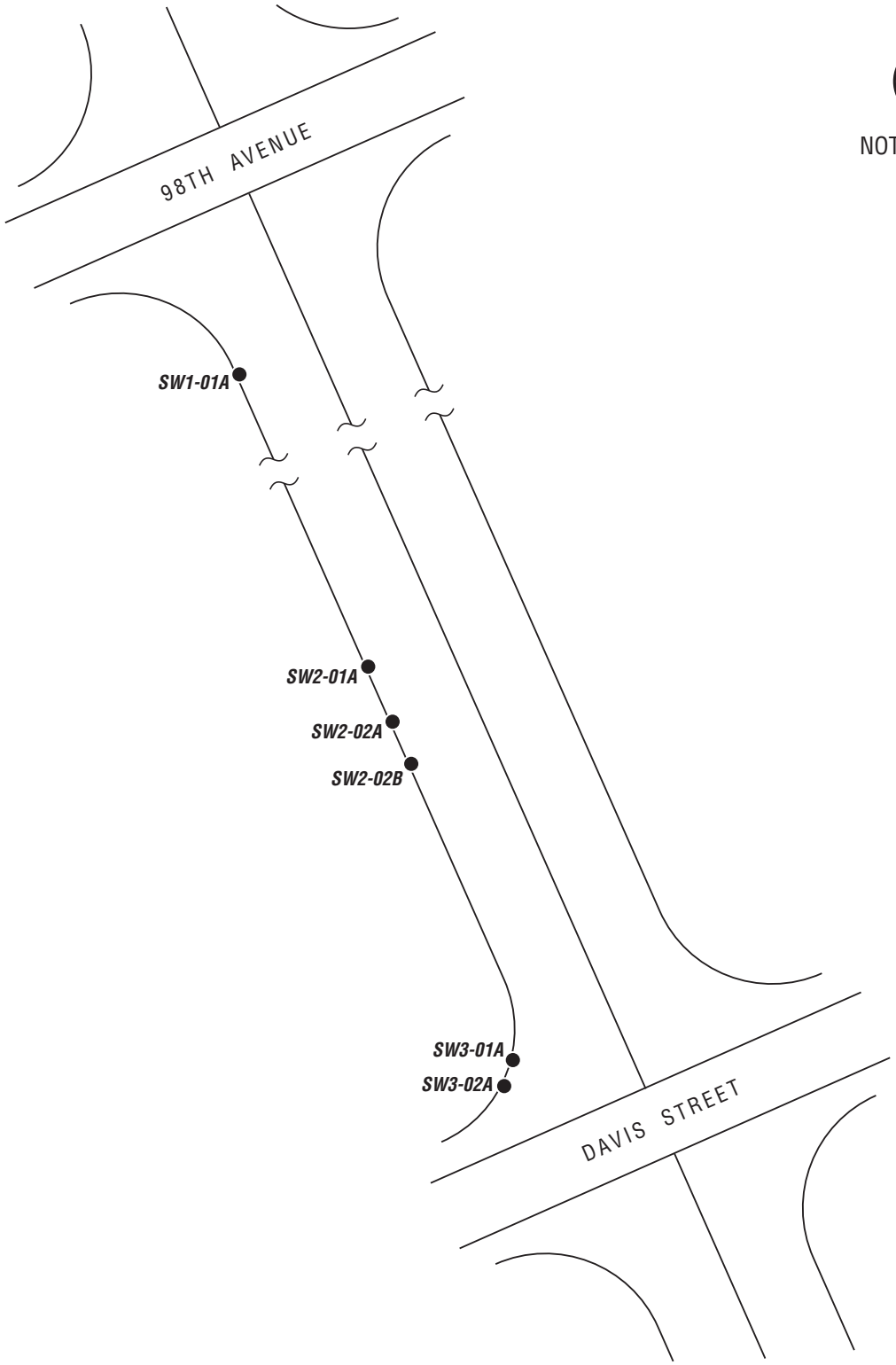
Highway 880 Southbound Improvements Project

Oakland/San Leandro,
California

SITE PLAN

E8449-06-01	December 2008	Figure 2B



NOT TO SCALE

LEGEND:

- Approximate Asbestos Sample Location

GEOCON
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Highway 880 Southbound Improvements Project

Oakland/San Leandro,
California

SITE PLAN

E8449-06-01	December 2008	Figure 2C

Photo 1 – Marina Boulevard OC (Bridge No. 33-0167) span

Photo 2 – Asbestos-containing bolt thread compound use on guard rails system at Marina Boulevard OC

Photo 3 – Brown fiberboard (not asbestos containing material) on the Marina Boulevard OC

Photo 4 – Asbestos-containing rail shim use on guard rails system at the Marina Boulevard OC

Photo 5 – Typical bridge deck joint material (non-suspect) at the Marina Boulevard OC

Photo 6 – Typical intact paint used on girder system at the Marina Boulevard OC

Photo 7 – Davis Street OC (Bridge No. 33-0168) span

Photo 8 – Brown fiberboard (not asbestos containing material) on the Davis Street OC

Photo 9 – Brown fiberboard (not asbestos containing material) on the Davis Street OC

Photo 10 – Typical bridge deck joint material (non-suspect) at the Davis Street OC

Photo 11 – Typical intact paint used on girder system at the Davis Street OC

Photo 12 – Typical intact paint used on bridge bents at the Davis Street OC

Photo 13 – San Leandro Creek Bridge (Bridge No. 33-0100) span

Photo 14 – Brown fiberboard (not asbestos containing material) on the San Leandro Creek Bridge

Photo 15 – Mortar (not asbestos containing material) on the San Leandro Creek Bridge

Photo 16 – Brown fiberboard (not asbestos containing material) on the San Leandro Creek Bridge

Photo 17 – Typical bridge deck joint (non-suspect) at the San Leandro Creek Bridge

Photo 18 – Typical intact paint used on girder system at the San Leandro Creek Bridge

Photo 19 – Soundwall at 98th Avenue entrance ramp to southbound Highway 880

Photo 20– Southbound Highway 880 soundwall south of San Leandro Bridge

Photo 21 – Soundwall at Davis Street exit ramp from southbound Highway 880

Photo 22– Typical mortar (not asbestos containing material) used at soundwalls within the project area

Photo 23 – Typical brown fiberboard (not asbestos containing material) at soundwalls within the project area

TABLE 1
SUMMARY OF ANALYTICAL TEST RESULTS - ASBESTOS
HIGHWAY 880 SOUTHBOUND IMPROVEMENTS PROJECT
OAKLAND AND SAN LEANDRO, CALIFORNIA

Polarized Light Microscopy (PLM) - EPA Test Method 600/R-93/116						
Bridge No.	Sample Group No.	Description of Material	Approximate Quantity	Friable	Site Photo	Asbestos Content
33-0167	167-01	Thread sealant	unable to quantify	No	2	5-6% chrysotile
	167-02	Brown fiberboard	NA	NA	3	ND
	167-03	Shims (barrier rail)	15 square feet (multi-layered)	No	4	40% chrysotile
33-0168	168-01	Brown fiberboard	NA	NA	8	ND
	168-02	Brown fiberboard	NA	NA	9	ND
33-0100	100-01	Brown fiberboard	NA	NA	14	ND
	100-02	Mortar	NA	NA	15	ND
	100-03	Brown fiberboard	NA	NA	16	ND

Notes:

NA = Not applicable (no asbestos detected)

ND = Not detected

TABLE 2
SUMMARY OF ANALYTICAL TEST RESULTS - PAINT
HIGHWAY 880 SOUTHBOUND IMPROVEMENTS PROJECT
OAKLAND AND SAN LEANDRO, CALIFORNIA

Bridge No.	Sample No.	Paint Description	Approximate Quantity Peeling/Flaking	Site Photo	Total Lead (mg/kg)	WET Lead (mg/l)	TCLP Lead (mg/l)
33-0167	167-P01A	Green Paint (girder system)	Intact	6	32	NA	NA
	167-P01B				290,000	NA	110
33-0168	168-P01A	Green Paint (girder system)	Intact	11	180,000	NA	830
	168-P01B				300,000	NA	150
	168-P02A	White Paint (bridge bents)	Intact	12	87	<0.25	NA
33-0100	100-P01A	Green Paint (girder system)	Intact	18	24,000	NA	3.1
	100-P01A				50,000	NA	16

Notes:

mg/kg = milligrams per kilogram (EPA 6010)
mg/l = milligrams per liter
WET = Waste Extraction Test
TCLP = Toxicity Characteristic Leaching Procedure
< = Less than the indicated laboratory method detection limits
NA = Not analyzed

APPENDIX A

EMSL Analytical, Inc
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Geocon Consultants
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Livermore, CA 94550

Fax: (925) 371-5915 Phone: (925) 371-5900
Project: **E8449-06-01**

Customer ID: GECN21
Customer PO: E8449-06-01
Received: 11/03/08 12:37 PM
EMSL Order: 090808708

EMSL Proj:
Analysis Date: 11/4/2008
Report Date: 11/5/2008

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Location	Appearance	Non-Asbestos %	Fibrous	Non-Asbestos %	Non-Fibrous	Asbestos %	Type
167-01A, Thread sealant *090808708-0001*		Silver Non-Fibrous Homogeneous			94%	Non-fibrous (other)	**6%**	**Chrysotile**
167-01B, Thread sealant *090808708-0002*		Silver Non-Fibrous Homogeneous			95%	Non-fibrous (other)	**5%**	**Chrysotile**
167-02A, Fiber board *090808708-0003*		Black Non-Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**	
167-02B, Fiber board *090808708-0004*		Black Non-Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**	
167-03A, Rail shim *090808708-0005*		Gray Fibrous Homogeneous			60%	Non-fibrous (other)	**40%**	**Chrysotile**
167-03B, Rail shim *090808708-0006*		Gray Fibrous Homogeneous			60%	Non-fibrous (other)	**40%**	**Chrysotile**
168-01A-1, Fiber board *090808708-0007*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**	

Analyst(s)

Adam C. Fink (17)

Baojia Ke, Laboratory Manager
or other approved signatory

Due to magnification limitations inherent in PLM, asbestos fibers in dimensions below the resolution capability of PLM may not be detected. Samples reported as <1% or none detected may require additional testing by TEM to confirm asbestos quantities. The above test report relates only to the items tested and may not be reproduced in any form without the express written approval of EMSL Analytical, Inc. EMSL's liability is limited to the cost of analysis. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client.Samples received in good condition unless otherwise noted.
NVLAP Lab Code 101048-3

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Received: 11/03/08 12:37 PM
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EMSL Proj:
Analysis Date: 11/4/2008
Report Date: 11/5/2008

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Location	Appearance	%	Non-Asbestos Fibrous	%	Non-Asbestos Non-Fibrous	Asbestos % Type
168-01A-2, Foam *090808708-0007A*		White Non-Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**
168-01B-1, Fiber board *090808708-0008*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**
168-01B-2, Foam *090808708-0008A*		White Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
168-02A, Fiber board *090808708-0009*		Black Non-Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**
SW1-01A, Mortar *090808708-0010*		Gray Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SW2-01A, Mortar *090808708-0011*		Gray Non-Fibrous Heterogeneous			100%	Non-fibrous (other)	**None Detected**
SW2-02A, Fiber board *090808708-0012*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (17)

Baojia Ke, Laboratory Manager
or other approved signatory

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Project: **E8449-06-01**

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Received: 11/03/08 12:37 PM
EMSL Order: 090808708

EMSL Proj:
Analysis Date: 11/4/2008
Report Date: 11/5/2008

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos				Asbestos
Sample	**Location**	**Appearance**	**%**	**Fibrous**	**%**	**Non-Fibrous**	**% Type**
SW2-02B, Fiber board *090808708-0013*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**
SW3-01A, Mortar *090808708-0014*		Gray Non-Fibrous Homogeneous			100%	Non-fibrous (other)	**None Detected**
SW3-02A, Fiber board *090808708-0015*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (17)

Baojia Ke, Laboratory Manager
or other approved signatory

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NVLAP Lab Code 101048-3

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EMSL ANALYTICAL, INC.

