

Appendix D

Geotechnical Report

Zadoorian & Associates, Inc.
1467 Montgomery Street, Tustin CA 92782
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July 9, 2019

Soto Capital LP
P.O. Box 17119
Beverly Hills, CA 90209

Attention: Ben Soroudi

Addendum 1
Updated Recommendations
Proposed Mixed-Use Development
8527-8555 Santa Monica Boulevard
and 8532 to 8552 West Knoll Drive
West Hollywood, California
Zadoorian & Associates Project: SotoCapt-1-01

You furnished us with a geotechnical report dated July 23, 2018 prepared by GeoDesign, Inc. for the proposed mixed-use development to be constructed at 8527-8555 Santa Monica Boulevard and 8532 West Knoll Drive in West Hollywood, California.

We have reviewed the report and concur with the conclusions and findings presented therein and as such we assume the professional responsibility for the use and interpretation of the data, conclusions and recommendations presented therein.

Pedram Farashbandi of Holloway Partners furnished us with updated project plans on July 8, 2019. Based on our review of the current plans, the proposed development will now include an additional parcel located at 8552 West Knoll Drive.

The current proposed development remains feasible and the conclusions and recommendations presented in the July 23, 2018 report remain applicable.

• • •

We appreciate the opportunity to be of service to you. Please contact us if you have questions regarding this addendum.

Sincerely,

Zadoorian & Associates, Inc.



Christopher J. Zadoorian, G.E.
Principal Engineer



cc: Tony Ghodsi, Englekirk Institutional (via email only)

cjz

Attachments

Four copies submitted

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REPORT OF GEOTECHNICAL ENGINEERING SERVICES

Proposed Mixed-Use Development
8527 - 8555 Santa Monica Boulevard
and 8532 - 8552 West Knoll Drive
West Hollywood, California

For
Soto Capital LP
July 23, 2018
(Revised October 31, 2019)

GeoDesign Project: SotoCapt-1-01

July 23, 2018
(Revised October 31, 2019)

Soto Capital LP
P.O. Box 17119
Beverly Hills, CA 90209

Attention: Ben Soroudi

Report of Geotechnical Engineering Services

Proposed Mixed-Use Development
8527 - 8555 Santa Monica Boulevard
and 8532 - 8552 West Knoll Drive
West Hollywood, California
GeoDesign Project: SotoCapt-1-01

GeoDesign, Inc. is pleased to submit this geotechnical report for the proposed mixed-use development to be constructed at 8527 - 8555 Santa Monica Boulevard and 8532 - 8552 West Knoll Drive in West Hollywood, California.

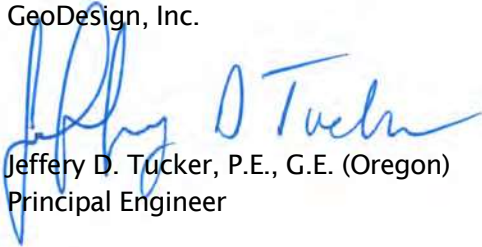
Our services were performed in general accordance with our proposal dated February 18, 2010, our revised proposals dated June 14, 2010 and June 28, 2010, and our e-mail correspondence dated March 21, 2018.

◆ ◆ ◆

We appreciate the opportunity to be of service to you. Please contact us if you have questions regarding this report.

Sincerely,

GeoDesign, Inc.



Jeffery D. Tucker, P.E., G.E. (Oregon)
Principal Engineer

cc: Scott Watterson, Cefali & Associates (via email only)
Tony Ghodsi, Englekirk Institutional (via email only)
Nickie Carlsen, Alston & Bird LLP (via email only)
Rachel Soroudi, Holloway Partners (via email only)

JM:AJA:JDT:kt

Attachments

One copy submitted (via email only)

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ACRONYMS AND ABBREVIATIONS

AP	Alquist-Priolo
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
BGS	below ground surface
CBC	California Building Code
CDMG	California Division of Mines and Geology
CDWR	California Department of Water Resources
CGS	California Geological Survey
CPT	cone penetration test
g	gravitational acceleration (32.2 feet/second ²)
H:V	horizontal to vertical
HHGWL	historical high groundwater level
LFPE	lowest finish floor elevation
MCE	maximum considered earthquake
MSL	mean sea level
NCEER	National Center for Earthquake Engineering Research
OSHA	Occupational Safety and Health Administration
pcf	pounds per cubic foot
pci	pounds per cubic inch
PGA	peak ground acceleration
PGA _M	maximum considered earthquake geometric mean peak ground acceleration adjusted for site affects
psf	pounds per square foot
psi	pounds per square inch
SPT	standard penetration test
USGS	U.S. Geological Survey
UST	underground storage tank

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering investigation for the proposed mixed-use development to be constructed at 8527 - 8555 Santa Monica Boulevard and 8532 - 8552 West Knoll Drive in West Hollywood, California. The site location is shown on Figure 1. Acronyms and abbreviations used herein are defined above, immediately following the Table of Contents.

The site is bound on the north and east by West Knoll Drive, on the south by Santa Monica Boulevard, and on the west by existing private developments, including existing two-story condominiums located at 8562 West Knoll Drive and an existing four-story Ramada hotel as shown on Figure 2. Based on information provided by Scott Watterson of Cefali and Associates, the existing structures are supported on spread and continuous footings.

The site is bi-level and the ground surface level varies from approximately Elevation 264 at the north side of the site to Elevation 235 at the southeastern corner of the site. An existing approximately 2H:1V, 10- to 15-foot-high, ascending slope partially supported by periodic make-shift 1- to 2-foot-high timber railroad tie bulkheads is present at the northwest site boundary.

The site is currently developed with single-story private residences within the north portion of the upper level, three two-story commercial structures adjacent to Santa Monica Boulevard along the southeast portion of the site, and surface parking lots north and west of the existing structures.

A UST may be present on the west side of the site. Attempts were made to locate the suspected UST with geophysical methods; however, these attempts were unsuccessful.

James Fischer and Robin Samara of DFH Architects furnished us with project plans dated March 1, 2018 they prepared. Based on our review of the plans and our discussions with the project team, the proposed development includes the construction of five above-grade levels and two subterranean parking levels.

The lowest finished floor level will be established between approximately Elevation 225 to 227 as shown on Figure 2.

The proposed mixed-use building will be supported on a mat foundation that will be established approximately 3 to 5 feet below the lowest finish floor level, between approximately Elevation 224 and 221 MSL.

It should be noted that a project reference elevation has been established and the reference data shows the ground surface level at the southwest corner of the site to be Elevation 85.4, which corresponds approximately to Elevation 234.9 MSL.

Reza Bayat of Englekirk Institutional furnished us with structural loading information for the proposed development. Based on the information provided by Mr. Bayat, the average dead-plus-live applied pressure across the mat foundation will be on the order of 1,200 to 2,600 psf.

Our geotechnical investigation is summarized below followed by our conclusions and recommendations for the current proposed development

2.0 PURPOSE AND SCOPE

The purpose of our services was to perform a geotechnical investigation at the site to obtain data for use in the development of geotechnical design recommendations for the proposed development. The specific scope of our services for this current investigation is summarized as follows:

- Coordinated and managed the field investigation, including utility checks, site access authorizations, and scheduling subcontractors and GeoDesign field staff.
- Drilled three borings using mud rotary drilling methods.
- Installed one groundwater monitoring well at the site.
- Advanced three CPTs at the site.
- Collected soil samples for laboratory testing and maintained a detailed log of the soil and groundwater conditions encountered in the borings.
- Performed geotechnical laboratory testing on selected samples.
- Performed liquefaction analysis.
- Developed foundation design recommendations.
- Developed recommendations for the design of temporary shoring.
- Developed recommendations for the design of permanent below-grade walls.
- Evaluated surcharge loading from adjacent foundations.
- Developed recommendations for the design and construction of concrete floor slabs, including an estimate of the subgrade modulus.
- Developed recommendations for hydrostatic design for below-grade walls, foundations, and the lowest level building floor slab.
- Prepared this report summarizing the results of our geotechnical evaluation and presenting our conclusions and recommendations.

3.0 SITE CONDITIONS AND GEOLOGIC CONDITIONS

3.1 SURFACE CONDITIONS

The site is located at the northwest corner of Santa Monica Boulevard and West Knoll Drive in the city of West Hollywood, California.

The site is bi-level and the ground surface level varies from approximately Elevation 264 at the north side of the site to Elevation 235 at the southeastern corner of the site. An existing approximately 2H:1V, 10- to 15-foot-high, ascending slope partially supported by periodic make-shift 1- to 2-foot-high timber railroad tie bulkheads is present at the northwest site boundary.

The site is currently developed with single-story private residences within the north portion of the upper level, three two-story commercial structures adjacent to Santa Monica Boulevard along the southeast portion of the site, and surface parking lots north and west of the existing structures.

3.2 GEOLOGIC SETTING

The site is located along the northern margin of the Los Angeles Basin on a steep-sloping alluvial fan at the base of the Santa Monica Mountains (Dibblee, 1991; CDWR, 1961).

Geologic materials at the site consist of Holocene and Pleistocene Age alluvial fan deposits originating from the Santa Monica Mountains. The fan deposits consist of alternating layers of silty sand and sand with lesser amounts of clayey sand, silt, and clay. Together, the Holocene and Pleistocene Age sediments are approximately 600 feet thick in the site vicinity and are underlain by Tertiary Age sedimentary (CDWR, 1961).

Regionally, the site is located in the northern-most portion of the Peninsular Ranges Geomorphic Province, near the Transverse Ranges Geomorphic Province to the north. The Peninsular Ranges is characterized by northwest-trending geologic structures in contrast to the Transverse Ranges, which is characterized by east to west-trending geologic structures. The boundary between the two geomorphic provinces is a system of faults that include the active Malibu Coast, Santa Monica, Hollywood, Raymond, and Sierra Madre fault zones. Based on published geologic maps, splays of the Hollywood fault zone are located approximately 600 feet north of the site (CGS, 2010a; City of West Hollywood, 2010; Ziony and Jones, 1989).

The site is within an area designated as having a potential for liquefaction as indicated on the State of California Seismic Hazard Zone Map for the Beverly Hills 7.5-minute quadrangle published by CGS (CDMG, 1999).

3.3 FAULTS

3.3.1 General

Faults in Southern California are considered active, potentially active, and inactive based on criteria developed by CGS for the AP Earthquake Fault Zoning Program (CGS, 2018a). By definition, an active fault is one that has had surface displacement within Holocene time (approximately the last 11,000 years). A potentially active fault is one that has demonstrated surface displacement of Quaternary Age deposits (last 1.6 million years). Inactive faults have not moved in the last 1.6 million years.

The primary purpose of the AP Earthquake Fault Zoning Program is to identify sites that have a potential for surface rupture due to active faults that are in close proximity to the site. In such cases, a building setback zone is established to mitigate the potential for surface rupture. The site is not located within an Alquist-Priolo Earthquake Fault Zone (APZ). The most recent version of the APZ map for the Beverly Hills 7.5-minute quadrangle was published in January 2018 (CGS, 2018b). The zoning shown on this map is based on evaluation of data summarized by Olsen (2018). The site is not within a state-designated APZ according to the most recent version of the APZ map for the Beverly Hills quadrangle. The closest AP-zoned fault trace is the Hollywood fault located approximately 600 feet north-northwest.

The site is included within a City of West Hollywood Fault Precaution Zone FP-2 as designated in the Safety Element of the West Hollywood General Plan 2035 dated September 6, 2011. Based on the evaluation of Olsen (2018) and city and state fault zone maps, the potential for surface rupture at the site is considered low.

3.3.2 Hollywood Fault Zone

The closest active fault to the site capable of surface rupture is the Hollywood fault. The Hollywood fault trends approximately east-west along the base of the Santa Monica Mountains from the West Beverly Hills Lineament in the West Hollywood-Beverly Hills area to the Los Feliz area of Los Angeles (Dolan and Sieh, 1992). The heavily urbanized area of the fault zone has historically resulted in limited availability of investigations to define the location and age of faulting for zoning purposes. The recent release of an updated Earthquake Fault Zone map for the Beverly Hills quadrangle, based on Fault Evaluation Report 259 (published in January 2018) that documents consultants studies along the Hollywood fault trace, provides new zoning of faults in the region of the site.

