PRELIMINARY FOUNDATION REPORT

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

(Rev 2)

For

Biggs Cordosa Associates, Inc.

By

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1.0 INTRODUCTION

This "Preliminary Foundation Report" presents the results of our geotechnical engineering investigation for the proposed "Adobe Creek Pedestrian Overcrossing" for the City of Palo Alto (City) in Santa Clara County, California, hereinafter referred to as "PROJECT". The work was performed in general accordance with the scope of work outlined in our proposal to Biggs Cardosa Associates, Inc. (Designer).

2.0 SCOPE OF WORK

The purpose of this report is to evaluate the general subsurface soil conditions and engineering properties at the project site and to provide foundation design recommendations for the proposed project. The approximate location of the project site is shown on the Project Location Plan (Plate No. 1) and Site Map (Appendix I). This report supersedes the "Preliminary Foundation Report for Highway 101 Overcrossing & Reach Trail at Adobe Creek/Palo Alto Baylands" dated April, 2014.

The scope of work performed for this investigation included a review of the readily available soils and geologic literature pertaining to the project site; site reconnaissance; obtaining representative soil samples and logging soil materials encountered in the exploratory soil borings; laboratory testing of the representative soil samples, performing engineering analyses based on the field and laboratory data, and preparation of this preliminary foundation report.

3.0 PROJECT DESCRIPTION

The proposed Adobe Creek Pedestrian Overcrossing (POC) is located in the City of Palo Alto (City) in Santa Clara County, between the East Oregon Expressway and San Antonio Road overpasses of Highway 101, and will replace the existing seasonal Benjamin Lefkowitz Underpass of Highway 101 located within the Adobe Creek corridor. The grade-separated crossing will provide year-round connectivity from residential and commercial areas west of Highway 101 to the Palo Alto Baylands Nature Preserve (Baylands), East Bayshore Business

Park area, and the regional Bay Trail network of multi-use trails east of Highway 101. The project will include a new bridge structure over Highway 101 and West and East Bayshore Roads, a trail connection along Adobe Creek to East Meadow Drive, sidewalk improvements along West Bayshore Road, and landscaping and habitat restoration within the Palo Alto Baylands and along the Adobe Creek riparian corridor. The project lies primarily within City and Caltrans rights-of-way, although the south/west project area includes Santa Clara Valley Water District property and private property owned by Google.

The proposed POC will consist of multiple structure types in order to maximize the benefits of the different structure types for the various constraints present in the project. For this Type Selection Report, the POC will be divided into the following three main elements:

1. Principal Span Structure: Three span structure over Highway 101 and East and West Bayshore Roads
2. West Approach Structure: Multi-span structure located west of West Bayshore Road
3. East Approach Structure: Multi-span structure located east of East Bayshore Road

4.0 EXCEPTION TO POLICY

Normal procedures were assumed for the construction of the bridge structure throughout our analyses and represent one of the bases of recommendations presented herein. The recommendations of the proposed foundations have followed Caltrans policy.

5.0 FIELD EXPLORATION AND TESTING PROGRAM

The subsurface conditions at the site were studied by reviewing readily available geologic information and subsurface data from six exploratory borings and six cone penetration tests (CPT) drilled between August and October 2016 for the proposed bridge structure. Boring/CPT depths are shown in the table below. All elevations shown in this report are based on NAVD88 Datum.

TABLE 1 - SUMMARY OF BORING DEPTHS

Reference Boring /CPT	Approximate Ground Surface Elevation (ft) (NAVD88)	Approximate Boring/CPT Depth below Ground Surface (ft)
CPT C-1	+12	120.0
Boring B-2	+12	121.5
Boring B-3	+11	121.5
Boring B-4	+11	121.5
CPT C-5	+12	119.5
Boring B-6	+5	121.5
Boring B-7	+5	121.5
CPT C-8	+6	120.5
Boring B-9	+6	121.5
CPT C-10	+5	120.5
CPT C-11	+5	119.5
CPT C-12	+11	120.5

Drilling for Borings B-2, B-3, B-4, B-6, B-7 and B-9 was done with rotary wash drilling technique using a 5-inch diameter drill bit by Geo-Ex Subsurface Exploration. Selected soil samples were obtained from an either 2.5-inch I.D. (Modified California, MC) or 1.4-inch I.D. (at shoe of the sampler) Standard Penetration Test (SPT) sampler 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 required to drive the sampler were recorded for the last 12 inches.

Based on the hammer energy calibration information provided by the driller, the hammer efficiency percentage of the drill rig used is approximately 77% for all of the borings. All raw blow counts can be converted into 60% hammer efficiency ratio equivalent blow counts by multiplying the raw counts by 1.28. When correlating standard penetration data, the blow counts for the Modified California Sampler may be converted to equivalent SPT blow counts by multiplying an additional conversion 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.

The CPTs were performed by Gregg Drilling & In Situ, Inc. The CPTs were conducted by using a 20-Ton capacity cone with a 60-degree cone attached to a 1.7-inch diameter (tip area of 8.52 in^2) rod. The soil resistance exerted to the tip and side of the cone were recorded and correlated to "Soil Behavior Type", classification and strength characteristics.

The Log of Test Borings (LOTB) are presented in Appendix II and the boring/CPT locations are shown in Plate 2.

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.

6.0 LABORATORY TESTING PROGRAM

Laboratory tests were performed on the selected soil sample to evaluate the physical and engineering properties for analyses required for the project such as evaluation of liquefaction potential, settlement, pile capacity, and corrosion potential.

Laboratory tests include the following:

a) Moisture (California Test Method 226);
b) Density (Based on mass / volume relationships)
c) Plastic Limit, Liquid Limit & Plastic Index (California Test Method 204);
d) Grain Size Distribution Analysis (ASTM Test Method D422-63);
e) Unconfined Compression Test (ASTM Test Method 2166);
f) Corrosion Test (Sulfate content, chloride content, resistivity and pH) (California Test Methods 417, 422, and 643);
g) Consolidation Test (ASTM Test Method D2435)

The laboratory test methods and laboratory test results are presented in Appendix IV.

7.0 SITE GEOLOGY AND SUBSURFACE SOIL 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 Palo Alto 30'x60' Quadrangle, California" by E.E. Brabb et al.

Based on the publication, the project site is located on the mapped units described as below:

Artificial fill – Historic (af): Loose to very well consolidated gravel, sand, silt, clay, rock fragments, organic matter, and man-made debris in various combinations.

Artificial levee fill – Historic (alf) – Man-made deposits of various materials and ages, forming artificial levees as much as 21.5 ft high.

Bay mud – Holocene (Qhbm) – Water-saturated estuarine mud, predominantly gray, green, blue and silty clay underlying marshlands and tidal mud flats of San Francisco Bay, Pescadero, and Pacifica.

Alluvial fan and fluvial deposits - Pleistocene (Qpaf): Brown, dense gravelly and clayey sand or clayey gravel that fines upward to sandy clay.

A geologic map of the general project area is shown on Plate 3.

7.2 Subsurface Soil Conditions

Based on the boring data, the generalized descriptions of the subsurface soil materials encountered in the exploratory borings/CPTs are summarized in the Table 2 below.

TABLE 2 - SUMMARY OF SUBSURFACE SOIL CONDITIONS

Reference Borings/CPTs	Generalized Subsurface Soil Conditions
West of Hwy101 CPT C-1 Boring B-2 CPT C-5 Boring B-3 CPT C-12	About 17 feet of stiff lean/fat clay underlain by about 4 feet of medium dense and about 15 feet thick dense sand/silty sand. This is predominantly underlain by about 28 feet of stiff clays in B-2 and silty sands in B-3. These layers are predominantly underlain by very stiff clays up to the maximum depths explored.
East of Hwy101 (Bike Trail) Boring B-4 CPT C-11	About 22 feet of stiff lean/fat clay underlain by medium dense to dense silty sand. These layers are underlain by about 43 feet of intermittent layers of medium to very dense silty sands and stiff lean clays. These layers are followed by stiff to very stiff fat clay up to the maximum depth explored.
East of Hwy 101 (Baylands) Boring B-6 Boring B-7 CPT C-8 Boring B-9 CPT C-10	Interbedded layers of medium stiff to stiff lean/fat clay, medium dense to very dense sands, and medium dense silty gravels up to 42 feet followed by predominantly of very stiff lean/fat clays up to the maximum depth explored.

A soil boring "R-09-004" and a cone penetration test were completed in 2009 as a part of previous "Adobe Creek Bridge (Widen)" Project which are relatively close to the current project site. The LOTB for this reference CPT and boring is included in Appendix II of our report.

Groundwater table elevations at the time of drilling are shown in Table 3 below.

TABLE 3 – GROUND WATER LEVELS

Reference Boring /CPT	Approximate Ground Surface Elevation (ft) (NAVD88)	Approximate Groundwater Depth below Ground Surface (ft)	Approximate Groundwater Elevation (ft) (NAVD88)
CPT C-1	+12.0	12.5	-0.5
Boring B-2	+12.0	14	-2.0
Boring B-3	+11.0	18	-7.0
Boring B-4	+11.0	18	-7.0
CPT C-5	+12.0	12.6	-0.6
Boring B-6	+5.0	5	0.0
Boring B-7	+5.0	6	-1.0
CPT C-8	+6.0	Not measured	Not measured

Reference Boring /CPT	Approximate Ground Surface Elevation (ft) (NAVD88)	Approximate Groundwater Depth below Ground Surface (ft)	Approximate Groundwater Elevation (ft) (NAVD88)
Boring B-9	+6.0	13 (during drilling) / 8 (after drilling)	-7.0 (during drilling) / -2.0 (after drilling)
CPT C-10	+5.0	11.5	-6.5
CPT C-11	+5.0	12.5	-7.5
CPT C-12	+11.0	8	+3.0

The borings were drilled with rotary-wash method and the ground water elevations are based on the relative wetness of the samples. Groundwater elevations for the CPTs were calculated from piezometer sensor readings. California Geological Survey "Seismic Hazard Zone Report 060 (revised), depth to historically high ground water" map is shown at about 5 feet which slightly shallower but overall consistent with our findings. It is anticipated to vary with the passage of time due to seasonal groundwater fluctuations, variations in yearly rainfall, water elevations in the bay, surface and subsurface flows, ground surface run-off, and other environmental factors that may not be present at the time of the investigation.

We have also referred to USGS Report "Map showing thickness of young bay mud, southern San Francisco Bay, California" by McDonald et al. dated 1978 for additional information. Based on that, the proposed structure lies between thickness contours 0 and 10 feet.

8.0 SCOUR EVALUATION

The subject was considered and was determined to be not applicable for the project site since the Adobe Creek Channel is lined with concrete at the project site.

9.0 CORROSION EVALUATION

Chemical tests were performed on selected soil samples from the soil borings and a water sample taken from nearby Adobe Creek to evaluate the corrosion potential of the subsurface soil/water. The test results are as follows:

TABLE 4 - SUMMARY OF CORROSION TEST RESULT

Location	Sample Depth (ft)	Minimum Resistivity (ohms-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
B-2	16	460	8.97	347.8	260.2
B-3	2	510	8.40	500.4	99.9
B-4	16	460	9.04	33.1	300.3
B-6	3	130	8.62	2238.4	1092.3
B-7	11	540	8.65	346.7	145.9
B-9	6	400	8.17	821.9	617.7
Adobe Creek Water Sample	Near Surface	800	7.56	78.3	62.1

According to Caltrans Corrosion Guidelines, January 2015 (Version 2.1), Caltrans considers a site to be corrosive to foundation element if one of the following conditions exists for the representative soil/water samples taken at the site:

- Chloride concentration is greater than or equal to 500 ppm,
- Sulfate concentration is greater than or equal to 2000 ppm,
- pH is 5.5 or less.

Based on the corrosion test results as shown in Table 4, the soils tested in Borings B-3, B-6 and B-9 are considered corrosive per Caltrans guidelines. Chapter 12 of the Caltrans Corrosion Guidelines and AASHTO LRFD Specifications (6^{th} Edition), Chapter 5.12.3 can be referred to for mitigation measures.

10.0 SEISMIC RECOMMENDATIONS

10.1 Seismic Sources

The project is located in a seismically active part of northern California. Many faults exist in the regional area. These faults are capable of producing earthquakes and may cause strong ground shaking at the site.

Maximum magnitudes (M_{max}) of some of the closest faults in the area are based on Caltrans ARS Online Website. These maximum magnitudes represent the largest earthquake a fault is capable of generating and is related to the seismic moment. The earthquake data of the active faults in the project vicinity are summarized in the table below. A Caltrans ARS Online Map showing faults in the vicinity for ARS calculation purposes is shown on Plate 5.

TABLE 5 - ARS DATA

Fault (Fault ID)	Maximum Magnitude of Fault, M_{max}	Fault Type	Site-to-Fault Distance (R_{rup})*
Cascade fault (153)	6.7	Reverse	5.6 km
San Andreas fault zone (Peninsula) 2011 CFM (134)	8.0	Strike Slip	12.1 km
San Andreas fault zone (Santa Cruz Mts) 2011 CFM (158)	8.0	Strike Slip	17.8 km

*Closest distance (km) to the fault rupture plane calculated by Caltrans ARS Online.

10.2 Seismic Design Criteria

The project site is located in a seismically active part of northern California. Seismic activity may result in geological and seismic hazards including seismically induced fault displacement and rupture, ground shaking, liquefaction, lateral spreading, landslides, and structural hazards.

The design spectrum shall be designed in accordance with the 2012 Caltrans Fault Database (Version 2b) and the Acceleration Response Spectrum (ARS) Online web tool (Version 2.3.08). 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 30m/100 feet (Vs_{30m}), and other site parameters, such as fault characteristics, site-to-fault distances.

The current design methods incorporate both "Deterministic and Probabilistic Seismic Hazards" to produce the "Design Response Spectrum". According to the recent Caltrans methodology, the Caltrans probabilistic response spectrum to be used for design of bridge structures is verified with the spectrum from "2008 USGS National Seismic Hazard Map" for the 5% in 50 years probability of exceedance (or 975 year return period) at periods of 0, 0.3, 1 and 3 seconds.

Average shear wave velocity (V_s) for the top 100 feet at the site was estimated by using established correlations and the procedure provided in the Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations (November 2012). The site location and the relevant parameters are summarized as follows, and the design and comparison curves are presented on Plates 5A and 5B.

1. Site Location: 37.432531ºN/122.105675ºW
2. Estimated V_{S30m} = 210 m/s (See Appendix V for summary calculation)
3. Peak Ground Acceleration = 0.585g
4. Maximum Magnitude = 8.0
5. The recommended ARS curve is governed by the Caltrans Online Probabilistic ARS.
6. An adjustment factor for near fault effects was 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.
7. No adjustments were made for basin effect.

10.3 Seismic Hazards/Liquefaction Potential

10.3.1 Seismic Hazards

Potential seismic hazards may arise from three sources: surface fault rupture, ground shaking, liquefaction and seismically-induced dry sand settlement.

10.3.2 Seismic Ground Shaking

Based on available geological and seismic data, the possibility of the site to experience strong ground shaking is considered high. A PGA of 0.585 g was estimated for the site, which is discussed in Section 10.1.

10.3.3 Surface Fault Rupture

Since no known active faults pass through the site, the fault rupture potential at the site does not exist.

10.3.4 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.

The Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California (Witter et. al., 2006) indicates the potential for liquefaction to occur is high to very high. Refer to Plate 6 for the Liquefaction Susceptibility Map.

The liquefaction potential for the project site was evaluated in accordance with the methods proposed by Youd, et. al. (2001) using the procedures (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." As indicated by further 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 Caltrans Online Probabilistic ARS, which is based on several input parameters, including the site location (longitude/latitude), average shear wave velocity for the top 30 m/100 feet (V_{s30}). A PGA of 0.585g was used for analyses.

Based on the analysis, the potential of liquefaction at the site exists. Summary of the liquefaction analysis results are shown in the summary table below:

TABLE 6 – LIQUEFACTION SUMMARY TABLE

Boring	Liquefiable Soil Depth (ft)	Thickness (ft)	Average $N_{1,60(cs)}$ (bpf)	Post-Liquefaction Settlement (in)
C-1	53.0 to 58.9	5.9	-	-
B-2	22.5 to 28.0	5.5	24**	0.79
	58.0 to 64.0	6.0	10	1.68
B-3	18.5 to 23.0	4.5	20	0.73
	58.0 to 64.0	6.0	22	0.92
B-4	58 to 64	6.0	24**	0.88
C-5	Not susceptible*	-	-	-
B-6	13.5 to 18.5	5.0	17	0.94
	53.5 to 58.0	4.5	19	0.76
B-7	33.5 to 38.0	4.5	19	0.76
	53.5 to 61.0	7.5	16	1.46
C-8	36.6 to 41.2	4.6	-	-
B-9	13.0 to 18.0	5.0	16	0.96
	28.0 to 31.0	3.0	11	0.77
C-10	14.9 to 24.8	9.9	-	-
	35.9 to 41.2	5.3	-	-
C-11	Not susceptible*	-	-	-
C-12	26.7 to 31.3	4.6	-	-

*Liquefaction from layers with thicknesses <3' are considered insignificant and not listed.
**Borderline non-liquefiable/liquefiable material.

The soils above the groundwater level are predominantly of cohesive nature. Therefore, analysis of seismically induced dry sand settlement is considered not applicable at this site.

11.0 AS-BUILT FOUNDATION DATA

This is a new structure. Therefore, there are no as-built logs of test borings.

12.0 PRELIMINARY FOUNDATION RECOMMENDATIONS

12.1 General

This report was prepared specifically for the proposed project according to the plans provided to us. Normal construction procedures were assumed throughout our analysis and represent one of the bases of recommendations presented herein. Our design criteria have been based upon the materials and subsurface soil conditions encountered in the soil borings at the project site. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations. The calculations and foundation recommendations presented in this report are preliminary and may need to be revised during final design stage.

12.2 Foundations

Both driven piles (open-ended steel pipe) and Cast-In-Drilled-Hole (CIDH) are considered feasible from a geotechnical standpoint. For CIDH construction, due to ground water and presence of granular layer, steel casing and slurry construction may be necessary to minimize caving issues. The Designer has elected to use CIDH piles for the project, to best fit structural, civil and environmental constraints within the project limits.

Based on the information received from the designer, 3, 5 and 6 feet diameter CIDH piles will be used as foundation supports. It is our understanding Bents 2 through 4 and Bents 9 through 14 will be Type II CIDH shafts, which are designed so the plastic hinge will form at or above the shaft/column interface. Pertinent foundation design information provided by the Structural Designer (Biggs Cordosa Associates, Inc., BCA), including Foundation Design Data and Foundation Loads, are presented in the following tables. The cut-off elevation is defined as the elevation of the top of the pile which is indicated on the contract drawing. Finish grade elevation is defined as the final ground surface elevation after construction.

TABLE 7 – FOUNDATION DESIGN DATA

Support No.	Pile Type	Finish Grade Elev. (ft) (NAVD88)	Pile Cut-off Elev. (ft) (NAVD88)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)	No. of Piles per Support
				B	L		
WEST APPROACH							
ABUT 1	60” Dia CIDH	12.20	10.20	N/A	N/A	1	1
BENT 2	72" Dia CIDH	11.80	7.80	N/A	N/A	1	1
BENT 3	72" Dia CIDH	11.60	8.60	N/A	N/A	1	1
BENT 4	72" Dia CIDH	12.00	10.00	N/A	N/A	1	1
PRINCIPAL SPAN							
BENT 5	36" Dia CIDH	10.60	3.05	15.0	15.0	1	4
BENT 6	60" Dia CIDH	11.70	4.95	7.0	25.0	2	2
BENT 7	60" Dia CIDH	11.90	5.15	7.0	25.0	2	2
BENT 8	36" Dia CIDH	7.50	1.75	15.0	15.0	1	4
EAST APPROACH							
BENT 9	72" Dia CIDH	3.50	2.00	N/A	N/A	1	1
BENT 10	72" Dia CIDH	3.30	1.80	N/A	N/A	1	1
BENT 11	72" Dia CIDH	3.50	0.50	N/A	N/A	1	1
BENT 12	60" Dia CIDH	3.70	2.20	N/A	N/A	1	1
BENT 13	60" Dia CIDH	3.50	1.00	N/A	N/A	1	1
BENT 14	60" Dia CIDH	4.50	-0.50	N/A	N/A	1	1
ABUT 15	36” Dia CIDH	5.10	0.40	15.0	17.0	1	4

Note: Table Provided by Biggs Cardosa Associates (BCA), Inc. dated April, 13 ,2017

TABLE 8 – FOUNDATION DESIGN LOADS

Support No.	Service-I Limit State (kips)		Strength Limit State (Controlling Group, kips)				Extreme Limit State (Controlling Group, kips)			
	Total Load Per Support	Permanent Loads Per Support	Compression		Tension		Compression		Tension	
			Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
WEST APPROACH										
ABUT 1	210	190	280	280	N/A	N/A	N/A	N/A	N/A	N/A
BENT 2	380	300	510	510	N/A	N/A	300	300	N/A	N/A
BENT 3	380	310	510	510	N/A	N/A	310	310	N/A	N/A
BENT 4	430	340	570	570	N/A	N/A	340	340	N/A	N/A
PRINCIPAL SPAN										
BENT 5	500	440	640	220	N/A	N/A	440	210	N/A	N/A
BENT 6	660	520	880	440	N/A	N/A	520	260	N/A	N/A
BENT 7	660	520	920	460	N/A	N/A	520	260	N/A	N/A
BENT 8	490	430	630	190	N/A	N/A	430	200	N/A	N/A
WEST APPROACH										
BENT 9	400	310	520	520	N/A	N/A	310	310	N/A	N/A
BENT 10	490	400	650	650	N/A	N/A	400	400	N/A	N/A
BENT 11	490	400	650	650	N/A	N/A	400	400	N/A	N/A
BENT 12	370	300	500	500	N/A	N/A	300	300	N/A	N/A
BENT 13	390	310	520	520	N/A	N/A	310	310	N/A	N/A
BENT 14	400	310	510	510	N/A	N/A	310	310	N/A	N/A
ABUT 15	500	470	650	210	N/A	N/A	N/A	N/A	N/A	N/A

Note: Table Provided by Biggs Cardosa Associates (BCA), Inc. dated April, 13, 2017

The pile capacities of the CIDH piles were estimated in general accordance with the procedures outlined in Section 10.8.3.5 of AASHTO LRFD BDS, which is quoted from the "Drilled Shafts: Construction Procedures and Design Methods" by O'Neill and Reese (1999). The procedure utilizes α factor for cohesive materials, where α is a function of the undrained shear strength of the clayey materials, and β factor for cohesionless materials, which is a function of the depths.

According to AASHTO LRFD BDS 10.8.3.5.1b and C10.8.3.5.1b (Side Resistance), the following portions of a drilled shaft, should not be taken to contribute to the development of resistance through skin friction:

a) At least the top 5.0 ft of any shaft; and

b) For straight shafts, a bottom length of the shaft taken as the shaft diameter.

Computer program "SHAFT" (by ENSOFT, Inc.) was used for calculation purpose. The analysis results are presented in Appendix V.

Per Caltrans Memo-To-Designer 3-1, an optional construction joint should be allowed for Type II shafts for the embedded column rebar cage below pile cutoff elevation. A permanent steel casing is required to allow workers to prepare the construction joint in the hole.

The pile capacity of the CIDH pile was derived only from frictional resistance along the pile shafts, and end bearing capacity was not included when estimating the pile capacity. In addition to the reductions in items "a" and "b" above, for piles that will be constructed with a construction joint, the side friction capacity between the cut-off elevation and the permanent casing was ignored. The permanent casing bottom elevations were assumed to be at 5 feet below the construction joint elevations.

The loss of frictional capacity from liquefied layers and downdrag forces are considered in our analysis where necessary. Downdrag forces are not considered between ground surface and tip of the steel casing, where steel casing will be installed for Type-II CIDH construction.

The load deflection relationship was obtained from SHAFT program which is used to estimate the pile head deflection under different loading conditions. According to the design demands provided by the designer, the pile deflections under demand Service Limit State do not govern the design. The settlement charts from "SHAFT" are included in Appendix V.

The evaluation of Load Demands on the piles, based upon LRFD is presented in Table 8 "Foundation Design Loads" above. The estimated specified tip elevations for the anticipated design loading of the piles are shown in Tables 9 and 10 below. The pile cut-off elevations are shown in Table 7.

TABLE 9 - FOUNDATION DESIGN RECOMMENDATIONS

Support No.	Pile Type	Cut-off Elevation (ft) (NAVD88)	Service-I Limit State Load (kips) per Support		Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elev. (ft) (NAVD88)	Specified Tip Elev. (ft) (NAVD88)
						Strength Limit		Extreme Event			
			Total	Permanent		Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
WEST APPROACH											
ABUT 1	60” Dia CIDH	10.20	210	190	1	280	N/A	190	N/A	(a-I) -36.0 (a-II) -28.0	-36.0
BENT 2	72" Dia CIDH	7.80	380	300	1	510	N/A	300	N/A	(a-I) -57.0 (a-II) -36.0	-57.0
BENT 3	72" Dia CIDH	8.60	380	310	1	510	N/A	310	N/A	(a-I) -57.0 (a-II) -36.0	-57.0
BENT 4	72" Dia CIDH	10.00	430	340	1	570	N/A	340	N/A	(a-I) -58.0 (a-II) -39.0	-58.0
PRINCIPAL SPAN											
BENT 5	36" Dia CIDH	3.05	500	440	1	220	N/A	210	N/A	(a-I) -45.0 (a-II) -59.0	-59.0
BENT 6	60" Dia CIDH	4.95	660	520	2	440	N/A	260	N/A	(a-I) -53.0 (a-II) -32.0	-53.0
BENT 7	60" Dia CIDH	5.15	660	520	2	460	N/A	260	N/A	(a-I) -41.0 (a-II) -22.0	-41.0
BENT 8	36" Dia CIDH	1.75	490	430	1	190	N/A	200	N/A	(a-I) -28.0 (a-II) -29	-29.0
EAST APROACH											
BENT 9	72" Dia CIDH	2.00	400	310	1	520	N/A	310	N/A	(a-I) -74.0 (a-II) -85.0	-85.0
BENT 10	72" Dia CIDH	1.80	490	400	1	650	N/A	400	N/A	(a-I) -83.0 (a-II) -89.0	-89.0
BENT 11	72" Dia CIDH	0.50	490	400	1	650	N/A	400	N/A	(a-I) -83.0 (a-II) -89.0	-89.0
BENT 12	60" Dia CIDH	2.20	370	300	1	500	N/A	300	N/A	(a-I) -79.0 (a-II) -86.0	-86.0
BENT 13	60" Dia CIDH	1.00	390	310	1	520	N/A	310	N/A	(a-I) -79.0 (a-II) -86.0	-86.0
BENT 14	60" Dia CIDH	-0.50	400	310	1	510	N/A	310	N/A	(a-I) -79.0 (a-II) -86.0	-86.0
ABUT 15	36” Dia CIDH	0.40	500	470	1	210	N/A	130	N/A	(a-I) -45.0 (a-II) -78.0	-78.0

Notes:

(i) Design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event).

(ii) The design tip elevations for extreme limit compression case consider downdrag forces for all supports except for Bents 7 and 8.

TABLE 10 - PILE DATA TABLE

Support No.	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft) (NAVD88)	Specified Tip Elev. (ft) (NAVD88)
		Compression	Tension		
WEST APPROACH					
ABUT 1	60" Dia CIDH	400	N/A	(a) -28.0	-28.0
BENT 2	72" Dia CIDH	730	N/A	(a) -50.0	-50.0
BENT 3	72" Dia CIDH	730	N/A	(a) –50.0	-50.0
BENT 4	72" Dia CIDH	820	N/A	(a) -52.0	-52.0
PRINCIPAL SPAN					
BENT 5	36" Dia CIDH	320	N/A	(a) -55.0	-55.0
BENT 6	60" Dia CIDH	640	N/A	(a) -49.0	-49.0
BENT 7	60" Dia CIDH	660	N/A	(a) -39.0	-39.0
BENT 8	36" Dia CIDH	280	N/A	(a) -26.0	-26.0
EAST APPROACH					
BENT 9	72" Dia CIDH	760	N/A	(a) -81.0	-81.0
BENT 10	72" Dia CIDH	940	N/A	(a) -86.0	-86.0
BENT 11	72" Dia CIDH	940	N/A	(a) -86.0	-86.0
BENT 12	60" Dia CIDH	760	N/A	(a) -83.0	-83.0
BENT 13	60" Dia CIDH	760	N/A	(a) -83.0	-83.0
BENT 14	60" Dia CIDH	760	N/A	(a) -83.0	-83.0
ABUT 15	36" Dia CIDH	300	N/A	(a) -78.0	-78.0

Notes:
(1) Design tip elevations are controlled by: (a) Compression
(2) Nominal Resistances include downdrag forces for all supports except for Bents 7 and 8.

12.3 Lateral Pile Design for Pedestrian Overcrossing Structure

Under seismic loading conditions, lateral pile capacity analyses should be performed for the foundation piles at bents using the LPILE program. LPILE analyses will be performed by BCA during the final design. The calculations are per Section 10.7.2.4 of "California Amendments to AASHTO LRFD Bridge Design Specifications -Sixth Edition.".

A typical calculation of an average p-multiplier is shown below for Bent 6, with a pile-to-pile spacing of three pile diameters (3B) and two rows of piles in transverse direction of loading:

- p-multiplier > Pile spacing @ 3D, Row 1 → 0.75
- p-multiplier > Pile spacing @ 3D, Row 2 → 0.55
- Average p-multiplier @ Bent $6_{(\text{transverse, 2 rows})}$ = (0.75 +0.55) / 2 = 0.65

Further calculation of p-multipliers for other supports and loading directions are shown in Appendix V.

The recommended geotechnical parameters for L-PILE analyses are provided in the tables below.

TABLE 11A – Abutment 1, and Bents 2 through 6
(Based on Borings B-2 and B-3, and CPTs C-1, C-5 and C-12)

Depth from (ft)	Depth to (ft)	Elevation (ft) (NAVD88)	Generalized Soil Profile	LPILE Soil Type	c (psf)	Phi (degrees)	Effective Unit Weight (pcf)
0	5	12 to 7	Clay	Stiff Clay w/o Free Water (Reese)	1500	-	125
5	17	7 to -5	Clay	Stiff Clay w/o Free Water (Reese)	1500	-	65
17	21	-5 to -9	Liquefiable Sand	Case I) Sand (Reese)	-	31	65
				Case II) Mod. Stiff Clay w/o Free Water (Reese)	Sr=500	-	
21	30	-9 to -18	Clay	Sand (Reese)	1000	-	65
30	36	-18 to -24	Sand	Stiff Clay w/o Free Water (Reese)	-	33	65
36	56	-24 to -44	Clay	Stiff Clay w/o Free Water (Reese)	1000	-	65
56	64	-44 to -52	Liquefiable Sand	Case I) Sand (Reese)	-	31	65
				Case II) Mod. Stiff Clay w/o Free Water (Reese)	Sr=500	-	
64	120	-52 to -108	Clay	Stiff Clay w/o Free Water (Reese)	2000	-	65

Notes:
1) Default values can be used for ε_{50} and K except for the liquefied soils (Case II) where ε_{50} of 0.05 should be used.
2) P-multipliers of 0.65 for transverse direction and 0.90 for longitudinal direction can be used for Bent 6 for all soils.
3) P-multiplier of 1.00 can be used for Abutment 1, and Bents 2,3 and 4 for both transverse and longitudinal directions for all soils.
4) P-multipliers of 0.65 can be used for Bent 5 for both transverse and longitudinal directions for all soils.
5) A p-multiplier of 1.0 can be used for the liquefiable layers under Case II (Residual Strength, Sr) analysis.

TABLE 11B – BENTS 7 and 8
(Based on Boring B-4 and CPT C-11)

Depth from (ft)	Depth to (ft)	Elevation (ft) (NAVD88)	Generalized Soil Profile	LPILE Soil Type	c (psf)	Phi (degrees)	Effective Unit Weight (pcf)
0	5	11 to 6	Clay	Stiff Clay w/o Free Water (Reese)	1000	-	125
5	22	6 to -11	Clay	Stiff Clay w/o Free Water (Reese)	1000	-	65
22	38	-11 to -27	Sand	Sand (Reese)	-	36	65
38	43	-27 to -32	Clay	Stiff Clay w/o Free Water (Reese)	1000	-	65
43	48	-32 to -37	Sand	Sand (Reese)	-	36	65
48	52	-37 to -41	Clay	Stiff Clay w/o Free Water (Reese)	1000	-	65
52	58	-41 to -47	Sand	Sand (Reese)	-	36	65
58	65	-47 to -54	Liquefiable Sand	Case I) Sand (Reese)	-	34	65
				Case II) Stiff Clay w/o Free Water (Reese)	Sr=1000	-	
65	74	-54 to -63	Clay	Stiff Clay w/o Free Water (Reese)	1500	-	65
74	95	-63 to -84	Clay	Stiff Clay w/o Free Water (Reese)	2000	-	65
95	105	-84 to -94	Clay	Stiff Clay w/o Free Water (Reese)	1000	-	65
105	120	-94 to -109	Clay	Stiff Clay w/o Free Water (Reese)	2000	-	65

Notes:
1) Default values can be used for ε_{50} and K except for the liquefied soils (Case II) where ε_{50} of 0.05 should be used.
2) P-multipliers of 0.65 for transverse direction and 0.90 for longitudinal direction can be used for Bent 7 for all soils.
3) P-multipliers of 0.65 can be used for Bent 8 for both transverse and longitudinal directions for all soils.
4) A p-multiplier of 1.0 can be used for the liquefiable layers under Case II (Residual Strength, Sr) analysis.

TABLE 11C – BENTS 9 through 14, and Abutment 15
(Based on Borings B-6, B7 and B-9, and CPTs C-8 and C-10)

Depth from (ft)	Depth to (ft)	Elevation (ft) (NAVD88)	Generalized Soil Profile	LPILE Soil Type	c (psf)	Phi (degrees)	Effective Unit Weight (pcf)
0	5	5 to 0	Clay	Stiff Clay w/o Free Water (Reese)	1250	-	125
5	14	0 to -9	Clay	Stiff Clay w/o Free Water (Reese)	1250	-	65
14	19	-9 to -14	Sand	Case I) Sand (Reese)	-	31	65
				Case II) Soft Clay (Matlock)	Sr=350	-	
19	34	-14 to -34	Clay	Mod. Stiff Clay w/o Free Water (Reese)	650	-	65
34	42	-34 to -37	Liquefiable Sand	Case I) Sand (Reese)	-	33	65
				Case II) Mod. Stiff Clay w/o Free Water (Reese)	Sr=600	-	
42	53	-37 to -48	Clay	Stiff Clay w/o Free Water (Reese)	1250	-	65
53	61	-48 to -56	Liquefiable Sand	Case I) Sand (Reese)	-	31	65
				Case II) Mod. Stiff Clay w/o Free Water (Reese)	Sr=500	-	
61	73	-56 to -51	Clay	Stiff Clay w/o Free Water (Reese)	1250	-	65
73	121	-51 to -116	Clay	Stiff Clay w/o Free Water (Reese)	2000	-	65

Notes:
1) Default values can be used for ε_{50} and K except for the liquefied soils (Case II) where ε_{50} of 0.05 should be used.
2) P-multipliers of 1.00 can be used for the Bents 9 through 14 in both longitudinal and transverse directions for all soils.
3) P-multipliers of 0.65 can be used for the Abutment 15 in both longitudinal and transverse directions for all soils.
4) A p-multiplier of 1.0 can be used for the liquefiable layers under Case II (Residual Strength, Sr) analysis.

12.4 Retaining Walls

The analysis and recommendations presented below in this section is preliminary and may not be revised during final design stage.

12.4.1 Caltrans Type 5 Wall (West Approach Ramp)

A Caltrans Type 5 cantilever retaining wall is planned at the west approach (Between Abutment 2A of Adobe Creek Bridge and Abutment 1 of Adobe Creek POC) adjacent to the existing channel. The maximum retained height is anticipated to be 10 feet plus embedment into native soil (2 feet embedment assumed) as shown on the Plate S-9 of the plan set received on

02/10/17 from the Designer (Plate 7). The "Bottom of Wall" Elev. is assumed to be 2 feet below existing ground surface for preliminary analysis.

Based on the field information, the subsurface soil conditions of the foundation subgrade in the vicinity of the proposed retaining wall generally consists of stiff lean clay. Groundwater was encountered at Elev. -7 feet (NAVD88 Datum) during drilling in October 2016. Post-liquefaction induced settlements in the order of 1.5 inches are possible under the wall foundation.

Preliminary bearing capacities for this wall are presented below:

Service Limit State: 2.8 ksf
Strength Limit State: 4.5 ksf
Extreme Event Limit State: 8.3 ksf

12.4.2 Caltrans Type 1A Wall (West Approach Ramp)

A Caltrans Type 1A cantilever retaining wall is planned at the west approach (Between Abutment 2A of Adobe Creek Bridge and Abutment 1 of MUPOC) adjacent to West Bayshore Road. The maximum retained height is anticipated to be about 5.75 feet plus embedment into native soil (2 feet embedment assumed) as shown on the Plate S-9 of the plan set received on 02/10/17 from the designer (Plate 7). The "Bottom of Wall" Elev. is assumed to be 2 feet below existing ground surface for preliminary analysis.

Based on the field information, the subsurface soil conditions of the foundation subgrade in the vicinity of the proposed retaining wall generally consists of stiff lean clay. Groundwater was encountered at Elev. -7 feet (NAVD 88 Datum) during drilling in October 2016. Post-liquefaction induced settlements in the order of 1.5 inches are possible under the wall foundation.

Preliminary bearing capacities for this wall are presented below:

Service Limit State: 2.8 ksf
Strength Limit State: 4.5 ksf
Extreme Event Limit State: 8.3 ksf

These bearing capacity values are preliminary and based on typical sections. They may need to be revised in the foundation report (FR) submittal based on design cross-sections during that phase.

12.4.3 Lateral Earth Pressures and Friction Coefficient

Retaining walls should be designed to resist the following "Applied Lateral Earth Pressures" (Equivalent Fluid Pressures-EFP) and live load. These values assume no hydrostatic pore pressure is allowed to build-up behind the wall and are based on well-drained backfill or geocomposite drain behind the wall. If hydrostatic pressures are allowed to build up behind the wall, additional lateral loads should be considered in the design.

Applied Lateral Earth Pressure

Recommended active pressure acting on the wall is 36 pcf EFP for the engineered backfill with horizontal backslope for cantilever walls mentioned above.

Passive Condition

Recommended passive pressure in front of the wall is 400 pcf EFP for cantilever walls mentioned above. For sloping ground, the passive resistance should only be used where a minimum 6 feet horizontal set-back from the free-face exists. According to AASHTO LRFD Bridge Design Specifications 6th Edition, Section 11.5, resistance factors of 0.5 and 1.0 should be applied to passive pressure for strength and extreme event limit states, respectively.

Coefficient of sliding resistance of 0.3 (nominal) can be used for footing on native soil. An increased coefficient of 0.55 can be used if the soil below the footing is over-excavated at least 24 inches and replaced with compacted aggregate base. Appropriate resistance factors should be applied for Service, Strength and Extreme Event Limit States.

Live Loads

The effect of any surcharge (dead, live, or traffic load) should be added to the preceding lateral earth pressures. A coefficient of 0.28 may be used to determine the additional lateral earth pressures resulting from the surcharge for cantilever walls mentioned above. The resultant pressure distribution is rectangular.

12.4.4 Seismic Lateral Earth Pressure

The proposed retaining walls will experience increased lateral loads during earthquake shaking. The design needs to consider seismic event per the AASHTO LRFD (Sections11.8.6). The additional horizontal forces recommended to simulate earthquake loads are dependent upon the magnitude of ground surface accelerations and the retained height of the retaining wall, together with the weight and type of material retained by the retaining walls. In general, the pseudo-static approach developed by Mononobe and Okabe (M-O) may be used to estimate the equivalent static force using a seismic coefficient $K_h = 1/3 * A_{max}$. According to Appendix A11.1.1.1 (California Amendment), the seismic incremental lateral earth pressure is assumed to have triangular distribution over wall height. A unit weight of $\gamma = 125$ pcf is assumed for the calculations.

Based on the analyses, incremental seismic lateral force with a value of $7H^2$ (in lb per linear foot of wall and normal triangular distribution) is recommended for the retaining walls.

For abutments, a seismic coefficient $K_h = ½ * A_{max}$ is used to estimate incremental seismic lateral force due to relative rigidity of the abutments. Based on the analyses, incremental seismic lateral force with a value of $13H^2$ (in lb per linear foot of wall and normal triangular distribution) is recommended for the abutments.

The resultant force from the incremental seismic lateral earth pressure is triangularly distributed acting one-third of the wall height (H in ft.). The calculations of seismic lateral force are included in Appendix V.

12.5 Approach Fill Earthwork

All grading operations should be performed in accordance with the project specifications and Caltrans Standard Specifications for Earthwork (Section 19). A representative from PARIKH or regulating agency should observe all excavated areas during grading and perform moisture and density tests on prepared subgrade and compacted fill materials.

12.5.1 Approach Fill Settlement

Approach fills of up to 10 feet high at the West Approaches are planned based on the plan set received on 02/10/17 from the Designer. Based on our settlement analysis on planned West Approaches, up to 1.8 inch of settlement is expected under retaining wall footings.

An approach fill of up to 9 feet high at the East Approach (at Abutment 15) is planned based on the Section M-M of Plate S-9 of the plan set. Settlement of up to 2.5 inches can be expected below this fill.

Majority of the fills for West and East Approaches are due to sand settlement or compression of clay within the over-consolidated range, which happens relatively fast. Only about a quarter-inch or less of the settlements are due to consolidation of clays within the normally-consolidation range, which is relatively small. Settlement calculation is shown in Appendix V.

The embankment fill should be placed in accordance with the guidelines provided in the Caltrans Highway Design Manual. These guidelines require structure approach embankment material to be compacted to a 95% Relative

Compaction. This also reduces the potential for earthquake-induced settlement or slippage to occur.

12.5.2 Waiting Period after Fill Placement

Based on our previous experience with Caltrans projects, a standard waiting period of 30 days prior to abutment foundation construction is recommended after the placement of the approach fills. The waiting period serves as a contingency for the estimated consolidation settlement within the over-consolidated range and minimize the downdrag forces on piles due to soil settlement.

13.0 NOTES TO DESIGNER

The lateral pile analysis will be conducted by the structural engineer. It is recommended that the structure engineer verify the pile tip elevations when finalizing the pile data table. Should the specified pile tip elevation required to meet lateral load demands exceed the specified pile tip elevation given within this report, the Geotechnical Engineer must be contacted for further recommendations.

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.

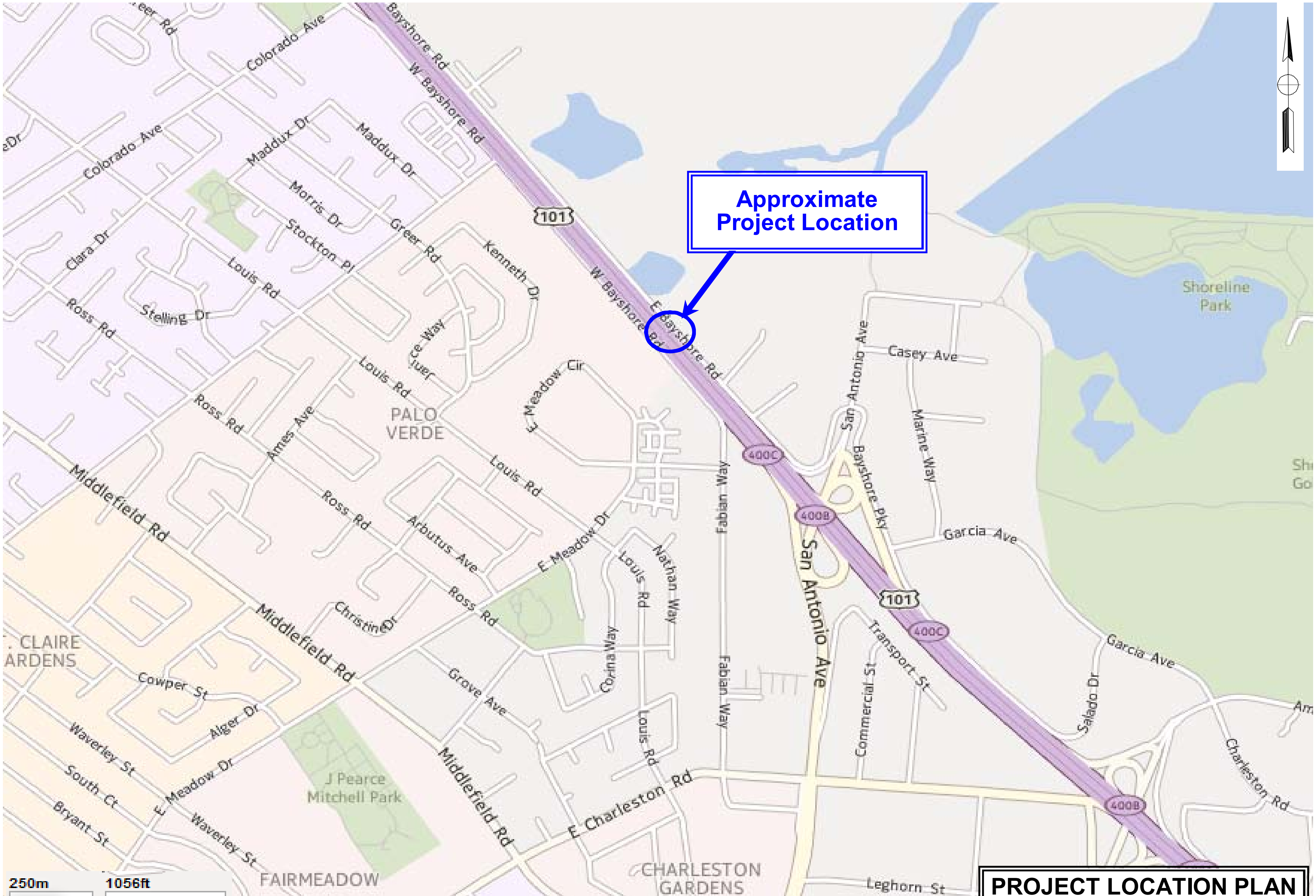
The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards 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.

Very truly yours,
PARIKH CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
Y. DAVID WANG
No. P.E. 52911
Exp. 12/31/18
CIVIL
STATE OF CALIFORNIA

A. Emre Ortakci, P.E., G.E. 3067
Project Engineer

Y. David Wang, Ph.D., P.E., 52911
Senior Engineer

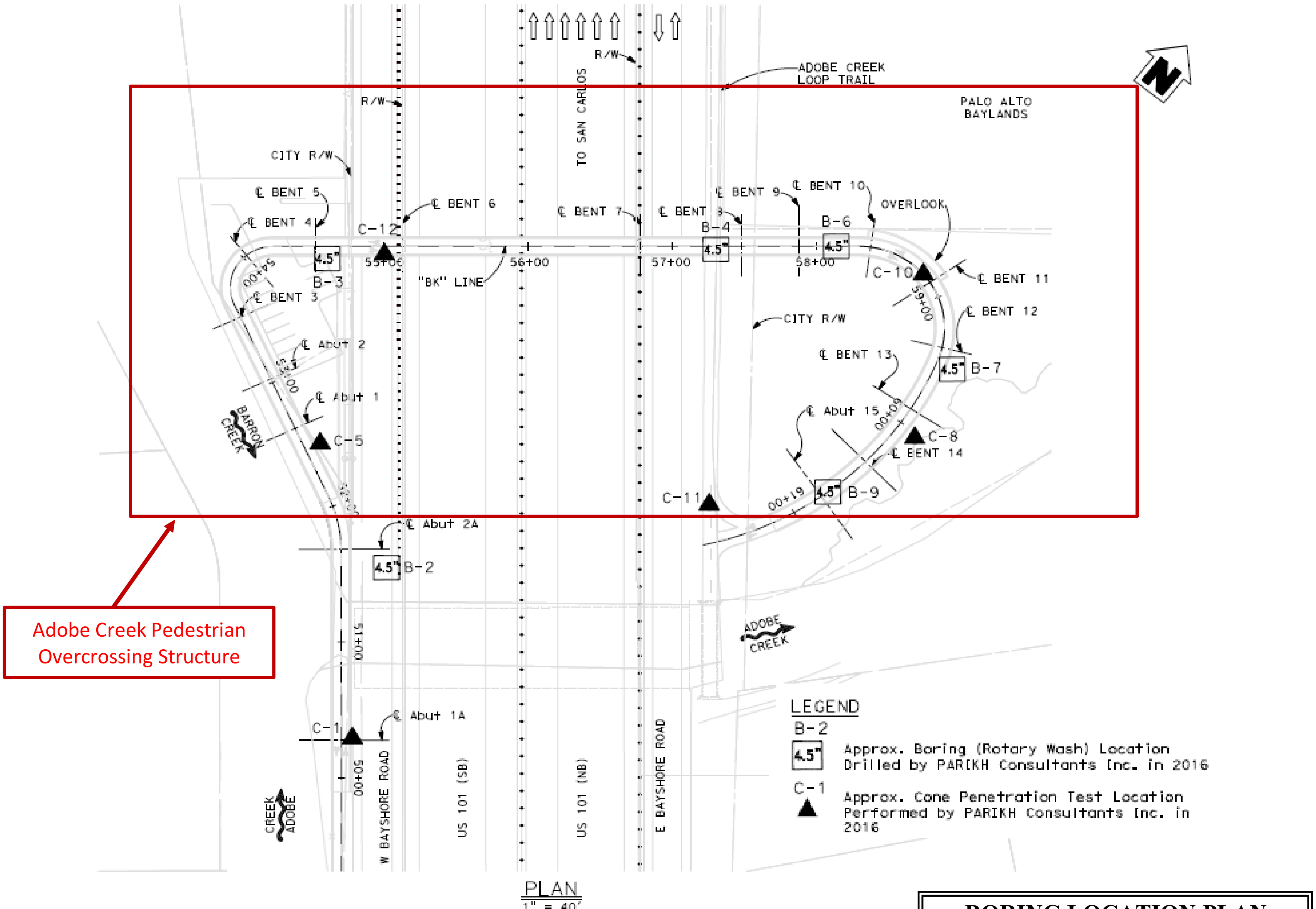


PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

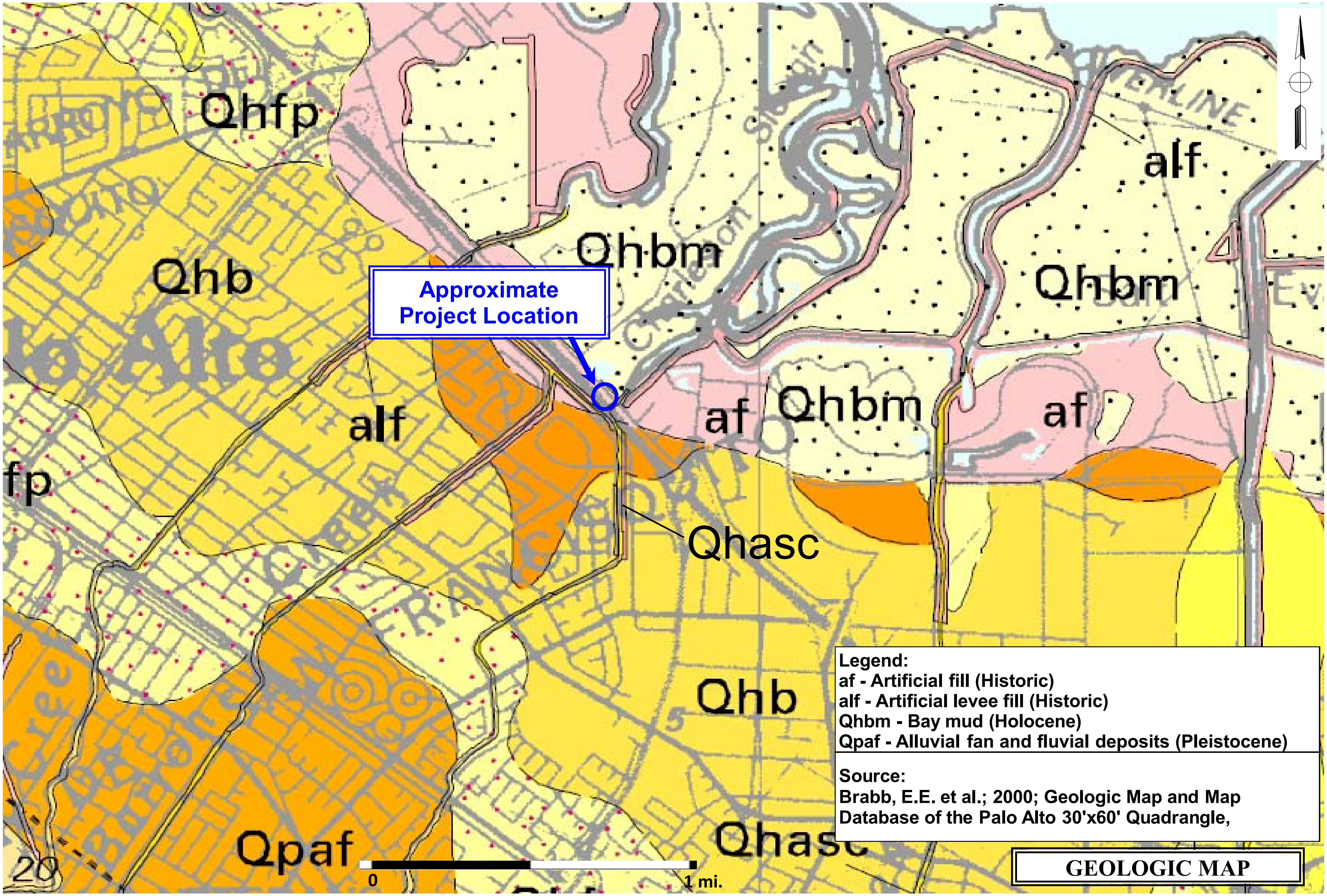
JOB NO.: 2016-122-POC

PLATE NO.: 1



BORING LOCATION PLAN

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**ADOBE CREEK PEDESTRIAN OVERCROSSING** **SANTA CLARA COUNTY, CALIFORNIA**
JOB NO.: 2016-122-POC	**PLATE NO.: 2**



Legend:
af - Artificial fill (Historic)
alf - Artificial levee fill (Historic)
Qhbm - Bay mud (Holocene)
Qpaf - Alluvial fan and fluvial deposits (Pleistocene)

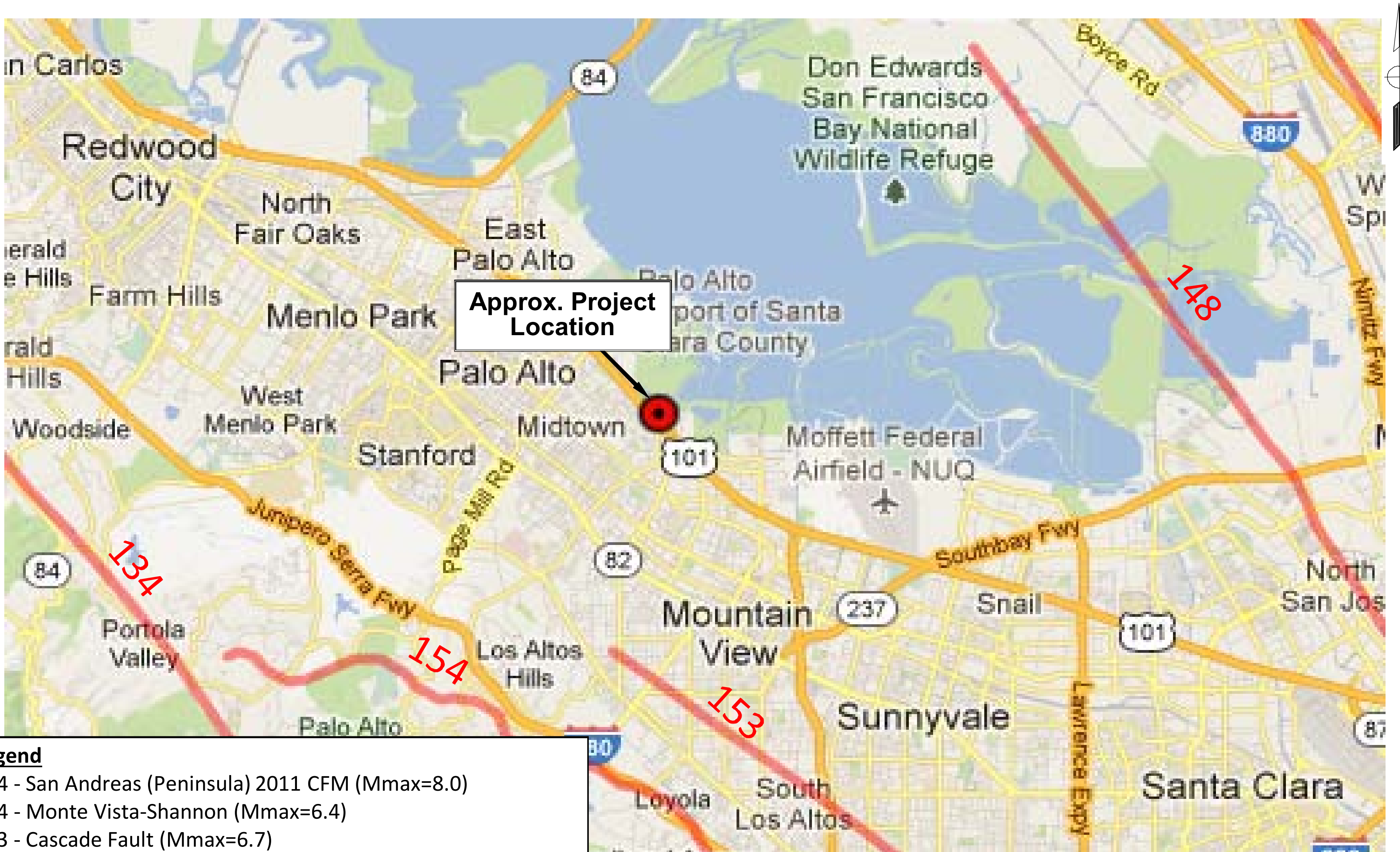
Source:
Brabb, E.E. et al.; 2000; Geologic Map and Map Database of the Palo Alto 30'x60' Quadrangle,

GEOLOGIC MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN CROSSING
SANTA CLARA COUNTY, CALIFORNIA

JOB NO.: 2016-122-POC | PLATE NO.: 3



Legend
134 - San Andreas (Peninsula) 2011 CFM (Mmax=8.0)
154 - Monte Vista-Shannon (Mmax=6.4)
153 - Cascade Fault (Mmax=6.7)
148 - Silver Creek (Mmax=6.9)

Source: Caltrans ARS Online v.2.3.08 Web Site
http://dap3.dot.ca.gov/ARS_Online/

ARS ONLINE MAP

PARIKH CONSULTANTS, INC.
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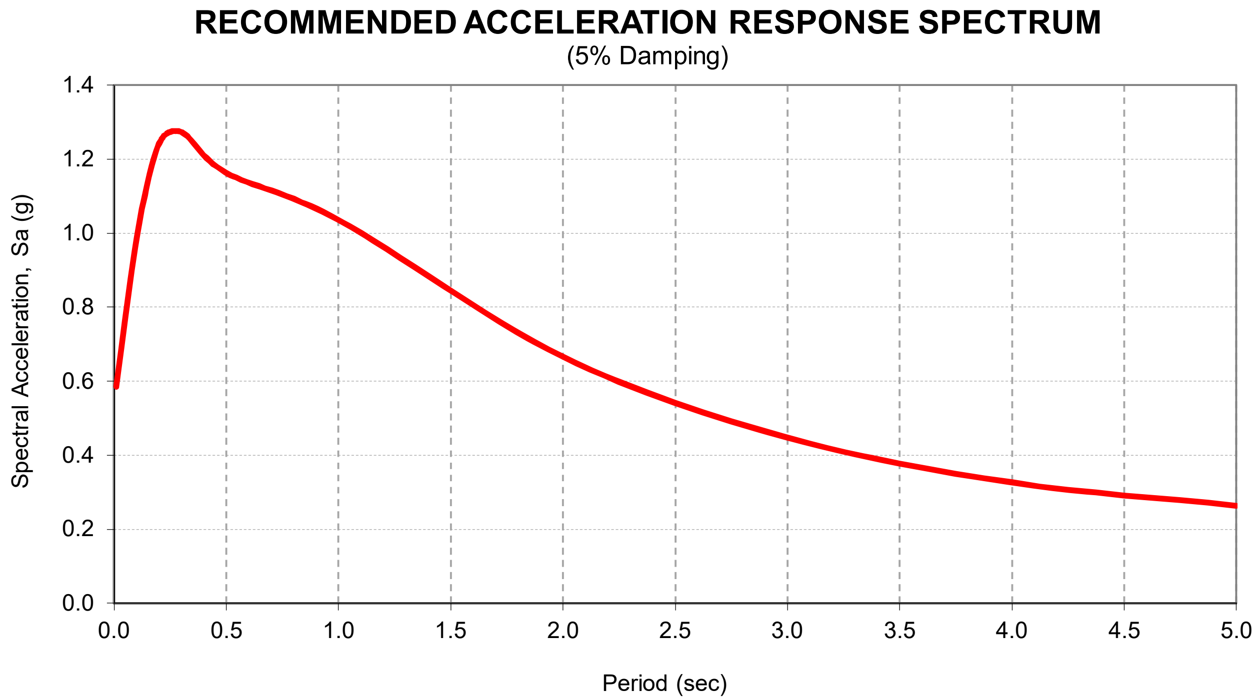
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

JOB NO.: 2016-122-POC	PLATE NO.: 4



Site Information

Latitude:	37.4325
Longitude	-122.1057
V_{S30} (m/s) =	210
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	11.7

Governing Curve:
Caltrans Online Probabilistic ARS

Recommended Response Spectrum

Period (sec)	Caltrans Online Probabilistic Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.585	1	1	0.585
0.1	0.986	1	1	0.986
0.2	1.242	1	1	1.242
0.3	1.273	1	1	1.273
0.5	1.163	1	1	1.163
1.0	0.863	1.2	1	1.036
2.0	0.555	1.2	1	0.666
3.0	0.373	1.2	1	0.448
4.0	0.272	1.2	1	0.326
5.0	0.22	1.2	1	0.264

Source:

1. Caltrans ARS Online tool (V.2, http://dap3.dot.ca.gov/ARS_Online/)
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)
3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

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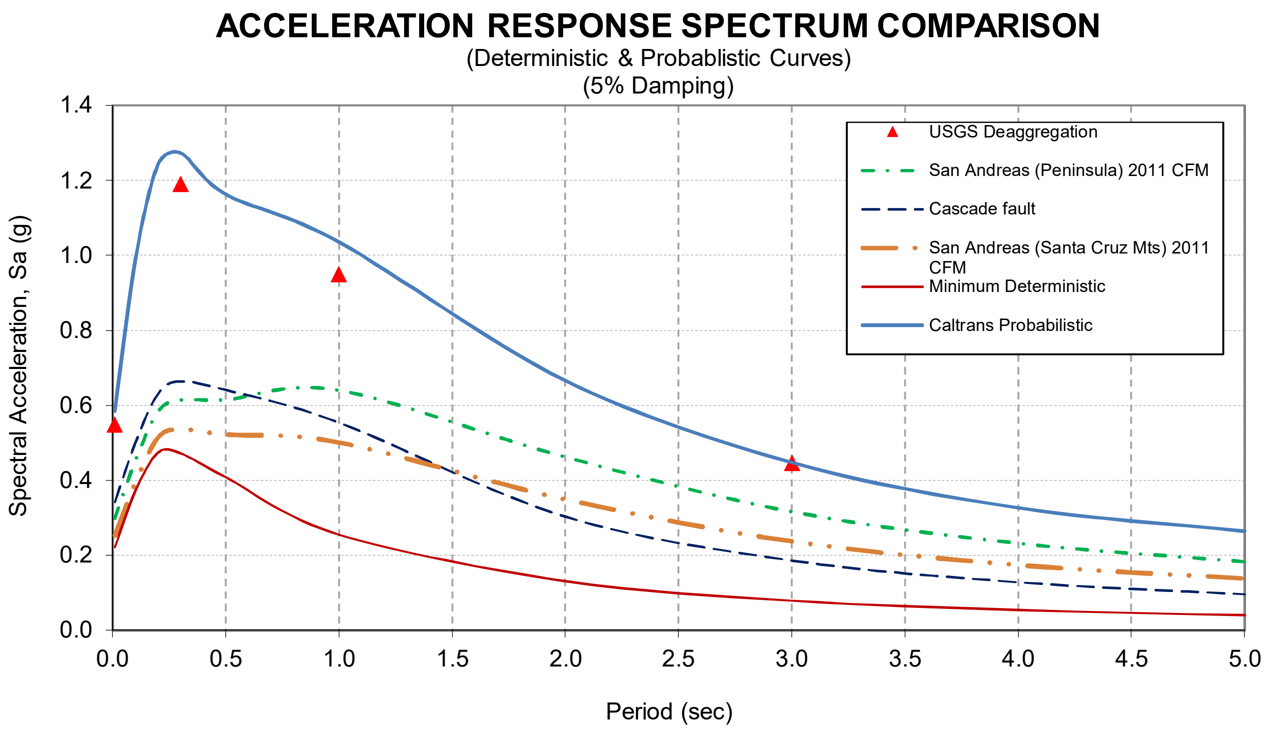
Practicing in the Geosciences

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Project No.: 2016-122-POC	**Plate No.: 5A**



Site Information

Latitude: 37.4325

Longitude -122.1057

V_{S30} (m/s) = 210

$Z_{1.0}$ (m) = N/A

$Z_{2.5}$ (km) = N/A

Near Fault Factor, Derived from USGS Deagg. Dist (km) = 11.7

Final Adjusted Spectral Accelerations (g)

Period (sec)	San Andreas (Peninsula) 2011 CFM	Cascade fault	San Andreas (Santa Cruz Mts) 2011 CFM	Minimum Deterministic	Caltrans Probabilistic	USGS Deaggregation
0.0	0.299	0.342	0.253	0.222	0.585	0.547
0.1	0.452	0.499	0.393	0.371	0.986	
0.2	0.583	0.630	0.513	0.474	1.242	
0.3	0.614	0.664	0.536	0.472	1.273	1.189
0.5	0.615	0.641	0.522	0.408	1.163	
1.0	0.640	0.554	0.501	0.255	1.036	0.948
2.0	0.462	0.303	0.349	0.131	0.666	
3.0	0.316	0.186	0.237	0.079	0.448	0.445
4.0	0.232	0.128	0.174	0.054	0.326	
5.0	0.183	0.096	0.138	0.040	0.264	

Source:

1. Caltrans ARS Online tool (V.2, http://dap3.dot.ca.gov/ARS_Online/)

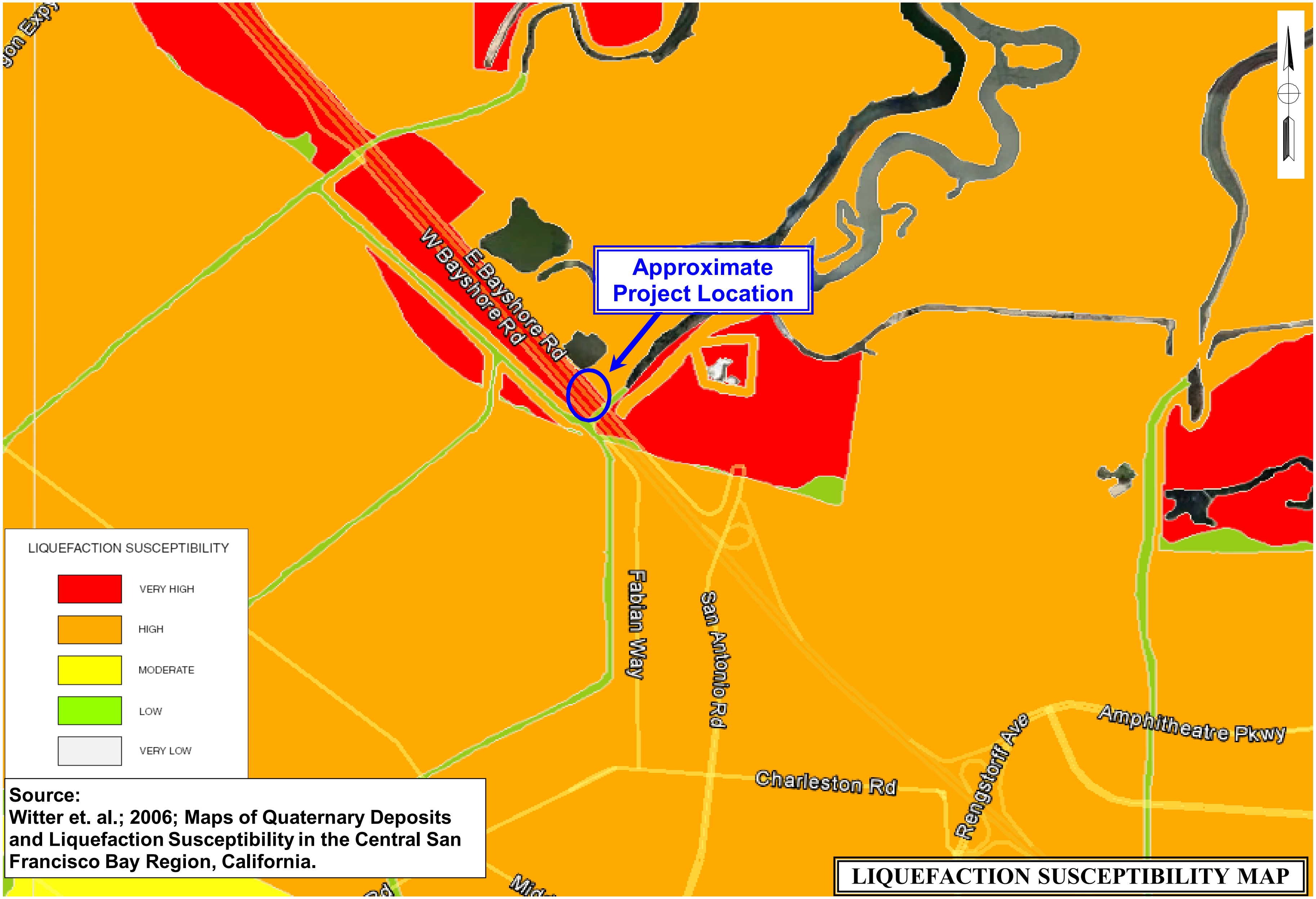
2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)

3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

PARIKH
Practicing in the Geosciences

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Project No.: 2016-122-POC | **Plate No.: 5B**



Source:
Witter et. al.; 2006; Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California.