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EMSL Rep:	DAN KOCHER	*Third Party Billing*	**requires written authorization from third party*
Company:	GEOCON CONSULTANTS, INC.	EMSL-Bill to:	
Contact:	CHRIS GIUNTOLI	Contact:	
Address:	6671 BRISA ST	Address:	
City & State:	LIVERMORE, CA Zip 94550	City & State:	Zip
Phone:	925-371-5900	Fax:	
☒ Email Results	GIUNTOLI@GEOCONINC.COM	☐ Fax results	
Project Name or Number:	E8449-06-01	Purchase Order Number:	

TURNAROUND TIME

☐ 3 Hours	☐ 6 Hours	☐ 12 Hours	☒ 24 Hours	☐ 48 Hours	☐ 72 Hours	☐ 4 Days	☐ 5 Days	☐ 6-10 Days

SAMPLE MATRIX

☐ Air	☒ Bulk	☐ Soil	☐ Wipe	☐ Micro-Vac	☐ Drinking Water	☐ Wastewater	☐ Chips	☐ Other

ASBESTOS ANALYSIS

PCM - Air
- ☐ NIOSH 7400 (A) Issue 2: August 1994
- ☐ OSHA w/TWA

TEM AIR
- ☐ AHERA 40 CFR, Part 763 Subpart E
- ☐ NIOSH 7402 Issue 2
- ☐ EPA Level II

PLM - Bulk
- ☒ EPA 600/R-93/116
- ☐ NY Stratified Point Count

CARB 435 Level: ☐ A ☐ B ☐ C ☐ D ☐ E
- ☐ NIOSH 9002
- ☐ PLM NOB (Gravimetric) NYS 198.1
- ☐ EPA Point Count (400 Points)
- ☐ EPA Point Count (1,000 Points)
- ☐ Standard Addition Point Count

SOILS

EPA Protocol ☐ Qualitative ☐ Quantitative

CARB 435 Level: ☐ A ☐ B ☐ C ☐ D ☐ E
- ☐ EMSL MSD 9000 Method fibers/gram
- ☐ Superfund EPA 540-R097-028 (dust generation)

TEM BULK
- ☐ Drop Mount (Qualitative)
- ☐ Chatfield SOP-1988-02
- ☐ TEM NOB (Gravimetric) NY 198.4

TEM MICROVAC
- ☐ ASTM D 5755-95 (Quantitative)

TEM WIPE
- ☐ ASTM D-6480-99
- ☐ Qualitative ☐

TEM WATER
- ☐ EPA 100.1
- ☐ EPA 100.2
- ☐ NYS 198.2

OTHER:

LEAD ANALYSIS

Flame Atomic Absorption
- ☐ Wipe, SW846-7420 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-7420
- ☐ Air, NIOSH 7082
- ☐ Chips, SW846-7420 or AOAC 5.009 (974.02)
- ☐ Wastewater, SW 846-7420
- ☐ TCLP LEAD SW846-1311/7420

Graphite Furnace Atomic Absorption
- ☐ Air, NIOSH 7105
- ☐ Wastewater, SW846-7421
- ☐ Soil, SW846-7421
- ☐ Drinking Water, EPA 239.2

ICP – Inductively Coupled Plasma
- ☐ Wipe, SW846-6010 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-6010
- ☐ Air, NIOSH 7300

MATERIALS ANALYSIS
- ☐ Full Particle Identification
- ☐ Optical Particle Identification
- ☐ Dust Mites and Insect Fragments
- ☐ Particle Size & Distribution
- ☐ Product Comparison
- ☐ Paint Characterizaton
- ☐ Failure Analysis
- ☐ Corrosion Analysis
- ☐ Glove Box Containment Study
- ☐ Petrographic Examination of Concrete
- ☐ Portland Cement in Workplace Atmospheres (OSHA ID-143)
- ☐ Man Made Vitrous Fibers – MMVF's
- ☐ Synthetic Fiber Identification
- ☐ Other:

MICROBIAL ANALYSIS

Air Samples
- ☐ Mold & Fungi by Air O Cell
- ☐ Mold & Fungi by Agar Plate count & id
- ☐ Bacterial Count and Gram Stain
- ☐ Bacterial Count and Identification

Water Samples
- ☐ Total Coliforms, Fecal Coliforms
- ☐ Escherichia Coli, Fecal Streptococcus
- ☐ Legionella
- ☐ Salmonella
- ☐ Giardia and Cryptosporidium

Wipe and Bulk Samples
- ☐ Mold & Fungi – Direct Examination
- ☐ Mold & Fungi – (Culture follow up to direct examination if necessary)
- ☐ Mold & Fungi – Culture (Count & ID)
- ☐ Mold & Fungi – Culture (Count only)
- ☐ Bacterial Count & Gram Stain
- ☐ Bacterial Count & Identification (3 most prominent types)
- ☐ Other:

IAQ ANALYSIS
- ☐ Nuisance Dust (NIOSH 0500 & 0600)
- ☐ Airborne Dust (PM10, TSP)
- ☐ Silica Analysis by XRD ☐ Niosh 7500
- ☐ HVAC Efficiency
- ☐ Carbon Black
- ☐ Airborne Oil Mist
- ☐ Other:

Client Sample # (S)

TOTAL SAMPLE # 15

Relinquished:	[signature]	Date:	11/3/08	Time:	1237
Received:	M. Edwards	Date:	11/3/08	Time:	12:37
Relinquished:		Date:		Time:	
Received:		Date:		Time:	

090808708

90808708

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SAMPLE NUMBER	SAMPLE DESCRIPTION/LOCATION	VOLUME Air (L) Area (Inches sq.)
167-01A	THREAD SEALANT	
167-01B	↓	
167-02A	BROWN FIBER BOARD	
167-02B	↓	
167-03A	RAIL SHIM	
167-03B	↓	
168-01A	BROWN FIBER BOARD	
168-01B	↓	
168-02A	↓	
SW1-01A	MORTAR	
SW2-01A	↓	
SW2-02A	BROWN FIBER BOARD	
SW2-02B	↓	
SW3-01A	MORTAR	
SW3-02A	BROWN FIBER BOARD	

Relinquished: _____ Date: _____ Time: _____
Received: _____ Date: _____ Time: _____
Relinquished: _____ Date: _____ Time: _____
Received: _____ Date: _____ Time: _____

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Project: **E8449-06-01**

Customer ID: GECN21
Customer PO: E8449-06-01
Received: 11/04/08 3:00 PM
EMSL Order: 090808740

EMSL Proj:
Analysis Date: 11/4/2008
Report Date: 11/5/2008

Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Location	Appearance	%	Non-Asbestos Fibrous	%	Non-Asbestos Non-Fibrous	Asbestos % Type
100-01A, Fiberboard *090808740-0001*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**
100-01B, Fiberboard *090808740-0002*		Brown Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**
100-02A, Mortar *090808740-0003*		Tan Non-Fibrous Heterogeneous			100%	Non-fibrous (other)	**None Detected**
100-03A, Fiberboard *090808740-0004*		Black Fibrous Homogeneous	95%	Cellulose	5%	Non-fibrous (other)	**None Detected**

Analyst(s)

Alan Tahran (4)

Baojia Ke, Laboratory Manager
or other approved signatory

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090808740

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EMSL Rep:	DAN KOCHER	*Third Party Billing*	**requires written authorization from third party*
Company:	GEOCON	EMSL-Bill to:	
Contact:	CHRIS GIUNTOLI	Contact:	
Address:	6671 BRISA ST	Address:	
City & State:	LIVERMORE, CA Zip 94550	City & State:	Zip
Phone:	925-371-5900	Fax:	
☒ Email Results	GIUNTOLI@GEOCONINC.COM	☐ Fax results	
Project Name or Number:	E8449-06-01	Purchase Order Number:	

TURNAROUND TIME

☐ 3 Hours	☐ 6 Hours	☐ 12 Hours	☒ 24 Hours	☐ 48 Hours	☐ 72 Hours	☐ 4 Days	☐ 5 Days	☐ 6-10 Days

SAMPLE MATRIX

☐ Air	☒ Bulk	☐ Soil	☐ Wipe	☐ Micro-Vac	☐ Drinking Water	☐ Wastewater	☐ Chips	☐ Other

ASBESTOS ANALYSIS

PCM - Air
- ☐ NIOSH 7400 (A) Issue 2: August 1994
- ☐ OSHA w/TWA

TEM AIR
- ☐ AHERA 40 CFR, Part 763 Subpart E
- ☐ NIOSH 7402 Issue 2
- ☐ EPA Level II

PLM - Bulk
- ☒ EPA 600/R-93/116
- ☐ NY Stratified Point Count
- CARB 435 Level: ☐ A ☐ B ☐ C ☐ D ☐ E
- ☐ NIOSH 9002
- ☐ PLM NOB (Gravimetric) NYS 198.1
- ☐ EPA Point Count (400 Points)
- ☐ EPA Point Count (1,000 Points)
- ☐ Standard Addition Point Count

SOILS
- EPA Protocol ☐ Qualitative ☐ Quantitative
- CARB 435 Level: ☐ A ☐ B ☐ C ☐ D ☐ E
- ☐ EMSL MSD 9000 Method fibers/gram
- ☐ Superfund EPA 540-R097-028 (dust generation)

TEM BULK
- ☐ Drop Mount (Qualitative)
- ☐ Chatfield SOP-1988-02
- ☐ TEM NOB (Gravimetric) NY 198.4

TEM MICROVAC
- ☐ ASTM D 5755-95 (Quantitative)

TEM WIPE
- ☐ ASTM D-6480-99
- ☐ Qualitative ☐

TEM WATER
- ☐ EPA 100.1
- ☐ EPA 100.2
- ☐ NYS 198.2

OTHER:

LEAD ANALYSIS

Flame Atomic Absorption
- ☐ Wipe, SW846-7420 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-7420
- ☐ Air, NIOSH 7082
- ☐ Chips, SW846-7420 or AOAC 5.009 (974.02)
- ☐ Wastewater, SW 846-7420
- ☐ TCLP LEAD SW846-1311/7420

Graphite Furnace Atomic Absorption
- ☐ Air, NIOSH 7105
- ☐ Wastewater, SW846-7421
- ☐ Soil, SW846-7421
- ☐ Drinking Water, EPA 239.2

ICP – Inductively Coupled Plasma
- ☐ Wipe, SW846-6010 ☐ ASTM ☐ non ASTM
- ☐ Soil, SW846-6010
- ☐ Air, NIOSH 7300

MATERIALS ANALYSIS

- ☐ Full Particle Identification
- ☐ Optical Particle Identification
- ☐ Dust Mites and Insect Fragments
- ☐ Particle Size & Distribution
- ☐ Product Comparison
- ☐ Paint Characterizaton
- ☐ Failure Analysis
- ☐ Corrosion Analysis
- ☐ Glove Box Containment Study
- ☐ Petrographic Examination of Concrete
- ☐ Portland Cement in Workplace Atmospheres (OSHA ID-143)
- ☐ Man Made Vitrous Fibers – MMVF's
- ☐ Synthetic Fiber Identification
- ☐ Other:

MICROBIAL ANALYSIS

Air Samples
- ☐ Mold & Fungi by Air O Cell
- ☐ Mold & Fungi by Agar Plate count & id
- ☐ Bacterial Count and Gram Stain
- ☐ Bacterial Count and Identification

Water Samples
- ☐ Total Coliforms, Fecal Coliforms
- ☐ Escherichia Coli, Fecal Streptococcus
- ☐ Legionella
- ☐ Salmonella
- ☐ Giardia and Cryptosporidium

Wipe and Bulk Samples
- ☐ Mold & Fungi – Direct Examination
- ☐ Mold & Fungi – (Culture follow up to direct examination if necessary)
- ☐ Mold & Fungi – Culture (Count & ID)
- ☐ Mold & Fungi – Culture (Count only)
- ☐ Bacterial Count & Gram Stain
- ☐ Bacterial Count & Identification (3 most prominent types)
- ☐ Other:

IAQ ANALYSIS

- ☐ Nuisance Dust (NIOSH 0500 & 0600)
- ☐ Airborne Dust (PM10, TSP)
- ☐ Silica Analysis by XRD ☐ Niosh 7500
- ☐ HVAC Efficiency
- ☐ Carbon Black
- ☐ Airborne Oil Mist
- ☐ Other:

Client Sample # (S) - TOTAL SAMPLE # 3

Relinquished:	Chris Giuntoli	Date:	11/3/08	Time:	1500
Received:		Date:		Time:	
Relinquished:		Date:		Time:	
Received:		Date:		Time:	

090808740

90808740

EMSL ANALYTICAL, INC.