Based on Plate 3 of the Fault Evaluation Report by Olsen (2018), the closest splay of the Hollywood fault is located approximately 600 feet to the north of the site.

The site is located in a City Fault Precaution Zone FP-1 or Fault Precaution Zone FP-2 (City of West Hollywood, 2010).

3.3.3 Regional Faults

Regional faults capable of generating strong ground shaking at the site include the Santa Monica fault (a westward extension of the Hollywood fault), Newport-Inglewood fault, the Los Angeles segment of the Puente Hills Blind Thrust, and San Andreas fault located 0.6 mile west, 3.3 miles west-southwest, 4.7 miles east, and 35 miles northeast, respectively. These faults do not present a surface rupture hazard at the site but can generate strong ground shaking.

3.4 SUBSURFACE CONDITIONS

We drilled three borings (B-1 through B-3) at the site to depths between 51.5 and 120.0 feet BGS between 2010 and 2017. The borings were drilled using mud rotary drilling equipment. Upon completion of boring B-3, we constructed a groundwater monitoring well. The locations of the explorations are shown on Figure 2.

Asphalt concrete, 3 inches thick, was encountered at the ground surface in each boring. Medium stiff clay and sandy clay soil with trace gravel was encountered in borings B-1 and B-2 immediately below the asphalt concrete to depths of 4 to 15.5 feet BGS. The clayey soil is underlain by fine to coarse sand with varying amounts of silt and fine gravel to the maximum depth explored (120.0 feet BGS). Fine to coarse sand with varying amounts of silt, clay, and fine gravel was encountered immediately beneath the asphalt concrete in boring B-3 to the maximum depth explored (51.5 feet BGS).

At depths of 34.5 and 49 feet BGS in borings B-1 and B-2, respectively, lenses of clayey sand, clay, and silt ranging from 4 to 7.5 feet in thickness are present in the primarily sand and silty sand alluvial deposits.

We also performed P-S logging in boring B-1 to develop an estimate of the shear wave velocity at the site. Based on the results of the borings, CPTs, and shear wave velocity measurements, the soil at the site is generally dense and stiff below the planned LFFE.

The general subsurface conditions at the site are presented on the geologic cross sections on Figures 3 and 4. Logs of the borings are presented in Appendix A and the results of the CPTs are presented in Appendix B.

The mud rotary drilling was performed by SoCal Drilling with a rig equipped with an automatic hammer to advance the samplers. At the time of our borings, the hammer energy efficiency measurements were performed on the drill rig by EarthSpectives. Based on the results of the energy efficiency testing, the automatic hammer generally had an energy efficiency ratio of approximately 80 percent.

3.5 GROUNDWATER

3.5.1 Data from Prior Borings

Groundwater was encountered in our explorations at depths between 30 and 49 feet BGS, corresponding to approximately Elevations 205 and 207 feet above MSL.

Table 1 summarizes the groundwater levels encountered in our explorations that were performed in August 2010 and May 2017. We also measured the groundwater level in boring B-3 in June 2018.

Table 1. Summary of Groundwater Levels

Exploration	Exploration Elevation (above MSL)	Date	Depth to Groundwater ¹ (feet BGS)	Groundwater Elevation	
				MSL	Project Reference Datum
B-1	235	August 2010	30	205	56
B-2	255	August 2010	49	206	57
B-3	235	May 2017	32	203	54
B-3	235	June 2018	34	201	52
CPT-1	237	August 2010	30	207	58
CPT-2	253	August 2010	47	206	57
CPT-3	237	August 2010	30	207	58

1. Elevations and depths are reported to the nearest foot.

3.5.2 Historical High Groundwater Data

A map of historical artesian areas by Mendenhall (1905) includes the area of the site within an artesian area in 1904. A depth to water of 23 feet BGS was recorded in March 1930 in a Los Angeles County well (no. 2621A) located 180 feet south of the site. Based on the seismic hazards evaluation report for the Beverly Hills quadrangle published by CGS (CDMG, 1998), the HHGWL in the site vicinity is at a depth on the order of 10 feet BGS along Santa Monica Boulevard corresponding to Elevation 225, corresponding approximately to the planned lowest finish floor level.

Data from the Seismic Technical Background Report - City of West Hollywood General Plan Update prepared by KFM GeoSciences (March 2010) indicates that the HHGWL at the site is approximately 13.5 to 17 feet BGS along Santa Monica Boulevard, corresponding roughly to Elevations 222 to 225 feet above MSL (corresponding to project reference elevations 72.1 to 76.1) as shown on Figure 2. Table 2 summarizes the historical high groundwater levels at site boundaries.

Table 2. Summary of Historical High Groundwater Levels

Location	Historical High Groundwater Elevation ¹	
	MSL	Project Reference Datum
Southeast Corner	222.5	73.1
Southwest Corner	225.5	76.1
Northeast Corner	221.5	72.1
Northwest Corner	224.5	75.1

1. Elevations and depths reported in Table 2 are rounded to the nearest 0.5 foot to reflect the degree of precision in our interpretations from the KFM Geosciences plan.

Based on the data from the City of West Hollywood, the HHGWL at the site ranges from approximately 1.5 to 4.5 feet below the lowest planned finished floor level as shown on Figures 3 and 4.

3.6 SHEAR WAVE VELOCITY MEASUREMENTS

Suspension P-S logging was performed by GEOVision in the upper 115 feet of boring B-1 to estimate the stiffness of the subsurface soil profile.

The suspension P-S logging method uses a 7-meter probe that contains a source and two receivers. The probe is lowered down the drilled hole where the source generates a pressure wave in the drilling fluid within the hole. The pressure wave is converted to seismic P- and S-waves at the boring sidewalls, and at each receiver, the P- and S-waves are converted back to pressure waves. The elapsed time between wave arrivals at the receivers is used to determine the average velocity of a 1-meter-high column of soil. The process is repeated for the full depth of the boring to obtain a continuous log of the boring.

Based on the results of shear wave velocity measurements performed, the average shear wave velocity for the upper 100 feet was approximately 1,210 feet per second.

The results of the P-S logging are presented graphically on Figure 5. GEOVision's report of their geophysical testing P-S log results are presented in Appendix C.

3.7 LABORATORY TESTING

Geotechnical laboratory testing was performed on select samples from the borings. The following tests were performed:

- In-place moisture and density
- Atterberg limits
- Consolidation
- Direct shear strength
- Percent passing the U.S. Standard No. 200 sieve

Results of the geotechnical testing are presented in Appendix A.

4.0 SEISMIC ANALYSIS

Table 3 summarizes the seismic design parameters in accordance with the 2016 CBC and ASCE 7 based on a soil profile type S_c .

Table 3. Seismic Design Parameters

Parameter	Short Period ($T_s = 0.2$ second)	1 Second Period ($T_1 = 1.0$ second)
MCE Spectral Acceleration	$S_s = 2.440$ g	$S_1 = 0.887$ g
Site Class	C	
Site Coefficient	$F_a = 1.0$	$F_v = 1.3$
Adjusted Spectral Acceleration	$S_{MS} = 2.440$ g	$S_{M1} = 1.153$ g
Design Spectral Response Acceleration Parameters	$S_{DS} = 1.627$ g	$S_{D1} = 0.769$ g
PGA_M	0.941 g	

5.0 LIQUEFACTION ANALYSIS

5.1 GENERAL

Liquefaction generally occurs in saturated, loose to medium dense, granular soil and in saturated, soft to moderately firm silt as a result of strong ground shaking. As the density and/or particle size of the soil increases and as the confinement (overburden pressure) increases, the potential for liquefaction decreases.

According to seismic hazard maps published by the CGS (CDMG, 1999), the site is within an area identified as having a potential for liquefaction.

5.2 METHODOLOGY

We used the procedure outlined in the NCEER document titled *Proceedings of the NCEER Workshop of Liquefaction Resistance of Soils* (Youd and Idriss, 1997, updated in 2001).

The data available from the SPT hammer energy efficiency testing was used in our analysis along with the plasticity index and moisture content testing performed as part of our laboratory testing program.

To evaluate the liquefaction potential of fine-grained soil, we used the procedures summarized and/or suggested by Boulanger and Idriss (2006), which includes references to the work by Andrews and Martin (2000), Seed et al. (2003), and Bray et al. (2004).

These procedures evaluate whether soil will behave more like clay or more like sand. Clay-like behavior generally precludes liquefaction while sand-like behavior indicates soil may be subject to liquefaction and should be evaluated using the appropriate procedure.

Our determinations for clay- and sand-like behavior were made based on the plasticity data, moisture content, and grain-size distribution data from our laboratory testing.

5.3 GROUNDWATER AND GROUND SURFACE LEVELS

The groundwater level at the time of our field investigation is below the HHGWL in the area. Therefore, in performing SPT blow count and CPT tip resistance and sleeve friction correction calculations, the current groundwater level data was used for each boring. However, in evaluating liquefaction potential, the HHGWL was used.

We used an HHGWL equal to an elevation of 225 feet above MSL in our liquefaction analysis.

5.4 SEISMIC INPUT DATA

We evaluated liquefaction potential for 2,475-year recurrence interval ground motion levels defined as having a 2 percent probability of exceedance in 50 years.

We used the USGS web-based software application, accessible from <http://earthquake.usgs.gov/designmaps/us/application.php>, to provide the PGA and predominant earthquake magnitude for use in our evaluation. Based on our review of the data from the USGS web application, we used a liquefaction PGA_m equal to 0.941 g in conjunction with a predominant earthquake magnitude of 6.85 in our analysis.

5.5 LIQUEFACTION ANALYSIS AND RESULTS

The results of our analysis indicate the potential for liquefaction and associated settlement exists at the site. The liquefaction settlement computed in our analysis when considering the HHGWL ranges from approximately 0.9 inch to 1.8 inches as summarized in Table 4.

Table 4. Summary of Liquefaction Analysis

Exploration Number	Total Liquefaction Settlement (inches)
B-1	1.8
B-2	0.9
B-3	1.2

The results of our liquefaction analysis are presented in Appendix D.

5.6 LATERAL SPREADING

Lateral spreading may occur when potentially liquefiable soil is present in conjunction with a sloping ground surface and an “open-face” condition whereby the sloping surface daylights or is unsupported. If soil within the slope liquefies, the result may be temporary instability resulting in deformation or translation of the slope. In order for this to occur, the liquefiable soil needs to be continuous and the toe of the slope needs to be unsupported.

The depth of potentially liquefiable layers is below the lowest floor level, approximately 30 feet BGS along Santa Monica Boulevard. Open-face or unconfined conditions are not present; therefore, the potential for lateral spreading is not present at the site.

5.7 SEISMIC (DRY) SETTLEMENT

Seismic (dry) settlement can occur in relatively clean, loose to medium dense, granular soil as a result of strong ground shaking. Generally, the soil at the site contains greater than 15 percent fines, where tested and as observed in our laboratory, so relatively clean, granular soil is not present at the site.

In addition, our liquefaction analysis took into consideration the HHGWL, which is well above the planned bottom of foundation level.

Therefore, the potential for seismic (dry) settlement is not present at this site with respect to the proposed development.

6.0 CONCLUSIONS

6.1 GENERAL

Based on our review of available information, the results of our explorations, and the laboratory testing and analyses, the proposed development is feasible from a geotechnical perspective. The site is free of geologic or seismic hazards that would preclude the proposed development.

Potentially liquefiable soil is present at the site in the event of a significant rise in the groundwater level. However, the potential for excessive liquefaction-induced settlement can be mitigated with the use of a mat foundation established in the dense soil at the planned foundation depth.

Based on total static and seismic-induced settlement, the structure can be supported on spread, strip, or mat foundations established in the dense to very dense native soil at the planned foundation bottom elevations.

6.2 GROUNDWATER

The HHGWL is at approximately the lowest planned finish floor level, so the mat foundation must be designed to resist the resulting hydrostatic uplift pressure that could occur if the groundwater level rises to the historical high level.

The HHGWL is not above the bottom of planned below-grade building walls; therefore, hydrostatic design is not required for the below-grade building walls.

The current groundwater level is on the order of approximately 18 to 26 feet below the lowest planned finish floor level and approximately 12 to 20 feet below the anticipated bottom of foundation. Therefore, it is unlikely that groundwater control provisions will be required during construction for the mass excavation. However, it is possible that groundwater control provisions may be required for elevator pit, vault, and sump excavations.