LIQUEFACTION SUSCEPTIBILITY MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

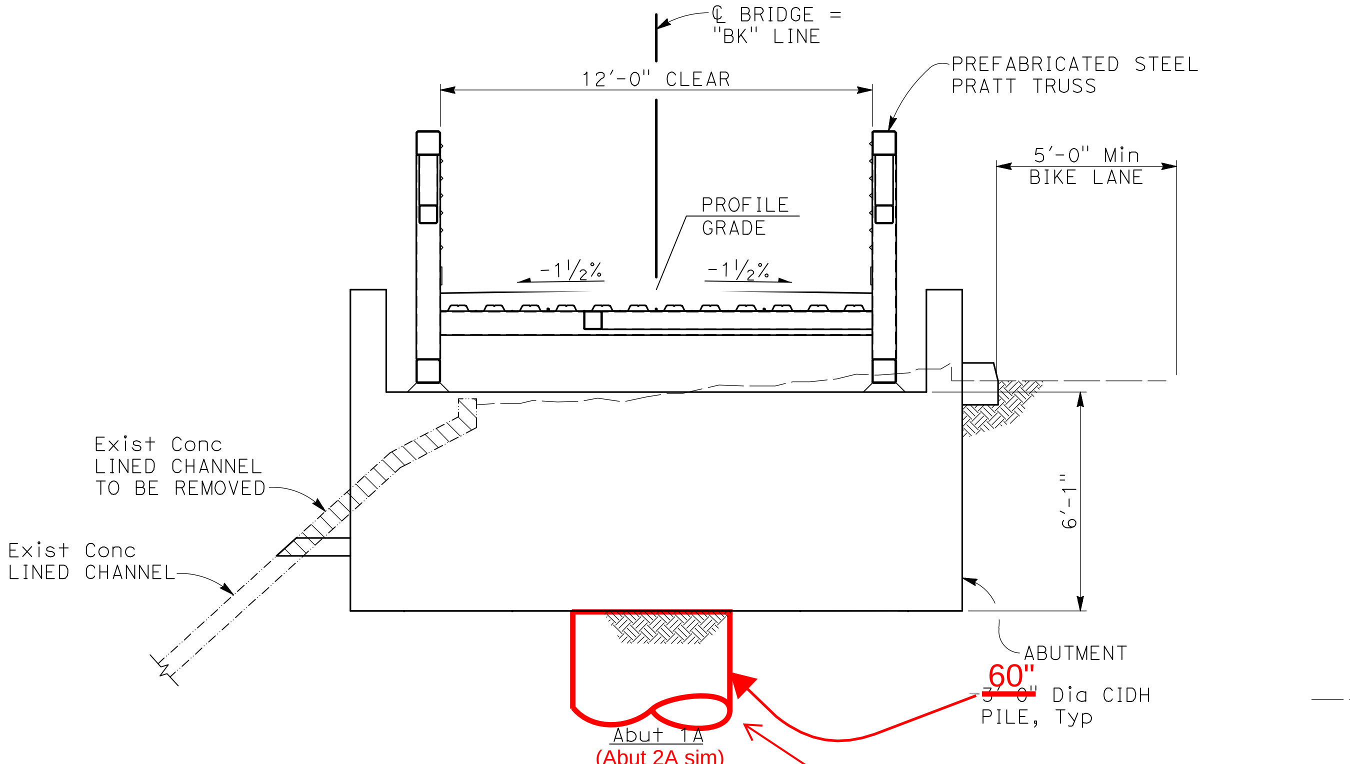
JOB NO.: 2016-122-POC	**PLATE NO.: 6**

PREPARED FOR THE STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

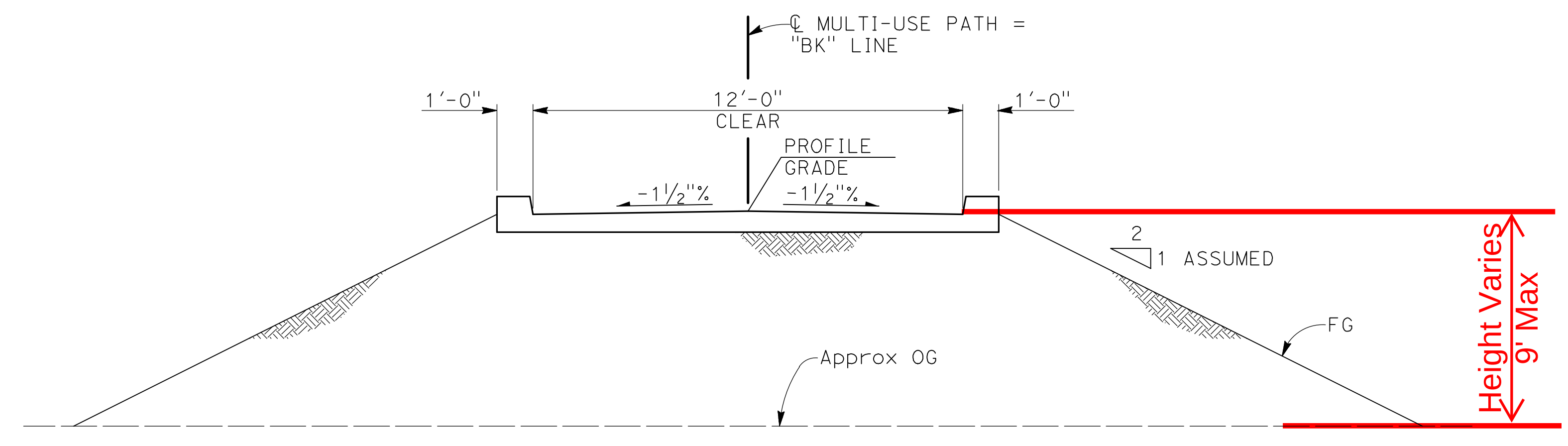
DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT
04	SCI	101	

CITY OF PALO ALTO
250 HAMILTON AVENUE
PALO ALTO, CALIFORNIA 94301

BIGGS CARDOSA ASSOCIATES INC.
865 THE ALAMEDA
SAN JOSE, CALIFORNIA 95126

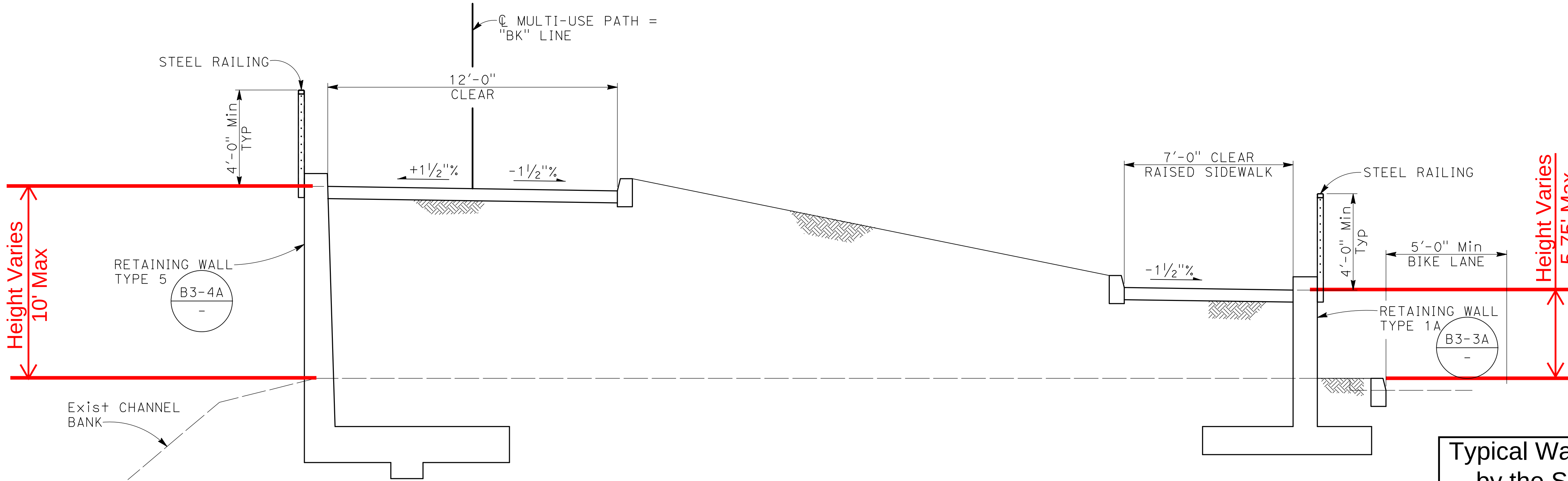


SECTION K-K
3/8" = 1'-0"



EAST APPROACH FILL

SECTION M-M
3/8" = 1'-0"



Typical Wall Sections Provided by the Structural Designer

Plate 7

PATH/RAISED SIDEWALK

SECTION L-L
3/8" = 1'-0"

DESIGNED BY	D. ROSELLINI	DATE	11/22/16
DRAWN BY	S. HICKEY	DATE	11/22/16
CHECKED BY	A. NOTARO	DATE	11/22/16
APPROVED	R. SCHNABEL	DATE	11/22/16

ANTHONY NOTARO
PROJECT ENGINEER

ADOBE CREEK POC

BRIDGE NO. TBD
UNIT:
SCALE: AS NOTED
PROJECT NUMBER & PHASE: 0413000094
CONTRACT NO.:

DESIGN OVERSIGHT
SIGN OFF DATE

PLAN CHECK SET/NOT FOR CONSTRUCTION (11/28/16)

ADVANCE PLANNING STUDY SHEET (ENGLISH) (REV. 7/16/10)

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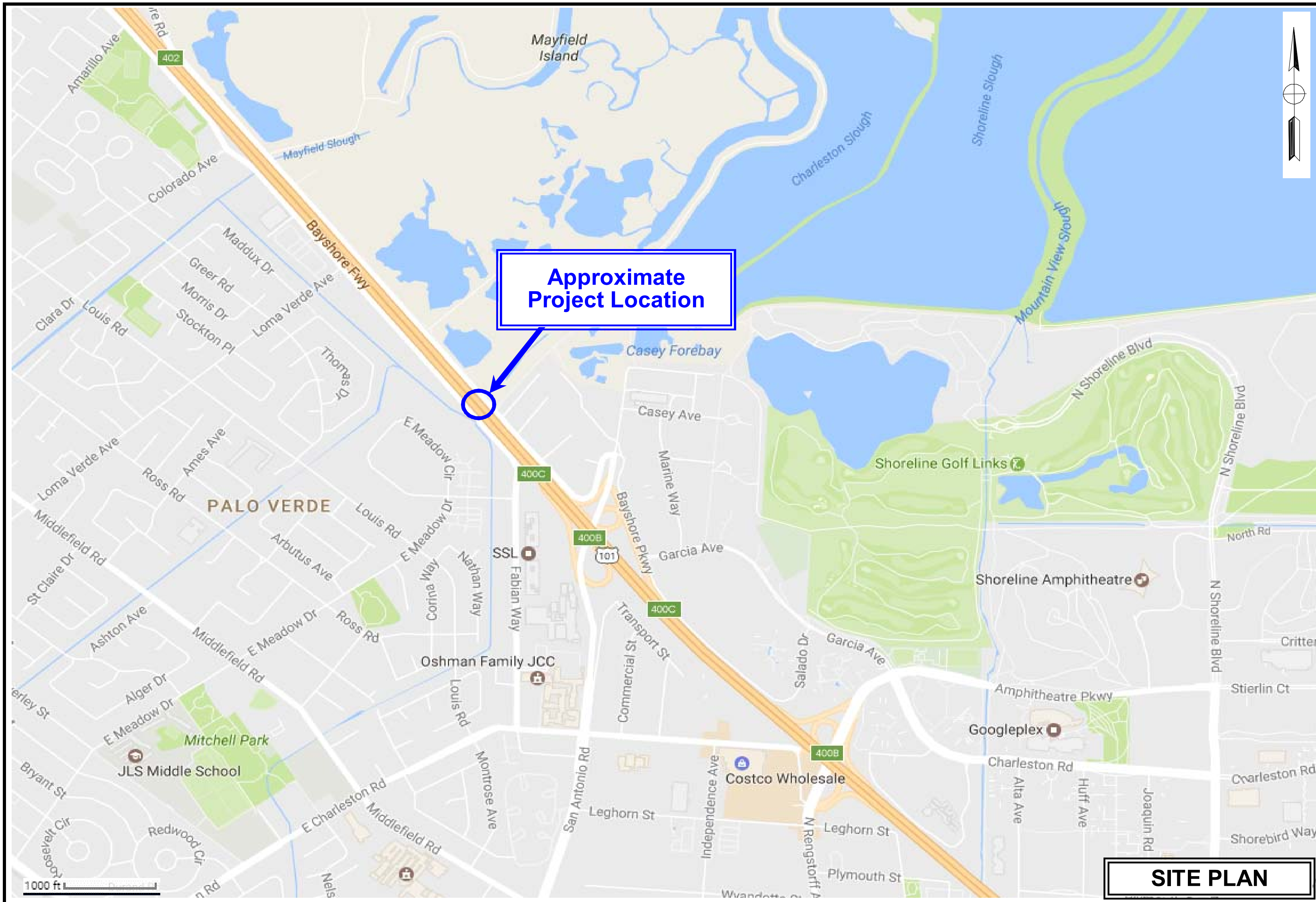
2016055 (2016055APS_S9)
TIME PLOTTED => $TIME
DATE PLOTTED => $DATE
USERNAME => $USER

APPENDIX I
Site Map



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GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

JOB NO.: 2016-122-POC

APPENDIX I

APPENDIX II
Log of Test Borings

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCL	101	50.66		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

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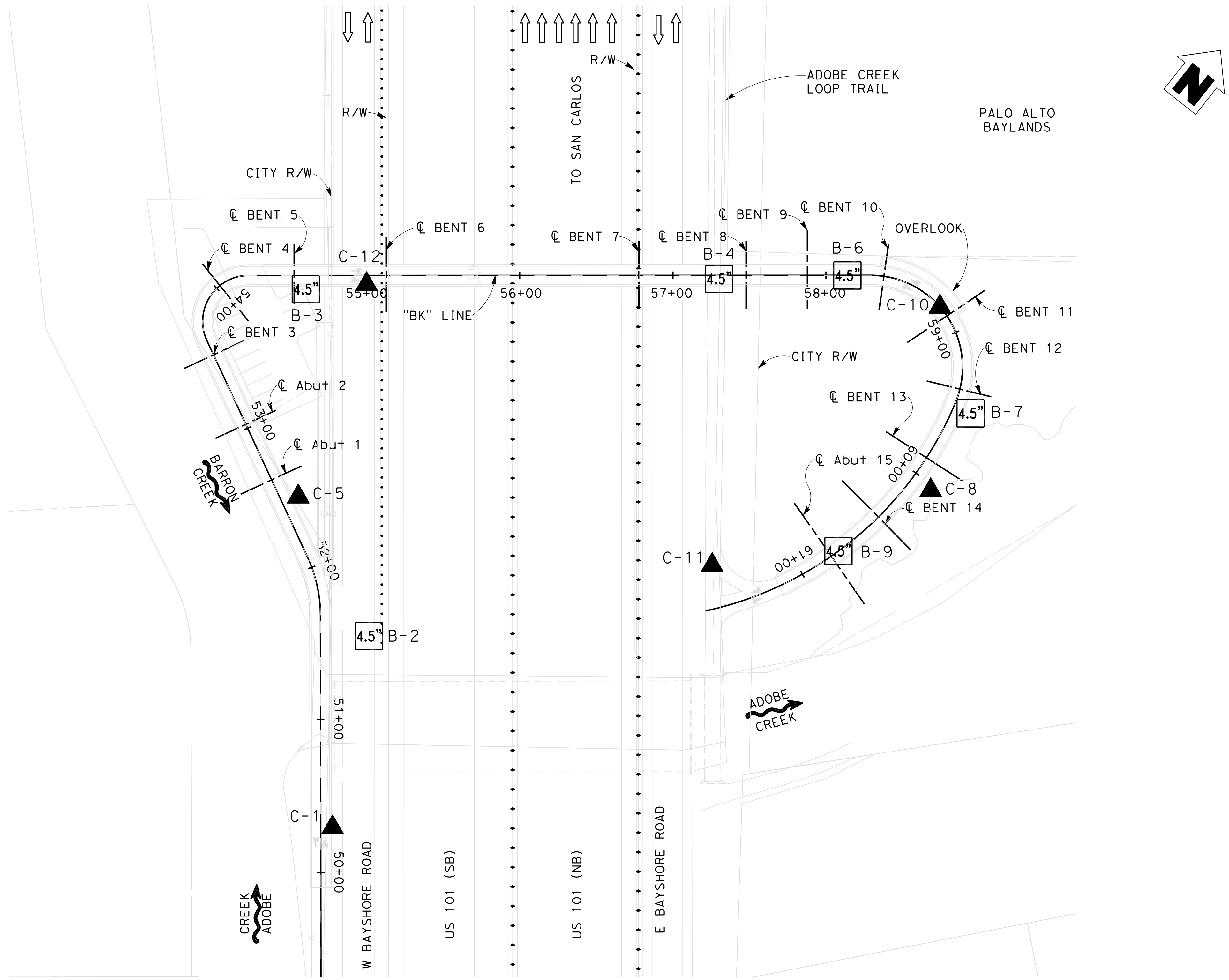
REGISTERED PROFESSIONAL ENGINEER
GARY PARIKH
No. G.E. 666
Exp. 12/31/17
GEOTECHNICAL
STATE OF CALIFORNIA

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

BIGGS CARDOSA ASSOCIATES, INC.
865 THE ALAMEDA
SAN JOSE, CA 95126

DRAFT



PLAN
1" = 40'

LEGEND

B-2 [4.5"] Approx. Boring (Rotary Wash) Location Drilled by PARIKH Consultants Inc. in 2016

C-1 ▲ Approx. Cone Penetration Test Location Performed by PARIKH Consultants Inc. in 2016

SCALE 1 inch = 40 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by BCA, Inc.

X DESIGN OVERSIGHT	DRAWN BY	KIM OUYANG	L.S. BHANGOO & YJ FIELD INVESTIGATION BY:
X SIGN OFF DATE	CHECKED BY	EMRE ORTAKCI	DATE: AUG 2016 THROUGH OCT 2016

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

X
PROJECT ENGINEER

BRIDGE NO. TBD
POST MILES 50.66

ADOBE CREEK PEDESTRIAN OVERCROSSING

LOG OF TEST BORINGS 1 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES ...X... SHEET _X_ OF _X_

FILE => $REQUEST

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

DRAFT

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCL	101	50.66		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/17 GEOTECHNICAL STATE OF CALIFORNIA

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

BIGGS CARDOSA ASSOCIATES, INC.
865 THE ALAMEDA
SAN JOSE, CA 95126

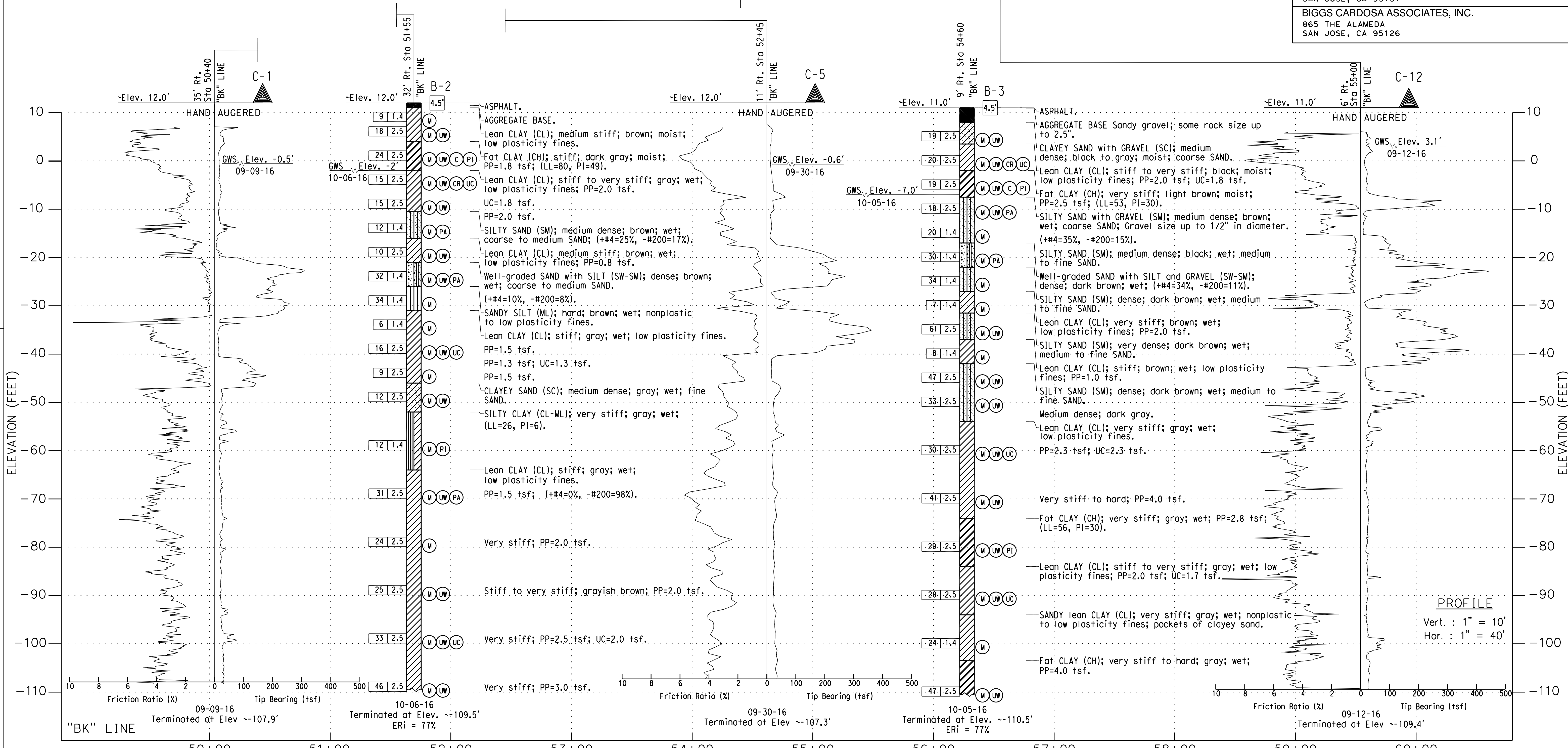
NOTES:

Standard Penetration Test Sampler: I.D. = 1.4" (@ shoe); 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)

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

See Caltrans 2015 Standard Plans A10F, A10G for Soil Legend.

All dimensions are in feet unless otherwise shown



X DESIGN OVERSIGHT	DRAWN BY: KIM OUYANG	L.S. BHANGOO & YJ — FIELD INVESTIGATION BY:	
X SIGN OFF DATE	CHECKED BY: EMRE ORTAKCI	DATE: AUG 2016 THROUGH OCT 2016	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

X PROJECT ENGINEER

BRIDGE NO. TBD — POST MILES 50.66

ADOBE CREEK PEDESTRIAN OVERCROSSING

LOG OF TEST BORINGS 2 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES — SHEET _X_ OF _X_

FILE => $REQUEST

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

DRAFT

NOTES:

Standard Penetration Test Sampler: I.D. = 1.4" (@ shoe); 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)

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

See Caltrans 2015 Standard Plans A10F, A10G for Soil Legend.

All dimensions are in feet unless otherwise shown

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCL	101	50.66		

GEOTECHNICAL PROFESSIONAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp. 12/31/17 GEOTECHNICAL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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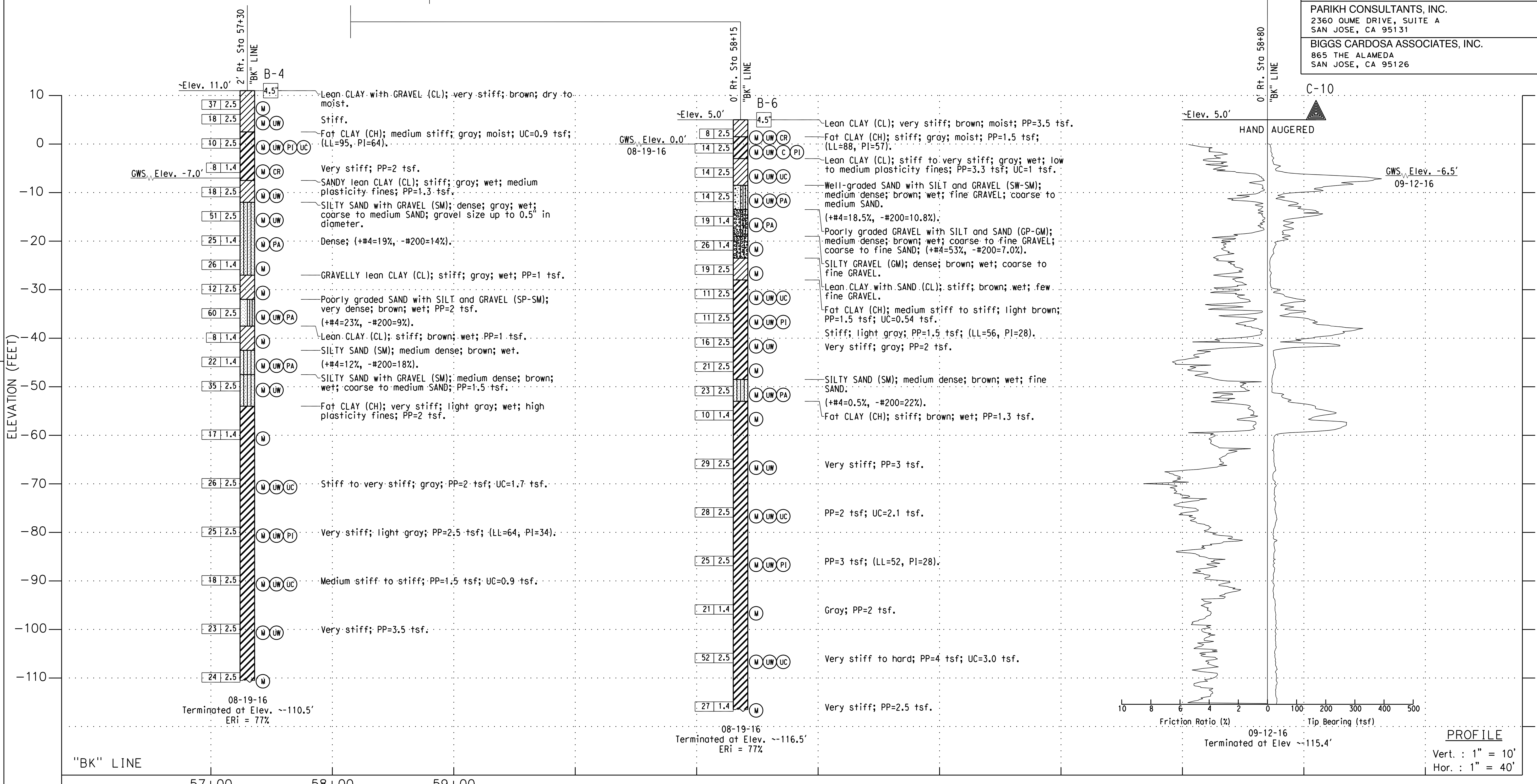
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

BIGGS CARDOSA ASSOCIATES, INC.
865 THE ALAMEDA
SAN JOSE, CA 95126



X DESIGN OVERSIGHT	DRAWN BY	KIM OUYANG	L.S. BHANGOO & YJ FIELD INVESTIGATION BY:	
X SIGN OFF DATE	CHECKED BY	EMRE ORTAKCI	DATE: AUG 2016 THROUGH OCT 2016	

PREPARED FOR THE **STATE OF CALIFORNIA** DEPARTMENT OF TRANSPORTATION

X PROJECT ENGINEER

BRIDGE NO. TBD

POST MILES 50.66

ADOBE CREEK PEDESTRIAN OVERCROSSING

LOG OF TEST BORINGS 3 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X

CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES X

SHEET _X_ OF _X_

FILE => $REQUEST

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

NOTES:

Standard Penetration Test Sampler: I.D. = 1.4" (@ shoe); 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)

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

See Caltrans 2015 Standard Plans A10F, A10G for Soil Legend.

All dimensions are in feet unless otherwise shown

DRAFT

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCL	101	50.66		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — GARY PARIKH — No. G.E. 666 — Exp. 12/31/17 — GEOTECHNICAL — STATE OF CALIFORNIA

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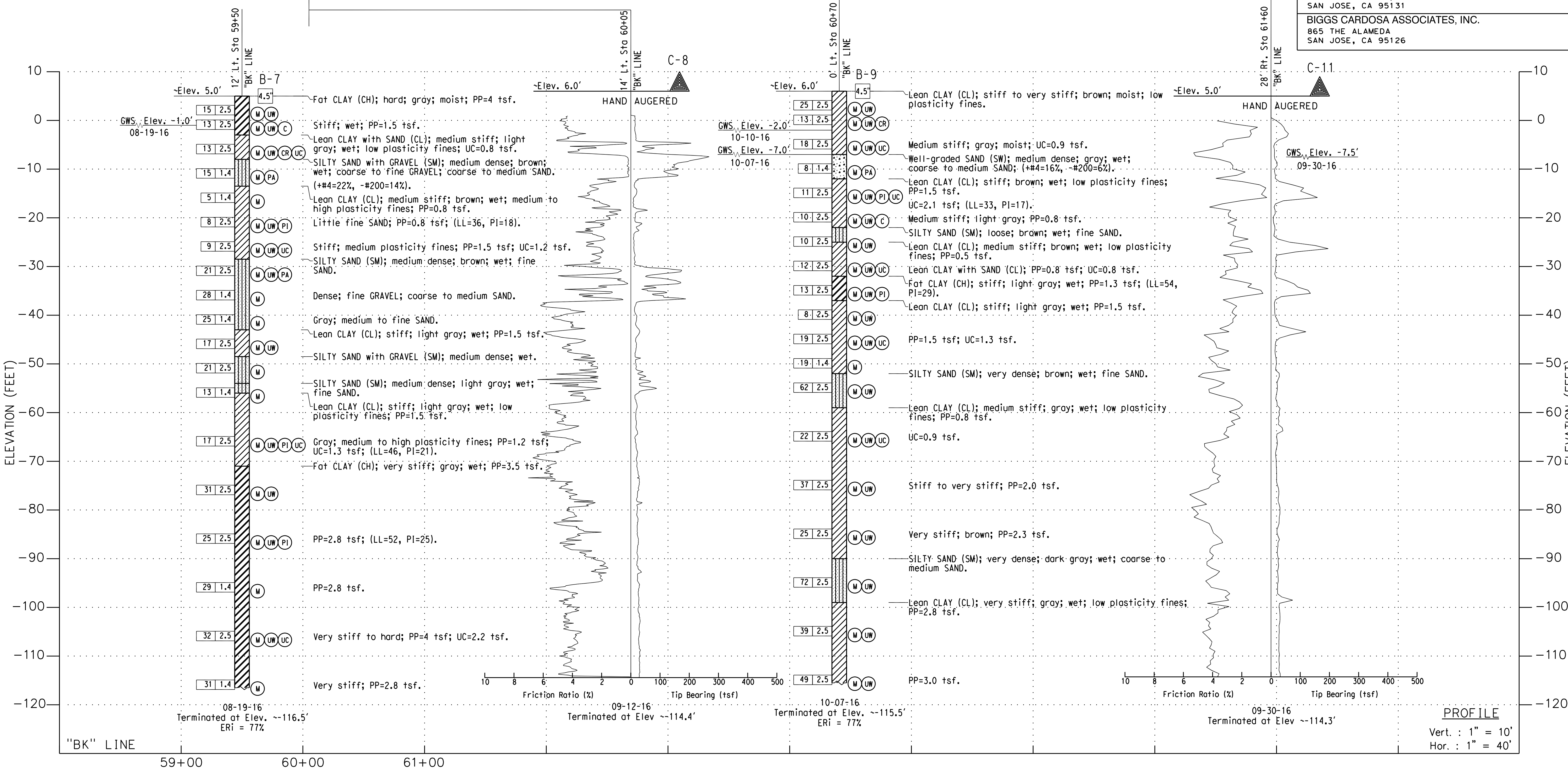
PARIKH CONSULTANTS, INC.
2360 QUME DRIVE, SUITE A
SAN JOSE, CA 95131

BIGGS CARDOSA ASSOCIATES, INC.
865 THE ALAMEDA
SAN JOSE, CA 95126



X DESIGN OVERSIGHT	DRAWN BY	KIM OUYANG	L.S. BHANGOO & YJ — FIELD INVESTIGATION BY:
X SIGN OFF DATE	CHECKED BY	EMRE ORTAKCI	DATE: AUG 2016 THROUGH OCT 2016

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

X PROJECT ENGINEER

BRIDGE NO. TBD — POST MILES 50.66

ADOBE CREEK PEDESTRIAN OVERCROSSING
LOG OF TEST BORINGS 4 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES — SHEET _X_ OF _X_

FILE => $REQUEST

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

REFERENCE LOTB

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCL	101			

GEOTECHNICAL PROFESSIONAL DATE 7/13/11

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 03/31/12 CIVIL STATE OF CALIFORNIA

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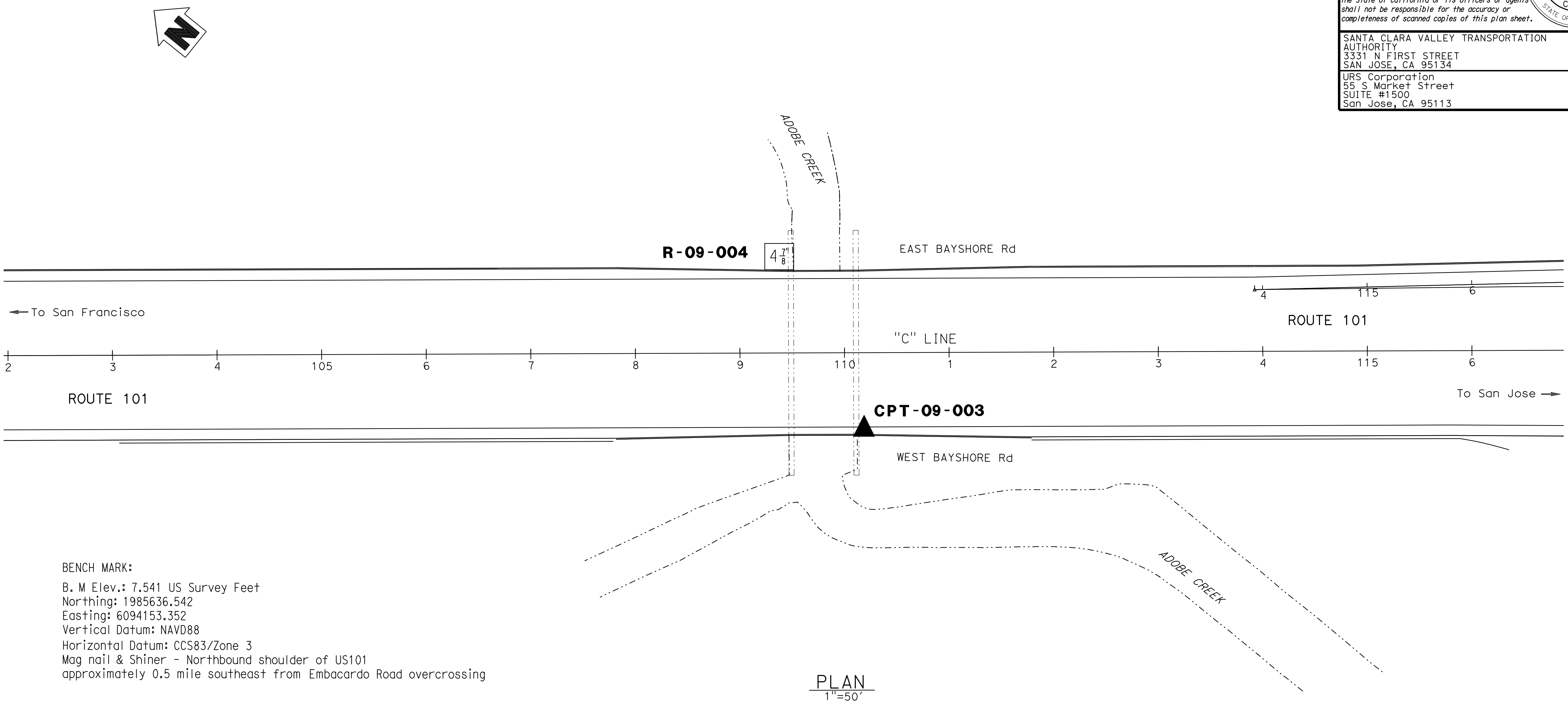
SANTA CLARA VALLEY TRANSPORTATION AUTHORITY
3331 N FIRST STREET
SAN JOSE, CA 95134

URS Corporation
55 S Market Street
SUITE #1500
San Jose, CA 95113



PLAN
1"=50'

BENCH MARK:

B. M Elev.: 7.541 US Survey Feet
Northing: 1985636.542
Easting: 6094153.352
Vertical Datum: NAVD88
Horizontal Datum: CCS83/Zone 3
Mag nail & Shiner - Northbound shoulder of US101
approximately 0.5 mile southeast from Embacardo Road overcrossing

NOTE:

1. This LOTB sheet was prepared in accordance with the caltrans soil and Rock logging, Classification, and Presentation Manual (June 2007)
2. Groundwater depth was not measured; dry to 9 feet before switching auger to rotarywash method.
3. Design groundwater level at Elev. 4 ft.

DESIGN OVERSIGHT Emil A. Vergara Jr.
7-14-11
SIGN OFF DATE

DRAWN BY A. CHEUNG
CHECKED BY S. HUANG

M. SELVENDRAN
FIELD INVESTIGATION BY:
DATE: 03/23/09

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Walt LaFranchi
PROJECT ENGINEER

BRIDGE NO. 37-0174
POST MILES 50.66

ADOBE CREEK BRIDGE (WIDEN)
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

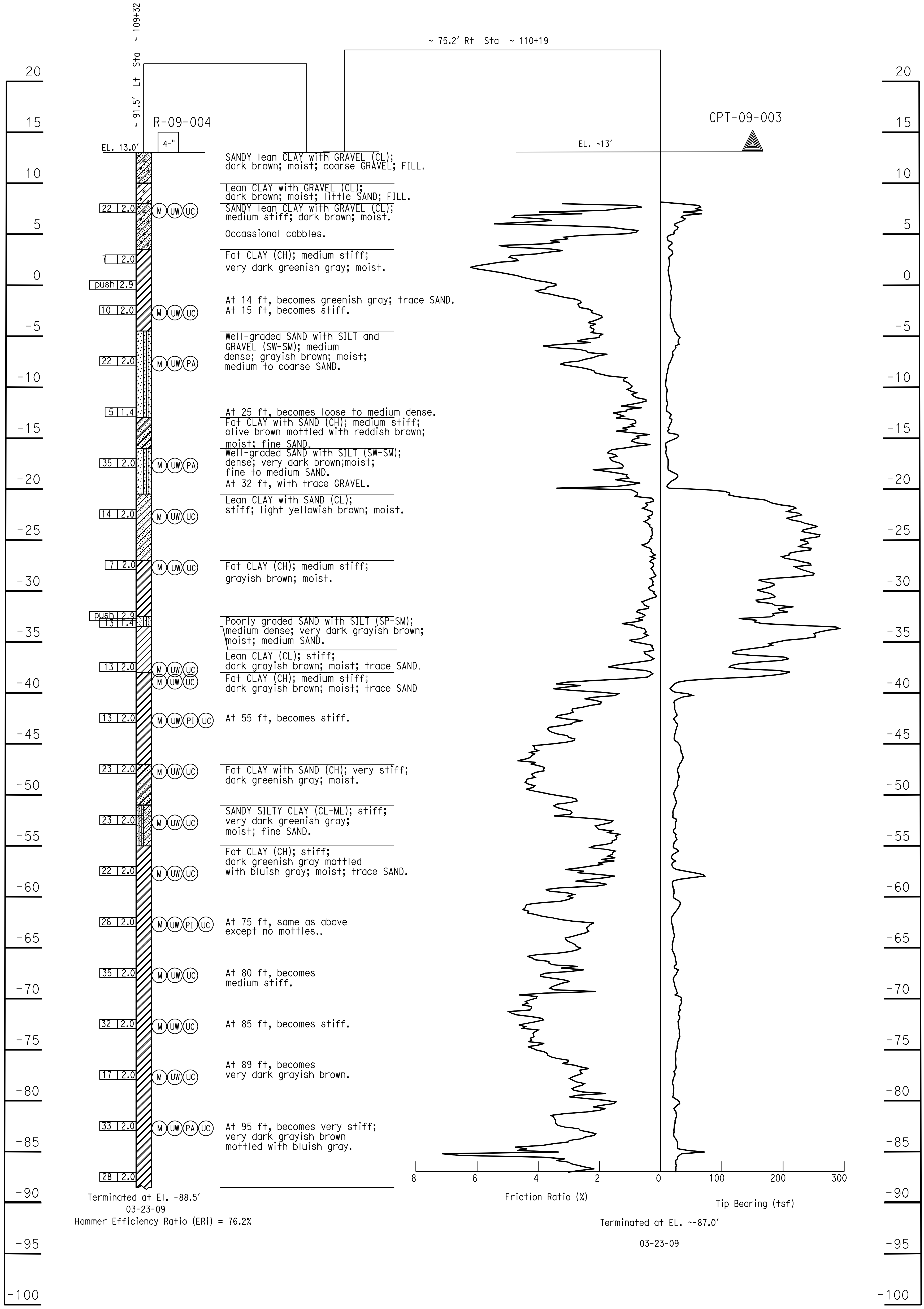
CU 04235
EA 4A3301

DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES 11-20-09 3-22-10 8-20-10 9-14-10 7-13-11

SHEET 13 OF 15

FILE => 37-0174-z-ltb03.dgn

USERNAME => s117075 DATE PLOTTED => 14-JUL-2011 TIME PLOTTED => 10:02



"C" LINE

107+50 110+00 112+50

BENCH MARK:

B. M Elev.: 7.541 US Survey Feet
Northing: 1985636.542
Easting: 6094153.352
Vertical Datum: NAVD88
Horizontal Datum: CCS83/Zone 3
Mag nail & Shiner - Northbound shoulder of US101
approximately 0.5 mile southeast from Embacardo Road overcrossing

NOTE:

1. This LOTB sheet was prepared in accordance with the caltrans soil and Rock logging, Classification, and Presentation Manual (June 2007)
2. Groundwater depth was not measured; dry to 9 feet before switching auger to rotarywash method.
3. Design groundwater level at Elev. 4 ft.

PROFILE
HOR. 1"=50'
VER. 1"=5'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCL	101	48.7/52.0		

GEOTECHNICAL PROFESSIONAL DATE 7/13/11

REGISTERED PROFESSIONAL ENGINEER Stephen Huang No. C 42289 Exp. 03/31/12 CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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SANTA CLARA VALLEY TRANSPORTATION AUTHORITY
3331 N FIRST STREET
SAN JOSE, CA 95134

URS Corporation
55 S Market Street
SUITE #1500
San Jose, CA 95113

DESIGN OVERSIGHT Emil A. Vergara Jr.
7-14-11
SIGN OFF DATE

DRAWN BY A. CHEUNG
CHECKED BY S. HUANG

M. SELVENDRAN
FIELD INVESTIGATION BY:
DATE: 03/23/09

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Walt LaFranchi
PROJECT ENGINEER

BRIDGE NO. 37-0174
POST MILES 50.66

ADOBE CREEK BRIDGE (WIDEN)

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 04235
EA 4A3301

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 11-20-09 3-22-10 8-20-10 9-14-10 7-13-11

SHEET 14 OF 15

FILE => 37-0174-z-ltb04.dgn

USERNAME => s117075 DATE PLOTTED => 14-JUL-2011 TIME PLOTTED => 10:02

APPENDIX III
Field Exploration and Testing

This appendix is not relevant to the report.

APPENDIX IV
Laboratory Test Results

APPENDIX IV
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 on "Log of Test Borings", Appendix II.

Moisture-Density

The natural moisture contents were determined for selected undisturbed samples of the soils in general accordance with California Test Method 226 and dry unit weights based on mass/volume relationships. This information was used to classify and correlate the soils. The results are presented on Plates IV-1A through IV-1C "Summary of Laboratory Test Results", Appendix IV.

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 expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with California Test Method 204. The results of the test are presented on Plate IV-2, "Plasticity Chart", Appendix IV.

Grain Size Classification

Grain size classification tests (ASTM Test Method D 422-63) were performed on selected samples of granular soil to aid in the classification. The results are presented on Plates IV-3A through IV-3C, "Grain Size Distribution Curves", Appendix IV.

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. The results are presented on Plates IV-4A through IV-4V, "Unconfined Consolidation Test", Appendix IV.

Corrosion Tests

A corrosion test was performed on selected sample to determine the corrosion potential of the soils. The pH and minimum resistivity tests (California Test Method 643), Sulfate (California Test Method 417) and Chloride (California Test Method 422) tests were performed by Sunland Analytical. The test results are presented on Plates IV-5A through IV-5F, Appendix IV.

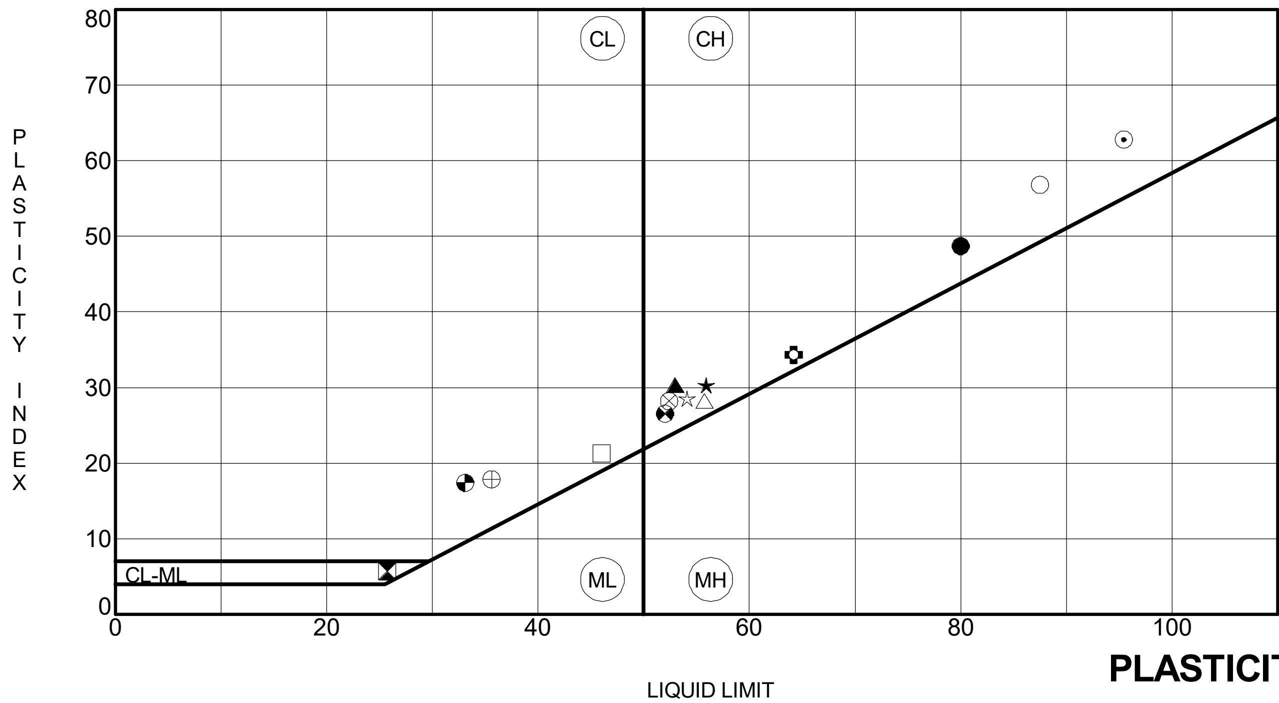
Consolidation Test

Consolidation tests were performed on selected samples to determine the consolidation potential of the soils. Consolidation tests were performed in general accordance with ASTM D 2435. The test results are presented on Plates IV-6A through IV-6E, Appendix IV.

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Shear Strength (tsf)
B2	1	3.0	CL	13.4	-						
B2	2	6.0	CL	18.5	108.4						
B2	3	11.0	CH	35.2	85.7	80	31	49			
B2	4	16.0	CL	32.8	89.1						UC = 0.88
B2	5	21.0	CL	22.7	109.0						
B2	6	26.0	SM	11.6	-				24.8	16.5	
B2	7	31.0	CL	31.9	87.7						
B2	8	36.0	SW-SM	16.5	107.9				9.7	7.7	
B2	9	41.0	SM	10.4	-						
B2	10	46.0	CL	28.4	-						
B2	11	51.0	CL	33.4	87.1						UC = 0.64
B2	12	56.0	CL	34.8	-						
B2	13	61.0	SM	28.5	95.8						
B2	14	71.0	CL-ML	24.3	-	26	20	6			
B2	15	81.0	CL	30.0	94.6					97.8	
B2	16	91.0	CL	16.5	-						
B2	17	101.0	CL	31.8	90.5						
B2	18	111.0	CL	27.6	75.0						UC = 0.99
B2	19	121.0	CL	26.7	96.7						
B3	1	6.0	SM	11.4	115.4						
B3	2	11.0	CL	41.5	76.9						UC = 0.9
B3	3	16.0	CH	25.8	94.1	53	23	30			
B3	4	21.0	SM	13.5	145.7				35.1	14.8	
B3	5	26.0	SM	25.0	-						
B3	6	31.0	SW-SM	16.3	-				34.0	10.9	
B3	7	36.0	SM	11.3	-						
B3	8	41.0	CL	27.7	-						
B3	9	46.0	SM	11.2	121.6						
B3	10	51.0	CL	40.5	-						
B3	11	56.0	SM	20.0	106.8						
B3	12	61.0	SM	19.8	102.4						
B3	13	71.0	CL	25.1	98.7						UC = 1.14
B3	14	81.0	CL	25.6	103.1						
B3	15	91.0	CH	28.2	89.6	56	26	30			
B3	16	101.0	CL	23.7	99.8						UC = 0.86
B3	17	111.0	CH	18.8	-						
B3	18	121.0	CL	25.1	99.0						
B4	1	3.0	CL	7.8	-						
B4	2	6.0	CL	17.1	98.1						
B4	3	11.0	CH	44.6	74.7	95	33	62			UC = 0.45
B4	4	16.0	CL/CH	33.7	-						
B4	5	21.0	CL	21.1	110.8						
B4	6	26.0	SM	9.0	137.6						

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Shear Strength (tsf)
B4	7	31.0	SM	11.0	-				18.9	14.1	
B4	8	36.0	SM	10.4	-						
B4	9	41.0	GC	26.7	-						
B4	10	46.0	SP-SM	15.8	122.3				23.0	9.5	
B4	11	51.0	CL	36.5	-						
B4	12	56.0	SM	19.6	128.0				12.2	18.2	
B4	13	61.0	SM	18.5	101.8						
B4	14	71.0	CL	28.3	-						
B4	15	81.0	CL	25.4	94.0						UC = 0.86
B4	16	91.0	CH	34.1	84.7	64	30	34			
B4	17	101.0	CL	27.5	93.6						UC = 0.45
B4	18	111.0	CL	25.6	101.4						
B4	19	121.0	CL	28.2	-						
B6	1	3.0	CL	38.0	7.6						
B6	2	6.0	CH	40.9	78.2	88	31	57			
B6	3	11.0	CL	18.1	114.9						UC = 0.5
B6	4	16.0	SW-SC	14.7	129.1				18.5	10.8	
B6	5	21.0	GP-GM	12.6	-				52.6	7.0	
B6	6	26.0	GM	8.3	-						
B6	7	31.0	CL	7.1	-						
B6	8	36.0	CL	25.3	99.6						UC = 0.27
B6	9	41.0	CH	34.2	86.1	56	28	28			
B6	10	46.0	CL	27.0	96.5						
B6	11	51.0	CL	26.0	-						
B6	12	56.0	SM	19.6	113.3				0.5	21.8	
B6	13	61.0	CL	24.8	-						
B6	14	71.0	CL	29.2	87.4						
B6	15	81.0	CL	28.7	91.7						UC = 1.1
B6	16	91.0	CH	25.9	97.0	52	24	28			
B6	17	101.0	CL	27.0	-						
B6	18	111.0	CL	23.5	102.3						UC = 1.49
B6	19	121.0	CL	27.3	-						
B7	1	3.0	CH	44.6	78.5						
B7	2	6.0	CH	48.8	79.2						
B7	3	11.0	CL	24.5	101.0						UC = 0.38
B7	4	16.0	SM	12.7	-				22.3	13.8	
B7	5	21.0	CL	25.1	-						
B7	6	26.0	CL	24.9	100.0	36	18	18			
B7	7	31.0	CL	27.9	92.0						UC = 0.61
B7	8	36.0	SM	18.4	111.5				2.5	13.6	
B7	9	41.0	SM	15.7	-						
B7	10	46.0	SM	19.7	-						
B7	11	51.0	CL	22.2	94.7						

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Shear Strength (tsf)
B7	12	56.0	SM	3.6	-						
B7	13	61.0	CL	26.3	-						
B7	14	71.0	CL	29.9	92.5	46	25	21			UC = 0.67
B7	15	81.0	CL	32.0	87.5						
B7	16	91.0	CH	29.4	96.9	52	25	27			
B7	17	101.0	CL	28.1	-						
B7	18	111.0	CH	24.0	100.8						UC = 1.1
B7	19	121.0	CH	26.5	-						
B9	1	3.0	CL	12.4	103.4						
B9	2	6.0	CL	13.2	102.8						
B9	3	11.0	CL	24.1	97.9						UC = 0.46
B9	4	16.0	SW	11.6	-				15.5	5.5	
B9	5	21.0	CL	24.7	98.7	33	16	17			UC = 1.0
B9	6	26.0	CL	24.1	104.1						
B9	7	31.0	CL	29.9	95.3						
B9	8	36.0	CL	24.2	100.9						UC = 0.38
B9	9	41.0	CH	33.8	87.2	54	26	28			
B9	10	46.0	CL	34.4	88.1						
B9	11	51.0	CL	22.0	103.5						UC = 0.65
B9	12	56.0	CL	25.7	-						
B9	13	61.0	SM	21.7	105.6						
B9	14	71.0	CL	26.7	95.8						UC = 0.44
B9	15	81.0	CL	31.1	86.6						
B9	16	91.0	CL	31.5	93.5						
B9	17	101.0	SM	21.3	113.9						
B9	18	111.0	CH	26.7	99.0						
B9	19	121.0	CH	25.2	98.4						



PLASTICITY

	BOREHOLE	SAMPLE #	DEPTH	LL	PL	PI	Fines	Classification
●	**B2**	**3**	**11.0**	**80**	**31**	**49**		**Fat CLAY**
⧗	**B2**	**14**	**71.0**	**26**	**20**	**6**		**SILTY CLAY**
▲	**B3**	**3**	**16.0**	**53**	**23**	**30**		**Fat CLAY**
★	**B3**	**15**	**91.0**	**56**	**26**	**30**		**Fat CLAY**
⊙	**B4**	**3**	**11.0**	**95**	**33**	**62**		**Fat CLAY**
✿	**B4**	**16**	**91.0**	**64**	**30**	**34**		**Fat CLAY**
○	**B6**	**2**	**6.0**	**88**	**31**	**57**		**Fat CLAY**
△	**B6**	**9**	**41.0**	**56**	**28**	**28**		**Fat CLAY**
⊗	**B6**	**16**	**91.0**	**52**	**24**	**28**		**Fat CLAY**
⊕	**B7**	**6**	**26.0**	**36**	**18**	**18**		**Lean CLAY**
□	**B7**	**14**	**71.0**	**46**	**25**	**21**		**Lean CLAY**
◉	**B7**	**16**	**91.0**	**52**	**25**	**27**		**Fat CLAY**
◕	**B9**	**5**	**21.0**	**33**	**16**	**17**		**Lean CLAY**
☆	**B9**	**9**	**41.0**	**54**	**26**	**28**		**Fat CLAY**

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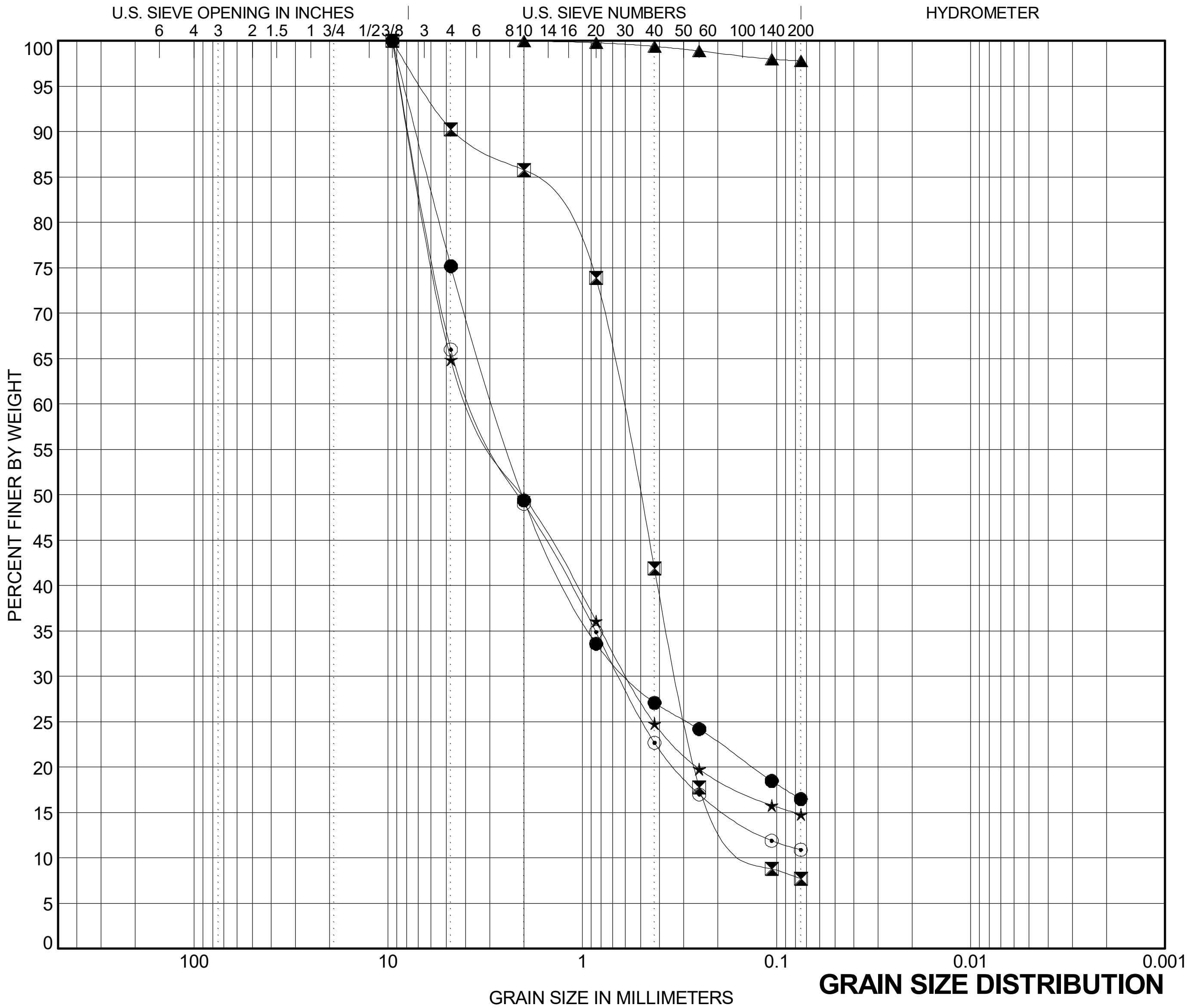
ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

JOB NO: 2016-122-POC | **APPENDIX IV-2**



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B2**	**6**	**26.0**	**SILTY SAND**					
⧗	**B2**	**8**	**36.0**	**Well-graded SAND with SILT and GRAVEL**				**1.43**	**5.29**
▲	**B2**	**15**	**81.0**	**Lean CLAY**					
★	**B3**	**4**	**21.0**	**SILTY SAND**					
⊙	**B3**	**6**	**31.0**	**Well-graded SAND with SILT and GRAVEL**				**2.15**	**63.72**

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B2**	**6**	**26.0**	**9.5**	**2.853**	**0.579**		**24.8**	**58.7**	**16.5**	
⧗	**B2**	**8**	**36.0**	**9.5**	**0.629**	**0.327**	**0.119**	**9.7**	**82.6**	**7.7**	
▲	**B2**	**15**	**81.0**	**2**				**0.0**	**2.2**	**97.8**	
★	**B3**	**4**	**21.0**	**9.5**	**3.594**	**0.585**		**35.1**	**50.1**	**14.8**	
⊙	**B3**	**6**	**31.0**	**9.5**	**3.5**	**0.643**		**34.0**	**55.1**	**10.9**	

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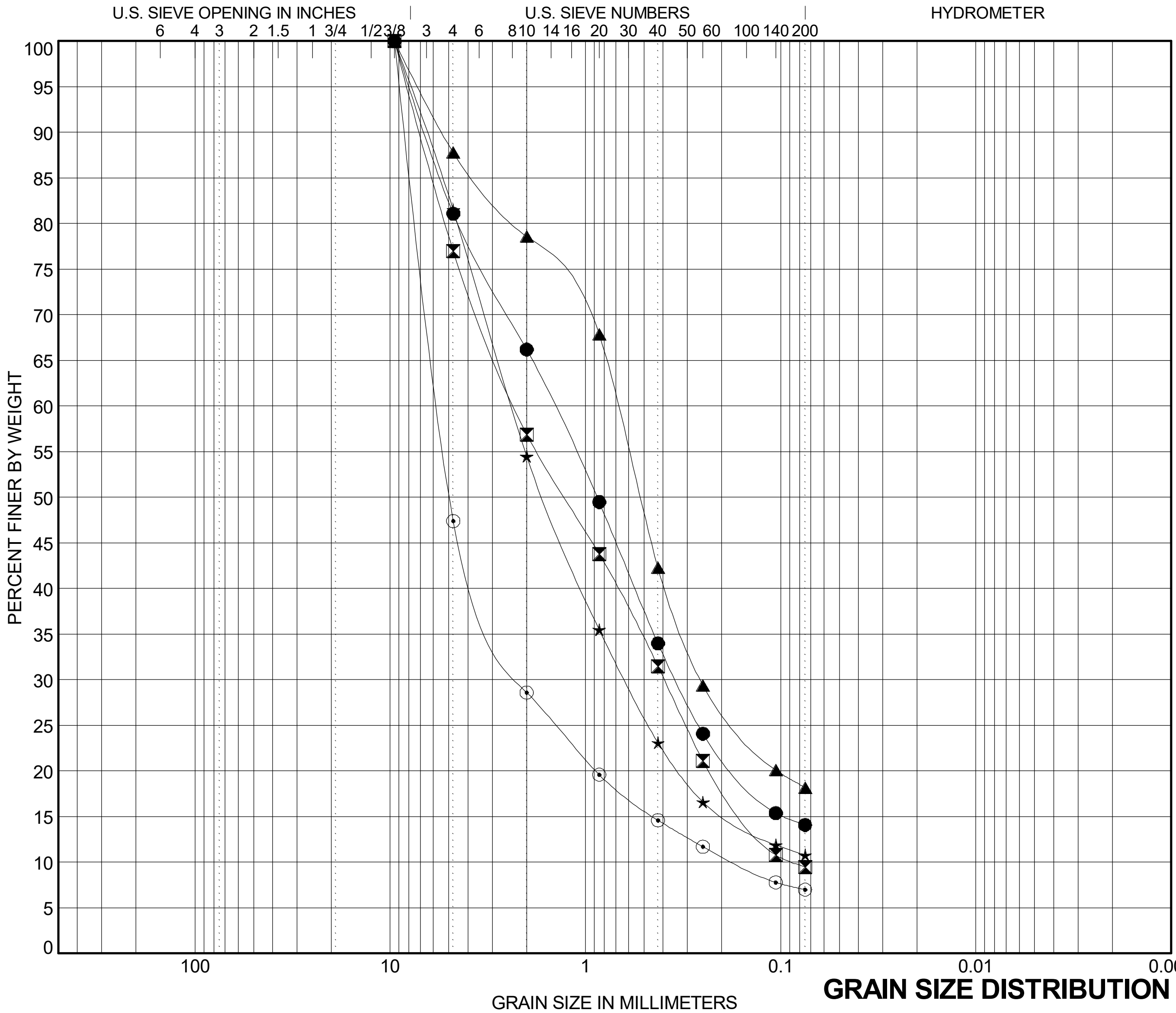
ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

JOB NO: 2016-122-POC

APPENDIX IV-3A



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B4**	**7**	**31.0**	**SILTY SAND with GRAVEL**					
⧗	**B4**	**10**	**46.0**	**Poorly graded SAND with SILT and GRAVEL**				**0.79**	**26.68**
▲	**B4**	**12**	**56.0**	**SILTY SAND**					
★	**B6**	**4**	**16.0**	**Well-graded GRAVEL with SILT and SAND**				**2.81**	**40.90**
⊙	**B6**	**5**	**21.0**	**Poorly graded GRAVEL with SILT and SAND**				**4.72**	**32.61**

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B4**	**7**	**31.0**	**9.5**	**1.456**	**0.343**		**18.9**	**67.0**	**14.1**	
⧗	**B4**	**10**	**46.0**	**9.5**	**2.285**	**0.394**	**0.086**	**23.0**	**67.5**	**9.5**	
▲	**B4**	**12**	**56.0**	**9.5**	**0.686**	**0.256**		**12.2**	**69.6**	**18.2**	
★	**B6**	**4**	**16.0**	**9.5**	**2.385**	**0.625**		**18.5**	**70.7**	**10.8**	
⊙	**B6**	**5**	**21.0**	**9.5**	**5.608**	**2.133**	**0.172**	**52.6**	**40.4**	**7.0**	

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ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

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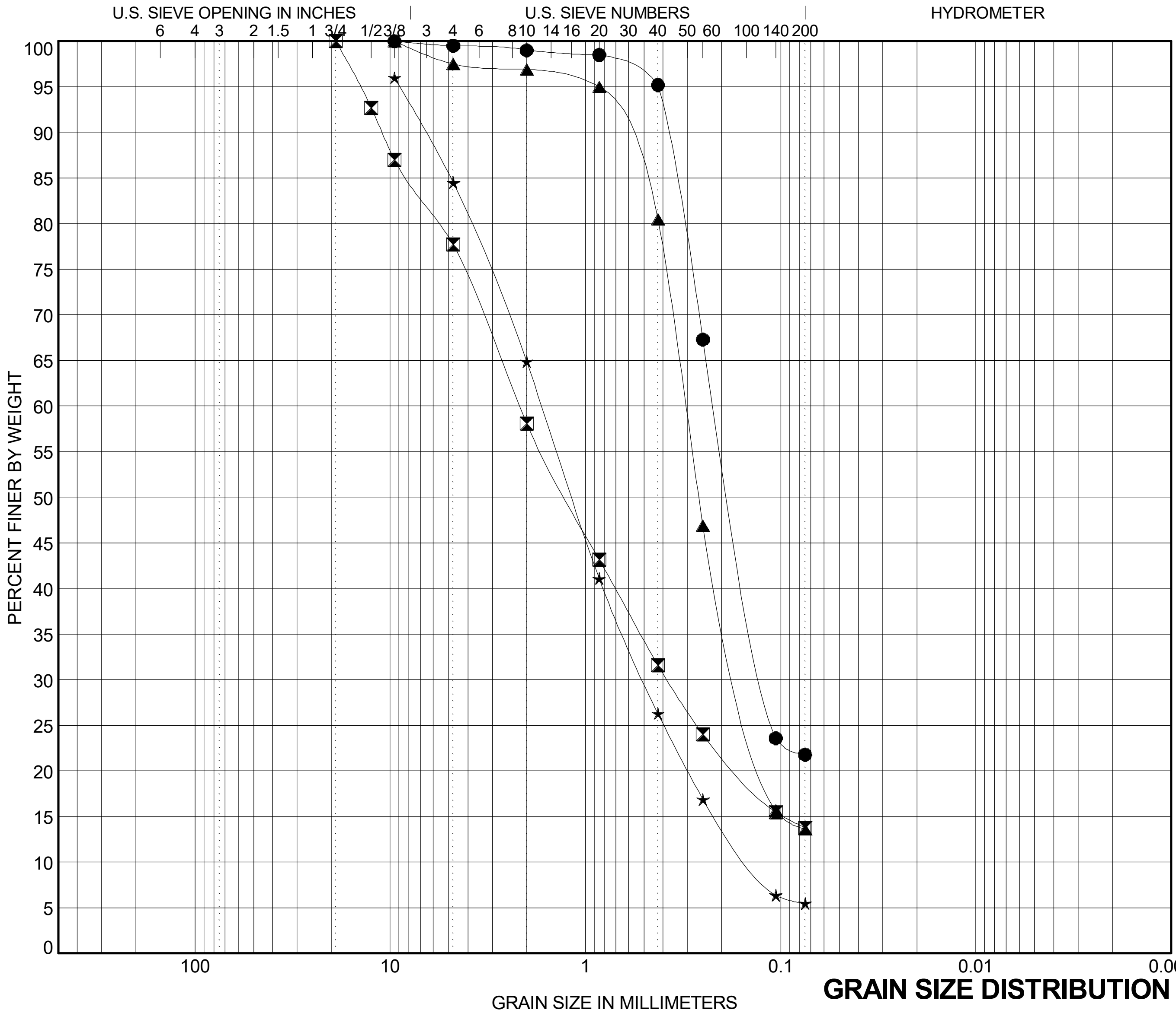
APPENDIX IV-3B



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B6	12	56.0	SILTY SAND					
⧗	B7	4	16.0	SILTY SAND with GRAVEL					
▲	B7	8	36.0	SILTY SAND					
★	B9	4	16.0	Well-graded SAND				1.07	11.79

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt / %Clay
●	B6	12	56.0	9.5	0.217	0.12		0.5	77.7	21.8
⧗	B7	4	16.0	19	2.175	0.38		22.3	63.9	13.8
▲	B7	8	36.0	9.5	0.307	0.157		2.5	83.9	13.6
★	B9	4	16.0	9.5	1.677	0.505	0.142	11.5	79.0	5.5

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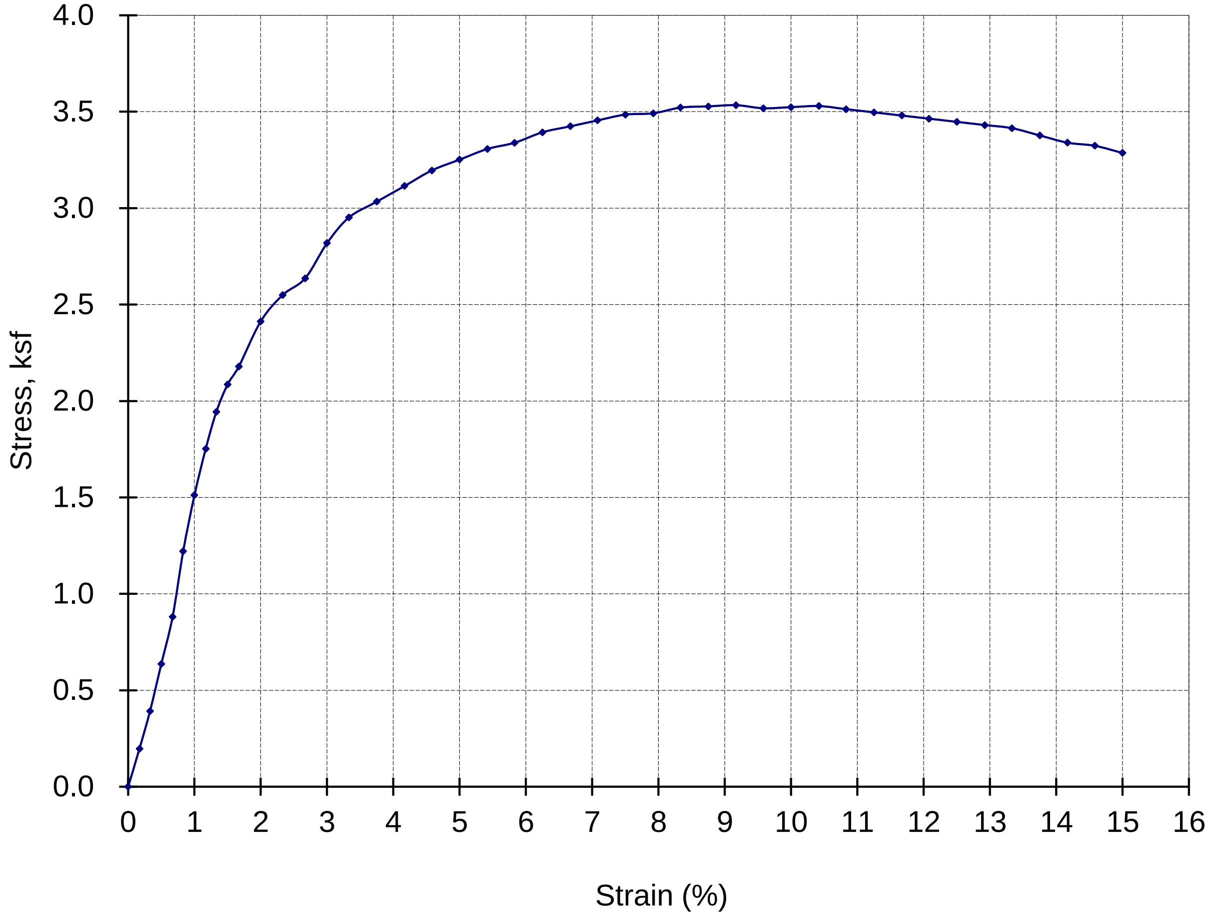
ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