EMSL – San Leandro ◆ 2235 Polvorosa Ave, Suite 230, San Leandro, CA 94577

SAMPLE NUMBER	SAMPLE DESCRIPTION/LOCATION	VOLUME Air (L) Area (Inches sq.)
100-01A	TAN FIBER BOARD	
100-01B	↓	
100-02A	MORTAR	
100-02A	BROWN FIBER BOARD	

Relinquished: _____ **Date:** _____ **Time:** _____
Received: _____ **Date:** _____ **Time:** _____
Relinquished: _____ **Date:** _____ **Time:** _____
Received: _____ **Date:** _____ **Time:** _____

November 04, 2008

Chris Giuntoli
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 101989

RE: I-880, E8449-06-01

Attention: Chris Giuntoli

Enclosed are the results for sample(s) received on November 04, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *04-Nov-08*

CLIENT: Geocon Consultants, Inc.
Project: I-880, E8449-06-01
Lab Order: 101989

CASE NARRATIVE

Result for sample 101989-001A was J-Flag. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" Flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Analytical Comments for Method 6010

Dilution was necessary for samples 101989-001A, 101989-002A, 101989-003A, 101989-004A, 101989-005A, 101989-006A and 101989-007A, due to sample matrix.

Matrix Spike (MS) and /or Matrix Spike Duplicate (MSD) are/is outside recovery criteria for samples 101989-007AMS and 101989-007AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

RPD for Matrix Spike (MS)/Matrix Spike Duplicate (MSD) is outside criteria for sample 101989-007AMSD; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	167-P01A
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-001A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B		**EPA 6010B**				
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	32	9.0	80	J	mg/Kg	20	11/4/2008 05:55 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	167-P01B
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-002A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B			**EPA 6010B**			
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	290000	22	200		mg/Kg	50	11/4/2008 06:00 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	168-P01A
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-003A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B			**EPA 6010B**			
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	180000	9.0	80		mg/Kg	20	11/4/2008 06:03 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	168-P01B
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-004A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B			**EPA 6010B**			
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	300000	22	200		mg/Kg	50	11/4/2008 06:14 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	168-P02A
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-005A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B			**EPA 6010B**			
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	87	9.0	80		mg/Kg	20	11/4/2008 06:21 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	100-P01A
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-006A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B			**EPA 6010B**			
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	24000	18	160		mg/Kg	40	11/4/2008 06:28 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *04-Nov-08*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	100-P01B
Lab Order:	101989	**Collection Date:**	11/3/2008
Project:	I-880, E8449-06-01	**Matrix:**	PAINT CHIP
Lab ID:	101989-007A		

Analyses	Result	MDL	PQL	Qual	Units	DF	Date Analyzed
ICP METALS							
	EPA 3050B			**EPA 6010B**			
RunID: **ICP6_081104A**	QC Batch: **49879**				PrepDate:	**11/4/2008**	Analyst: **CL**
Lead	50000	9.0	80		mg/Kg	20	11/4/2008 06:26 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	S	Spike/Surrogate outside of limits due to matrix interference
		Results are wet unless otherwise specified	DO	Surrogate Diluted Out

Advanced Technology Laboratories

Date: *04-Nov-08*

CLIENT: Geocon Consultants, Inc.
Work Order: 101989
Project: I-880, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB-49879** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/4/2008** RunNo: **101272**
Client ID: **PBS** Batch ID: **49879** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/4/2008** SeqNo: **1575083**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1.0									

Sample ID: **LCS-49879** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/4/2008** RunNo: **101272**
Client ID: **LCSS** Batch ID: **49879** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/4/2008** SeqNo: **1575084**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	50.711	1.0	50.00	0	101	80	120				

Sample ID: **101989-001ADUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/4/2008** RunNo: **101272**
Client ID: **167-P01A** Batch ID: **49879** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/4/2008** SeqNo: **1575089**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	61.319	80						31.99	0	20	

Sample ID: **101989-007AMS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/4/2008** RunNo: **101272**
Client ID: **100-P01B** Batch ID: **49879** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/4/2008** SeqNo: **1575094**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	37062.304	80	500.0	50340	-2660	33	120				S

Sample ID: **101989-007AMSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **11/4/2008** RunNo: **101272**
Client ID: **100-P01B** Batch ID: **49879** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **11/4/2008** SeqNo: **1575095**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	54337.763	80	500.0	50340	799	33	120	37060	37.8	20	SR

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CHAIN OF CUSTODY RECORD

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
(562) 989-4045 • Fax (562) 989-4040

FOR LABORATORY USE ONLY:

P.O.#:

Logged By: K Date: 11/4/08

Method of Transport: Client ☐ ATL ☐ CA OverN ☐ FEDEX ☐ Other: GSO

Sample Condition Upon Receipt:
1. CHILLED Y☐ N☑ N/A
2. HEADSPACE (VOA) Y☐ N☐
3. CONTAINER INTACT Y☑ N☐
4. SEALED Y☐ N☑
5. # OF SPLS MATCH COC Y☐ N☐
6. PRESERVED Y☐ N☑

Client: GEOCON CONSULTANTS, INC.
Attn: CHRIS GIUNTOLI
Address: 6671 Brisa Street
City: Livermore State: CA Zip Code: 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

Project Name: I-880 Project #: E8449-06-01 Sampler: (Printed Name) C. GIUNTOLI (Signature)

Relinquished by: (Signature and Printed Name) Date: 11/3/08 Time: 1630 Received by: (Signature and Printed Name) Date: 11/4/08 Time: 8:15

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

Relinquished by: (Signature and Printed Name) Date: Time: Received by: (Signature and Printed Name) Date: Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: CGIUNTOLI 11/3/08
Print Name Date
Signature

Send Report To:
Attn:
Co: SAME AS ABOVE
Address
City State Zip

Bill To:
Attn:
Co: SAME AS ABOVE
Address
City State Zip

Special Instructions/Comments:
BASED ON TOTAL LEAD RESULTS, SOLUBLE LEAD ANALYSIS MAY BE REQUESTED.
* 24 HR TAT

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample : $2.00 / sample / mo (after 45 days)
- Records : $1.00 / ATL workorder / mo (after 1 year)

Circle or Add Analysis(es) Requested

QA/QC: RTNE ☐ CT ☒ SWRCB ☐ Logcode ____ OTHER ____

ITEM	LAB USE ONLY: Batch #: Lab No.	Sample Description: Sample I.D. / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / BTEX	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)	TOTAL LEAD					SOIL	WATER	GROUND WATER	WASTEWATER	PAINT CHIP		* TAT	Container(s) #	Type	PRESERVATION	REMARKS
	101489-1	167-P01A	11/3/08											X								X			A	1	P	J	
	2	167-P01B																											
	3	168-P01A																											
	4	168-P01B																											
	5	168-P02A																											
	6	100-P01A																											
	7	100-P01B																											

• TAT starts 8 a.m. following day if samples received after 3 p.m.

TAT: A= Overnight ≤ 24 hr B= Emergency Next workday C= Critical 2 Workdays D= Urgent 3 Workdays E= Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives: H=Hcl N=HNO_3 S=H_2SO_4 C=4°C Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

DISTRIBUTION: **White** with report, **Yellow** to folder, **Pink** to submitter.

November 06, 2008

Chris Giuntoli
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550
TEL: (925) 371-5900
FAX: (925) 371-5915

ELAP No.: 1838
NELAP No.: 02107CA
NEVADA.: CA-401
Arizona: AZ0689
CSDLAC No.: 10196
Workorder No.: 101989

RE: I-880, E8449-06-01

Attention: Chris Giuntoli

Enclosed are the results for sample(s) received on November 04, 2008 by Advanced Technology Laboratories . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (562)989-4045 if I can be of further assistance to your company.

Sincerely,

Eddie F. Rodriguez
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories.

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *06-Nov-08*

CLIENT: Geocon Consultants, Inc.
Project: I-880, E8449-06-01
Lab Order: 101989

CASE NARRATIVE

Analytical Comments for Method 7420

Dilution was necessary for samples 101989-002A, 101989-003A and 101989-004A, due to sample matrix.

RPD for Duplicate (DUP) is outside criteria for sample 101989-007ADUP; however, the analytical batch was validated by the Laboratory Control Sample (LCS).

Advanced Technology Laboratories

Date: 11/6/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (TCLP)
EPA 1311/ 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	101989
Project:	I-880, E8449-06-01	**Date Received**	11/4/2008 8:15:00 AM
Project No:		**Matrix:**	Paint Chip
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
101989-002A	167-P01B	110	mg/L	49946	5.0	4	11/3/2008	11/6/2008
101989-003A	168-P01A	830	mg/L	49946	25	20	11/3/2008	11/6/2008
101989-004A	168-P01B	150	mg/L	49946	5.0	4	11/3/2008	11/6/2008
101989-006A	100-P01A	3.1	mg/L	49946	1.2	1	11/3/2008	11/6/2008
101989-007A	100-P01B	16	mg/L	49946	1.2	1	11/3/2008	11/6/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: 11/7/2008

ANALYTICAL RESULTS

LEAD BY ATOMIC ABSORPTION (STLC)
WET/ EPA 7420

CLIENT:	Geocon Consultants, Inc.	**Lab Order:**	101989
Project:	I-880, E8449-06-01	**Date Received**	11/4/2008 8:15:00 AM
Project No:		**Matrix:**	Paint Chip
Analyte:	Lead	**Analyst:**	AMT

Laboratory ID	Client Sample ID	Results	Units	QC Batch	PQL	DF	Date Collected	Date Analyzed
101989-005A	168-P02A	ND	mg/L	49945	0.25	1	11/3/2008	11/7/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories

Date: *06-Nov-08*

CLIENT: Geocon Consultants, Inc.
Work Order: 101989
Project: I-880, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **MB-49946A** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101326**
Client ID: **PBS** Batch ID: **49946** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/6/2008** SeqNo: **1576159**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **MB-49932A TCLP** SampType: **MBLK** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101326**
Client ID: **PBS** Batch ID: **49946** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/6/2008** SeqNo: **1576160**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49946** SampType: **LCS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101326**
Client ID: **LCSS** Batch ID: **49946** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/6/2008** SeqNo: **1576161**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.949	0.25	1.000	0	94.9	80	120				

Sample ID: **MB-49946-MS** SampType: **MS** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101326**
Client ID: **ZZZZZZ** Batch ID: **49946** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/6/2008** SeqNo: **1576162**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.696	0.25	2.000	0	84.8	70	130				

Sample ID: **MB-49946-MSD** SampType: **MSD** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101326**
Client ID: **ZZZZZZ** Batch ID: **49946** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/6/2008** SeqNo: **1576163**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	1.403	0.25	2.000	0	70.2	70	130	1.696	18.9	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

CLIENT: Geocon Consultants, Inc.
Work Order: 101989
Project: I-880, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_TC

Sample ID: **101989-007A-DUP** SampType: **DUP** TestCode: **7420_TC** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101326**
Client ID: **100-P01B** Batch ID: **49946** TestNo: **EPA 1311/ 74 EPA3010A** Analysis Date: **11/6/2008** SeqNo: **1576169**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	9.088	1.2						15.81	54.0	20	R

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories

Date: *07-Nov-08*

CLIENT: Geocon Consultants, Inc.
Work Order: 101989
Project: I-880, E8449-06-01

ANALYTICAL QC SUMMARY REPORT

TestCode: 7420_ST

Sample ID: **MB-49945A** SampType: **MBLK** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101382**
Client ID: **PBS** Batch ID: **49945** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/7/2008** SeqNo: **1577150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25									

Sample ID: **LCS-49945** SampType: **LCS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101382**
Client ID: **LCSS** Batch ID: **49945** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/7/2008** SeqNo: **1577151**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	5.068	0.25	5.000	0	101	80	120				

Sample ID: **101989-005A-DUP** SampType: **DUP** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101382**
Client ID: **168-P02A** Batch ID: **49945** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/7/2008** SeqNo: **1577153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	0.25						0	0	20	

Sample ID: **101989-005A-MS** SampType: **MS** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101382**
Client ID: **168-P02A** Batch ID: **49945** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/7/2008** SeqNo: **1577154**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.300	0.25	5.000	0	86.0	80	120				

Sample ID: **101989-005A-MSD** SampType: **MSD** TestCode: **7420_ST** Units: **mg/L** Prep Date: **11/5/2008** RunNo: **101382**
Client ID: **168-P02A** Batch ID: **49945** TestNo: **WET/ EPA 74 WET** Analysis Date: **11/7/2008** SeqNo: **1577155**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	4.176	0.25	5.000	0	83.5	80	120	4.300	2.93	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Diane Galvan

From: Chris Giuntoli [giuntoli@geoconinc.com]
Sent: Wednesday, November 05, 2008 7:59 AM
To: Diane Galvan
Subject: RE: Results - I-880 (101989)

Hi Diane,

For Workorder 101989, please run TCLP for lead on the following samples on 24 Hour TAT:

Sample ID 167-P01B,
Sample ID 168-P01A,
Sample ID 168-P01B,
Sample ID 100-P01A,
Sample ID 100-P01B.