A permanent waterproofing system is planned for the below-grade building walls and the floor slab/mat foundation.

7.0 RECOMMENDATIONS

The following sections present recommendations based on the results from our geotechnical evaluation of the site, our understanding of the proposed development, and our discussions with the project team.

7.1 MAT FOUNDATION

7.1.1 Bearing Pressure and Modulus of Subgrade Reaction

The proposed building may be supported on a mat foundation established in the dense to very dense native soil at the site at the planned foundation bottom level (approximately Elevation 223 feet above MSL).

Mat foundations established at least 3 feet below the lowest adjacent grade or top of floor slab can be designed using an allowable bearing pressure of 7,500 psf and a subgrade modulus of reaction equal to 100 pci. The assumed modulus includes a reduction for the size of the mat foundation.

The design bearing pressure is based on the results of strength testing presented in Appendix A. The subgrade modulus value is based on the shear wave velocity measurements made at the foundation level.

7.1.2 Settlement

Using an average allowable bearing pressure of approximately 2,600 psf applied over the entire footprint and noting that the pressure release from the planned excavation ranges from approximately 1,200 to 2,400 psf, we estimate that total static settlement of the mat foundation established in the dense to very dense native soil at the site will be $\frac{3}{4}$ inch or less. Differential settlement due to gravity loading across the mat foundation is estimated to be $\frac{1}{2}$ inch or less.

As discussed in Section 5.5, liquefaction settlement on the order of 0.9 inch to 1.8 inches may occur during strong ground shaking and when a concurrent rise in the groundwater level to the historical high level. Therefore, when considering liquefaction settlement, the total estimated settlement will be on the order of 2.5 inches or less and the total differential settlement will be on the order of 1.25 inches or less across the mat foundation.

7.1.3 Lateral Resistance

Lateral loading may be resisted using a passive pressure of 300 psf per foot of embedment where concrete is placed directly against the undisturbed, dense native soil.

A coefficient of friction equal to 0.4 may be used when calculating resistance to sliding for footings bearing on the native soil.

The passive pressure and the frictional resistance may be used in combination without reduction and may be increased by one-third when considering short-term seismic and wind loading.

The above lateral bearing pressure takes into consideration that the foundations will be established near the potential HHGWL.

7.1.4 Groundwater Impact on Permanent Design

CBC Sections 1805.1.3 and 1805.3 define the conditions in which waterproofing will be required when the groundwater level is within 6 inches of the lowest planned finish floor level or higher. Therefore, since the lowest finish floor level is within 6 inches of the historical high levels at the site, waterproofing is required per CBC Sections 1805.1.3 and 1805.3.

It should be noted that in the event HHGWLs are experienced at the site, a condition could exist where the mat foundation will be submerged. This condition will not adversely impact the performance of the mat foundation as the hydrostatic pressure acting against the mat is considerably lower than the weight of the mat foundation.

7.2 PERMANENT BELOW-GRADE WALLS/PERMANENT SHORING WALLS

7.2.1 Design Lateral Earth Pressures

For static conditions, drained below-grade building walls should be designed to resist a trapezoidal-shaped at-rest lateral earth pressure distribution equal to $32H$ psf as shown on Figure 6.

If wall back-drainage is not provided, the below-grade building walls should be designed to resist a buoyant trapezoidal-shaped at-rest lateral earth pressure distribution equal to $16H$ psf in conjunction with a hydrostatic pressure equal to 62.4 pcf as shown on Figure 7.

For seismic loading conditions, drained below-grade building walls should be designed to resist a triangular-shaped active lateral earth pressure distribution also equal to $30H$ psf in conjunction and a triangular-shaped seismic lateral earth pressure distribution equal to $8H$ psf as shown on Figure 8.

If wall back-drainage is not provided, the below-grade building walls should be designed to resist a buoyant triangular-shaped active lateral earth pressure distribution equal to $15H$ psf in conjunction with a triangular-shaped seismic lateral earth pressure distribution equal to $8H$ psf as shown on Figure 9.

The load combination (active and seismic earth pressure) and the shape of the seismic pressure distribution are each based on the recent technical papers (Atik and Sitar, 2010; Sitar et al., 2010).

The upper 10 feet of the below-grade building walls should also be designed to resist a uniform lateral pressure of 100 psf to account for normal traffic loading as shown on Figures 7 through 9.

Where the surface at the top of the shoring is sloped, the recommended lateral earth pressures should be increased as indicated in Table 5.

**Table 5. Permanent Below-Grade Walls
Increased Lateral Earth Pressure for Sloping Retained Surfaces**

Slope Inclination at Top of Shoring (H:V)	Increase in Lateral Earth Pressure (percent)
1:1	200
1.5:1	165
2:1	150

7.2.2 Surcharge Loading from Adjacent Building Foundations

Surcharge loads from the adjacent building foundations can be determined by the structural engineer and/or the shoring designer using NAVFAC DM 7.2. We will review the surcharge calculations prior to approving and stamping the project plans indicating that the recommendations provided herein were properly incorporated in design of the permanent below-grade walls/permanent shoring walls.

7.2.3 Wall Back-Drainage

Wall back-drainage provisions should be provided and retaining walls should be constructed with adequate back-drainage to prevent the buildup of hydrostatic pressure behind the walls or the walls should be designed to resist hydrostatic pressure for the full depth of the wall.

Typically, a pre-fabricated geo-composite drainage board is fixed to the shoring wall and the below-grade building wall is constructed by the placement of shotcrete directly against the drainage board.

7.3 TEMPORARY SHORING

7.3.1 Design Lateral Earth Pressures

Typically, cantilevered shoring is feasible for retained heights of approximately 15 feet or less, and braced shoring typically becomes economical for retained heights exceeding 15 feet. Cantilevered shoring should be designed to resist a triangular lateral earth pressure distribution with a maximum value of 30 pcf.

Internally braced shoring should be designed to resist a trapezoidal earth pressure where the maximum value is equal to $24H$, where H is the retained height.

The applicable surcharge loading from the adjacent building foundations can be determined following Section 7.2.2.

In addition, the upper 10 feet of the shoring should be designed to resist a uniform lateral pressure of 100 psf to account for normal traffic loading. When developing temporary shoring design drawings, the location of construction cranes and other potentially heavy equipment or loads that may act against the shoring system should be considered and incorporated into the design.

For cantilevered and braced shoring design, where the surface at the top of the shoring is sloped, the recommended lateral earth pressures should be increased as indicated in Table 6.

Table 6. Temporary Shoring – Lateral Earth Pressures

Slope Inclination at Top of Shoring (H:V)	Increase in Lateral Earth Pressure (percent)
1:1	200
1.5:1	165
2:1	150

7.3.2 Soldier Piles, Tiebacks, and Timber Lagging

For the design of soldier piles spaced at least 2 diameters on centers, the allowable lateral bearing value (passive value) of the native soils below the level of excavation may be assumed to be 600 psf per foot of depth, up to a maximum of 6,000 psf of depth. The recommended value includes a 200 percent increase for the case of isolated piles as allowed per the CBC. To develop the full lateral value, provisions should be taken to ensure firm contact between the soldier piles and the undisturbed soil.

If the embedded portion of the soldier pile shaft is filled with lean mix concrete with a minimum compressive strength of 2,000 psi, the effective width of the soldier pile shaft (for use in developing passive resistance) may be assumed to be twice the diameter of the shaft. If the embedded portion of the soldier pile shaft is filled with other materials (such as low strength sand-cement slurry), the effective width of the soldier pile should be limited to be the diagonal dimension of the soldier pile beam. The materials used to fill the portion of the shaft above the embedded depth should be of sufficient strength to adequately transfer the imposed loads to the surrounding soil.

The frictional resistance between the soldier piles and the retained earth may be used in resisting the downward component of the tieback anchor loads. For design, the coefficient of friction between the soldier piles and the retained earth is 0.4. This value is based on the assumption that uniform full bearing will be developed between the steel soldier beam and the retained earth against the shaft's backfilled material. In addition, provided that the portion of the soldier piles below the excavated level is backfilled with structural concrete, the soldier piles below the excavated level may be used to resist downward loads. For resisting downward loads, the frictional resistance between the concrete soldier piles and the soil below the excavated level may be taken equal to 400 psf.

Drilling for soldier pile shafts will encounter groundwater, and provisions to control groundwater and mitigate potential caving of the shaft side walls may be required. Such provisions may consist of the use of steel shell casing and/or polymer-based drilling fluid, or other suitable alternatives proposed by the shoring contractor. The shoring contractor should provide a procedure for the installation of soldier pile shafts for our review and comment.

Continuous lagging will be required between the soldier piles. The soldier piles and anchors should be designed for the full anticipated lateral pressure; however, the pressure on the lagging will be less due to arching in the soil. For clear spans of up to 6 feet, we recommend that the lagging be designed for a triangular distribution of earth pressure where the maximum pressure is 400 psf at the mid-line between soldier piles and 0 psf at the soldier piles.

Tieback friction anchors may be used to resist lateral loads. For design purposes, it may be assumed that the active wedge adjacent to the shoring is defined by a plane drawn at 35 degrees with the vertical through the bottom of the excavation. The anchors should extend at least 20 feet beyond the potential active wedge and to a greater length, if necessary, to develop the desired capacities.

The capacities of anchors should be determined by testing of the initial anchors as outlined below. We anticipate that the anchors will be capable of achieving an allowable bond strength of 3 kips per square foot, depending on the method of construction. A variety of methods are available for construction of anchors.

For design of temporary shoring tieback anchors, we recommend using a factor of safety not less than 1.5.

The shoring designer and the shoring contractor should be responsible for selecting the appropriate bonded length and installation methods to achieve the required capacity and our office should review the final shoring plans.

If post-grouted anchors are used, we estimate that the anchors will develop resistance on the order of three times the estimated value.

Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads. If the anchors are spaced at least 6 feet on centers, reduction in the capacity of the anchors does not need to be considered due to group action.

The anchors should be installed at angles of 15 to 40 degrees below the horizontal. Caving of the anchor holes should be anticipated and provisions made to minimize such caving. The anchors should be filled with concrete placed by pumping from the tip out, and the concrete should extend from the tip of the anchor to the active wedge. To minimize chances of caving, we suggest that the portion of the anchor shaft within the active wedge be backfilled with sand before testing the anchor. This portion of the shaft should be filled tightly and flushed with the face of the excavation. The sand backfill may contain a small amount of cement to allow the sand to be placed by pumping. For post-grouted anchors of 8-inch diameter or less, the anchor may be filled with concrete to the surface of the shoring.

Our representative should select at least two of the initial anchors for 24-hour 200 percent tests and six additional anchors for quick 200 percent tests. The purpose of the 200 percent test is to verify the friction value assumed in design. The anchors should be tested to develop twice the assumed friction value. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained.

For post-grouted anchors where concrete is used to backfill the anchor along its entire length, the test load should be computed as that required to develop the appropriate friction along the entire bonded length of the anchor.

Total deflection during the 24-hour 200 percent tests should not exceed 6 inches during loading; the anchor deflection should not exceed 0.75 inch during the 24-hour period, measured after the 200 percent test load is applied. If the anchor movement after the 200 percent load has been applied for six hours is less than 0.5 inch and the movement over the previous four hours has been less than 0.1 inch, the test may be terminated.

For the quick 200 percent tests, the 200 percent test load should be maintained for 30 minutes. Total deflection of the anchor during the quick 200 percent tests should not exceed 6 inches; deflection after the 200 percent test load has been applied should not exceed $\frac{1}{4}$ inch during the 30-minute period. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained.

All of the production anchors should be pre-tested to at least 150 percent of the design load; total deflection during the tests should not exceed 6 inches. The rate of creep under the 150 percent test should not exceed $\frac{1}{10}$ inch over a 15-minute period for the anchor to be approved for the design loading.

After a satisfactory test, each production anchor should be locked off at the design load. The locked-off load should be verified by rechecking the load in the anchor. If the locked-off load varies by more than 10 percent from the design load, the load should be reset until the anchor is locked off within 10 percent of the design load. Installation of the anchors and testing of the completed anchors should be observed by a representative of our firm.