JOB NO: 2016-122-POC

APPENDIX IV-3C

UNCONFINED COMPRESSION TEST



Boring No.: B-2

Sample No. : 4

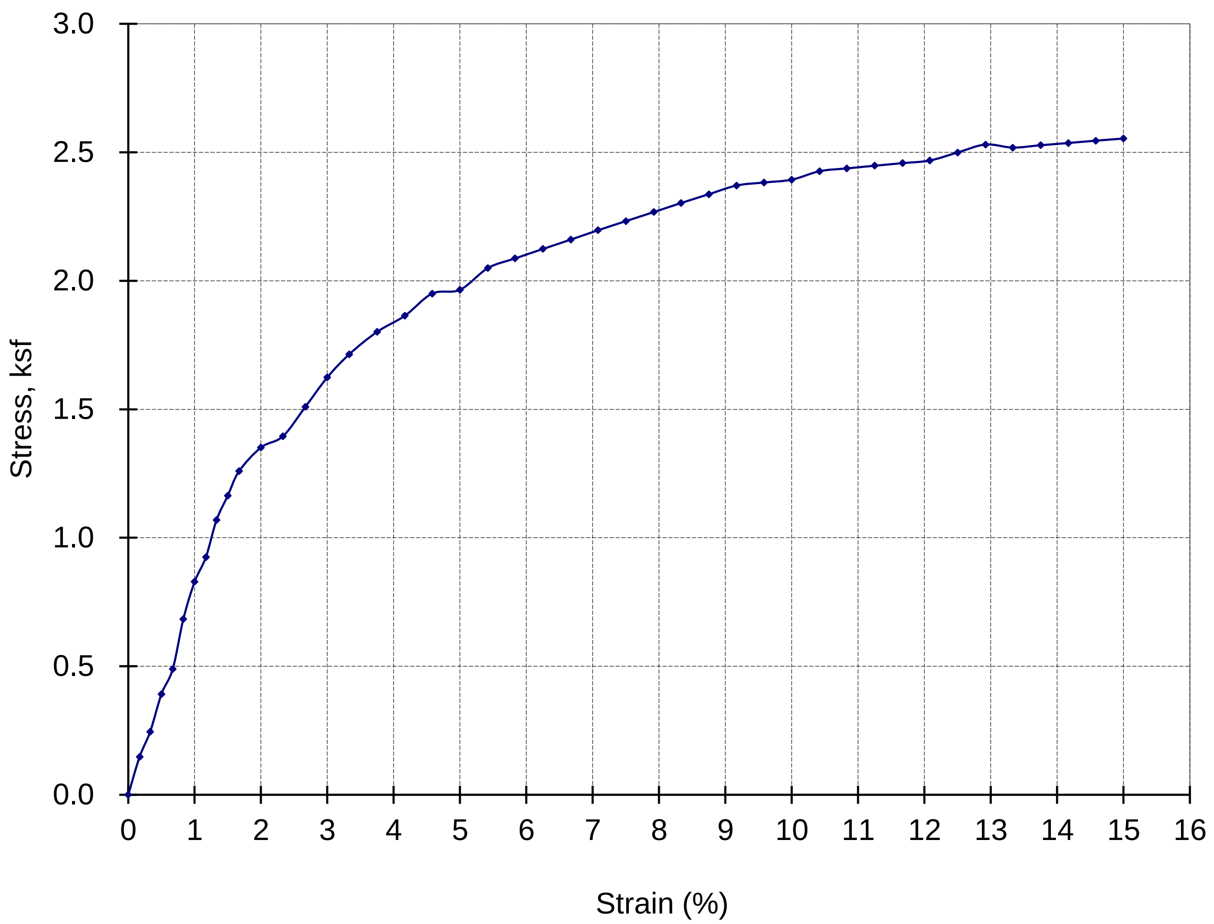
Depth (feet): 16

Maximum Strength (ksf): 3.53

Strain @ Failure (%): 9.00

Material Description:
Lean Clay

UNCONFINED COMPRESSION TEST



Boring No.: B-2

Sample No. : 11

Maximum Strength (ksf): 2.55

Depth (feet): 51

Strain @ Failure (%): 15.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**ADOBE CREEK PEDESTRIAN OVERCROSSING** **SANTA CLARA COUNTY, CALIFORNIA**	
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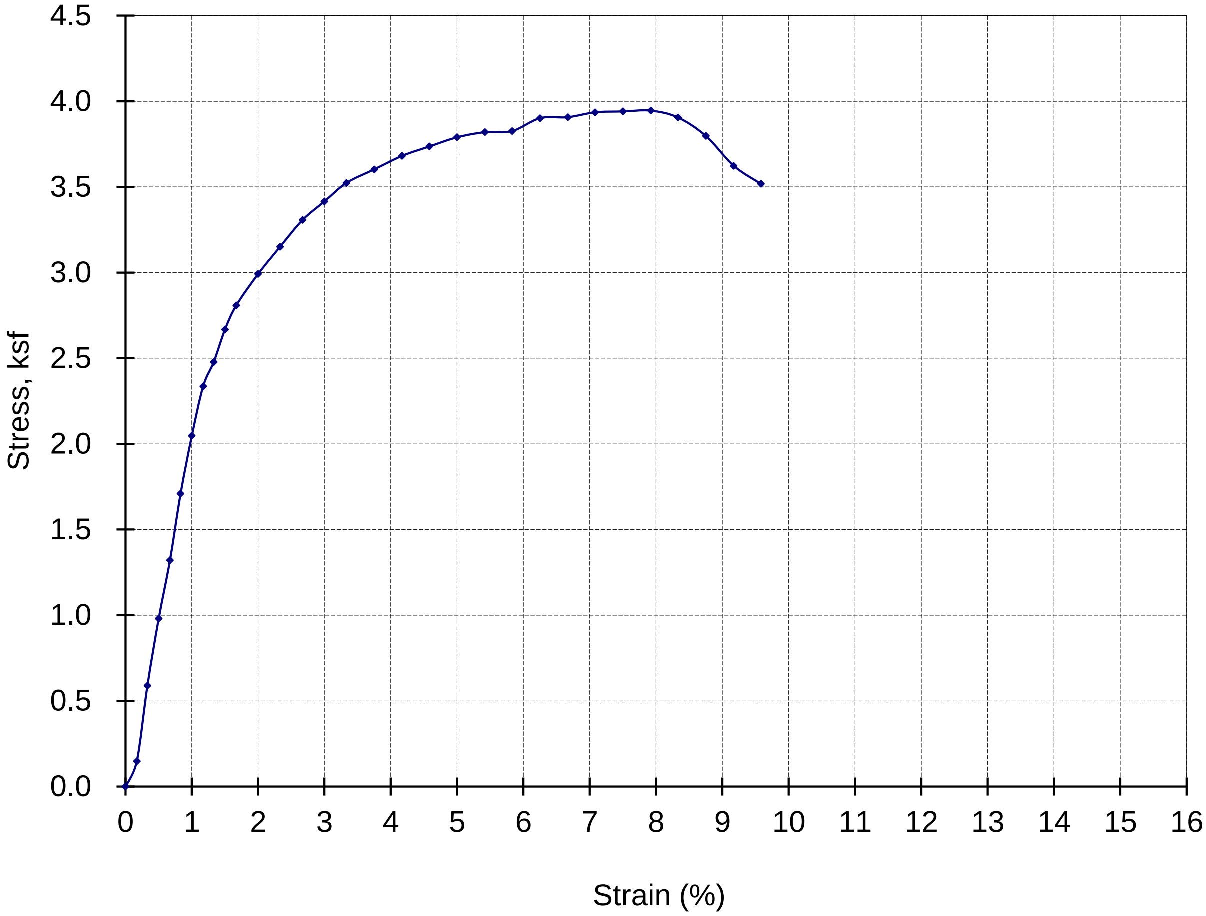
UNCONFINED COMPRESSION TEST



Boring No.: B-2

Sample No. : 18 **Maximum Strength (ksf):** 3.95

Depth (feet): 111 **Strain @ Failure (%):** 8.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC.
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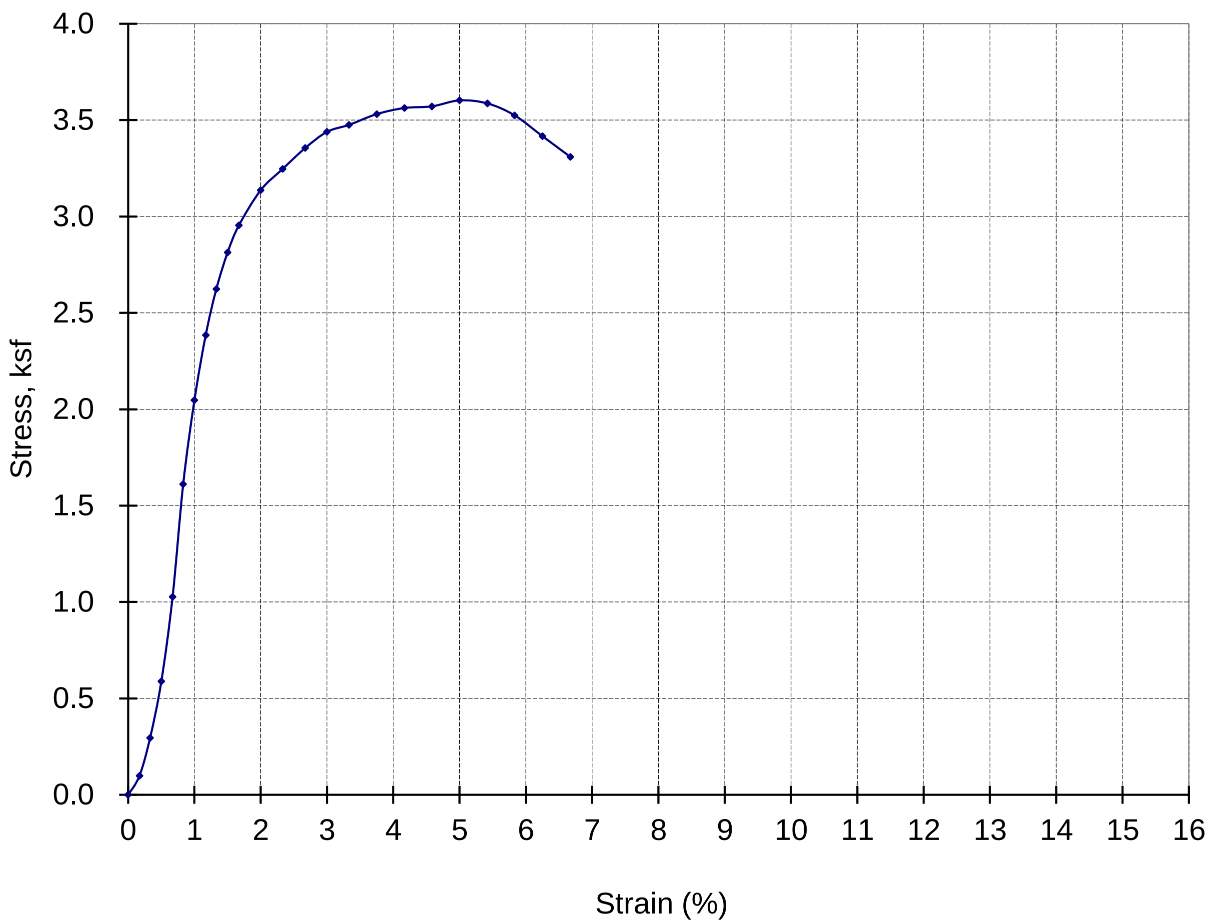
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC | **APPENDIX IV-4C**

UNCONFINED COMPRESSION TEST



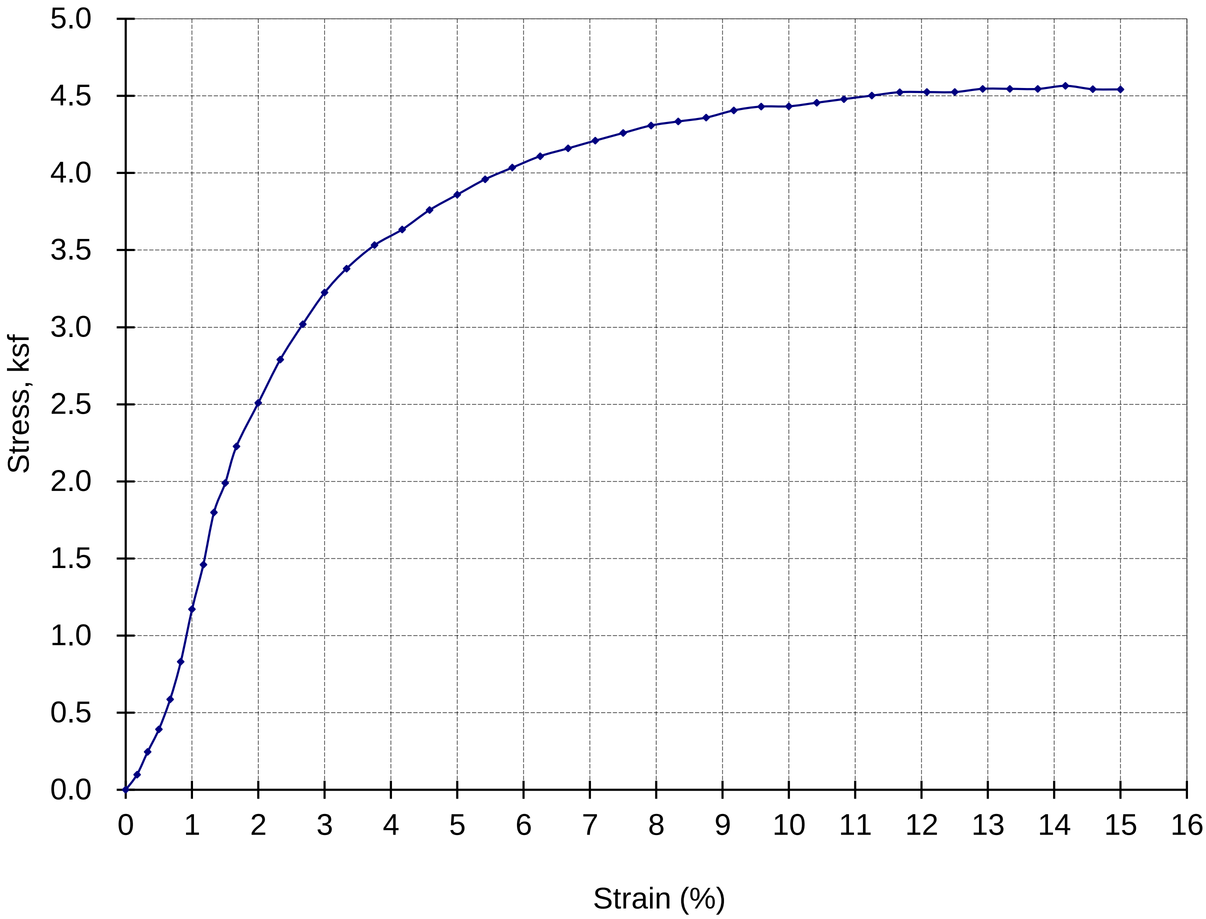
Boring No.: B-3

Sample No. : 2 **Maximum Strength (ksf):** 3.60

Depth (feet): 11 **Strain @ Failure (%):** 5.00

Material Description:
Lean Clay

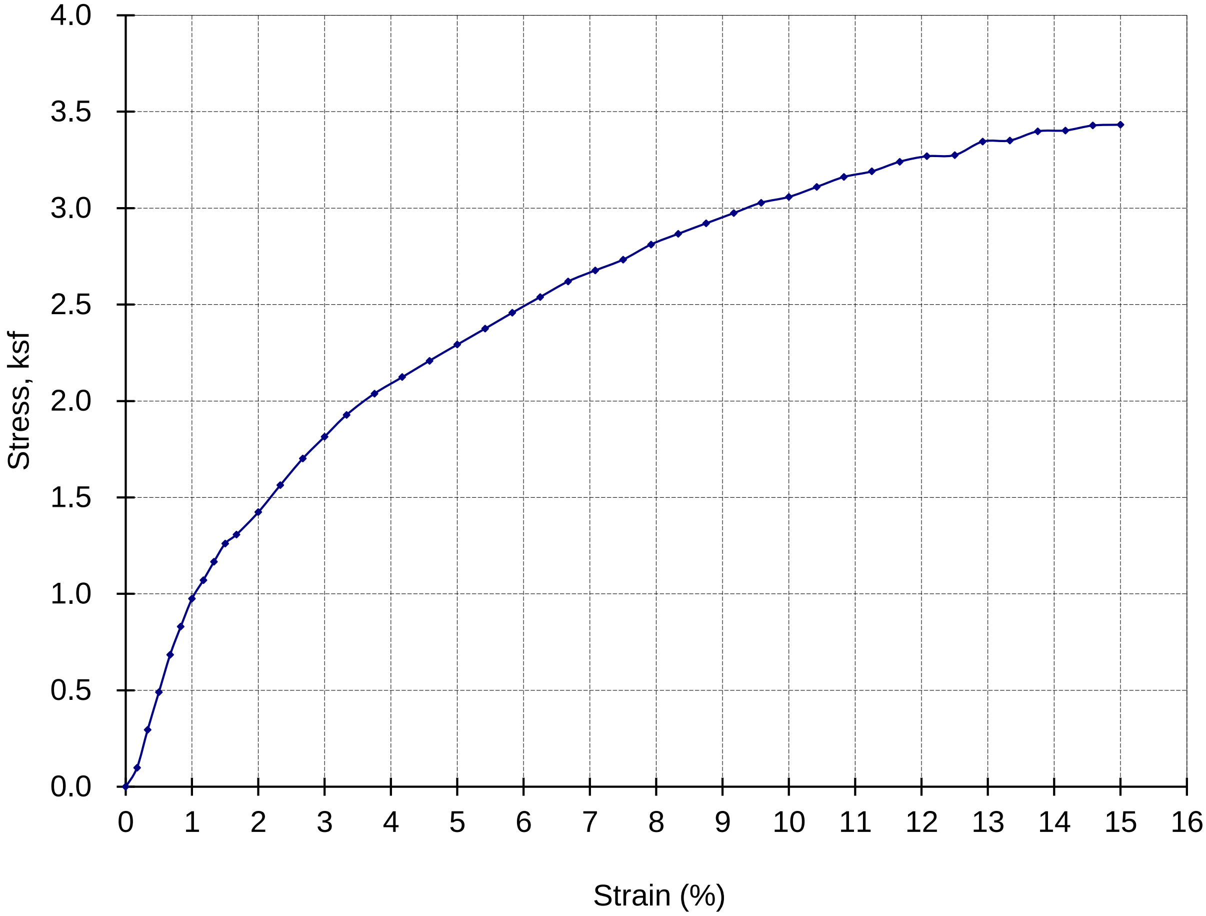
UNCONFINED COMPRESSION TEST



Boring No.:	B-3		
Sample No. :	13	**Maximum Strength (ksf):**	4.57
Depth (feet):	71	**Strain @ Failure (%):**	15.00

Material Description:
Lean Clay

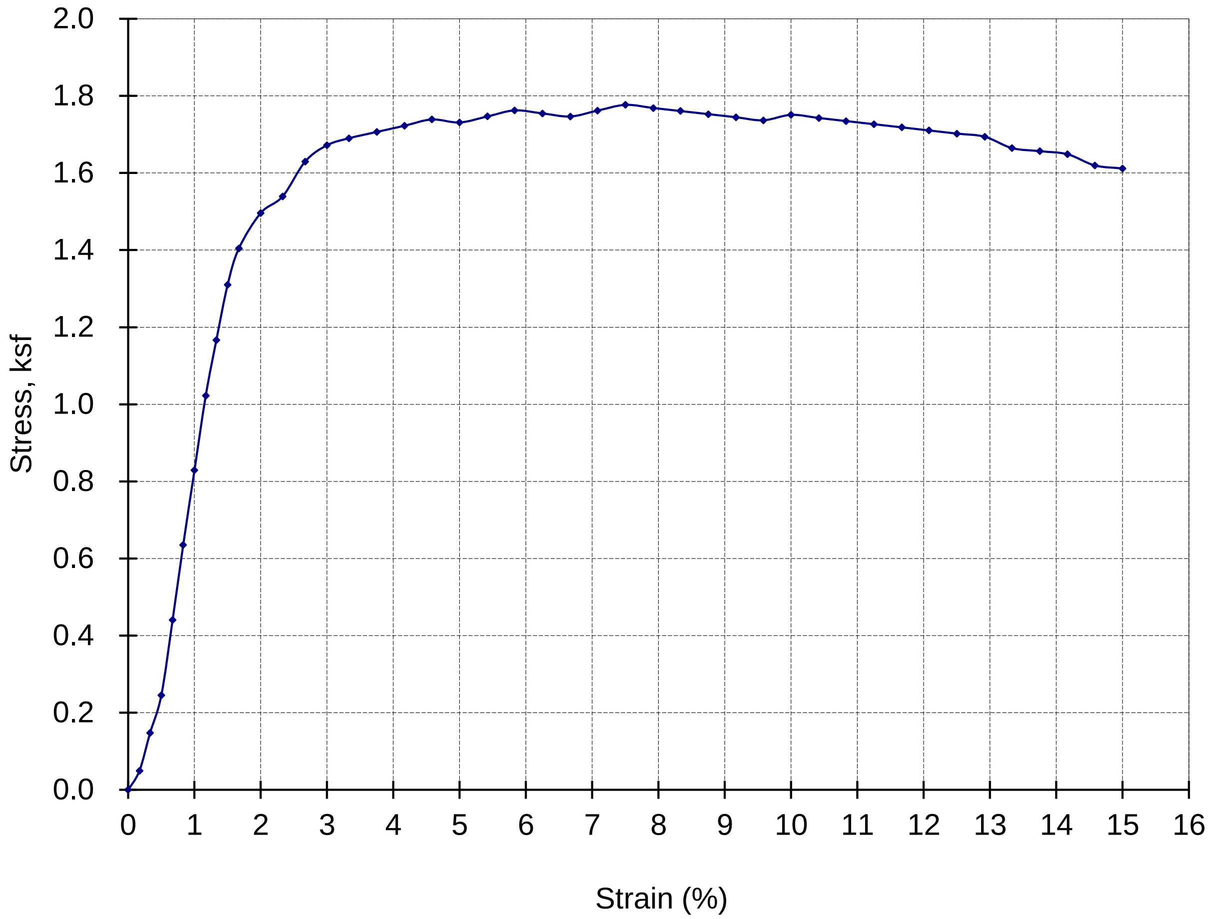
UNCONFINED COMPRESSION TEST



Boring No.:	B-3		
Sample No. :	16	**Maximum Strength (ksf):**	3.43
Depth (feet):	101	**Strain @ Failure (%):**	15.00

Material Description:
Lean Clay

UNCONFINED COMPRESSION TEST



Boring No.: B-4

Sample No. : 3

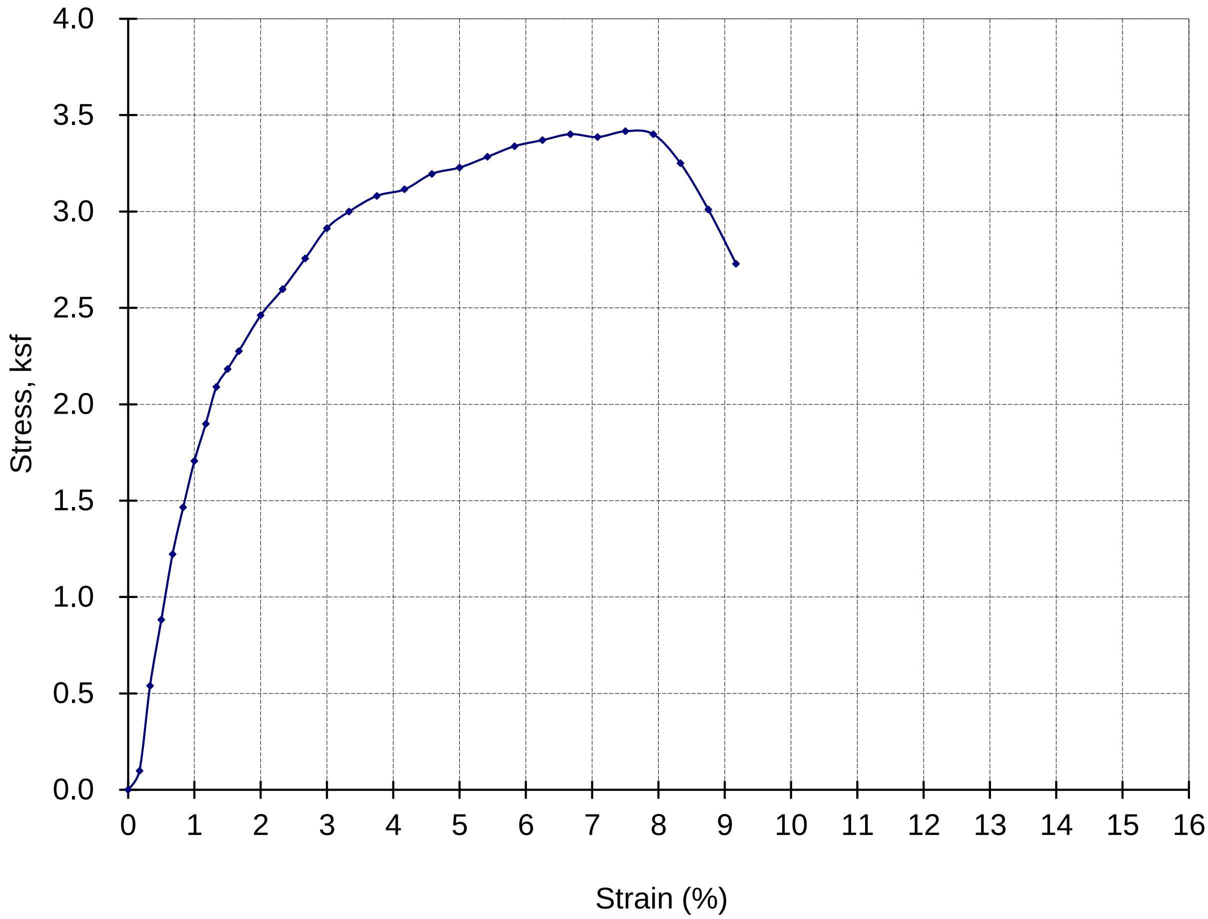
Maximum Strength (ksf): 1.78

Depth (feet): 11

Strain @ Failure (%): 7.50

Material Description:
Fat Clay

UNCONFINED COMPRESSION TEST



Boring No.:	B-4		
Sample No. :	15	**Maximum Strength (ksf):**	3.42
Depth (feet):	81	**Strain @ Failure (%):**	7.50

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC.
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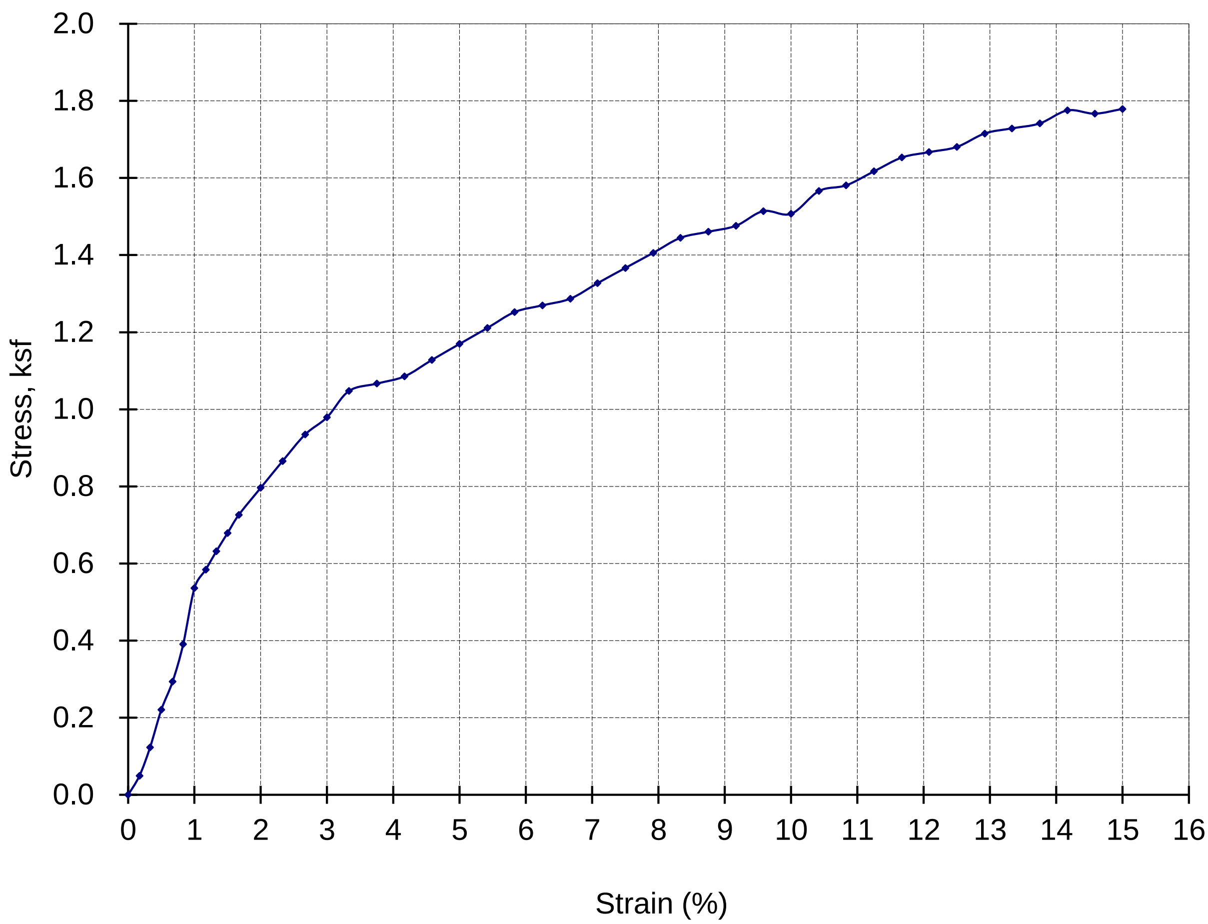
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC | **APPENDIX IV-4H**

UNCONFINED COMPRESSION TEST



Boring No.:	B-4		
Sample No. :	17	**Maximum Strength (ksf):**	1.78
Depth (feet):	101	**Strain @ Failure (%):**	15.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC.
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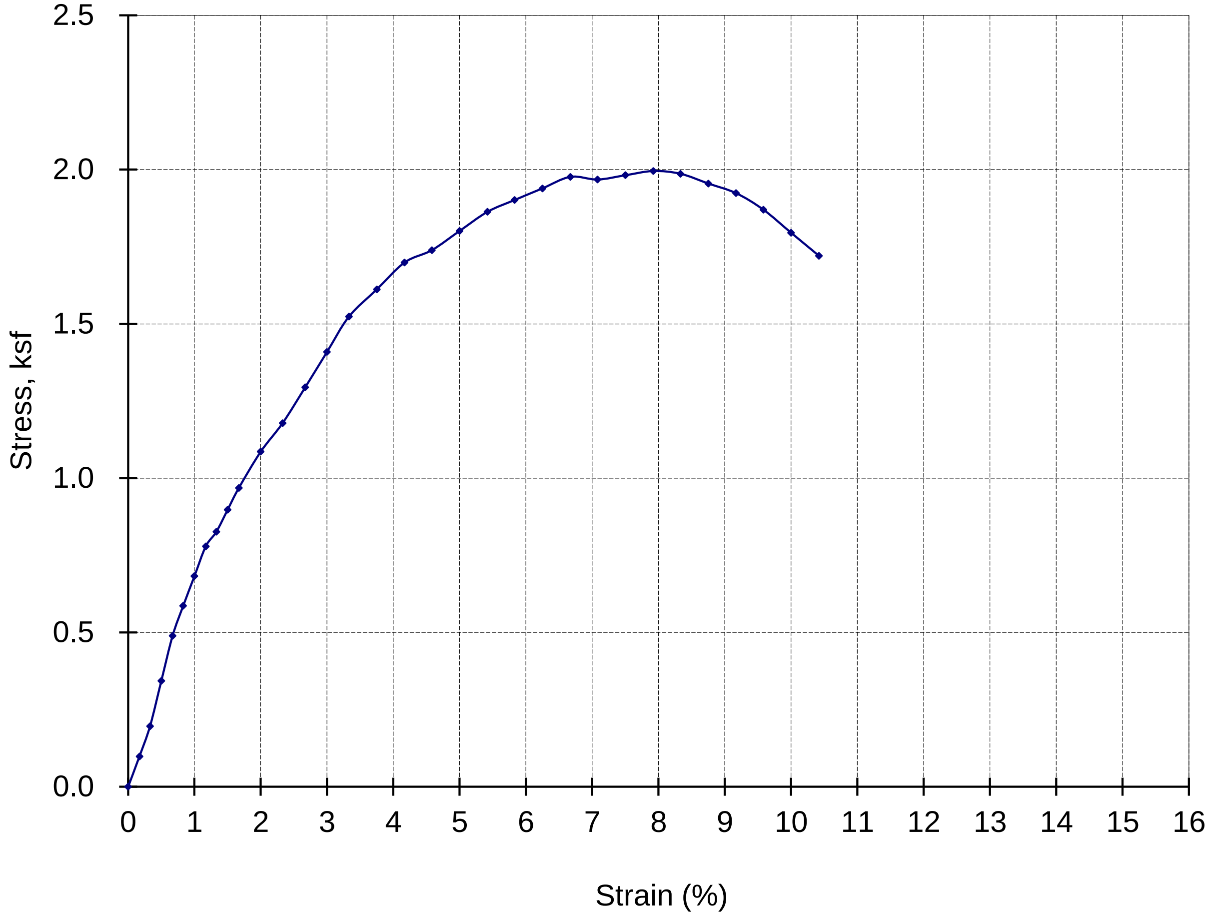
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC | **APPENDIX IV-4I**

UNCONFINED COMPRESSION TEST



Boring No.: B-6

Sample No. : 3

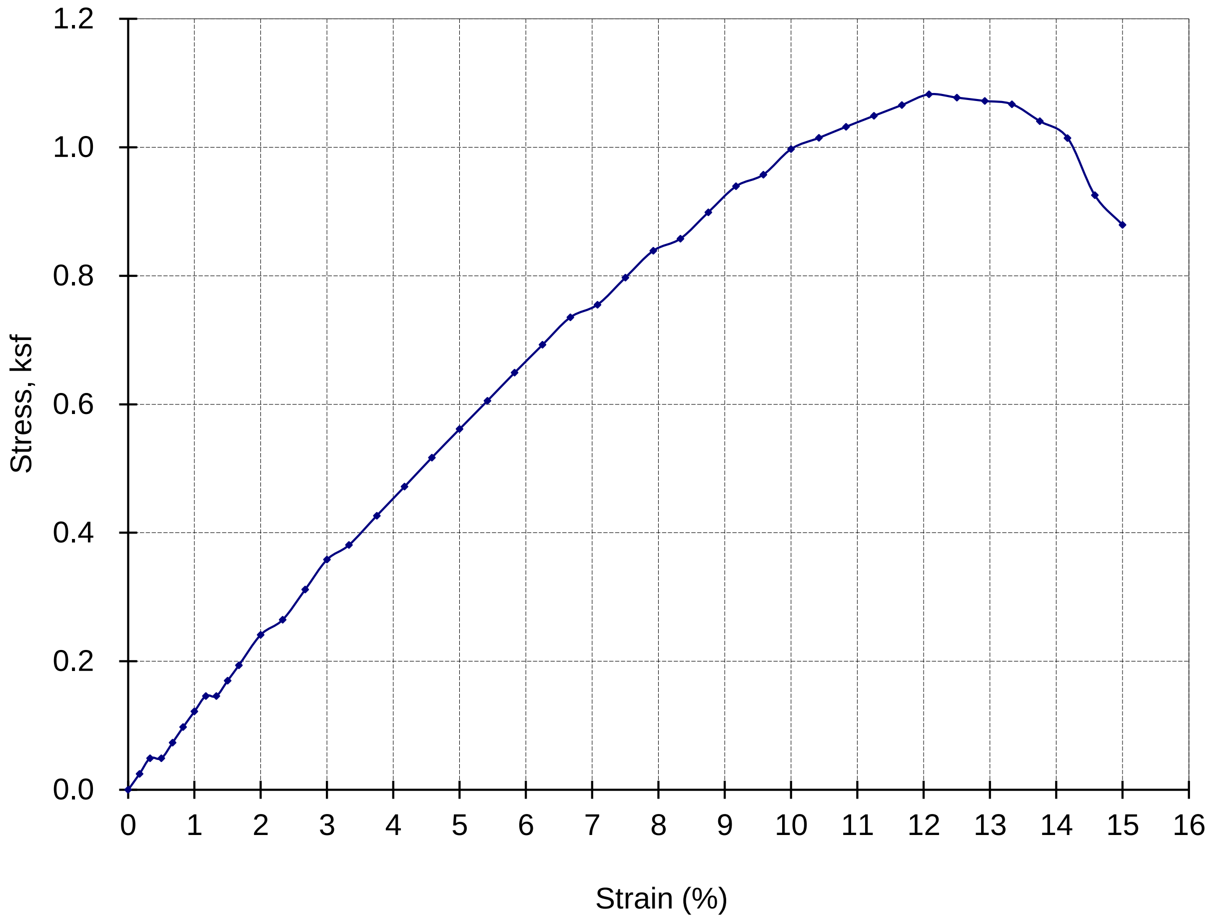
Maximum Strength (ksf): 2.00

Depth (feet): 11

Strain @ Failure (%): 8.00

Material Description:
Lean Clay

UNCONFINED COMPRESSION TEST



Boring No.: B-6

Sample No. : 8

Depth (feet): 36

Maximum Strength (ksf): 1.08

Strain @ Failure (%): 12.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**ADOBE CREEK PEDESTRIAN OVERCROSSING** **SANTA CLARA COUNTY, CALIFORNIA**	
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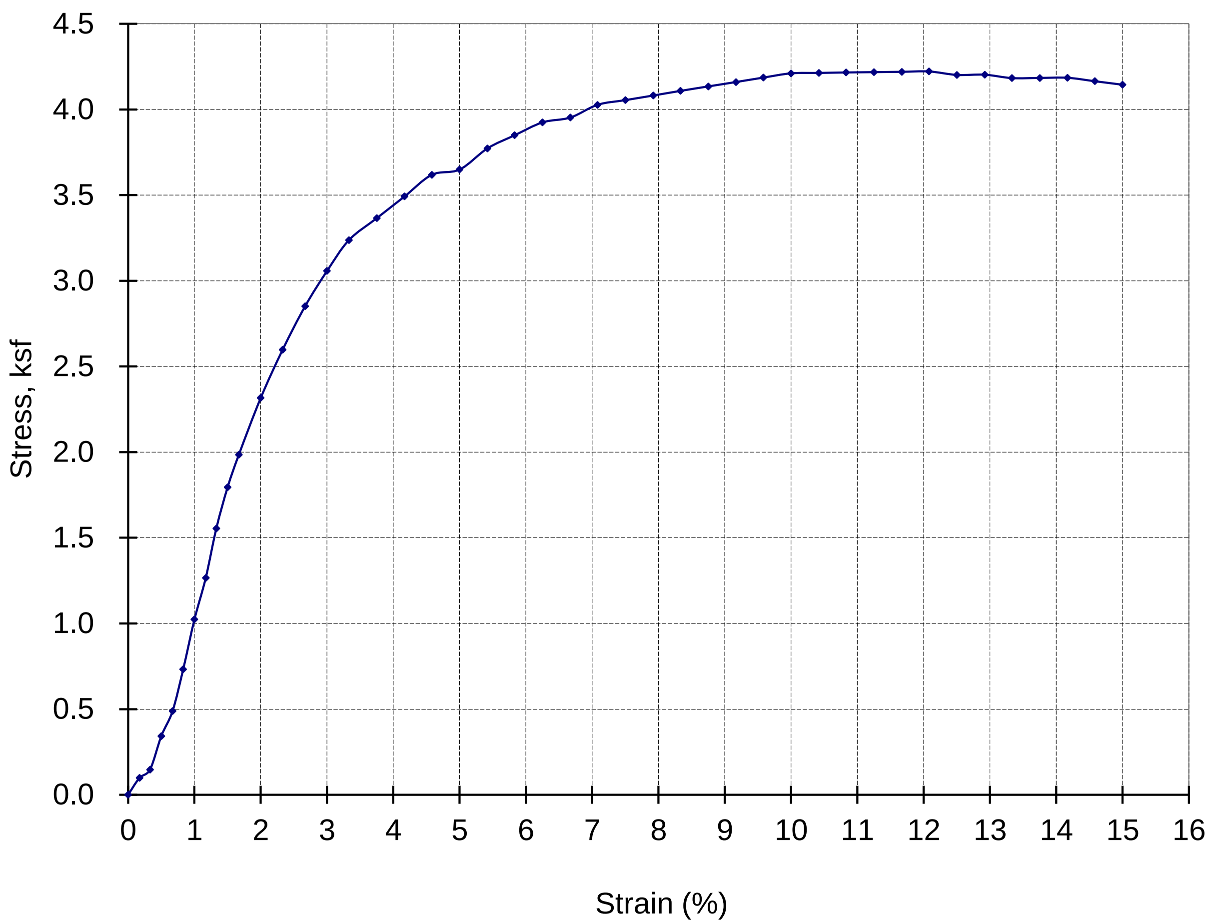
UNCONFINED COMPRESSION TEST



Boring No.: B-6

Sample No. : 15

Depth (feet): 81

Maximum Strength (ksf): 4.22

Strain @ Failure (%): 15.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC.
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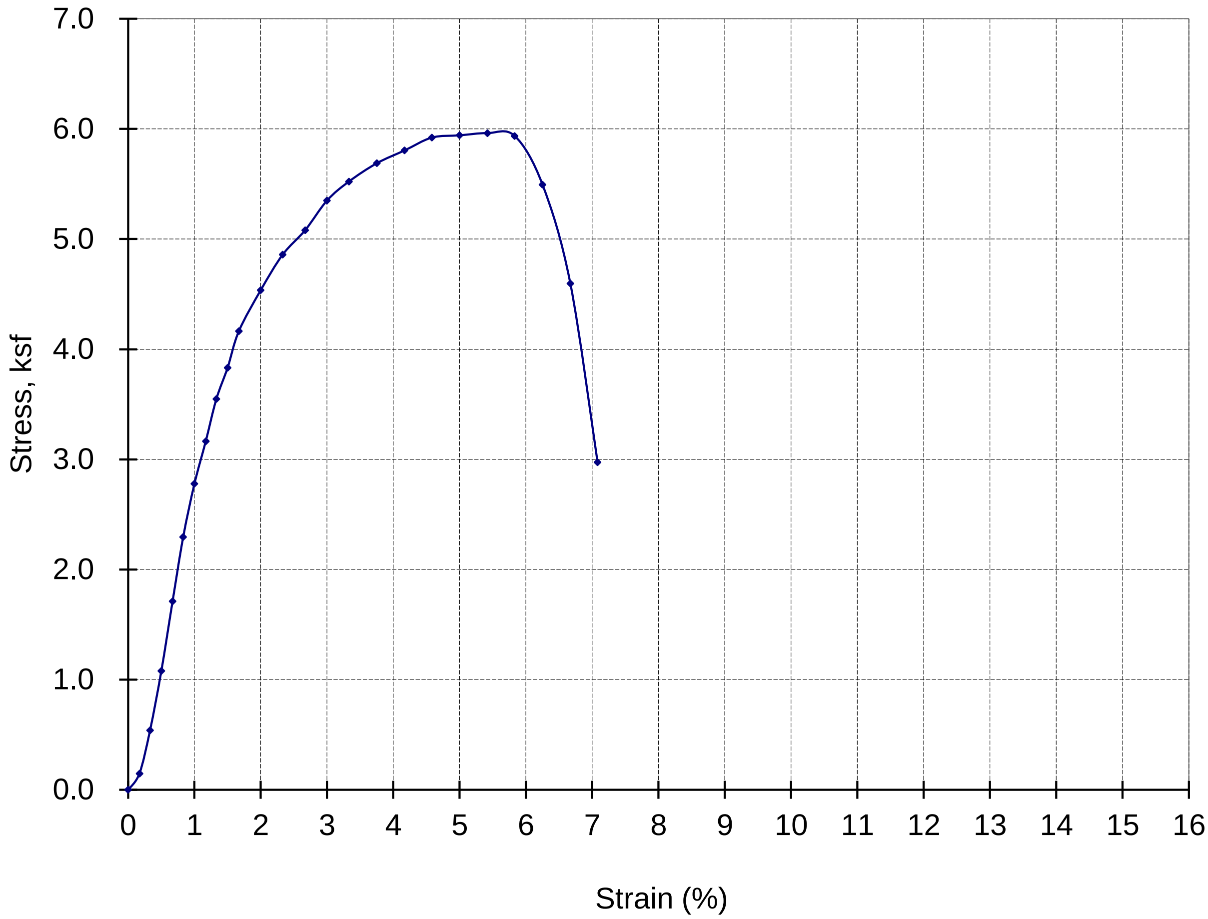
ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC | **APPENDIX IV-4L**

UNCONFINED COMPRESSION TEST



Boring No.: B-6

Sample No. : 18

Depth (feet): 111

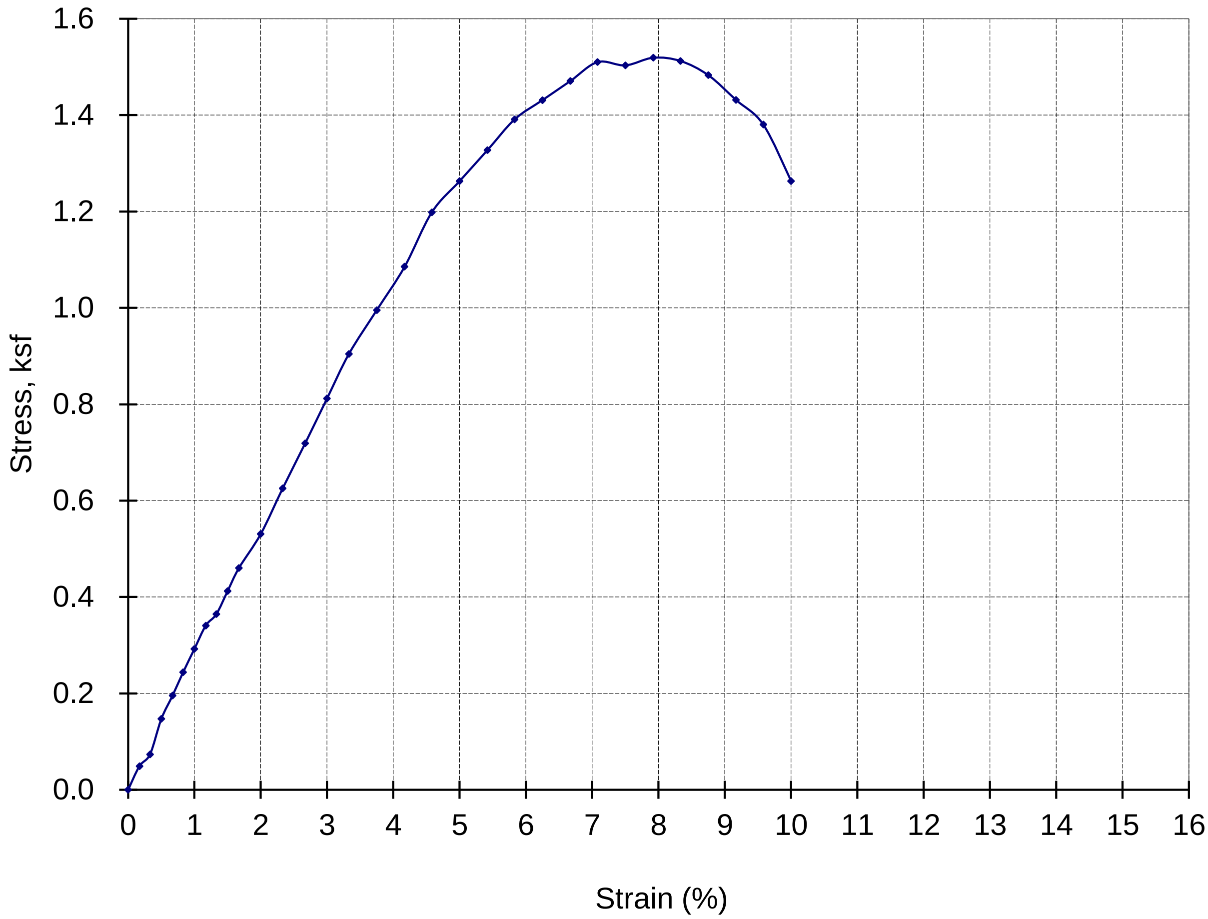
Maximum Strength (ksf): 5.96

Strain @ Failure (%): 6.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**ADOBE CREEK PEDESTRIAN OVERCROSSING** **SANTA CLARA COUNTY, CALIFORNIA**	
	Job No.: 2016-122-POC	**APPENDIX IV-4M**

UNCONFINED COMPRESSION TEST



Boring No.:	B-7		
Sample No. :	3	**Maximum Strength (ksf):**	1.52
Depth (feet):	11	**Strain @ Failure (%):**	8.00

Material Description:
Lean Clay

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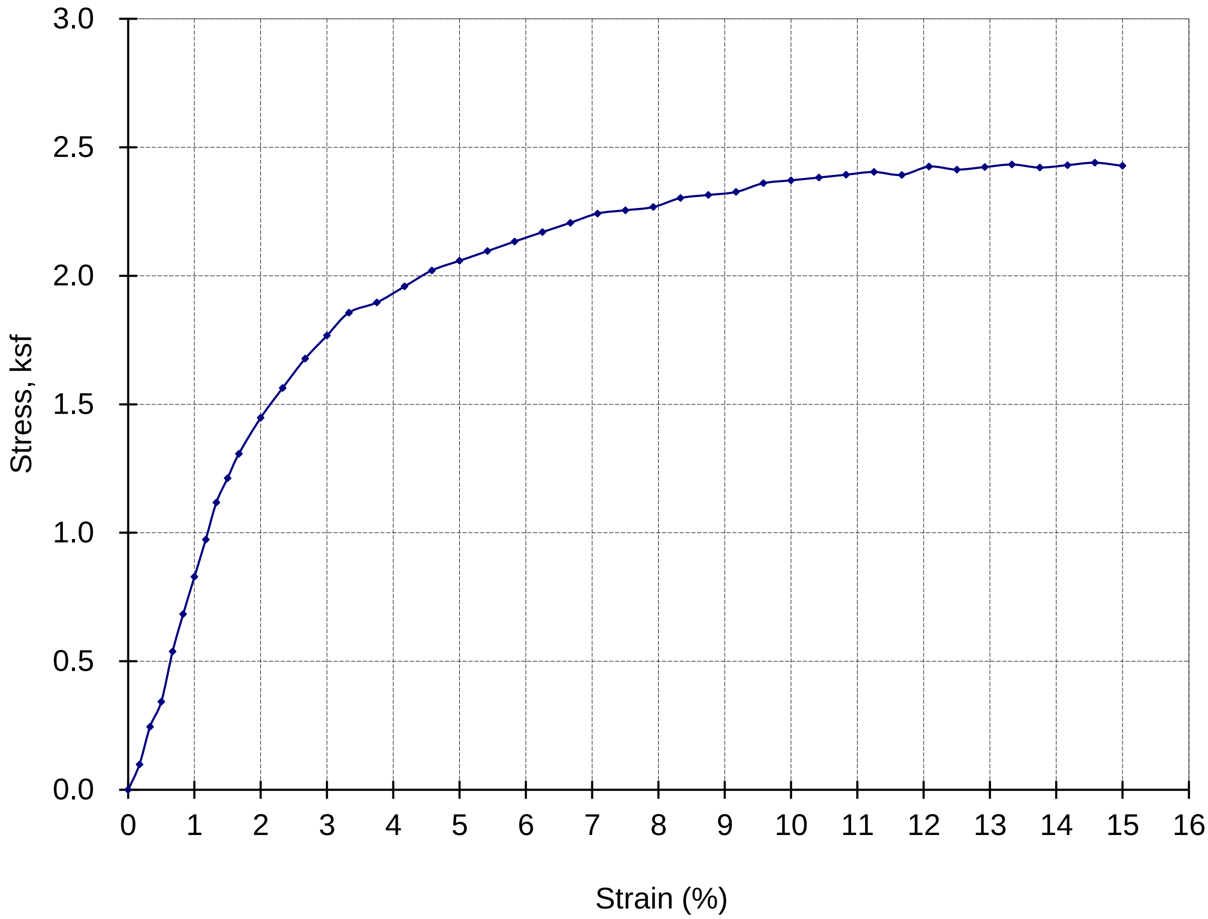
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC | **APPENDIX IV-4N**

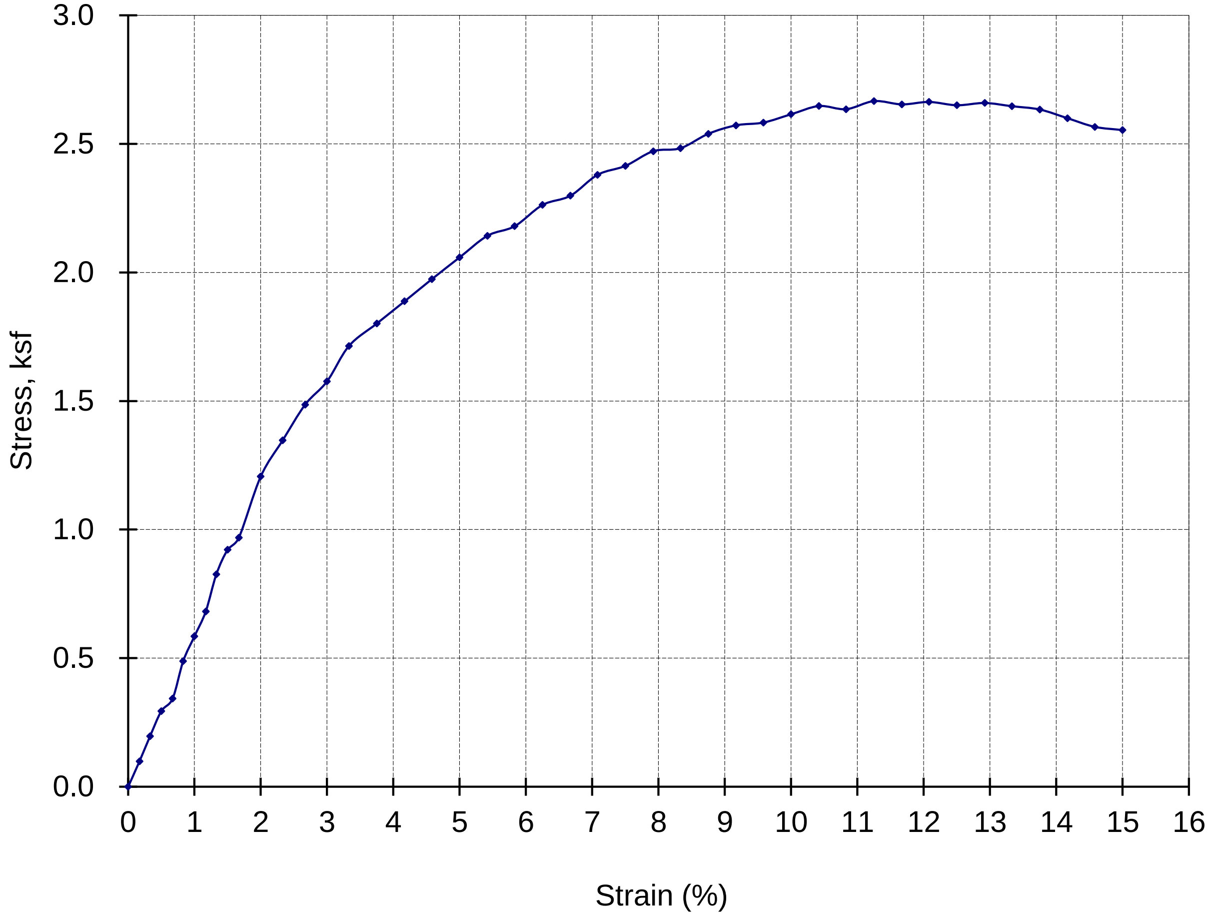
UNCONFINED COMPRESSION TEST



Boring No.:	B-7		
Sample No. :	7	**Maximum Strength (ksf):**	2.44
Depth (feet):	31	**Strain @ Failure (%):**	15.00

Material Description:
Lean Clay

UNCONFINED COMPRESSION TEST



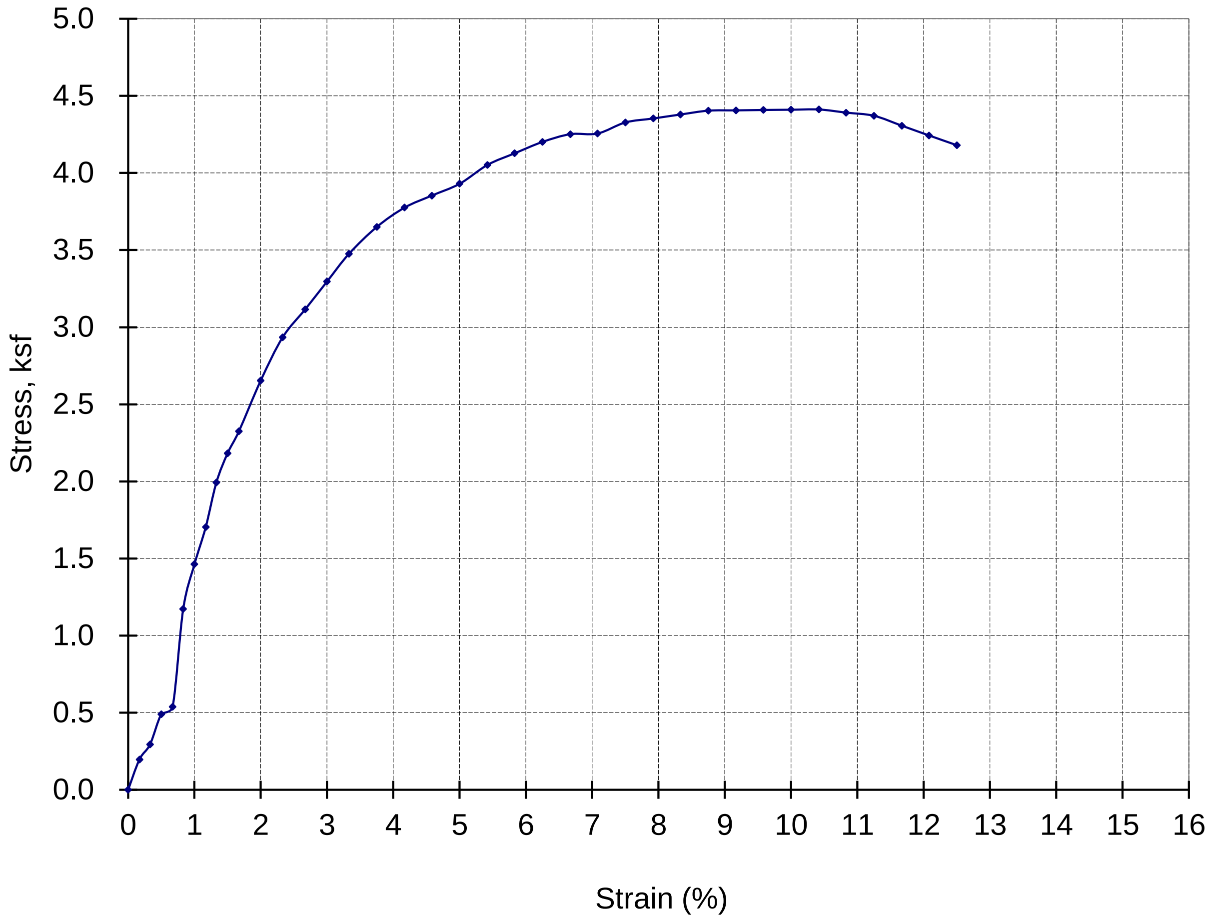
Boring No.: B-7

Sample No. : 14 **Maximum Strength (ksf):** 2.67

Depth (feet): 71 **Strain @ Failure (%):** 12.00

Material Description:
Fat Clay

UNCONFINED COMPRESSION TEST

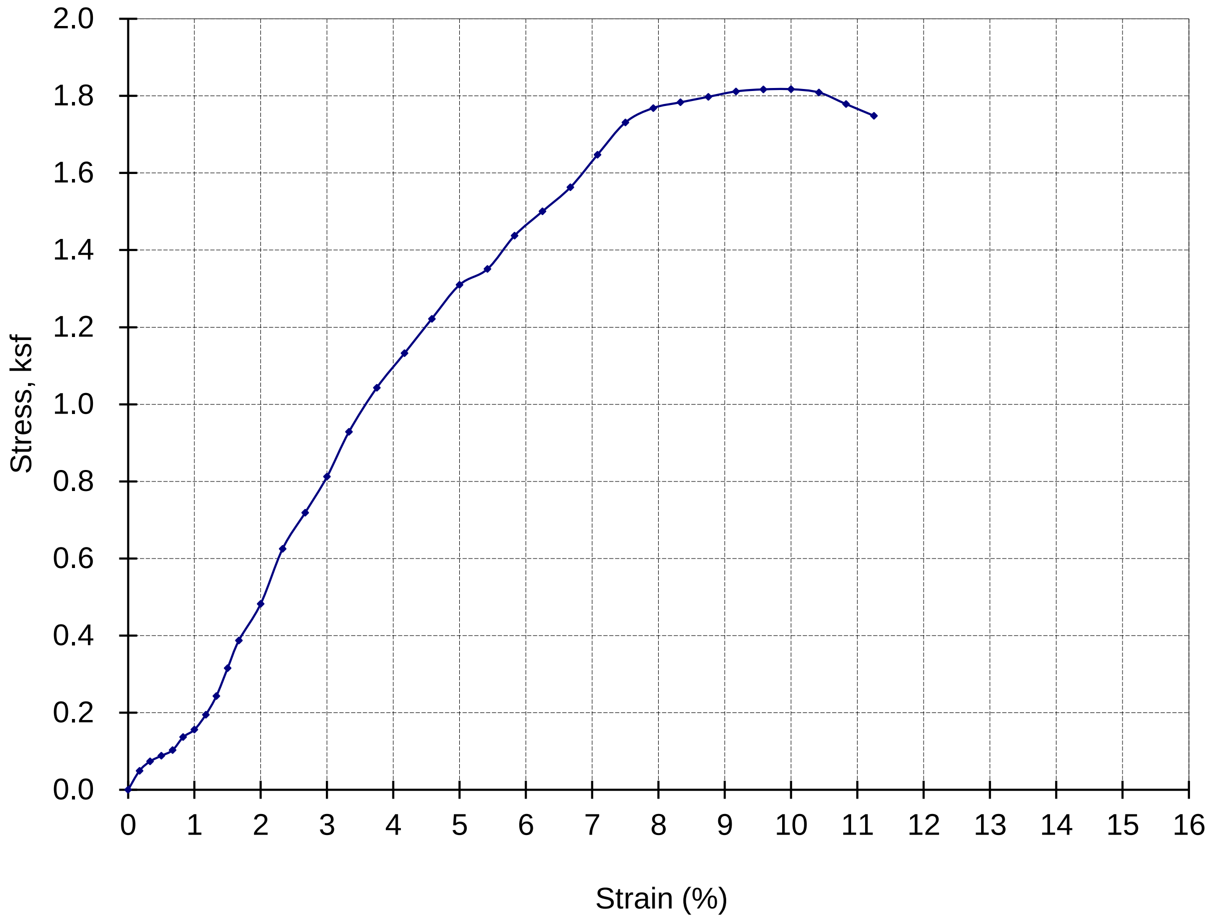


Boring No.:	B-7		
Sample No. :	18	**Maximum Strength (ksf):**	4.41
Depth (feet):	111	**Strain @ Failure (%):**	10.00

Material Description:
Fat Clay

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**ADOBE CREEK PEDESTRIAN OVERCROSSING SANTA CLARA COUNTY, CALIFORNIA**	
	Job No.: 2016-122-POC	**APPENDIX IV-4Q**

UNCONFINED COMPRESSION TEST

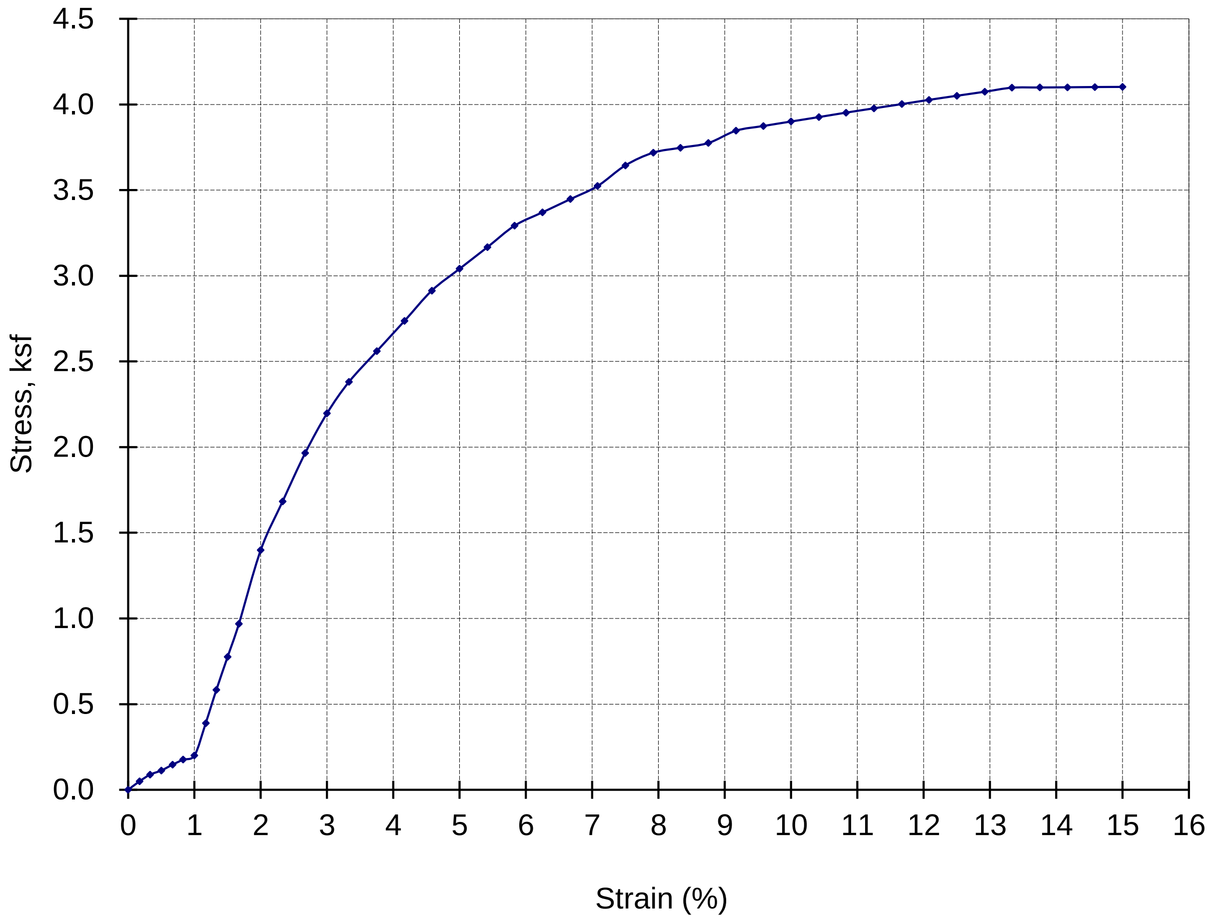


Boring No.:	B-9		
Sample No. :	3	**Maximum Strength (ksf):**	1.82
Depth (feet):	11	**Strain @ Failure (%):**	10.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**ADOBE CREEK PEDESTRIAN OVERCROSSING** **SANTA CLARA COUNTY, CALIFORNIA**	
	Job No.: 2016-122-POC	**APPENDIX IV-4R**

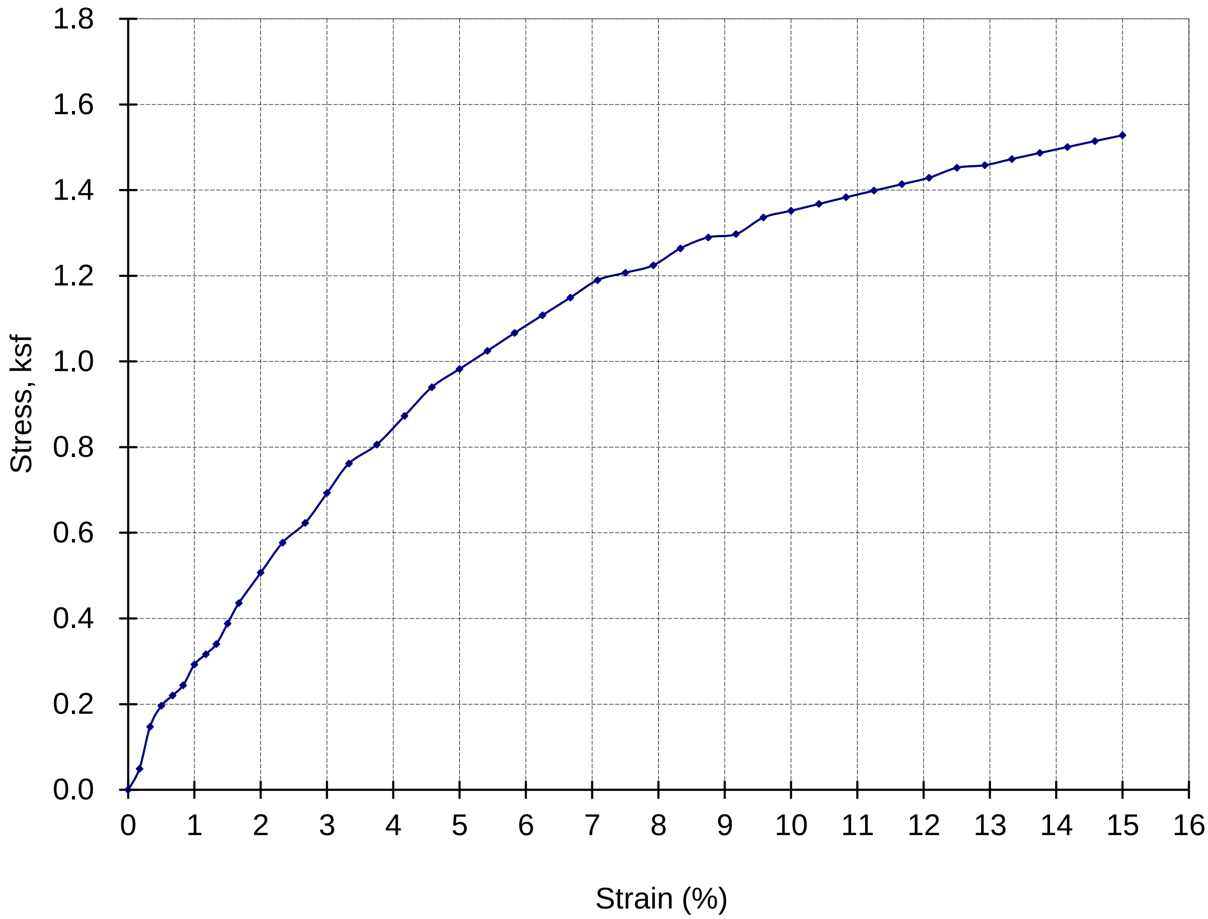
UNCONFINED COMPRESSION TEST



Boring No.:	B-9		
Sample No. :	5	**Maximum Strength (ksf):**	4.10
Depth (feet):	21	**Strain @ Failure (%):**	15.00

Material Description:
Lean Clay

UNCONFINED COMPRESSION TEST



Boring No.:	B-9		
Sample No. :	8	**Maximum Strength (ksf):**	1.53
Depth (feet):	36	**Strain @ Failure (%):**	15.00

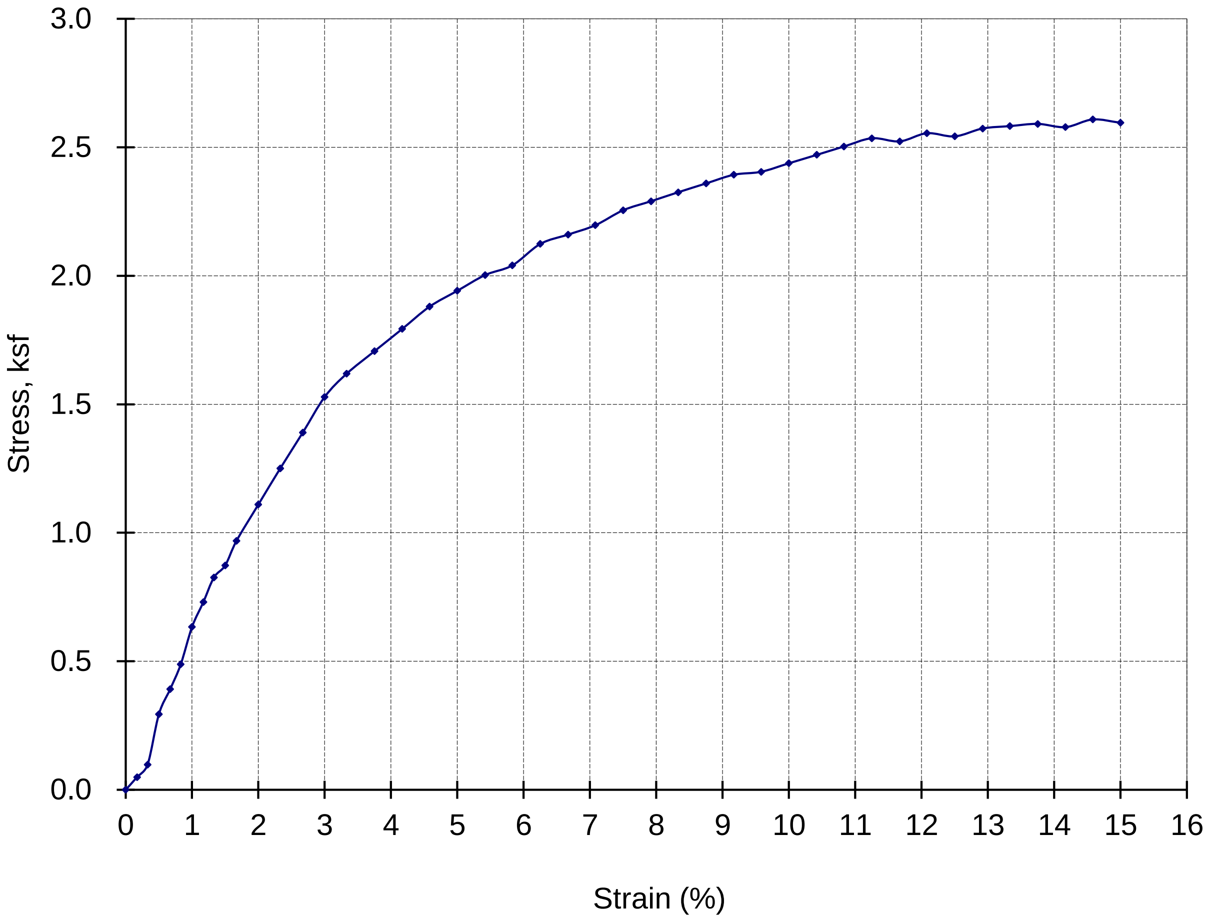
Material Description:
Lean Clay

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC | **APPENDIX IV-4T**

UNCONFINED COMPRESSION TEST

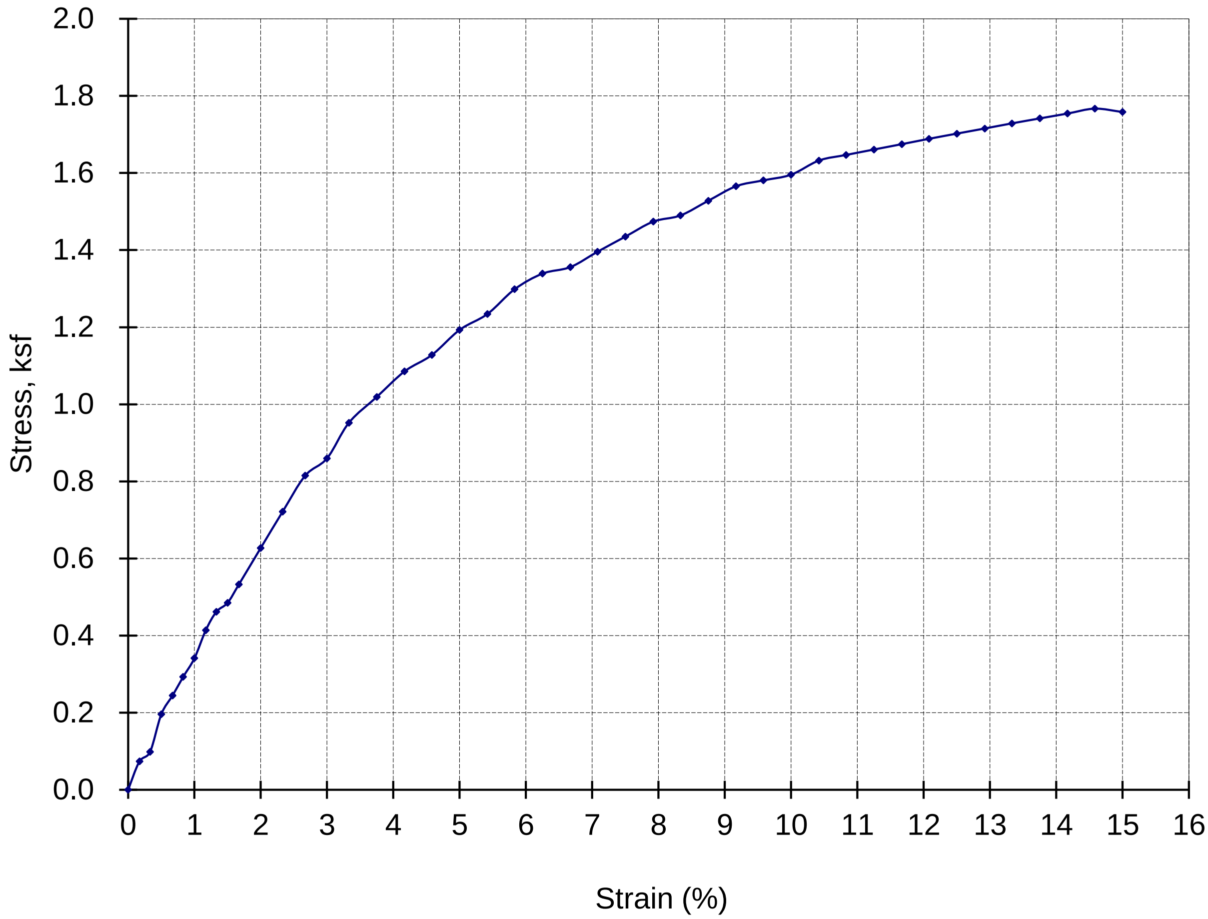


Boring No.:	B-9		
Sample No. :	11	**Maximum Strength (ksf):**	2.61
Depth (feet):	51	**Strain @ Failure (%):**	15.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**ADOBE CREEK PEDESTRIAN OVERCROSSING** **SANTA CLARA COUNTY, CALIFORNIA**	
	Job No.: 2016-122-POC	**APPENDIX IV-4U**

UNCONFINED COMPRESSION TEST



Boring No.: B-9

Sample No. : 14

Maximum Strength (ksf): 1.77

Depth (feet): 71

Strain @ Failure (%): 15.00

Material Description:
Lean Clay

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

Job No.: 2016-122-POC

APPENDIX IV-4V

Sunland Analytical
11419 Sunrise Gold Cir.#10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 11/09/16
Date Submitted 11/04/16

To: Nasir Ahmad
Parikh Consultants Inc.
2360 Qume Dr. Suite A
San Jose, CA, 95131

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

The reported analysis was requested for the following:
Location : 2016-122-POC Site ID: B-2 4@16FT
Thank you for your business.