Also, please run WET lead on 24-Hour TAT for sample ID 168-P02A.

Thanks,
Chris

623 TRENCHLESS TECHNOLOGIES (Rev 07/2008)
Bore & Jack / Horizontal Directional Drilling / Micro-Tunneling / Pipe Ramming / Pipe Bursting
Permit Code UJ

The establishment of a "Survey Grid Line" is required on installations with proposed "hole-diameters at 30" or greater," and may be required on installations with hole-diameters < 30" if warranted. **All transverse-crossings of State Highway right-of-way require encasement.** (See Table 6.8)

623.0 Introduction (Rev 07/2008)

Utility installations and service installations are not permitted to be placed within culverts or drainage structures within State highway right-of-way.

The installation of underground utilities within State highway right-of-way shall be performed by the use of a trenchless technology, in most cases. Open-cut installations will only be allowed as a last resort, by issuance of a "UT" permit. The requirement for encasement of utility installations is for the protection of the traveling public and to minimize the amount of disturbance to the structural integrity of the roadbed.

In specific cases encasement may cause a reduction in cathodic protection to the carrier pipe, which may result in corrosion to the pipeline. In these specific cases when authenticated and warranted, encasement of said facility may be waived. Encasement requirements are shown in Table 6.8.

Encasement may be required for longitudinal utility installations within city or county roadways that cross within State highway right-of-way.

623.1 Bore & Jack (Rev 10/03)

Utility installations placed by the bore & jack method shall be monitored to ensure that the integrity of the existing roadway elevations are maintained.

Bore & Jack consists of cutting of the soil, generally 6" to 8" ahead of the pipe being jacked simultaneously, by an auger placed within the encasement. The encasement should generally support the integrity of the hole. When the encasement is also to serve as the carrier facility for hazardous materials, the use of another trenchless installation is recommended. Potential damage could occur during the jacking process, rendering the use of that facility as the carrier pipe useless.

Table 6.8 (Rev 11/11)
Encasement Considerations for Transverse Crossings

Encasement Requirements based on: Installation Method, Type of Highway Facility, and Material Transported in Carrier						
	Bore and Jack		Directional Drilling		Trenching	
Facility Type	**Frwy/Expwy**	**Conventional**	**Frwy/Expwy**	**Conventional**	**Frwy/Expwy**	**Conventional**
High Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Encase
Low Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Encase*
Exempt Facilities (Section 605)	Encase	Encase	Encase*	Encase*	Encase*	Encase*
Pressurized Fluids	Encase	Encase	Encase	Encase	Encase	Encase
Natural Gas Lines Minimum 7.5' Depth (Appendix H)	Encase*	Encase*	Encase*	Encase*	Encase*	Encase*
Gravity Flows	Encase	Encase	Encase	Encase	Encase*	Encase*

**NOTE: The District Permit Engineer may waive at his/her discretion the encasement requirement when warranted*

623.1A Encasements

Encasements that house carrier pipes under pressure shall be steel pipe with a minimum inside diameter sufficiently larger than the outside diameter of the pipe or duct to accommodate placement and removal and shall conform to Caltrans' Standard Specifications. The steel encasement can be either new or used, or of the approved connector system. Used steel casing shall be pre-approved by a Caltrans' representative prior installation.

When the method of Horizontal Directional Drilling is used to install the encasement, the use of High Density Polyethylene Pipe (HDPE) as the encasement is acceptable. In specific instances the approval of Headquarters Office of Encroachment Permits, may be required.

Reinforced Concrete Pipe (RCP) in compliance of State Standard Specifications is an acceptable carrier for storm drain gravity flow or non-pressure flow. RCP when installed by Bore & Jack shall have rubber gaskets at the joints, and holes for the grouting of voids left by jacking operations (see grouting requirements in # 4 below).

Encasement requirements:

1. All transverse crossings, single ducts or pipes 6" or greater in diameter shall be encased. Installation of multiple ducts or pipes, regardless of diameters, shall require encasement (for exceptions see Appendix H).

2. The minimum wall thickness required for steel encasements is based on lengths and diameters of pipes. See Table 6.9.

3. Encasement ends shall be plugged with un-grouted bricks or other suitable material approved by the Caltrans' representative.

4. The Caltrans' representative may require the permittee to pressure grout, filling any voids generated in the course of the permitted work. Grouting shall be at the expense of the permittee. Grout holes when placed inside the of the pipe, generally on diameters of 36” or greater, shall be on 8' centers, longitudinally and offset 22-1/2 degrees from vertical, and staggered to the left and right of the top longitudinal axis of the pipe. Grout pressure shall not exceed 5 psig for a duration sufficient to fill all voids.

5. There is a spacing requirement when placement of multiple encasements is requested. The distance between multiple encasements shall be the greater of either 24” or twice that of the diameter of the larger pipe being installed.

6. Wing cutters when used shall only add a maximum of 1" in diameter to the outside diameter of the encasement pipe. Voids in excess of the Standard Specifications shall be grouted.

7. A band welded to the leading edge of the encasement pipe should be placed square to the alignment and not on the bottom edge of pipe. A flared lead section on bores over 100' shall not be permitted.

8. The length of the auger strand shall be equal to that of the section of encasement pipe.

9. Encasements placed within conventional highway right-of-way shall extend 5' beyond the edge of the paved shoulder, back of curb, or to the highway right-of-way line.

10. Encasements placed across controlled access right-of-way shall extend to the highway right-of-way lines.

Table 6.9
Minimal Wall Thickness for Steel Pipe Casings

Casing Pipe Diameter	Up to 150' in length	Over 150' in Length
6" to 28"	1/4"	1/4"
30" to 38"	3/8"	1/2"
40" to 60"	1/2"	3/4"
62" to 72"	3/4"	3/4"

623.1B Bore and Receiving Pits (Rev 10/03)

Requirements:

1. Shall be located a minimum of 10' from the edge of pavement in rural areas, or at least 5' beyond the concrete curb and gutter or AC dike in urban areas, or at least 5' beyond the toe of slope of embankments.

2. Shall be located outside of controlled access highway right-of-way. EXCEPT, when approved by the district for direct crossings that are excessively long, or there is restricted space available for placement, outside of the right-of-way. Those portions of the installation not placed by Bore & Jack shall be encased by the open trench method.

3. Protected by placement of 6' chain link fence or Type-K barrier around them.

4. Shored in accordance to Cal-OSHA requirements. Shoring of pits located within 15' of lanes within State highway right-of-way shall not extend more than 36" in height above the pavement grade, unless authorized by a Caltrans' representative.

5. Reflectors shall be affixed to the shoring on all sides facing traffic.

6. Pits shall not affect any State facilities, or create a hazard to the traveling public. Damaged State facilities shall be replaced in-kind or repaired to their original state.

7. All pits should have crushed-rock and sump areas to clear groundwater and water used to clean the casings. Pits shall be lined with filter fabric when groundwater is found and pumping is required.

8. Temporary Type-K railing shall be placed at a 20:1 taper or as otherwise directed by the Caltrans' representative to maintain the integrity of the adjacent travel lane.

A tunnel is defined as any installation that is 30" or larger in diameter (see Section 518, and Table 5.24 - Permit Code TN).

623.2 Horizontal Directional Drilling (Rev 07/08)

Horizontal Directional Drilling is another trenchless method for the placement of encasement and/or carrier pipe under, across or within existing highway right-of-way.

623.2A BACKREAMER DETECTION

JANUARY 1, 2000, sonde detection on the backreamer is required. (See Appendix E, "Guidelines and Specifications for Trenchless Technology Projects")

NON-STORM WATER INFORMATION PACKAGE

CONTRACT NO. 04-3A9224

04-ALA-880-24.0/25.5
IN ALAMEDA COUNTY
0.2 MILE NORTH OF DAVIS ST OC TO HEGENBERGER RD OC
ON I-880

MAY 2012

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CONTRACT NO. 04-3A9224

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3. LIST OF PUBLICLY OWNED TREATMENT WORKS (POTW) FACILITIES

ESTIMATE RATE OF SEEPAGE

PARIKH
Practicing in the Geosciences

Geotechnical
Environmental
Materials Testing
Construction Inspection

Rajappan & Meyer Consulting Engineers, Inc.
1038 Leigh Avenue, Suite 100
San Jose, CA 95126

Job No. 2006-139-UPR
May 12, 2012

Attn: Mr. Keith Meyer

Subject: Estimate of Seepage Flow Rate for Excavations, San Leandro Creek Bridge & Overhead (Widen) (Br. No. 33-0100), Alameda County, California

Reference: Foundation Report for San Leandro Creek Bridge & Overhead (Widen) (Br. No. 33-0100) dated February 29, 2012.

Dear Mr. Meyer:

As requested, we are providing a memorandum for the estimated groundwater seepage flow rate expected during the excavations for this project. Based on the project plans and geotechnical investigation, we estimate that dewatering will be required at the bent pile cap excavations. San Leandro Creek is the vicinity. It is our understanding that the memo will be attached to the Stormwater Information Handout.

The flow of groundwater through porous media, such as soil, is dependent upon many variables. The most important parameters that control the flow of water in soil are the permeability of the soil and the head differential. The permeability of the soil can be determined from laboratory test results or a site pump test. In the absence of laboratory tests or pump test data, an estimate of the permeability can be made based on standard correlations published in geotechnical literature. Head differential can be determined based on the elevation of the measured phreatic surface and the anticipated drawdown needed to keep the ground surface dry and workable.

The permeability of soil is generally very difficult to estimate accurately from laboratory tests and correlations. This is because the permeability of the soil is dependent on numerous factors such as the soil density, the void ratio, the presence of sand or silt lenses, the soil saturation, sample disturbance, etc. It is virtually impossible to account for all these factors accurately in the laboratory or when correlating with published values. Consequently, permeability based on laboratory tests and/or correlations can be off by orders of magnitude. For this project, we estimated the seepage using soil description and published soil data correlations in literature.

The estimated seepage flow rate is approximately 0.01 to 0.02 cubic feet/day/square ft of excavation below groundwater level for the pile caps. Based on boring and CPT data, the groundwater level is assumed at Elev. 12 feet. The lowest footing/pile cap elevation is at 10.7 feet per the design plans.