As an alternative to tiebacks, raker bracing may be used to internally brace the soldier piles. If used, raker bracing could be supported laterally by temporary concrete footings (deadmen) or by the permanent interior footings. For design of such temporary footings poured with the bearing surface normal to the rakers inclined at 45 to 60 degrees with the vertical, a bearing value of 6,000 psf may be used for footings on the dense or stiff native soil provided the shallowest point of the footing is at least 1 foot below the lowest adjacent grade. To reduce movement of the shoring, rakers should be tightly wedged against the footings and/or shoring system.

It is difficult to accurately predict the amount of deflection of a shoring system. It should be realized, however, that some deflection will occur. We estimate that this deflection could be on the order of 1 inch at the top of the shored embankment. If greater deflection occurs during

construction, additional bracing may be necessary to minimize settlement of utilities in the adjacent streets. If it is desired to reduce deflection of the shoring, a greater active pressure could be used in the shoring design.

Some means of monitoring the performance of the shoring system is recommended. The monitoring should consist of periodic surveying of the lateral and vertical locations of the tops of all the soldier piles. We will be pleased to discuss this further with the design consultants and the contractor when the design of the shoring system has been finalized.

7.4 TEMPORARY SLOPES AND VERTICAL CUTS

Temporary, unsurcharged slopes should not exceed a 1H:1V gradient when constructed in existing fill and/or native materials. Such temporary slopes should not exceed 15 feet high.

Temporary vertical cuts that will be beneficial for foundation construction may be made into the dense native materials but should not exceed 5 feet BGS.

Temporary cut slopes should be protected from erosion by directing surface water away from the top of slopes by placing sand bags at the top of slopes and covering the slopes with plastic sheeting during wet weather.

Surcharge loading, including (but not limited to) materials and equipment lay-down, cranes and concrete trucks, and construction or regular traffic, should not be allowed within 10 feet of temporary construction slopes.

7.5 FLOOR SLABS

The building floor slab will be constructed on approximately 1 foot of compacted fill placed on the top of the mat foundation.

7.6 GROUNDWATER CONTROL PROVISIONS

The planned construction will include mass excavations on the order of 5 feet below the lowest planned finish floor level to allow for the construction of the mat foundation. Localized deeper excavations may also be required for elevator pits and/or other depressed building features.

The required excavations will extend below the HHGWL, and there is a possibility that groundwater may be encountered during construction at the bottom of the excavation. In this case, suitable groundwater control provisions may be required.

It would be prudent to periodically check the groundwater level in the existing groundwater monitoring well installed in boring B-3 to verify the groundwater level at the time of construction.

It should be noted that other than the potential need for temporary groundwater control provisions during construction, the impact of the HHGWL on the project is negligible.

The contractor should be aware of requirements for discharge of water generated on site, including National Pollutant Discharge Elimination System, if it is intended to discharge groundwater to the storm drain system.

7.7 SITE PREPARATION

7.7.1 General

Site preparation includes tasks to be performed prior to the placement of new fill material at the site. Since the mat foundation will be established on dense native soil, the only areas to receive new fill will be for floor slab support and/or for non-structural features (such as behind below-grade walls and beneath landscaping or flatwork areas).

In these areas, all loose or otherwise unsuitable soil should be removed and the exposed surface of the soil should be scarified to a depth of 6 inches, moisture conditioned, and compacted as recommended in the "Compaction" section.

7.7.2 Bottom of Mass Excavation

The current groundwater level is several feet below the bottom of the planned mass excavation and groundwater is not anticipated to affect construction. However, the actual conditions at the bottom of the mass excavation could be affected by the combination of disturbance and intermittent loading from construction and excavation activities as well as the underlying groundwater table.

It may be prudent to consider construction of a waste slab at the bottom of the mass excavation to preserve the bottom and avoid localized or mass mitigation that may be required. As an alternative, if localized areas or the majority of the bottom are disturbed as described above or by other means, the disturbed areas should be removed and replaced with a sufficient thickness of ¾-inch-minus crushed rock to re-establish a firm bottom.

7.8 CONSTRUCTION CONSIDERATIONS

7.8.1 General

If not carefully executed, site preparation and basement and footing excavation can result in the presence of unsuitable (disturbed and/or excessively soft) soil conditions that may require additional effort to mitigate or, in more extreme cases (if not detected), could result in significant costs to repair damage to flatwork or structures.

Earthwork should be planned and executed to minimize subgrade disturbance. Soil that has been disturbed during site preparation activities or soft or loose zones identified during probing should be removed beneath foundations and floor slabs.

7.8.2 Compaction

All granular fill material should be compacted to at least 95 percent of the maximum dry density, as determined by ASTM D1557. Cohesive fill, though not anticipated for this project, should be compacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557.

Fill material should be placed in loose lifts not exceeding 8 inches in thickness, properly moisture conditioned, and mechanically compacted to the minimum required density. For granular fill, compaction may be achieved using heavy equipment and vibration, although the use of such equipment should not be allowed within a horizontal distance of 3 feet from retaining walls. Backfill placed within 3 feet of retaining walls should be compacted in lifts less than 6 inches thick using hand-operated compaction equipment. If flatwork (slabs, sidewalk, or

pavement) will be placed adjacent to retaining walls, we recommend that the upper 2 feet of fill be compacted to 95 percent of the maximum dry density, as determined by ASTM D1557.

7.8.3 Site Drainage

Adequate site drainage should be maintained at all times. Site drainage should be collected and routed to suitable discharge points.

7.9 FILL MATERIALS

Fill materials should be free of organic matter and other deleterious materials and, in general, should consist of particles no larger than 6 inches in largest dimension.

Existing asphalt pavement and base materials generated from on-site demolition can be used for structural fill, although the percentage of such materials should be limited to less than 5 percent of the fill content.

The following sections provide recommendations for the reuse of on-site materials in compacted fills and for the use of imported materials in required fills.

7.9.1 On-Site Native Soil

The on-site native soil is suitable for use in the required fills provided that particles larger than 3 inches in largest dimension are removed. However, the percentage of particles in excess of 3 inches should be less than 10 percent of the fill.

7.9.2 Imported Granular Material

If necessary, imported granular material should be pit- or quarry-run rock, crushed rock, or crushed gravel and sand that is well graded and has less than 5 percent by dry weight passing the U.S. Standard No. 200 Sieve. The percentage of fines can be increased to 12 percent if the fill is placed during dry weather and provided the fill material is properly moisture conditioned to achieve the required compaction. Imported fill material should have a sand equivalent of at least 35.

7.10 UTILITY TRENCHES

Trench cuts should stand near vertical to a depth of approximately 4 feet in the upper silt and sand provided groundwater seepage is not present. If seepage is encountered that undermines the stability of the trench, the sidewalls should be flattened or shored. All trench excavations should be in accordance with applicable OSHA, state, and local regulations.

It should be understood that it is the contractor's responsibility to select the excavation methods, monitor trench excavations for safety, and provide shoring required to protect personnel and adjacent improvements.

8.0 OBSERVATION OF CONSTRUCTION

Geotechnical testing and observation during construction is considered to be a continuing part of the geotechnical consultation. In order to confirm that the recommendations presented herein remain applicable, our representative should be present at the site to provide appropriate observation and testing.

As satisfactory earthwork and foundation performance depend to a large degree on the quality of construction, it is essential that qualified personnel be present to perform the required geotechnical testing and inspection.

The presence of an experienced representative at the site during construction provides value and benefits to the project and can often result in schedule and cost savings for the owner by approaching the geotechnical testing and inspection responsibilities in a proactive and team-oriented manner.

9.0 LIMITATIONS

We have prepared this report for use by Soto Capital and members of the design and construction team for the proposed development. The data and report can be used for estimating purposes, but our report, conclusions, and interpretations should not be construed as a warranty of the subsurface conditions and are not applicable to other sites.

Explorations indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect soil strata or water level variations that may exist between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, re-evaluation will be necessary.

The recommendations presented in this report are based on the current site development plan and structural information provide to us by the project team. If design changes are made, we should be retained to review our conclusions and recommendations and to provide a written evaluation or modification.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with that degree of skill and care ordinarily exercised by reputable geotechnical consultants practicing in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

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We appreciate the opportunity to be of continued service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

GeoDesign, Inc.



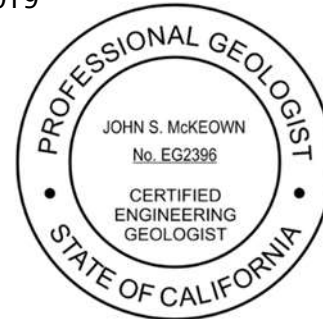
John W. Halseth, P.E.
Senior Project Engineer