* For future reference to this analysis please use SUN # 73144 - 152645

EVALUATION FOR SOIL CORROSION

Soil pH	8.97	
Minimum Resistivity	0.46	ohm-cm (x1000)
Chloride	347.8 ppm	0.0348 %
Sulfate-S	260.2 ppm	0.026 %

METHODS:
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11419 Sunrise Gold Cir.#10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 11/09/16
Date Submitted 11/04/16

To: Nasir Ahmad
Parikh Consultants Inc.
2360 Qume Dr. Suite A
San Jose, CA, 95131

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

The reported analysis was requested for the following:
Location : 2016-122-POC Site ID: B-3 2@11FT
Thank you for your business.

* For future reference to this analysis please use SUN # 73144 - 152646

EVALUATION FOR SOIL CORROSION

Soil pH	8.40		
Minimum Resistivity	0.51	ohm-cm (x1000)	
Chloride	500.4 ppm	0.05	%
Sulfate-S	99.9 ppm	0.01	%

METHODS:
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11419 Sunrise Gold Cir.#10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 09/16/16
Date Submitted 09/13/16

To: Nasir Ahmad
Parikh Consultants Inc.
2360 Qume Dr. Suite A
San Jose, CA, 95131

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

The reported analysis was requested for the following:
Location : 2016-122-POC Site ID: B-4 4@16FT
Thank you for your business.

* For future reference to this analysis please use SUN # 72809 - 152006

EVALUATION FOR SOIL CORROSION

Soil pH	9.04		
Minimum Resistivity	0.46	ohm-cm (x1000)	
Chloride	33.1 ppm		0.0033 %
Sulfate-S	300.3 ppm		0.03 %

METHODS:
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11419 Sunrise Gold Cir.#10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 09/16/16
Date Submitted 09/13/16

To: Nasir Ahmad
Parikh Consultants Inc.
2360 Qume Dr. Suite A
San Jose, CA, 95131

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

The reported analysis was requested for the following:
Location : 2016-122-POC Site ID: B-6 1@3FT
Thank you for your business.

* For future reference to this analysis please use SUN # 72809 - 152007

EVALUATION FOR SOIL CORROSION

Soil pH	8.62			
Minimum Resistivity	0.13	ohm-cm (x1000)		
Chloride	2238.4	ppm	0.2238	%
Sulfate-S	1092.3	ppm	0.1092	%

METHODS:
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11419 Sunrise Gold Cir.#10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 09/28/16
Date Submitted 09/23/16

To: Nasir Ahmad
Parikh Consultants Inc.
2360 Qume Dr. Suite A
San Jose, CA, 95131

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

The reported analysis was requested for the following:
Location : 2016-122-POC Site ID: B-7 3@11FT
Thank you for your business.

* For future reference to this analysis please use SUN # 72886 - 152151

EVALUATION FOR SOIL CORROSION

Soil pH	8.65		
Minimum Resistivity	0.54	ohm-cm (x1000)	
Chloride	346.7 ppm	0.0347	%
Sulfate-S	145.9 ppm	0.0146	%

METHODS:
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11419 Sunrise Gold Cir.#10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 11/09/16
Date Submitted 11/04/16

To: Nasir Ahmad
Parikh Consultants Inc.
2360 Qume Dr. Suite A
San Jose, CA, 95131

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

The reported analysis was requested for the following:
Location : 2016-122-POC Site ID: B-9 2@6FT
Thank you for your business.

* For future reference to this analysis please use SUN # 73144 - 152647

EVALUATION FOR SOIL CORROSION

Soil pH	8.17	
Minimum Resistivity	0.40	ohm-cm (x1000)
Chloride	821.9 ppm	0.0822 %
Sulfate-S	617.7 ppm	0.0618 %

METHODS:
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 06/21/2017
Date Submitted 06/14/2017

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite A
San Jose, CA 95131

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

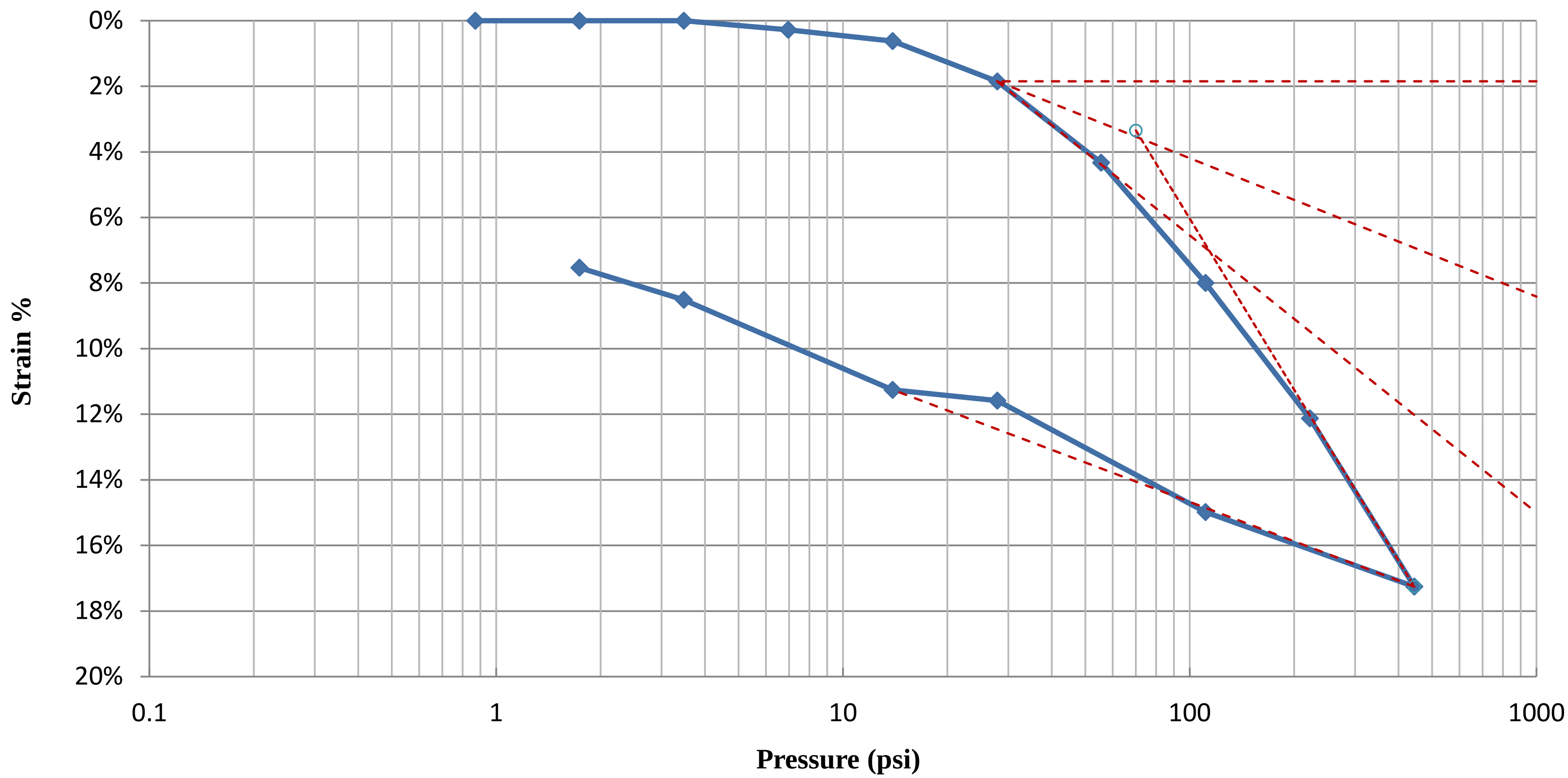
The reported analysis was requested for the following location:
Location : 2016-122-POC Site ID : A,B,C,D. (Water Sample From Adobe Creek)
Thank you for your business.

* For future reference to this analysis please use SUN # 74494-155494.

EVALUATION FOR WATER CORROSION

Soil pH	7.56		
Minimum Resistivity	0.80 ohm-cm (x1000)		
Chloride	78.3 ppm	0.00783	%
Sulfate	62.1ppm	0.00621	%

METHODS
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate CA DOT Test #417, Chloride CA DOT Test #422



BH	B-2
Sample	3
Depth	11
Sample Vertical stress (psi)	9.5
OCR	7.3
Cc/(1+e0)	17.3%
Cr/(1+e0)	4.0%

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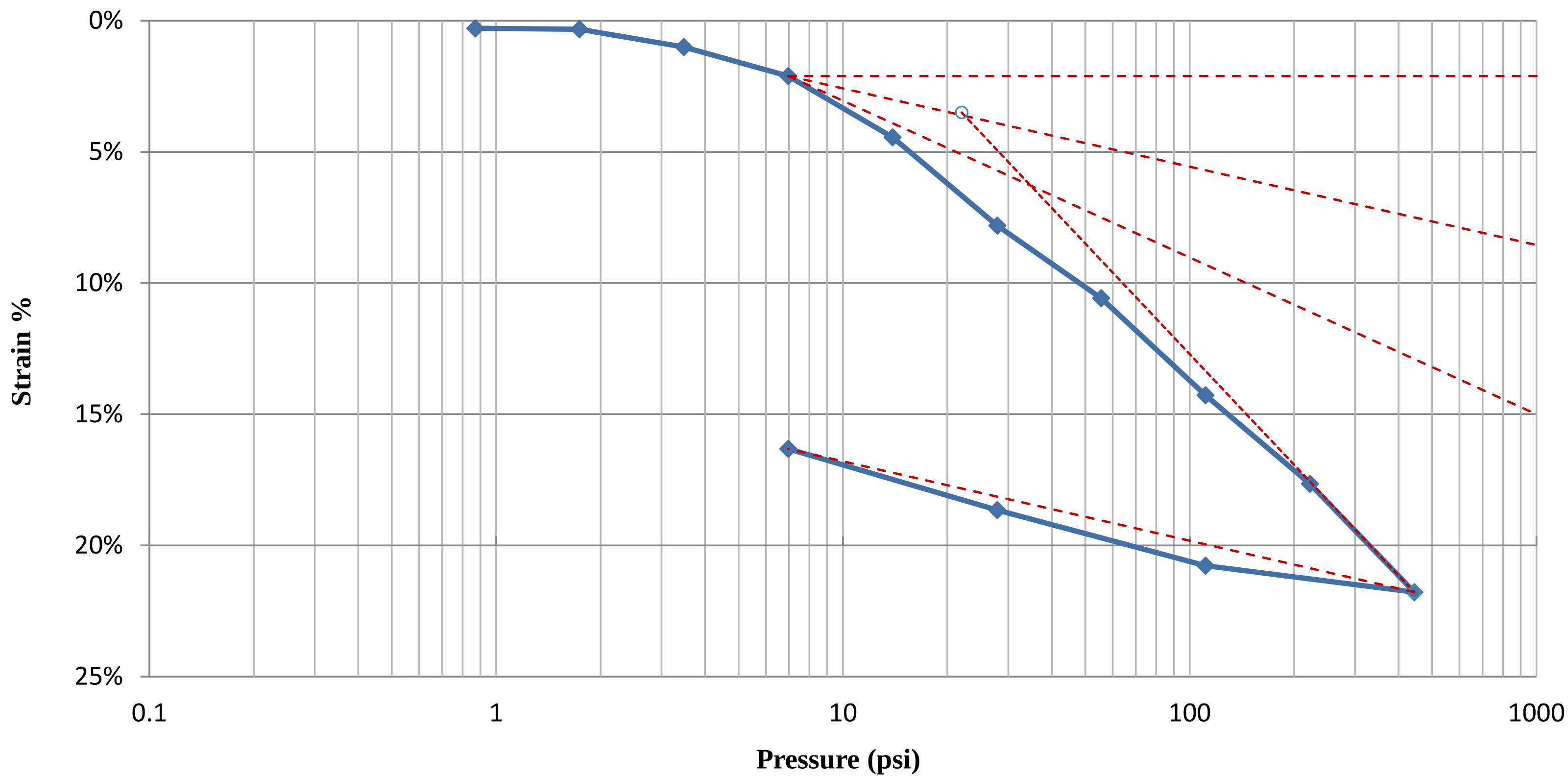
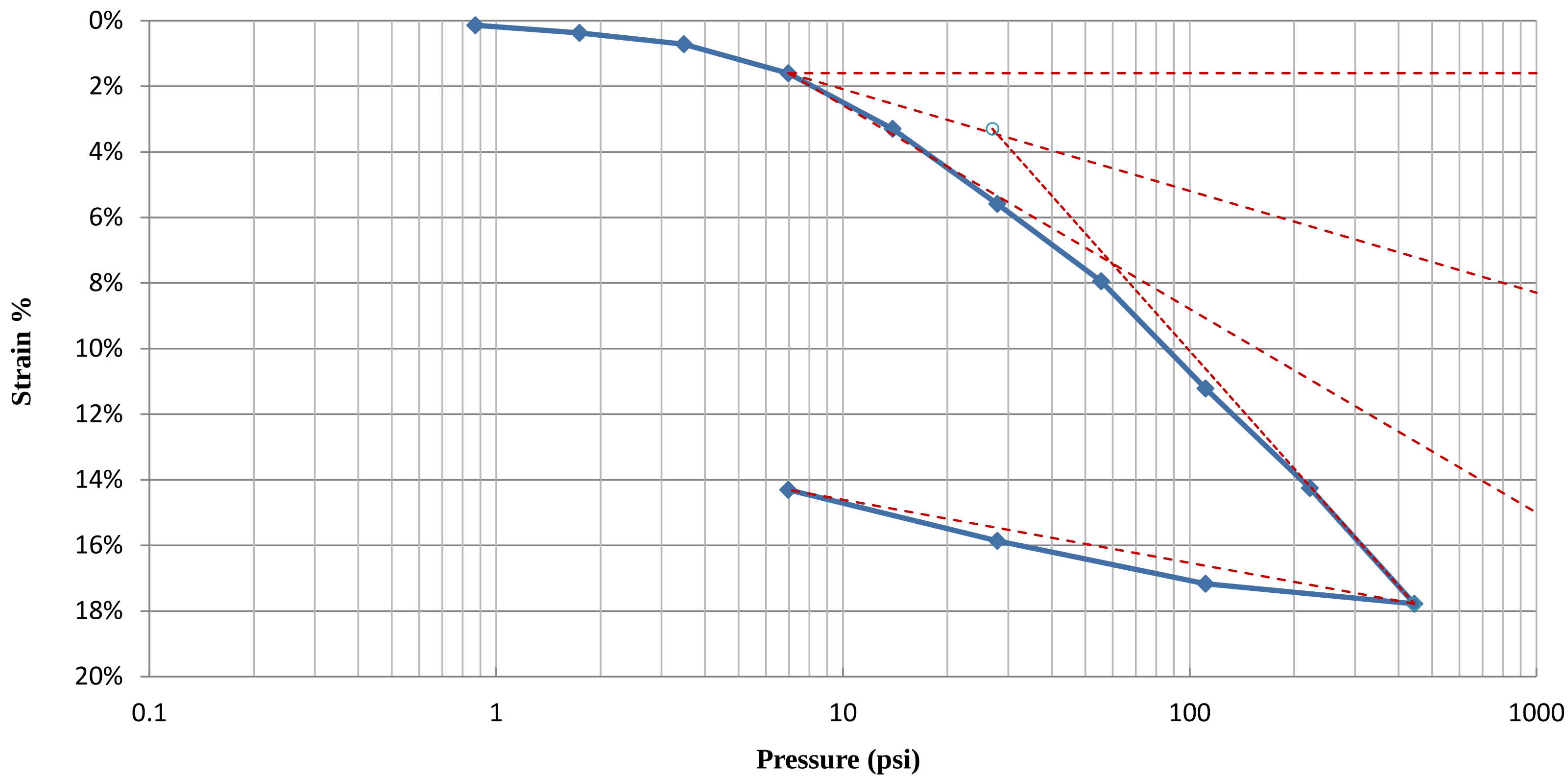
ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA



BH	B-3
Sample	3
Depth	16
Sample Vertical stress (psi)	13.9
OCR	1.6
Cc/(1+e0)	14.0%
Cr/(1+e0)	3.0%

PARIKH Practicing in the Geosciences

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA



BH	B-3
Sample	6
Depth	26
Sample Vertical stress (psi)	22.6
OCR	1.2
Cc/(1+e0)	11.9%
Cr/(1+e0)	1.9%

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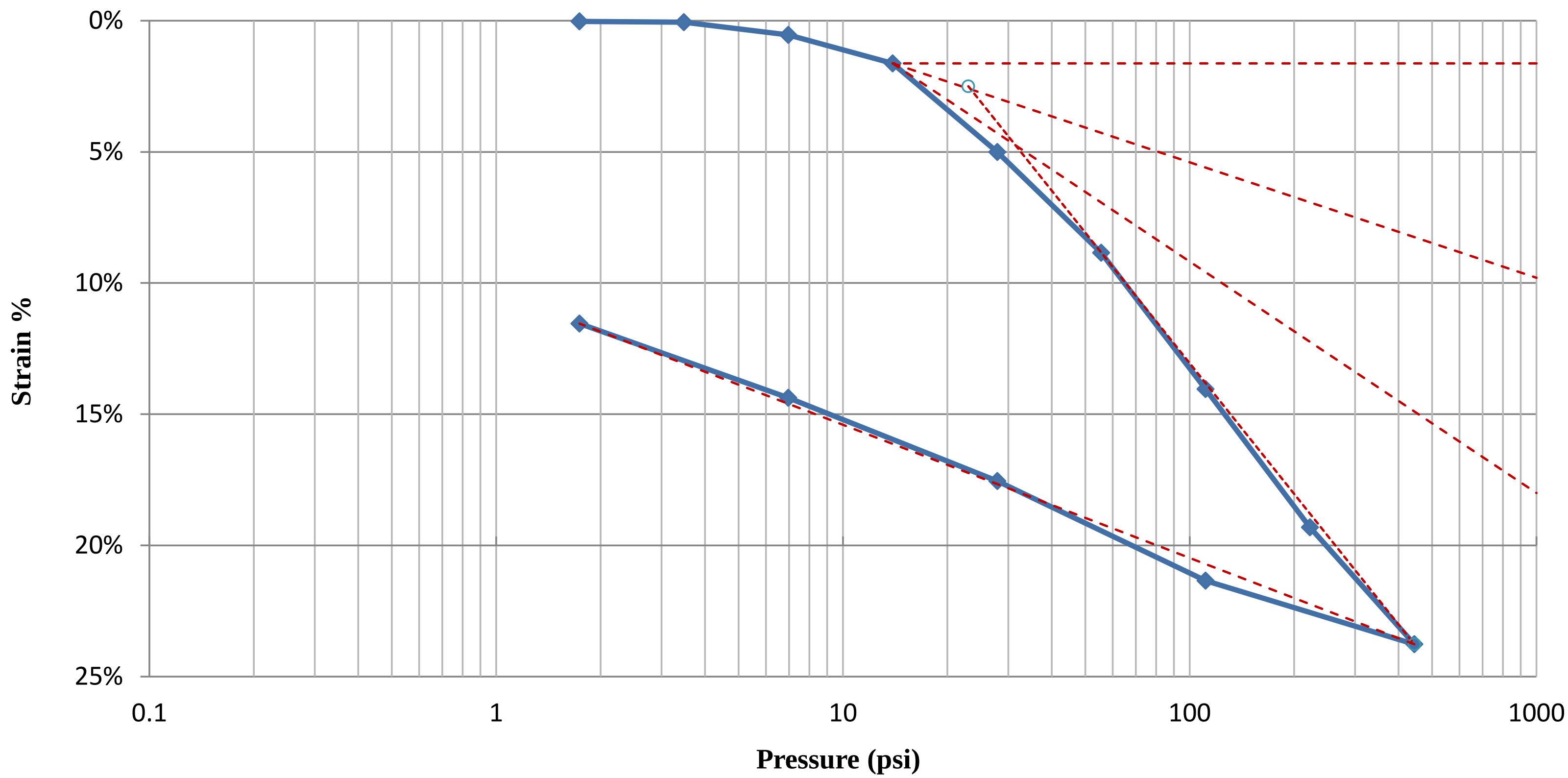
Practicing in the Geosciences

ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA



BH	B-6
Sample	2
Depth	6
Sample Vertical stress (psi)	5.2
OCR	4.4
Cc/(1+e0)	16.5%
Cr/(1+e0)	5.1%

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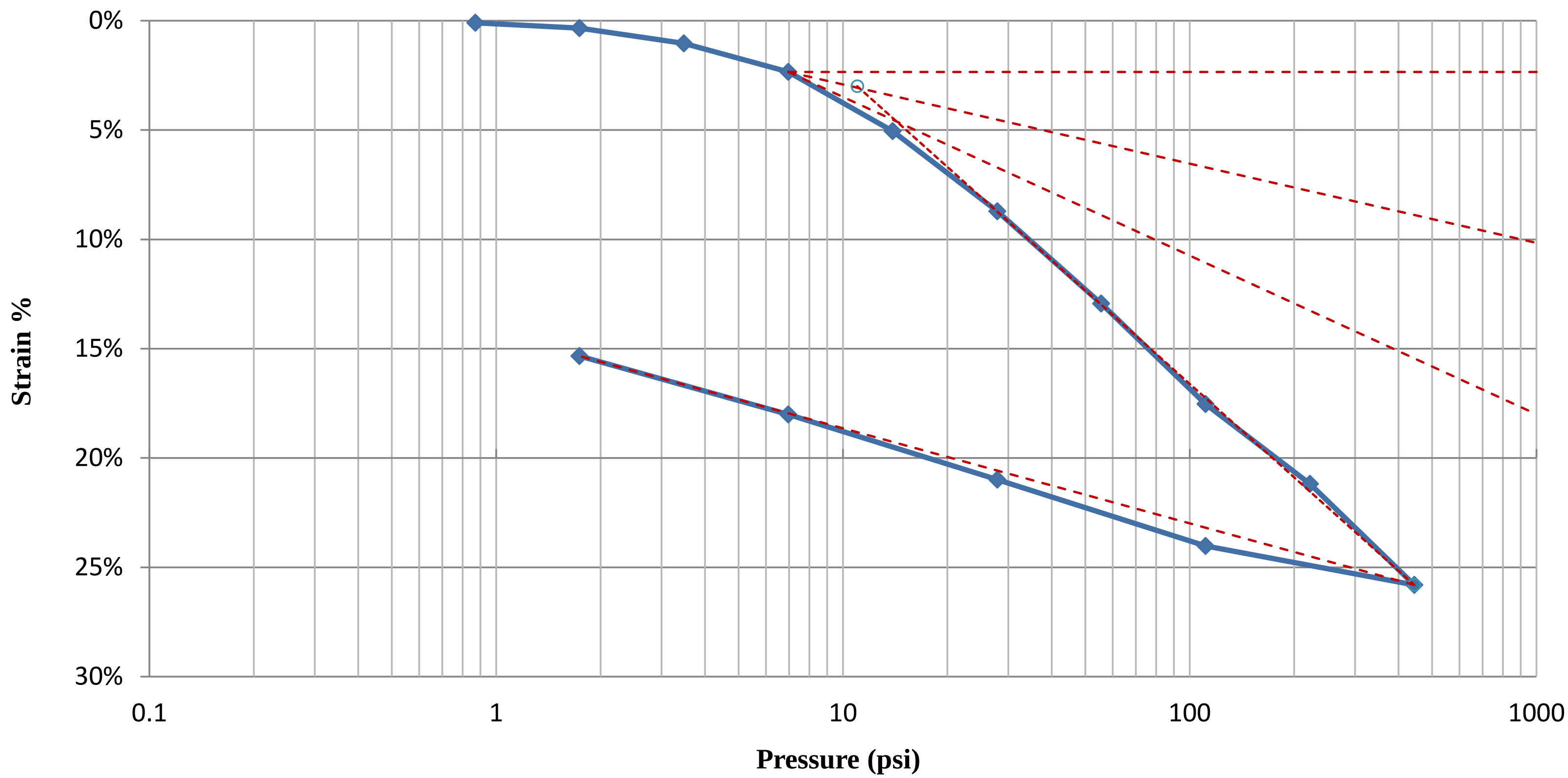
ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA



BH	B-7
Sample	2
Depth	6
Sample Vertical stress (psi)	5.2
OCR	2.1
Cc/(1+e0)	14.2%
Cr/(1+e0)	4.3%

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ADOBE CREEK PEDESTRIAN OVERCROSSING
SANTA CLARA COUNTY, CALIFORNIA

APPENDIX V
Analyses and Calculations

Vs30 CALCULATION SUMMARY

Project Name: Adobe Creek

Project Name: 2016-122-POC

Calc By: EO

Date: 1/31/2017

B2		B3		B4		B6		B7		B9	
Depth	**Vs (m/s)**	**Depth**	**Vs (m/s)**	**Depth**	**Vs (m/s)**	**Depth**	**Vs (m/s)**	**Depth**	**Vs (m/s)**	**Depth**	**Vs (m/s)**
3	153	6	173	3	192	3	135	3	156	3	176
6	182	11	193	6	182	6	170	6	169	6	169
11	214	16	217	11	139	11	146	11	128	11	140
16	191	21	228	16	190	16	192	16	204	16	196
21	204	26	247	21	213	21	217	21	171	21	203
26	224	31	263	26	247	26	233	26	178	26	189
31	195	36	273	31	248	31	221	31	161	31	215
36	261	41	211	36	256	36	109	36	235	36	128
41	275	46	288	41	211	41	203	41	259	41	213
46	201	51	223	46	279	46	225	46	262	46	194
51	164	56	291	51	218	51	243	51	233	51	165
56	206	61	285	56	274	56	259	56	258	56	268
61	100	71	216	61	280	61	233	61	248	61	294
71	251	81	312	71	272	71	276	71	168	71	137
81	288	91	292	81	189	81	212	81	286	81	299
91	276	101	189	91	279	91	277	91	277	91	278
101	283	111	318	101	139	101	298	101	322	101	332
111	202	121	340	111	282	111	245	111	212	111	318
121	296		100	121	289	121	325	121	336	121	339
Vs30 (m/s)	*209*		*239*		*219*		*208*		*210*		*194*

Average value of Vs30 is 213 m/s for all 6 borings based recommended correlations by Methodology for Developing Design Response Spectrum for Spectrum for Use in Seismic Design Recommendations

Vs_{30} fo ***210 m/s*** will be used in analysis.

EVALUATION OF LIQUEFACTION POTENTIAL

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

PROJECT NAME	***Adobe Creek POC***	*SOIL GROUPS*	*FAULT INFO*
PROJECT NO.	***2016-122-POC***	1. GRAVELS, SANDS AND NONPLASTIC SILTS	
BORING NO.	***B-2***	2. CLAYS AND PLASTIC SILTS	*a_{max} (g)=* 0.585
			FAULT M_w = 8

GW DEPTH (ft)= 10

BOREHOLE DIA (in)= 4.5
HAMMER ENERGY = 77%

CUT(-)/FILL(+) (ft) = 0
DESIGN GW DEPTH (ft)= 5 *(below OG)*

MSF = 0.94

SOIL STRATA							*LIQUEFACTION RESISTANCE (CRR $_{7.5}$)*												*CYCLIC STRESS RATIO (CSR)*				*S.=(CRR $_{7.5}$/CSR)*MSF*Ks*K*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60,\ CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Ks	Ka	F.S.	Vol. Strain (%)	ΔD (in)
0.0	4.0	1	3	2	9	SPT	9.0	1.3	0.75	1.2	1.0	10.4	375.0	1.70	17.7												
4.0	8.0	2	6	2	18	MC	11.7	1.3	0.80	1.0	1.0	12.0	750.0	1.63	19.6												
8.0	14.0	3	11	2	24	MC	15.6	1.3	0.85	1.0	1.0	17.0	1312.6	1.23	21.0												
14.0	18.0	4	16	2	15	MC	9.8	1.3	0.95	1.0	1.0	11.9	1625.6	1.11	13.2												
18.0	22.5	5	21	2	15	MC	9.8	1.3	0.95	1.0	1.0	11.9	1938.6	1.02	12.1												
22.5	28.0	6	26	1	12	SPT	12.0	1.3	1.00	1.2	1.0	18.5	2251.6	0.94	17.4	17%	21.5	0.2	3250.0	1939.6	0.94	0.6	1.0	1.0	(0.36)	1.33%	0.88
28.0	33.0	7	31	2	10	MC	6.5	1.3	1.00	1.0	1.0	8.3	2564.6	0.88	7.4												
33.0	38.0	8	36	1	32	SPT	32.0	1.3	1.00	1.2	1.0	49.3	2877.6	0.83	41.1	8%	41.9		4500.0	2565.6	0.88	0.6	0.9	1.0	NON-LIQ.		
38.0	43.0	9	41	1	34	SPT	34.0	1.3	1.00	1.2	1.0	52.4	3190.6	0.79	41.5	50%	54.7		5125.0	2878.6	0.84	0.6	0.8	1.0	NON-LIQ.		
43.0	48.0	10	46	2	6	SPT	6.0	1.3	1.00	1.2	1.0	9.2	3503.6	0.76	7.0												
48.0	53.0	11	51	2	16	MC	10.4	1.3	1.00	1.0	1.0	13.3	3816.6	0.72	9.7												
53.0	58.0	12	56	2	9	MC	5.9	1.3	1.00	1.0	1.0	7.5	4129.6	0.70	5.2												
58.0	64.0	13	61	1	12	MC	7.8	1.3	1.00	1.0	1.0	10.0	4442.6	0.67	6.7	15%	9.5	0.1	7625.0	4130.6	0.65	0.5	0.8	1.0	(0.19)	2.44%	1.76
64.0	76.0	14	71	2	12	SPT	12.0	1.3	1.00	1.2	1.0	18.5	5068.6	0.63	11.6												
76.0	86.0	15	81	2	31	MC	20.2	1.3	1.00	1.0	1.0	25.9	5694.6	0.59	15.3												
86.0	96.0	16	91	2	24	MC	15.6	1.3	1.00	1.0	1.0	20.0	6320.6	0.56	11.3												
96.0	106.0	17	101	2	25	MC	16.3	1.3	1.00	1.0	1.0	20.9	6946.6	0.54	11.2												
106.0	116.0	18	111	2	33	MC	21.5	1.3	1.00	1.0	1.0	27.5	7572.6	0.51	14.1												
116.0	121.5	19	121	2	27	MC	17.6	1.3	1.00	1.0	1.0	22.5	8198.6	0.49	11.1												

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, $C_N = (1/\sigma_v')^{0.5}$ 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

<u>LIQUEFACTION POTENTIAL ANALYSIS</u> <u>(SPT procedures per Youd et al, 2001)</u>

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
BORING NO. ***B-3***

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

FAULT INFO
a_{max} (g)= 0.585
FAULT M_w = 8

GW DEPTH (ft)= 18

BOREHOLE DIA (in)= 4.5
HAMMER ENERGY = 77%

CUT(-)/FILL(+) (ft) = 0
DESIGN GW DEPTH (ft)= 5 *(below OG)*

MSF = 0.94

SOIL STRATA							*LIQUEFACTION RESISTANCE ($CRR_{7.5}$)*												*CYCLIC STRESS RATIO (CSR)*				*S.=($CRR_{7.5}$/CSR)*MSF*Ks*K*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Ks	Ka	F.S.	Vol. Strain (%)	ΔD (in)
0.0	7.5	1	6	1	19	MC	12.4	1.3	0.8	1.0	1.0	12.7	750.0	1.6	20.7	20%	26.0	0.3	750.0	687.6	1.0	0.4	1.0	1.0	NON-LIQ.		
7.5	13.0	2	11	2	20	MC	13.0	1.3	0.9	1.0	1.0	14.2	1375.0	1.2	17.1												
13.0	18.5	3	16	2	19	MC	12.4	1.3	1.0	1.0	1.0	15.1	2000.0	1.0	15.1												
18.5	23.0	4	21	1	18	MC	11.7	1.3	1.0	1.0	1.0	14.3	2437.8	0.9	12.9	15%	16.0	0.2	2625.0	1626.6	1.0	0.6	0.9	1.0	(0.26)	1.65%	0.89
23.0	28.0	5	26	1	20	SPT	20.0	1.3	1.0	1.2	1.0	30.8	2750.8	0.9	26.3	15%	30.0		3250.0	1939.6	0.9	0.6	0.9	1.0	NON-LIQ.		
28.0	33.0	6	31	1	30	SPT	30.0	1.3	1.0	1.2	1.0	46.2	3063.8	0.8	37.3	11%	39.5		3875.0	2252.6	0.9	0.6	0.8	1.0	NON-LIQ.		
33.0	38.0	7	36	1	34	SPT	34.0	1.3	1.0	1.2	1.0	52.4	3376.8	0.8	40.3	20%	47.1		4500.0	2565.6	0.9	0.6	0.8	1.0	NON-LIQ.		
38.0	43.0	8	41	2	7	SPT	7.0	1.3	1.0	1.2	1.0	10.8	3689.8	0.7	7.9												
43.0	48.0	9	46	1	61	MC	39.7	1.3	1.0	1.0	1.0	50.9	4002.8	0.7	36.0	20%	42.4		5750.0	3191.6	0.8	0.5	0.8	1.0	NON-LIQ.		
48.0	53.0	10	51	2	8	SPT	8.0	1.3	1.0	1.2	1.0	12.3	4315.8	0.7	8.4												
53.0	58.0	11	56	1	47	MC	30.6	1.3	1.0	1.0	1.0	39.2	4628.8	0.7	25.8	20%	31.4		7000.0	3817.6	0.7	0.5	0.7	1.0	NON-LIQ.		
58.0	64.0	12	61	1	33	MC	21.5	1.3	1.0	1.0	1.0	27.5	4941.8	0.6	17.5	20%	22.5	0.2	7625.0	4130.6	0.7	0.5	0.7	1.0	(0.37)	1.28%	0.92
64.0	76.0	13	71	2	30	MC	19.5	1.3	1.0	1.0	1.0	25.0	5567.8	0.6	15.0												
76.0	86.0	14	81	2	41	MC	26.7	1.3	1.0	1.0	1.0	34.2	6193.8	0.6	19.4												
86.0	96.0	15	91	2	29	MC	18.9	1.3	1.0	1.0	1.0	24.2	6819.8	0.5	13.1												
96.0	106.0	16	101	2	28	MC	18.2	1.3	1.0	1.0	1.0	23.4	7445.8	0.5	12.1												
106.0	116.0	17	111	2	24	SPT	24.0	1.3	1.0	1.2	1.0	37.0	8071.8	0.5	18.4												
116.0	121.5	18	121	2	47	MC	30.6	1.3	1.0	1.0	1.0	39.2	8697.8	0.5	18.8												

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, $C_N = (1/\sigma_v')^{0.5}$ 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

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

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
BORING NO. ***B-4***

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

FAULT INFO
a_{max} (g)= 0.585
FAULT M_w = 8

GW DEPTH (ft)= 10

BOREHOLE DIA (in)= 4.5
HAMMER ENERGY = 77%

CUT(-)/FILL(+) (ft) = 0
DESIGN GW DEPTH (ft)= 5 *(below OG)*

MSF = 0.94

SOIL STRATA							*LIQUEFACTION RESISTANCE ($CRR_{7.5}$)*												*CYCLIC STRESS RATIO (CSR)*				*S.=($CRR_{7.5}$/CSR)*MSF*Ks*K*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60,\ CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Ks	Ka	F.S.	Vol. Strain (%)	ΔD (in)
0.0	4.0	1	3	2	37	MC	24.1	1.3	0.8	1.0	1.0	23.1	375.0	1.7	39.4												
4.0	8.5	2	6	2	18	MC	11.7	1.3	0.8	1.0	1.0	12.0	750.0	1.6	19.6												
8.5	14.0	3	11	2	10	MC	6.5	1.3	0.9	1.0	1.0	7.1	1312.6	1.2	8.8												
14.0	18.5	4	16	2	8	SPT	8.0	1.3	1.0	1.2	1.0	11.7	1625.6	1.1	13.0												
18.5	23.0	5	21	2	18	MC	11.7	1.3	1.0	1.0	1.0	14.3	1938.6	1.0	14.5												
23.0	28.0	6	26	1	51	MC	33.2	1.3	1.0	1.0	1.0	42.5	2251.6	0.9	40.1	15%	44.5		3250.0	1939.6	0.9	0.6	1.0	1.0	NON-LIQ.		
28.0	33.0	7	31	1	25	SPT	25.0	1.3	1.0	1.2	1.0	38.5	2564.6	0.9	34.0	14%	37.6		3875.0	2252.6	0.9	0.6	0.9	1.0	NON-LIQ.		
33.0	38.0	8	36	1	26	SPT	26.0	1.3	1.0	1.2	1.0	40.0	2877.6	0.8	33.4	15%	37.5		4500.0	2565.6	0.9	0.6	0.9	1.0	NON-LIQ.		
38.0	43.0	9	41	2	12	MC	7.8	1.3	1.0	1.0	1.0	10.0	3190.6	0.8	7.9												
43.0	48.0	10	46	1	60	MC	39.0	1.3	1.0	1.0	1.0	50.1	3503.6	0.8	37.8	10%	39.5		5750.0	3191.6	0.8	0.5	0.8	1.0	NON-LIQ.		
48.0	53.0	11	51	2	8	SPT	8.0	1.3	1.0	1.2	1.0	12.3	3816.6	0.7	8.9												
53.0	58.0	12	56	1	22	SPT	22.0	1.3	1.0	1.2	1.0	33.9	4129.6	0.7	23.6	18%	28.4	0.4	7000.0	3817.6	0.7	0.5	0.8	1.0	NON-LIQ.		
58.0	64.0	13	61	1	35	MC	22.8	1.3	1.0	1.0	1.0	29.2	4442.6	0.7	19.6	18%	24.1	0.3	7625.0	4130.6	0.7	0.5	0.8	1.0	(0.43)	1.22%	0.88
64.0	76.0	14	71	2	17	SPT	17.0	1.3	1.0	1.2	1.0	26.2	5068.6	0.6	16.4												
76.0	86.0	15	81	2	26	MC	16.9	1.3	1.0	1.0	1.0	21.7	5694.6	0.6	12.9												
86.0	96.0	16	91	2	25	MC	16.3	1.3	1.0	1.0	1.0	20.9	6320.6	0.6	11.7												
96.0	106.0	17	101	2	18	MC	11.7	1.3	1.0	1.0	1.0	15.0	6946.6	0.5	8.1												
106.0	116.0	18	111	2	23	MC	15.0	1.3	1.0	1.0	1.0	19.2	7572.6	0.5	9.9												
116.0	121.5	19	121	2	24	MC	15.6	1.3	1.0	1.0	1.0	20.0	8198.6	0.5	9.9												

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, $C_N = (1/\sigma_v')^{0.5}$ 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

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

PROJECT NAME	***Adobe Creek POC***	*SOIL GROUPS*		*FAULT INFO*		
PROJECT NO.	***2016-122-POC***	1. GRAVELS, SANDS AND NONPLASTIC SILTS				
BORING NO.	***B-6***	2. CLAYS AND PLASTIC SILTS		*a_{max} (g)=*	0.585	
				FAULT M_w =	8	
GW DEPTH (ft)=	5	*BOREHOLE DIA (in)=* 4.5	*CUT(-)/FILL(+) (ft) =* 0	*MSF =*	0.94	
		HAMMER ENERGY = 77%	*DESIGN GW DEPTH (ft)=* 5	*(below OG)*		

SOIL STRATA							*LIQUEFACTION RESISTANCE ($CRR_{7.5}$)*												*CYCLIC STRESS RATIO (CSR)*				*S.=($CRR_{7.5}$/CSR)*MSF*Ks*K*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Ks	Ka	F.S.	Vol. Strain (%)	ΔD (in)
0.0	3.5	1	3	2	8	MC	5.2	1.3	0.8	1.0	1.0	5.0	375.0	1.7	8.5												
3.5	8.0	2	6	2	14	MC	9.1	1.3	0.8	1.0	1.0	9.3	687.6	1.7	15.9												
8.0	13.5	3	11	2	14	MC	9.1	1.3	0.9	1.0	1.0	9.9	1000.6	1.4	14.0												
13.5	18.5	4	16	1	14	MC	9.1	1.3	1.0	1.0	1.0	11.1	1313.6	1.2	13.7	11%	15.3	0.2	2000.0	1313.6	1.0	0.6	1.0	1.0	(0.27)	1.71%	1.03
18.5	24.0	5	21	1	19	SPT	19.0	1.3	1.0	1.2	1.0	27.8	1626.6	1.1	30.8	7%	31.2		2625.0	1626.6	1.0	0.6	1.0	1.0	NON-LIQ.		
24.0	28.5	6	26	1	26	SPT	26.0	1.3	1.0	1.2	1.0	40.0	1939.6	1.0	40.7	15%	45.1		3250.0	1939.6	0.9	0.6	1.0	1.0	NON-LIQ.		
28.5	33.0	7	31	2	19	MC	12.4	1.3	1.0	1.0	1.0	15.8	2252.6	0.9	14.9												
33.0	38.0	8	36	2	11	MC	7.2	1.3	1.0	1.0	1.0	9.2	2565.6	0.9	8.1												
38.0	43.0	9	41	2	11	MC	7.2	1.3	1.0	1.0	1.0	9.2	2878.6	0.8	7.6												
43.0	48.0	10	46	2	16	MC	10.4	1.3	1.0	1.0	1.0	13.3	3191.6	0.8	10.6												
48.0	53.5	11	51	2	21	MC	13.7	1.3	1.0	1.0	1.0	17.5	3504.6	0.8	13.2												
53.5	58.0	12	56	1	23	MC	15.0	1.3	1.0	1.0	1.0	19.2	3817.6	0.7	13.9	22%	19.1	0.2	7000.0	3817.6	0.7	0.5	0.8	1.0	(0.33)	1.45%	0.78
58.0	64.0	13	61	2	10	SPT	10.0	1.3	1.0	1.2	1.0	15.4	4130.6	0.7	10.7												
64.0	76.0	14	71	2	29	MC	18.9	1.3	1.0	1.0	1.0	24.2	4756.6	0.6	15.7												
76.0	86.0	15	81	2	28	MC	18.2	1.3	1.0	1.0	1.0	23.4	5382.6	0.6	14.2												
86.0	96.0	16	91	2	25	MC	16.3	1.3	1.0	1.0	1.0	20.9	6008.6	0.6	12.0												
96.0	106.0	17	101	2	21	SPT	21.0	1.3	1.0	1.2	1.0	32.3	6634.6	0.5	17.8												
106.0	116.0	18	111	2	52	MC	33.8	1.3	1.0	1.0	1.0	43.4	7260.6	0.5	22.8												
116.0	121.5	19	121	2	27	SPT	27.0	1.3	1.0	1.2	1.0	41.6	7886.6	0.5	20.9												

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, $C_N = (1/\sigma_v')^{0.5}$ 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

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

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
BORING NO. ***B-7***

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

FAULT INFO
a_{max} (g)= 0.585
FAULT M_w = 8

GW DEPTH (ft)= 6

BOREHOLE DIA (in)= 4.5
HAMMER ENERGY = 77%

CUT(-)/FILL(+) (ft) = 0
DESIGN GW DEPTH (ft)= 5 *(below OG)*

MSF = 0.94

SOIL STRATA							*LIQUEFACTION RESISTANCE ($CRR_{7.5}$)*												*CYCLIC STRESS RATIO (CSR)*				*S.=($CRR_{7.5}$/CSR)*MSF*Ks*K*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Ks	Ka	F.S.	Vol. Strain (%)	ΔD (in)
0.0	4.0	1	3	2	15	MC	9.8	1.3	0.8	1.0	1.0	9.4	375.0	1.7	16.0												
4.0	8.0	2	6	2	13	MC	8.5	1.3	0.8	1.0	1.0	8.7	750.0	1.6	14.2												
8.0	13.0	3	11	2	13	MC	8.5	1.3	0.9	1.0	1.0	9.2	1063.0	1.4	12.6												
13.0	18.5	4	16	1	15	SPT	15.0	1.3	1.0	1.2	1.0	21.9	1376.0	1.2	26.5	14%	29.8	0.5	2000.0	1313.6	1.0	0.6	1.0	1.0	NON-LIQ.		
18.5	23.0	5	21	2	5	SPT	5.0	1.3	1.0	1.2	1.0	7.3	1689.0	1.1	8.0												
23.0	28.5	6	26	2	8	MC	5.2	1.3	1.0	1.0	1.0	6.7	2002.0	1.0	6.7												
28.5	33.5	7	31	2	9	MC	5.9	1.3	1.0	1.0	1.0	7.5	2315.0	0.9	7.0												
33.5	38.0	8	36	1	21	MC	13.7	1.3	1.0	1.0	1.0	17.5	2628.0	0.9	15.3	15%	18.5	0.2	4500.0	2565.6	0.9	0.6	0.9	1.0	(0.29)	1.48%	0.80
38.0	43.0	9	41	1	28	SPT	28.0	1.3	1.0	1.2	1.0	43.1	2941.0	0.8	35.6	15%	39.8		5125.0	2878.6	0.8	0.6	0.9	1.0	NON-LIQ.		
43.0	48.0	10	46	1	25	SPT	25.0	1.3	1.0	1.2	1.0	38.5	3254.0	0.8	30.2	15%	34.1		5750.0	3191.6	0.8	0.5	0.8	1.0	NON-LIQ.		
48.0	53.5	11	51	2	17	MC	11.1	1.3	1.0	1.0	1.0	14.2	3567.0	0.7	10.6												
53.5	61.0	12	56	1	21	MC	13.7	1.3	1.0	1.0	1.0	17.5	3880.0	0.7	12.6	15%	15.7	0.2	7000.0	3817.6	0.7	0.5	0.8	1.0	(0.27)	1.68%	1.51
61.0	66.0	13	61	2	13	SPT	13.0	1.3	1.0	1.2	1.0	20.0	4193.0	0.7	13.8												
66.0	76.0	14	71	2	17	MC	11.1	1.3	1.0	1.0	1.0	14.2	4819.0	0.6	9.1												
76.0	86.0	15	81	2	31	MC	20.2	1.3	1.0	1.0	1.0	25.9	5445.0	0.6	15.7												
86.0	96.0	16	91	2	25	MC	16.3	1.3	1.0	1.0	1.0	20.9	6071.0	0.6	12.0												
96.0	106.0	17	101	2	29	SPT	29.0	1.3	1.0	1.2	1.0	44.7	6697.0	0.5	24.4												
106.0	116.0	18	111	2	32	MC	20.8	1.3	1.0	1.0	1.0	26.7	7323.0	0.5	13.9												
116.0	121.5	19	121	2	31	SPT	31.0	1.3	1.0	1.2	1.0	47.7	7949.0	0.5	23.9												

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, $C_N = (1/\sigma_v')^{0.5}$ 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

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

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
BORING NO. ***B-9***

GW DEPTH (ft)= 8

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

BOREHOLE DIA (in)= 4.5
HAMMER ENERGY = 77%

CUT(-)/FILL(+) (ft) = 0
DESIGN GW DEPTH (ft)= 5 *(below OG)*

FAULT INFO
a_{max} (g)= 0.585
FAULT M_w = 8
MSF = 0.94

SOIL STRATA							*LIQUEFACTION RESISTANCE ($CRR_{7.5}$)*												*CYCLIC STRESS RATIO (CSR)*				*S.=($CRR_{7.5}$/CSR)*MSF*Ks*K*			*POST-LIQ. SETTLEMENT*	
Layer Thickness from	to	Sample No	Depth (ft)	Soil Type	Blow Count	Sampler Type	SPT-$N_{eq.}$	C_E	C_R	C_S	C_B	N_{60}	σ_v' (psf)	C_N	$(N_1)_{60}$	F.C.	$(N_1)_{60, CS}$	$CRR_{7.5}$	σ_v (psf)	σ_v' (psf)	r_d	CSR	Ks	Ka	F.S.	Vol. Strain (%)	ΔD (in)
0.0	4.0	1	3	2	25	MC	16.3	1.3	0.8	1.0	1.0	15.6	375.0	1.7	26.6												
4.0	8.0	2	6	2	13	MC	8.5	1.3	0.8	1.0	1.0	8.7	750.0	1.6	14.2												
8.0	13.0	3	11	2	18	MC	11.7	1.3	0.9	1.0	1.0	12.8	1187.8	1.3	16.6												
13.0	18.0	4	16	1	8	SPT	8.0	1.3	1.0	1.2	1.0	11.7	1500.8	1.2	13.5	6%	13.6	0.1	2000.0	1313.6	1.0	0.6	1.0	1.0	(0.25)	1.87%	1.12
18.0	23.0	5	21	2	11	MC	7.2	1.3	1.0	1.0	1.0	8.7	1813.8	1.1	9.2												
23.0	28.0	6	26	2	10	MC	6.5	1.3	1.0	1.0	1.0	8.3	2126.8	1.0	8.1												
28.0	31.0	7	31	1	10	MC	6.5	1.3	1.0	1.0	1.0	8.3	2439.8	0.9	7.6	15%	10.4	0.1	3875.0	2252.6	0.9	0.6	1.0	1.0	(0.17)	2.28%	0.82
31.0	38.0	8	36	2	12	MC	7.8	1.3	1.0	1.0	1.0	10.0	2752.8	0.9	8.5												
38.0	43.0	9	41	2	13	MC	8.5	1.3	1.0	1.0	1.0	10.8	3065.8	0.8	8.8												
43.0	48.0	10	46	2	8	MC	5.2	1.3	1.0	1.0	1.0	6.7	3378.8	0.8	5.1												
48.0	53.0	11	51	2	19	MC	12.4	1.3	1.0	1.0	1.0	15.8	3691.8	0.7	11.7												
53.0	58.0	12	56	2	19	SPT	19.0	1.3	1.0	1.2	1.0	29.3	4004.8	0.7	20.7												
58.0	64.0	13	61	1	62	MC	40.3	1.3	1.0	1.0	1.0	51.7	4317.8	0.7	35.2	15%	39.4		7625.0	4130.6	0.7	0.5	0.7	1.0	NON-LIQ.		
64.0	76.0	14	71	2	22	MC	14.3	1.3	1.0	1.0	1.0	18.4	4943.8	0.6	11.7												
76.0	86.0	15	81	2	37	MC	24.1	1.3	1.0	1.0	1.0	30.9	5569.8	0.6	18.5												
86.0	96.0	16	91	2	25	MC	16.3	1.3	1.0	1.0	1.0	20.9	6195.8	0.6	11.8												
96.0	106.0	17	101	1	72	MC	46.8	1.3	1.0	1.0	1.0	60.1	6821.8	0.5	32.5	15%	36.6		12625.0	6634.6	0.5	0.4	0.3	1.0	NON-LIQ.		
106.0	116.0	18	111	2	39	MC	25.4	1.3	1.0	1.0	1.0	32.5	7447.8	0.5	16.9												
116.0	121.5	19	121	2	49	MC	31.9	1.3	1.0	1.0	1.0	40.9	8073.8	0.5	20.3												

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, $C_N = (1/\sigma_v')^{0.5}$ 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

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME **Adobe Creek POC**
PROJECT NO. **2016-122-POC**
CPT NO. **CPT-1**

M_w = 8 | *MSF* = 0.94 | a_{max} *(g)*= 0.585 | V_{S30m}(m/s)= 207.2 193.7

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.	V_s (m/s)	$V_{s,liq}$ (m/s)
		CPT RESULT INPUT								***CSR***		***$CRR_{7.5}$***						***F.S.=($CRR_{7.5}$/CSR)*MSF*K_σ*K_α***				
0.492																						
1.148																						
1.804																						
2.461																						
3.117																						
3.773																						
4.429																						
5.085	6	Sandy Silt to Clayey Silt	38.187	1.05	0.291		0.291	2.15	1.4755	0.99	0.376	2.150	1.48	56.35	1.553	87.493	0.14				124.71	124.71
5.741	4	Silty Clay to Clay	29.352	1.372	0.329		0.329	2.43	1.4388	0.99	0.376	2.430	1.44	42.23	2.439	103.007	0.18				124.58	124.58
6.398	3	Clay	20.768	0.941	0.365		0.365	2.55	1.4058	0.99	0.375	2.550	1.41	29.19	3.034	88.583	0.14				122.49	122.49
7.054	4	Silty Clay to Clay	29.095	1.369	0.403		0.403	2.49	1.3724	0.99	0.375	2.490	1.37	39.93	2.718	108.547	0.20				131.43	131.43
7.71	3	Clay	31.555	1.719	0.44		0.44	2.54	1.3415	0.98	0.374	2.540	1.34	42.33	2.979	126.099	0.27				136.03	136.03
8.366	3	Clay	32.735	1.758	0.476		0.476	2.55	1.3126	0.98	0.374	2.550	1.31	42.97	3.034	130.380	0.29				139.62	139.62
9.022	3	Clay	24.425	1.316	0.513		0.513	2.66	1.2843	0.98	0.373										226.71	226.71
9.678	3	Clay	19.197	0.856	0.549		0.549	2.7	1.2579	0.98	0.373							1.00	0		194.93	194.93
10.335	3	Clay	15.456	0.92	0.586		0.586	2.88	1.2318	0.98	0.372							1.00	1		170.17	170.17
10.991	3	Clay	15.696	0.891	0.622		0.622	2.88	1.2075	0.98	0.372							1.00	1		171.82	171.82
11.647	3	Clay	16.306	0.781	0.659		0.659	2.84	1.1834	0.98	0.371							1.00	1		175.91	175.91
12.303	3	Clay	16.496	0.694	0.695	0.009	0.686	2.81	1.1665	0.97	0.375							1.00	1		177.19	177.19
12.959	4	Silty Clay to Clay	17.061	0.651	0.733	0.03	0.703	2.78	1.1561	0.97	0.386							1.00	1		181.01	181.01
13.615	4	Silty Clay to Clay	17.374	0.659	0.771	0.05	0.72	2.78	1.1458	0.97	0.396							1.00	1		183.06	183.06
14.272	4	Silty Clay to Clay	17.391	0.618	0.808	0.071	0.737	2.77	1.1358	0.97	0.404							1.00	1		183.19	183.19
14.928	5	Clayey Silt to Silty Clay	18.515	0.49	0.846	0.091	0.755	2.68	1.1253	0.97	0.413							1.00	1		190.50	190.50
15.584	5	Clayey Silt to Silty Clay	16.558	0.371	0.883	0.112	0.772	2.69	1.1156	0.97	0.421							1.00	1		177.59	177.59
16.24	6	Sandy Silt to Clayey Silt	15.954	0.273	0.921	0.132	0.789	2.64	1.1061	0.97	0.429							1.00	1		173.53	173.53
16.896	6	Sandy Silt to Clayey Silt	19.152	0.317	0.959	0.153	0.806	2.57	1.0967	0.96	0.436	2.570	1.10	21.00	3.148	66.120	0.11	1.00	1	(0.23)	150.11	47.33
17.552	6	Sandy Silt to Clayey Silt	20.153	0.349	0.996	0.173	0.823	2.57	1.0875	0.96	0.443	2.570	1.09	21.92	3.148	68.992	0.11	1.00	1	(0.23)	151.96	48.54
18.209	6	Sandy Silt to Clayey Silt	23.335	0.357	1.034	0.194	0.84	2.49	1.0784	0.96	0.450	2.490	1.08	25.17	2.718	68.409	0.11	1.00	1	(0.23)	155.75	51.35
18.865	6	Sandy Silt to Clayey Silt	22.362	0.397	1.071	0.214	0.857	2.55	1.0695	0.96	0.456	2.550	1.07	23.92	3.034	72.568	0.12	1.00	1	(0.24)	155.74	50.36
19.521	6	Sandy Silt to Clayey Silt	20.086	0.367	1.109	0.235	0.874	2.61	1.0608	0.96	0.462							1.00	1		200.61	200.61
20.177	6	Sandy Silt to Clayey Silt	17.514	0.33	1.147	0.255	0.892	2.68	1.0516	0.96	0.468							1.00	1		184.05	184.05
20.833	5	Clayey Silt to Silty Clay	14.589	0.311	1.184	0.276	0.909	2.79	1.0431	0.95	0.473							1.00	1		164.17	164.17
21.49	5	Clayey Silt to Silty Clay	15.73	0.381	1.222	0.296	0.926	2.8	1.0348	0.95	0.478							1.00	1		172.09	172.09
22.146	5	Clayey Silt to Silty Clay	15.053	0.474	1.259	0.316	0.943	2.9	1.0266	0.95	0.483							1.00	1		167.32	167.32
22.802	5	Clayey Silt to Silty Clay	14.243	0.358	1.297	0.337	0.96	2.87	1.0185	0.95	0.488							1.00	1		161.62	161.62
23.458	5	Clayey Silt to Silty Clay	16.289	0.384	1.335	0.357	0.977	2.81	1.0106	0.95	0.492							1.00	1		175.84	175.84
24.114	5	Clayey Silt to Silty Clay	17.956	0.404	1.372	0.378	0.994	2.76	1.0027	0.94	0.496							1.00	1		186.94	186.94
24.77	6	Sandy Silt to Clayey Silt	21.585	0.494	1.41	0.398	1.011	2.7	0.995	0.94	0.500							1.00	1		209.81	209.81
25.427	6	Sandy Silt to Clayey Silt	46.524	1.345	1.447	0.419	1.029	2.49	0.987	0.94	0.503	2.490	0.99	45.92	2.718	124.825	0.26	0.99	1	(0.48)	179.97	87.26
26.083	5	Clayey Silt to Silty Clay	45.943	1.526	1.485	0.439	1.046	2.54	0.9795	0.94	0.506	2.540	0.98	45.00	2.979	134.060	0.30	0.99	1	(0.56)	180.48	87.26
26.739	4	Silty Clay to Clay	28.642	1.258	1.523	0.46	1.063	2.79	0.9722	0.94	0.510							0.99	1		250.69	250.69
27.395	4	Silty Clay to Clay	11.95	0.357	1.56	0.48	1.08	3.04	0.9649	0.93	0.512							0.98	1		145.02	145.02
28.051	5	Clayey Silt to Silty Clay	9.858	0.211	1.598	0.501	1.097	3.06	0.9578	0.93	0.515							0.98	1		128.60	128.60
28.707	5	Clayey Silt to Silty Clay	8.544	0.102	1.635	0.521	1.114	3.02	0.9507	0.93	0.517							0.98	1		117.55	117.55
29.364	5	Clayey Silt to Silty Clay	8.119	0.109	1.673	0.542	1.131	3.08	0.9438	0.92	0.520							0.98	1		113.82	113.82
30.02	5	Clayey Silt to Silty Clay	7.018	0.114	1.711	0.562	1.148	3.2	0.937	0.92	0.522							0.97	1		103.91	103.91
30.676	5	Clayey Silt to Silty Clay	13.42	0.278	1.748	0.583	1.166	2.94	0.9298	0.92	0.523							0.97	1		155.86	155.86
31.332	5	Clayey Silt to Silty Clay	18.643	0.531	1.786	0.603	1.183	2.88	0.9232	0.91	0.524							0.97	1		191.54	191.54
31.988	7	Silty Sand to Sandy Silt	59.084	0.918	1.824	0.624	1.201	2.29	0.9163	0.91	0.525	2.290	0.92	54.14	1.917	103.785	0.18	0.96	1	(0.32)	193.56	93.79
32.644	9	Sand	114.38	0.853	1.865	0.644	1.221	1.86	0.9087	0.91	0.526	1.860	0.91	103.94	1.153	119.880	0.24	0.95	1	(0.41)	211.86	158.53
33.301	9	Sand	171.64	1.364	1.906	0.664	1.241	1.74	0.9013	0.90	0.527	1.740	0.90	154.70	1.065	164.724		0.93	1		224.32	224.32
33.957	9	Sand	246.79	1.604	1.947	0.685	1.262	1.57	0.8936	0.90	0.527	1.570	0.89	220.53	1.000	220.531		0.91	1		236.24	236.24
34.613	10	Gravelly Sand to Sand	298	1.592	1.988	0.705	1.283	1.46	0.886	0.89	0.526	1.460	0.89	264.03	1.000	264.035		0.91	1		243.18	243.18
35.269	10	Gravelly Sand to Sand	265	1.255	2.03	0.726	1.304	1.47	0.8786	0.89	0.526	1.470	0.88	232.82	1.000	232.823		0.90	1		240.56	240.56
35.925	9	Sand	209.57	1.153	2.071	0.746	1.324	1.6	0.8716	0.88	0.526	1.600	0.87	182.67	1.000	182.671		0.91	1		234.30	234.30
36.581	9	Sand	193.86	0.968	2.112	0.767	1.345	1.61	0.8644	0.88	0.525	1.610	0.86	167.58	1.000	167.576		0.90	1		232.93	232.93
37.238	9	Sand	206.38	0.891	2.152	0.787	1.365	1.55	0.8577	0.87	0.524	1.550	0.86	177.01	1.000	177.013		0.90	1		235.77	235.77
37.894	9	Sand	201.14	0.686	2.193	0.808	1.385	1.52	0.8511	0.87	0.523	1.520	0.85	171.18	1.000	171.184		0.89	1		235.91	235.91
38.55	9	Sand	188.02	0.617	2.234	0.828	1.405	1.54	0.8445	0.86	0.522	1.540	0.84	158.79	1.000	158.791	0.45	0.89	1	(0.73)	234.75	222.60
39.206	9	Sand	191	0.461	2.274	0.849	1.426	1.48	0.8378	0.86	0.520	1.480	0.84	160.02	1.000	160.018		0.89	1		236.16	236.16
39.862	9	Sand	154.31	0.455	2.315	0.869	1.446	1.61	0.8314	0.85	0.519	1.610	0.83	128.30	1.000	128.299	0.28	0.90	1	(0.45)	230.58	181.91
40.518	9	Sand	193.59	1.082	2.356	0.89	1.466	1.67	0.8252	0.85	0.517	1.670	0.83	159.75	1.017	162.529		0.88	1		238.35	238.35
41.175	10	Gravelly Sand to Sand	243.23	1.03	2.398	0.91	1.488	1.52	0.8185	0.84	0.515	1.520	0.82	199.07	1.000	199.069		0.86	1		246.52	246.52
41.831	10	Gravelly Sand to Sand	250.5	0.803	2.439	0.931	1.509	1.45	0.8121	0.83	0.513	1.450	0.81	203.43	1.000	203.430		0.86	1		248.40	248.40
42.487	10	Gravelly Sand to Sand	240.54	0.809	2.481	0.951	1.53	1.48	0.8059	0.83	0.511	1.480	0.81	193.84	1.000	193.843		0.86	1		248.01	248.01
43.143	10	Gravelly Sand to Sand	227.47	0.682	2.523	0.972	1.551	1.48	0.7997	0.82	0.508	1.480	0.80	181.91	1.000	181.913		0.86	1		247.13	247.13
43.799	9	Sand	200.23	0.514	2.564	0.992	1.572	1.51	0.7937	0.82	0.506	1.510	0.79	158.91	1.000	158.913	0.45	0.86	1	(0.73)	243.95	221.73
44.455	8	Sand to Silty Sand	87.899	0.988	2.603	1.013	1.591	2.16	0.7882	0.81	0.503	2.160	0.79	69.29	1.574	109.075	0.20	0.91	1	(0.34)	219.93	116.42
45.112	3	Clay	18.822	0.897	2.64	1.033	1.607	3.14	0.7838	0.80	0.501							0.91	1		193.97	193.97
45.768	5	Clayey Silt to Silty Clay	45.239	1.868	2.678	1.053	1.624	2.77	0.779	0.80	0.499							0.91	1		334.73	334.73
46.424	3	Clay	21.048	0.95	2.714	1.074	1.64	3.09	0.7746	0.79	0.497							0.91	1		207.85	207.85
47.08	3	Clay	14.405	0.605	2.751	1.094	1.656	3.25	0.7703	0.78	0.494							0.90	1		164.31	164.31
47.736	3	Clay	12.073	0.511	2.787	1.115	1.672	3.34	0.766	0.78	0.492							0.90	1		147.36	147.36
48.392	3	Clay	13.309	0.57	2.824	1.135	1.688	3.3	0.7618	0.77	0.489							0.90	1		156.45	156.45
49.049	3	Clay	13.912	0.598	2.86	1.156	1.704	3.29	0.7576	0.76	0.487							0.90	1		160.84	160.84
49.705	4	Silty Clay to Clay	13.706	0.5	2.898	1.176	1.722	3.26	0.7529	0.76	0.484							0.90	1		159.40	159.40
50.361	4	Silty Clay to Clay	13.549	0.442	2.935	1.197	1.739	3.24	0.7486	0.75	0.481							0.90	1		158.40	158.40
51.017	5	Clayey Silt to Silty Clay	13.75	0.347	2.973	1.217	1.756	3.18	0.7442	0.74	0.478							0.89	1		159.91	159.91
51.673	5	Clayey Silt to Silty Clay	13.471	0.278	3.011	1.238	1.773	3.15	0.74	0.74	0.475							0.89	1		157.97	157.97
52.329	5	Clayey Silt to Silty Clay	17.736	0.496	3.048	1.258	1.79	3.09	0.7358	0.73	0.472							0.89	1		187.33	187.33
52.986	7	Silty Sand to Sandy Silt	79.31	1.309	3.087	1.279	1.808	2.35	0.7314	0.72	0.469	2.350	0.73	58.01	2.120	122.952	0.25	0.89	1	(0.45)	224.69	106.28
53.642	7	Silty Sand to Sandy Silt	94.867	1.83	3.126	1.299	1.826	2.33	0.727	0.72	0.466	2.330	0.73	68.97	2.049	141.305	0.34	0.88	1	(0.61)	230.58	127.52
54.298	8	Sand to Silty Sand	118.49	1.229	3.165	1.32	1.846	2.09	0.7223	0.71	0.463	2.090	0.72	85.58	1.437	122.976	0.25	0.87	1	(0.44)	238.02	144.71
54.954	9	Sand	131.77	1.252	3.206	1.34	1.866	2.03	0.7175	0.70	0.460	2.030	0.72	94.55	1.341	126.817	0.27	0.86	1	(0.47)	242.02	156.80
55.61	8	Sand to Silty Sand	126.7	1.384	3.246	1.361	1.885	2.08	0.7131	0.70	0.457	2.080	0.71	90.35	1.420	128.266	0.28	0.86	1	(0.49)	241.44	153.35
56.266	8	Sand to Silty Sand	145.66	1.722	3.285	1.381	1.904	2.06	0.7088	0.69	0.454	2.060	0.71	103.24	1.387	143.161	0.35	0.85	1	(0.62)	246.51	175.84
56.923	9	Sand	132.05	1.26	3.326	1.401	1.925	2.04	0.704	0.69	0.450	2.040	0.70	92.96	1.356	126.045	0.27	0.85	1	(0.47)	244.12	155.94
57.579	8	Sand to Silty Sand	114.94	1.453	3.366	1.422	1.944	2.17	0.6997	0.68	0.448	2.170	0.70	80.43	1.596	128.390	0.28	0.86	1	(0.50)	240.39	140.40
58.235	9	Sand	139.77	0.499	3.406	1.442	1.964	1.81	0.6953	0.67	0.444	1.810	0.70	97.19	1.114	108.265	0.20	0.84	1	(0.35)	247.25	149.03
58.891	8	Sand to Silty Sand	87.631	1.066	3.446	1.463	1.983	2.27	0.6912	0.67	0.442	2.270	0.69	60.57	1.856	112.419	0.21	0.87	1	(0.39)	233.31	107.96
59.547	4	Silty Clay to Clay	25.264	1.068	3.484	1.483	2	3.09	0.6875	0.66	0.439							0.87	1		232.37	232.37
60.203	4	Silty Clay to Clay	27.602	1.229	3.521	1.504	2.017	3.07	0.6839	0.66	0.436							0.87	1		245.62	245.62
60.86	4	Silty Clay to Clay	26.869	1.203	3.559	1.524	2.035	3.09	0.6801	0.65	0.434							0.87	1		241.50	241.50
61.516	5	Clayey Silt to Silty Clay	25.941	0.955	3.596	1.545	2.052	3.05	0.6765	0.65	0.431							0.87	1		236.31	236.31
62.172	5	Clayey Silt to Silty Clay	26.628	0.871	3.634	1.565	2.069	3.01	0.673	0.64	0.429							0.86	1		240.20	240.20
62.828	5	Clayey Silt to Silty Clay	25.935	0.864	3.672	1.586	2.086	3.03	0.6695	0.64	0.427							0.86	1		236.31	236.31