Please be advised that we are performing a professional service and that our conclusions and professional opinions only. All work done and all recommendations made are in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

Y. David Wang, Ph.D., P.E. 52911
Senior Engineer

Gary Parikh, G.E. 666
Project Manager

REGISTERED PROFESSIONAL ENGINEER
GAURANG R. PARIKH
No. 666
EXP. 12-31-13
GEOTECHNICAL
STATE OF CALIFORNIA

SITE INVESTIGATION REPORT – GROUNDWATER RESULTS

(Extract of Limited Site Investigation Report)

LIMITED SITE INVESTIGATION REPORT

ROUTE 880 SOUTHBOUND IMPROVEMENTS PROJECT OAKLAND/SAN LEANDRO, CALIFORNIA

PREPARED FOR:
RAJAPPAN & MEYER CONSULTING ENGINEERS, INC.
1038 LEIGH AVENUE, SUITE 100
SAN JOSE, CALIFORNIA

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA

GEOCON

GEOCON PROJECT NO. E8449-06-01

DECEMBER 2008

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. E8449-06-01
December 15, 2008

Bala Rajappan
Rajappan & Meyer Consulting Engineers, Inc.
1038 Leigh Avenue, Suite 100
San Jose, California 95126

Subject: LIMITED SITE INVESTIGATION REPORT
ROUTE I-880 SOUTHBOUND IMPROVEMENTS
HEGENBERGER ROAD TO SOUTH OF MARINA BOULEVARD
ALAMEDA COUNTY, CALIFORNIA

Dear Mr. Rajappan:

Geocon has performed environmental engineering services at the subject site in general accordance with the scope of work outlined in our Revised Final workplan dated October 23, 2008. The subject site includes the southbound shoulder, and three overcorssings within the project limits of the Route I-880 Southbound Improvements Project in Oakland and San Leandro, Alameda County, California.

The accompanying report summarizes the services performed including limited soil sample collection from soil borings advanced using hand-auger and direct-push drilling equipment, and laboratory testing.

The contents of this report reflect the views of Geocon Consultants, Inc., who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

If there are any questions concerning the contents of this report, or if Geocon may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

PROFESSIONAL GEOLOGIST
RICHARD W. DAY
No. 5479
Exp. 09-30-13
STATE OF CALIFORNIA

Richard Day, CEG, CHG
Regional Manager

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LIMITED SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This *Limited Site Investigation Report* was prepared for the Route I-880 Southbound Improvements Project in Oakland and San Leandro, Alameda County, California. The Route I-880 Southbound Improvements Project limits extend from the Hegenberger Road interchange to south of the Marina Boulevard interchange and consists of an approximately three mile roadway segment.

This report documents the limited site investigation for metals, petroleum hydrocarbons, and volatile organic compounds (VOCs) in shallow soil and groundwater within the limits of the Route I-880 Southbound Improvements Project, as depicted on the Vicinity Map, Figure 1. Soil samples were collected along the southbound shoulders and at three interchanges within the project boundaries. The soil boring locations advanced during the site investigation within the project area are depicted on the Site Plans, Figures 2a through 2f.

1.1 Purpose

The purpose of the proposed scope of services was to evaluate whether impacts due to metals, including aerially deposited lead (ADL), petroleum hydrocarbon compounds, including benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl-tert-butyl ether (MTBE), exist in the surface and near surface soil at the Site, associated with historical automobile emissions from the use of leaded gasoline or historical agricultural activities. Grab-groundwater samples were also collected at locations where groundwater may be encountered during proposed project construction activities. Grab-groundwater samples were analyzed for metals, total petroleum hydrocarbons (TPH), and VOCs, including BTEX and MTBE.

The information obtained from this investigation will be used by the Client to coordinate interchange project activities, evaluate soil reuse and soil/groundwater disposal options, and for health, safety, and waste management purposes.

In addition, we conducted an asbestos containing materials/lead containing paint (ACM/LCP) survey of the three bridge structures located within the project boundaries, which is presented under separate cover.

1.2 Proposed Improvements

The I-880 Southbound Improvement Project is proposed to include the following:

- Construction of a new HOV lane between Hegenberger Road and south of Marina Boulevard;

- Retained the services of Advanced Technology Laboratories (ATL) to perform the analyses of the soil samples.
- Notified Underground Service Alert (USA) at least 48 hours prior to fieldwork involving drilling or direct push sampling activities.

3.2 Field Activities

The field activities consisted of advancing soil borings along the southbound shoulder, and at the interchanges with 98th Avenue, Davis Street, and Marina Boulevard using hand-auger and direct-push methods. Soil samples were collected from the borings as follows:

- On November 4 and 5, 2008, we collected 177 soil samples from 59 soil borings (SB-1 through SB-18, and SB-28 through SB-68) at the following depth intervals: 0 foot to 0.5 foot, 1.0 foot to 1.5 feet (ft) and 2.0 ft to 2.5 ft. Note that boring ID's SB-19 through SB-27 were not utilized.
- On November 19 and 20, 2008, we collected 86 soil samples from 18 borings (RW1-1 through RW1-5, RW2-1 through RW2-2, RW3-2, RW3-3, RW4-1, RW4-2, RW5-1, RW8-1, and RW8-2. Soil samples from the nine of the retaining wall borings were collected at depth intervals of 1.0 ft to 1.5 ft and 5.0 ft to 5.5 ft. The remaining nine soil borings were further advanced to depths between 16 ft and 24 ft to attempt to collect grab-groundwater and/or saturated soil samples. Grab-groundwater samples were obtained from the following five borings: DSGW1, MBGW2, RW2-1, RW3-2, RW8-1, and UPRR1.

Soil boring coordinates were obtained using global positioning system (GPS) equipment. The GPS coordinates are presented in Table 1. The boring locations are depicted on the Site Plans, Figures 2a through 2f.

4.0 INVESTIGATIVE METHODS

4.1 Sampling Procedures

The soil samples collected for metals, TPH and VOCs analysis were retrieved using direct-push and hand-auger methods. Soil samples obtained from the direct-push borings were collected using 1.5-inch diameter acetate liners, which were secured with Teflon tape and plastic end caps. Soil samples collected using the hand auger were transferred from the auger bucket into individual polyethylene sample bags, with the exception of samples collected for CAM17 metals analysis, which were collected in stainless steel tubes secured with Teflon tape and plastic end caps. Grab-groundwater samples were collected using a clean stainless steel bailer into appropriate, pre-preserved, laboratory-supplied containers. Soil and grab-groundwater samples were labeled and placed in a chilled cooler for transport to the analytical laboratory. Completed shallow soil borings were backfilled to surface grade with soil cuttings, and soil borings advanced to groundwater were backfilled with neat cement grout.

Sampling equipment was cleansed by washing the equipment with a Liquinox solution followed by two successive rinses with distilled water. The decontamination water was returned to the site surface away from storm drains and inlets in a manner not to create runoff.

The soil samples were transported to ATL for analysis, under standard chain-of-custody documentation.

4.2 Laboratory Analyses

Laboratory analyses were performed under a 48-hour turn-around-time (TAT) for lead analyses, and standard TATs for the other analyses. Reproductions of the laboratory reports and chain-of-custody documentation are presented as Appendix A. The laboratory analyses performed are summarized below:

Soil

- A total of 138 soil samples were analyzed for total lead following Environmental Protection Agency (EPA) Test Method 6010
- A total of 86 soil samples were analyzed for CAM17 metals using EPA Test Methods 6010B/7471A
- A total of 81 soil samples with total lead concentrations greater than 50 mg/kg (i.e. ten times the STLC of 5 mg/l) were further analyzed for soluble WET lead
- A total of 38 soil samples with soluble WET lead concentrations greater than the STLC of 5 mg/l were further analyzed for soluble WET-DI lead
- A total of 31 soil samples with total and soluble WET lead concentrations greater than 100 mg/kg and 5 mg/l, respectively, were further analyzed for soluble TCLP lead
- A total of 20 soil samples were analyzed for total petroleum hydrocarbons (TPH) as diesel and as motor oil (TPHd/mo) using EPA Test Method 8015M
- A total of 29 soil samples were analyzed for TPH as gasoline (TPHg), BTEX, and MTBE using EPA Test Method 8021B
- Three soil samples were analyzed for VOCs using EPA Method 8260B
- Four soil samples (those collected from boring UPRR1) were analyzed for semi volatile organic compounds (SVOCs) using EPA Method 8270
- A total of 19 soil samples were analyzed for soil pH following EPA Test Method 9045

Grab-Groundwater

- Six grab-groundwater samples were analyzed for CAM17 metals using EPA Test Methods 6010B/7471A
- Six grab-groundwater samples were analyzed for TPHd/mo using EPA Test Method 8015M
- Six grab-groundwater samples were analyzed for TPHg, BTEX, and MTBE using EPA Test Method 8021B
- Six grab-groundwater samples were analyzed for VOCs using EPA Method 8260B
- One grab-groundwater sample (UPRR1) was analyzed for SVOCs using EPA Method 8270

4.3 QA/QC Procedures

Quality assurance/quality control (QA/QC) procedures were performed for each method of analysis with specificity for each analyte listed in the test method's QA/QC. The laboratory QA/QC procedures included the following:

- One method blank for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One sample analyzed in duplicate for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One spiked sample for every ten samples, batch of samples or type of matrix, whichever was more frequent, with spike made at ten times the detection limit or at the analyte level.

Prior to submitting the soil samples to the laboratory, the chain-of-custody documentation was reviewed for accuracy and completeness.

respective STLC values. Beryllium, silver, and thallium were not detected above their respective laboratory reporting limits in the soil samples.

- TPHd was reported in the soil samples at concentrations between 1.1 mg/kg and 1,100 mg/kg; TPHmo was reported in the soil samples at concentrations between 1.5 mg/kg and 1,600 mg/kg.
- TPHg, BTEX, MTBE, VOCs or SVOCs were not detected above their respective laboratory reporting limits in the soil samples analyzed for these constituents.

5.2.2 Grab-Groundwater Samples

Results for the grab-groundwater samples are presented in Tables 5 and 6.

- CAM17 metals were reported in the grab-groundwater samples as follows:
  - Arsenic was detected in two samples at concentrations of 0.011 mg/l and 0.021 mg/l
  - Barium was detected in the six samples at concentrations between 0.48 mg/l and 2.0 mg/l
  - Beryllium was detected in three samples at concentrations between 0.0038 mg/l and 0.0062 mg/l
  - Cadmium was detected in three samples at concentrations between 0.0061 mg/l and 0.0069 mg/l
  - Chromium was detected in five samples at concentrations between 0.0042 mg/l and 0.055 mg/l
  - Cobalt was detected in the six samples at concentrations between 0.023 mg/l and 0.11 mg/l
  - Copper was detected in the six samples at concentrations between 0.0072 mg/l and 0.089 mg/l
  - Lead was detected in sample DSGW1 at a concentration of 0.013 mg/l
  - Molybdenum was detected in sample MBGW2 at a concentration of 0.0077 mg/l
  - Nickel was detected in the six samples at concentrations between 0.025 mg/l and 0.39 mg/l
  - Selenium was detected in two samples at concentrations of 0.011 mg/l and 0.013 mg/l
  - Vanadium was detected in the six samples at concentrations between 0.038 mg/l and 0.082 mg/l
  - Zinc was detected in the six samples at concentrations between 0.049 mg/l and 0.38 mg/l
  - Antimony, mercury, silver, and thallium were not detected above their respective laboratory reporting limits in the grab-groundwater samples.
- TPHd was reported at concentrations between 0.060 mg/l and 0.25 mg/l
- TPHmo was reported at concentrations between 0.070 mg/l and 0.24 mg/l
- TPHg, BTEX, or MTBE were not detected above their respective laboratory reporting limits in the grab-groundwater samples
- VOCs were reported in three of the grab-groundwater samples as follows:

- 1,1-Dichloroethene (1,1-DCE) was detected in sample MBGW2 at a concentration of 0.53 micrograms per liter (µg/l)
- Dichlorodifluoromethane was detected in sample RW3-2 at a concentration of 1.8 µg/l
- Tetrachloroethene (PCE) was reported at concentrations between 3.8 µg/l and 32 µg/l
- Trichloroethene (TCE) was reported at concentrations between 0.57 µg/l and 5.5 µg/l

- SVOCs were not detected above their respective laboratory reporting limits the in grab-groundwater sample analyzed for these constituents

5.3 Laboratory Quality Assurance/Quality Control

We reviewed the laboratory QA/QC provided with the laboratory report. The data show acceptable surrogate recoveries and non-detect results for the method blanks.