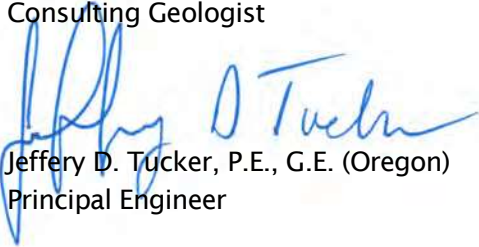
Signed 10/31/2019



John S. McKeown, C.E.G.
Consulting Geologist



Signed 10/31/2019



Jeffery D. Tucker, P.E., G.E. (Oregon)
Principal Engineer

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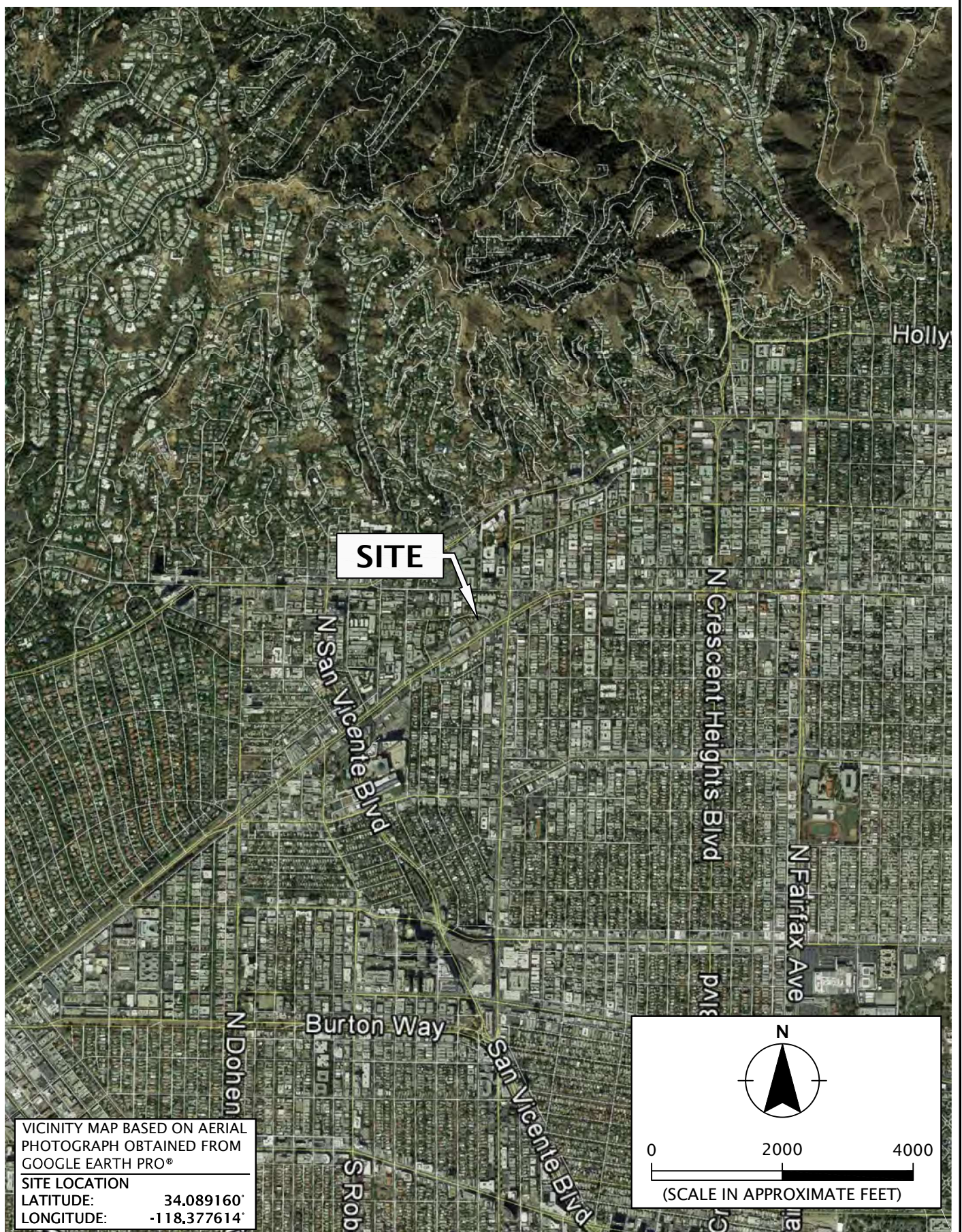
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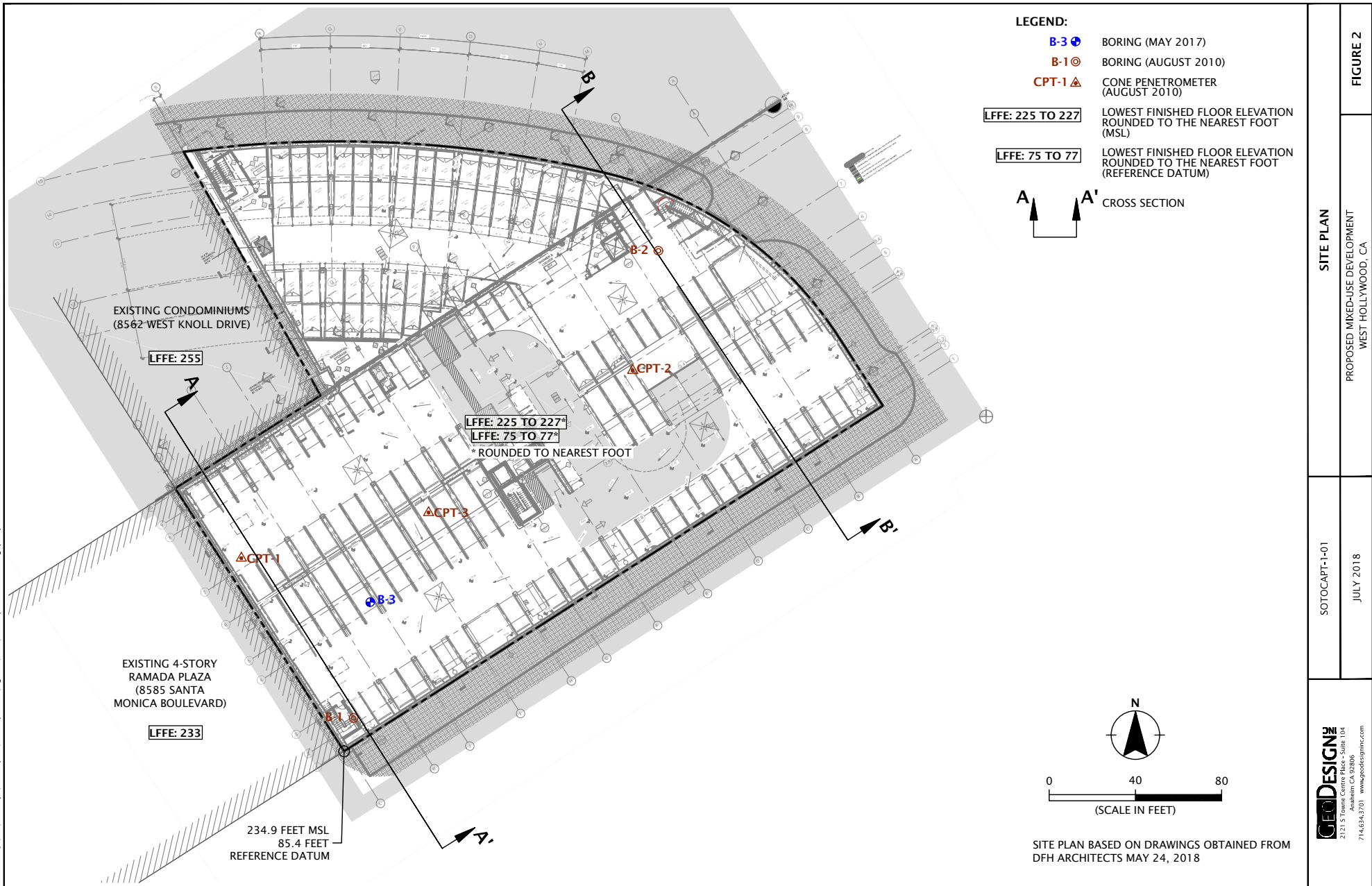
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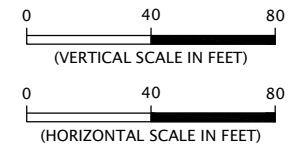
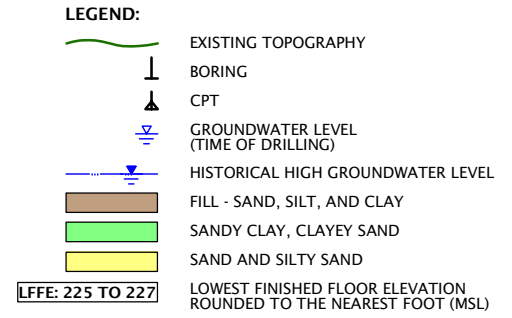
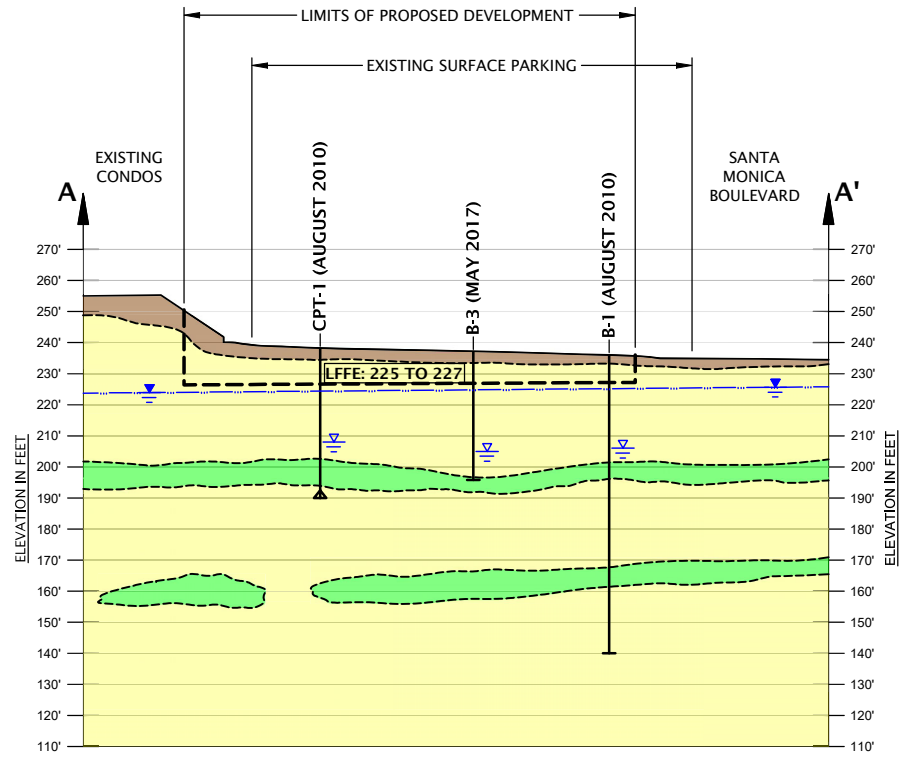
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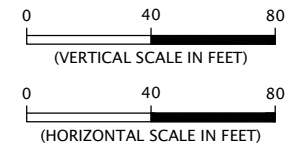
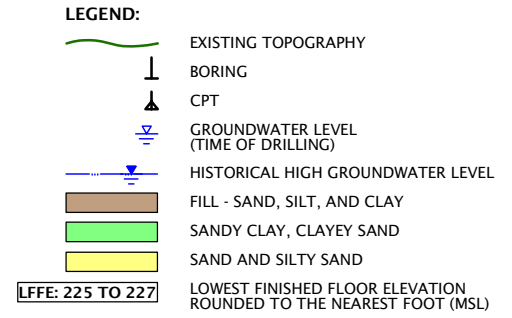
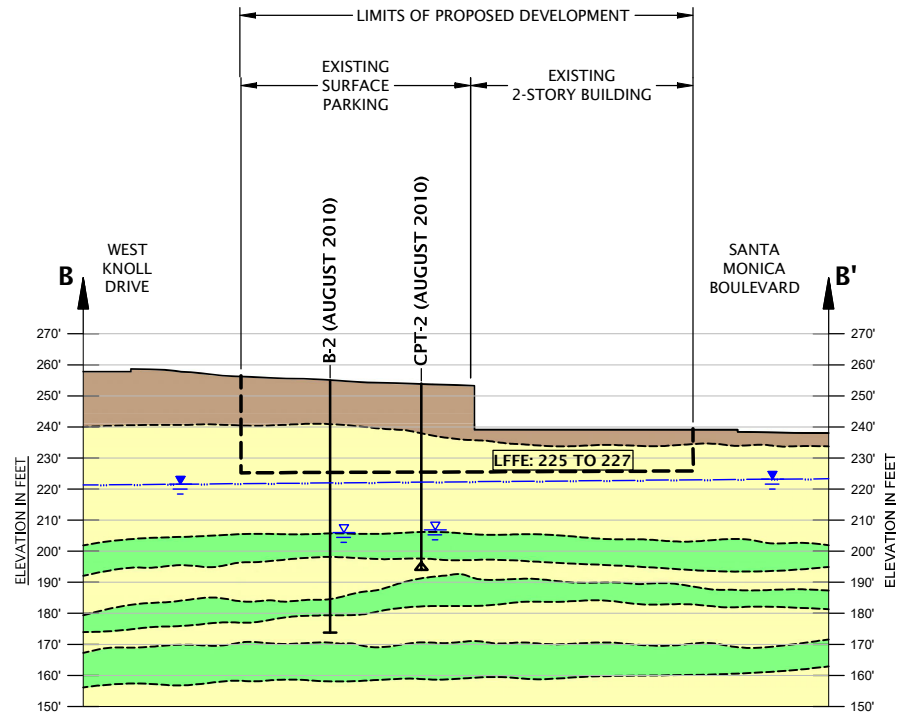
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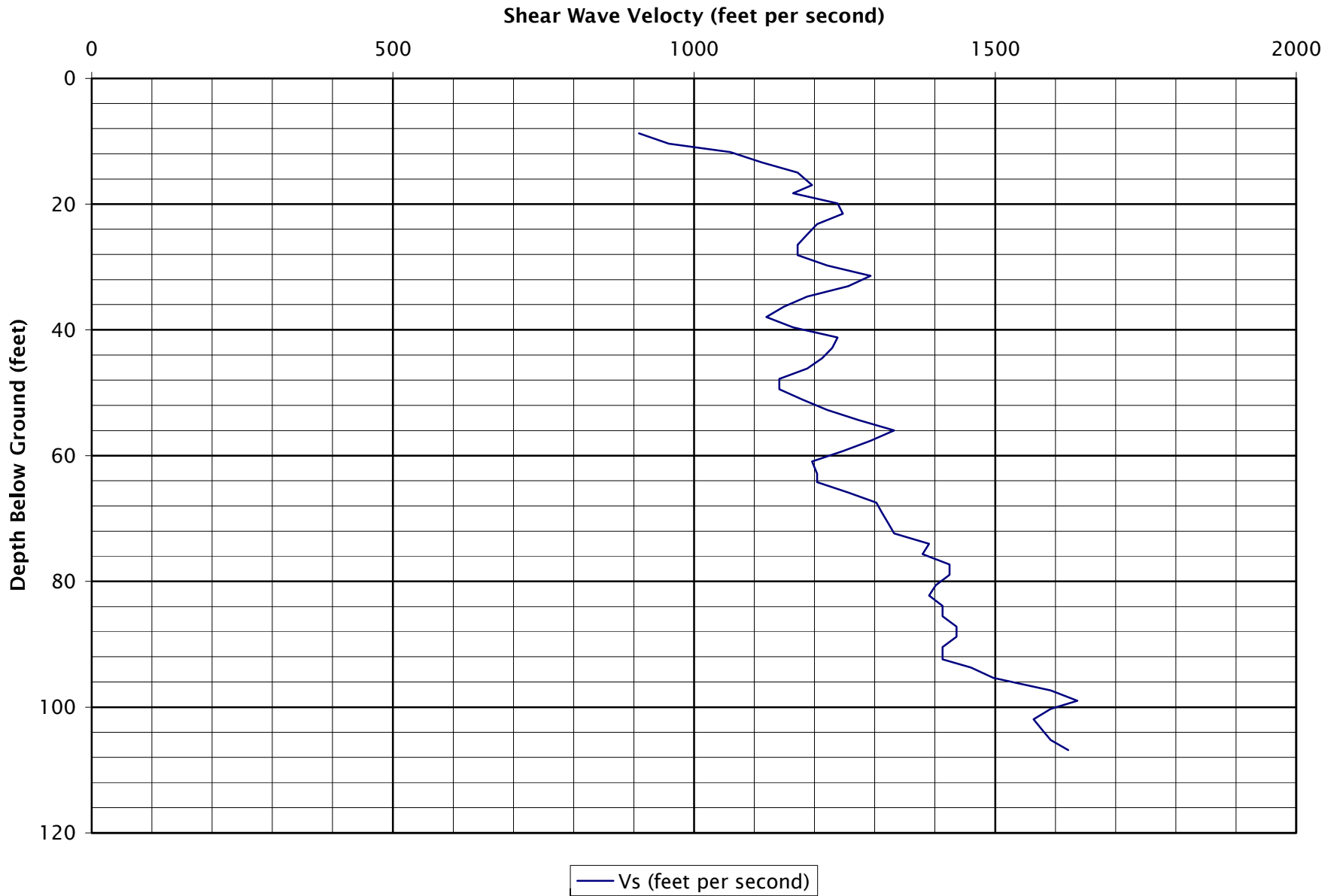
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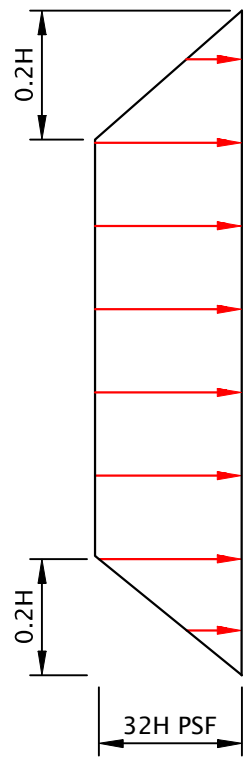