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME	***Adobe Creek POC***						
PROJECT NO.	***2016-122-POC***						
CPT NO.	***CPT-1***	*M_w =* 8	*MSF =* 0.94	*a_{max} (g)=* 0.585	V_{S30m}(m/s)=	207.2	193.7

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	Ic	C_Q	***$CRR_{7.5}$*** q_{c1N}	K_C	$(q_{c1N})_{cs}$	$CRR_{7.5}$	***F.S.=($CRR_{7.5}$/CSR)*MSF*K σ*K α*** $K\sigma$	$K\alpha$	F.S.	V_s (m/s)	$V_{s,liq}$ (m/s)
63.484	5	Clayey Silt to Silty Clay	20.981	0.71	3.709	1.606	2.103	3.14	0.6661	0.63	0.424							0.86	1		207.05	207.05
64.14	5	Clayey Silt to Silty Clay	22.865	0.691	3.747	1.627	2.12	3.07	0.6627	0.63	0.422							0.86	1		218.47	218.47
64.797	6	Sandy Silt to Clayey Silt	25.102	0.654	3.784	1.647	2.137	3	0.6593	0.62	0.420							0.86	1		231.51	231.51
65.453	5	Clayey Silt to Silty Clay	23.033	0.622	3.822	1.668	2.154	3.05	0.6559	0.62	0.418							0.86	1		219.54	219.54
66.109	6	Sandy Silt to Clayey Silt	39.309	1.128	3.86	1.688	2.172	2.84	0.6524	0.61	0.415							0.86	1		306.37	306.37
66.765	6	Sandy Silt to Clayey Silt	28.837	0.704	3.897	1.709	2.189	2.93	0.6492	0.61	0.413							0.85	1		252.55	252.55
67.421	6	Sandy Silt to Clayey Silt	40.245	0.952	3.935	1.729	2.206	2.78	0.6459	0.61	0.411							0.85	1		310.92	310.92
68.077	6	Sandy Silt to Clayey Silt	65.297	1.56	3.972	1.75	2.223	2.6	0.6427	0.60	0.410							0.85	1		231.63	231.63
68.734	5	Clayey Silt to Silty Clay	30.795	0.958	4.01	1.77	2.24	2.97	0.6395	0.60	0.408							0.85	1		263.12	263.12
69.39	5	Clayey Silt to Silty Clay	17.956	0.459	4.048	1.79	2.257	3.19	0.6364	0.60	0.406							0.85	1		188.11	188.11
70.046	6	Sandy Silt to Clayey Silt	32.892	0.793	4.085	1.811	2.274	2.89	0.6333	0.59	0.404							0.85	1		274.16	274.16
70.702	5	Clayey Silt to Silty Clay	20.539	0.574	4.123	1.831	2.291	3.15	0.6302	0.59	0.402							0.85	1		204.53	204.53
71.358	5	Clayey Silt to Silty Clay	18.655	0.513	4.16	1.852	2.309	3.2	0.627	0.58	0.401							0.85	1		192.76	192.76
72.014	5	Clayey Silt to Silty Clay	20.998	0.656	4.198	1.872	2.326	3.17	0.6239	0.58	0.399							0.84	1		207.48	207.48
72.671	4	Silty Clay to Clay	23.743	0.965	4.236	1.893	2.343	3.18	0.6209	0.58	0.398							0.84	1		223.97	223.97
73.327	4	Silty Clay to Clay	22.049	0.849	4.273	1.913	2.36	3.21	0.618	0.58	0.396							0.84	1		213.93	213.93
73.983	5	Clayey Silt to Silty Clay	18.951	0.624	4.311	1.934	2.377	3.25	0.615	0.57	0.395							0.84	1		194.80	194.80
74.639	5	Clayey Silt to Silty Clay	16.558	0.352	4.348	1.954	2.394	3.22	0.6121	0.57	0.393							0.84	1		179.20	179.20
75.295	5	Clayey Silt to Silty Clay	17.452	0.435	4.386	1.975	2.411	3.23	0.6092	0.57	0.392							0.84	1		185.30	185.30
75.951	5	Clayey Silt to Silty Clay	16.893	0.466	4.424	1.995	2.428	3.28	0.6064	0.56	0.391							0.84	1		181.67	181.67
76.608	5	Clayey Silt to Silty Clay	16.966	0.46	4.461	2.016	2.445	3.28	0.6036	0.56	0.389							0.84	1		182.20	182.20
77.264	5	Clayey Silt to Silty Clay	19.348	0.668	4.499	2.036	2.463	3.27	0.6006	0.56	0.388							0.84	1		197.72	197.72
77.92	4	Silty Clay to Clay	23.469	0.895	4.536	2.057	2.48	3.2	0.5978	0.56	0.387							0.83	1		222.85	222.85
78.576	5	Clayey Silt to Silty Clay	27.602	1.022	4.574	2.077	2.497	3.12	0.5951	0.55	0.385							0.83	1		246.56	246.56
79.232	5	Clayey Silt to Silty Clay	24.107	0.656	4.612	2.098	2.514	3.11	0.5924	0.55	0.384							0.83	1		226.83	226.83
79.888	5	Clayey Silt to Silty Clay	24.778	0.867	4.649	2.118	2.531	3.16	0.5897	0.55	0.383							0.83	1		230.70	230.70
80.545	5	Clayey Silt to Silty Clay	21.887	0.812	4.687	2.138	2.548	3.24	0.587	0.55	0.382							0.83	1		213.74	213.74
81.201	4	Silty Clay to Clay	23.805	1.006	4.724	2.159	2.565	3.23	0.5843	0.54	0.381							0.83	1		225.14	225.14
81.857	4	Silty Clay to Clay	25.13	1.061	4.762	2.179	2.582	3.21	0.5817	0.54	0.380							0.83	1		232.89	232.89
82.513	4	Silty Clay to Clay	24.403	1.057	4.799	2.2	2.6	3.23	0.5789	0.54	0.379							0.83	1		228.68	228.68
83.169	4	Silty Clay to Clay	25.292	1.07	4.837	2.22	2.617	3.21	0.5764	0.54	0.378							0.82	1		233.86	233.86
83.825	3	Clay	25.611	1.209	4.874	2.241	2.633	3.24	0.574	0.54	0.377							0.82	1		235.68	235.68
84.482	4	Silty Clay to Clay	26.332	1.123	4.911	2.261	2.65	3.2	0.5714	0.53	0.376							0.82	1		239.81	239.81
85.138	3	Clay	27.988	1.378	4.948	2.282	2.666	3.22	0.5691	0.53	0.375							0.82	1		248.94	248.94
85.794	4	Silty Clay to Clay	35.173	1.663	4.985	2.302	2.683	3.11	0.5666	0.53	0.375							0.82	1		286.83	286.83
86.45	3	Clay	32.746	1.729	5.022	2.323	2.699	3.17	0.5642	0.53	0.374							0.82	1		274.16	274.16
87.106	4	Silty Clay to Clay	28.837	1.238	5.06	2.343	2.716	3.18	0.5618	0.53	0.373							0.82	1		253.48	253.48
87.762	5	Clayey Silt to Silty Clay	28.161	1.074	5.097	2.364	2.733	3.16	0.5594	0.52	0.372							0.82	1		249.82	249.82
88.419	5	Clayey Silt to Silty Clay	25.203	0.878	5.135	2.384	2.751	3.19	0.5568	0.52	0.371							0.82	1		233.29	233.29
89.075	5	Clayey Silt to Silty Clay	19.997	0.558	5.172	2.405	2.768	3.26	0.5544	0.52	0.371							0.82	1		202.23	202.23
89.731	6	Sandy Silt to Clayey Silt	20.958	0.483	5.21	2.425	2.785	3.2	0.5521	0.52	0.370							0.81	1		208.22	208.22
90.387	5	Clayey Silt to Silty Clay	24.806	0.83	5.247	2.446	2.802	3.2	0.5497	0.52	0.369							0.81	1		231.05	231.05
91.043	5	Clayey Silt to Silty Clay	22.284	0.727	5.285	2.466	2.819	3.25	0.5474	0.52	0.368							0.81	1		216.27	216.27
91.699	5	Clayey Silt to Silty Clay	22.429	0.667	5.323	2.487	2.836	3.23	0.5451	0.52	0.368							0.81	1		217.22	217.22
92.356	6	Sandy Silt to Clayey Silt	32.489	0.84	5.36	2.507	2.853	3.01	0.5428	0.51	0.367							0.81	1		273.12	273.12
93.012	6	Sandy Silt to Clayey Silt	24.459	0.621	5.398	2.527	2.87	3.15	0.5405	0.51	0.366							0.81	1		229.20	229.20
93.668	5	Clayey Silt to Silty Clay	22.664	0.677	5.435	2.548	2.888	3.23	0.5382	0.51	0.366							0.81	1		218.77	218.77
94.324	5	Clayey Silt to Silty Clay	23.782	0.834	5.473	2.568	2.905	3.25	0.5359	0.51	0.365							0.81	1		225.37	225.37
94.98	5	Clayey Silt to Silty Clay	21.316	0.738	5.511	2.589	2.922	3.31	0.5337	0.51	0.364							0.81	1		210.72	210.72
95.636	5	Clayey Silt to Silty Clay	19.566	0.57	5.548	2.609	2.939	3.32	0.5315	0.51	0.364							0.81	1		199.98	199.98
96.293	5	Clayey Silt to Silty Clay	21.316	0.691	5.586	2.63	2.956	3.3	0.5294	0.51	0.363							0.81	1		210.84	210.84
96.949	4	Silty Clay to Clay	25.007	1.035	5.623	2.65	2.973	3.28	0.5272	0.50	0.363							0.80	1		232.66	232.66
97.605	4	Silty Clay to Clay	23.849	0.932	5.661	2.671	2.99	3.29	0.5251	0.50	0.362							0.80	1		226.01	226.01
98.261	5	Clayey Silt to Silty Clay	23.111	0.776	5.699	2.691	3.007	3.27	0.5229	0.50	0.362							0.80	1		221.79	221.79
98.917	5	Clayey Silt to Silty Clay	22.094	0.593	5.736	2.712	3.024	3.25	0.5208	0.50	0.361							0.80	1		215.85	215.85
99.573	6	Sandy Silt to Clayey Silt	21.764	0.504	5.774	2.732	3.042	3.22	0.5186	0.50	0.360							0.80	1		213.99	213.99
100.23	5	Clayey Silt to Silty Clay	21.937	0.597	5.811	2.753	3.059	3.26	0.5166	0.50	0.360							0.80	1		215.13	215.13
100.89	5	Clayey Silt to Silty Clay	23.078	0.795	5.849	2.773	3.076	3.29	0.5145	0.50	0.359							0.80	1		221.97	221.97
101.54	5	Clayey Silt to Silty Clay	21.926	0.769	5.887	2.794	3.093	3.33	0.5125	0.50	0.359							0.80	1		215.31	215.31
102.2	5	Clayey Silt to Silty Clay	21.311	0.658	5.924	2.814	3.11	3.31	0.5104	0.49	0.358							0.80	1		211.69	211.69
102.85	5	Clayey Silt to Silty Clay	22.468	0.637	5.962	2.835	3.127	3.27	0.5084	0.49	0.358							0.80	1		218.77	218.77
103.51	6	Sandy Silt to Clayey Silt	23.257	0.552	5.999	2.855	3.144	3.21	0.5064	0.49	0.357							0.80	1		223.61	223.61
104.17	6	Sandy Silt to Clayey Silt	24.794	0.52	6.037	2.876	3.161	3.15	0.5045	0.49	0.357							0.79	1		232.71	232.71
104.82	6	Sandy Silt to Clayey Silt	36.459	1.066	6.075	2.896	3.179	3.04	0.5024	0.49	0.356							0.79	1		294.55	294.55
105.48	6	Sandy Silt to Clayey Silt	41.576	1.199	6.112	2.916	3.196	2.98	0.5005	0.49	0.356							0.79	1		319.15	319.15
106.14	6	Sandy Silt to Clayey Silt	30.61	0.765	6.15	2.937	3.213	3.09	0.4985	0.49	0.355							0.79	1		263.97	263.97
106.79	6	Sandy Silt to Clayey Silt	23.016	0.498	6.187	2.957	3.23	3.21	0.4966	0.49	0.355							0.79	1		221.79	221.79
107.45	5	Clayey Silt to Silty Clay	24.671	0.722	6.225	2.978	3.247	3.25	0.4947	0.49	0.354							0.79	1		231.62	231.62
108.1	5	Clayey Silt to Silty Clay	25.779	0.861	6.263	2.998	3.264	3.26	0.4928	0.49	0.354							0.79	1		238.29	238.29
108.76	6	Sandy Silt to Clayey Silt	25.628	0.686	6.3	3.019	3.281	3.21	0.491	0.48	0.354							0.79	1		237.89	237.89
109.42	6	Sandy Silt to Clayey Silt	29.016	0.803	6.338	3.039	3.298	3.15	0.4891	0.48	0.353							0.79	1		257.00	257.00
110.07	6	Sandy Silt to Clayey Silt	48.029	1.437	6.375	3.06	3.316	2.94	0.4872	0.48	0.353							0.79	1		350.39	350.39
110.73	6	Sandy Silt to Clayey Silt	50.098	1.591	6.413	3.08	3.333	2.94	0.4853	0.48	0.352							0.79	1		359.66	359.66
111.39	6	Sandy Silt to Clayey Silt	59.353	1.945	6.45	3.101	3.35	2.88	0.4835	0.48	0.352							0.79	1		397.86	397.86
112.04	6	Sandy Silt to Clayey Silt	30.342	0.779	6.488	3.121	3.367	3.13	0.4817	0.48	0.351							0.78	1		262.32	262.32
112.7	6	Sandy Silt to Clayey Silt	27.439	0.62	6.526	3.142	3.384	3.15	0.4799	0.48	0.351							0.78	1		246.84	246.84
113.35	6	Sandy Silt to Clayey Silt	29.514	0.838	6.563	3.162	3.401	3.17	0.4782	0.48	0.350							0.78	1		258.35	258.35
114.01	6	Sandy Silt to Clayey Silt	30.638	0.871	6.601	3.183	3.418	3.15	0.4764	0.48	0.350							0.78	1		264.50	264.50
114.67	5	Clayey Silt to Silty Clay	30.979	1.179	6.638	3.203	3.435	3.22	0.4746	0.48	0.350							0.78	1		266.35	266.35
115.32	5	Clayey Silt to Silty Clay	31.488	1.252	6.676	3.224	3.453	3.23	0.4728	0.47	0.349							0.78	1		269.15	269.15
115.98	5	Clayey Silt to Silty Clay	30.202	1.104	6.714	3.244	3.47	3.23	0.4711	0.47	0.349							0.78	1		262.48	262.48
116.63	5	Clayey Silt to Silty Clay	32.215	1.287	6.751	3.264	3.487	3.22	0.4694	0.47	0.348							0.78	1		273.12	273.12
117.29	5	Clayey Silt to Silty Clay	31.751	1.278	6.789	3.285	3.504	3.24	0.4677	0.47	0.348							0.78	1		270.62	270.62
117.95	5	Clayey Silt to Silty Clay	30.308	1.112	6.826	3.305	3.521	3.24	0.466	0.47	0.348							0.78	1		263.12	263.12
118.6	5	Clayey Silt to Silty Clay	32.718	1.257	6.864	3.326	3.538	3.21	0.4643	0.47	0.347							0.78	1		275.98	275.98
119.26	5	Clayey Silt to Silty Clay	30.778	1.071	6.902	3.346	3.555	3.22	0.4627	0.47	0.347							0.78	1		265.72	265.72
119.92	5	Clayey Silt to Silty Clay	29.892	1.129	6.939	3.367	3.572	3.26	0.461	0.47	0.346							0.78	1		261.09	261.09

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
CPT NO. ***CPT-5*** M_w = 8 *MSF =* 0.94 a_{max} *(g)=* 0.585 V_{S30m}(m/s)= 218.1 224.5

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.=$(CRR_{7.5}/CSR)*MSF*K\sigma*K\alpha$ $K\sigma$	$K\alpha$	F.S.	V_s (m/s)	$V_{s,liq}$ (m/s)
0.492																						
1.148																						
1.804																						
2.461																						
3.117																						
3.773																						
4.429																						
5.085	5	Clayey Silt to Silty Clay	14.772	0.449	0.291		0.291	2.46	1.4755	0.99	0.376	2.460	1.48	21.80	2.574	56.110	0.10				110.36	110.36
5.741	5	Clayey Silt to Silty Clay	21.171	0.678	0.329		0.329	2.4	1.4388	0.99	0.376	2.400	1.44	30.46	2.312	70.439	0.11				119.48	119.48
6.398	4	Silty Clay to Clay	14.928	0.556	0.367		0.367	2.6	1.404	0.99	0.375										117.56	117.56
7.054	3	Clay	14.539	0.618	0.403		0.403	2.68	1.3724	0.99	0.375										163.89	163.89
7.71	4	Silty Clay to Clay	14.981	0.605	0.441		0.441	2.68	1.3406	0.98	0.374										167.04	167.04
8.366	3	Clay	14.361	0.667	0.477		0.477	2.76	1.3119	0.98	0.374										162.97	162.97
9.022	3	Clay	11.323	0.546	0.514		0.514	2.88	1.2835	0.98	0.373										140.35	140.35
9.678	3	Clay	10.95	0.539	0.55		0.55	2.91	1.2571	0.98	0.373							1.00	0		138.56	138.56
10.335	3	Clay	11.896	0.622	0.587		0.587	2.93	1.2311	0.98	0.372							1.00	1		145.86	145.86
10.991	3	Clay	11.44	0.696	0.623		0.623	3	1.2068	0.98	0.372							1.00	1		142.50	142.50
11.647	3	Clay	11.467	0.672	0.66		0.66	3.02	1.1828	0.98	0.371							1.00	1		142.20	142.20
12.303	3	Clay	12.269	0.644	0.697	0.009	0.687	2.98	1.1659	0.97	0.376							1.00	1		148.19	148.19
12.959	3	Clay	12.803	0.646	0.733	0.03	0.703	2.96	1.1561	0.97	0.386							1.00	1		152.06	152.06
13.615	3	Clay	14.272	0.713	0.77	0.05	0.719	2.93	1.1464	0.97	0.396							1.00	1		162.61	162.61
14.272	3	Clay	15.963	0.72	0.806	0.071	0.735	2.86	1.137	0.97	0.405							1.00	1		175.09	175.09
14.928	4	Silty Clay to Clay	17.532	0.755	0.844	0.091	0.753	2.82	1.1265	0.97	0.413							1.00	1		185.89	185.89
15.584	4	Silty Clay to Clay	17.844	0.731	0.881	0.112	0.77	2.81	1.1168	0.97	0.421							1.00	1		187.65	187.65
16.24	4	Silty Clay to Clay	18.845	0.721	0.919	0.132	0.787	2.78	1.1072	0.97	0.429							1.00	1		195.44	195.44
16.896	4	Silty Clay to Clay	22.496	0.886	0.957	0.153	0.804	2.73	1.0978	0.96	0.436							1.00	1		218.47	218.47
17.552	5	Clayey Silt to Silty Clay	22.373	0.793	0.994	0.173	0.821	2.7	1.0886	0.96	0.443							1.00	1		218.89	218.89
18.209	4	Silty Clay to Clay	22.329	0.86	1.032	0.194	0.838	2.74	1.0795	0.96	0.450							1.00	1		218.71	218.71
18.865	6	Sandy Silt to Clayey Silt	49.915	1.376	1.069	0.214	0.855	2.39	1.0706	0.96	0.456	2.390	1.07	53.44	2.272	121.410	0.25	1.00	1	(0.51)	172.89	97.92
19.521	7	Silty Sand to Sandy Silt	64.248	0.929	1.108	0.235	0.873	2.13	1.0613	0.96	0.462	2.130	1.06	68.18	1.512	103.077	0.18	1.00	1	(0.37)	179.54	113.03
20.177	5	Clayey Silt to Silty Clay	20.353	0.615	1.146	0.255	0.891	2.72	1.0521	0.96	0.468							1.00	1		206.68	206.68
20.833	5	Clayey Silt to Silty Clay	21.55	0.634	1.183	0.276	0.908	2.7	1.0436	0.95	0.473							1.00	1		213.80	213.80
21.49	5	Clayey Silt to Silty Clay	23.202	0.741	1.221	0.296	0.925	2.71	1.0353	0.95	0.478							1.00	1		223.50	223.50
22.146	5	Clayey Silt to Silty Clay	24.482	0.75	1.258	0.316	0.942	2.68	1.0271	0.95	0.483							1.00	1		231.16	231.16
22.802	5	Clayey Silt to Silty Clay	14.611	0.474	1.296	0.337	0.959	2.91	1.019	0.95	0.488							1.00	1		167.11	167.11
23.458	5	Clayey Silt to Silty Clay	11.284	0.34	1.334	0.357	0.976	2.99	1.011	0.95	0.492							1.00	1		143.50	143.50
24.114	5	Clayey Silt to Silty Clay	14.789	0.429	1.371	0.378	0.993	2.87	1.0032	0.94	0.496							1.00	1		170.65	170.65
24.77	4	Silty Clay to Clay	15.452	0.549	1.409	0.398	1.01	2.92	0.9955	0.94	0.500							1.00	1		174.41	174.41
25.427	5	Clayey Silt to Silty Clay	17.121	0.475	1.446	0.419	1.028	2.83	0.9874	0.94	0.503							0.99	1		185.76	185.76
26.083	5	Clayey Silt to Silty Clay	15.852	0.357	1.484	0.439	1.045	2.8	0.98	0.94	0.506							0.99	1		178.33	178.33
26.739	5	Clayey Silt to Silty Clay	13.649	0.439	1.522	0.46	1.062	2.97	0.9726	0.94	0.510							0.99	1		160.91	160.91
27.395	4	Silty Clay to Clay	10.801	0.346	1.559	0.48	1.079	3.08	0.9653	0.93	0.512							0.98	1		139.03	139.03
28.051	5	Clayey Silt to Silty Clay	11.963	0.309	1.597	0.501	1.096	2.98	0.9582	0.93	0.515							0.98	1		150.06	150.06
28.707	6	Sandy Silt to Clayey Silt	23.336	0.489	1.634	0.521	1.113	2.68	0.9511	0.93	0.517							0.98	1		223.03	223.03
29.364	6	Sandy Silt to Clayey Silt	35.299	0.972	1.672	0.542	1.13	2.6	0.9442	0.92	0.520							0.98	1		178.24	178.24
30.02	9	Sand	114.93	0.932	1.713	0.562	1.15	1.86	0.9362	0.92	0.521	1.860	0.94	107.59	1.153	124.089	0.26	0.96	1	(0.45)	208.58	164.59
30.676	9	Sand	156.9	0.885	1.753	0.583	1.171	1.66	0.9279	0.92	0.522	1.660	0.93	145.58	1.010	147.094	0.38	0.95	1	(0.64)	218.25	211.35
31.332	9	Sand	195.56	1.293	1.794	0.603	1.191	1.64	0.9201	0.91	0.523	1.640	0.92	179.94	1.000	179.937		0.94	1		225.63	225.63
31.988	9	Sand	212.17	1.146	1.835	0.624	1.211	1.56	0.9125	0.91	0.524	1.560	0.91	193.60	1.000	193.600		0.93	1		229.07	229.07
32.644	10	Gravelly Sand to Sand	240.57	1.016	1.877	0.644	1.233	1.46	0.9042	0.91	0.524	1.460	0.90	217.53	1.000	217.529		0.92	1		233.97	233.97
33.301	9	Sand	179.79	1.545	1.917	0.664	1.253	1.75	0.8969	0.90	0.525	1.750	0.90	161.25	1.072	172.792		0.93	1		226.27	226.27
33.957	9	Sand	205.55	1.889	1.958	0.685	1.273	1.74	0.8896	0.90	0.525	1.740	0.89	182.86	1.065	194.707		0.92	1		231.23	231.23
34.613	9	Sand	215.53	1.386	1.999	0.705	1.293	1.62	0.8825	0.89	0.525	1.620	0.88	190.20	1.000	190.202		0.91	1		233.62	233.62
35.269	9	Sand	210.79	1.237	2.039	0.726	1.314	1.61	0.8751	0.89	0.524	1.610	0.88	184.47	1.000	184.466		0.91	1		233.97	233.97
35.925	10	Gravelly Sand to Sand	271.12	1.024	2.081	0.746	1.335	1.41	0.8679	0.88	0.524	1.410	0.87	235.29	1.000	235.291		0.89	1		242.80	242.80
36.581	9	Sand	225.28	1	2.122	0.767	1.355	1.53	0.8611	0.88	0.524	1.530	0.86	193.98	1.000	193.981		0.90	1		237.96	237.96
37.238	9	Sand	218.12	0.927	2.163	0.787	1.375	1.53	0.8544	0.87	0.523	1.530	0.85	186.36	1.000	186.357		0.89	1		237.91	237.91
37.894	10	Gravelly Sand to Sand	208.94	0.483	2.204	0.808	1.397	1.43	0.8471	0.87	0.521	1.430	0.85	177.00	1.000	176.996		0.89	1		237.59	237.59
38.55	7	Silty Sand to Sandy Silt	64.193	0.797	2.243	0.828	1.415	2.26	0.8413	0.86	0.520	2.260	0.84	54.01	1.827	98.657	0.17	0.93	1	(0.29)	204.53	92.14
39.206	5	Clayey Silt to Silty Clay	14.177	0.373	2.281	0.849	1.432	3.03	0.8359	0.86	0.520							0.93	1		167.46	167.46
39.862	6	Sandy Silt to Clayey Silt	22.101	0.487	2.318	0.869	1.449	2.8	0.8305	0.85	0.518							0.93	1		219.60	219.60
40.518	6	Sandy Silt to Clayey Silt	31.537	0.791	2.356	0.89	1.466	2.71	0.8252	0.85	0.517							0.93	1		269.88	269.88
41.175	8	Sand to Silty Sand	79.833	1.075	2.396	0.91	1.485	2.22	0.8194	0.84	0.516	2.220	0.82	65.41	1.717	112.325	0.21	0.92	1	(0.36)	213.31	112.18
41.831	8	Sand to Silty Sand	59.101	0.511	2.435	0.931	1.505	2.23	0.8133	0.83	0.513	2.230	0.81	48.07	1.743	83.804	0.13	0.92	1	(0.23)	205.74	80.86
42.487	5	Clayey Silt to Silty Clay	31.237	1.091	2.473	0.951	1.522	2.81	0.8082	0.83	0.512							0.92	1		271.30	271.30
43.143	8	Sand to Silty Sand	175.92	3.192	2.513	0.972	1.541	2.05	0.8026	0.82	0.510	2.050	0.80	141.20	1.371	193.589		0.88	1		238.67	238.67
43.799	9	Sand	249.97	1.853	2.553	0.992	1.561	1.68	0.7968	0.82	0.507	1.680	0.80	199.18	1.024	204.012		0.85	1		250.60	250.60
44.455	9	Sand	219.28	1.476	2.594	1.013	1.581	1.7	0.7911	0.81	0.505	1.700	0.79	173.47	1.038	180.035		0.85	1		247.22	247.22
45.112	9	Sand	214.86	1.909	2.635	1.033	1.602	1.79	0.7852	0.80	0.502	1.790	0.79	168.69	1.099	185.470		0.85	1		247.44	247.44
45.768	9	Sand	260.92	2.014	2.675	1.053	1.622	1.69	0.7796	0.80	0.499	1.690	0.78	203.41	1.031	209.729		0.83	1		254.62	254.62
46.424	9	Sand	344.9	3.123	2.716	1.074	1.642	1.65	0.7741	0.79	0.496	1.650	0.77	266.99	1.003	267.878		0.82	1		264.91	264.91
47.08	10	Gravelly Sand to Sand	361	2.559	2.758	1.094	1.664	1.56	0.7682	0.78	0.493	1.560	0.77	277.30	1.000	277.301		0.82	1		267.44	267.44
47.736	10	Gravelly Sand to Sand	318.35	1.994	2.8	1.115	1.685	1.57	0.7626	0.78	0.490	1.570	0.76	242.76	1.000	242.760		0.81	1		264.00	264.00
48.392	9	Sand	239.24	1.71	2.84	1.135	1.705	1.71	0.7573	0.77	0.487	1.710	0.76	181.18	1.045	189.263		0.83	1		255.19	255.19
49.049	9	Sand	304.44	2.915	2.881	1.156	1.725	1.72	0.7521	0.76	0.484	1.720	0.75	228.98	1.051	240.735		0.81	1		264.14	264.14
49.705	10	Gravelly Sand to Sand	301.52	1.678	2.923	1.176	1.747	1.57	0.7465	0.76	0.481	1.570	0.75	225.09	1.000	225.092		0.80	1		264.70	264.70
50.361	9	Sand	206.83	1.099	2.964	1.197	1.767	1.7	0.7415	0.75	0.478	1.700	0.74	153.36	1.038	159.170	0.46	0.83	1	(0.74)	252.82	230.38
51.017	9	Sand	202.13	1.672	3.004	1.217	1.787	1.83	0.7365	0.74	0.475	1.830	0.74	148.87	1.129	168.101		0.83	1		252.84	252.84
51.673	9	Sand	172.12	1.081	3.045	1.238	1.807	1.82	0.7316	0.74	0.471	1.820	0.73	125.93	1.122	141.228	0.34	0.84	1	(0.57)	248.35	195.77
52.329	6	Sandy Silt to Clayey Silt	35.844	1.094	3.083	1.258	1.825	2.81	0.7273	0.73	0.468							0.89	1		290.40	290.40
52.986	5	Clayey Silt to Silty Clay	16.447	0.422	3.12	1.279	1.842	3.08	0.7232	0.72	0.466							0.88	1		183.33	183.33
53.642	6	Sandy Silt to Clayey Silt	16.191	0.347	3.158	1.299	1.859	3.05	0.7192	0.72	0.463							0.88	1		182.53	182.53
54.298	5	Clayey Silt to Silty Clay	16.225	0.391	3.195	1.32	1.876	3.08	0.7152	0.71	0.460							0.88	1		183.39	183.39
54.954	5	Clayey Silt to Silty Clay	17.043	0.389	3.233	1.34	1.893	3.05	0.7113	0.70	0.457							0.88	1		188.63	188.63
55.61	6	Sandy Silt to Clayey Silt	16.247	0.33	3.271	1.361	1.91	3.04	0.7074	0.70	0.454							0.88	1		184.45	184.45
56.266	6	Sandy Silt to Clayey Silt	16.453	0.327	3.308	1.381	1.927	3.03	0.7035	0.69	0.451							0.88	1		186.22	186.22
56.923	6	Sandy Silt to Clayey Silt	16.648	0.265	3.346	1.401	1.944	2.98	0.6997	0.69	0.449							0.88	1		188.56	188.56
57.579	6	Sandy Silt to Clayey Silt	18.233	0.278	3.383	1.422	1.961	2.93	0.696	0.68	0.446							0.87	1		199.54	199.54
58.235	5	Clayey Silt to Silty Clay	38.737	1.274	3.421	1.442	1.979	2.83	0.692	0.67	0.443							0.87	1		307.00	307.00
58.891	5	Clayey Silt to Silty Clay	48.302	1.624	3.459	1.463	1.996	2.76	0.6884	0.67	0.440							0.87	1		348.41	348.41
59.547	6	Sandy Silt to Clayey Silt	44.846	1.389	3.496	1.483	2.013	2.77	0.6847	0.66	0.438							0.87	1		334.18	334.18
60.203	6	Sandy Silt to Clayey Silt	38.793	1.161	3.534	1.504	2.03	2.82	0.6811	0.66	0.435							0.87	1		305.15	305.15
60.86	5	Clayey Silt to Silty Clay	28.56	0.847	3.571	1.524	2.047	2.94	0.6775	0.65	0.433							0.87	1		253.92	253.92
61.516	5	Clayey Silt to Silty Clay	24.777	0.692	3.609	1.545	2.064	2.98	0.674	0.65	0.430							0.87	1		234.14	234.14
62.172	6	Sandy Silt to Clayey Silt	23.024	0.604	3.647	1.565	2.081	3	0.6705	0.64	0.428							0.86	1		225.31	225.31
62.828	5	Clayey Silt to Silty Clay	22.457	0.614	3.684	1.586	2.098	3.02	0.6671	0.64	0.426							0.86	1		221.38	221.38

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME	***Adobe Creek POC***							
PROJECT NO.	***2016-122-POC***							
CPT NO.	***CPT-5***	*M_w =*	8	*MSF =*	0.94	*a_{max} (g)=*	0.585	V_{S30m}(m/s)= 218.1 224.5

		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.	V_s (m/s)	$V_{s,liq}$ (m/s)
63.484	6	Sandy Silt to Clayey Silt	20.843	0.487	3.722	1.606	2.116	3.02	0.6634	0.63	0.423							0.86	1		212.66	212.66
64.14	6	Sandy Silt to Clayey Silt	22.217	0.464	3.759	1.627	2.133	2.96	0.6601	0.63	0.421							0.86	1		223.38	223.38
64.797	6	Sandy Silt to Clayey Silt	27.32	0.554	3.797	1.647	2.15	2.87	0.6567	0.62	0.419							0.86	1		251.41	251.41
65.453	6	Sandy Silt to Clayey Silt	27.787	0.593	3.835	1.668	2.167	2.88	0.6534	0.62	0.417							0.86	1		253.86	253.86
66.109	6	Sandy Silt to Clayey Silt	29.501	0.784	3.872	1.688	2.184	2.92	0.6501	0.61	0.414							0.86	1		260.77	260.77
66.765	6	Sandy Silt to Clayey Silt	42.298	1.377	3.91	1.709	2.201	2.84	0.6469	0.61	0.413							0.85	1		322.88	322.88
67.421	5	Clayey Silt to Silty Clay	29.295	1.037	3.947	1.729	2.218	3.01	0.6437	0.61	0.411							0.85	1		257.71	257.71
68.077	6	Sandy Silt to Clayey Silt	34.569	0.984	3.985	1.75	2.235	2.89	0.6405	0.60	0.409							0.85	1		286.42	286.42
68.734	6	Sandy Silt to Clayey Silt	61.461	1.494	4.023	1.77	2.253	2.63	0.6371	0.60	0.407							0.85	1		407.25	407.25
69.39	6	Sandy Silt to Clayey Silt	38.954	1.111	4.06	1.79	2.27	2.85	0.634	0.60	0.405							0.85	1		305.83	305.83
70.046	5	Clayey Silt to Silty Clay	17.121	0.398	4.098	1.811	2.287	3.14	0.6309	0.59	0.403							0.85	1		190.57	190.57
70.702	6	Sandy Silt to Clayey Silt	18.834	0.411	4.135	1.831	2.304	3.09	0.6279	0.59	0.401							0.85	1		201.29	201.29
71.358	6	Sandy Silt to Clayey Silt	20.626	0.53	4.173	1.852	2.321	3.09	0.6248	0.58	0.400							0.85	1		212.66	212.66
72.014	5	Clayey Silt to Silty Clay	21.672	0.675	4.211	1.872	2.338	3.12	0.6218	0.58	0.398							0.84	1		217.28	217.28
72.671	4	Silty Clay to Clay	20.275	0.794	4.248	1.893	2.355	3.22	0.6188	0.58	0.397							0.84	1		207.54	207.54
73.327	5	Clayey Silt to Silty Clay	18.195	0.632	4.286	1.913	2.372	3.24	0.6159	0.58	0.395							0.84	1		195.94	195.94
73.983	5	Clayey Silt to Silty Clay	17.883	0.577	4.323	1.934	2.39	3.23	0.6128	0.57	0.394							0.84	1		195.12	195.12
74.639	5	Clayey Silt to Silty Clay	18.539	0.635	4.361	1.954	2.407	3.23	0.6099	0.57	0.392							0.84	1		199.10	199.10
75.295	5	Clayey Silt to Silty Clay	19.102	0.682	4.398	1.975	2.424	3.23	0.6071	0.57	0.391							0.84	1		202.35	202.35
75.951	4	Silty Clay to Clay	21.41	0.874	4.436	1.995	2.441	3.22	0.6042	0.56	0.389							0.84	1		215.67	215.67
76.608	4	Silty Clay to Clay	22.929	1.001	4.474	2.016	2.458	3.22	0.6014	0.56	0.388							0.84	1		223.67	223.67
77.264	4	Silty Clay to Clay	24.654	1.004	4.511	2.036	2.475	3.17	0.5986	0.56	0.387							0.83	1		233.23	233.23
77.92	5	Clayey Silt to Silty Clay	22.289	0.79	4.549	2.057	2.492	3.17	0.5959	0.56	0.386							0.83	1		222.03	222.03
78.576	5	Clayey Silt to Silty Clay	20.131	0.591	4.586	2.077	2.509	3.16	0.5932	0.55	0.385							0.83	1		211.33	211.33
79.232	5	Clayey Silt to Silty Clay	20.331	0.583	4.624	2.098	2.526	3.16	0.5904	0.55	0.383							0.83	1		212.48	212.48
79.888	5	Clayey Silt to Silty Clay	27.019	1.091	4.662	2.118	2.544	3.13	0.5876	0.55	0.382							0.83	1		248.06	248.06
80.545	3	Clay	36.684	1.956	4.698	2.138	2.56	3.1	0.5851	0.55	0.381							0.83	1		293.26	293.26
81.201	3	Clay	34.147	1.945	4.735	2.159	2.576	3.15	0.5826	0.54	0.380							0.83	1		281.33	281.33
81.857	3	Clay	29.011	1.506	4.771	2.179	2.592	3.19	0.5802	0.54	0.379							0.83	1		255.65	255.65
82.513	3	Clay	26.669	1.336	4.808	2.2	2.608	3.23	0.5777	0.54	0.378							0.83	1		242.39	242.39
83.169	4	Silty Clay to Clay	28.382	1.32	4.845	2.22	2.625	3.18	0.5752	0.54	0.377							0.82	1		252.55	252.55
83.825	3	Clay	28.399	1.397	4.882	2.241	2.641	3.2	0.5728	0.54	0.377							0.82	1		253.10	253.10
84.482	4	Silty Clay to Clay	30.736	1.385	4.92	2.261	2.658	3.13	0.5702	0.53	0.376							0.82	1		267.04	267.04
85.138	4	Silty Clay to Clay	33.251	1.599	4.957	2.282	2.675	3.12	0.5677	0.53	0.375							0.82	1		279.28	279.28
85.794	4	Silty Clay to Clay	32.817	1.592	4.995	2.302	2.692	3.13	0.5653	0.53	0.374							0.82	1		277.53	277.53
86.45	3	Clay	29.044	1.441	5.031	2.323	2.709	3.2	0.5628	0.53	0.373							0.82	1		255.49	255.49
87.106	4	Silty Clay to Clay	24.254	1.063	5.069	2.343	2.726	3.25	0.5604	0.53	0.372							0.82	1		229.72	229.72
87.762	5	Clayey Silt to Silty Clay	22.946	0.891	5.107	2.364	2.743	3.25	0.558	0.52	0.372							0.82	1		223.55	223.55
88.419	5	Clayey Silt to Silty Clay	24.231	0.908	5.144	2.384	2.76	3.22	0.5556	0.52	0.371							0.82	1		229.61	229.61
89.075	5	Clayey Silt to Silty Clay	22.379	0.811	5.182	2.405	2.777	3.26	0.5532	0.52	0.370							0.82	1		218.83	218.83
89.731	5	Clayey Silt to Silty Clay	22.601	0.727	5.219	2.425	2.794	3.21	0.5508	0.52	0.369							0.81	1		222.14	222.14
90.387	6	Sandy Silt to Clayey Silt	23.508	0.567	5.257	2.446	2.811	3.11	0.5485	0.52	0.369							0.81	1		230.01	230.01
91.043	5	Clayey Silt to Silty Clay	27.898	0.849	5.294	2.466	2.828	3.1	0.5462	0.52	0.368							0.81	1		253.97	253.97
91.699	5	Clayey Silt to Silty Clay	25.022	0.857	5.332	2.487	2.846	3.18	0.5437	0.52	0.367							0.81	1		237.84	237.84
92.356	4	Silty Clay to Clay	24.515	0.997	5.37	2.507	2.863	3.24	0.5415	0.51	0.366							0.81	1		234.37	234.37
93.012	5	Clayey Silt to Silty Clay	22.245	0.811	5.407	2.527	2.88	3.26	0.5392	0.51	0.366							0.81	1		221.85	221.85
93.668	5	Clayey Silt to Silty Clay	22.407	0.815	5.445	2.548	2.897	3.26	0.537	0.51	0.365							0.81	1		223.03	223.03
94.324	5	Clayey Silt to Silty Clay	23.124	0.815	5.482	2.568	2.914	3.23	0.5348	0.51	0.365							0.81	1		228.45	228.45
94.98	5	Clayey Silt to Silty Clay	25.639	0.939	5.52	2.589	2.931	3.2	0.5326	0.51	0.364							0.81	1		242.22	242.22
95.636	4	Silty Clay to Clay	27.748	1.166	5.558	2.609	2.948	3.22	0.5304	0.51	0.363							0.81	1		250.15	250.15
96.293	5	Clayey Silt to Silty Clay	25.205	0.962	5.595	2.63	2.965	3.23	0.5282	0.51	0.363							0.80	1		237.95	237.95
96.949	5	Clayey Silt to Silty Clay	23.43	0.725	5.633	2.65	2.983	3.21	0.5259	0.50	0.362							0.80	1		230.01	230.01
97.605	5	Clayey Silt to Silty Clay	24.198	0.743	5.67	2.671	3	3.19	0.5238	0.50	0.361							0.80	1		235.06	235.06
98.261	5	Clayey Silt to Silty Clay	25.717	0.976	5.708	2.691	3.017	3.23	0.5217	0.50	0.361							0.80	1		241.44	241.44
98.917	5	Clayey Silt to Silty Clay	24.332	0.95	5.746	2.712	3.034	3.26	0.5196	0.50	0.360							0.80	1		234.66	234.66
99.573	5	Clayey Silt to Silty Clay	23.43	0.854	5.783	2.732	3.051	3.25	0.5175	0.50	0.360							0.80	1		230.93	230.93
100.23	5	Clayey Silt to Silty Clay	22.868	0.783	5.821	2.753	3.068	3.25	0.5155	0.50	0.359							0.80	1		228.45	228.45
100.89	6	Sandy Silt to Clayey Silt	22.968	0.639	5.858	2.773	3.085	3.2	0.5134	0.50	0.359							0.80	1		229.95	229.95
101.54	6	Sandy Silt to Clayey Silt	23.441	0.555	5.896	2.794	3.102	3.15	0.5114	0.50	0.358							0.80	1		233.40	233.40
102.2	6	Sandy Silt to Clayey Silt	21.661	0.534	5.934	2.814	3.119	3.19	0.5094	0.49	0.358							0.80	1		223.79	223.79
102.85	6	Sandy Silt to Clayey Silt	20.815	0.506	5.971	2.835	3.137	3.22	0.5073	0.49	0.357							0.80	1		218.53	218.53
103.51	6	Sandy Silt to Clayey Silt	21.216	0.441	6.009	2.855	3.154	3.17	0.5053	0.49	0.357							0.79	1		222.03	222.03
104.17	6	Sandy Silt to Clayey Silt	23.263	0.557	6.046	2.876	3.171	3.16	0.5033	0.49	0.356							0.79	1		233.40	233.40
104.82	6	Sandy Silt to Clayey Silt	27.025	0.795	6.084	2.896	3.188	3.15	0.5014	0.49	0.356							0.79	1		252.83	252.83
105.48	5	Clayey Silt to Silty Clay	32.388	1.269	6.122	2.916	3.205	3.16	0.4994	0.49	0.355							0.79	1		275.77	275.77
106.14	5	Clayey Silt to Silty Clay	30.547	1.248	6.159	2.937	3.222	3.2	0.4975	0.49	0.355							0.79	1		266.78	266.78
106.79	5	Clayey Silt to Silty Clay	27.92	1.135	6.197	2.957	3.239	3.24	0.4956	0.49	0.354							0.79	1		253.81	253.81
107.45	5	Clayey Silt to Silty Clay	27.42	1.018	6.234	2.978	3.256	3.23	0.4937	0.49	0.354							0.79	1		251.79	251.79
108.1	5	Clayey Silt to Silty Clay	27.008	0.989	6.272	2.998	3.274	3.24	0.4917	0.49	0.353							0.79	1		248.66	248.66
108.76	5	Clayey Silt to Silty Clay	27.62	1.013	6.31	3.019	3.291	3.23	0.4899	0.48	0.353							0.79	1		252.66	252.66
109.42	5	Clayey Silt to Silty Clay	29.172	1.101	6.347	3.039	3.308	3.21	0.488	0.48	0.353							0.79	1		260.77	260.77
110.07	5	Clayey Silt to Silty Clay	28.772	1.124	6.385	3.06	3.325	3.24	0.4862	0.48	0.352							0.79	1		257.54	257.54
110.73	5	Clayey Silt to Silty Clay	28.677	1.041	6.422	3.08	3.342	3.22	0.4844	0.48	0.352							0.79	1		257.87	257.87
111.39	5	Clayey Silt to Silty Clay	27.492	0.9	6.46	3.101	3.359	3.21	0.4826	0.48	0.351							0.78	1		251.68	251.68
112.04	5	Clayey Silt to Silty Clay	27.687	0.859	6.497	3.121	3.376	3.2	0.4808	0.48	0.351							0.78	1		253.10	253.10
112.7	5	Clayey Silt to Silty Clay	31.036	1.112	6.535	3.142	3.393	3.19	0.479	0.48	0.350							0.78	1		269.57	269.57
113.35	5	Clayey Silt to Silty Clay	35.382	1.439	6.573	3.162	3.411	3.17	0.4771	0.48	0.350							0.78	1		290.30	290.30
114.01	5	Clayey Silt to Silty Clay	33.284	1.335	6.61	3.183	3.428	3.19	0.4754	0.48	0.350							0.78	1		281.89	281.89
114.67	6	Sandy Silt to Clayey Silt	33.752	1.068	6.648	3.203	3.445	3.11	0.4736	0.48	0.349							0.78	1		287.99	287.99
115.32	5	Clayey Silt to Silty Clay	37.602	1.367	6.685	3.224	3.462	3.11	0.4719	0.47	0.349							0.78	1		303.63	303.63
115.98	5	Clayey Silt to Silty Clay	34.815	1.435	6.723	3.244	3.479	3.18	0.4702	0.47	0.348							0.78	1		289.85	289.85
116.63	5	Clayey Silt to Silty Clay	31.387	1.181	6.761	3.264	3.496	3.21	0.4685	0.47	0.348							0.78	1		272.50	272.50
117.29	5	Clayey Silt to Silty Clay	29.439	1.08	6.798	3.285	3.513	3.24	0.4668	0.47	0.348							0.78	1		261.73	261.73
117.95	4	Silty Clay to Clay	32.923	1.434	6.836	3.305	3.53	3.24	0.4651	0.47	0.347							0.78	1		277.53	277.53
118.6	5	Clayey Silt to Silty Clay	35.894	1.471	6.873	3.326	3.548	3.18	0.4634	0.47	0.347							0.78	1		293.61	293.61
119.26	5	Clayey Silt to Silty Clay	34.48	1.461	6.911	3.346	3.565	3.21	0.4617	0.47	0.346							0.78	1		286.83	286.83

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
CPT NO. ***CPT-8*** M_w = 8 *MSF* = 0.94 a_{max} *(g)*= 0.585 V_{S30m}(m/s)= 199.7 191.6

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.	V_s (m/s)	$V_{s,liq}$ (m/s)
			CPT RESULT INPUT							***CSR***				***$CRR_{7.5}$***				***F.S.=($CRR_{7.5}$/CSR)*MSF*K σ*K α***				
0.492																						
1.148																						
1.804																						
2.461																						
3.117																						
3.773																						
4.429																						
5.085	3	Clay	8.391	0.367	0.283		0.283	2.75	1.4835	0.99	0.376										116.08	116.08
5.741	3	Clay	14.488	0.67	0.32		0.32	2.63	1.4474	0.99	0.376										163.46	163.46
6.398	3	Clay	14.627	0.666	0.356		0.356	2.66	1.4139	0.99	0.375										164.45	164.45
7.054	3	Clay	14.593	0.651	0.393		0.393	2.68	1.381	0.99	0.375										164.24	164.24
7.71	3	Clay	13.407	0.586	0.429		0.429	2.73	1.3505	0.98	0.374										155.72	155.72
8.366	4	Silty Clay to Clay	14.627	0.552	0.467		0.467	2.69	1.3197	0.98	0.374										164.45	164.45
9.022	4	Silty Clay to Clay	16.759	0.618	0.505		0.505	2.66	1.2903	0.98	0.373										179.07	179.07
9.678	3	Clay	17.305	0.77	0.541		0.541	2.73	1.2636	0.98	0.373							1.00	0		182.73	182.73
10.335	8	Sand to Silty Sand	85.043	0.832	0.581		0.581	1.78	1.2353	0.98	0.372	1.780	1.24	105.05	1.092	114.751	0.22	1.00	1		166.81	166.81
10.991	8	Sand to Silty Sand	113.44	1.08	0.621		0.621	1.7	1.2081	0.98	0.372	1.700	1.21	137.05	1.038	142.237	0.35	1.00	1		176.32	176.32
11.647	6	Sandy Silt to Clayey Silt	58.88	1.818	0.658		0.658	2.29	1.1841	0.98	0.371	2.290	1.18	69.72	1.917	133.653	0.30	1.00	1		164.46	164.46
12.303	5	Clayey Silt to Silty Clay	38.841	1.481	0.696	0.009	0.686	2.5	1.1665	0.97	0.376	2.500	1.17	45.31	2.768	125.431	0.26	1.00	1	(0.66)	157.57	88.88
12.959	8	Sand to Silty Sand	137.94	1.846	0.735	0.03	0.706	1.79	1.1542	0.97	0.385	1.790	1.15	159.22	1.099	175.054		1.00	1		187.23	187.23
13.615	10	Gravelly Sand to Sand	249.28	0.628	0.777	0.05	0.727	1.12	1.1417	0.97	0.395	1.120	1.14	284.59	1.000	284.592		1.00	1		203.80	203.80
14.272	10	Gravelly Sand to Sand	203.65	0.359	0.819	0.071	0.748	1.14	1.1294	0.97	0.404	1.140	1.13	230.00	1.000	229.999		1.00	1		200.05	200.05
14.928	9	Sand	157.3	0.303	0.86	0.091	0.768	1.27	1.1179	0.97	0.412	1.270	1.12	175.85	1.000	175.846		1.00	1		194.83	194.83
15.584	9	Sand	150.45	0.291	0.9	0.112	0.789	1.3	1.1061	0.97	0.420	1.300	1.11	166.41	1.000	166.408		1.00	1		195.12	195.12
16.24	9	Sand	134.98	0.226	0.941	0.132	0.809	1.33	1.0951	0.97	0.427	1.330	1.10	147.81	1.000	147.814	0.38	1.00	1	(0.84)	193.70	193.70
16.896	9	Sand	135.4	0.243	0.982	0.153	0.829	1.35	1.0843	0.96	0.434	1.350	1.08	146.81	1.000	146.809	0.37	1.00	1	(0.81)	195.05	194.03
17.552	9	Sand	115.87	0.359	1.023	0.173	0.849	1.52	1.0737	0.96	0.441	1.520	1.07	124.41	1.000	124.411	0.26	1.00	1	(0.55)	192.38	172.38
18.209	6	Sandy Silt to Clayey Silt	25.368	0.403	1.06	0.194	0.867	2.48	1.0643	0.96	0.447	2.480	1.06	27.00	2.669	72.073	0.11	1.00	1	(0.24)	158.83	53.49
18.865	5	Clayey Silt to Silty Clay	14.042	0.235	1.098	0.214	0.884	2.74	1.0557	0.96	0.453							1.00	1		160.41	160.41
19.521	5	Clayey Silt to Silty Clay	12.311	0.324	1.135	0.235	0.901	2.91	1.0471	0.96	0.459							1.00	1		147.74	147.74
20.177	5	Clayey Silt to Silty Clay	18.463	0.45	1.173	0.255	0.918	2.74	1.0387	0.96	0.465							1.00	1		190.38	190.38
20.833	5	Clayey Silt to Silty Clay	19.927	0.568	1.211	0.276	0.935	2.76	1.0304	0.95	0.470							1.00	1		199.73	199.73
21.49	5	Clayey Silt to Silty Clay	14.977	0.459	1.248	0.296	0.952	2.89	1.0223	0.95	0.475							1.00	1		167.04	167.04
22.146	4	Silty Clay to Clay	9.192	0.257	1.286	0.316	0.969	3.09	1.0143	0.95	0.480							1.00	1		123.06	123.06
22.802	5	Clayey Silt to Silty Clay	8.658	0.187	1.323	0.337	0.986	3.06	1.0064	0.95	0.484							1.00	1		118.58	118.58
23.458	5	Clayey Silt to Silty Clay	9.103	0.155	1.361	0.357	1.004	2.99	0.9982	0.95	0.488							1.00	1		122.31	122.31
24.114	7	Silty Sand to Sandy Silt	29.493	0.357	1.4	0.378	1.022	2.42	0.9901	0.94	0.492	2.420	0.99	29.20	2.396	69.962	0.11	1.00	1	(0.21)	169.31	55.22
24.77	7	Silty Sand to Sandy Silt	29.922	0.297	1.438	0.398	1.04	2.38	0.9821	0.94	0.496	2.380	0.98	29.39	2.233	65.610	0.11	0.99	1	(0.20)	170.43	54.63
25.427	6	Sandy Silt to Clayey Silt	15.401	0.199	1.476	0.419	1.057	2.72	0.9747	0.94	0.499							0.99	1		169.96	169.96
26.083	6	Sandy Silt to Clayey Silt	14.643	0.222	1.513	0.439	1.074	2.79	0.9675	0.94	0.502							0.99	1		164.73	164.73
26.739	5	Clayey Silt to Silty Clay	19.009	0.426	1.551	0.46	1.091	2.78	0.9603	0.94	0.506							0.98	1		193.91	193.91
27.395	6	Sandy Silt to Clayey Silt	31.909	0.61	1.589	0.48	1.108	2.54	0.9532	0.93	0.509	2.540	0.95	30.42	2.979	90.608	0.15	0.98	1	(0.27)	174.84	58.93
28.051	5	Clayey Silt to Silty Clay	21.097	0.526	1.626	0.501	1.125	2.78	0.9462	0.93	0.511							0.98	1		206.99	206.99
28.707	5	Clayey Silt to Silty Clay	21.57	0.657	1.664	0.521	1.143	2.83	0.939	0.93	0.513							0.97	1		209.93	209.93
29.364	5	Clayey Silt to Silty Clay	11.269	0.301	1.701	0.542	1.16	3.07	0.9322	0.92	0.515							0.97	1		139.88	139.88
30.02	5	Clayey Silt to Silty Clay	9.649	0.188	1.739	0.562	1.177	3.08	0.9255	0.92	0.517							0.97	1		126.96	126.96
30.676	5	Clayey Silt to Silty Clay	10.278	0.237	1.777	0.583	1.194	3.1	0.919	0.92	0.519							0.97	1		132.07	132.07
31.332	4	Silty Clay to Clay	10.646	0.305	1.814	0.603	1.211	3.14	0.9125	0.91	0.520							0.96	1		135.02	135.02
31.988	5	Clayey Silt to Silty Clay	10.434	0.263	1.852	0.624	1.228	3.13	0.9061	0.91	0.522							0.96	1		133.35	133.35
32.644	5	Clayey Silt to Silty Clay	10.846	0.214	1.889	0.644	1.245	3.06	0.8998	0.91	0.523							0.96	1		136.60	136.60
33.301	5	Clayey Silt to Silty Clay	13.185	0.303	1.927	0.664	1.262	3.01	0.8936	0.90	0.524							0.95	1		154.33	154.33
33.957	5	Clayey Silt to Silty Clay	13.274	0.292	1.965	0.685	1.28	3	0.8871	0.90	0.524							0.95	1		154.99	154.99
34.613	5	Clayey Silt to Silty Clay	12.533	0.303	2.002	0.705	1.297	3.06	0.8811	0.89	0.524							0.95	1		149.53	149.53
35.269	5	Clayey Silt to Silty Clay	13.547	0.362	2.04	0.726	1.314	3.05	0.8751	0.89	0.525							0.95	1		156.95	156.95
35.925	6	Sandy Silt to Clayey Silt	36.692	1.115	2.077	0.746	1.331	2.68	0.8692	0.88	0.525							0.94	1		292.81	292.81
36.581	9	Sand	135.5	1.316	2.118	0.767	1.351	1.91	0.8624	0.88	0.524	1.910	0.86	116.86	1.198	140.040	0.34	0.92	1	(0.55)	222.57	183.64
37.238	9	Sand	141.5	1.448	2.159	0.787	1.371	1.92	0.8557	0.87	0.523	1.920	0.86	121.08	1.208	146.300	0.37	0.91	1	(0.61)	224.72	191.44
37.894	6	Sandy Silt to Clayey Silt	67.304	2.257	2.196	0.808	1.389	2.52	0.8497	0.87	0.522	2.520	0.85	57.19	2.872	164.232		0.94	1		204.76	204.76
38.55	8	Sand to Silty Sand	115.48	1.325	2.236	0.828	1.408	2.03	0.8436	0.86	0.521	2.030	0.84	97.42	1.341	130.655	0.29	0.92	1	(0.47)	220.45	158.53
39.206	9	Sand	163.61	0.686	2.277	0.849	1.428	1.65	0.8371	0.86	0.520	1.650	0.84	136.96	1.003	137.417	0.32	0.90	1	(0.52)	231.53	197.50
39.862	8	Sand to Silty Sand	96.546	0.925	2.316	0.869	1.447	2.05	0.8311	0.85	0.519	2.050	0.83	80.24	1.371	110.016	0.20	0.92	1	(0.34)	216.97	130.09
40.518	6	Sandy Silt to Clayey Silt	62.577	1.576	2.354	0.89	1.464	2.47	0.8258	0.85	0.518	2.470	0.83	51.68	2.621	135.463	0.31	0.93	1	(0.52)	205.73	97.92
41.175	7	Silty Sand to Sandy Silt	92.136	1.614	2.393	0.91	1.483	2.24	0.82	0.84	0.516	2.240	0.82	75.55	1.770	133.759	0.30	0.92	1	(0.51)	217.09	132.66
41.831	6	Sandy Silt to Clayey Silt	96.719	2.697	2.43	0.931	1.5	2.37	0.8148	0.83	0.514	2.370	0.81	78.81	2.194	172.909		0.91	1		219.14	219.14
42.487	8	Sand to Silty Sand	142.99	2.132	2.47	0.951	1.519	2.06	0.8091	0.83	0.512	2.060	0.81	115.69	1.387	160.436		0.89	1		231.34	231.34
43.143	7	Silty Sand to Sandy Silt	56.374	1.049	2.509	0.972	1.537	2.45	0.8038	0.82	0.510	2.450	0.80	45.31	2.528	114.562	0.22	0.92	1	(0.37)	205.65	84.04
43.799	3	Clay	16.815	1.012	2.545	0.992	1.553	3.25	0.7991	0.82	0.508							0.92	1		179.81	179.81
44.455	3	Clay	13.374	0.696	2.582	1.013	1.569	3.32	0.7945	0.81	0.506							0.91	1		155.86	155.86
45.112	4	Silty Clay to Clay	12.873	0.48	2.619	1.033	1.586	3.26	0.7897	0.80	0.504							0.91	1		152.20	152.20
45.768	3	Clay	16.837	0.73	2.656	1.053	1.602	3.17	0.7852	0.80	0.502							0.91	1		179.94	179.94
46.424	3	Clay	20.072	1.035	2.692	1.074	1.618	3.15	0.7807	0.79	0.499							0.91	1		200.86	200.86
47.08	3	Clay	18.897	0.875	2.729	1.094	1.635	3.15	0.776	0.78	0.497							0.91	1		193.46	193.46
47.736	4	Silty Clay to Clay	16.776	0.676	2.767	1.115	1.652	3.17	0.7714	0.78	0.494							0.90	1		179.54	179.54
48.392	4	Silty Clay to Clay	20.829	0.795	2.804	1.135	1.669	3.07	0.7668	0.77	0.491							0.90	1		205.58	205.58
49.049	4	Silty Clay to Clay	28.524	1.25	2.842	1.156	1.686	2.98	0.7623	0.76	0.489							0.90	1		250.26	250.26
49.705	3	Clay	28.229	1.615	2.878	1.176	1.702	3.06	0.7581	0.76	0.486							0.90	1		248.61	248.61
50.361	3	Clay	21.236	1.07	2.915	1.197	1.718	3.15	0.7539	0.75	0.483							0.90	1		208.10	208.10
51.017	4	Silty Clay to Clay	16.548	0.589	2.952	1.217	1.735	3.17	0.7496	0.74	0.480							0.90	1		178.06	178.06
51.673	4	Silty Clay to Clay	18.179	0.689	2.99	1.238	1.752	3.15	0.7453	0.74	0.477							0.89	1		188.89	188.89
52.329	3	Clay	18.992	0.843	3.027	1.258	1.768	3.17	0.7412	0.73	0.475							0.89	1		194.10	194.10
52.986	3	Clay	17.516	0.768	3.063	1.279	1.784	3.21	0.7373	0.72	0.472							0.89	1		184.51	184.51
53.642	4	Silty Clay to Clay	15.322	0.615	3.101	1.299	1.802	3.26	0.7328	0.72	0.469							0.89	1		169.75	169.75
54.298	5	Clayey Silt to Silty Clay	14.883	0.46	3.138	1.32	1.819	3.22	0.7287	0.71	0.466							0.89	1		166.70	166.70
54.954	5	Clayey Silt to Silty Clay	21.381	0.669	3.176	1.34	1.836	3.05	0.7246	0.70	0.463							0.89	1		209.01	209.01
55.61	5	Clayey Silt to Silty Clay	16.381	0.46	3.213	1.361	1.853	3.15	0.7206	0.70	0.460							0.88	1		176.99	176.99
56.266	5	Clayey Silt to Silty Clay	18.212	0.471	3.251	1.381	1.87	3.09	0.7166	0.69	0.457							0.88	1		189.15	189.15
56.923	5	Clayey Silt to Silty Clay	18.563	0.489	3.289	1.401	1.887	3.09	0.7127	0.69	0.454							0.88	1		191.41	191.41
57.579	5	Clayey Silt to Silty Clay	30.372	0.88	3.326	1.422	1.904	2.89	0.7088	0.68	0.452							0.88	1		260.34	260.34
58.235	5	Clayey Silt to Silty Clay	35.718	1.205	3.364	1.442	1.921	2.87	0.7049	0.67	0.449							0.88	1		288.14	288.14
58.891	5	Clayey Silt to Silty Clay	36.692	1.288	3.401	1.463	1.939	2.87	0.7009	0.67	0.446							0.88	1		293.06	293.06
59.547	6	Sandy Silt to Clayey Silt	51.786	1.621	3.439	1.483	1.956	2.71	0.6971	0.66	0.443							0.87	1		363.58	363.58
60.203	4	Silty Clay to Clay	32.716	1.401	3.477	1.504	1.973	2.98	0.6934	0.66	0.441							0.87	1		272.81	272.81
60.86	6	Sandy Silt to Clayey Silt	67.443	1.894	3.514	1.524	1.99	2.59	0.6897	0.65	0.438	2.590	0.69	46.51	3.266	151.911	0.41	0.87	1	(0.76)	225.72	95.44
61.516	6	Sandy Silt to Clayey Silt	44.197	1.373	3.552	1.545	2.007	2.78	0.686	0.65	0.436							0.87	1		329.26	329.26
62.172	4	Silty Clay to Clay	20.467	0.746	3.589	1.565	2.024	3.15	0.6824	0.64	0.433							0.87	1		203.60	203.60
62.828	4	Silty Clay to Clay	13.903	0.464	3.627	1.586	2.041	3.34	0.6788	0.64	0.431							0.87	1		160.05	160.05

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME	***Adobe Creek POC***							
PROJECT NO.	***2016-122-POC***							
CPT NO.	***CPT-8***	*M_w =* 8	*MSF =* 0.94	*a_{max} (g)=* 0.585		V_{S30m}(m/s)=	199.7	191.6