The relative percent differences (RPDs) of the duplicate samples for three metals and one of the TPH analyses were outside criteria. Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) were outside recovery criteria for several analyses. The Case Narratives in the laboratory reports state that each analytical batch was validated by the Laboratory Control Sample (LCS). The data showed acceptable recoveries and RPDs for the remainder of the duplicates and matrix spikes.

Several samples required dilution due to sample matrix. The surrogate recovery for one of the laboratory duplicate sample was biased high, which was also likely due to matrix interferences. However, acceptable reporting limits were achieved and other laboratory QA/QC samples were within criteria.

Based on this limited data review, no additional qualifications of the soil data are necessary and the data are of sufficient quality for the purposes of this report.

5.4 Statistical Evaluation for Lead Detected in Soil Samples

Statistical methods were applied to the total lead data to evaluate: 1) the upper confidence limits (UCLs) of the arithmetic means of the total lead concentrations for each sampling depth; and 2) if an acceptable correlation between total and soluble lead concentrations exists that would allow the prediction of soluble lead concentrations based on calculated UCLs. The statistical methods used are discussed in a book entitled *Statistical Methods for Environmental Pollution Monitoring,* by Richard Gilbert; in an EPA *Technology Support Center Issue* document entitled, *The Lognormal Distribution in Environmental Applications,* by Ashok Singh et. al., dated December 1997; and in a book entitled *An Introduction to the Bootstrap,* by Bradley Efron and Robert J. Tibshirani.

Based on the calculated UCLs for arsenic, mercury, and vanadium, and comparisons to ESLs and the published background concentrations, offsite disposal of soil may be restricted based on metals content, depending on proposed use.

6.2.2 Petroleum Hydrocarbon Compounds

TPHg, BTEX, MTBE, VOCs or SVOCs were not detected above the laboratory reporting limit in the soil samples.

TPHd was detected above the laboratory reporting limit in the soil samples at concentrations between 1.1 mg/kg and 1,100 mg/kg, with four samples exceeding the residential and commercial/industrial land use ESL of 83 mg/kg for middle distillates in shallow soil (SFRWQCB, Table A). TPHmo was reported in the soil samples at concentrations between 1.4 mg/kg and 6,700 mg/kg, with exceeding the residential and commercial/industrial land use ESLs of 410 mg/kg and 2,500 mg/kg, respectively, for residual fuels in shallow soil (SFRWQCB, Table A).

Upper one-sided 90% and 95% upper confidence limits (UCLs) were calculated for the full set of TPHd/mo results for soil samples collected at the Site. For those samples in which TPHd/mo was not detected at concentrations exceeding the laboratory MRL, a value equal to one-half of the detection limit was used in the UCL calculation. The bootstrap results are included in Appendix B. The calculated standard bootstrap UCLs and ESLs for TPHd/mo are summarized in the following table:

Compound	90% UCL	95% UCL	Mean	Minimum	Maximum	Residential ESL	Commercial/ Industrial ESL
TPHd	266.5	293.7	167.5	1.1	1,100	83	83
TPHmo	1,360	1,511	833.7	1.4	6,700	410	2,500

Concentrations reported in milligrams per kilogram (mg/kg)

The calculated 90% and 95% UCLs for TPHd are greater than the residential and commercial/industrial land use ESL value of 83 mg/kg. The calculated UCLs for TPHmo exceed the residential land use ESL and are less than the commercial/industrial land use ESL. Therefore, offsite disposal of soil may be restricted based on petroleum hydrocarbon content, depending on proposed use.

6.3 Groundwater

6.3.1 CAM17 Metals

CAM17 metals were reported in the grab-groundwater samples collected at the Site at concentrations exceeding applicable standards. Specifically, barium, beryllium, cadmium,

chromium, nickel, and vanadium were reported above their respective ESLs for Groundwater that IS a Potential Drinking Water Source and Freshwater (SFRWQCB, Tables A and F, November 2007), Department of Health Services Maximum Contaminant Levels (DHS MCLs, Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003), and Water Quality Objectives (WQOs) for Municipal and Agricultural Supply (SFRWQCB Basin Plan, January 2007). The following CAM17 metals were reported in the grab-groundwater samples at concentrations below their respective ESLs, MCLs, and WQOs: antimony, arsenic, cobalt, copper, lead, mercury, molybdenum, selenium, silver, thallium, and zinc. Therefore, there may be restrictions for handling groundwater generated during the proposed project.

6.3.2 Organics

TPHg, BTEX, MTBE, and SVOCs were not detected above laboratory reporting limits in the samples. Reported concentrations of TPHd/mo in the grab-groundwater samples are below their respective ESLs, MCLs, and WQOs.

VOCs were and reported in the grab-groundwater samples at concentrations exceeding their respective ESLs, MCLs, and WQOs. Specifically, PCE and TCE were reported in grab-groundwater sample MBGW2 at concentrations of 32 µg/l and 5.5 µg/l, respectively. These reported values are greater than the ESLs for Groundwater That is a Current/Potential Source of Drinking Water (SFRWQCB, Tables A and F, November 2007), MCLs (Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003), and WQOs for Municipal Supply of 5.0 µg/l for each compound (SFRWQCB Basin Plan, January 2007). The detection of these compounds in the grab-groundwater samples is likely attributable to a well-documented regional plume of VOC-impacted groundwater. Therefore, there may be restrictions for handling groundwater generated during the proposed project.

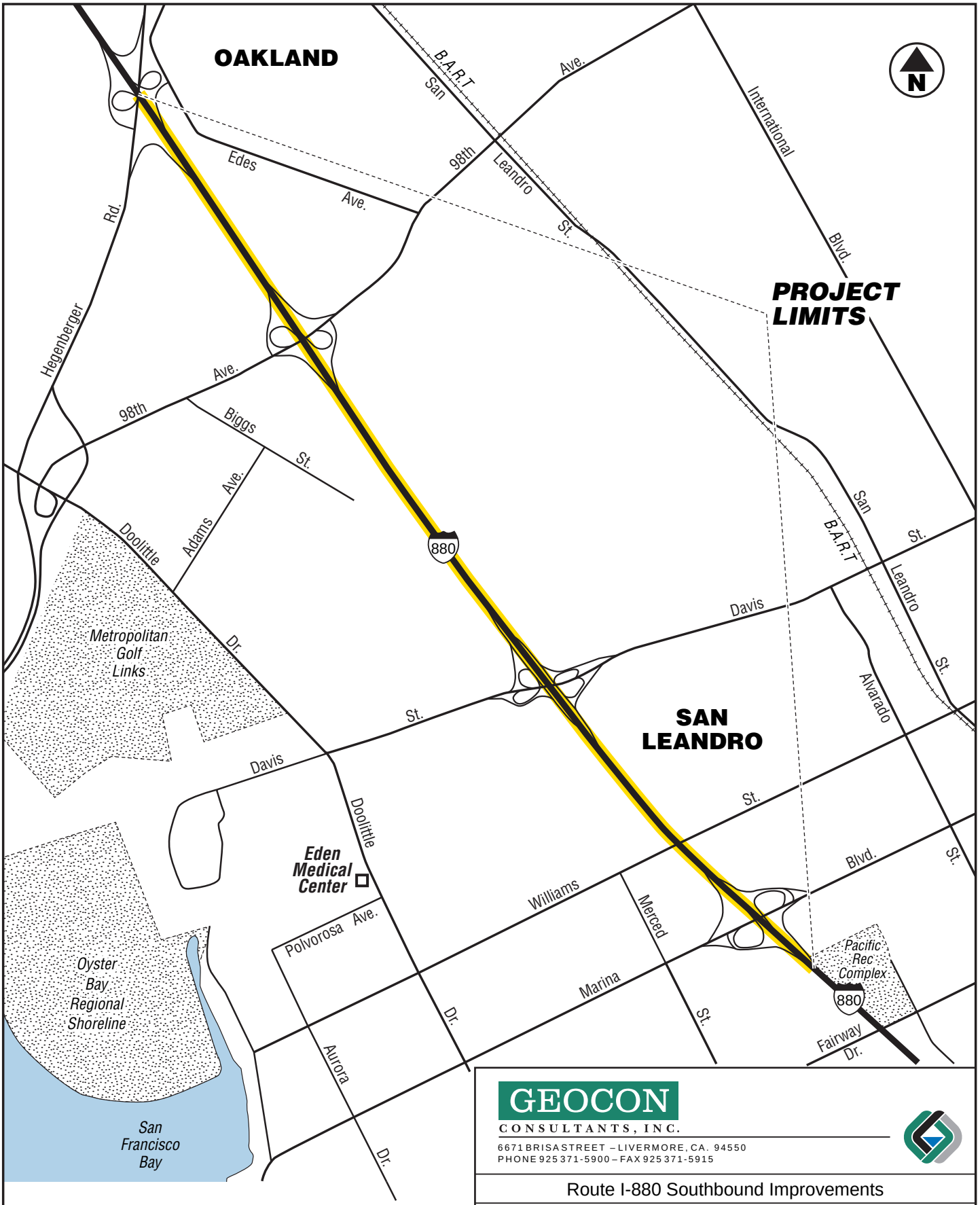
6.4 Worker Protection

Per Caltrans requirements, the contractor(s) should prepare a project-specific lead compliance plan (CCR Title 8, Section 1532.1, the "Lead in Construction" standard) to minimize worker exposure to lead-impacted soil. The plan should include protocols for environmental and personnel monitoring, requirements for personal protective equipment, and other health and safety protocols and procedures for the handling of lead-impacted soil.

7.0 REPORT LIMITATIONS

This report has been prepared exclusively for Rajappan & Meyer Consulting Engineers, Inc. The information contained herein is only valid as of the date of the field sampling, and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.



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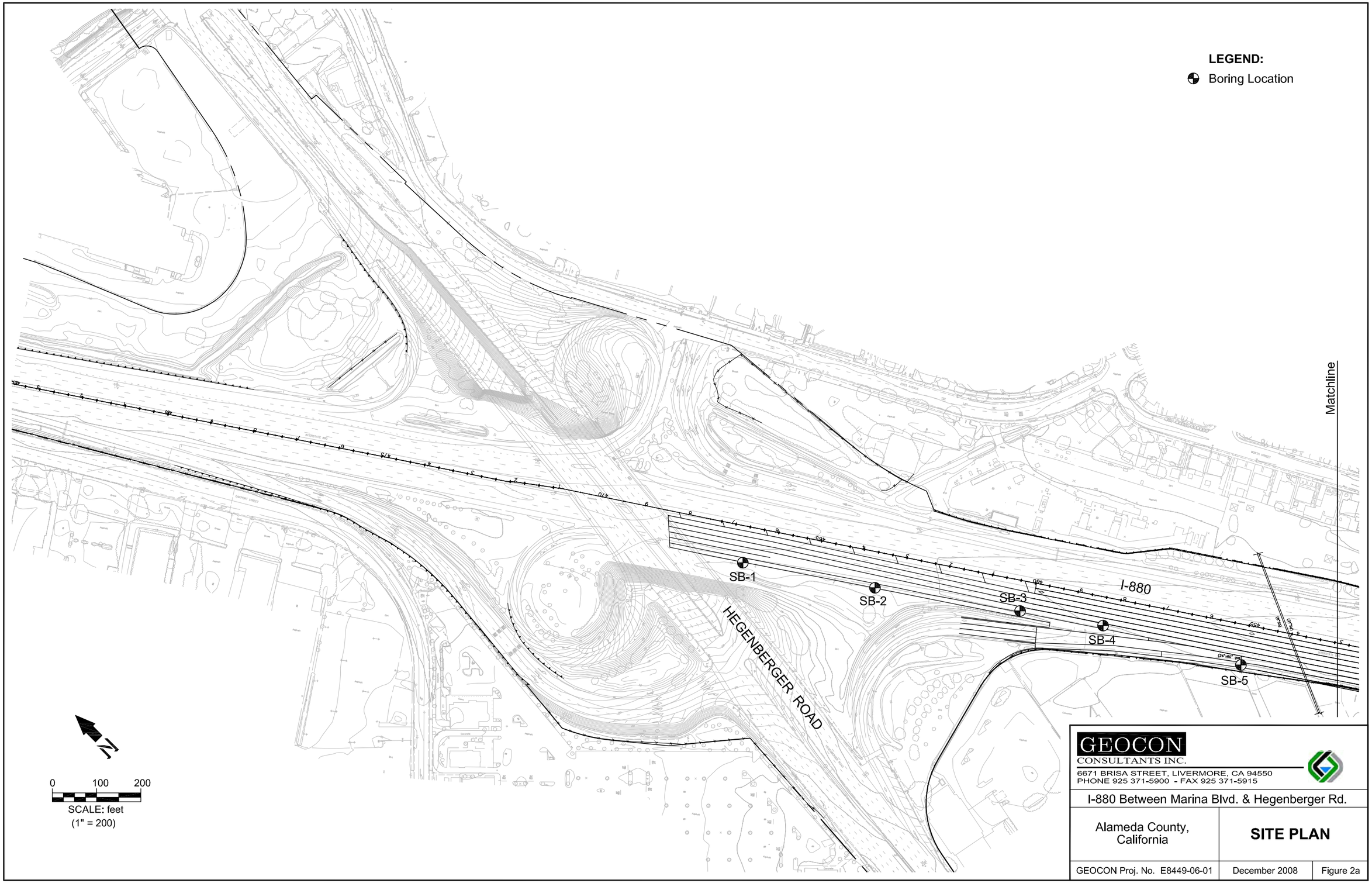
Route I-880 Southbound Improvements