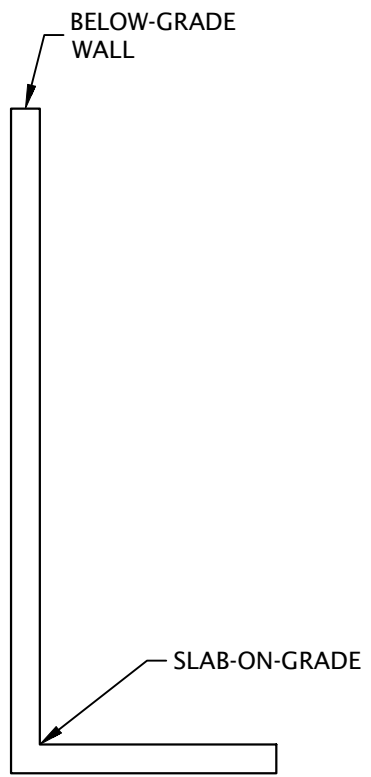
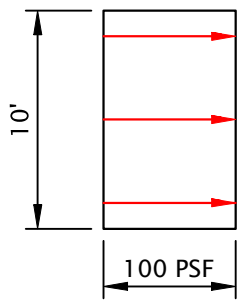


AT-REST
LATERAL EARTH PRESSURE



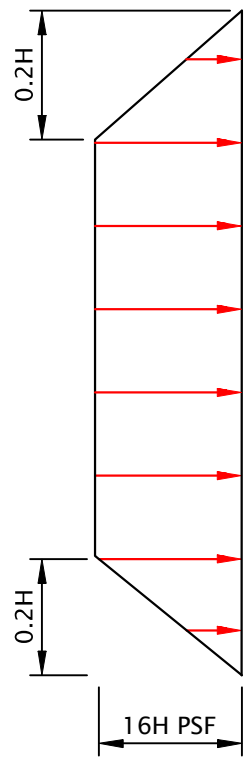
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TRAFFIC
SURCHARGE



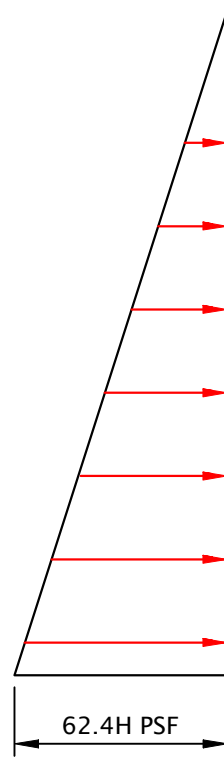
NOTE:
1. SURCHARGE LOADING FROM EXISTING RAMADA AND CONDOMINIUM BUILDINGS SHOULD BE ADDED PER SECTION 7.2 OF REPORT.

**BUOYANT AT-REST
LATERAL EARTH PRESSURE**



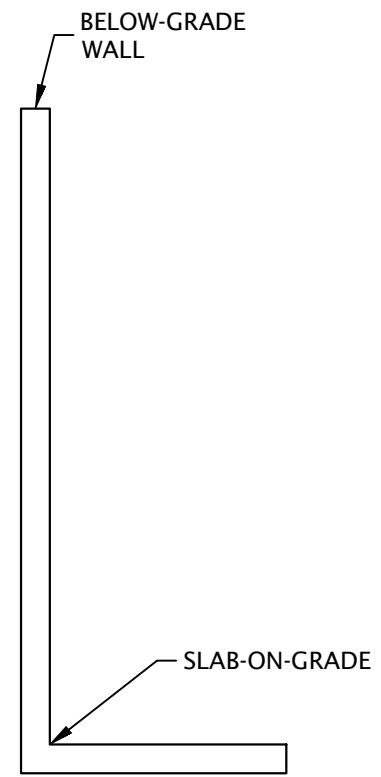
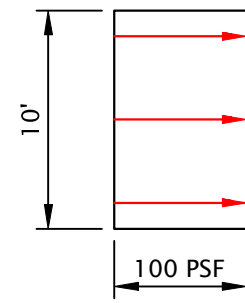
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**HYDROSTATIC
PRESSURE**