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	Ic	***CRR 7.5*** 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.	V_s (m/s)	$V_{s,liq}$ (m/s)
63.484	5	Clayey Silt to Silty Clay	16.603	0.532	3.665	1.606	2.058	3.23	0.6753	0.63	0.428							0.87	1		178.74	178.74
64.14	3	Clay	19.883	0.926	3.701	1.627	2.074	3.24	0.672	0.63	0.426							0.86	1		200.04	200.04
64.797	3	Clay	21.358	1.194	3.738	1.647	2.091	3.26	0.6685	0.62	0.424							0.86	1		209.20	209.20
65.453	3	Clay	18.903	0.992	3.774	1.668	2.107	3.31	0.6653	0.62	0.422							0.86	1		193.84	193.84
66.109	3	Clay	17.305	0.868	3.811	1.688	2.123	3.34	0.6621	0.61	0.420							0.86	1		183.52	183.52
66.765	3	Clay	16.82	0.768	3.847	1.709	2.139	3.34	0.6589	0.61	0.418							0.86	1		180.34	180.34
67.421	3	Clay	17.633	0.82	3.884	1.729	2.155	3.32	0.6557	0.61	0.416							0.86	1		185.69	185.69
68.077	3	Clay	19.014	0.917	3.92	1.75	2.171	3.3	0.6526	0.60	0.414							0.86	1		194.61	194.61
68.734	4	Silty Clay to Clay	17.962	0.726	3.958	1.77	2.188	3.29	0.6494	0.60	0.412							0.86	1		187.91	187.91
69.39	3	Clay	19.142	0.846	3.995	1.79	2.204	3.28	0.6463	0.60	0.410							0.85	1		195.50	195.50
70.046	3	Clay	22.706	1.273	4.031	1.811	2.22	3.27	0.6433	0.59	0.409							0.85	1		217.46	217.46
70.702	3	Clay	18.168	1.022	4.068	1.831	2.236	3.38	0.6403	0.59	0.407							0.85	1		189.28	189.28
71.358	3	Clay	14.699	0.636	4.104	1.852	2.252	3.43	0.6373	0.58	0.405							0.85	1		165.93	165.93
72.014	4	Silty Clay to Clay	16.135	0.595	4.142	1.872	2.27	3.34	0.634	0.58	0.403							0.85	1		175.84	175.84
72.671	4	Silty Clay to Clay	18.04	0.74	4.179	1.893	2.287	3.31	0.6309	0.58	0.402							0.85	1		188.50	188.50
73.327	3	Clay	18.953	0.848	4.216	1.913	2.303	3.31	0.628	0.58	0.400							0.85	1		194.42	194.42
73.983	3	Clay	22.116	1.113	4.253	1.934	2.319	3.27	0.6252	0.57	0.399							0.85	1		214.05	214.05
74.639	3	Clay	21.987	1.352	4.289	1.954	2.335	3.33	0.6223	0.57	0.398							0.84	1		213.26	213.26
75.295	3	Clay	19.805	1.273	4.326	1.975	2.351	3.4	0.6195	0.57	0.396							0.84	1		199.86	199.86
75.951	3	Clay	19.933	1.097	4.362	1.995	2.367	3.36	0.6168	0.56	0.395							0.84	1		200.67	200.67
76.608	3	Clay	20.969	1.128	4.399	2.016	2.383	3.33	0.614	0.56	0.394							0.84	1		207.11	207.11
77.264	3	Clay	21.364	1.201	4.435	2.036	2.399	3.33	0.6113	0.56	0.392							0.84	1		209.50	209.50
77.92	3	Clay	23.513	1.346	4.472	2.057	2.415	3.3	0.6086	0.56	0.391							0.84	1		222.44	222.44
78.576	3	Clay	25.211	1.419	4.508	2.077	2.431	3.26	0.6059	0.55	0.390							0.84	1		232.31	232.31
79.232	3	Clay	27.013	1.529	4.545	2.098	2.447	3.24	0.6032	0.55	0.389							0.84	1		242.56	242.56
79.888	3	Clay	29.203	1.466	4.581	2.118	2.463	3.17	0.6006	0.55	0.388							0.84	1		254.62	254.62
80.545	4	Silty Clay to Clay	28.953	1.249	4.619	2.138	2.481	3.14	0.5977	0.55	0.387							0.83	1		253.26	253.26
81.201	4	Silty Clay to Clay	26.754	1.254	4.657	2.159	2.498	3.2	0.5949	0.54	0.386							0.83	1		241.10	241.10
81.857	4	Silty Clay to Clay	25.512	1.113	4.694	2.179	2.515	3.2	0.5922	0.54	0.385							0.83	1		234.09	234.09
82.513	4	Silty Clay to Clay	22.806	0.937	4.732	2.2	2.532	3.25	0.5895	0.54	0.384							0.83	1		218.36	218.36
83.169	4	Silty Clay to Clay	22.238	0.895	4.769	2.22	2.549	3.26	0.5868	0.54	0.383							0.83	1		214.95	214.95
83.825	4	Silty Clay to Clay	20.1	0.732	4.807	2.241	2.566	3.29	0.5842	0.54	0.382							0.83	1		201.86	201.86
84.482	5	Clayey Silt to Silty Clay	28.702	0.808	4.845	2.261	2.583	3.05	0.5815	0.53	0.381							0.83	1		251.95	251.95
85.138	5	Clayey Silt to Silty Clay	22.5	0.748	4.882	2.282	2.6	3.21	0.5789	0.53	0.380							0.83	1		216.57	216.57
85.794	4	Silty Clay to Clay	22.505	0.965	4.92	2.302	2.618	3.28	0.5762	0.53	0.379							0.82	1		216.63	216.63
86.45	4	Silty Clay to Clay	21.225	0.866	4.957	2.323	2.635	3.3	0.5737	0.53	0.378							0.82	1		208.89	208.89
87.106	4	Silty Clay to Clay	20.991	0.802	4.995	2.343	2.652	3.3	0.5711	0.53	0.377							0.82	1		207.48	207.48
87.762	4	Silty Clay to Clay	24.025	1.052	5.033	2.364	2.669	3.27	0.5686	0.52	0.376							0.82	1		225.66	225.66
88.419	3	Clay	23.58	1.086	5.069	2.384	2.685	3.29	0.5663	0.52	0.376							0.82	1		223.08	223.08
89.075	3	Clay	22.177	1.019	5.106	2.405	2.701	3.32	0.564	0.52	0.375							0.82	1		214.77	214.77
89.731	5	Clayey Silt to Silty Clay	21.921	0.789	5.143	2.425	2.718	3.27	0.5615	0.52	0.374							0.82	1		213.26	213.26
90.387	5	Clayey Silt to Silty Clay	22.082	0.659	5.181	2.446	2.735	3.23	0.5591	0.52	0.373							0.82	1		214.23	214.23
91.043	5	Clayey Silt to Silty Clay	22.355	0.782	5.219	2.466	2.752	3.26	0.5567	0.52	0.373							0.82	1		215.91	215.91
91.699	4	Silty Clay to Clay	24.71	1.002	5.256	2.487	2.77	3.25	0.5542	0.52	0.372							0.82	1		229.78	229.78
92.356	4	Silty Clay to Clay	25.846	1.107	5.294	2.507	2.787	3.25	0.5518	0.51	0.371							0.81	1		236.31	236.31
93.012	4	Silty Clay to Clay	24.833	1.113	5.331	2.527	2.804	3.28	0.5495	0.51	0.370							0.81	1		230.59	230.59
93.668	4	Silty Clay to Clay	23.039	1.02	5.369	2.548	2.821	3.32	0.5471	0.51	0.370							0.81	1		220.08	220.08
94.324	5	Clayey Silt to Silty Clay	21.948	0.754	5.406	2.568	2.838	3.28	0.5448	0.51	0.369							0.81	1		213.62	213.62
94.98	5	Clayey Silt to Silty Clay	21.815	0.71	5.444	2.589	2.855	3.28	0.5425	0.51	0.368							0.81	1		212.84	212.84
95.636	5	Clayey Silt to Silty Clay	23.953	0.689	5.482	2.609	2.872	3.2	0.5403	0.51	0.368							0.81	1		225.54	225.54
96.293	6	Sandy Silt to Clayey Silt	22.639	0.514	5.519	2.63	2.889	3.18	0.538	0.51	0.367							0.81	1		217.82	217.82
96.949	6	Sandy Silt to Clayey Silt	20.785	0.378	5.557	2.65	2.907	3.18	0.5357	0.50	0.367							0.81	1		206.68	206.68
97.605	6	Sandy Silt to Clayey Silt	22.756	0.4	5.594	2.671	2.924	3.12	0.5335	0.50	0.366							0.81	1		218.65	218.65
98.261	6	Sandy Silt to Clayey Silt	28.691	0.646	5.632	2.691	2.941	3.06	0.5313	0.50	0.365							0.81	1		252.44	252.44
98.917	6	Sandy Silt to Clayey Silt	29.476	0.662	5.67	2.712	2.958	3.05	0.5291	0.50	0.365							0.81	1		256.73	256.73
99.573	6	Sandy Silt to Clayey Silt	22.845	0.476	5.707	2.732	2.975	3.17	0.5269	0.50	0.364							0.80	1		219.37	219.37
100.23	6	Sandy Silt to Clayey Silt	22.767	0.46	5.745	2.753	2.992	3.17	0.5248	0.50	0.364							0.80	1		218.95	218.95
100.89	5	Clayey Silt to Silty Clay	26.002	0.714	5.782	2.773	3.009	3.17	0.5227	0.50	0.363							0.80	1		237.72	237.72
101.54	4	Silty Clay to Clay	29.114	1.26	5.82	2.794	3.026	3.23	0.5206	0.50	0.363							0.80	1		255.00	255.00
102.2	3	Clay	27.232	1.389	5.857	2.814	3.042	3.31	0.5186	0.49	0.362							0.80	1		244.73	244.73
102.85	4	Silty Clay to Clay	25.673	1.044	5.894	2.835	3.06	3.28	0.5164	0.49	0.362							0.80	1		235.97	235.97
103.51	5	Clayey Silt to Silty Clay	25.907	1.014	5.932	2.855	3.077	3.27	0.5144	0.49	0.361							0.80	1		237.33	237.33
104.17	4	Silty Clay to Clay	27.36	1.142	5.969	2.876	3.094	3.26	0.5123	0.49	0.360							0.80	1		245.51	245.51
104.82	4	Silty Clay to Clay	27.076	1.244	6.007	2.896	3.111	3.3	0.5103	0.49	0.360							0.80	1		243.95	243.95
105.48	4	Silty Clay to Clay	27.372	1.199	6.045	2.916	3.128	3.28	0.5083	0.49	0.360							0.80	1		245.62	245.62
106.14	5	Clayey Silt to Silty Clay	25.361	0.972	6.082	2.937	3.145	3.29	0.5063	0.49	0.359							0.80	1		234.37	234.37
106.79	5	Clayey Silt to Silty Clay	25.529	0.988	6.12	2.957	3.162	3.29	0.5044	0.49	0.359							0.79	1		235.34	235.34
107.45	4	Silty Clay to Clay	28.491	1.26	6.157	2.978	3.179	3.27	0.5024	0.49	0.358							0.79	1		251.90	251.90
108.1	4	Silty Clay to Clay	29.977	1.344	6.195	2.998	3.197	3.25	0.5003	0.49	0.358							0.79	1		260.02	260.02
108.76	4	Silty Clay to Clay	31.469	1.379	6.232	3.019	3.214	3.22	0.4984	0.48	0.357							0.79	1		267.99	267.99
109.42	4	Silty Clay to Clay	29.916	1.321	6.27	3.039	3.231	3.25	0.4965	0.48	0.357							0.79	1		259.75	259.75
110.07	4	Silty Clay to Clay	28.491	1.268	6.308	3.06	3.248	3.28	0.4946	0.48	0.356							0.79	1		252.12	252.12
110.73	5	Clayey Silt to Silty Clay	28.953	1.156	6.345	3.08	3.265	3.25	0.4927	0.48	0.356							0.79	1		254.68	254.68
111.39	5	Clayey Silt to Silty Clay	29.582	1.066	6.383	3.101	3.282	3.21	0.4909	0.48	0.355							0.79	1		258.14	258.14
112.04	5	Clayey Silt to Silty Clay	27.533	1.048	6.42	3.121	3.299	3.27	0.489	0.48	0.355							0.79	1		247.01	247.01
112.7	5	Clayey Silt to Silty Clay	26.575	1.004	6.458	3.142	3.316	3.29	0.4872	0.48	0.354							0.79	1		241.66	241.66
113.35	5	Clayey Silt to Silty Clay	27.394	1.014	6.496	3.162	3.334	3.27	0.4852	0.48	0.354							0.79	1		246.29	246.29
114.01	4	Silty Clay to Clay	28.596	1.157	6.533	3.183	3.351	3.27	0.4834	0.48	0.353							0.79	1		252.88	252.88
114.67	5	Clayey Silt to Silty Clay	30.885	1.235	6.571	3.203	3.368	3.23	0.4816	0.48	0.353							0.78	1		265.24	265.24
115.32	4	Silty Clay to Clay	30.451	1.365	6.608	3.224	3.385	3.27	0.4798	0.47	0.353							0.78	1		262.96	262.96
115.98	4	Silty Clay to Clay	30.211	1.381	6.646	3.244	3.402	3.28	0.4781	0.47	0.352							0.78	1		261.73	261.73
116.63	4	Silty Clay to Clay	28.775	1.201	6.684	3.264	3.419	3.29	0.4763	0.47	0.352							0.78	1		253.97	253.97
117.29	4	Silty Clay to Clay	29.832	1.271	6.721	3.285	3.436	3.28	0.4745	0.47	0.351							0.78	1		259.75	259.75
117.95	4	Silty Clay to Clay	29.821	1.321	6.759	3.305	3.453	3.29	0.4728	0.47	0.351							0.78	1		259.70	259.70
118.6	5	Clayey Silt to Silty Clay	29.988	1.178	6.796	3.326	3.471	3.26	0.471	0.47	0.350							0.78	1		260.66	260.66
119.26	4	Silty Clay to Clay	30.133	1.281	6.834	3.346	3.488	3.28	0.4693	0.47	0.350							0.78	1		261.46	261.46
119.92	5	Clayey Silt to Silty Clay	28.764	1.052	6.872	3.367	3.505	3.27	0.4676	0.47	0.350							0.78	1		254.08	254.08

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME ***Adobe Creek POC***
PROJECT NO. ***2016-122-POC***
CPT NO. ***CPT-10*** M_w = 8 *MSF =* 0.94 a_{max} *(g)=* 0.585 V_{S30m}(m/s)= 207.1 197.2

			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.	V_s (m/s)	$V_{s,liq}$ (m/s)
0.492																						
1.148																						
1.804																						
2.461																						
3.117																						
3.773																						
4.429																						
5.085	3	Clay	5.735	0.294	0.283		0.283	2.93	1.4835	0.99	0.376										91.33	91.33
5.741	3	Clay	11.208	0.469	0.32		0.32	2.68	1.4474	0.99	0.376										139.03	139.03
6.398	4	Silty Clay to Clay	12.383	0.47	0.357		0.357	2.66	1.413	0.99	0.375										148.04	148.04
7.054	5	Clayey Silt to Silty Clay	14.938	0.466	0.395		0.395	2.57	1.3793	0.99	0.375	2.570	1.38	20.60	3.148	64.861	0.11				119.89	119.89
7.71	4	Silty Clay to Clay	18.318	0.659	0.433		0.433	2.57	1.3472	0.98	0.374	2.570	1.35	24.68	3.148	77.686	0.12				126.20	126.20
8.366	4	Silty Clay to Clay	18.379	0.718	0.47		0.47	2.63	1.3174	0.98	0.374										189.66	189.66
9.022	5	Clayey Silt to Silty Clay	23.429	0.814	0.508		0.508	2.54	1.2881	0.98	0.373	2.540	1.29	30.18	2.979	89.899	0.15				136.04	136.04
9.678	5	Clayey Silt to Silty Clay	37.009	1.206	0.545		0.545	2.39	1.2607	0.98	0.373	2.390	1.26	46.66	2.272	106.010	0.19	1.00	0		147.15	147.15
10.335	5	Clayey Silt to Silty Clay	32.895	1.007	0.583		0.583	2.43	1.2339	0.98	0.372	2.430	1.23	40.59	2.439	98.996	0.17	1.00	1		147.57	147.57
10.991	8	Sand to Silty Sand	96.034	1.134	0.623		0.623	1.82	1.2068	0.98	0.372	1.820	1.21	115.89	1.122	129.977	0.28	1.00	1		172.69	172.69
11.647	10	Gravelly Sand to Sand	280.35	1.388	0.664		0.664	1.25	1.1803	0.98	0.371	1.250	1.18	330.88	1.000	330.879		1.00	1		201.94	201.94
12.303	10	Gravelly Sand to Sand	365.53	1.182	0.706	0.009	0.697	1.05	1.1597	0.97	0.375	1.050	1.16	423.91	1.000	423.912		1.00	1		211.78	211.78
12.959	9	Sand	292.32	2.301	0.747	0.03	0.717	1.41	1.1476	0.97	0.385	1.410	1.15	335.48	1.000	335.476		1.00	1		207.29	207.29
13.615	10	Gravelly Sand to Sand	230.57	0.867	0.789	0.05	0.738	1.26	1.1352	0.97	0.395	1.260	1.14	261.74	1.000	261.740		1.00	1		202.57	202.57
14.272	9	Sand	177.1	0.492	0.829	0.071	0.759	1.29	1.123	0.97	0.403	1.290	1.12	198.88	1.000	198.883		1.00	1		197.23	197.23
14.928	9	Sand	119.51	0.547	0.87	0.091	0.779	1.56	1.1117	0.97	0.411	1.560	1.11	132.85	1.000	132.853	0.30	1.00	1	(0.68)	188.72	188.72
15.584	7	Silty Sand to Sandy Silt	47.983	0.639	0.909	0.112	0.797	2.17	1.1017	0.97	0.419	2.170	1.10	52.86	1.596	84.386	0.14	1.00	1	(0.30)	168.66	88.07
16.24	6	Sandy Silt to Clayey Silt	44.359	0.931	0.946	0.132	0.814	2.33	1.0924	0.97	0.427	2.330	1.09	48.46	2.049	99.273	0.17	1.00	1	(0.38)	167.90	86.45
16.896	8	Sand to Silty Sand	83.144	0.786	0.986	0.153	0.833	1.9	1.0821	0.96	0.434	1.900	1.08	89.97	1.189	106.965	0.19	1.00	1	(0.42)	183.32	140.40
17.552	9	Sand	94.085	0.483	1.027	0.173	0.854	1.71	1.0711	0.96	0.440	1.710	1.07	100.77	1.045	105.267	0.19	1.00	1	(0.40)	187.54	146.44
18.209	9	Sand	119.95	0.534	1.068	0.194	0.874	1.6	1.0608	0.96	0.447	1.600	1.06	127.23	1.000	127.234	0.27	1.00	1	(0.57)	194.77	181.04
18.865	9	Sand	156.82	0.823	1.108	0.214	0.894	1.55	1.0506	0.96	0.452	1.550	1.05	164.76	1.000	164.756		1.00	1		202.91	202.91
19.521	9	Sand	163.45	0.652	1.149	0.235	0.914	1.47	1.0407	0.96	0.458	1.470	1.04	170.10	1.000	170.098		1.00	1		205.23	205.23
20.177	9	Sand	108.48	0.281	1.19	0.255	0.935	1.55	1.0304	0.96	0.463	1.550	1.03	111.78	1.000	111.781	0.21	1.00	1	(0.43)	195.78	153.35
20.833	8	Sand to Silty Sand	67.588	0.198	1.229	0.276	0.954	1.77	1.0214	0.95	0.468	1.770	1.02	69.03	1.085	74.923	0.12	1.00	1	(0.24)	185.11	98.75
21.49	8	Sand to Silty Sand	71.797	0.326	1.269	0.296	0.973	1.84	1.0124	0.95	0.473	1.840	1.01	72.69	1.137	82.650	0.13	1.00	1	(0.26)	187.56	107.12
22.146	8	Sand to Silty Sand	73.328	0.299	1.309	0.316	0.992	1.81	1.0036	0.95	0.477	1.810	1.00	73.60	1.114	81.986	0.13	1.00	1	(0.26)	189.06	107.12
22.802	8	Sand to Silty Sand	64.665	0.268	1.348	0.337	1.011	1.88	0.995	0.95	0.481	1.880	1.00	64.34	1.171	75.319	0.12	1.00	1	(0.23)	186.95	94.61
23.458	7	Silty Sand to Sandy Silt	56.703	0.901	1.387	0.357	1.03	2.25	0.9865	0.95	0.485	2.250	0.99	55.94	1.798	100.595	0.17	0.99	1	(0.34)	184.71	95.44
24.114	6	Sandy Silt to Clayey Silt	65.26	1.713	1.425	0.378	1.047	2.36	0.9791	0.94	0.489	2.360	0.98	63.89	2.156	137.783	0.32	0.99	1	(0.62)	188.95	116.42
24.77	6	Sandy Silt to Clayey Silt	53.657	1.393	1.462	0.398	1.064	2.42	0.9717	0.94	0.493	2.420	0.97	52.14	2.396	124.921	0.26	0.99	1	(0.49)	185.01	96.26
25.427	5	Clayey Silt to Silty Clay	28.424	0.817	1.5	0.419	1.081	2.68	0.9645	0.94	0.496							0.98	1		249.54	249.54
26.083	5	Clayey Silt to Silty Clay	25.412	0.757	1.537	0.439	1.098	2.74	0.9574	0.94	0.499							0.98	1		232.66	232.66
26.739	5	Clayey Silt to Silty Clay	20.434	0.613	1.575	0.46	1.115	2.83	0.9503	0.94	0.502							0.98	1		202.98	202.98
27.395	5	Clayey Silt to Silty Clay	20.406	0.529	1.613	0.48	1.132	2.8	0.9434	0.93	0.505							0.98	1		202.85	202.85
28.051	4	Silty Clay to Clay	14.922	0.484	1.65	0.501	1.15	2.99	0.9362	0.93	0.507							0.97	1		166.77	166.77
28.707	3	Clay	9.627	0.339	1.687	0.521	1.166	3.22	0.9298	0.93	0.510							0.97	1		126.88	126.88
29.364	4	Silty Clay to Clay	8.012	0.215	1.724	0.542	1.183	3.25	0.9232	0.92	0.512							0.97	1		113.11	113.11
30.02	5	Clayey Silt to Silty Clay	8.574	0.198	1.762	0.562	1.2	3.19	0.9167	0.92	0.514							0.96	1		118.06	118.06
30.676	5	Clayey Silt to Silty Clay	8.162	0.153	1.8	0.583	1.217	3.18	0.9102	0.92	0.516							0.96	1		114.43	114.43
31.332	5	Clayey Silt to Silty Clay	10.807	0.231	1.837	0.603	1.234	3.07	0.9039	0.91	0.517							0.96	1		136.37	136.37
31.988	4	Silty Clay to Clay	10.657	0.337	1.875	0.624	1.251	3.18	0.8976	0.91	0.519							0.96	1		135.18	135.18
32.644	5	Clayey Silt to Silty Clay	9.838	0.223	1.912	0.644	1.268	3.15	0.8914	0.91	0.519							0.95	1		128.60	128.60
33.301	5	Clayey Silt to Silty Clay	9.866	0.2	1.95	0.664	1.285	3.13	0.8853	0.90	0.520							0.95	1		128.84	128.84
33.957	5	Clayey Silt to Silty Clay	10.417	0.184	1.988	0.685	1.303	3.08	0.8789	0.90	0.521							0.95	1		133.27	133.27
34.613	5	Clayey Silt to Silty Clay	20.79	0.535	2.025	0.705	1.32	2.86	0.873	0.89	0.521							0.95	1		205.27	205.27
35.269	6	Sandy Silt to Clayey Silt	32.538	0.81	2.063	0.726	1.337	2.68	0.8672	0.89	0.521							0.94	1		271.66	271.66
35.925	6	Sandy Silt to Clayey Silt	45.595	0.972	2.1	0.746	1.354	2.51	0.8614	0.88	0.521	2.510	0.86	39.28	2.820	110.737	0.21	0.94	1	(0.35)	193.33	74.63
36.581	7	Silty Sand to Sandy Silt	77.905	1.446	2.139	0.767	1.372	2.29	0.8554	0.88	0.521	2.290	0.86	66.64	1.917	127.747	0.27	0.94	1	(0.46)	208.00	117.27
37.238	8	Sand to Silty Sand	114.23	1.492	2.179	0.787	1.391	2.06	0.8491	0.87	0.521	2.060	0.85	96.99	1.387	134.500	0.31	0.92	1	(0.51)	219.41	160.26
37.894	6	Sandy Silt to Clayey Silt	62.499	1.681	2.216	0.808	1.408	2.48	0.8436	0.87	0.520	2.480	0.84	52.72	2.669	140.732	0.34	0.93	1	(0.57)	203.55	100.41
38.55	6	Sandy Silt to Clayey Silt	70.333	1.835	2.254	0.828	1.426	2.44	0.8378	0.86	0.519	2.440	0.84	58.92	2.483	146.315	0.37	0.93	1	(0.63)	207.41	110.49
39.206	7	Silty Sand to Sandy Silt	92.125	1.472	2.292	0.849	1.444	2.21	0.8321	0.86	0.518	2.210	0.83	76.65	1.692	129.671	0.28	0.92	1	(0.47)	215.54	131.81
39.862	8	Sand to Silty Sand	88.885	0.746	2.332	0.869	1.463	2.05	0.8261	0.85	0.517	2.050	0.83	73.43	1.371	100.678	0.17	0.92	1	(0.29)	215.29	118.12
40.518	7	Silty Sand to Sandy Silt	76.925	1.499	2.371	0.89	1.481	2.33	0.8206	0.85	0.515	2.330	0.82	63.12	2.049	129.324	0.28	0.92	1	(0.47)	211.99	113.88
41.175	9	Sand	147.65	1.477	2.411	0.91	1.501	1.93	0.8145	0.84	0.513	1.930	0.81	120.26	1.218	146.534	0.37	0.89	1	(0.61)	231.57	191.44
41.831	8	Sand to Silty Sand	164.62	2.946	2.451	0.931	1.521	2.07	0.8085	0.83	0.511	2.070	0.81	133.10	1.403	186.726		0.88	1		235.71	235.71
42.487	9	Sand	224.26	3.115	2.492	0.951	1.541	1.89	0.8026	0.83	0.509	1.890	0.80	179.99	1.180	212.314		0.86	1		246.24	246.24
43.143	10	Gravelly Sand to Sand	299.98	1.769	2.534	0.972	1.562	1.55	0.7965	0.82	0.507	1.550	0.80	238.94	1.000	238.939		0.84	1		256.66	256.66
43.799	10	Gravelly Sand to Sand	263.76	1.119	2.575	0.992	1.583	1.51	0.7905	0.82	0.504	1.510	0.79	208.51	1.000	208.505		0.84	1		253.32	253.32
44.455	9	Sand	209.81	1.673	2.616	1.013	1.604	1.77	0.7846	0.81	0.502	1.770	0.78	164.61	1.085	178.662		0.85	1		246.77	246.77
45.112	7	Silty Sand to Sandy Silt	131.32	3.485	2.655	1.033	1.622	2.28	0.7796	0.80	0.499	2.280	0.78	102.38	1.886	193.102		0.88	1		232.90	232.90
45.768	7	Silty Sand to Sandy Silt	112.44	2.356	2.693	1.053	1.64	2.26	0.7746	0.80	0.497	2.260	0.77	87.10	1.827	159.118	0.45	0.89	1	(0.77)	228.93	156.80
46.424	9	Sand	221.42	1.164	2.734	1.074	1.66	1.65	0.7692	0.79	0.494	1.650	0.77	170.32	1.003	170.892		0.84	1		250.82	250.82
47.08	7	Silty Sand to Sandy Silt	77.343	1.649	2.773	1.094	1.678	2.4	0.7644	0.78	0.492	2.400	0.76	59.12	2.312	136.713	0.32	0.90	1	(0.55)	219.42	110.49
47.736	4	Silty Clay to Clay	21.436	0.929	2.81	1.115	1.696	3.09	0.7597	0.78	0.489							0.90	1		209.50	209.50
48.392	3	Clay	20.612	0.997	2.847	1.135	1.712	3.14	0.7555	0.77	0.486							0.90	1		204.40	204.40
49.049	3	Clay	23.201	1.196	2.884	1.156	1.728	3.11	0.7514	0.76	0.484							0.90	1		220.14	220.14
49.705	3	Clay	25.501	1.587	2.92	1.176	1.744	3.13	0.7473	0.76	0.481							0.89	1		233.51	233.51
50.361	3	Clay	26.92	1.497	2.957	1.197	1.76	3.08	0.7432	0.75	0.479							0.89	1		241.55	241.55
51.017	3	Clay	26.397	1.348	2.993	1.217	1.776	3.07	0.7392	0.74	0.476							0.89	1		238.63	238.63
51.673	3	Clay	22.215	1.108	3.03	1.238	1.792	3.14	0.7353	0.74	0.473							0.89	1		214.29	214.29
52.329	3	Clay	19.415	0.862	3.066	1.258	1.808	3.17	0.7314	0.73	0.470							0.89	1		197.02	197.02
52.986	3	Clay	16.698	0.725	3.103	1.279	1.824	3.24	0.7275	0.72	0.468							0.89	1		179.34	179.34
53.642	5	Clayey Silt to Silty Clay	15.2	0.416	3.14	1.299	1.841	3.18	0.7234	0.72	0.465							0.89	1		169.13	169.13
54.298	6	Sandy Silt to Clayey Silt	15.808	0.226	3.178	1.32	1.858	3.02	0.7194	0.71	0.462							0.88	1		173.32	173.32
54.954	6	Sandy Silt to Clayey Silt	15.278	0.264	3.216	1.34	1.876	3.08	0.7152	0.70	0.459							0.88	1		169.68	169.68
55.61	6	Sandy Silt to Clayey Silt	15.556	0.227	3.253	1.361	1.893	3.04	0.7113	0.70	0.456							0.88	1		171.61	171.61
56.266	6	Sandy Silt to Clayey Silt	31.558	0.816	3.291	1.381	1.91	2.85	0.7074	0.69	0.453							0.88	1		266.78	266.78
56.923	6	Sandy Silt to Clayey Silt	51.168	1.594	3.328	1.401	1.927	2.71	0.7035	0.69	0.450							0.88	1		360.94	360.94
57.579	6	Sandy Silt to Clayey Silt	68.167	1.993	3.366	1.422	1.944	2.59	0.6997	0.68	0.448	2.590	0.70	47.70	3.266	155.788	0.43	0.88	1	(0.79)	224.62	97.92
58.235	6	Sandy Silt to Clayey Silt	93.395	2.707	3.404	1.442	1.961	2.48	0.696	0.67	0.445	2.480	0.70	65.00	2.669	173.511		0.87	1		234.54	234.54
58.891	8	Sand to Silty Sand	154.16	2.148	3.443	1.463	1.98	2.1	0.6918	0.67	0.442	2.100	0.69	106.65	1.455	155.148	0.43	0.84	1	(0.76)	250.96	186.24
59.547	9	Sand	176.59	2.137	3.484	1.483	2.001	2.02	0.6873	0.66	0.439	2.020	0.69	121.37	1.327	161.060		0.82	1		256.16	256.16
60.203	9	Sand	221.62	2.137	3.525	1.504	2.021	1.88	0.683	0.66	0.436	1.880	0.68	151.37	1.171	177.187		0.80	1		264.54	264.54
60.86	9	Sand	194.02	1.779	3.565	1.524	2.041	1.91	0.6788	0.65	0.433	1.910	0.68	131.70	1.198	157.833	0.45	0.81	1	(0.78)	260.70	216.54
61.516	8	Sand to Silty Sand	151.14	2.386	3.605	1.545	2.06	2.16	0.6748	0.65	0.431	2.160	0.67	102.00	1.574	160.573		0.83	1		253.01	253.01
62.172	9	Sand	230.46	2.402	3.646	1.565	2.081	1.9	0.6705	0.64	0.428	1.900	0.67	154.53	1.189	183.710		0.79	1		268.00	268.00
62.828	9	Sand	268.62	2.363	3.687	1.586	2.101	1.8	0.6665	0.64	0.425	1.800	0.67	179.03	1.107	198.120		0.77	1		274.09	274.09

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME **Adobe Creek POC**
PROJECT NO. **2016-122-POC**
CPT NO. **CPT-10** M_w = 8 *MSF* = 0.94 a_{max} *(g)*= 0.585 V_{S30m}(m/s)= 207.1 197.2

		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.	V_s (m/s)	$V_{s,liq}$ (m/s)
63.484	9	Sand	247.77	2.335	3.727	1.606	2.121	1.85	0.6625	0.63	0.423	1.850	0.66	164.14	1.145	187.951		0.78	1		271.93	271.93
64.14	7	Silty Sand to Sandy Silt	164.01	3.434	3.766	1.627	2.139	2.22	0.6589	0.63	0.420	2.220	0.66	108.06	1.717	185.564		0.82	1		258.32	258.32
64.797	4	Silty Clay to Clay	40.428	1.753	3.804	1.647	2.156	2.93	0.6555	0.62	0.418							0.86	1		311.59	311.59
65.453	4	Silty Clay to Clay	22.728	0.867	3.841	1.668	2.173	3.15	0.6522	0.62	0.416							0.86	1		217.52	217.52
66.109	4	Silty Clay to Clay	23.095	0.901	3.879	1.688	2.191	3.15	0.6488	0.61	0.414							0.85	1		219.72	219.72
66.765	4	Silty Clay to Clay	21.698	0.827	3.916	1.709	2.208	3.18	0.6455	0.61	0.412							0.85	1		211.33	211.33
67.421	5	Clayey Silt to Silty Clay	21.185	0.636	3.954	1.729	2.225	3.13	0.6423	0.61	0.410							0.85	1		208.22	208.22
68.077	6	Sandy Silt to Clayey Silt	20.122	0.409	3.991	1.75	2.242	3.07	0.6392	0.60	0.408							0.85	1		201.67	201.67
68.734	5	Clayey Silt to Silty Clay	21.77	0.569	4.029	1.77	2.259	3.1	0.636	0.60	0.406							0.85	1		211.81	211.81
69.39	5	Clayey Silt to Silty Clay	22.032	0.67	4.067	1.79	2.276	3.13	0.6329	0.60	0.404							0.85	1		213.38	213.38
70.046	5	Clayey Silt to Silty Clay	21.876	0.709	4.104	1.811	2.293	3.15	0.6298	0.59	0.403							0.85	1		212.42	212.42
70.702	5	Clayey Silt to Silty Clay	22.717	0.712	4.142	1.831	2.31	3.13	0.6268	0.59	0.401							0.85	1		217.52	217.52
71.358	5	Clayey Silt to Silty Clay	24.81	0.834	4.179	1.852	2.328	3.11	0.6236	0.58	0.399							0.84	1		229.78	229.78
72.014	3	Clay	27.421	1.361	4.216	1.872	2.344	3.17	0.6208	0.58	0.398							0.84	1		244.57	244.57
72.671	3	Clay	22.043	1.46	4.253	1.893	2.36	3.35	0.618	0.58	0.396							0.84	1		213.44	213.44
73.327	3	Clay	18.44	1.146	4.289	1.913	2.376	3.43	0.6152	0.58	0.395							0.84	1		191.08	191.08
73.983	3	Clay	19.571	1.197	4.326	1.934	2.392	3.4	0.6125	0.57	0.393							0.84	1		198.28	198.28
74.639	3	Clay	25.072	1.687	4.362	1.954	2.408	3.31	0.6098	0.57	0.392							0.84	1		231.39	231.39
75.295	3	Clay	27.605	1.876	4.399	1.975	2.424	3.27	0.6071	0.57	0.391							0.84	1		245.68	245.68
75.951	3	Clay	24.744	1.593	4.435	1.995	2.44	3.31	0.6044	0.56	0.390							0.84	1		229.49	229.49
76.608	3	Clay	23.613	1.493	4.472	2.016	2.456	3.33	0.6018	0.56	0.388							0.84	1		222.91	222.91
77.264	3	Clay	24.487	1.418	4.508	2.036	2.472	3.29	0.5991	0.56	0.387							0.83	1		228.05	228.05
77.92	3	Clay	24.348	1.247	4.545	2.057	2.488	3.26	0.5965	0.56	0.386							0.83	1		227.23	227.23
78.576	3	Clay	25.874	1.366	4.581	2.077	2.504	3.25	0.594	0.55	0.385							0.83	1		236.02	236.02
79.232	3	Clay	28.151	1.759	4.618	2.098	2.52	3.26	0.5914	0.55	0.384							0.83	1		248.77	248.77
79.888	3	Clay	26.185	1.44	4.655	2.118	2.537	3.26	0.5887	0.55	0.383							0.83	1		237.84	237.84
80.545	3	Clay	26.152	1.315	4.691	2.138	2.553	3.24	0.5862	0.55	0.382							0.83	1		237.61	237.61
81.201	3	Clay	28.747	1.648	4.728	2.159	2.569	3.23	0.5837	0.54	0.381							0.83	1		252.06	252.06
81.857	3	Clay	31.263	1.604	4.764	2.179	2.585	3.17	0.5812	0.54	0.380							0.83	1		265.61	265.61
82.513	3	Clay	30.729	1.564	4.801	2.2	2.601	3.17	0.5788	0.54	0.379							0.83	1		262.80	262.80
83.169	4	Silty Clay to Clay	27.349	1.264	4.838	2.22	2.618	3.21	0.5762	0.54	0.378							0.82	1		244.40	244.40
83.825	4	Silty Clay to Clay	24.727	0.997	4.876	2.241	2.635	3.22	0.5737	0.54	0.377							0.82	1		229.55	229.55
84.482	4	Silty Clay to Clay	21.113	0.874	4.914	2.261	2.652	3.31	0.5711	0.53	0.376							0.82	1		208.10	208.10
85.138	4	Silty Clay to Clay	19.827	0.757	4.951	2.282	2.669	3.33	0.5686	0.53	0.375							0.82	1		200.17	200.17
85.794	5	Clayey Silt to Silty Clay	20.066	0.565	4.989	2.302	2.686	3.25	0.5661	0.53	0.374							0.82	1		201.67	201.67
86.45	6	Sandy Silt to Clayey Silt	25.684	0.554	5.026	2.323	2.704	3.06	0.5635	0.53	0.373							0.82	1		235.11	235.11
87.106	5	Clayey Silt to Silty Clay	24.493	0.732	5.064	2.343	2.721	3.17	0.5611	0.53	0.373							0.82	1		228.28	228.28
87.762	4	Silty Clay to Clay	22.722	0.961	5.102	2.364	2.738	3.3	0.5587	0.52	0.372							0.82	1		217.94	217.94
88.419	3	Clay	24.81	1.208	5.138	2.384	2.754	3.29	0.5564	0.52	0.371							0.82	1		230.24	230.24
89.075	3	Clay	23.719	1.357	5.175	2.405	2.77	3.36	0.5542	0.52	0.370							0.82	1		223.91	223.91
89.731	3	Clay	21.653	1.016	5.211	2.425	2.786	3.36	0.5519	0.52	0.370							0.81	1		211.57	211.57
90.387	4	Silty Clay to Clay	22.413	0.843	5.249	2.446	2.803	3.29	0.5496	0.52	0.369							0.81	1		216.21	216.21
91.043	5	Clayey Silt to Silty Clay	21.815	0.783	5.286	2.466	2.82	3.29	0.5473	0.52	0.368							0.81	1		212.66	212.66
91.699	4	Silty Clay to Clay	20.879	0.773	5.324	2.487	2.837	3.33	0.545	0.52	0.368							0.81	1		206.93	206.93
92.356	4	Silty Clay to Clay	23.296	0.986	5.362	2.507	2.855	3.31	0.5425	0.51	0.367							0.81	1		221.55	221.55
93.012	3	Clay	23.006	1.116	5.398	2.527	2.871	3.35	0.5404	0.51	0.366							0.81	1		219.84	219.84
93.668	4	Silty Clay to Clay	20.356	0.889	5.436	2.548	2.888	3.39	0.5382	0.51	0.366							0.81	1		203.78	203.78
94.324	4	Silty Clay to Clay	20.389	0.846	5.473	2.568	2.905	3.38	0.5359	0.51	0.365							0.81	1		204.03	204.03
94.98	5	Clayey Silt to Silty Clay	18.908	0.6	5.511	2.589	2.922	3.36	0.5337	0.51	0.364							0.81	1		194.80	194.80
95.636	5	Clayey Silt to Silty Clay	21.169	0.656	5.548	2.609	2.939	3.3	0.5315	0.51	0.364							0.81	1		208.89	208.89
96.293	5	Clayey Silt to Silty Clay	21.358	0.573	5.586	2.63	2.956	3.26	0.5294	0.51	0.363							0.81	1		210.11	210.11
96.949	6	Sandy Silt to Clayey Silt	19.404	0.416	5.624	2.65	2.973	3.27	0.5272	0.50	0.363							0.80	1		198.09	198.09
97.605	5	Clayey Silt to Silty Clay	20.551	0.583	5.661	2.671	2.99	3.3	0.5251	0.50	0.362							0.80	1		205.33	205.33
98.261	5	Clayey Silt to Silty Clay	20.835	0.637	5.699	2.691	3.008	3.31	0.5228	0.50	0.361							0.80	1		207.11	207.11
98.917	4	Silty Clay to Clay	24.771	1.028	5.736	2.712	3.025	3.3	0.5207	0.50	0.361							0.80	1		230.59	230.59
99.573	4	Silty Clay to Clay	26.542	1.099	5.774	2.732	3.042	3.26	0.5186	0.50	0.360							0.80	1		240.77	240.77
100.23	4	Silty Clay to Clay	26.213	1.134	5.812	2.753	3.059	3.29	0.5166	0.50	0.360							0.80	1		238.97	238.97
100.89	4	Silty Clay to Clay	25.768	1.051	5.849	2.773	3.076	3.28	0.5145	0.50	0.359							0.80	1		236.48	236.48
101.54	5	Clayey Silt to Silty Clay	27.5	1.072	5.887	2.794	3.093	3.24	0.5125	0.50	0.359							0.80	1		246.18	246.18
102.2	4	Silty Clay to Clay	28.301	1.153	5.924	2.814	3.11	3.24	0.5104	0.49	0.358							0.80	1		250.64	250.64
102.85	4	Silty Clay to Clay	28.385	1.27	5.962	2.835	3.127	3.27	0.5084	0.49	0.358							0.80	1		251.19	251.19
103.51	3	Clay	29.582	1.492	5.999	2.855	3.144	3.28	0.5064	0.49	0.357							0.80	1		257.71	257.71
104.17	4	Silty Clay to Clay	28.719	1.299	6.036	2.876	3.161	3.27	0.5045	0.49	0.357							0.79	1		253.04	253.04
104.82	4	Silty Clay to Clay	28.786	1.232	6.074	2.896	3.178	3.25	0.5025	0.49	0.356							0.79	1		253.43	253.43
105.48	4	Silty Clay to Clay	27.199	1.17	6.111	2.916	3.195	3.29	0.5006	0.49	0.356							0.79	1		244.73	244.73
106.14	5	Clayey Silt to Silty Clay	28.067	1.094	6.149	2.937	3.212	3.25	0.4986	0.49	0.355							0.79	1		249.60	249.60
106.79	4	Silty Clay to Clay	27.405	1.158	6.187	2.957	3.229	3.28	0.4967	0.49	0.355							0.79	1		245.95	245.95
107.45	4	Silty Clay to Clay	27.717	1.173	6.224	2.978	3.246	3.28	0.4948	0.49	0.355							0.79	1		247.72	247.72
108.1	4	Silty Clay to Clay	28.435	1.292	6.262	2.998	3.263	3.29	0.4929	0.49	0.354							0.79	1		251.73	251.73
108.76	4	Silty Clay to Clay	28.958	1.337	6.299	3.019	3.281	3.29	0.491	0.48	0.354							0.79	1		254.57	254.57
109.42	5	Clayey Silt to Silty Clay	25.495	0.959	6.337	3.039	3.298	3.3	0.4891	0.48	0.353							0.79	1		235.40	235.40
110.07	4	Silty Clay to Clay	25.195	1.131	6.375	3.06	3.315	3.36	0.4873	0.48	0.353							0.79	1		233.69	233.69
110.73	5	Clayey Silt to Silty Clay	25.935	1.007	6.412	3.08	3.332	3.31	0.4854	0.48	0.352							0.79	1		237.95	237.95
111.39	5	Clayey Silt to Silty Clay	27.499	1.071	6.45	3.101	3.349	3.28	0.4836	0.48	0.352							0.79	1		246.73	246.73
112.04	5	Clayey Silt to Silty Clay	27.911	1.112	6.487	3.121	3.366	3.28	0.4818	0.48	0.351							0.78	1		248.99	248.99
112.7	5	Clayey Silt to Silty Clay	30.005	1.147	6.525	3.142	3.383	3.24	0.48	0.48	0.351							0.78	1		260.45	260.45
113.35	4	Silty Clay to Clay	30.556	1.454	6.562	3.162	3.4	3.29	0.4783	0.48	0.351							0.78	1		263.44	263.44
114.01	5	Clayey Silt to Silty Clay	28.997	1.084	6.6	3.183	3.417	3.25	0.4765	0.48	0.350							0.78	1		255.11	255.11
114.67	5	Clayey Silt to Silty Clay	30.578	1.085	6.638	3.203	3.435	3.22	0.4746	0.48	0.350							0.78	1		263.65	263.65
115.32	5	Clayey Silt to Silty Clay	30.4	1.233	6.675	3.224	3.452	3.26	0.4729	0.47	0.349							0.78	1		262.69	262.69
115.98	4	Silty Clay to Clay	32.499	1.539	6.713	3.244	3.469	3.26	0.4712	0.47	0.349							0.78	1		273.75	273.75
116.63	4	Silty Clay to Clay	30.078	1.46	6.75	3.264	3.486	3.31	0.4695	0.47	0.348							0.78	1		261.04	261.04
117.29	5	Clayey Silt to Silty Clay	28.563	1.146	6.788	3.285	3.503	3.29	0.4678	0.47	0.348							0.78	1		252.94	252.94
117.95	5	Clayey Silt to Silty Clay	28.162	1.074	6.826	3.305	3.52	3.29	0.4661	0.47	0.348							0.78	1		250.86	250.86
118.6	5	Clayey Silt to Silty Clay	28.63	1.136	6.863	3.326	3.537	3.29	0.4644	0.47	0.347							0.78	1		253.48	253.48
119.26	4	Silty Clay to Clay	31.603	1.436	6.901	3.346	3.554	3.28	0.4628	0.47	0.347							0.78	1		269.41	269.41
119.92	4	Silty Clay to Clay	31.825	1.325	6.938	3.367	3.572	3.26	0.461	0.47	0.346							0.78	1		270.62	270.62

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME	***Adobe Creek POC***							
PROJECT NO.	***2016-122-POC***							
CPT NO.	**CPT-11**	M_w =	8	*MSF =*	0.94	a_{max} (g)=	0.585	V_{S30m}(m/s)= 201.1 202.4

			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.	V_s (m/s)	$V_{s,liq}$ (m/s)
0.492																						
1.148																						
1.804																						
2.461																						
3.117																						
3.773																						
4.429																						
5.085	4	Silty Clay to Clay	19.624	0.723	0.291		0.291	2.43	1.4755	0.99	0.376	2.430	1.48	28.96	2.439	70.623	0.11				114.39	114.39
5.741	6	Sandy Silt to Clayey Silt	34.263	0.852	0.329		0.329	2.18	1.4388	0.99	0.376	2.180	1.44	49.30	1.619	79.824	0.13				127.12	127.12
6.398	7	Silty Sand to Sandy Silt	43.678	0.402	0.368		0.368	1.83	1.4031	0.99	0.375	1.830	1.40	61.28	1.129	69.199	0.11				135.22	135.22
7.054	7	Silty Sand to Sandy Silt	48.663	0.7	0.406		0.406	1.96	1.3699	0.99	0.375	1.960	1.37	66.66	1.251	83.401	0.13				140.85	140.85
7.71	7	Silty Sand to Sandy Silt	59.83	0.804	0.445		0.445	1.91	1.3374	0.98	0.374	1.910	1.34	80.02	1.198	95.891	0.16				148.30	148.30
8.366	7	Silty Sand to Sandy Silt	53.637	0.792	0.483		0.483	2	1.3072	0.98	0.374	2.000	1.31	70.11	1.300	91.148	0.15				149.47	149.47
9.022	5	Clayey Silt to Silty Clay	25.806	0.774	0.521		0.521	2.47	1.2783	0.98	0.373	2.470	1.28	32.99	2.621	86.473	0.14				138.75	138.75
9.678	4	Silty Clay to Clay	12.998	0.43	0.559		0.559	2.75	1.2507	0.98	0.373							1.00	0		153.09	153.09
10.335	4	Silty Clay to Clay	9.27	0.303	0.596		0.596	2.89	1.2249	0.98	0.372							1.00	1		124.65	124.65
10.991	3	Clay	11.818	0.484	0.633		0.633	2.88	1.2002	0.98	0.372							1.00	1		145.70	145.70
11.647	3	Clay	11.946	0.633	0.669		0.669	2.98	1.1771	0.98	0.371							1.00	1		145.93	145.93
12.303	3	Clay	11.518	0.595	0.706	0.009	0.697	3	1.1597	0.97	0.375							1.00	1		142.50	142.50
12.959	4	Silty Clay to Clay	13.37	0.479	0.744	0.03	0.714	2.85	1.1494	0.97	0.385							1.00	1		156.66	156.66
13.615	5	Clayey Silt to Silty Clay	20.748	0.579	0.781	0.05	0.731	2.63	1.1393	0.97	0.395							1.00	1		207.48	207.48
14.272	5	Clayey Silt to Silty Clay	20.887	0.545	0.819	0.071	0.748	2.61	1.1294	0.97	0.404							1.00	1		209.87	209.87
14.928	5	Clayey Silt to Silty Clay	12.825	0.338	0.856	0.091	0.765	2.8	1.1196	0.97	0.412							1.00	1		154.99	154.99
15.584	5	Clayey Silt to Silty Clay	12.08	0.213	0.894	0.112	0.782	2.73	1.11	0.97	0.420							1.00	1		149.16	149.16
16.24	5	Clayey Silt to Silty Clay	15.084	0.348	0.931	0.132	0.799	2.72	1.1006	0.97	0.428							1.00	1		171.89	171.89
16.896	4	Silty Clay to Clay	14.555	0.549	0.969	0.153	0.816	2.88	1.0913	0.96	0.435							1.00	1		166.84	166.84
17.552	6	Sandy Silt to Clayey Silt	28.761	0.575	1.007	0.173	0.834	2.47	1.0816	0.96	0.442	2.470	1.08	31.11	2.621	81.544	0.13	1.00	1	(0.28)	159.94	59.58
18.209	8	Sand to Silty Sand	73.117	0.577	1.046	0.194	0.853	1.91	1.0716	0.96	0.448	1.910	1.07	78.35	1.198	93.898	0.16	1.00	1	(0.33)	181.45	120.68
18.865	9	Sand	111.79	0.395	1.087	0.214	0.873	1.57	1.0613	0.96	0.454	1.570	1.06	118.64	1.000	118.642	0.24	1.00	1	(0.49)	192.94	166.32
19.521	9	Sand	101.16	0.494	1.128	0.235	0.893	1.69	1.0511	0.96	0.460	1.690	1.05	106.33	1.031	109.637	0.20	1.00	1	(0.41)	191.61	153.35
20.177	9	Sand	131.36	0.859	1.169	0.255	0.914	1.68	1.0407	0.96	0.465	1.680	1.04	136.71	1.024	140.023	0.34	1.00	1	(0.68)	199.47	199.47
20.833	9	Sand	158.88	0.453	1.209	0.276	0.934	1.42	1.0309	0.95	0.470	1.420	1.03	163.79	1.000	163.795		1.00	1		205.66	205.66
21.49	6	Sandy Silt to Clayey Silt	42.381	0.879	1.247	0.296	0.951	2.4	1.0228	0.95	0.475	2.400	1.02	43.35	2.312	100.233	0.17	1.00	1	(0.34)	174.11	78.50
22.146	5	Clayey Silt to Silty Clay	14.995	0.504	1.284	0.316	0.968	2.9	1.0148	0.95	0.480							1.00	1		170.79	170.79
22.802	3	Clay	10.616	0.447	1.321	0.337	0.984	3.12	1.0073	0.95	0.484							1.00	1		136.13	136.13
23.458	5	Clayey Silt to Silty Clay	14.282	0.393	1.359	0.357	1.001	2.89	0.9995	0.95	0.489							1.00	1		164.73	164.73
24.114	5	Clayey Silt to Silty Clay	14.522	0.426	1.396	0.378	1.018	2.91	0.9919	0.94	0.493							1.00	1		165.86	165.86
24.77	4	Silty Clay to Clay	8.285	0.239	1.434	0.398	1.035	3.16	0.9843	0.94	0.497							0.99	1		117.81	117.81
25.427	5	Clayey Silt to Silty Clay	7.784	0.182	1.471	0.419	1.053	3.13	0.9765	0.94	0.499							0.99	1		115.13	115.13
26.083	4	Silty Clay to Clay	9.203	0.273	1.509	0.439	1.07	3.12	0.9692	0.94	0.503							0.99	1		127.04	127.04
26.739	5	Clayey Silt to Silty Clay	12.814	0.311	1.547	0.46	1.087	2.93	0.962	0.94	0.506							0.98	1		155.86	155.86
27.395	5	Clayey Silt to Silty Clay	13.727	0.347	1.584	0.48	1.104	2.92	0.9549	0.93	0.509							0.98	1		162.47	162.47
28.051	5	Clayey Silt to Silty Clay	11.562	0.298	1.622	0.501	1.121	3	0.9479	0.93	0.512							0.98	1		146.99	146.99
28.707	5	Clayey Silt to Silty Clay	9.804	0.253	1.659	0.521	1.138	3.08	0.941	0.93	0.514							0.97	1		133.27	133.27
29.364	6	Sandy Silt to Clayey Silt	24.215	0.378	1.697	0.542	1.155	2.6	0.9342	0.92	0.516							0.97	1		171.15	171.15
30.02	6	Sandy Silt to Clayey Silt	64.905	1.694	1.735	0.562	1.172	2.39	0.9275	0.92	0.518	2.390	0.93	60.20	2.272	136.772	0.32	0.97	1	(0.56)	194.69	110.49
30.676	7	Silty Sand to Sandy Silt	150.87	4.268	1.773	0.583	1.191	2.17	0.9201	0.92	0.519	2.170	0.92	138.82	1.596	221.605		0.95	1		218.20	218.20
31.332	8	Sand to Silty Sand	195.91	2.935	1.813	0.603	1.21	1.89	0.9129	0.91	0.520	1.890	0.91	178.84	1.180	210.953		0.94	1		226.66	226.66
31.988	8	Sand to Silty Sand	85.185	1.076	1.853	0.624	1.229	2.11	0.9057	0.91	0.522	2.110	0.91	77.15	1.473	113.660	0.22	0.95	1	(0.37)	204.24	126.66
32.644	5	Clayey Silt to Silty Clay	20.32	0.664	1.89	0.644	1.246	2.91	0.8994	0.91	0.523							0.96	1		202.17	202.17
33.301	5	Clayey Silt to Silty Clay	15.896	0.397	1.928	0.664	1.263	2.94	0.8932	0.90	0.524							0.95	1		173.67	173.67
33.957	5	Clayey Silt to Silty Clay	17.382	0.429	1.965	0.685	1.28	2.9	0.8871	0.90	0.524							0.95	1		184.71	184.71
34.613	5	Clayey Silt to Silty Clay	17.688	0.403	2.003	0.705	1.297	2.88	0.8811	0.89	0.525							0.95	1		187.72	187.72
35.269	5	Clayey Silt to Silty Clay	16.519	0.381	2.041	0.726	1.315	2.92	0.8748	0.89	0.525							0.95	1		179.67	179.67
35.925	5	Clayey Silt to Silty Clay	14.967	0.468	2.078	0.746	1.332	3.04	0.8689	0.88	0.524							0.94	1		168.71	168.71
36.581	5	Clayey Silt to Silty Clay	12.62	0.387	2.116	0.767	1.349	3.12	0.8631	0.88	0.524							0.94	1		151.61	151.61
37.238	5	Clayey Silt to Silty Clay	17.961	0.628	2.153	0.787	1.366	3	0.8574	0.87	0.524							0.94	1		189.08	189.08
37.894	6	Sandy Silt to Clayey Silt	52.87	1.232	2.191	0.808	1.383	2.49	0.8517	0.87	0.523	2.490	0.85	45.03	2.718	122.410	0.25	0.94	1	(0.42)	198.26	84.84
38.55	8	Sand to Silty Sand	78.798	1.049	2.231	0.828	1.402	2.2	0.8455	0.86	0.522	2.200	0.85	66.62	1.667	111.047	0.21	0.93	1	(0.35)	209.50	113.03
39.206	7	Silty Sand to Sandy Silt	91.072	1.446	2.269	0.849	1.42	2.2	0.8397	0.86	0.521	2.200	0.84	76.47	1.667	127.462	0.27	0.93	1	(0.46)	214.22	131.81
39.862	9	Sand	126.45	0.888	2.31	0.869	1.441	1.87	0.833	0.85	0.519	1.870	0.83	105.34	1.162	122.386	0.25	0.91	1	(0.41)	224.45	161.99
40.518	9	Sand	135.1	0.739	2.351	0.89	1.461	1.79	0.8268	0.85	0.518	1.790	0.83	111.69	1.099	122.798	0.25	0.90	1	(0.41)	227.22	168.05
41.175	6	Sandy Silt to Clayey Silt	35.498	0.73	2.388	0.91	1.478	2.63	0.8215	0.84	0.516							0.92	1		287.33	287.33
41.831	5	Clayey Silt to Silty Clay	15.101	0.496	2.426	0.931	1.495	3.09	0.8163	0.83	0.515							0.92	1		171.89	171.89
42.487	5	Clayey Silt to Silty Clay	11.389	0.313	2.463	0.951	1.512	3.18	0.8112	0.83	0.513							0.92	1		146.38	146.38
43.143	5	Clayey Silt to Silty Clay	11.996	0.281	2.501	0.972	1.529	3.11	0.8062	0.82	0.511							0.92	1		151.98	151.98
43.799	5	Clayey Silt to Silty Clay	12.814	0.329	2.539	0.992	1.547	3.1	0.8009	0.82	0.509							0.92	1		158.47	158.47
44.455	5	Clayey Silt to Silty Clay	12.876	0.344	2.576	1.013	1.564	3.11	0.7959	0.81	0.507							0.91	1		159.55	159.55
45.112	5	Clayey Silt to Silty Clay	14.199	0.34	2.614	1.033	1.581	3.05	0.7911	0.80	0.505							0.91	1		169.55	169.55
45.768	5	Clayey Silt to Silty Clay	20.042	0.523	2.651	1.053	1.598	2.93	0.7863	0.80	0.502							0.91	1		206.99	206.99
46.424	6	Sandy Silt to Clayey Silt	25.116	0.654	2.689	1.074	1.615	2.85	0.7815	0.79	0.500							0.91	1		235.40	235.40
47.08	6	Sandy Silt to Clayey Silt	29.195	0.847	2.727	1.094	1.632	2.82	0.7768	0.78	0.497							0.91	1		259.00	259.00
47.736	6	Sandy Silt to Clayey Silt	72.833	2.556	2.764	1.115	1.649	2.56	0.7722	0.78	0.495	2.560	0.77	56.24	3.091	173.818		0.90	1		216.95	216.95
48.392	7	Silty Sand to Sandy Silt	119.49	3.433	2.803	1.135	1.667	2.34	0.7674	0.77	0.492	2.340	0.77	91.69	2.084	191.059		0.88	1		231.81	231.81
49.049	5	Clayey Silt to Silty Clay	65.16	2.986	2.84	1.156	1.685	2.68	0.7626	0.76	0.489							0.90	1		423.36	423.36
49.705	4	Silty Clay to Clay	28.632	1.21	2.878	1.176	1.702	2.95	0.7581	0.76	0.486							0.90	1		255.38	255.38
50.361	4	Silty Clay to Clay	16.592	0.647	2.916	1.197	1.719	3.15	0.7537	0.75	0.483							0.90	1		184.58	184.58
51.017	4	Silty Clay to Clay	14.722	0.557	2.953	1.217	1.736	3.2	0.7493	0.74	0.480							0.90	1		171.20	171.20
51.673	4	Silty Clay to Clay	14.567	0.541	2.991	1.238	1.753	3.21	0.745	0.74	0.477							0.89	1		169.61	169.61
52.329	5	Clayey Silt to Silty Clay	13.587	0.393	3.028	1.258	1.77	3.18	0.7407	0.73	0.474							0.89	1		163.96	163.96
52.986	5	Clayey Silt to Silty Clay	14.494	0.49	3.066	1.279	1.787	3.19	0.7365	0.72	0.472							0.89	1		170.79	170.79
53.642	4	Silty Clay to Clay	16.642	0.711	3.104	1.299	1.804	3.2	0.7324	0.72	0.469							0.89	1		183.79	183.79
54.298	4	Silty Clay to Clay	18.194	0.741	3.141	1.32	1.822	3.16	0.728	0.71	0.465							0.89	1		192.88	192.88
54.954	4	Silty Clay to Clay	18.662	0.705	3.179	1.34	1.839	3.14	0.7239	0.70	0.463							0.89	1		196.01	196.01
55.61	4	Silty Clay to Clay	16.564	0.606	3.216	1.361	1.856	3.18	0.7199	0.70	0.460							0.88	1		183.79	183.79
56.266	5	Clayey Silt to Silty Clay	15.679	0.437	3.254	1.381	1.873	3.13	0.7159	0.69	0.457							0.88	1		180.14	180.14
56.923	4	Silty Clay to Clay	28.037	1.305	3.292	1.401	1.89	3.03	0.712	0.69	0.454							0.88	1		251.90	251.90
57.579	3	Clay	28.694	1.429	3.328	1.422	1.906	3.04	0.7083	0.68	0.451							0.88	1		256.90	256.90
58.235	5	Clayey Silt to Silty Clay	24.014	0.934	3.366	1.442	1.923	3.04	0.7045	0.67	0.449							0.88	1		231.11	231.11
58.891	5	Clayey Silt to Silty Clay	20.676	0.659	3.403	1.463	1.94	3.05	0.7006	0.67	0.446							0.88	1		212.42	212.42
59.547	5	Clayey Silt to Silty Clay	22.055	0.788	3.441	1.483	1.958	3.06	0.6966	0.66	0.443							0.87	1		220.43	220.43
60.203	4	Silty Clay to Clay	21.811	0.929	3.478	1.504	1.975	3.12	0.6929	0.66	0.440							0.87	1		217.58	217.58
60.86	4	Silty Clay to Clay	19.919	0.84	3.516	1.524	1.992	3.17	0.6892	0.65	0.438							0.87	1		205.21	205.21
61.516	5	Clayey Silt to Silty Clay	17.677	0.612	3.554	1.545	2.009	3.17	0.6856	0.65	0.435							0.87	1		191.73	191.73
62.172	5	Clayey Silt to Silty Clay	16.253	0.415	3.591	1.565	2.026	3.13	0.682	0.64	0.433							0.87	1		184.18	184.18
62.828	6	Sandy Silt to Clayey Silt	20.62	0.443	3.629	1.586	2.043	2.99	0.6784	0.64	0.430							0.87	1		211.02	211.02

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME **Adobe Creek POC**
PROJECT NO. **2016-122-POC**
CPT NO. **CPT-11** M_w = 8 *MSF =* 0.94 a_{max} (g)= 0.585 V_{S30m}(m/s)= 201.1 202.4

		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.	V_s (m/s)	$V_{s,liq}$ (m/s)
63.484	6	Sandy Silt to Clayey Silt	21.071	0.41	3.666	1.606	2.06	2.96	0.6748	0.63	0.428							0.87	1		213.74	213.74
64.14	6	Sandy Silt to Clayey Silt	31.042	0.676	3.704	1.627	2.077	2.82	0.6713	0.63	0.426							0.86	1		270.98	270.98
64.797	5	Clayey Silt to Silty Clay	27.331	0.782	3.742	1.647	2.094	2.97	0.6679	0.62	0.424							0.86	1		245.90	245.90
65.453	6	Sandy Silt to Clayey Silt	29.189	0.678	3.779	1.668	2.112	2.88	0.6643	0.62	0.421							0.86	1		259.54	259.54
66.109	6	Sandy Silt to Clayey Silt	24.404	0.514	3.817	1.688	2.129	2.93	0.6609	0.61	0.419							0.86	1		234.14	234.14
66.765	6	Sandy Silt to Clayey Silt	27.18	0.738	3.854	1.709	2.146	2.95	0.6575	0.61	0.417							0.86	1		248.00	248.00
67.421	6	Sandy Silt to Clayey Silt	24.877	0.615	3.892	1.729	2.163	2.97	0.6542	0.61	0.415							0.86	1		236.08	236.08
68.077	6	Sandy Silt to Clayey Silt	38.03	1.146	3.93	1.75	2.18	2.86	0.6509	0.60	0.413							0.86	1		302.31	302.31
68.734	6	Sandy Silt to Clayey Silt	40.845	1.245	3.967	1.77	2.197	2.84	0.6476	0.60	0.411							0.85	1		314.52	314.52
69.39	5	Clayey Silt to Silty Clay	20.375	0.66	4.005	1.79	2.214	3.13	0.6444	0.60	0.409							0.85	1		209.75	209.75
70.046	5	Clayey Silt to Silty Clay	19.079	0.549	4.042	1.811	2.231	3.12	0.6412	0.59	0.408							0.85	1		204.59	204.59
70.702	5	Clayey Silt to Silty Clay	21.077	0.733	4.08	1.831	2.249	3.15	0.6379	0.59	0.406							0.85	1		213.87	213.87
71.358	4	Silty Clay to Clay	21.939	1.001	4.118	1.852	2.266	3.21	0.6347	0.58	0.404							0.85	1		218.06	218.06
72.014	4	Silty Clay to Clay	19.947	0.905	4.155	1.872	2.283	3.25	0.6316	0.58	0.402							0.85	1		206.81	206.81
72.671	4	Silty Clay to Clay	17.616	0.753	4.193	1.893	2.3	3.3	0.6286	0.58	0.401							0.85	1		192.05	192.05
73.327	4	Silty Clay to Clay	15.635	0.622	4.23	1.913	2.317	3.34	0.6255	0.58	0.399							0.85	1		179.61	179.61
73.983	4	Silty Clay to Clay	16.147	0.609	4.268	1.934	2.334	3.31	0.6225	0.57	0.398							0.84	1		183.79	183.79
74.639	4	Silty Clay to Clay	17.671	0.689	4.306	1.954	2.351	3.28	0.6195	0.57	0.396							0.84	1		193.40	193.40
75.295	4	Silty Clay to Clay	18.166	0.709	4.343	1.975	2.368	3.27	0.6166	0.57	0.395							0.84	1		196.39	196.39
75.951	4	Silty Clay to Clay	18.216	0.7	4.381	1.995	2.386	3.27	0.6135	0.56	0.394							0.84	1		196.96	196.96
76.608	4	Silty Clay to Clay	18.89	0.761	4.418	2.016	2.403	3.26	0.6106	0.56	0.392							0.84	1		201.17	201.17
77.264	4	Silty Clay to Clay	19.324	0.766	4.456	2.036	2.42	3.26	0.6077	0.56	0.391							0.84	1		202.98	202.98
77.92	5	Clayey Silt to Silty Clay	19.413	0.671	4.494	2.057	2.437	3.22	0.6049	0.56	0.390							0.84	1		204.16	204.16
78.576	5	Clayey Silt to Silty Clay	19.19	0.708	4.531	2.077	2.454	3.25	0.6021	0.55	0.388							0.84	1		202.91	202.91
79.232	5	Clayey Silt to Silty Clay	19.224	0.681	4.569	2.098	2.471	3.23	0.5993	0.55	0.387							0.83	1		204.59	204.59
79.888	4	Silty Clay to Clay	21.911	0.895	4.606	2.118	2.488	3.22	0.5965	0.55	0.386							0.83	1		219.25	219.25
80.545	4	Silty Clay to Clay	25.515	1.092	4.644	2.138	2.505	3.17	0.5938	0.55	0.385							0.83	1		239.42	239.42
81.201	3	Clay	26.958	1.331	4.68	2.159	2.521	3.2	0.5912	0.54	0.384							0.83	1		245.23	245.23
81.857	3	Clay	26.763	1.491	4.717	2.179	2.538	3.24	0.5886	0.54	0.383							0.83	1		243.95	243.95
82.513	3	Clay	24.66	1.283	4.754	2.2	2.554	3.26	0.586	0.54	0.382							0.83	1		232.66	232.66
83.169	4	Silty Clay to Clay	24.309	1.156	4.791	2.22	2.571	3.24	0.5834	0.54	0.381							0.83	1		232.20	232.20
83.825	4	Silty Clay to Clay	27.776	1.225	4.829	2.241	2.588	3.15	0.5808	0.54	0.380							0.83	1		252.99	252.99
84.482	3	Clay	30.535	1.661	4.865	2.261	2.604	3.18	0.5783	0.53	0.379							0.83	1		264.77	264.77
85.138	3	Clay	30.636	1.58	4.902	2.282	2.62	3.16	0.5759	0.53	0.378							0.82	1		267.09	267.09
85.794	4	Silty Clay to Clay	30.641	1.523	4.939	2.302	2.637	3.16	0.5734	0.53	0.378							0.82	1		267.20	267.20
86.45	3	Clay	28.232	1.489	4.976	2.323	2.653	3.22	0.571	0.53	0.377							0.82	1		252.55	252.55
87.106	4	Silty Clay to Clay	28.148	1.334	5.014	2.343	2.67	3.19	0.5685	0.53	0.376							0.82	1		253.26	253.26
87.762	4	Silty Clay to Clay	27.514	1.166	5.051	2.364	2.687	3.17	0.566	0.52	0.375							0.82	1		250.58	250.58
88.419	4	Silty Clay to Clay	24.259	0.997	5.089	2.384	2.705	3.23	0.5634	0.52	0.374							0.82	1		231.22	231.22
89.075	4	Silty Clay to Clay	20.392	0.821	5.126	2.405	2.722	3.31	0.5609	0.52	0.373							0.82	1		208.10	208.10
89.731	4	Silty Clay to Clay	20.932	0.825	5.164	2.425	2.739	3.29	0.5585	0.52	0.373							0.82	1		212.36	212.36
90.387	5	Clayey Silt to Silty Clay	24.22	0.89	5.202	2.446	2.756	3.21	0.5561	0.52	0.372							0.82	1		231.85	231.85
91.043	5	Clayey Silt to Silty Clay	28.91	0.99	5.239	2.466	2.773	3.11	0.5537	0.52	0.371							0.82	1		258.14	258.14
91.699	5	Clayey Silt to Silty Clay	23.697	0.783	5.277	2.487	2.79	3.19	0.5514	0.52	0.371							0.81	1		230.01	230.01
92.356	5	Clayey Silt to Silty Clay	23.781	0.943	5.314	2.507	2.807	3.24	0.549	0.51	0.370							0.81	1		230.65	230.65
93.012	4	Silty Clay to Clay	22.373	0.933	5.352	2.527	2.824	3.28	0.5467	0.51	0.369							0.81	1		222.26	222.26
93.668	4	Silty Clay to Clay	21.549	0.902	5.39	2.548	2.842	3.3	0.5443	0.51	0.368							0.81	1		218.18	218.18
94.324	5	Clayey Silt to Silty Clay	22.534	0.888	5.427	2.568	2.859	3.26	0.542	0.51	0.368							0.81	1		225.31	225.31
94.98	5	Clayey Silt to Silty Clay	24.966	1.018	5.465	2.589	2.876	3.23	0.5397	0.51	0.367							0.81	1		238.80	238.80
95.636	4	Silty Clay to Clay	24.421	1.072	5.502	2.609	2.893	3.26	0.5375	0.51	0.367							0.81	1		234.77	234.77
96.293	4	Silty Clay to Clay	26.24	1.151	5.54	2.63	2.91	3.23	0.5353	0.51	0.366							0.81	1		245.29	245.29
96.949	4	Silty Clay to Clay	24.687	1.002	5.577	2.65	2.927	3.25	0.5331	0.50	0.365							0.81	1		234.54	234.54
97.605	5	Clayey Silt to Silty Clay	22.222	0.782	5.615	2.671	2.944	3.26	0.5309	0.50	0.365							0.81	1		223.26	223.26
98.261	5	Clayey Silt to Silty Clay	23.747	0.885	5.653	2.691	2.961	3.23	0.5287	0.50	0.364							0.80	1		234.20	234.20
98.917	5	Clayey Silt to Silty Clay	24.565	1.008	5.69	2.712	2.979	3.25	0.5264	0.50	0.364							0.80	1		237.84	237.84
99.573	4	Silty Clay to Clay	24.96	1.117	5.728	2.732	2.996	3.27	0.5243	0.50	0.363							0.80	1		238.46	238.46
100.23	4	Silty Clay to Clay	22.54	0.959	5.765	2.753	3.013	3.32	0.5222	0.50	0.362							0.80	1		223.32	223.32
100.89	4	Silty Clay to Clay	22.568	0.922	5.803	2.773	3.03	3.3	0.5201	0.50	0.362							0.80	1		225.95	225.95
101.54	5	Clayey Silt to Silty Clay	22.161	0.68	5.841	2.794	3.047	3.23	0.518	0.50	0.361							0.80	1		226.13	226.13
102.2	6	Sandy Silt to Clayey Silt	22.54	0.635	5.878	2.814	3.064	3.2	0.5159	0.49	0.361							0.80	1		228.51	228.51
102.85	6	Sandy Silt to Clayey Silt	36.812	1.157	5.916	2.835	3.081	3.01	0.5139	0.49	0.360							0.80	1		303.73	303.73
103.51	6	Sandy Silt to Clayey Silt	74.119	2.143	5.953	2.855	3.098	2.73	0.5119	0.49	0.360							0.80	1		455.86	455.86
104.17	4	Silty Clay to Clay	29.194	1.271	5.991	2.876	3.116	3.21	0.5097	0.49	0.359							0.80	1		261.84	261.84
104.82	6	Sandy Silt to Clayey Silt	27.397	0.787	6.029	2.896	3.133	3.13	0.5077	0.49	0.359							0.80	1		254.57	254.57
105.48	5	Clayey Silt to Silty Clay	29.267	1.063	6.066	2.916	3.15	3.17	0.5057	0.49	0.358							0.79	1		263.17	263.17
106.14	5	Clayey Silt to Silty Clay	30.24	1.097	6.104	2.937	3.167	3.16	0.5038	0.49	0.358							0.79	1		267.57	267.57
106.79	5	Clayey Silt to Silty Clay	30.942	1.214	6.141	2.957	3.184	3.18	0.5018	0.49	0.357							0.79	1		269.72	269.72
107.45	4	Silty Clay to Clay	30.925	1.38	6.179	2.978	3.201	3.22	0.4999	0.49	0.357							0.79	1		268.88	268.88
108.1	4	Silty Clay to Clay	30.051	1.258	6.217	2.998	3.218	3.22	0.498	0.49	0.356							0.79	1		263.97	263.97
108.76	4	Silty Clay to Clay	27.631	1.184	6.254	3.019	3.235	3.27	0.4961	0.48	0.356							0.79	1		251.08	251.08
109.42	5	Clayey Silt to Silty Clay	27.954	1.152	6.292	3.039	3.252	3.25	0.4942	0.48	0.356							0.79	1		254.08	254.08
110.07	4	Silty Clay to Clay	28.243	1.324	6.329	3.06	3.27	3.28	0.4922	0.48	0.355							0.79	1		255.22	255.22
110.73	4	Silty Clay to Clay	27.291	1.216	6.367	3.08	3.287	3.29	0.4903	0.48	0.355							0.79	1		250.26	250.26
111.39	4	Silty Clay to Clay	27.392	1.16	6.405	3.101	3.304	3.27	0.4885	0.48	0.354							0.79	1		250.80	250.80
112.04	5	Clayey Silt to Silty Clay	26.923	1.088	6.442	3.121	3.321	3.27	0.4866	0.48	0.354							0.79	1		248.11	248.11
112.7	5	Clayey Silt to Silty Clay	27.113	1.11	6.48	3.142	3.338	3.28	0.4848	0.48	0.353							0.79	1		248.55	248.55
113.35	4	Silty Clay to Clay	26.568	1.119	6.517	3.162	3.355	3.3	0.483	0.48	0.353							0.78	1		246.06	246.06
114.01	5	Clayey Silt to Silty Clay	26.874	1.03	6.555	3.183	3.372	3.27	0.4812	0.48	0.352							0.78	1		248.88	248.88
114.67	5	Clayey Silt to Silty Clay	28.827	1.141	6.593	3.203	3.389	3.24	0.4794	0.48	0.352							0.78	1		258.89	258.89
115.32	5	Clayey Silt to Silty Clay	27.609	1.086	6.63	3.224	3.407	3.27	0.4775	0.47	0.351							0.78	1		252.23	252.23
115.98	4	Silty Clay to Clay	27.336	1.139	6.668	3.244	3.424	3.29	0.4758	0.47	0.351							0.78	1		250.26	250.26
116.63	5	Clayey Silt to Silty Clay	28.61	1.181	6.705	3.264	3.441	3.27	0.474	0.47	0.351							0.78	1		256.73	256.73
117.29	4	Silty Clay to Clay	27.937	1.233	6.743	3.285	3.458	3.3	0.4723	0.47	0.350							0.78	1		253.10	253.10
117.95	5	Clayey Silt to Silty Clay	27.208	1.104	6.78	3.305	3.475	3.29	0.4706	0.47	0.350							0.78	1		250.42	250.42
118.6	5	Clayey Silt to Silty Clay	31.392	1.117	6.818	3.326	3.492	3.19	0.4689	0.47	0.349							0.78	1		273.54	273.54
119.26	5	Clayey Silt to Silty Clay	31.904	1.168	6.856	3.346	3.509	3.19	0.4672	0.47	0.349							0.78	1		276.65	276.65