Oakland & San Leandro, California

VICINITY MAP

E8449-06-01	December 2008	Figure 1



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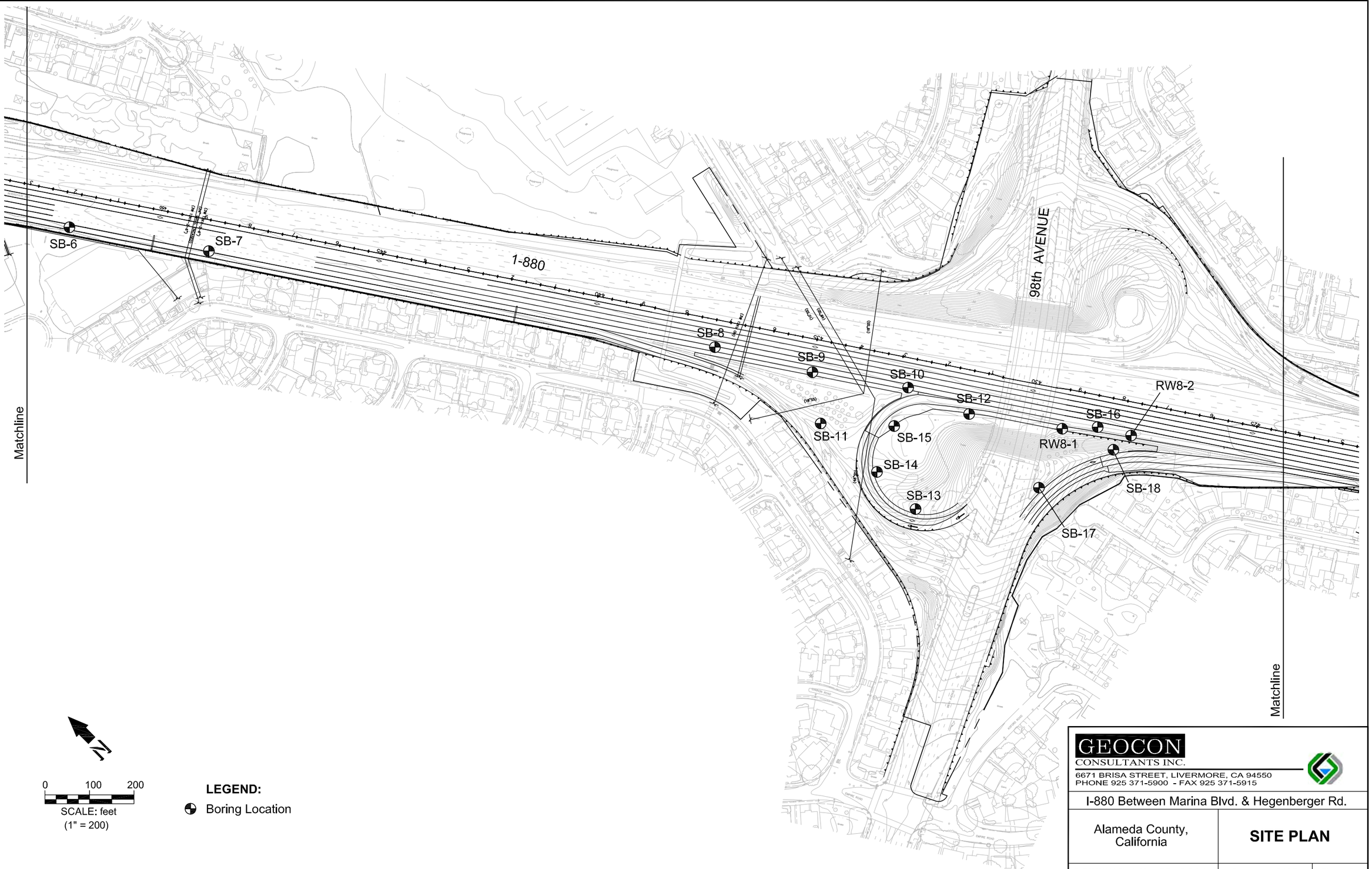
Alameda County, California

SITE PLAN

GEOCON Proj. No. E8449-06-01 | December 2008 | Figure 2a

SITE1208



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Alameda County, California

SITE PLAN

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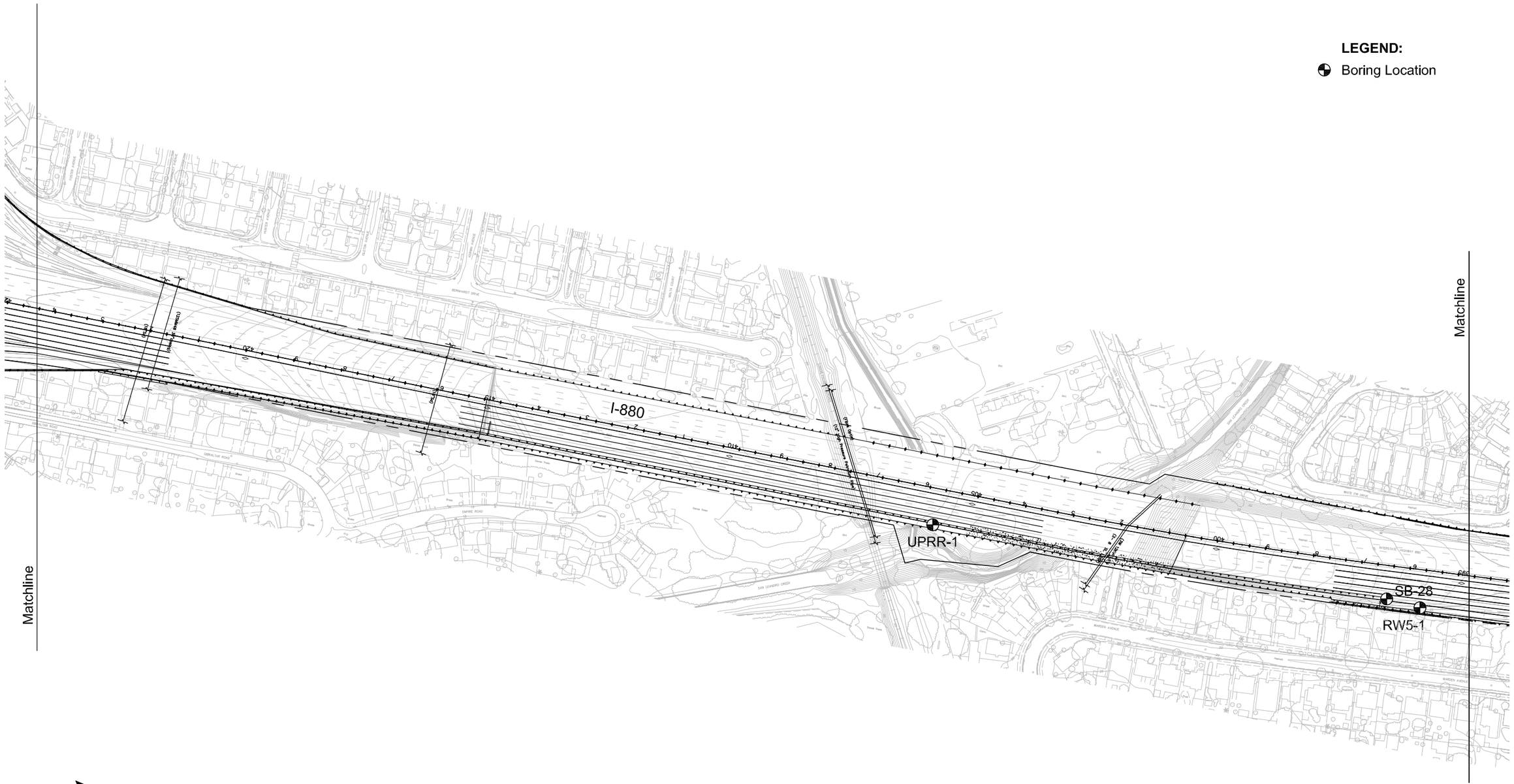
SITE1208



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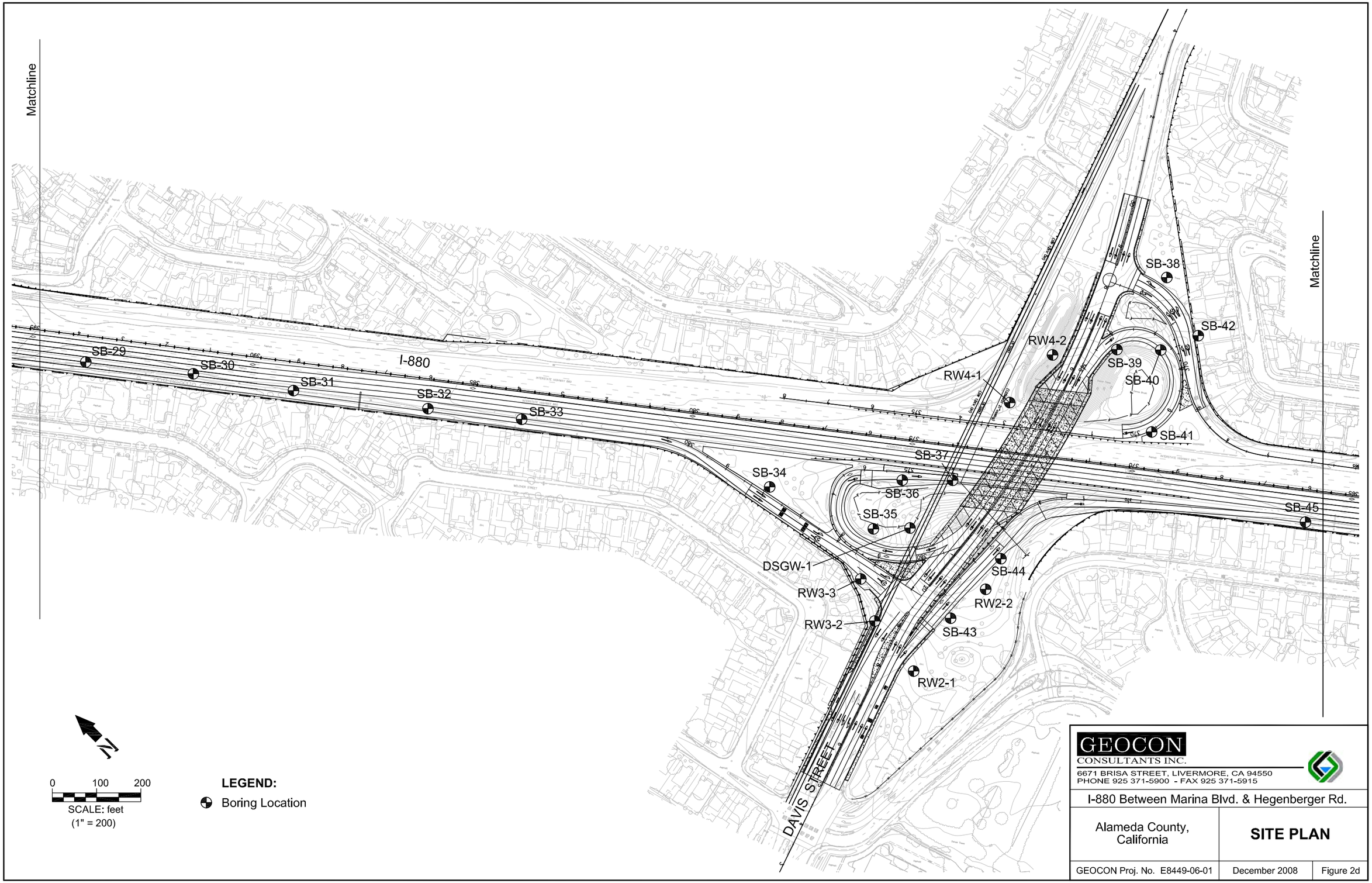
SITE1208