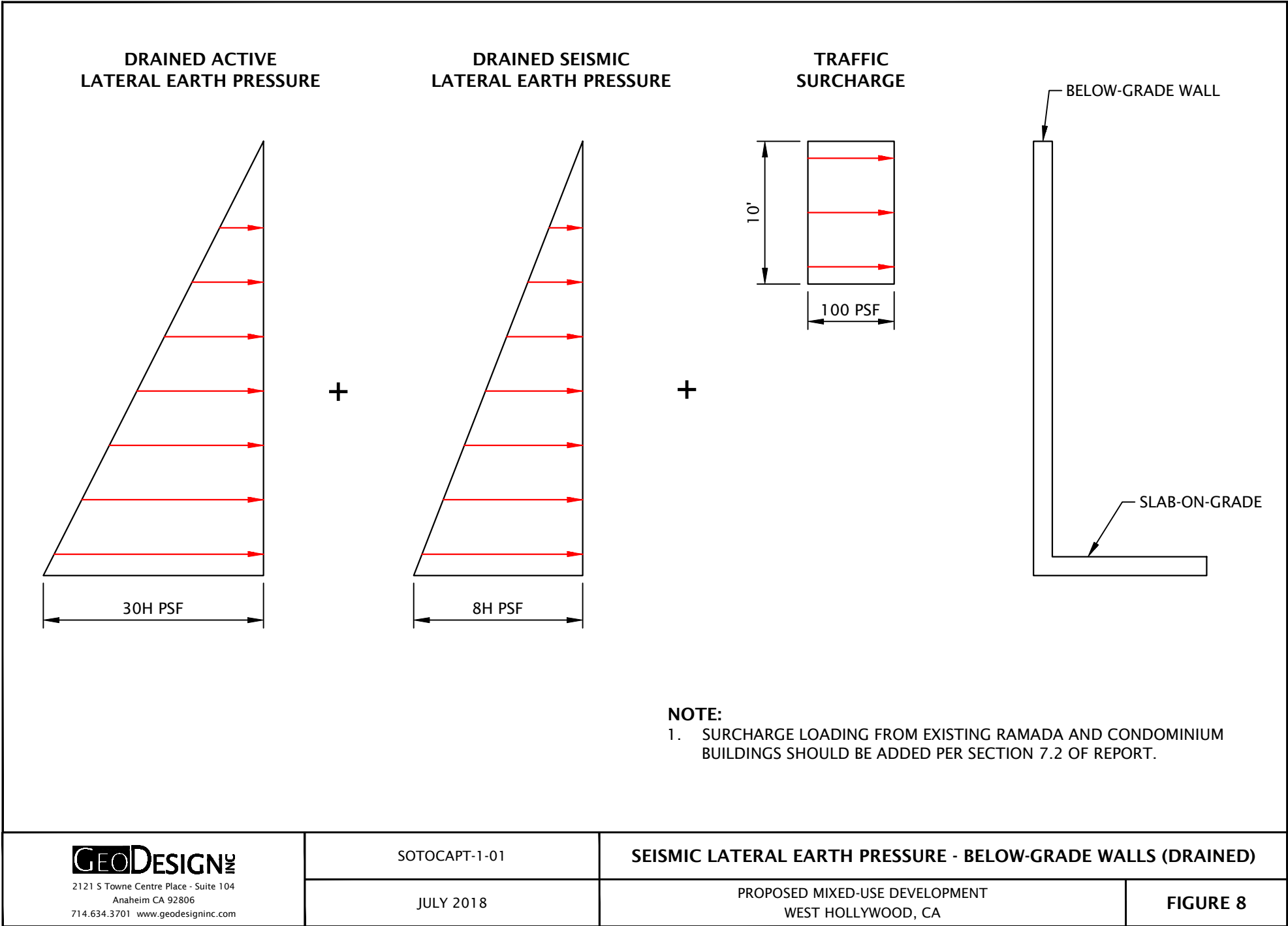


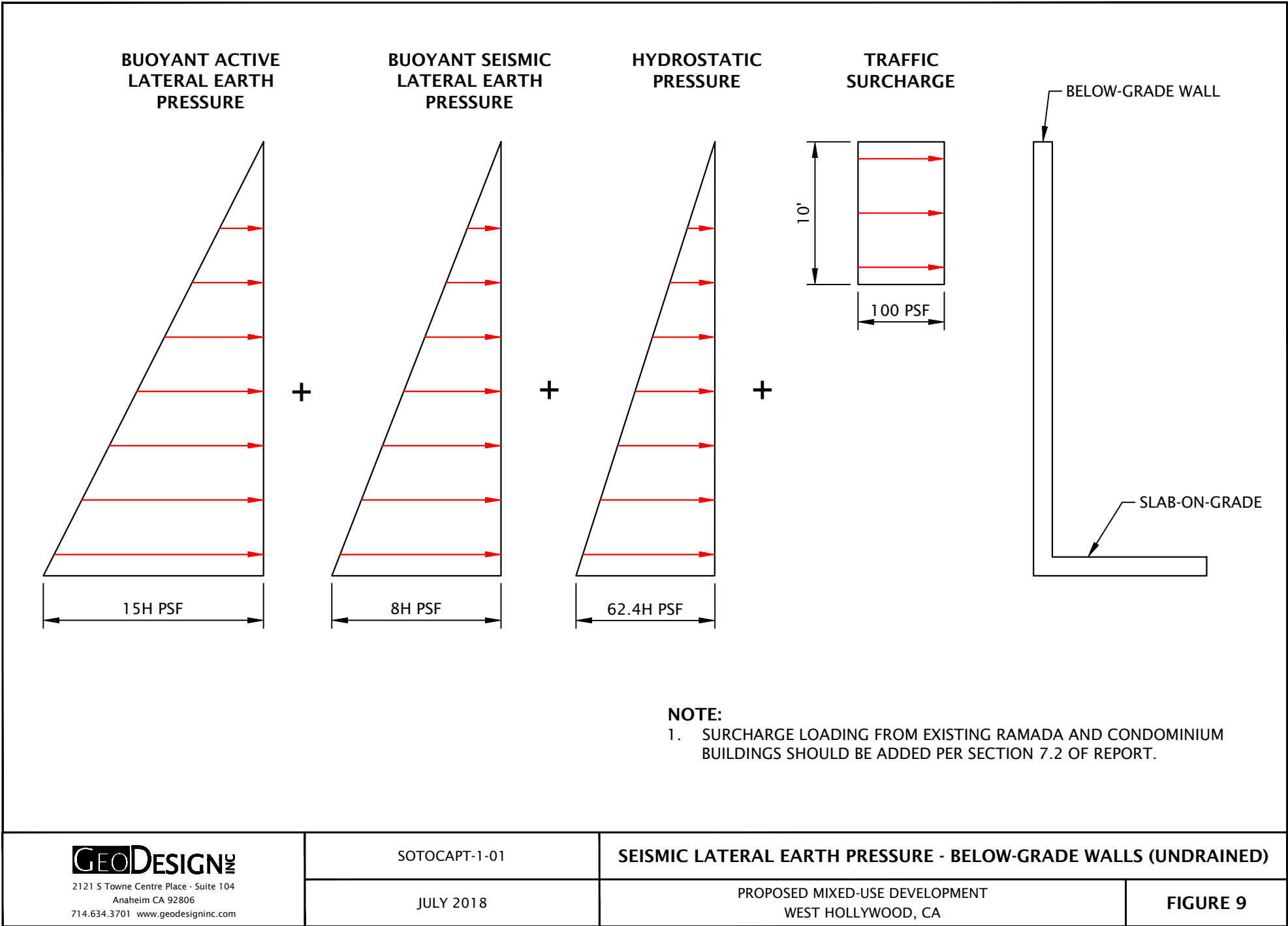
+

**TRAFFIC
SURCHARGE**



NOTE:
1. SURCHARGE LOADING FROM EXISTING RAMADA AND CONDOMINIUM BUILDINGS SHOULD BE ADDED PER SECTION 7.2 OF REPORT.





APPENDIX A

APPENDIX A

FIELD EXPLORATIONS

GENERAL

We explored the subsurface conditions at the site by drilling two borings (B-1 and B-2) to depths of 101.5 and 120.0 feet BGS at the locations shown on Figure 2. The borings were drilled on August 4 and 5, 2010 by SoCal Drilling of La Habra, California, using a mud rotary drill rig. The exploration logs are presented in this appendix.

Three CPTs were also performed at the site by Kehoe Testing and Engineering of Huntington Beach, California. The CPTs were performed to depths of 60 to 75 feet BGS at the direction of our geotechnical staff. The graphical representations of the CPTs are presented in Appendix B.

We performed a supplemental exploration of the subsurface conditions at the site on May 1, 2017. The supplemental exploration consisted of drilling one boring (B-3) to a depth of 51.5 feet BGS at the location shown on Figure 2. The boring was drilled by 2R Drilling of Chino, California, using a mud rotary drill rig. The exploration log is presented in this appendix.

The locations of the borings and CPTs were determined in the field by measuring from surveyed existing site features. This information should be considered accurate only to the degree implied by the methods used.

A member of our geotechnical staff observed and logged the borings. We collected representative samples of the various soils encountered in the explorations for geotechnical laboratory testing.

SOIL SAMPLING

Samples were collected from the borings using a modified California split-spoon sampler in general accordance with guidelines presented in ASTM D3550. The split-spoon samplers were driven into the soil with a 140-pound hammer free-falling 30 inches. The samplers were driven a total distance of 18 inches or to refusal as indicated on the exploration logs. The number of blows required to drive the sampler the final 12 inches is recorded on the exploration logs presented in this appendix, unless otherwise noted.

In addition, SPTs were performed in the borings in general accordance with ASTM D1586. The 2-inch-diameter, split-spoon sampler was driven into the soil with a 140-pound hammer free-falling 30 inches. The samplers were driven a total distance of 18 inches or to refusal. The number of blows required to drive the sampler the final 12 inches is recorded on the exploration logs presented in this appendix, unless otherwise noted.

Sampling methods and intervals are shown on the exploration logs.

SOIL CLASSIFICATION

The soil samples were classified in accordance with the "Exploration Key" (Table A-1) and "Soil Classification System" (Table A-2), which are presented in this appendix. The exploration logs indicate the depths at which the soils or their characteristics change, although the change actually could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration logs.

LABORATORY TESTING

CLASSIFICATION

The soil samples were classified in the laboratory to confirm field classifications. If those classifications differed from the field classifications, the laboratory classifications are shown on the exploration logs.

MOISTURE CONTENT

We tested the natural moisture content of select soil samples in general accordance with ASTM D2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage. The test results are presented in this appendix.

DRY DENSITY

We tested select soil samples to determine the in situ dry density in general accordance with ASTM D2937. The dry density is defined as the ratio of the dry weight of the soil sample to the volume of that sample. The dry density typically is expressed in units of pcf. The test results are presented in this appendix.

ATTERBERG LIMITS

The plastic limit and liquid limit (Atterberg limits) of select soil samples were determined in accordance with ASTM D2937. The test results are presented in this appendix.

CONSOLIDATION TESTING

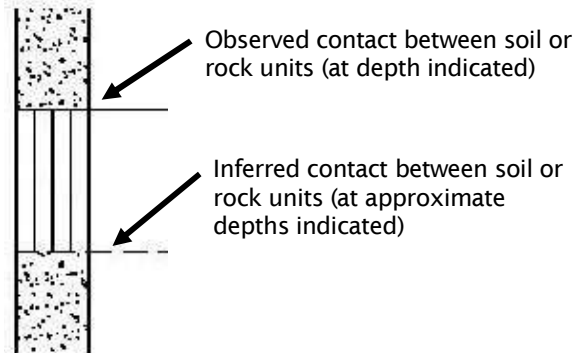
We performed one-dimensional consolidation tests in general accordance with ASTM D2435 on selected relatively undisturbed samples. The tests measure the volume change of a soil sample under predetermined loads. The test results are presented in this appendix.

PERCENT FINES DETERMINATIONS

Percent fines determinations were performed in general accordance with ASTM C136 and ASTM D1140. The test results are presented in this appendix.

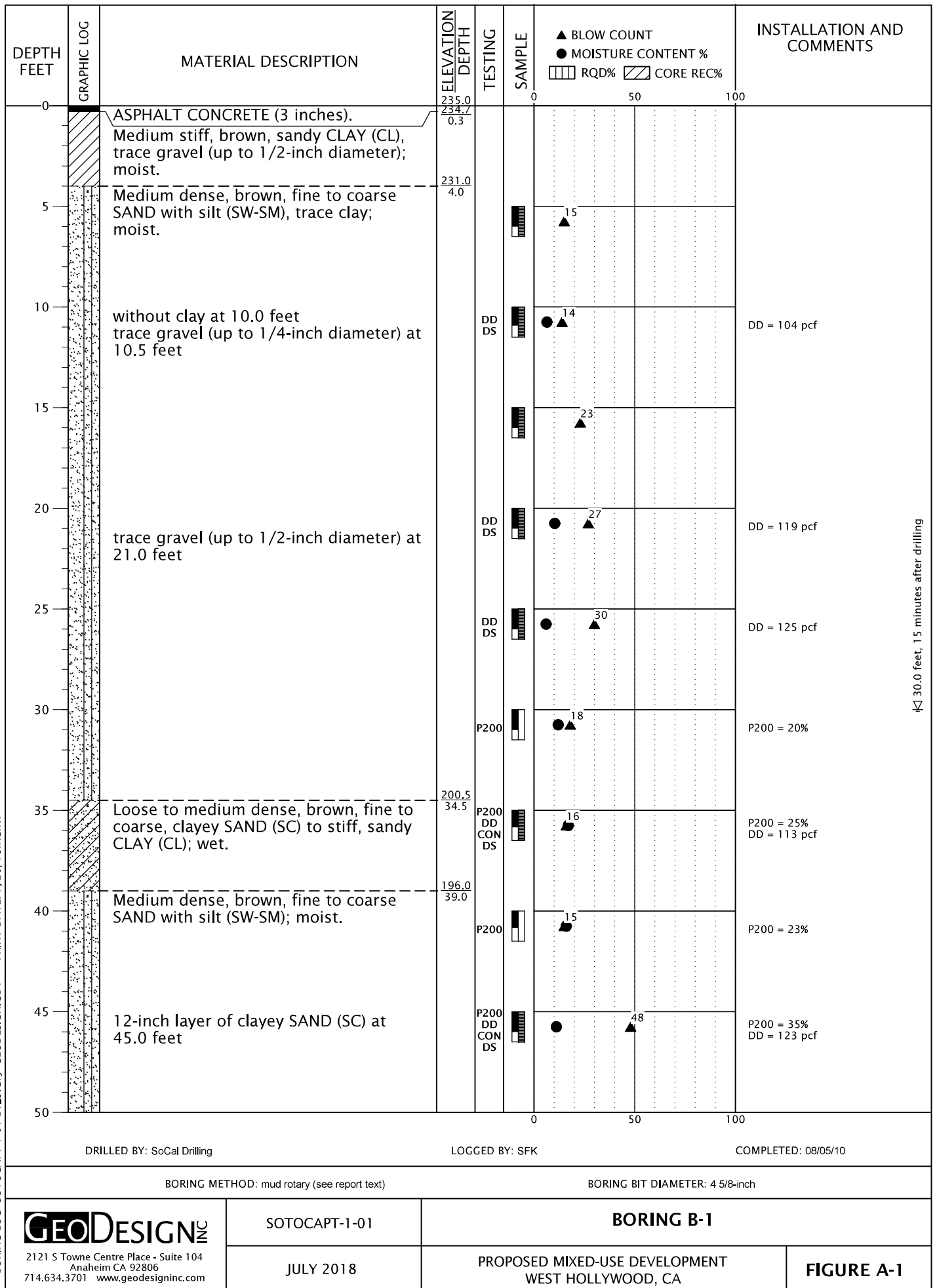
STRENGTH TESTING

Direct shear tests were completed on select soil samples in general accordance with ASTM D3080. The test results are presented in this appendix.

SYMBOL		SAMPLING DESCRIPTION	
	Location of sample obtained in general accordance with ASTM D 1586 Standard Penetration Test with recovery		
	Location of sample obtained using thin-wall Shelby tube or Geoprobe® sampler in general accordance with ASTM D 1587 with recovery		
	Location of sample obtained using Dames & Moore sampler and 300-pound hammer or pushed with recovery		
	Location of sample obtained using Dames & Moore and 140-pound hammer or pushed with recovery		
	Location of sample obtained using 3-inch-O.D. California split-spoon sampler and 140-pound hammer		
	Location of grab sample		
	Rock coring interval		
	Water level during drilling		
	Water level taken on date shown		
Graphic Log of Soil and Rock Types 			
GEOTECHNICAL TESTING EXPLANATIONS			
ATT	Atterberg Limits	P	Pushed Sample
CBR	California Bearing Ratio	PP	Pocket Penetrometer
CON	Consolidation	P200	Percent Passing U.S. Standard No. 200 Sieve
DD	Dry Density		
DS	Direct Shear	RES	Resilient Modulus
HYD	Hydrometer Gradation	SIEV	Sieve Gradation
MC	Moisture Content	TOR	Torvane
MD	Moisture-Density Relationship	UC	Unconfined Compressive Strength
NP	Nonplastic	VS	Vane Shear
OC	Organic Content	kPa	Kilopascal
ENVIRONMENTAL TESTING EXPLANATIONS			
CA	Sample Submitted for Chemical Analysis	ND	Not Detected
P	Pushed Sample	NS	No Visible Sheen
PID	Photoionization Detector Headspace Analysis	SS	Slight Sheen
		MS	Moderate Sheen
ppm	Parts per Million	HS	Heavy Sheen
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		TABLE A-1	