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME	***Adobe Creek POC***								
PROJECT NO.	***2016-122-POC***								
CPT NO.	***CPT-12***	M_w =	8	*MSF =*	0.94	a_{max} (g)=	0.585	V_{S30m}(m/s)=	219.9 / 216.2

		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.	V_s (m/s)	$V_{s,liq}$ (m/s)
0.492																						
1.148																						
1.804																						
2.461																						
3.117																						
3.773																						
4.429																						
5.085	4	Silty Clay to Clay	12.249	0.434	0.291		0.291	2.57	1.4755	0.99	0.376	2.570	1.48	18.07	3.148	56.895	0.10				107.62	107.62
5.741	5	Clayey Silt to Silty Clay	24.094	0.726	0.329		0.329	2.34	1.4388	0.99	0.376	2.340	1.44	34.67	2.084	72.239	0.12				121.46	121.46
6.398	4	Silty Clay to Clay	27.277	1.179	0.367		0.367	2.46	1.404	0.99	0.375	2.460	1.40	38.30	2.574	98.584	0.17				127.13	127.13
7.054	3	Clay	21.469	1.335	0.403		0.403	2.67	1.3724	0.99	0.375										209.44	209.44
7.71	3	Clay	25.055	1.539	0.44		0.44	2.65	1.3415	0.98	0.374										230.70	230.70
8.366	3	Clay	31.798	1.708	0.476		0.476	2.56	1.3126	0.98	0.374	2.560	1.31	41.74	3.091	128.999	0.28				139.13	139.13
9.022	4	Silty Clay to Clay	36.352	1.683	0.514		0.514	2.49	1.2835	0.98	0.373	2.490	1.28	46.66	2.718	126.839	0.27				144.54	144.54
9.678	3	Clay	23.825	1.529	0.55		0.55	2.75	1.2571	0.98	0.373							1.00	0		223.73	223.73
10.335	3	Clay	16.904	1.094	0.587		0.587	2.88	1.2311	0.98	0.372							1.00	1		180.61	180.61
10.991	3	Clay	13.752	1.037	0.623		0.623	3.01	1.2068	0.98	0.372							1.00	1		158.76	158.76
11.647	3	Clay	13.959	0.777	0.66		0.66	2.93	1.1828	0.98	0.371							1.00	1		160.26	160.26
12.303	4	Silty Clay to Clay	16.57	0.693	0.698	0.009	0.688	2.81	1.1653	0.97	0.376							1.00	1		178.33	178.33
12.959	4	Silty Clay to Clay	21.096	0.834	0.735	0.03	0.705	2.72	1.1549	0.97	0.386							1.00	1		207.36	207.36
13.615	4	Silty Clay to Clay	22.833	0.915	0.773	0.05	0.722	2.7	1.1446	0.97	0.396							1.00	1		217.88	217.88
14.272	4	Silty Clay to Clay	21.553	0.842	0.81	0.071	0.74	2.72	1.134	0.97	0.404							1.00	1		210.17	210.17
14.928	4	Silty Clay to Clay	19.838	0.728	0.848	0.091	0.757	2.74	1.1242	0.97	0.413							1.00	1		199.54	199.54
15.584	5	Clayey Silt to Silty Clay	22.071	0.617	0.886	0.112	0.774	2.64	1.1145	0.97	0.421							1.00	1		213.32	213.32
16.24	5	Clayey Silt to Silty Clay	21.926	0.613	0.923	0.132	0.791	2.65	1.105	0.97	0.429							1.00	1		212.48	212.48
16.896	4	Silty Clay to Clay	20.601	0.756	0.961	0.153	0.808	2.75	1.0956	0.96	0.436							1.00	1		204.34	204.34
17.552	4	Silty Clay to Clay	29.454	1.209	0.998	0.173	0.825	2.67	1.0864	0.96	0.443							1.00	1		255.49	255.49
18.209	7	Silty Sand to Sandy Silt	71.48	1.43	1.037	0.194	0.843	2.17	1.0768	0.96	0.450	2.170	1.08	76.97	1.596	122.878	0.25	1.00	1	(0.53)	180.35	132.66
18.865	7	Silty Sand to Sandy Silt	163.41	3.617	1.076	0.214	0.862	1.97	1.0669	0.96	0.456	1.970	1.07	174.34	1.263	220.147		1.00	1		202.01	202.01
19.521	8	Sand to Silty Sand	239.26	4.417	1.115	0.235	0.881	1.81	1.0572	0.96	0.461	1.810	1.06	252.94	1.114	281.781		1.00	1		213.53	213.53
20.177	9	Sand	233.04	1.228	1.156	0.255	0.901	1.42	1.0471	0.96	0.467	1.420	1.05	244.02	1.000	244.017		1.00	1		214.09	214.09
20.833	9	Sand	121.33	0.331	1.197	0.276	0.921	1.51	1.0372	0.95	0.472	1.510	1.04	125.85	1.000	125.847	0.27	1.00	1	(0.53)	197.85	172.38
21.49	6	Sandy Silt to Clayey Silt	20.077	0.276	1.234	0.296	0.938	2.57	1.029	0.95	0.477	2.570	1.03	20.66	3.148	65.034	0.11	1.00	1	(0.21)	157.43	46.96
22.146	6	Sandy Silt to Clayey Silt	13.892	0.163	1.272	0.316	0.955	2.7	1.0209	0.95	0.482							1.00	1		159.69	159.69
22.802	6	Sandy Silt to Clayey Silt	17.117	0.317	1.31	0.337	0.973	2.72	1.0124	0.95	0.486							1.00	1		181.94	181.94
23.458	5	Clayey Silt to Silty Clay	12.828	0.351	1.347	0.357	0.99	2.94	1.0046	0.95	0.490							1.00	1		152.06	152.06
24.114	5	Clayey Silt to Silty Clay	9.354	0.232	1.385	0.378	1.007	3.07	0.9968	0.94	0.494							1.00	1		124.98	124.98
24.77	5	Clayey Silt to Silty Clay	8.753	0.182	1.422	0.398	1.024	3.07	0.9892	0.94	0.498							1.00	1		119.94	119.94
25.427	4	Silty Clay to Clay	9.348	0.24	1.46	0.419	1.041	3.09	0.9817	0.94	0.501							0.99	1		124.98	124.98
26.083	6	Sandy Silt to Clayey Silt	15.796	0.261	1.497	0.439	1.058	2.76	0.9743	0.94	0.505							0.99	1		173.19	173.19
26.739	8	Sand to Silty Sand	72.036	0.302	1.537	0.46	1.077	1.86	0.9662	0.94	0.508	1.860	0.97	69.60	1.153	80.273	0.13	0.98	1	(0.23)	192.88	102.08
27.395	9	Sand	85.616	0.28	1.578	0.48	1.098	1.75	0.9574	0.93	0.510	1.750	0.96	81.96	1.072	87.833	0.14	0.98	1	(0.26)	198.29	117.27
28.051	9	Sand	94.48	0.325	1.619	0.501	1.118	1.73	0.9491	0.93	0.512	1.730	0.95	89.67	1.058	94.877	0.16	0.97	1	(0.28)	201.82	128.37
28.707	9	Sand	99.174	0.326	1.659	0.521	1.138	1.71	0.941	0.93	0.514	1.710	0.94	93.32	1.045	97.482	0.17	0.97	1	(0.29)	204.07	132.66
29.364	9	Sand	98.896	0.439	1.7	0.542	1.158	1.78	0.933	0.92	0.516	1.780	0.93	92.27	1.092	100.790	0.18	0.96	1	(0.31)	204.96	134.38
30.02	9	Sand	112.43	0.426	1.741	0.562	1.179	1.7	0.9248	0.92	0.517	1.700	0.92	103.97	1.038	107.902	0.20	0.96	1	(0.34)	209.41	149.03
30.676	9	Sand	139.56	0.513	1.782	0.583	1.199	1.62	0.917	0.92	0.518	1.620	0.92	127.98	1.000	127.981	0.27	0.95	1	(0.47)	216.35	181.04
31.332	9	Sand	143.76	0.676	1.822	0.603	1.219	1.67	0.9095	0.91	0.519	1.670	0.91	130.75	1.017	133.018	0.30	0.94	1	(0.51)	218.16	187.97
31.988	9	Sand	213.04	1.018	1.863	0.624	1.239	1.53	0.902	0.91	0.520	1.530	0.90	192.16	1.000	192.160		0.92	1		230.61	230.61
32.644	9	Sand	239.51	1.219	1.904	0.644	1.26	1.51	0.8943	0.91	0.521	1.510	0.89	214.20	1.000	214.197		0.91	1		235.21	235.21
33.301	10	Gravelly Sand to Sand	319.85	1.896	1.945	0.664	1.281	1.47	0.8867	0.90	0.521	1.470	0.89	283.62	1.000	283.623		0.91	1		245.32	245.32
33.957	10	Gravelly Sand to Sand	400.34	2.25	1.987	0.685	1.302	1.38	0.8793	0.90	0.521	1.380	0.88	352.02	1.000	352.016		0.90	1		253.69	253.69
34.613	10	Gravelly Sand to Sand	328.81	1.947	2.029	0.705	1.324	1.47	0.8716	0.89	0.521	1.470	0.87	286.60	1.000	286.600		0.89	1		248.41	248.41
35.269	9	Sand	262.95	1.765	2.07	0.726	1.344	1.58	0.8648	0.89	0.520	1.580	0.86	227.40	1.000	227.396		0.89	1		242.28	242.28
35.925	9	Sand	197.34	1.088	2.11	0.746	1.364	1.63	0.858	0.88	0.520	1.630	0.86	169.32	1.000	169.320		0.90	1		234.34	234.34
36.581	9	Sand	235.14	1.185	2.151	0.767	1.384	1.55	0.8514	0.88	0.520	1.550	0.85	200.20	1.000	200.197		0.89	1		240.68	240.68
37.238	9	Sand	190.84	1.018	2.192	0.787	1.405	1.64	0.8445	0.87	0.519	1.640	0.84	161.17	1.000	161.173		0.89	1		235.20	235.20
37.894	9	Sand	194.83	1.01	2.233	0.808	1.425	1.64	0.8381	0.87	0.518	1.640	0.84	163.29	1.000	163.285		0.89	1		236.73	236.73
38.55	8	Sand to Silty Sand	131.86	2.319	2.272	0.828	1.444	2.11	0.8321	0.86	0.517	2.110	0.83	109.71	1.473	161.628		0.91	1		225.84	225.84
39.206	11	Sitff Fine-Grained	60.049	2.899	2.315	0.849	1.466	2.68	0.8252	0.86	0.515							0.93	1		399.19	399.19
39.862	3	Clay	25.094	1.187	2.352	0.869	1.483	2.99	0.82	0.85	0.514							0.92	1		231.62	231.62
40.518	5	Clayey Silt to Silty Clay	15.401	0.496	2.389	0.89	1.5	3.1	0.8148	0.85	0.513							0.92	1		171.06	171.06
41.175	4	Silty Clay to Clay	20.941	0.802	2.427	0.91	1.517	3.01	0.8097	0.84	0.511							0.92	1		207.05	207.05
41.831	8	Sand to Silty Sand	123.8	1.954	2.467	0.931	1.536	2.12	0.8041	0.83	0.510	2.120	0.80	99.54	1.492	148.534	0.38	0.90	1	(0.64)	227.77	169.78
42.487	9	Sand	140.16	1.097	2.507	0.951	1.556	1.89	0.7983	0.83	0.507	1.890	0.80	111.88	1.180	131.974	0.29	0.89	1	(0.48)	232.28	174.98
43.143	9	Sand	132.55	1.038	2.548	0.972	1.576	1.92	0.7925	0.82	0.505	1.920	0.79	105.05	1.208	126.923	0.27	0.89	1	(0.45)	231.40	165.45
43.799	9	Sand	169.32	1.38	2.589	0.992	1.597	1.84	0.7866	0.82	0.503	1.840	0.79	133.18	1.137	151.432	0.40	0.87	1	(0.65)	239.73	207.89
44.455	9	Sand	220.12	1.477	2.629	1.013	1.617	1.7	0.781	0.81	0.500	1.700	0.78	171.91	1.038	178.419		0.85	1		248.87	248.87
45.112	9	Sand	228.57	1.983	2.67	1.033	1.637	1.77	0.7755	0.80	0.498	1.770	0.78	177.24	1.085	192.372		0.84	1		250.92	250.92
45.768	9	Sand	279.52	2.423	2.711	1.053	1.657	1.7	0.77	0.80	0.495	1.700	0.77	215.24	1.038	223.390		0.82	1		258.41	258.41
46.424	9	Sand	287.41	1.998	2.752	1.074	1.678	1.64	0.7644	0.79	0.492	1.640	0.76	219.70	1.000	219.703		0.82	1		260.23	260.23
47.08	9	Sand	319.91	2.8	2.792	1.094	1.698	1.67	0.7591	0.78	0.489	1.670	0.76	242.86	1.017	247.077		0.81	1		264.73	264.73
47.736	9	Sand	305.95	2.398	2.833	1.115	1.718	1.66	0.7539	0.78	0.486	1.660	0.75	230.67	1.010	233.070		0.81	1		264.03	264.03
48.392	9	Sand	188.61	1.943	2.874	1.135	1.738	1.9	0.7488	0.77	0.484	1.900	0.75	141.24	1.189	167.907		0.84	1		248.73	248.73
49.049	8	Sand to Silty Sand	125.45	1.991	2.914	1.156	1.758	2.17	0.7437	0.76	0.481	2.170	0.74	93.30	1.596	148.949	0.39	0.87	1	(0.66)	236.63	162.86
49.705	9	Sand	194.74	2.595	2.954	1.176	1.778	1.97	0.7388	0.76	0.477	1.970	0.74	143.86	1.263	181.656		0.84	1		251.30	251.30
50.361	9	Sand	319.6	2.818	2.995	1.197	1.798	1.69	0.7338	0.75	0.474	1.690	0.73	234.53	1.031	241.823		0.79	1		268.82	268.82
51.017	9	Sand	176.63	1.145	3.036	1.217	1.818	1.82	0.729	0.74	0.471	1.820	0.73	128.76	1.122	144.405	0.36	0.84	1	(0.60)	249.63	200.96
51.673	9	Sand	204.84	1.686	3.076	1.238	1.839	1.83	0.7239	0.74	0.468	1.830	0.72	148.29	1.129	167.444		0.83	1		255.27	255.27
52.329	9	Sand	203.55	1.183	3.117	1.258	1.859	1.75	0.7192	0.73	0.465	1.750	0.72	146.39	1.072	156.875	0.44	0.82	1	(0.73)	255.81	224.32
52.986	9	Sand	175.53	0.69	3.158	1.279	1.879	1.72	0.7145	0.72	0.462	1.720	0.71	125.42	1.051	131.858	0.29	0.83	1	(0.50)	251.66	188.84
53.642	7	Silty Sand to Sandy Silt	53.234	0.979	3.197	1.299	1.897	2.54	0.7104	0.72	0.459	2.540	0.71	37.82	2.979	112.651	0.21	0.88	1	(0.38)	216.13	74.63
54.298	4	Silty Clay to Clay	16.436	0.601	3.234	1.32	1.915	3.22	0.7063	0.71	0.456							0.88	1		178.20	178.20
54.954	4	Silty Clay to Clay	16.347	0.585	3.272	1.34	1.932	3.22	0.7024	0.70	0.453							0.88	1		177.73	177.73
55.61	5	Clayey Silt to Silty Clay	17.962	0.572	3.309	1.361	1.949	3.15	0.6986	0.70	0.450							0.88	1		188.63	188.63
56.266	5	Clayey Silt to Silty Clay	29.554	0.893	3.347	1.381	1.966	2.92	0.6949	0.69	0.448							0.87	1		257.17	257.17
56.923	5	Clayey Silt to Silty Clay	37.365	1.2	3.384	1.401	1.983	2.84	0.6912	0.69	0.445							0.87	1		297.68	297.68
57.579	5	Clayey Silt to Silty Clay	34.816	1.212	3.422	1.422	2	2.9	0.6875	0.68	0.442							0.87	1		285.00	285.00
58.235	5	Clayey Silt to Silty Clay	46.129	1.915	3.46	1.442	2.017	2.84	0.6839	0.67	0.440							0.87	1		339.51	339.51
58.891	7	Silty Sand to Sandy Silt	129.38	2.462	3.498	1.463	2.035	2.26	0.6801	0.67	0.437	2.260	0.68	87.99	1.827	160.732		0.85	1		247.20	247.20
59.547	9	Sand	204.75	2.718	3.539	1.483	2.056	2	0.6757	0.66	0.434	2.000	0.68	138.34	1.300	179.844		0.81	1		263.09	263.09
60.203	8	Sand to Silty Sand	160.95	2.729	3.579	1.504	2.075	2.16	0.6718	0.66	0.431	2.160	0.67	108.12	1.574	170.212		0.83	1		255.63	255.63
60.86	8	Sand to Silty Sand	150.43	2.084	3.618	1.524	2.094	2.12	0.6679	0.65	0.429	2.120	0.67	100.47	1.492	149.912	0.39	0.83	1	(0.71)	254.02	177.58
61.516	6	Sandy Silt to Clayey Silt	78.606	2.588	3.656	1.545	2.111	2.6	0.6645	0.65	0.426							0.86	1		234.03	234.03
62.172	7	Silty Sand to Sandy Silt	86.797	2.066	3.695	1.565	2.129	2.48	0.6609	0.64	0.424	2.480	0.66	57.36	2.669	153.115	0.41	0.86	1	(0.79)	237.60	113.88
62.828	6	Sandy Silt to Clayey Silt	57.744	1.989	3.732	1.586	2.146	2.73	0.6575	0.64	0.421							0.86	1		390.12	390.12

LIQUEFACTION POTENTIAL ANALYSIS (per Youd et al., 2001)

PROJECT NAME	***Adobe Creek POC***							
PROJECT NO.	***2016-122-POC***							
CPT NO.	***CPT-12***	*M_w =* 8	*MSF =* 0.94		*a_{max} (g)=* 0.585		V_{S30m}(m/s)=	219.9 216.2

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	Ic	C_Q	***CRR 7.5*** 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.	V_s (m/s)	$V_{s,liq}$ (m/s)
63.484	3	Clay	35.551	1.803	3.769	1.606	2.163	3.03	0.6542	0.63	0.419							0.86	1		288.49	288.49
64.14	3	Clay	30.1	1.801	3.805	1.627	2.179	3.14	0.6511	0.63	0.417							0.86	1		260.23	260.23
64.797	3	Clay	24.743	1.295	3.842	1.647	2.195	3.19	0.648	0.62	0.415							0.85	1		230.47	230.47
65.453	4	Silty Clay to Clay	25.049	1.034	3.879	1.668	2.212	3.13	0.6448	0.62	0.413							0.85	1		232.31	232.31
66.109	4	Silty Clay to Clay	46.057	2.213	3.917	1.688	2.229	2.92	0.6416	0.61	0.411							0.85	1		339.05	339.05
66.765	11	Sitff Fine-Grained	57.655	2.816	3.96	1.709	2.251	2.85	0.6375	0.61	0.409							0.85	1		389.95	389.95
67.421	4	Silty Clay to Clay	29.487	1.375	3.997	1.729	2.268	3.1	0.6344	0.61	0.407							0.85	1		257.00	257.00
68.077	4	Silty Clay to Clay	22.071	0.843	4.035	1.75	2.286	3.18	0.6311	0.60	0.405							0.85	1		214.95	214.95
68.734	5	Clayey Silt to Silty Clay	25.206	0.954	4.073	1.77	2.303	3.12	0.628	0.60	0.403							0.85	1		233.46	233.46
69.39	5	Clayey Silt to Silty Clay	38.902	1.57	4.11	1.79	2.32	2.96	0.625	0.60	0.401							0.85	1		305.49	305.49
70.046	4	Silty Clay to Clay	30.189	1.23	4.148	1.811	2.337	3.07	0.622	0.59	0.399							0.84	1		261.04	261.04
70.702	4	Silty Clay to Clay	20.133	0.823	4.185	1.831	2.354	3.25	0.619	0.59	0.398							0.84	1		203.60	203.60
71.358	3	Clay	21.52	1.139	4.222	1.852	2.37	3.29	0.6162	0.58	0.396							0.84	1		212.30	212.30
72.014	3	Clay	22.344	1.235	4.259	1.872	2.386	3.29	0.6135	0.58	0.395							0.84	1		217.34	217.34
72.671	3	Clay	21.625	1.159	4.295	1.893	2.402	3.3	0.6108	0.58	0.393							0.84	1		212.96	212.96
73.327	3	Clay	19.833	0.997	4.332	1.913	2.418	3.33	0.6081	0.58	0.392							0.84	1		201.98	201.98
73.983	3	Clay	17.539	0.802	4.368	1.934	2.434	3.37	0.6054	0.57	0.390							0.84	1		187.46	187.46
74.639	4	Silty Clay to Clay	18.056	0.703	4.406	1.954	2.452	3.32	0.6024	0.57	0.389							0.84	1		190.96	190.96
75.295	4	Silty Clay to Clay	20.038	0.91	4.443	1.975	2.469	3.31	0.5996	0.57	0.388							0.83	1		203.66	203.66
75.951	4	Silty Clay to Clay	19.955	0.897	4.481	1.995	2.486	3.31	0.5969	0.56	0.386							0.83	1		203.22	203.22
76.608	4	Silty Clay to Clay	20.105	0.886	4.519	2.016	2.503	3.3	0.5941	0.56	0.385							0.83	1		204.34	204.34
77.264	3	Clay	20.712	1.001	4.555	2.036	2.519	3.31	0.5916	0.56	0.384							0.83	1		208.28	208.28
77.92	3	Clay	21.62	1.075	4.592	2.057	2.535	3.3	0.589	0.56	0.383							0.83	1		213.93	213.93
78.576	5	Clayey Silt to Silty Clay	20.751	0.754	4.629	2.077	2.552	3.25	0.5864	0.55	0.382							0.83	1		208.89	208.89
79.232	4	Silty Clay to Clay	18.953	0.794	4.667	2.098	2.569	3.33	0.5837	0.55	0.381							0.83	1		198.16	198.16
79.888	3	Clay	21.058	1.003	4.703	2.118	2.585	3.31	0.5812	0.55	0.380							0.83	1		211.45	211.45
80.545	3	Clay	23.329	1.152	4.74	2.138	2.601	3.27	0.5788	0.55	0.379							0.83	1		225.19	225.19
81.201	3	Clay	27.11	1.424	4.777	2.159	2.618	3.22	0.5762	0.54	0.378							0.82	1		246.78	246.78
81.857	3	Clay	28.524	1.668	4.813	2.179	2.634	3.24	0.5738	0.54	0.377							0.82	1		254.40	254.40
82.513	3	Clay	25.668	1.582	4.85	2.2	2.65	3.3	0.5714	0.54	0.376							0.82	1		238.29	238.29
83.169	3	Clay	26.82	1.451	4.886	2.22	2.666	3.25	0.5691	0.54	0.375							0.82	1		244.73	244.73
83.825	3	Clay	27.505	1.587	4.923	2.241	2.682	3.26	0.5667	0.54	0.374							0.82	1		248.44	248.44
84.482	3	Clay	28.351	1.67	4.959	2.261	2.698	3.25	0.5644	0.53	0.373							0.82	1		253.10	253.10
85.138	3	Clay	27.36	1.562	4.996	2.282	2.714	3.26	0.5621	0.53	0.372							0.82	1		247.72	247.72
85.794	3	Clay	26.297	1.402	5.032	2.302	2.73	3.26	0.5598	0.53	0.372							0.82	1		241.89	241.89
86.45	3	Clay	25.111	1.437	5.069	2.323	2.746	3.31	0.5575	0.53	0.371							0.82	1		235.28	235.28
87.106	3	Clay	23.803	1.328	5.105	2.343	2.762	3.33	0.5553	0.53	0.370							0.82	1		227.70	227.70
87.762	4	Silty Clay to Clay	23.914	1.129	5.143	2.364	2.779	3.29	0.5529	0.52	0.369							0.82	1		228.45	228.45
88.419	4	Silty Clay to Clay	25.612	1.186	5.181	2.384	2.796	3.25	0.5506	0.52	0.369							0.81	1		238.23	238.23
89.075	3	Clay	24.276	1.245	5.217	2.405	2.813	3.31	0.5482	0.52	0.368							0.81	1		230.18	230.18
89.731	4	Silty Clay to Clay	23.942	1.104	5.255	2.425	2.83	3.29	0.5459	0.52	0.367							0.81	1		228.28	228.28
90.387	4	Silty Clay to Clay	22.004	0.98	5.292	2.446	2.847	3.33	0.5436	0.52	0.366							0.81	1		216.92	216.92
91.043	3	Clay	20.139	0.944	5.329	2.466	2.863	3.39	0.5415	0.52	0.366							0.81	1		205.64	205.64
91.699	4	Silty Clay to Clay	18.067	0.72	5.367	2.487	2.88	3.41	0.5392	0.52	0.365							0.81	1		192.76	192.76
92.356	5	Clayey Silt to Silty Clay	24.498	0.819	5.404	2.507	2.897	3.21	0.537	0.51	0.364							0.81	1		232.03	232.03
93.012	4	Silty Clay to Clay	24.827	1.121	5.442	2.527	2.914	3.28	0.5348	0.51	0.364							0.81	1		234.37	234.37
93.668	3	Clay	23.491	1.152	5.478	2.548	2.93	3.33	0.5327	0.51	0.363							0.81	1		226.83	226.83
94.324	4	Silty Clay to Clay	21.67	0.992	5.516	2.568	2.947	3.35	0.5305	0.51	0.363							0.81	1		216.15	216.15
94.98	4	Silty Clay to Clay	22.917	1.031	5.553	2.589	2.965	3.32	0.5282	0.51	0.362							0.80	1		223.85	223.85
95.636	4	Silty Clay to Clay	23.507	1.131	5.591	2.609	2.982	3.33	0.5261	0.51	0.361							0.80	1		227.58	227.58
96.293	3	Clay	24.387	1.322	5.628	2.63	2.998	3.35	0.5241	0.51	0.361							0.80	1		232.77	232.77
96.949	4	Silty Clay to Clay	40.133	2.024	5.665	2.65	3.015	3.11	0.5219	0.50	0.360							0.80	1		314.52	314.52
97.605	3	Clay	33.373	2.08	5.702	2.671	3.031	3.26	0.52	0.50	0.360							0.80	1		278.20	278.20
98.261	3	Clay	21.302	1.005	5.738	2.691	3.047	3.41	0.518	0.50	0.359							0.80	1		210.78	210.78
98.917	4	Silty Clay to Clay	21.993	0.999	5.776	2.712	3.064	3.39	0.5159	0.50	0.359							0.80	1		215.01	215.01
99.573	3	Clay	23.53	1.144	5.812	2.732	3.08	3.37	0.514	0.50	0.358							0.80	1		224.32	224.32
100.23	3	Clay	24.666	1.284	5.849	2.753	3.096	3.36	0.5121	0.50	0.358							0.80	1		231.11	231.11
100.89	3	Clay	25.784	1.435	5.886	2.773	3.112	3.36	0.5102	0.50	0.357							0.80	1		237.61	237.61
101.54	3	Clay	23.997	1.34	5.922	2.794	3.128	3.4	0.5083	0.50	0.357							0.80	1		227.58	227.58
102.2	3	Clay	21.664	1.09	5.959	2.814	3.145	3.43	0.5063	0.49	0.356							0.80	1		213.99	213.99
102.85	4	Silty Clay to Clay	19.287	0.768	5.996	2.835	3.162	3.44	0.5044	0.49	0.356							0.79	1		199.67	199.67
103.51	4	Silty Clay to Clay	20.278	0.781	6.034	2.855	3.179	3.4	0.5024	0.49	0.355							0.79	1		206.13	206.13
104.17	5	Clayey Silt to Silty Clay	19.504	0.704	6.071	2.876	3.196	3.41	0.5005	0.49	0.355							0.79	1		201.73	201.73
104.82	5	Clayey Silt to Silty Clay	18.179	0.548	6.109	2.896	3.213	3.41	0.4985	0.49	0.355							0.79	1		193.84	193.84
105.48	5	Clayey Silt to Silty Clay	18.602	0.635	6.147	2.916	3.23	3.42	0.4966	0.49	0.354							0.79	1		197.27	197.27
106.14	5	Clayey Silt to Silty Clay	20.757	0.626	6.184	2.937	3.247	3.33	0.4947	0.49	0.354							0.79	1		211.51	211.51
106.79	5	Clayey Silt to Silty Clay	22.305	0.833	6.222	2.957	3.264	3.34	0.4928	0.49	0.353							0.79	1		221.73	221.73
107.45	4	Silty Clay to Clay	24.927	1.108	6.259	2.978	3.282	3.33	0.4909	0.49	0.353							0.79	1		237.16	237.16
108.1	5	Clayey Silt to Silty Clay	24.342	0.977	6.297	2.998	3.299	3.31	0.489	0.49	0.352							0.79	1		234.09	234.09
108.76	5	Clayey Silt to Silty Clay	25.963	0.883	6.335	3.019	3.316	3.24	0.4872	0.48	0.352							0.79	1		244.12	244.12
109.42	5	Clayey Silt to Silty Clay	28.268	1.042	6.372	3.039	3.333	3.21	0.4853	0.48	0.351							0.79	1		258.19	258.19
110.07	5	Clayey Silt to Silty Clay	69.98	2.657	6.41	3.06	3.35	2.85	0.4835	0.48	0.351							0.79	1		442.33	442.33
110.73	5	Clayey Silt to Silty Clay	60.277	2.618	6.447	3.08	3.367	2.96	0.4817	0.48	0.350							0.78	1		400.56	400.56
111.39	5	Clayey Silt to Silty Clay	61.157	2.461	6.485	3.101	3.384	2.93	0.4799	0.48	0.350							0.78	1		404.25	404.25
112.04	5	Clayey Silt to Silty Clay	58.423	2.394	6.523	3.121	3.401	2.96	0.4782	0.48	0.350							0.78	1		392.89	392.89
112.7	4	Silty Clay to Clay	31.837	1.356	6.56	3.142	3.418	3.24	0.4764	0.48	0.349							0.78	1		269.30	269.30
113.35	5	Clayey Silt to Silty Clay	22.115	0.653	6.598	3.162	3.436	3.35	0.4745	0.48	0.349							0.78	1		215.25	215.25
114.01	5	Clayey Silt to Silty Clay	22.517	0.68	6.635	3.183	3.453	3.35	0.4728	0.48	0.348							0.78	1		218.00	218.00
114.67	5	Clayey Silt to Silty Clay	30.974	1.255	6.673	3.203	3.47	3.25	0.4711	0.48	0.348							0.78	1		265.72	265.72
115.32	4	Silty Clay to Clay	32.015	1.572	6.711	3.224	3.487	3.28	0.4694	0.47	0.348							0.78	1		271.45	271.45
115.98	3	Clay	29.025	1.498	6.747	3.244	3.503	3.35	0.4678	0.47	0.347							0.78	1		255.71	255.71
116.63	4	Silty Clay to Clay	28.24	1.352	6.785	3.264	3.52	3.34	0.4661	0.47	0.347							0.78	1		251.46	251.46
117.29	3	Clay	29.688	1.473	6.821	3.285	3.536	3.33	0.4645	0.47	0.346							0.78	1		259.37	259.37
117.95	3	Clay	28.563	1.399	6.858	3.305	3.552	3.35	0.463	0.47	0.346							0.78	1		253.43	253.43
118.6	4	Silty Clay to Clay	26.965	1.247	6.895	3.326	3.569	3.37	0.4613	0.47	0.346							0.78	1		244.68	244.68
119.26	4	Silty Clay to Clay	25.879	1.185	6.933	3.346	3.587	3.39	0.4596	0.47	0.345							0.77	1		238.63	238.63
119.92	5	Clayey Silt to Silty Clay	25.857	0.938	6.971	3.367	3.604	3.33	0.458	0.47	0.345							0.77	1		238.57	238.57

SETTLEMENT ANALYSES

RETAINING WALL SETTLEMENT

PROJECT NAME ***Highway 101 OC & Reach Tr at Adobe Creek/Palo A***
PROJECT NO. ***2016-122-POC***
BORING ***B-2***
LOCATION ***West Approach Ramp Type 5 - H=12***
Hammer Energy = 77%
GW Level (ft)= 5

Footing Depth (ft) = 2
Fill Height (ft)= 10
Base Width, B (ft)=
Side Slope (XH:1V)=
Effective Width, B' (ft)= 7.7
Length, L (ft)= -
Plane Strain? (Y/N) Y
Contact Pressure (psf)= 1250

Cr/C 18.0%

GROUPS
1. SANDS, GRAVELS AND NON-PLASTIC SILT
2. SATURATED CLAYS AND PLASTIC SILTS
3. NON-SATURATED CLAYS AND PLASTIC SILTS

Depth from FG From	To	Soil Type	BLOW COUNT	SAMPLER TYPE	AVG $SPT-N_{60}$	γ_T (pcf)	γ' (pcf)	ω	σ_v' (psf)	σ_v' (psf)	$\Delta\sigma_v'$ (psf)	Su (psf)	Pp (psf)	E (psf)	$Cr/1+e_0$	$Cc/1+e_0$	C' (Hough Method)	Settlements (in) Elastic	OC	NC	SAND	Sum
0	4	3	9	SPT	12	125.0	125.0	13.0%	500	250	1250.0			505313				0.119				0.119
4	8	2	18	MC	15	125.0	62.6	18.0%	250	625	822.6	1877	7508		0.0216	0.1202			0.379			0.379
8	14	2	24	MC	20	125.0	62.6	35.0%	376	938	576.3	2503	10010		0.0292	0.1623			0.438			0.438
14	18.5	2	15	MC	13	125.0	62.6	33.0%	282	1267	438.5	1564	6256		0.0283	0.1574			0.198			0.198
18.5	22.5	2	15	MC	13	125.0	62.6	23.0%	250	1533	367.4	1564	6256		0.0239	0.1327			0.107			0.107
22.5	28	1	12	SPT	15	125.0	62.6	12.0%	344	1830	311.0						68				0.066	0.066
28	33	2	10	MC	8	125.0	62.6	32.0%	313	2159	265.9	1043	4171		0.0279	0.1550			0.084			0.084
33	38	1	32	SPT	41	125.0	62.6	17.0%	313	2472	233.6						90				0.026	0.026
38	43	1	34	SPT	44	125.0	62.6	10.0%	313	2785	208.3						65				0.029	0.029
43	48.5	2	6	SPT	8	125.0	62.6	28.0%	344	3114	187.1	963	3850		0.0261	0.1451			0.044			0.044
48.5	53.5	2	16	MC	13	125.0	62.6	33.0%	313	3442	169.8	1668	6673		0.0283	0.1574			0.036			0.036
53.5	58	2	9	MC	8	125.0	62.6	35.0%	282	3740	156.6	938	3754		0.0292	0.1623			0.003	0.142		0.144
58	64	1	12	MC	10	125.0	62.6	29.0%	376	4068	144.3						38				0.029	0.029
64	76	2	12	SPT	15	125.0	62.6	24.0%	751	4632	127.1	1925	7700		0.0243	0.1351			0.041			0.041
76	85	2	31	MC	26	125.0	62.6	30.0%	563	5289	111.7	3232	12930		0.0270	0.1500			0.026			0.026
85	95	2	24	MC	20	125.0	62.6	17.0%	626	5884	100.6	2503	10010		0.0212	0.1177			0.019			0.019
95	105	2	25	MC	21	125.0	62.6	32.0%	626	6510	91.1	2607	10427		0.0279	0.1550			0.020			0.020
105	114	2	33	MC	28	125.0	62.6	28.0%	563	7104	83.6	3441	13764		0.0261	0.1451			0.014			0.014
114	121.5	2	46	MC	38	125.0	62.6	27.0%	470	7621	78.0	4796	19186		0.0257	0.1426			0.010			0.010
																Estimated Settlement (in)=		*0.1*	*1.4*	*0.1*	*0.1*	***1.8***

RETAINING WALL SETTLEMENT

PROJECT NAME ***Highway 101 OC & Reach Tr at Adobe Creek/Palo A***
PROJECT NO. ***2016-122-POC***
BORING ***B-2***
LOCATION ***West Approach Ramp Type 1A - H=8***
Hammer Energy = 77%
GW Level (ft)= 5

Footing Depth (ft) = 2
Fill Height (ft)= 8
Base Width, B (ft)=
Side Slope (XH:1V)=
Effective Width, B' (ft)= 6.3
Length, L (ft)= -
Plane Strain? (Y/N) Y
Contact Pressure (psf)= 1000

Cr/C 18.0%

GROUPS
1. SANDS, GRAVELS AND NON-PLASTIC SILT
2. SATURATED CLAYS AND PLASTIC SILTS
3. NON-SATURATED CLAYS AND PLASTIC SILTS

Depth from FG From	To	Soil Type	BLOW COUNT	SAMPLER TYPE	AVG $SPT-N_{60}$	γ_T (pcf)	γ' (pcf)	ω	σ_v' (psf)	σ_v' (psf)	$\Delta\sigma_v'$ (psf)	Su (psf)	Pp (psf)	E (psf)	$Cr/1+e_0$	$Cc/1+e_0$	C' (Hough Method)	Settlements (in) Elastic	OC	NC	SAND	Sum
0	4	3	9	SPT	12	125.0	125.0	13.0%	500	250	1000.0			505313				0.095				0.095
4	8	2	18	MC	15	125.0	62.6	18.0%	250	625	611.7	1877	7508		0.0216	0.1202			0.308			0.308
8	14	2	24	MC	20	125.0	62.6	35.0%	376	938	411.8	2503	10010		0.0292	0.1623			0.332			0.332
14	18.5	2	15	MC	13	125.0	62.6	33.0%	282	1267	306.6	1564	6256		0.0283	0.1574			0.144			0.144
18.5	22.5	2	15	MC	13	125.0	62.6	23.0%	250	1533	254.0	1564	6256		0.0239	0.1327			0.076			0.076
22.5	28	1	12	SPT	15	125.0	62.6	12.0%	344	1830	213.2						68				0.046	0.046
28	33	2	10	MC	8	125.0	62.6	32.0%	313	2159	181.0	1043	4171		0.0279	0.1550			0.059			0.059
33	38	1	32	SPT	41	125.0	62.6	17.0%	313	2472	158.3						90				0.018	0.018
38	43	1	34	SPT	44	125.0	62.6	10.0%	313	2785	140.6						65				0.020	0.020
43	48.5	2	6	SPT	8	125.0	62.6	28.0%	344	3114	125.9	963	3850		0.0261	0.1451			0.030			0.030
48.5	53.5	2	16	MC	13	125.0	62.6	33.0%	313	3442	113.9	1668	6673		0.0283	0.1574			0.024			0.024
53.5	58	2	9	MC	8	125.0	62.6	35.0%	282	3740	104.9	938	3754		0.0292	0.1623			0.003	0.091		0.094
58	64	1	12	MC	10	125.0	62.6	29.0%	376	4068	96.5						38				0.019	0.019
64	76	2	12	SPT	15	125.0	62.6	24.0%	751	4632	84.8	1925	7700		0.0243	0.1351			0.028			0.028
76	85	2	31	MC	26	125.0	62.6	30.0%	563	5289	74.3	3232	12930		0.0270	0.1500			0.018			0.018
85	95	2	24	MC	20	125.0	62.6	17.0%	626	5884	66.8	2503	10010		0.0212	0.1177			0.012			0.012
95	105	2	25	MC	21	125.0	62.6	32.0%	626	6510	60.4	2607	10427		0.0279	0.1550			0.013			0.013
105	114	2	33	MC	28	125.0	62.6	28.0%	563	7104	55.4	3441	13764		0.0261	0.1451			0.010			0.010
114	121.5	2	46	MC	38	125.0	62.6	27.0%	470	7621	51.6	4796	19186		0.0257	0.1426			0.007			0.007
																	Estimated Settlement (in)=	*0.1*	*1.1*	*0.1*	*0.1*	***1.4***

APPROACH FILL SETTLEMENT

PROJECT NAME ***Highway 101 OC & Reach Tr at Adobe Creek/Palo A***
PROJECT NO. ***2016-122-POC***
BORING ***B-9***
LOCATION ***Fill at Abutment 15***
Hammer Energy = 77%
GW Level (ft)= 5

Footing Depth (ft) = 0
Fill Height (ft)= 9
Base Width, B (ft)=
Side Slope (XH:1V)=
Effective Width, B' (ft)= 24
Length, L (ft)= -
Plane Strain? (Y/N) Y
Contact Pressure (psf)= 1125

Cr/C 16.0%

GROUPS
1. SANDS, GRAVELS AND NON-PLASTIC SILT
2. SATURATED CLAYS AND PLASTIC SILTS
3. NON-SATURATED CLAYS AND PLASTIC SILTS

Depth from FG From	To	Soil Type	BLOW COUNT	SAMPLER TYPE	AVG $SPT\text{-}N_{60}$	γ_T (pcf)	γ' (pcf)	ω	σ_v' (psf)	σ_v' (psf)	$\Delta\sigma_v'$ (psf)	Su (psf)	Pp (psf)	E (psf)	$Cr/1+e_0$	$Cc/1+e_0$	C' (Hough Method)	Settlements (in) Elastic	OC	NC	SAND	Sum
0	4	3	25	MC	21	125.0	125.0	12.0%	500	250	1038.5			912370				0.055				0.055
4	8.5	2	13	MC	11	125.0	62.6	13.0%	282	641	892.6	1356	5422		0.0172	0.1076			0.352			0.352
8.5	13	2	18	MC	15	125.0	62.6	24.0%	282	923	777.0	1877	7508		0.0216	0.1351			0.310			0.310
13	18	1	8	SPT	10	125.0	62.6	12.0%	313	1220	683.5						56				0.207	0.207
18	24	2	11	MC	9	125.0	62.6	25.0%	376	1564	600.0	1147	4588		0.0220	0.1376			0.224			0.224
24	28	2	10	MC	8	125.0	62.6	24.0%	250	1877	540.0	1043	4171		0.0216	0.1351			0.114			0.114
28	31.5	1	10	MC	8	125.0	62.6	30.0%	219	2112	502.3						40				0.098	0.098
31.5	38	2	12	MC	10	125.0	62.6	24.0%	407	2425	459.6	1251	5005		0.0216	0.1351			0.127			0.127
38	43	2	13	MC	11	125.0	62.6	34.0%	313	2785	418.6	1356	5422		0.0256	0.1599			0.093			0.093
43	49	2	8	MC	7	125.0	62.6	34.0%	376	3129	385.7	834	3337		0.0256	0.1599			0.051	0.260		0.312
49	53.5	2	19	MC	16	125.0	62.6	22.0%	282	3458	358.8	1981	7925		0.0208	0.1302			0.048			0.048
53.5	58	2	19	SPT	24	125.0	62.6	26.0%	282	3740	338.6	3048	12192		0.0224	0.1401			0.046			0.046
58	65	1	62	MC	52	125.0	62.6	22.0%	438	4100	315.8						89				0.031	0.031
65	75	2	22	MC	18	125.0	62.6	27.0%	626	4632	287.2	2294	9176		0.0228	0.1426			0.072			0.072
75	85	2	37	MC	31	125.0	62.6	31.0%	626	5258	259.6	3858	15432		0.0244	0.1525			0.061			0.061
85	96	2	25	MC	21	125.0	62.6	31.0%	689	5915	235.8	2607	10427		0.0244	0.1525			0.055			0.055
96	105	1	72	MC	60	125.0	62.6	21.0%	563	6541	216.9						83				0.018	0.018
105	114	2	39	MC	33	125.0	62.6	27.0%	563	7104	202.2	4067	16266		0.0228	0.1426			0.030			0.030
114	121.5	2	49	MC	41	125.0	62.6	25.0%	470	7621	190.5	5109	20437		0.0220	0.1376			0.021			0.021
																	Estimated Settlement (in)=	*0.1*	*1.6*	*0.3*	*0.4*	***2.3***

BEARING CAPACITY ANALYSES

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

PROJECT NO. 2016-122-POC
PROJECT NAME
CALCULATED BY S.K DATE 2,13,2017
CHECKED BY E.O DATE 2,14,2017
VERIFIED BY DATE
BACK CHECKED BY DATE

SUBJECT Bearing Capacity.

* West Approach Ramp / Fill

Retaining wall Type 5 (shown in section L-L)

H = 12 ft.

Calculations based on boring B-2 & B-3
Soil layer: Lean clay, C = 1500 psf

Ext Case		
I	B' = 4.2 ft	q_o = 4.8 ksf
II	B' = 5.8 ft	q_o = 3.5 ksf.

$q_{ult} = 5.53 \times C_u = 5.53 \times 1500 = 8.295$ ksf $\geq$ 4.8 & 3.5 ✓

$q_{str} = 0.55\, q_{ult} = 4.56 \geq 4.0$ ✓

$q_{ser} = \frac{1}{3}\, q_{ult} = 2.8 \geq 2.8$ ✓

- overburden effect neglected for conservatism.

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

PROJECT NO. 2016-122-POC
PROJECT NAME
CALCULATED BY S.K DATE 2/13/2017
CHECKED BY E.O DATE 2/14/2017
VERIFIED BY DATE
BACK CHECKED BY DATE

SUBJECT Bearing Capacity.

* west Approach Ramp / Fill

Retaining wall Type 1.A (shown in section L-L)

H = 8 ft.

Calculations based on boring B-2.
Soil layer 2 lean clay, C = 1500 psf

Ext Case:		
I	B' = 4.1 ft	$q_o = 2.0$ ksf
II	B' = 2.8 ft	$q_o = 3.0$ ksf.

$q_{ult} = 5.53 \times C_u = 5.53 \times 1500 = 8.295 > 2 \,\&\, 3$ ksf ✓

$q_{str} = 0.55 q_{ult} = 4.56 \geq 3.9$ ksf ✓

$q_{ser} = \frac{1}{3} q_{ult} = 2.8 \geq 1.9$ ksf ✓

- overburden effect neglected for conservatism.

LIQUEFACTION-INDUCED DOWNDRAG CALCULATIONS

Downdrag Forces on Circular Piles

Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 1 - Abut 1
Boring	
Single Pile Dia. (ft)	5
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By: EO
Date: 2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1a	12.00	CL	0.20	n	12.00	6.00	688	12.0	138	0.0	
1b	5.00	CL	0.20	y	17.00	14.50	1220	5.0	244	9.6	9.6
2	4.00	SM	0.30	n	21.00	19.00	1501	4.0	450	0.0	
3	15.00	SM	0.30	n	36.00	28.50	2096	15.0	629	0.0	
4	20.00	CL	0.20	n	56.00	46.00	3192	20.0	638	0.0	
5	8.00	SM	0.30	n	64.00	60.00	4068	8.0	1220	0.0	
6	56.00	CL	0.20	n	120.00	92.00	6071	26.0	1214	0.0	

Downdrag Forces on Circular Piles

Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 1 - Bents 2,3,4
Boring	
Single Pile Dia. (ft)	6
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By:	EO
Date:	2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1a	12.00	CL	0.20	n	12.00	6.00	688	12.0	138	0.0	
1b	5.00	CL	0.20	y	17.00	14.50	1220	5.0	244	11.5	11.5
2	4.00	SM	0.30	n	21.00	19.00	1501	4.0	450	0.0	
3	15.00	SM	0.30	n	36.00	28.50	2096	15.0	629	0.0	
4	20.00	CL	0.20	n	56.00	46.00	3192	20.0	638	0.0	
5	8.00	SM	0.30	n	64.00	60.00	4068	8.0	1220	0.0	
6	56.00	CL	0.20	n	120.00	92.00	6071	26.0	1214	0.0	

Downdrag Forces on Circular Piles

Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 1 - Bent 5
Boring	
Single Pile Dia. (ft)	3
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By:	EO
Date:	2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1a	6.00	CL	0.20	n	6.00	3.00	375	6.0	75	0.0	
1b	11.00	CL	0.20	y	17.00	11.50	1032	11.0	206	10.7	10.7
2	4.00	SM	0.30	n	21.00	19.00	1501	4.0	450	0.0	
3	15.00	SM	0.30	n	36.00	28.50	2096	15.0	629	0.0	
4	20.00	CL	0.20	n	56.00	46.00	3192	20.0	638	0.0	
5	8.00	SM	0.30	n	64.00	60.00	4068	8.0	1220	0.0	
6	56.00	CL	0.20	n	120.00	92.00	6071	26.0	1214	0.0	

Downdrag Forces on Circular Piles

Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 1 - Bent 6
Boring	
Single Pile Dia. (ft)	5
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By:	EO
Date:	2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1a	7.00	CL	0.20	n	7.00	3.50	438	7.0	88	0.0	
1b	10.00	CL	0.20	y	17.00	12.00	1063	10.0	213	16.7	16.7
2	4.00	SM	0.30	n	21.00	19.00	1501	4.0	450	0.0	
3	15.00	SM	0.30	n	36.00	28.50	2096	15.0	629	0.0	
4	20.00	CL	0.20	n	56.00	46.00	3192	20.0	638	0.0	
5	8.00	SM	0.30	n	64.00	60.00	4068	8.0	1220	0.0	
6	56.00	CL	0.20	n	120.00	92.00	6071	26.0	1214	0.0	

Downdrag Forces on Circular Piles

Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 3 - Bent 9, 10 ,11
Boring	
Single Pile Dia. (ft)	6
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By:	EO
Date:	2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1	14.00	CL	0.20	n	14.00	7.00	750	14.0	150	0.0	
2	5.00	SW-SM	0.35	y	19.00	16.50	1345	5.0	471	22.2	22.2
3	15.00	CL	0.20	y	34.00	26.50	1971	15.0	394	55.7	77.9
4	8.00	SM	0.30	n	42.00	38.00	2691	8.0	807	0.0	
5	11.00	CL	0.20	n	53.00	47.50	3286	11.0	657	0.0	
6	8.00	SM	0.30	n	61.00	57.00	3880	8.0	1164	0.0	
7	12.00	CL	0.20	n	73.00	67.00	4506	12.0	901	0.0	
8	48.00	CL	0.20	n	121.00	97.00	6384	17.0	1277	0.0	

Downdrag Forces on Circular Piles

Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 3 - Bent 12,13,14
Boring	
Single Pile Dia. (ft)	5
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By:	EO
Date:	2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1	14.00	CL	0.20	n	14.00	7.00	750	14.0	150	0.0	
2	5.00	SW-SM	0.35	y	19.00	16.50	1345	5.0	471	18.5	18.5
3	15.00	CL	0.20	y	34.00	26.50	1971	15.0	394	46.4	64.9
4	8.00	SM	0.30	n	42.00	38.00	2691	8.0	807	0.0	
5	11.00	CL	0.20	n	53.00	47.50	3286	11.0	657	0.0	
6	8.00	SM	0.30	n	61.00	57.00	3880	8.0	1164	0.0	
7	12.00	CL	0.20	n	73.00	67.00	4506	12.0	901	0.0	
8	48.00	CL	0.20	n	121.00	97.00	6384	17.0	1277	0.0	

Downdrag Forces on Circular Piles

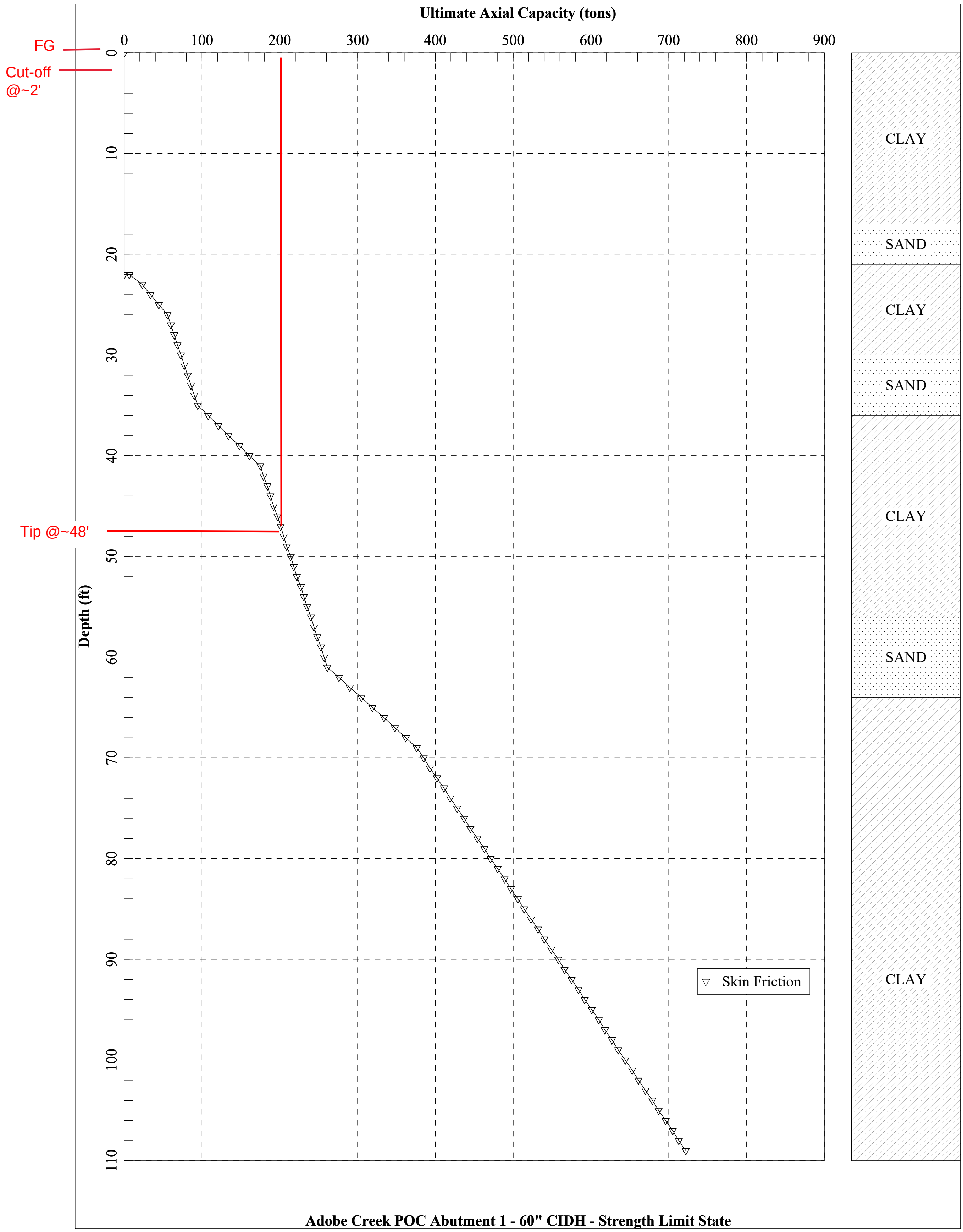
Project No	2012-122-POC
Project	Adobe Creek
Location	Profile 3 - Abutment 15
Boring	
Single Pile Dia. (ft)	3
GW Depth (ft)	5
Bulk Unit Weight (pcf)	125
Pile Length (ft)	90
# of Equiv. Pile Circumference	1

Analysis By:	EO
Date:	2/14/2017

Layer Number	Layer Thickness (ft)	Soil Type	Beta	Consider downdrag (y/n)	Total Depth (ft)	Layer Mid-Point Depth (ft)	Effective Stress (psf)	Contributing Thickness (ft)	Unit Negative Friction (ft)	Downdrag Force per Section (ton)	Total Downdrag Force (ton)
1	5.00	CL	0.20	n	5.00	2.50	313	5.0	63	0.0	
1b	9.00	CL	0.20	y	14.00	9.50	907	9.0	181	7.7	7.7
2	5.00	SW-SM	0.35	y	19.00	16.50	1345	5.0	471	11.1	18.8
3	15.00	CL	0.20	y	34.00	26.50	1971	15.0	394	27.9	46.6
4	8.00	SM	0.30	n	42.00	38.00	2691	8.0	807	0.0	
5	11.00	CL	0.20	n	53.00	47.50	3286	11.0	657	0.0	
6	8.00	SM	0.30	n	61.00	57.00	3880	8.0	1164	0.0	
7	12.00	CL	0.20	n	73.00	67.00	4506	12.0	901	0.0	
8	48.00	CL	0.20	n	121.00	97.00	6384	17.0	1277	0.0	

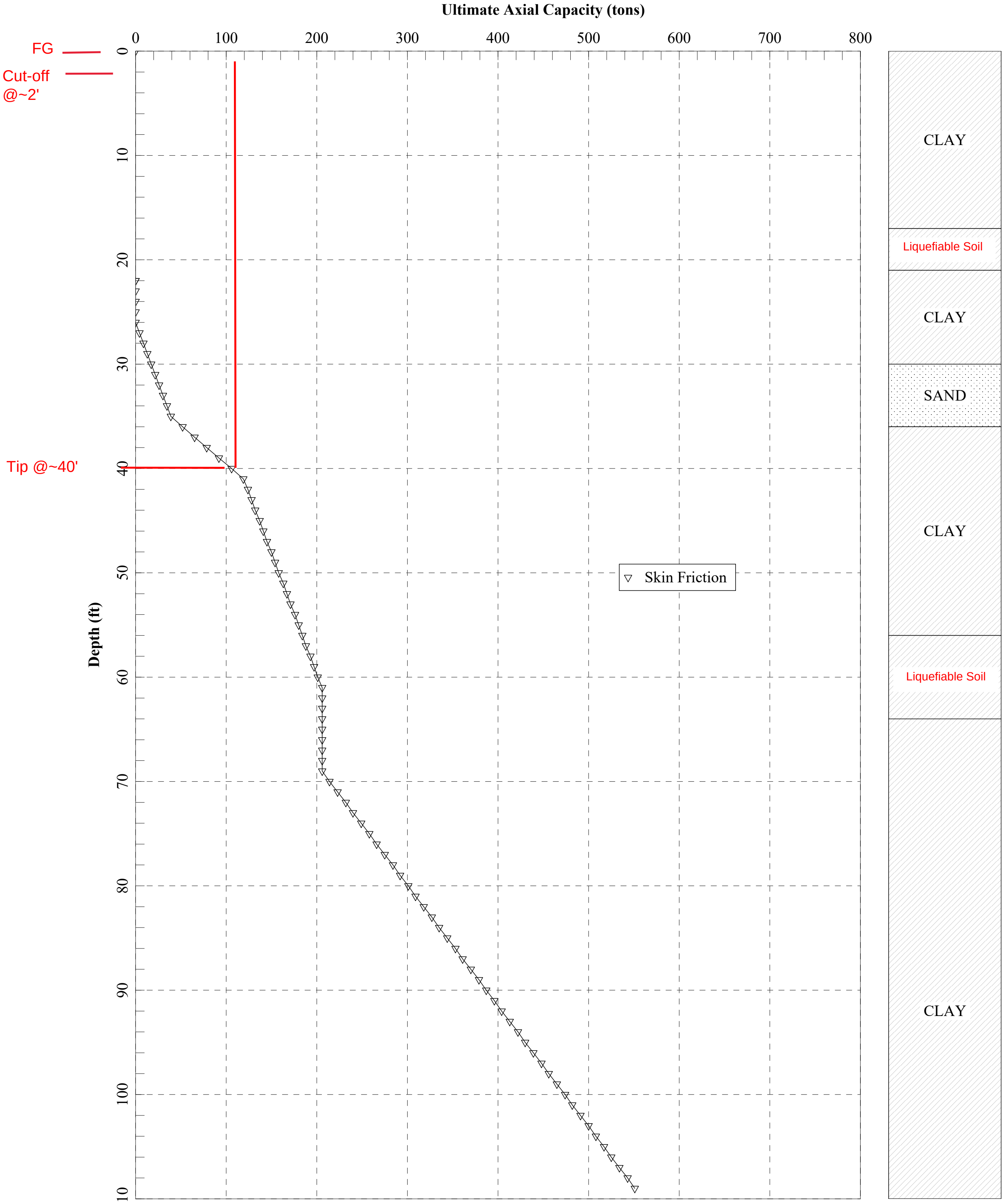
AXIAL PILE CAPACITY ANALYSES

Nominal Resistance Required 200 tons
(Permanent Casing ~15.5ft below FG)



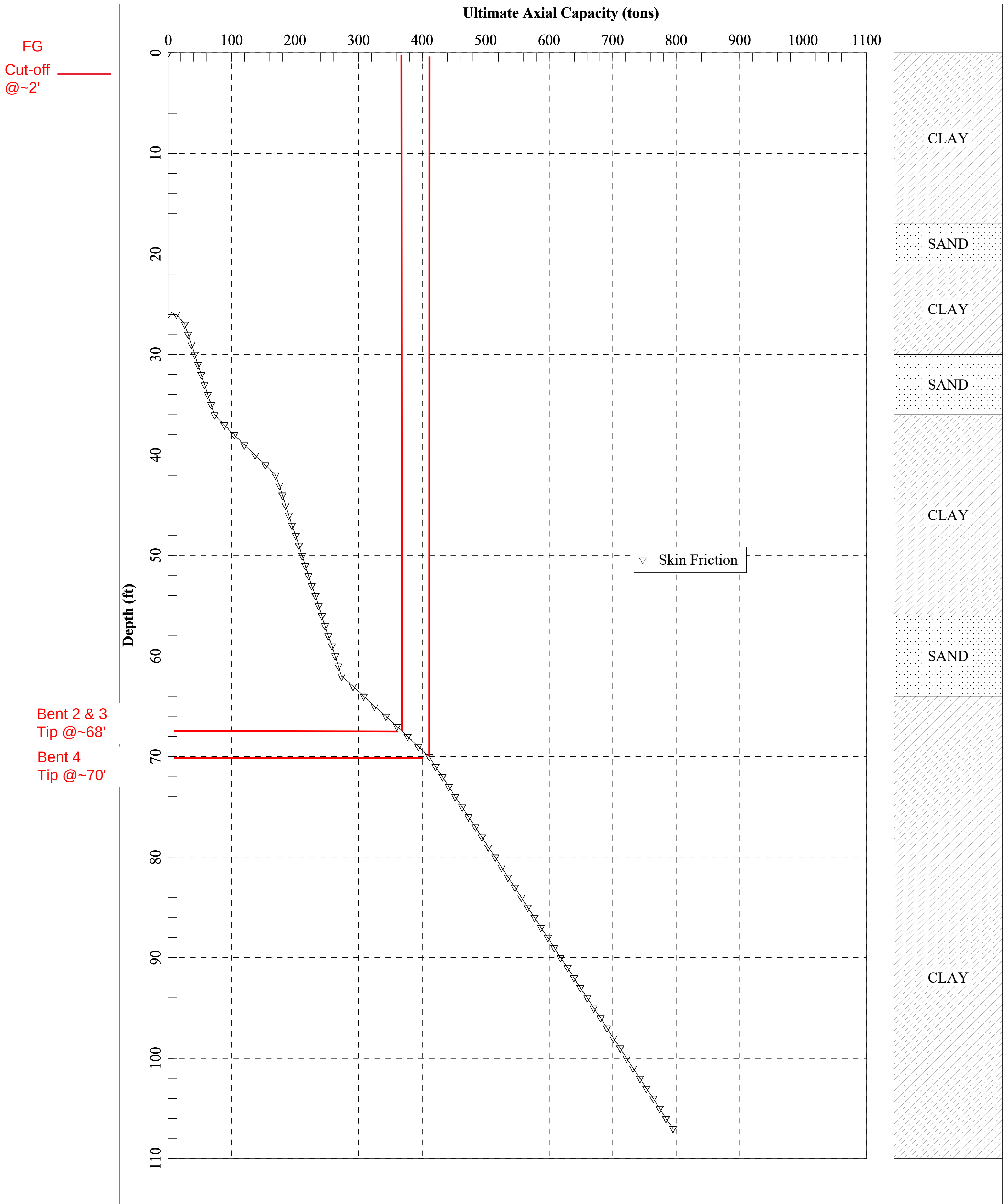
Adobe Creek POC Abutment 1 - 60" CIDH - Strength Limit State

Nominal Resistance Required 95+10(DD) = 105 tons ~=110 tons
(Permanent Casing ~15.5ft below FG)



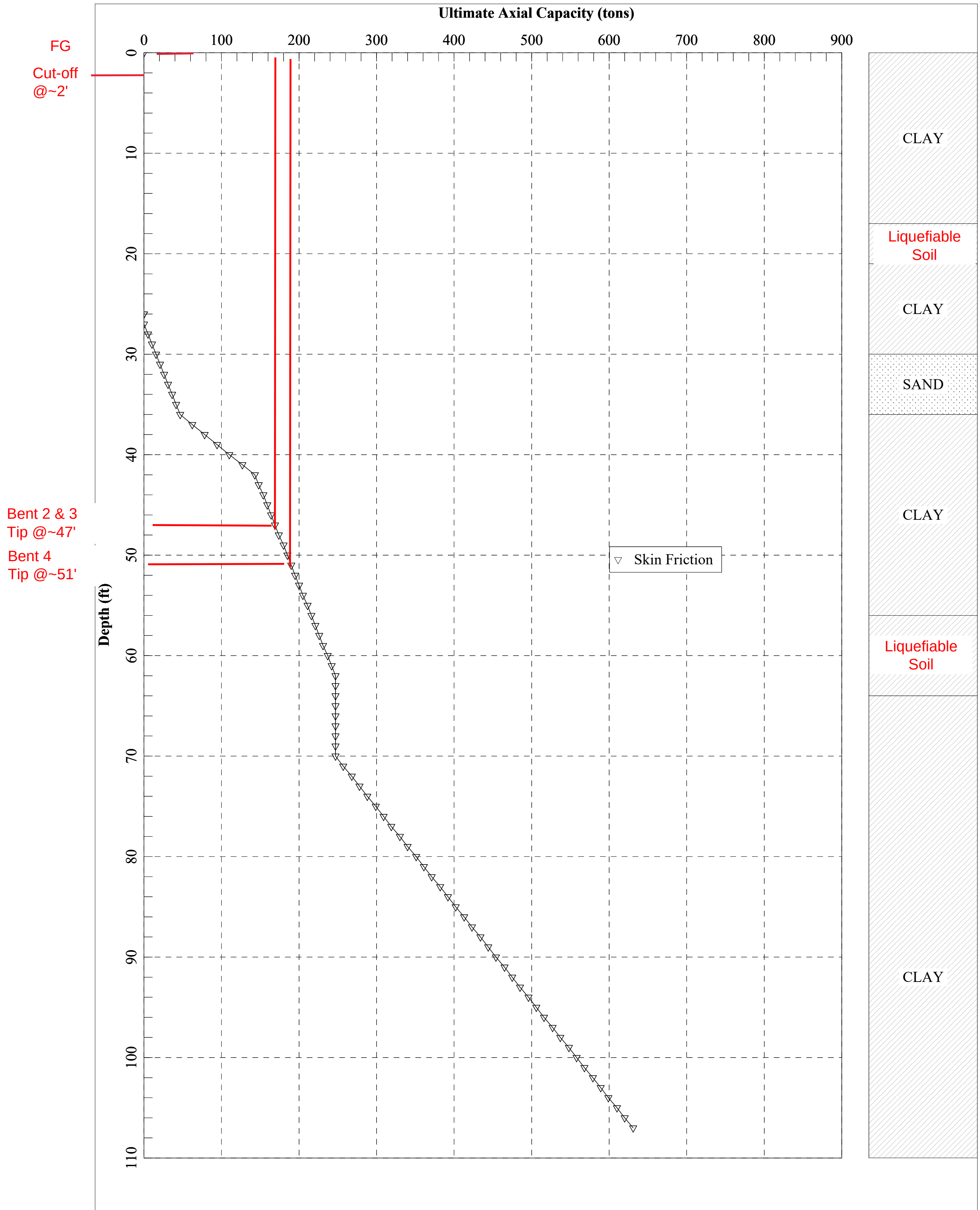
Adobe Creek POC Abutment 1 - 60" CIDH - Extreme Limit State

Nominal Resistance Required 365 tons for Bents 2 and 3
Nominal Resistance Required 410 tons for Bent 4
(Permanent Casing ~19ft below FG)

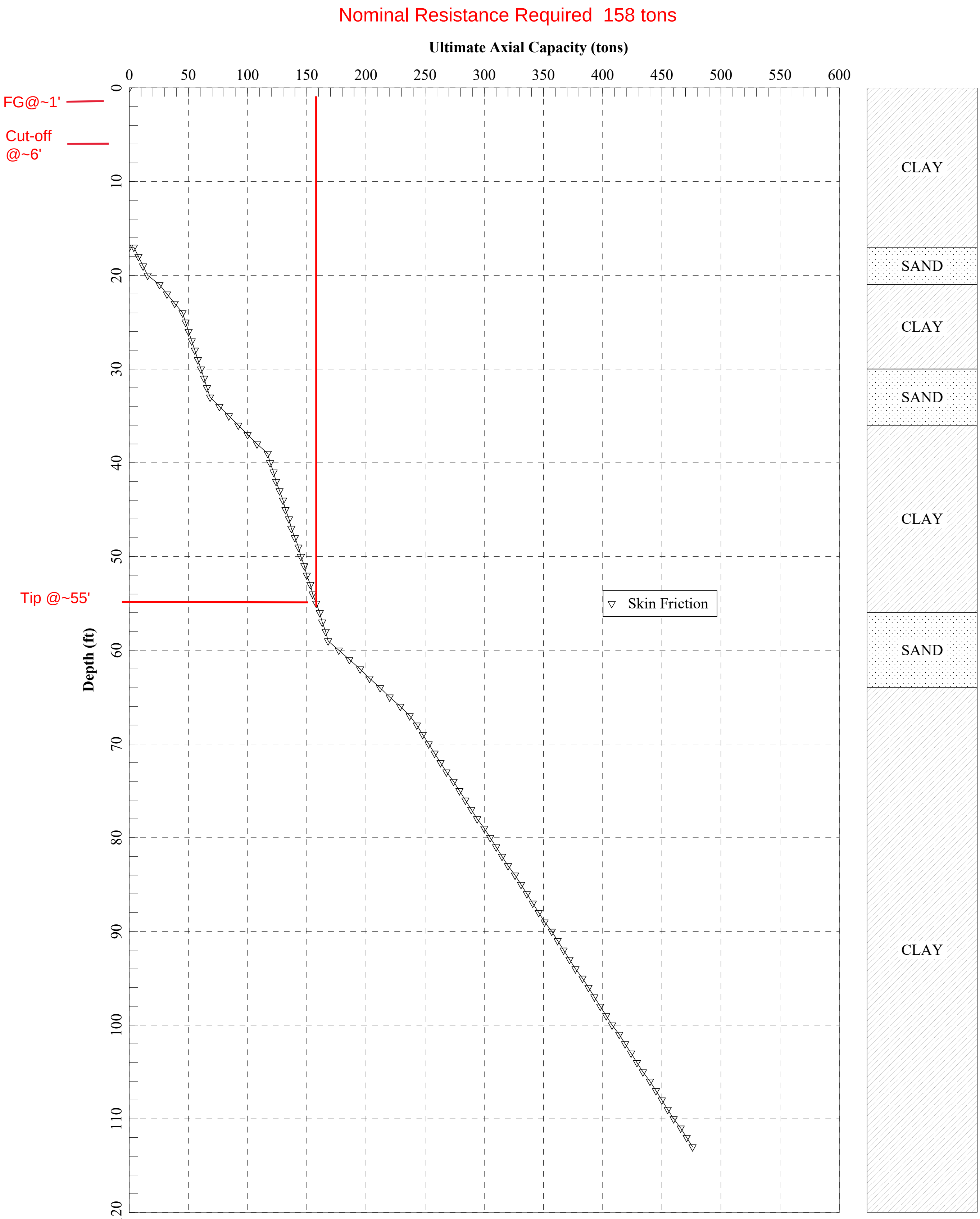


Adobe Creek POC Bents 2, 3, 4 - 72" CIDH - Strength Limit State

Nominal Resistance Required 155+ 11.5 (DD) = 166.5 tons ~= 170 tons for Bents 2 and 3
Nominal Resistance Required 170 + 11.5 (DD) = 181.5 tons = ~190 tons for Bent 4
(Permanent Casing ~19ft below FG)