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SITE PLAN

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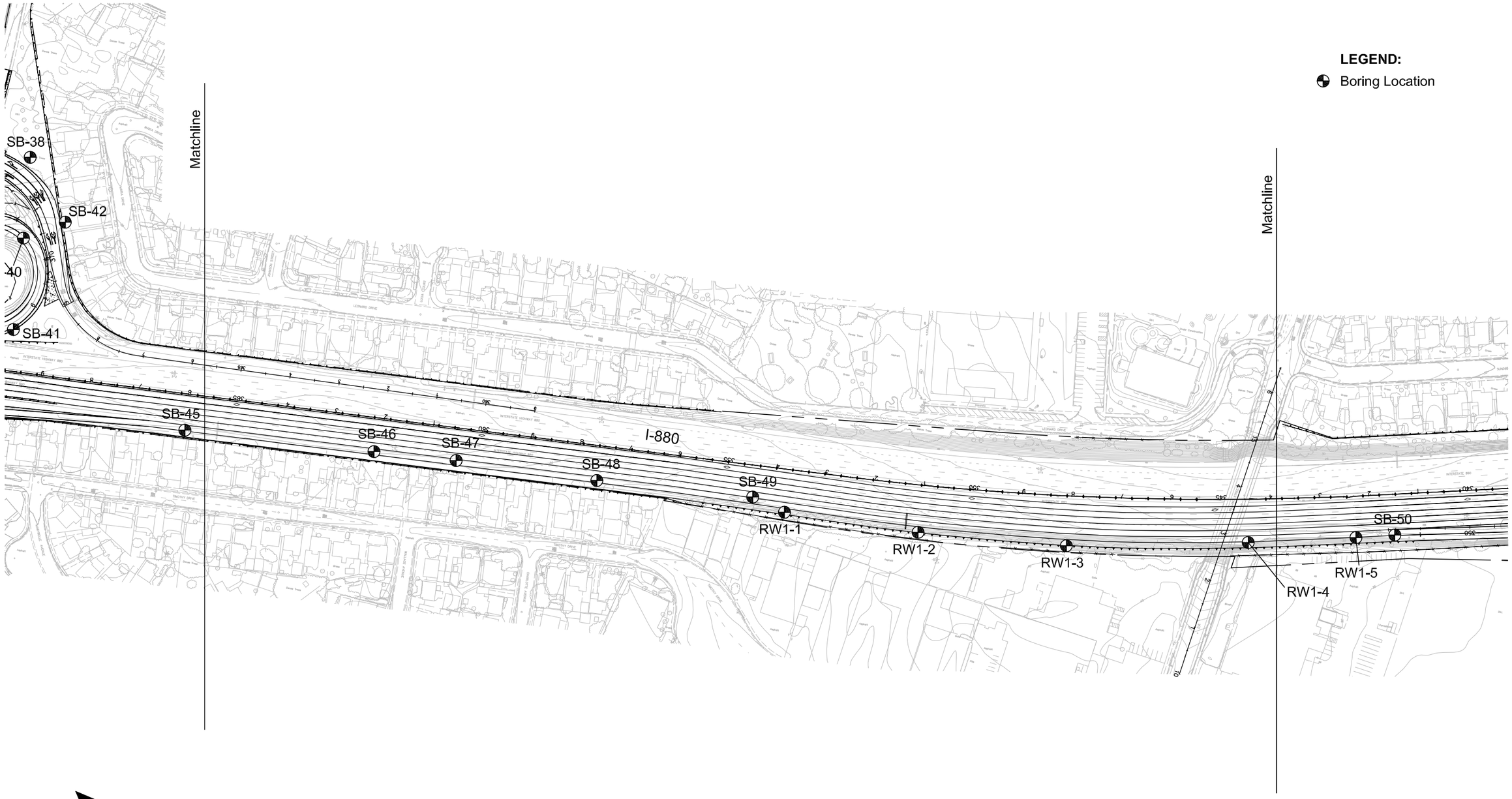
SITE1208



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SITE PLAN

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SITE1208

TABLE 5
Summary of CAM 17 Metals Results - Groundwater
Route I-880 Southbound Improvements Project
Alameda County, California

Sample I.D.	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury (ug/l)
DSGW1	<0.0050	<0.010	1.0	0.0038	0.0069	0.055	0.091	0.044	0.013	<0.0050	0.39	0.011	<0.0030	<0.015	0.057	0.38	<0.20
MBGW2	<0.0050	<0.010	1.9	<0.0030	<0.0030	0.022	0.027	0.043	<0.0050	0.0077	0.068	<0.010	<0.0030	<0.015	0.082	0.11	<0.20
RW2-1	<0.0050	<0.010	1.5	0.0062	0.0061	0.033	0.11	0.089	<0.0050	<0.0050	0.34	<0.010	<0.0030	<0.015	0.061	0.23	<0.20
RW3-2	<0.0050	0.021	1.5	0.0058	0.0062	0.0065	0.084	0.036	<0.0050	<0.0050	0.17	<0.010	<0.0030	<0.015	0.053	0.091	<0.20
RW8-1	<0.0050	0.011	0.48	<0.0030	<0.0030	<0.0030	0.029	0.019	<0.0050	<0.0050	0.058	<0.010	<0.0030	<0.015	0.038	0.049	<0.20
UPRR1	<0.0050	<0.010	2.0	<0.0030	<0.0030	0.0042	0.023	0.0072	<0.0050	<0.0050	0.025	0.013	<0.0030	<0.015	0.040	0.074	<0.20
WQOs																	
Municipal Supply	0.006	0.05	1.0	0.004	0.005	0.05	---	1.0	0.05	---	0.1	0.05	0.1	0.002	---	5.0	0.002
Agricultural Supply	---	2.0	---	0.5	0.5	1.0	5.0	5.0	10.0	0.05	2.0	0.02	---	---	1.0	10.0	---
California MCLs																	
Primary	0.006	0.05	1.0	0.004	0.005	0.05	---	---	---	---	0.1	0.05	---	0.002	---	---	2.0
Secondary	---	---	---	---	---	---	---	1.0	---	---	---	---	0.1	---	---	5.0	---
ESLs																	
GW IS Current/Potential Source of Drinking Water	0.006	0.050	1.0	0.004	0.005	0.05	0.14	1.0	0.015	0.035	0.1	0.050	0.035	0.002	0.015	5.0	2.0
GW IS NOT Current/Potential Source of Drinking Water	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Surface Water Bodies																	
Freshwater	6	0.14	1.0	0.004	0.005	0.05	0.14	1.0	0.015	0.035	0.1	0.05	0.035	0.002	0.015	5.0	5.1E-05
Marine	4,300	0.14	50	50	50	50	50	50	50	50	4.6	50	50	0.0063	50	50	5.1E-05
Estuarine	4,300	0.14	50	50	50	50	50	50	50	50	4.6	50	50	0.0063	50	50	5.1E-05

Notes:

Data are shown in units of milligrams per liter (mg/l), with the exception of mercury, which is presented in micrograms per liter (ug/l).
< = Not detected above the stated laboratory reporting limit
WQOs = Water Quality Objectives, SFRWQCB Basin Plan, Table 3-5 - WQO for Municipal Supply, January 2007.
MCLs = Maximum Contaminant Levels, Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003.
ESLs = Environmental Screening Levels, San Francisco Regional Water Quality Control Board (SFRWQCB), November 2007, Tables A, C and F.
GW = Groundwater
--- = Not Analyzed or No Standard

TABLE 6
Summary of Organics Results - Groundwater
Route I-880 Southbound Improvements Project
Alameda County, California

Sample I.D.	TPHd (mg/l)	TPHg (mg/l)	TPHmo (mg/l)	BTEX (ug/l)	MTBE (ug/l)	VOCs (ug/l)	SVOCs (ug/l)
DSGW1	0.10	<0.050	0.12	ND	<0.50	Tetrachloroethene=3.8 Trichloroethene=0.57	---
MBGW2	0.060	<0.050	0.070	ND	<0.50	1,1-Dichloroethene=0.53 Tetrachloroethene=32 Trichloroethene=5.5	---
RW2-1	0.079	<0.050	0.099	ND	<0.50	ND	---
RW3-2	0.078	<0.050	0.089	ND	<0.50	Dichlorodifluoromethane=1.8 Tetrachloroethene=13 Trichloroethene=2.5	---
RW8-1	0.25	<0.050	0.24	ND	<0.50	ND	---
UPRR1	0.078	<0.050	0.090	ND	<0.50	ND	ND
WQOs Municipal Supply	---	---	---	---	---	1,1-Dichloroethene=6.0 Tetrachloroethene=5.0 Trichloroethene=5.0	---
California MCLs Primary Standards	---	---	---	---	---	1,1-Dichloroethene=6.0 Tetrachloroethene=5.0 Trichloroethene=5.0	---
ESLs GW IS Current/Potential Source of Drinking Water	1.0	1.0	1.0	---	---	1,1-Dichloroethene=6.0 Tetrachloroethene=5.0 Trichloroethene=5.0	---
Surface Water Bodies Freshwater	1.0	1.0	1.0	---	---	1,1-Dichloroethene=3.2 Tetrachloroethene=5.0 Trichloroethene=5.0	--- ---
Marine/Estuarine	2.5	5.0	2.5	---	---	1,1-Dichloroethene=3.2 Tetrachloroethene=8.9 Trichloroethene=81	---

Notes:

mg/l = milligrams per liter
TPHd = Total Petroleum Hydrocarbons as diesel
TPHg = Total Petroleum Hydrocarbons as gasoline
TPHmo = Total Petroleum Hydrocarbons as motor oil
ND = No analytes detected above the method detection limit
< = Analyte was not detected above the laboratory reporting limit
WQOs = Water Quality Objective, SFRWQCB Basin Plan, Table 3-5 - WQO for Municipal Supply, January 2007
MCLs = Maximum Contaminant Levels, Title 22, CCR, Division 4, Chapter 15, Article 4, September 12, 2003
ESLs = Environmental Screening Levels, SFRWQCB, November 2007, Tables A, C and F.

ug/l = micrograms per liter
VOCs = Volatile organic compounds
SVOCs = Semi-volatile organic compounds
--- = No Standard

LIST OF PUBLICLY OWNED TREATMENT WORKS (POTW) FACILITIES

POTW LIST

City Discharger	Treatment Plant Name	WDR Discharger Name	Address	Phone No,	Service Area for the POTW
Oakland	EBMUD WPCP	EBMUD	375 11th St, Oakland, CA 94607	1-866-403-2683	Cities of Alameda, Albany, Berkeley, El Cerrito, Emeryville, Kensington, Oakland, and the Siege Sanitary Section of Richmond.
Oakland		City of Oakland	250 Frank H. Ogawa Plaza, Suite 4314, Oakland, CA 94612	1-510-444-2489	Part of EBMUD
San Leandro	San Leandro WPCP	City of San Leandro	3000 Davis St, San Leandro, CA 94577	1-510-577-6030	City boundaries of San Leandro