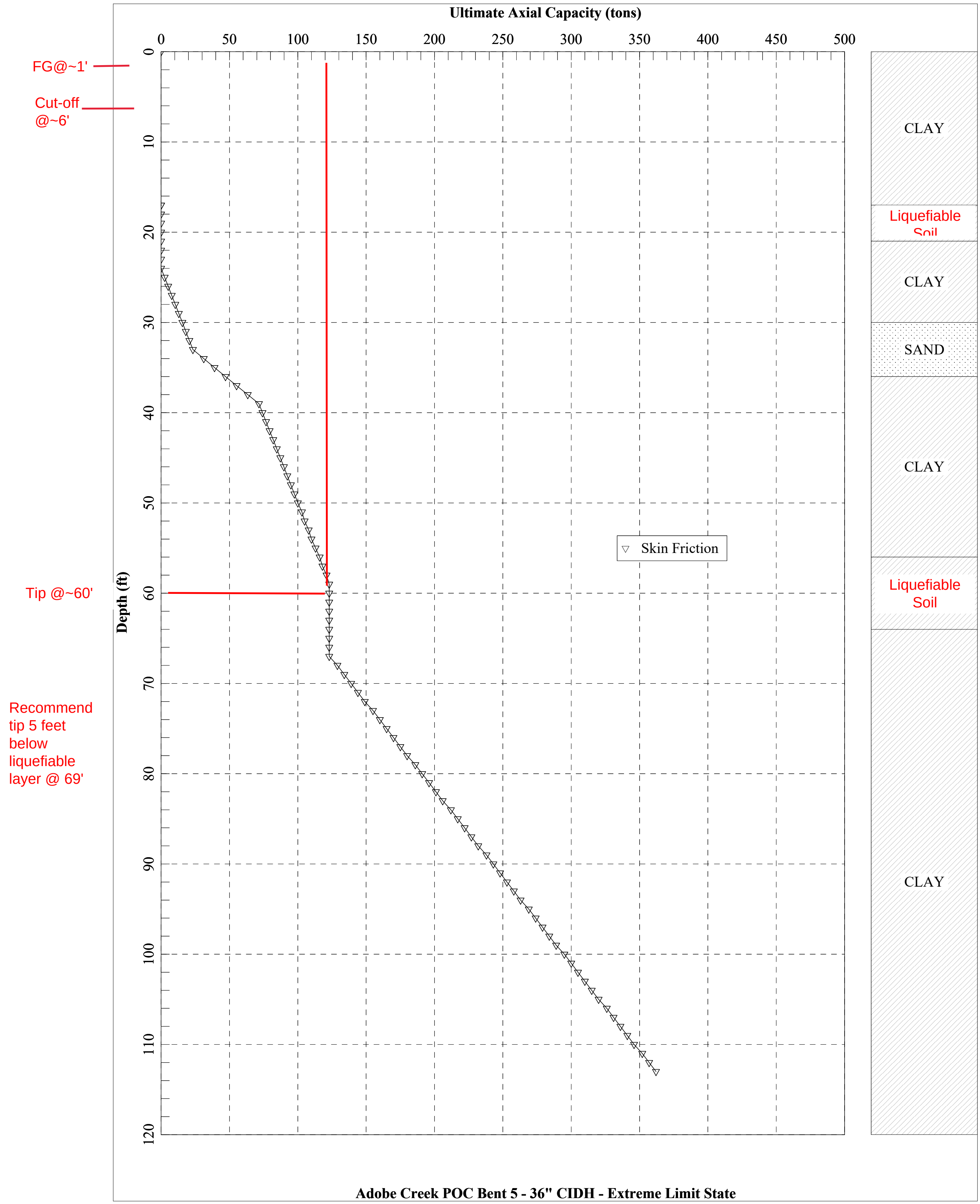


Adobe Creek POC Bents 2, 3, 4 - 72" CIDH - Extreme Limit State



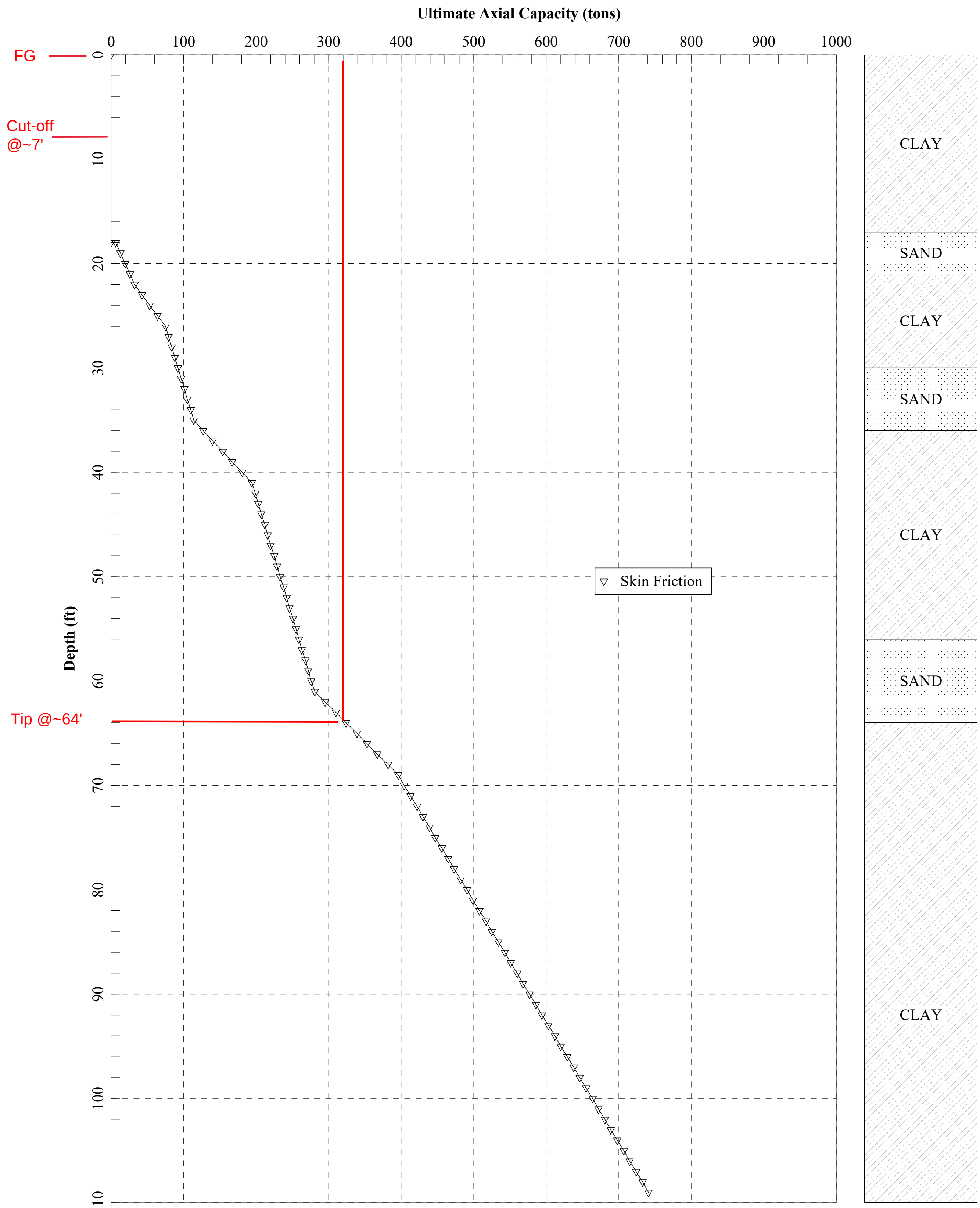
Adobe Creek POC Bent 5 - 36" CIDH - Strength Limit State

Nominal Resistance Required 105 + 11(DD) = 116 tons ~= 120 tons tons



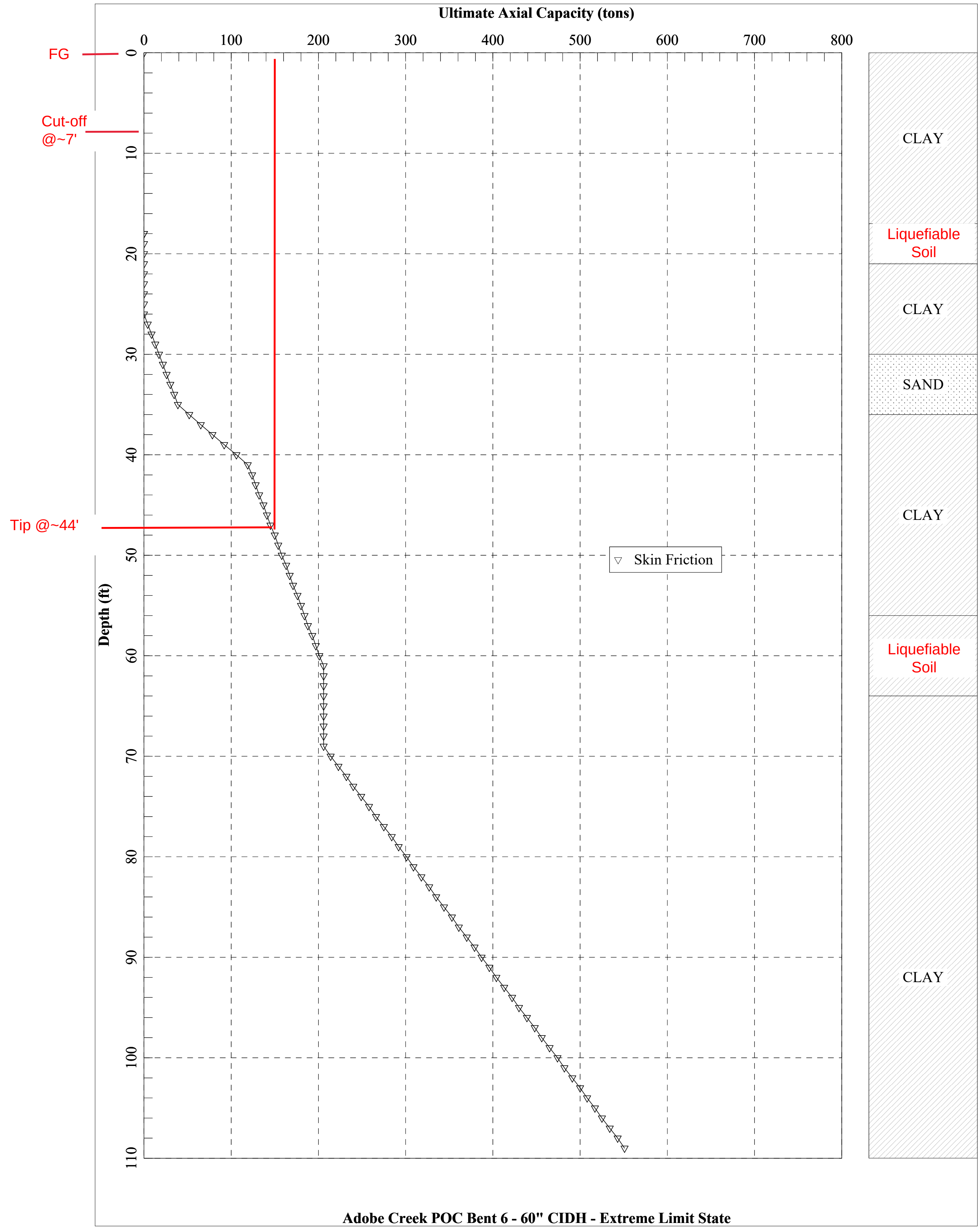
Adobe Creek POC Bent 5 - 36" CIDH - Extreme Limit State

Nominal Resistance Required 320 tons

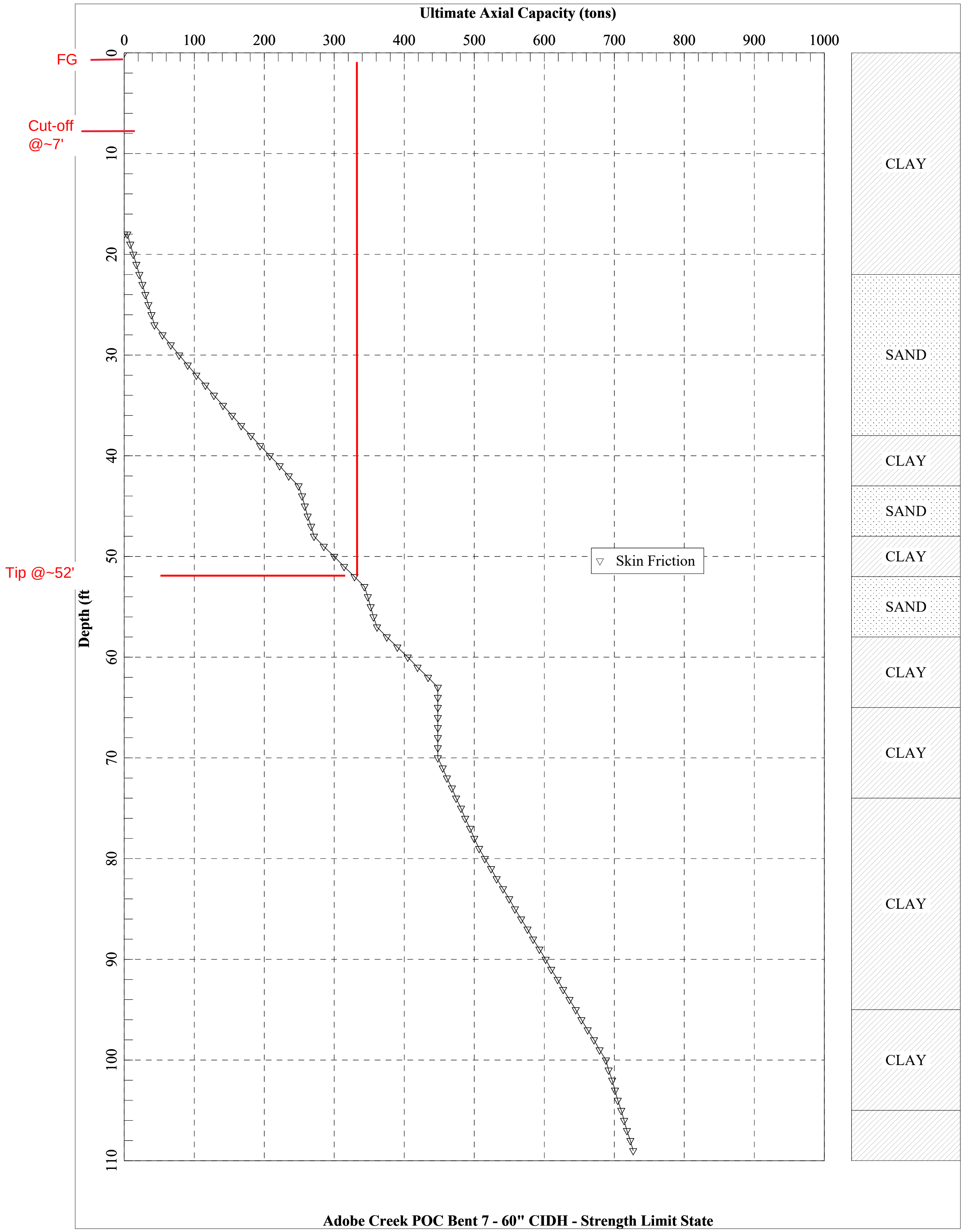


Adobe Creek POC Bent 6 - 60" CIDH - Strength Limit State

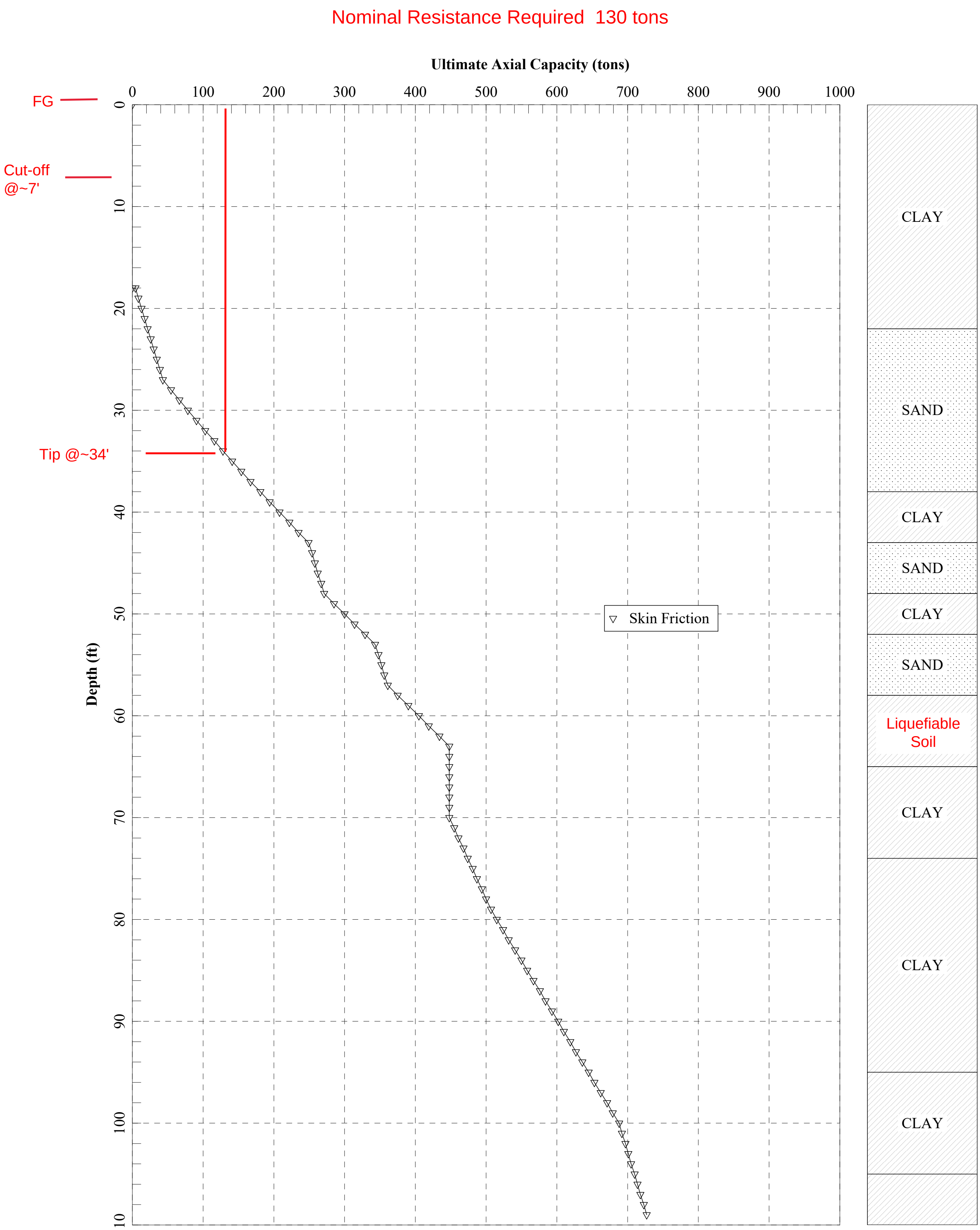
Nominal Resistance Required 130+17(DD)=147 tons ~= 150 tons



Nominal Resistance Required 330 tons

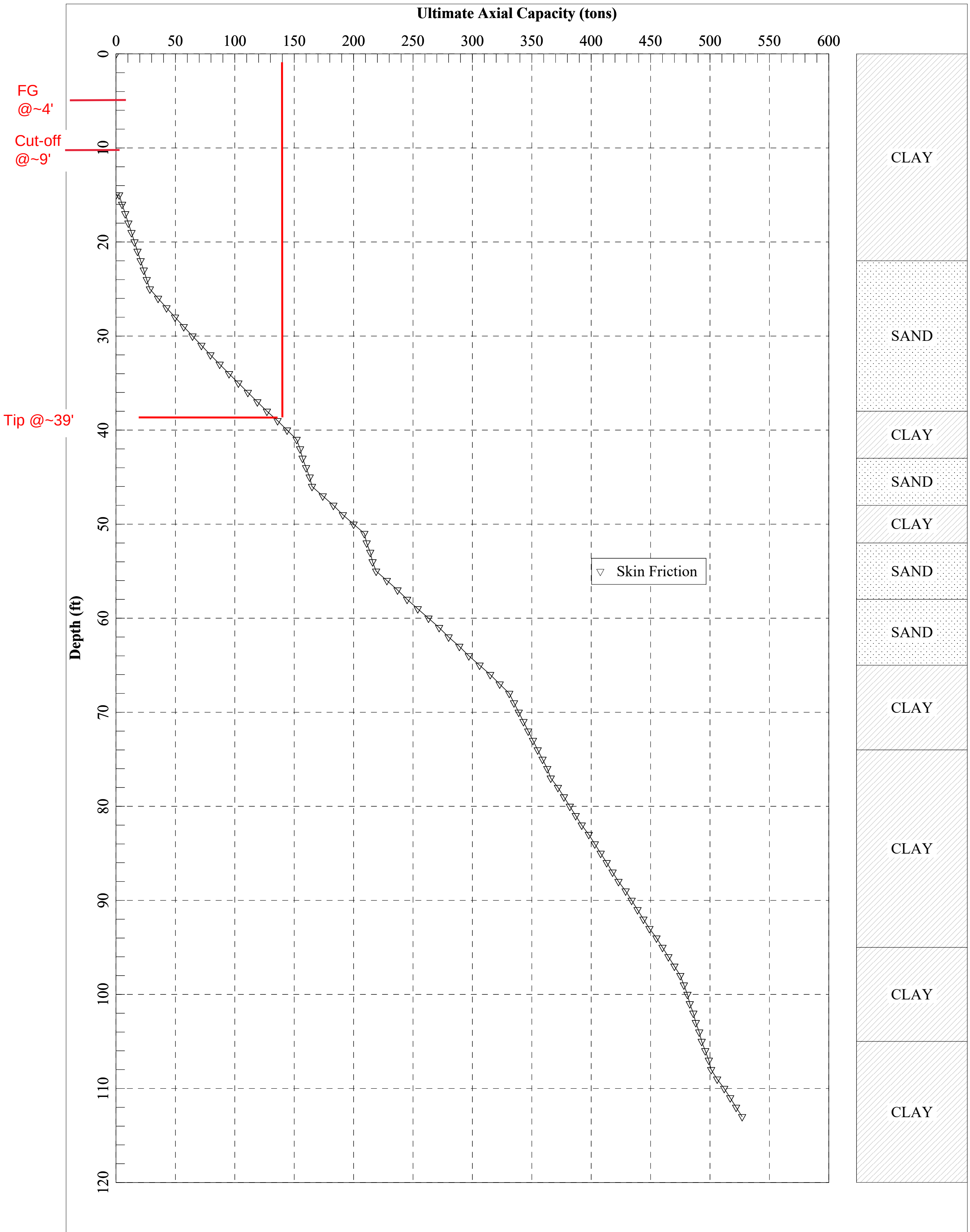


Adobe Creek POC Bent 7 - 60" CIDH - Strength Limit State



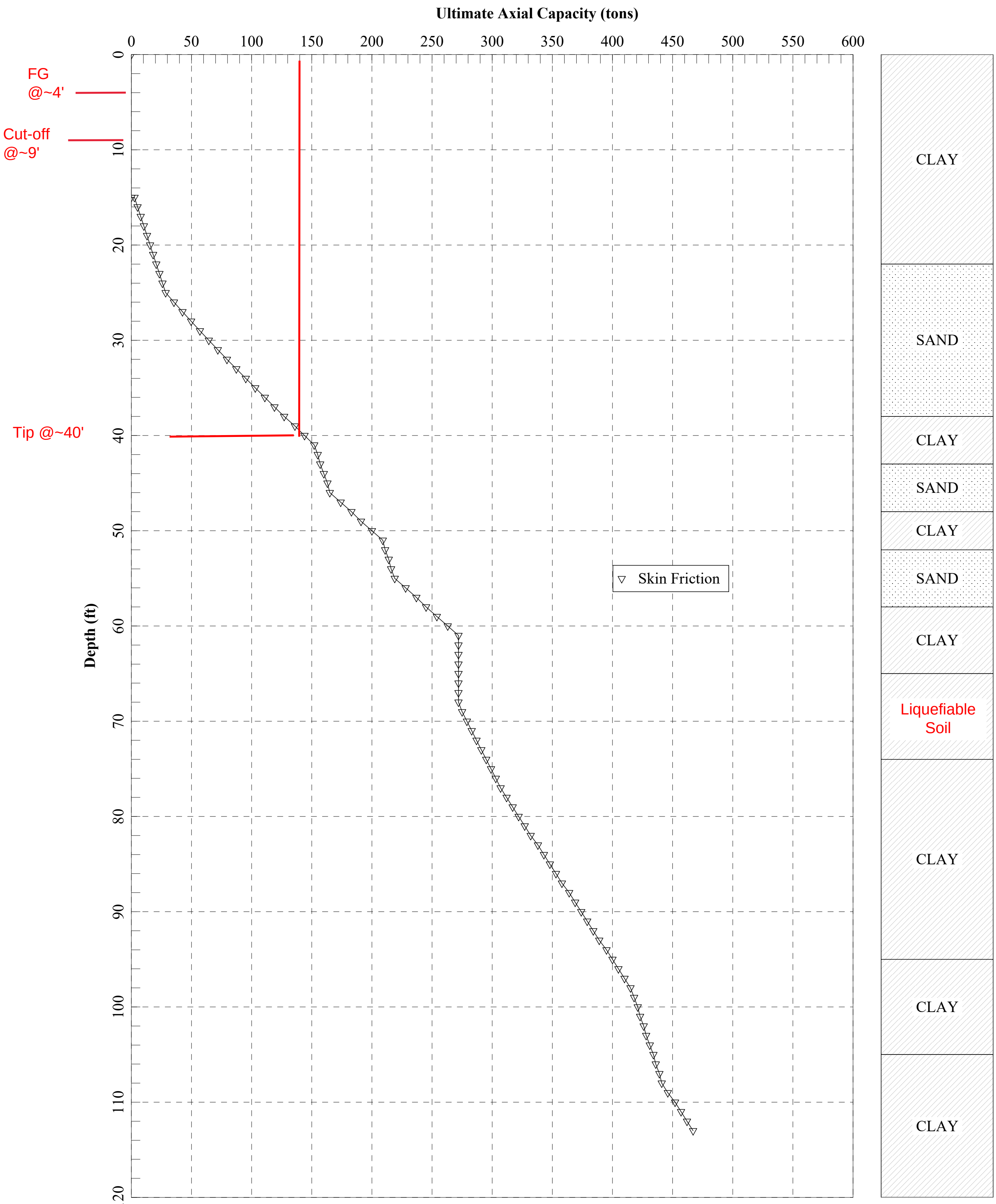
Adobe Creek POC Bent 7 - 60" CIDH - Extreme Limit State

Nominal Resistance Required 140 tons



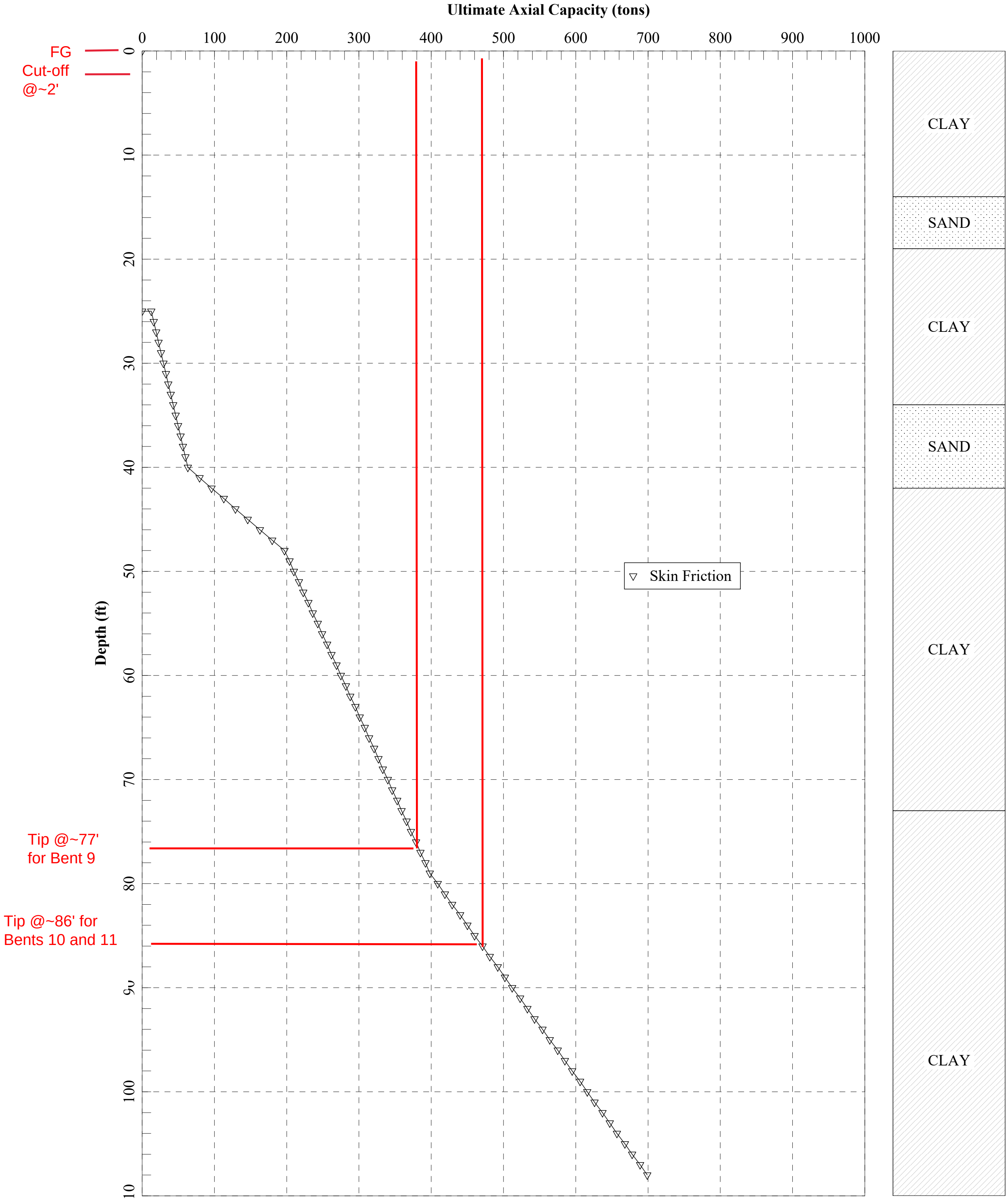
Adobe Creek POC Bent 8 - 36" CIDH - Strength Limit State

Nominal Resistance Required 140 tons



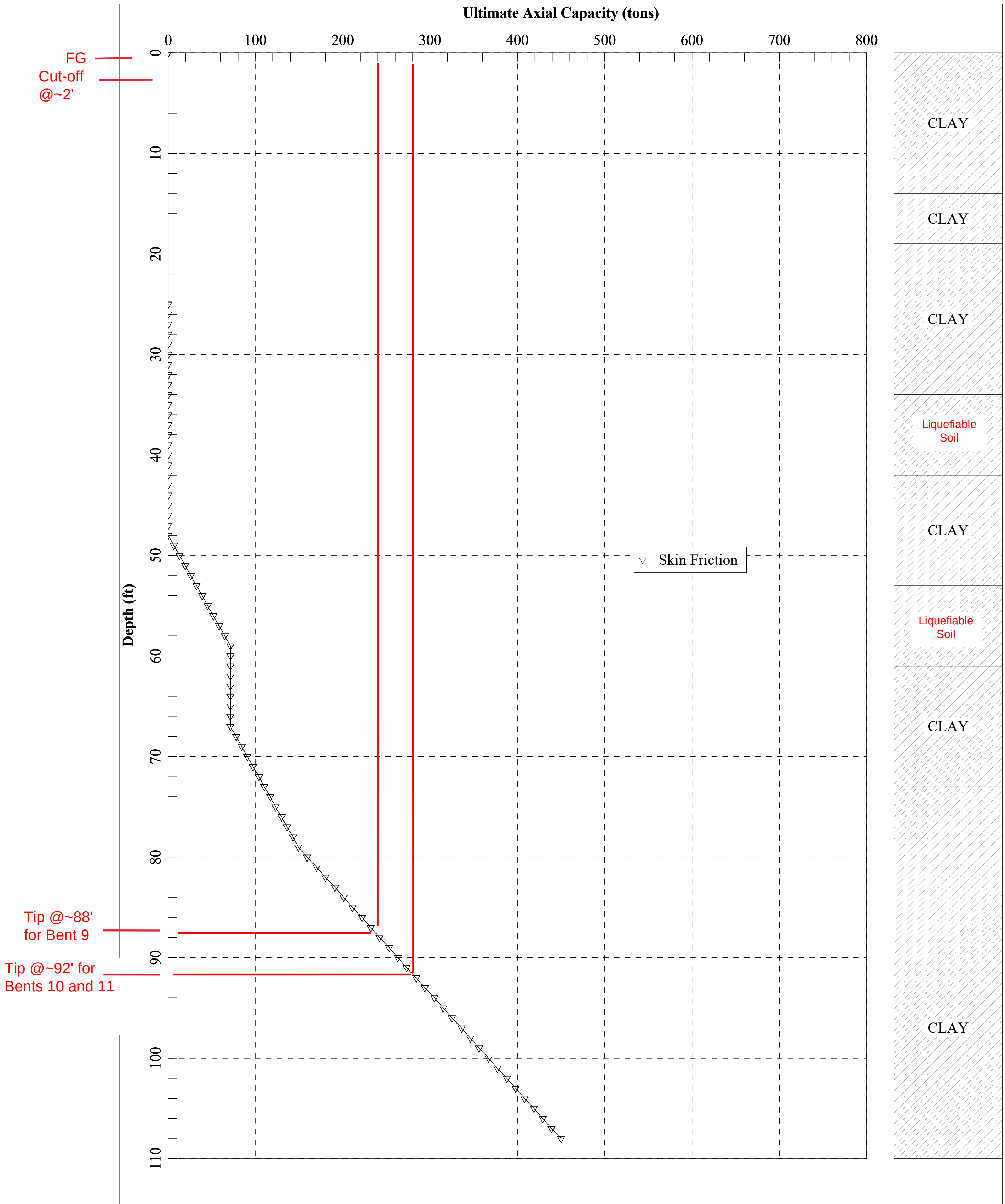
Adobe Creek POC Bent 8 - 36" CIDH - Extreme Limit State

Nominal Resistance Required 380 tons for Bent 9
Nominal Resistance Required 470 tons for Bents 10 and 11
(Permanent Casing ~ 18 ft below FG)

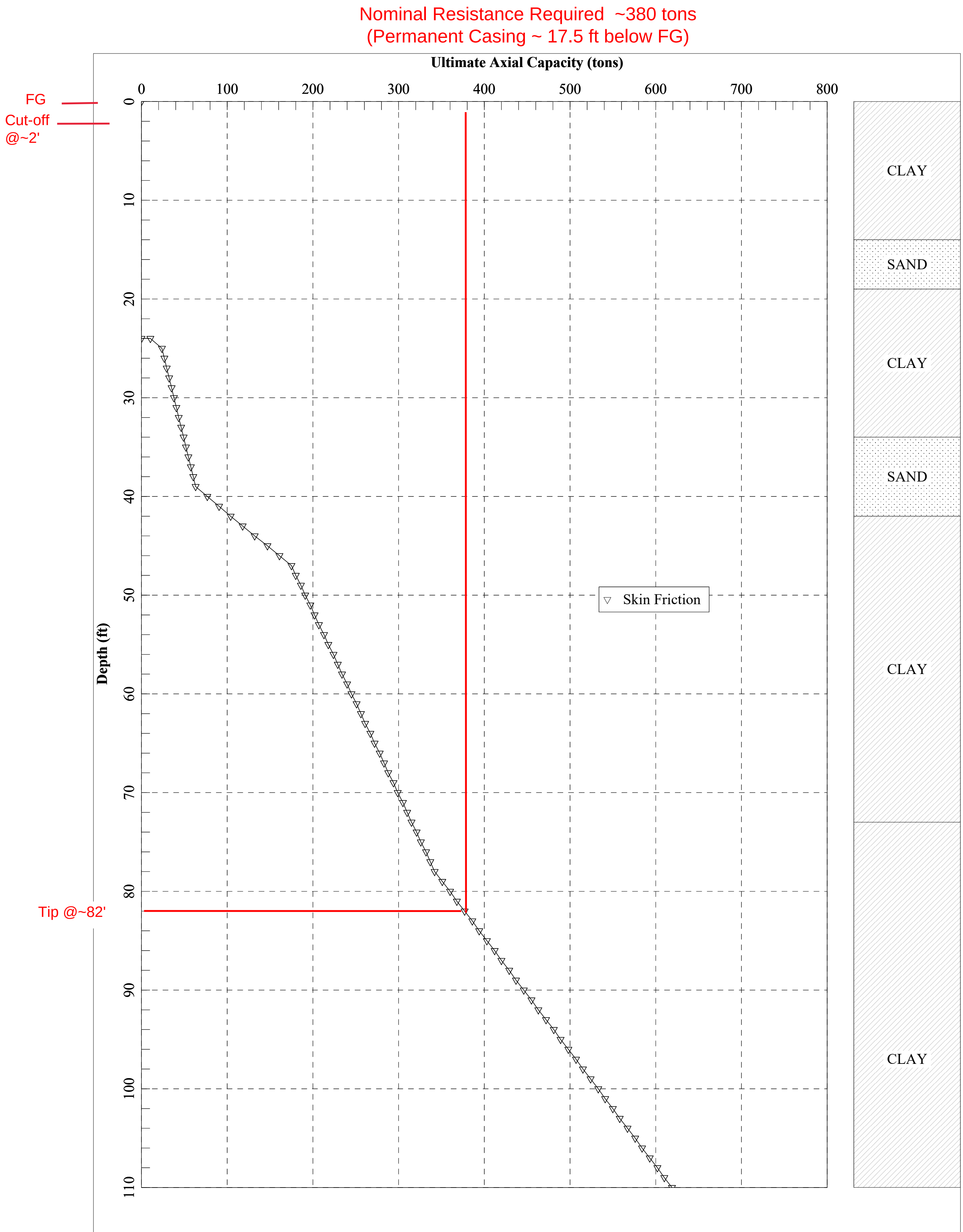


Adobe Creek POC Bents 9, 10, 11 - 72" CIDH - Strength Limit State

Nominal Resistance Required 155+78(DD)= 233 tons ~=240 tons for Bent 9
Nominal Resistance Required 200+ 78(DD) =278 tons ~= 280 tons for Bents 10 and 11
(Permanent Casing ~ 18 ft below FG)

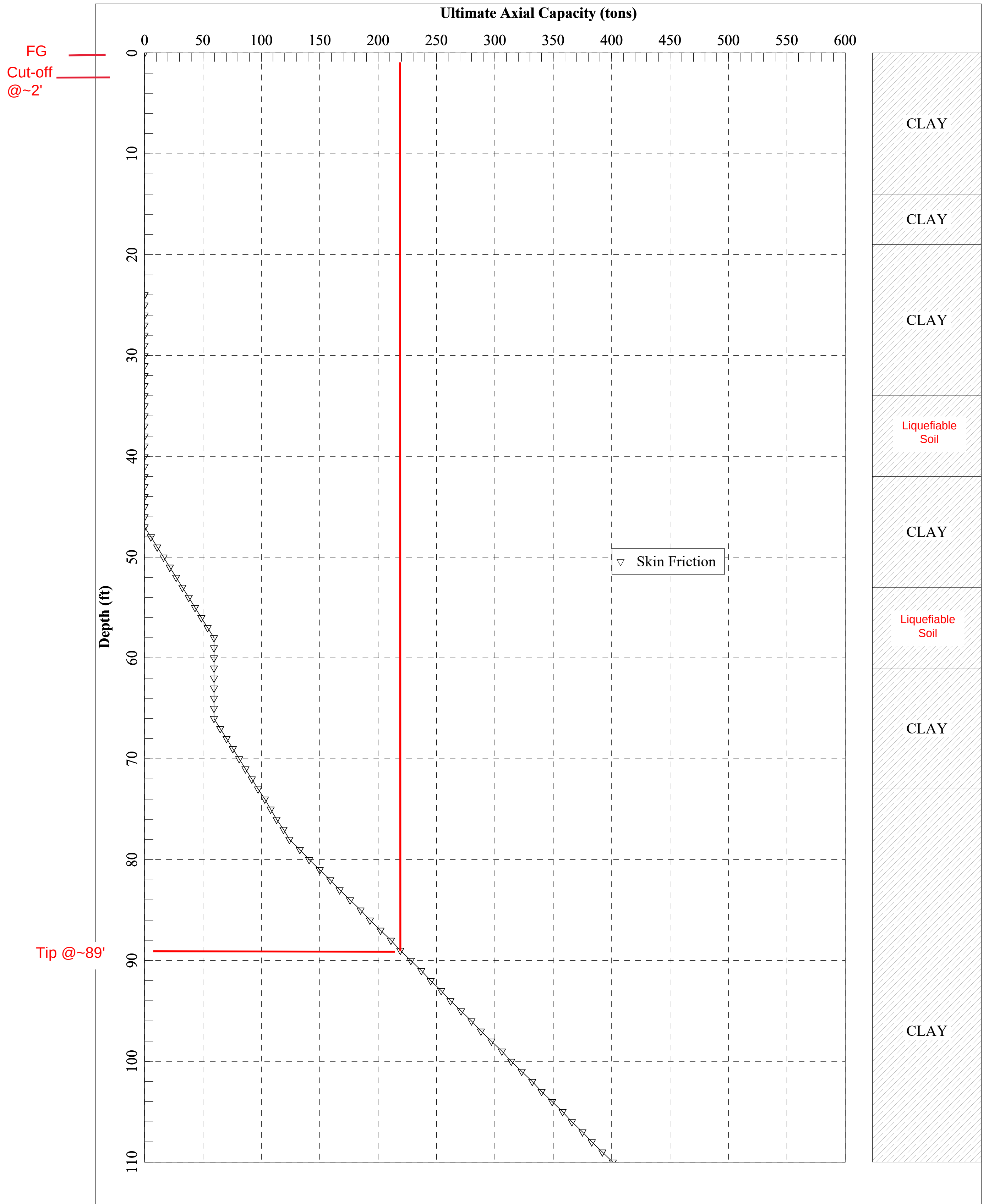


Adobe Creek POC Bents 9, 10, 11 - 72" CIDH - Extreme Limit State

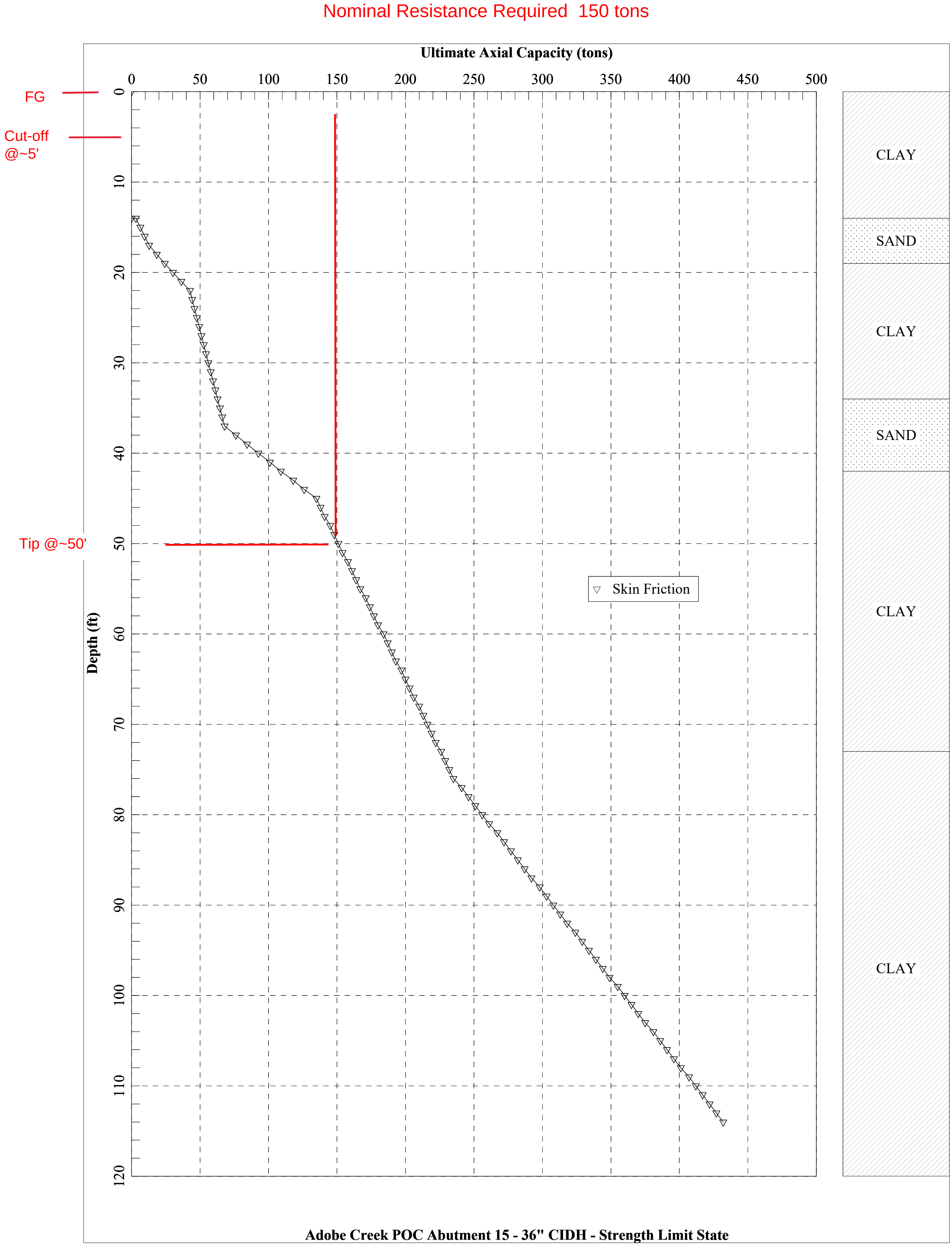


Adobe Creek POC Bents 12, 13, 14 - 60" CIDH - Strength Limit State

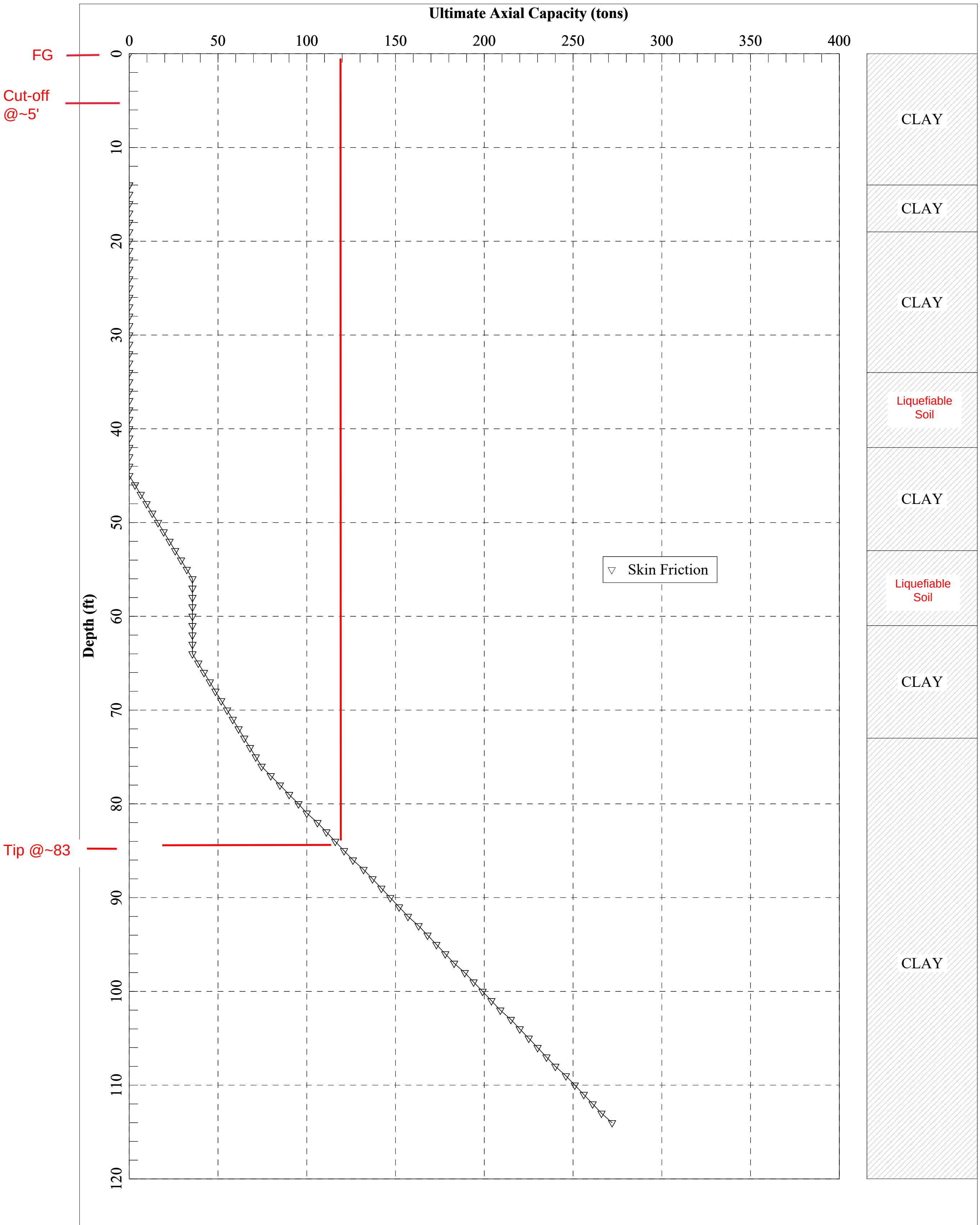
Nominal Resistance Required 155 + 65(DD) = 220 tons
(Permanent Casing ~ 17.5 ft below FG)



Adobe Creek POC Bents 12, 13, 14 - 60" CIDH - Extreme Limit State


Nominal Resistance Required 150 tons
Ultimate Axial Capacity (tons)
0
50
100
150
200
250
300
350
400
450
500
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
FG
Cut-off
@~5'
Tip @~50'
Skin Friction
CLAY
SAND
CLAY
SAND
CLAY
CLAY
Adobe Creek POC Abutment 15 - 36" CIDH - Strength Limit State

Nominal Resistance Required 65+47(DD) = 112 tons ~=120 tons



Adobe Creek POC Abutment 15 - 36" CIDH - Extreme Limit State

LATERAL SOIL PRESSURE

Rankine Active Lateral Pressure Coefficient (K_a)

Project Name/Number: Adobe Creek
Structure Name/Number:

By: EO
Date: 2/13/2017

Parameters	Angle in degrees	Angle in radians	
ϕ	34	0.593	(Friction Angle of Soil)
β	0	0.000	(Backfill angle with horizontal)

K_a	0.283

$$K_a = \frac{\cos\beta - \left(\cos^2\beta - \cos^2\phi\right)^{1/2}}{\cos\beta + \left(\cos^2\beta - \cos^2\phi\right)^{1/2}}$$

M-O Seismic Active Lateral Pressure Coefficient (K_{AE})

Project Name/Number: Adobe Creek **By:** EO
Structure Name/Number: Abutments **Date:** 2/13/2017

Parameters	Angle in degrees	Angle in Radians	
ϕ	34	0.593	(Friction Angle of Soil)
i	0	0.000	(Backfill angle with horizontal)
β	0	0.000	(Wall backface angle **with vertical**)
δ	22.78	0.398	(Friction Angle between Soil and the backface of the wall)

kh (no unit)	0.293	
kv (no unit)	0	
θ_{MO} (rad)		0.285

$\Delta P_{ae} = (0.49 - K_a) \times 125 \times 0.5 \times H^2$
$\cong 13H^2$ lb/ft

K_{ae}	0.49

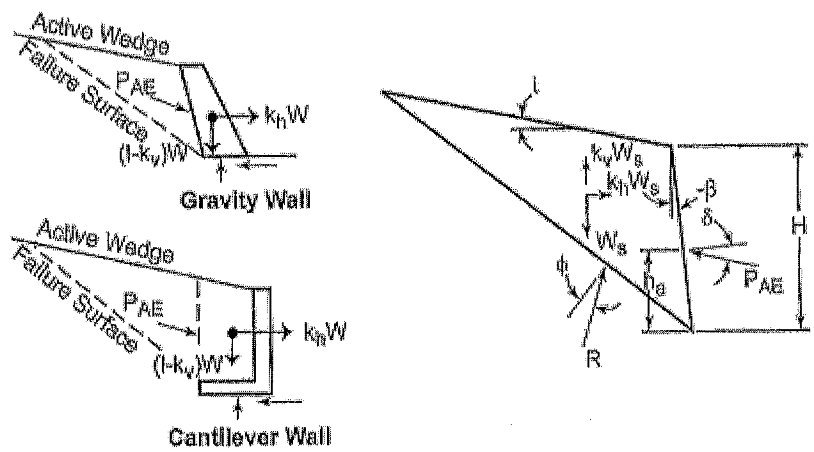


Figure A11.3.1-1—Mononobe-Okabe Method Force Diagrams

$$K_{AE} = \frac{\cos^2(\phi - \theta_{MO} - \beta)}{\cos\theta_{MO}\cos^2\beta\cos(\delta+\beta+\theta_{MO})} \times \left[1 + \sqrt{\frac{\sin(\phi+\delta)\sin(\phi-\theta_{MO}-i)}{\cos(\delta+\beta+\theta_{MO})\cos(i-\beta)}}\right]^{-2} \quad \text{(A11.3.1-1)}$$

where:

K_{AE} = seismic active earth pressure coefficient (dim)
γ = unit weight of soil (kcf)
H = height of wall (ft)
h = height of wall at back of wall heel considering height of sloping surcharge, if present (ft)
ϕ_f = friction angle of soil (degrees)
θ_{MO} = arc tan $[k_h/(1-k_v)]$ (degrees)
δ = wall backfill interface friction angle (degrees)
k_h = horizontal seismic acceleration coefficient (dim.)
k_v = vertical seismic acceleration coefficient (dim.)
i = backfill slope angle (degrees)
β = slope of wall to the vertical, negative as shown (degrees)

M-O Seismic Active Lateral Pressure Coefficient (K_{AE})

Project Name/Number: Adobe Creek
Structure Name/Number: Retaining Walls

By: EO
Date: 2/13/2017

Parameters	Angle in degrees	Angle in Radians	
ϕ	34	0.593	(Friction Angle of Soil)
i	0	0.000	(Backfill angle with horizontal)
β	0	0.000	(Wall backface angle **with vertical**)
δ	22.78	0.398	(Friction Angle between Soil and the backface of the wall)

kh (no unit)	0.195	
kv (no unit)	0	
θ_{MO} (rad)		0.193

K_{ae}	0.39

$\Delta P_{ae} = (0.39 - K_a) \times 125 \times 0.5 \times H^2$

$\cong 7H^2$ lb/ft

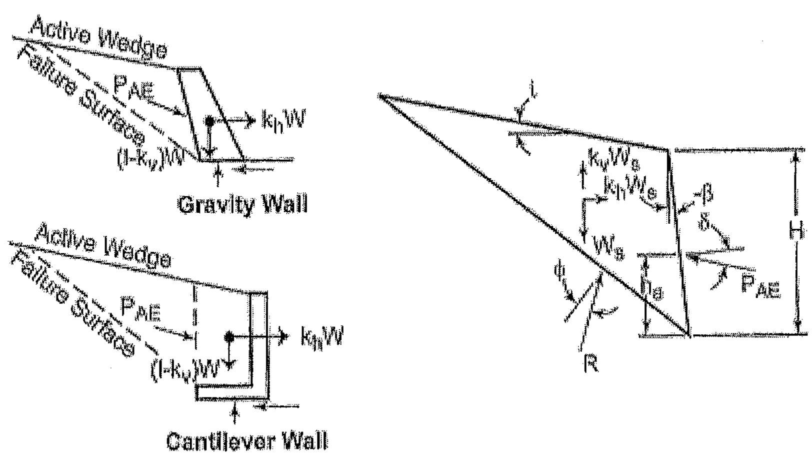


Figure A11.3.1-1—Mononobe-Okabe Method Force Diagrams

$$K_{AE} = \frac{\cos^2(\phi - \theta_{MO} - \beta)}{\cos\theta_{MO}\cos^2\beta\cos(\delta + \beta + \theta_{MO})} \times \left[1 + \sqrt{\frac{\sin(\phi+\delta)\sin(\phi - \theta_{MO} - i)}{\cos(\delta+\beta+\theta_{MO})\cos(i-\beta)}}\right]^{-2} \quad \text{(A11.3.1-1)}$$

where:

K_{AE} = seismic active earth pressure coefficient (dim)
γ = unit weight of soil (kcf)
H = height of wall (ft)
h = height of wall at back of wall heel considering height of sloping surcharge, if present (ft)
ϕ_f = friction angle of soil (degrees)
θ_{MO} = arc tan $[k_h/(1 - k_v)]$ (degrees)
δ = wall backfill interface friction angle (degrees)
k_h = horizontal seismic acceleration coefficient (dim.)
k_v = vertical seismic acceleration coefficient (dim.)
i = backfill slope angle (degrees)
β = slope of wall to the vertical, negative as shown (degrees)

P-MULTIPLIERS

PARIKH
Practicing in the Geosciences

PROJECT NO. 2016-122-POC
PROJECT NAME Adobe Creek POC
CALCULATED BY EO DATE 1/13/17
CHECKED BY YDW DATE 1/2017
VERIFIED BY DATE
BACK CHECKED BY DATE

SUBJECT P-multipliers

Per Section 10.7.2.4 of "California Amendments to AASHTO LRFD Bridge Design Specifications -Sixth Edition."

Piles with 3D spacing and 2 piles in single row: Bent 6, Bent 7

p-multiplier = (0.75 + 0.5)/2 = 0.65 in transverse ((table 10.7.2.4-1)

p-multiplier = 0.9 (single row, 3D spacing) in longitudinal (7th paragraph)

Piles with 3D spacing and 2x2 configuration: Bent 5, Bent 8, Abut 15

p-multiplier = (0.75 + 0.55)/2 = 0.65 in transverse and longitudinal (table 10.7.2.4-1)

* Rest of the supports are single columns and no p-multiplier reduction is needed

10.7.2.4—Horizontal Pile Foundation Movement

Revise Table as follows:

Table 10.7.2.4-1 Pile P-Multipliers, P_m for Multiple Row Shading ~~(average from Hannigan et al., 2005).~~

Pile *CTC* spacing (in the Direction of Loading)	P-Multipliers, P_m		
	Row 1	Row 2	Row 3
2.0*B*	0.60	0.35	0.25
3.0*B*	0.75 ~~0.8~~	0.55 ~~0.4~~	0.40 ~~0.3~~
5.0*B*	1.0	0.85	0.70
7.0*B*	1.0	1.0	0.90

Revise the 7th Paragraph as follows:

Loading direction and spacing shall be taken as defined in Figure 10.7.2.4-1. A P-multiplier of 1.0 shall be used for pile *CTC* spacing of 8*B* or greater. If the loading direction for a single row of piles is perpendicular to the row (bottom detail in the Figure), a P-multiplier ~~group reduction factor~~ of less than 1.0 shall only be used if the pile spacing is ~~5~~4*B* or less~~, i.e., a *Pm* of 0.8 for a spacing of 3*B*, as shown in Figure 10.7.2.4-1~~. A P-multiplier of 0.80, 0.90 and 1.0 shall be used for pile spacing of 2.5*B*, 3*B* and 4*B*, respectively.

C10.7.2.4

Revise the 6th Paragraph as follows:

The multipliers on the pile rows are a topic of current research and may change in the future. Values from recent research have been ~~tabulated by~~ compiled from Reese and Van Impe (2000), Caltrans (2003), Hannigan et al. (2006), and Rollins et al. (2006).

APPENDIX VI
Exceptions to Policy

This appendix is not relevant to the report.

APPENDIX VII
Response to Caltrans Review Comments

Response to Comments dated 05/31/17

Office of Special Funded Projects
Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer Liaison to complete)	
Dist:	**04-SCL-101-PM 50.6**	☐ PSR/PDS (Review No. 1	Reviewer Name:	**Hossain Salimi/Meng-Hsi Hung**
Proj ID (Phase):	**0413000094**	☐ APS/PSR (Review No.)	Functional Unit:	**OGD-West**
Project Name:	**Adobe Creek POC**	☐ APS/PR (Review No.)	Cost Center:	**3660**
OSFP Liaison:	**David Soon**	☐ Type Selection	Phone Number:	**916-227-7147/ 510-286-7245**
Phone:	**916-227-5671**	☐ 65% PS&E Unchecked Details	e-mail:	**Hossain.salimi@dot.ca.gov/menghsi.hung@dot.ca.gov**
E-mail:	**David.soon@dot.ca.gov**	☐ PS&E (Review No. 1)	Date of Review:	**05/31/2017**
		☐ Construction	Structure Name*:	**Adobe Creek POC**
		☐ Other: CCO	Br No*:	**TBD**
		Preliminary Foundation Report Adobe Creek Pedestrian Overcrossing Dated April 13, 2017	(*Use if necessary to when comment sheets are by individual structure)	

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Geotechnical Consultant Firm	Phone Number	E-mail	Response Date
Alta Planning and Design	**Parikh Consultants Inc.**			

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	PFR	Section 5 Page 3	Paragraph 2: "the hammer energy of the drill rig used is approximately 77% for all …". Is this the hammer efficiency percentage? If so, what is the N-value adjustment for the hammer? Typically, a hammer efficiency percentage of 77 for Caltrans rigs yields an N value adjustment of 1.28. There is no mention of the adjustment values in this report. (HS)	The terminology "hammer energy" is revised as "hammer efficiency percentage". For conversions to 60% equivalent, a factor of 77/60=±1.28 was used in our analyses. This ratio is added to the report.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
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2	PFR	Section 5 Page 3	Paragraph 2: "the blow counts for the modified California Sampler may be converted to equivalent SPT blow counts by multiplying a conversion factor of 0.65." Based on the LOTBs, both 1.4 and 2.5 inch samplers were used for the boring. However, it doesn't look like the adjustments were incorporated in determining the Vs30. More importantly, looking at liquefaction analysis, the adjustment for either hammer efficiency or sampler sizes don't seem to have been incorporated. I looked at one boring (B-2) and the field blow counts seem to have been used directly without any adjustments. (HS)	The blow counts were corrected for both hammer efficiency and sampler type in our calculation for both Vs30 calculations and for liquefaction analysis. In our liquefaction potential analysis tables in Appendix V, pages 98-103, the column "SPT-Neq" is for sampler type corrected blow counts. The column "N60" shows blow counts after additional corrections applied to "SPT-Neq" including the hammer efficiency ratio correction (C_E).	
3	PFR	Section 7.2 Page 6	Table 3: C-1 is a CPT not Boring. Please revise. (MH)	It has been revised.	
4	PFR	Section 9 Page 8	Per Caltrans Corrosion Guidelines (2015), we recommend to include at least one water sample from the adjacent Adobe Creek for corrosion evaluation. (MH)	A water sample was collected from Adobe Creek and tested for corrosion evaluation. The results are included in this revised PFR submittal.	
5	PFR	Section 10.3.3 Page 10	Per Caltrans' latest criteria, terms such as "low", "moderate", or "high" to describe seismic related hazards are outdated. Instead, acceptable language is "potential exists", "does not exist", and/or is "unknown and cannot be determined". The language has to be changed to reflect the latest criteria. (HS)	The language has been revised to match the latest Caltrans Criteria.	
6	PFR	Section 10.3.4 Page 12	Please refer to comment 1. The blow counts shown in the second column may have to be changed. Also, why are the blow counts shown in tenth of a decimal? They values should be rounded up or down to a round value. (HS)	We have rounded down the blow count values in Table 6 per review comment. Please see our response to Comments #1 and #2 regarding the comment that the values may have to be changed.	

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7	PFR	Section 12.3 Page 19 Table 11A	Notes 2, 3, and 4 mention P-multipliers. I assume these are reduction multipliers due to pile spacing. How were these values derived? Caltrans currently uses AASHTO LRFD criteria as shown in Table 10.7.2.4-1 of the California Amendments to AASHTO LRFD Bridge Design Specifications-Fourth Edition. The reduction factor(s) can be applied to pile center-to-center spacing, where D is the pile diameter. (HS)	The p-multiplier calculations per Section 10.7.2.4 of "California Amendments to AASHTO LRFD Bridge Design Specifications -Sixth Edition" are added to Appendix V. The text now also cites this document for clarification.	
8	PFR	Section 12.3 Page 20 Table 11B	Notes 2, and 3 mention P-multipliers. I assume these are reduction multipliers due to pile spacing. How were these values derived? Caltrans currently uses AASHTO LRFD criteria as shown in Table 10.7.2.4-1 of the California Amendments to AASHTO LRFD Bridge Design Specifications-Fourth Edition. The reduction factor(s) can be applied to pile center-to-center spacing, where D is the pile diameter. (HS)	See Consultant Response #7	
9	PFR	Section 12.3 Page 21 Table 11C	Notes 2, and 3 mention P-multipliers. I assume these are reduction multipliers due to pile spacing. How were these values derived? Caltrans currently uses AASHTO LRFD criteria as shown in Table 10.7.2.4-1 of the California Amendments to AASHTO LRFD Bridge Design Specifications-Fourth Edition. The reduction factor(s) can be applied to pile center-to-center spacing, where D is the pile diameter. (HS)	See Consultant Response #7	
10	PFR	Plate 7		The structure name on the plate has been revised to be consistent with the other plates.	

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			The name of the proposed structure used on Plate 7 is different from others. Please revise. (MH)		
11	PFR	Appendix II LOTBs	1. Santa Clara County is SCL, not SAN as shown on the upper right hand side block. The post mile, and the bridge number should be added to the LOTBs. (HS) 2. The following terms used to describe soil consistency or relative density are not consistent or incorrect. Please revise. a) Page 2 of 4, Boring B-2: At ~elevation -43 ft, it states 'soft: PP=1.5 tsf'. b) Page 3 of 4, Boring B-4: At ~elevation -20 ft, it states 'medium dense. c) Page 3 of 4, Boring B-4: At ~elevation 5 ft, it states 'soft;…; PP=3.5 tsf.' d) Page 4 of 4, Boring B-7: At ~elevation -1 ft, it states '(consistency ???), wet; PP=1.5 tsf.' (MH)	1. County abbreviation has been corrected to "SCL". LOTBs has been updated with post mile of 50.66. Bridge number is currently "TBD". 2. The missing or inconsistent information has been added/revised. In the comment (c), the boring description should be B-6, instead of B-4.	
12	PFR	Appendix V Bearing Capacity Analyses	According to Plate 7, the ground slope on the toe side of the proposed Type 5 retaining wall is different from the Caltrans 2015 Standard Plans. Please justify the calculations for the proposed Type 5 retaining wall. (MH)	These bearing capacity values are preliminary and based on typical sections. They may need to be revised in the foundation report (FR) submittal based on design cross-sections during that phase.	

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13	PFR	Appendix V Axial Pile Capacity Analyses	1. Some relative distances between FG and Cutoff elevations presented in Axial Pile Capacity Analyses are not consistent with that listed in Table 7(Section 12.2, page 14). Please revise. 2. According to AASHTO LRFD BDS 10.8.3.5.1b and C10.8.3.5.1b (Side Resistance), the following portions of a drilled shaft, should not be taken to contribute to the development of resistance through skin friction: a) At least the top 5.0 ft of any shaft; and b) For straight shafts, a bottom length of the shaft taken as the shaft diameter. Please revise or justify your calculations. (MH)	1)The analyses are preliminary and the cut-off and FG elevations may change during final design. Current level of accuracy is acceptable for preliminary design. We will update the relative distances in our final report. 2a) For the cut-off elevations without a construction joint, the elevation difference is at a minimum 5 feet between FG and cut-off. We consider the design acceptable based on the above without the need for ignoring the friction contribution the top 5 feet below cut-off elevation. 2b) Per FHWA-NHI-10016 "Drilled Shafts: Construction Procedures and LRFD Design Methods" dated May 2010: "The previous version of this manual (Reese and O'Neill, 1999) and AASHTO (2007) recommend neglecting side resistance over a distance of one diameter above the base of drilled shafts where this portion of the shaft derives its resistance from a cohesive soil. The recommendation is based on numerical modeling that predicts a zone of tension at the soil-shaft interface in the zone immediately above the base. However, this recommendation is not supported by field load test data and the authors of this version recommend that side resistance should not be neglected over the bottom one diameter." Based on the above, we consider the current design, which does assume contribution from the bottom one diameter length, acceptable.	

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OSFP Rev Form 12/2010

Response to Comments dated 07/15/17

Office of Special Funded Projects
Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer Liaison to complete)	
Dist:	**04-SCL-101-PM 50.6**	☐ PSR/PDS (Review No. 1	Reviewer Name:	**Hossain Salimi/Meng-Hsi Hung**
Proj ID (Phase):	**0413000094**	☐ APS/PSR (Review No.)	Functional Unit:	**OGD-West**
Project Name:	**Adobe Creek POC**	☐ APS/PR (Review No.)	Cost Center:	**3660**
OSFP Liaison:	**David Soon**	☐ Type Selection	Phone Number:	**916-227-7147/510-286-7245**
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E-mail:	**David.soon@dot.ca.gov**	☐ PS&E (Review No. 1)	Date of Review:	**07/15/2017**
		☐ Construction	Structure Name*:	**Adobe Creek POC**
		☐ Other: CCO	Br No*:	**TBD**
		Preliminary Foundation Report Adobe Creek Pedestrian Overcrossing (Rev 1) Dated June 27, 2017	(*Use if necessary to when comment sheets are by individual structure)	

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Geotechnical Consultant Firm	Phone Number	E-mail	Response Date
Alta Planning and Design	**Parikh Consultants Inc.**			

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1	PFR	Section 12.3 Page 21 Table 11A	Notes 2, 3, and 4 mention P-multipliers. I assume these are reduction multipliers due to pile spacing. How were these values derived? Caltrans currently uses AASHTO LRFD criteria as shown in Table 10.7.2.4-1 of the California Amendments to AASHTO LRFD Bridge Design Specifications-Fourth Edition. The	The reduction multipliers were derived based on Per Section 10.7.2.4 of "California Amendments to AASHTO LRFD Bridge Design Specifications -Sixth Edition.". Average p-multiplier values are used for pile groups with multiple piles in a row. Example p-multiplier calculations are shown in the	

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			reduction factor(s) can be applied to pile center-to-center spacing, where D is the pile diameter. **Please note that the same comments previously noted were not addressed in this latest submittal.**	text and all p-multiplier calculations are shown in Appendix V.	
2	PFR	Section 12.3 Page 22 Table 11B	Notes 2, and 3 mention P-multipliers. I assume these are reduction multipliers due to pile spacing. How were these values derived? Caltrans currently uses AASHTO LRFD criteria as shown in Table 10.7.2.4-1 of the California Amendments to AASHTO LRFD Bridge Design Specifications-Fourth Edition. The reduction factor(s) can be applied to pile center-to-center spacing, where D is the pile diameter. **Please note that the same comments previously noted were not addressed in this latest submittal.**	See our response to Review Comment # 1	
3	PFR	Section 12.3 Page 23 Table 11C	Notes 2, and 3 mention P-multipliers. I assume these are reduction multipliers due to pile spacing. How were these values derived? Caltrans currently uses AASHTO LRFD criteria as shown in Table 10.7.2.4-1 of the California Amendments to AASHTO LRFD Bridge Design Specifications-Fourth Edition. The reduction factor(s) can be applied to pile center-to-center spacing, where D is the pile diameter. **Please note that the same comments previously noted were not addressed in this latest submittal.**	See our response to Review Comment # 1	
4	PFR	Appendix II LOTBs	Pages 2/4 to 4/4, 'Notes' sections, dimensions for I.D. of SPT and both I.D. and O.D. of the Modified California Samplers are incorrect. Please revise. (MH)	The notes on the LOTBs will be updated to indicate that I.D. for the SPT sampler (1.4 inches) is at the shoe of the sampler. Regarding the comment on Modified California Sampler, we verified the dimensions of the sampler with the driller (Geo-ex Subsurface Exploration) and no changes are necessary.	
5	PFR	Appendix V Axial Pile	According to AASHTO LRFD BDS 10.8.3.5.1b and C10.8.3.5.1b (Side Resistance), the following portions	We revised our calculations to be inconsistent with AASHTO LRFD BDS 10.8.3.5.1b and C10.8.3.5.1b as pointed in the	

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		Capacity Analyses	of a drilled shaft, should not be taken to contribute to the development of resistance through skin friction: a) At least the top 5.0 ft of any shaft; and b) For straight shafts, a bottom length of the shaft taken as the shaft diameter. Please note that Caltrans' practice is to design abutments and bents/piers in accordance with the LRFD as specified in the current AASHTO LRFD Bridge Design Specifications with California Amendments. In addition, according to Table 7, page 15, for both West and East Approach sections, almost all differences between FG and Cutoff elevations are less than 5 feet. If a permanent casing with embedded length more than 5 feet is used in a CIDH concrete pile, such as a Type-II shaft, further deductions should be considered (MH)	review comment. For Type-II shafts, the frictional capacity along the permanent casing was ignored.	

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