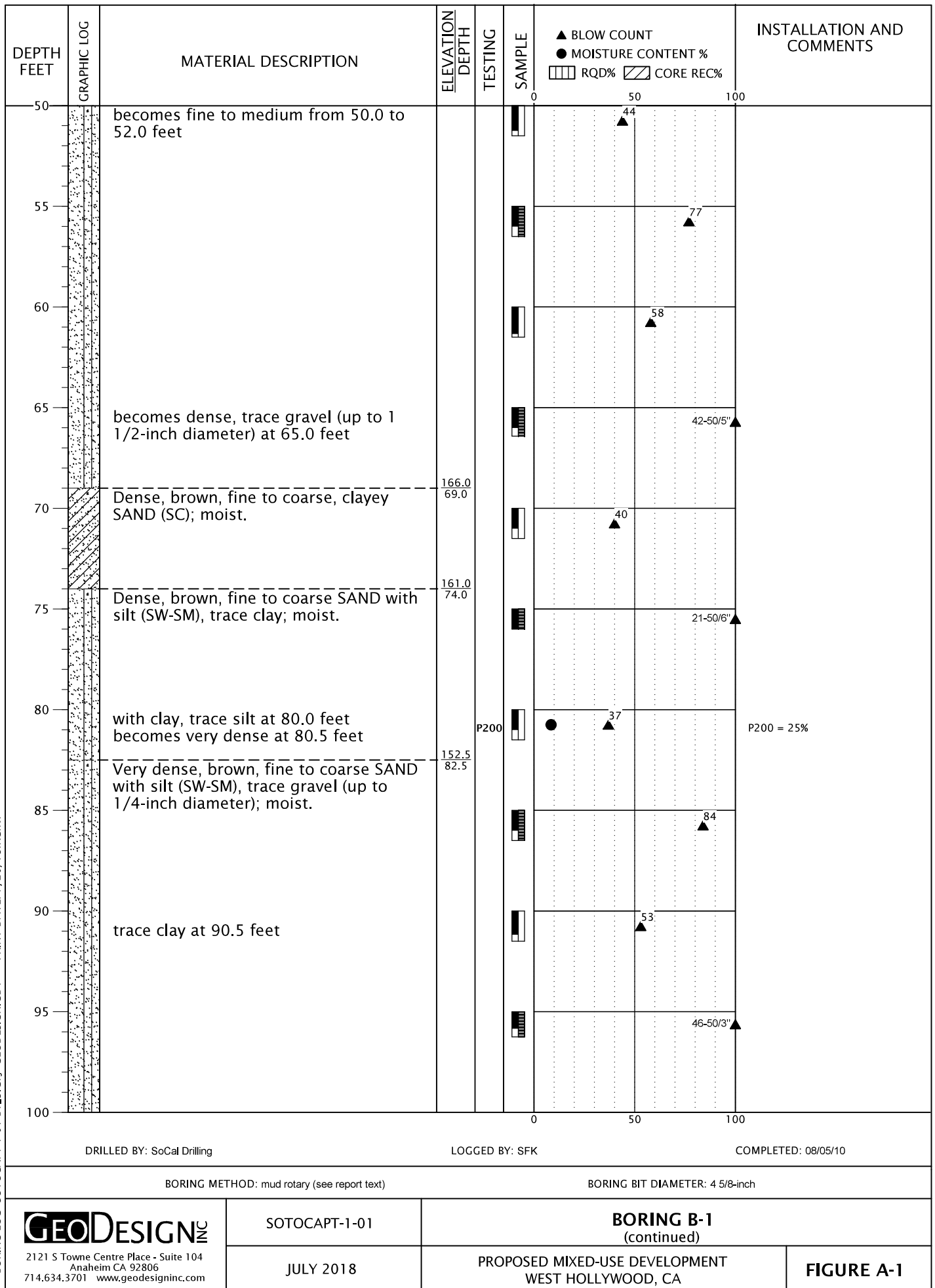
RELATIVE DENSITY - COARSE-GRAINED SOIL							
Relative Density	Standard Penetration Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)				
Very Loose	0 - 4	0 - 11	0 - 4				
Loose	4 - 10	11 - 26	4 - 10				
Medium Dense	10 - 30	26 - 74	10 - 30				
Dense	30 - 50	74 - 120	30 - 47				
Very Dense	More than 50	More than 120	More than 47				
CONSISTENCY - FINE-GRAINED SOIL							
Consistency	Standard Penetration Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)	Unconfined Compressive Strength (tsf)			
Very Soft	Less than 2	Less than 3	Less than 2	Less than 0.25			
Soft	2 - 4	3 - 6	2 - 5	0.25 - 0.50			
Medium Stiff	4 - 8	6 - 12	5 - 9	0.50 - 1.0			
Stiff	8 - 15	12 - 25	9 - 19	1.0 - 2.0			
Very Stiff	15 - 30	25 - 65	19 - 31	2.0 - 4.0			
Hard	More than 30	More than 65	More than 31	More than 4.0			
PRIMARY SOIL DIVISIONS			GROUP SYMBOL	GROUP NAME			
COARSE-GRAINED SOIL (more than 50% retained on No. 200 sieve)	GRAVEL (more than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (< 5% fines)	GW or GP	GRAVEL			
		GRAVEL WITH FINES (≥ 5% and ≤ 12% fines)	GW-GM or GP-GM	GRAVEL with silt			
			GW-GC or GP-GC	GRAVEL with clay			
		GRAVEL WITH FINES (> 12% fines)	GM	silty GRAVEL			
			GC	clayey GRAVEL			
	GC-GM		silty, clayey GRAVEL				
	SAND (50% or more of coarse fraction passing No. 4 sieve)	CLEAN SAND (<5% fines)	SW or SP	SAND			
		SAND WITH FINES (≥ 5% and ≤ 12% fines)	SW-SM or SP-SM	SAND with silt			
			SW-SC or SP-SC	SAND with clay			
		SAND WITH FINES (> 12% fines)	SM	silty SAND			
SC			clayey SAND				
SC-SM			silty, clayey SAND				
FINE-GRAINED SOIL (50% or more passing No. 200 sieve)		SILT AND CLAY Liquid limit less than 50	ML	SILT			
	CL		CLAY				
	CL-ML		silty CLAY				
	OL		ORGANIC SILT or ORGANIC CLAY				
	Liquid limit 50 or greater	MH	SILT				
		CH	CLAY				
		OH	ORGANIC SILT or ORGANIC CLAY				
		HIGHLY ORGANIC SOIL		PT	PEAT		
MOISTURE CLASSIFICATION		ADDITIONAL CONSTITUENTS					
Term	Field Test	Secondary granular components or other materials such as organics, man-made debris, etc.					
		Percent	Silt and Clay In:		Percent	Sand and Gravel In:	
Fine-Grained Soil	Coarse-Grained Soil		Fine-Grained Soil	Coarse-Grained Soil			
dry	very low moisture, dry to touch	< 5	trace	trace	< 5	trace	trace
moist	damp, without visible moisture	5 - 12	minor	with	5 - 15	minor	minor
		> 12	some	silty/clayey	15 - 30	with	with
wet	visible free water, usually saturated				> 30	sandy/gravelly	Indicate %
 2121 S Towne Centre Place - Suite 104 Anaheim CA 92806 714.634.3701 www.geodesigninc.com		SOIL CLASSIFICATION SYSTEM			TABLE A-2		

BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT



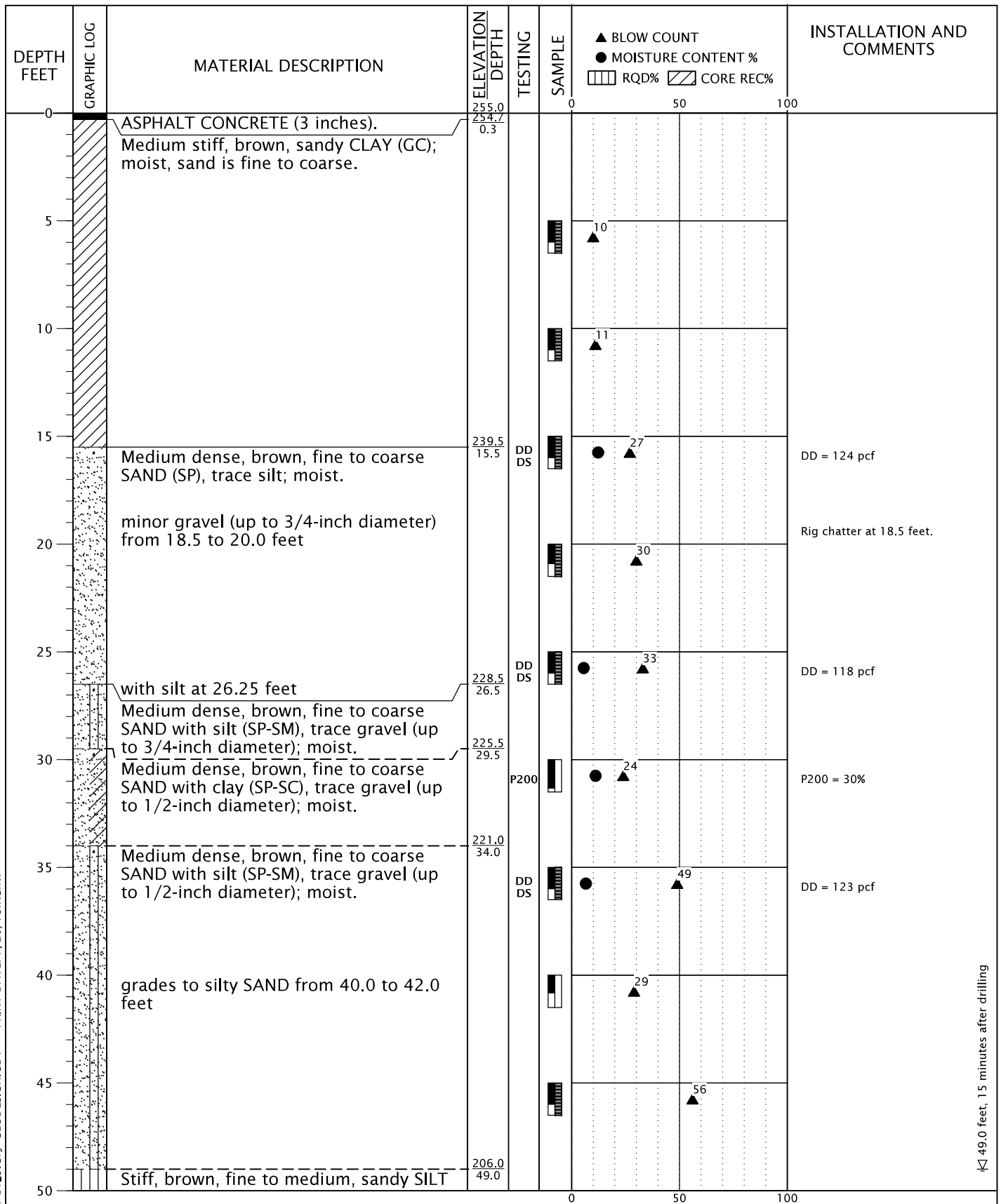
30.0 feet, 15 minutes after drilling

BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT



DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	BLOW COUNT		MOISTURE CONTENT %		RQD% CORE REC%		INSTALLATION AND COMMENTS
						▲	●					
100		(continued from previous page)				0	50	100				No sampling below 101.5 feet. Drilled from 101.5 to 120.0 feet for suspension logging.
105												
110												
115												
120		Exploration completed at a depth of 120.0 feet.	115.0 120.0									
125		Groundwater observed at a depth of 30.0 feet BGS 15 minutes after drilling.										
130												
135												
140												
145												
150												
DRILLED BY: SoCal Drilling												
LOGGED BY: SFK												
COMPLETED: 08/05/10												
BORING METHOD: mud rotary (see report text)												
BORING BIT DIAMETER: 4 5/8-inch												
GEODESIGN INC. 2121 S Towne Centre Place - Suite 104 Anaheim CA 92806 714.634.3701 www.geodesigninc.com			SOTOCAPT-1-01		BORING B-1 (continued)							
JULY 2018					PROPOSED MIXED-USE DEVELOPMENT WEST HOLLYWOOD, CA						FIGURE A-1	

BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT



DRILLED BY: SoCal Drilling

LOGGED BY: SFK

COMPLETED: 08/04/10

BORING METHOD: mud rotary (see report text)

BORING BIT DIAMETER: 4 5/8-inch



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SOTOCAPT-1-01

JULY 2018

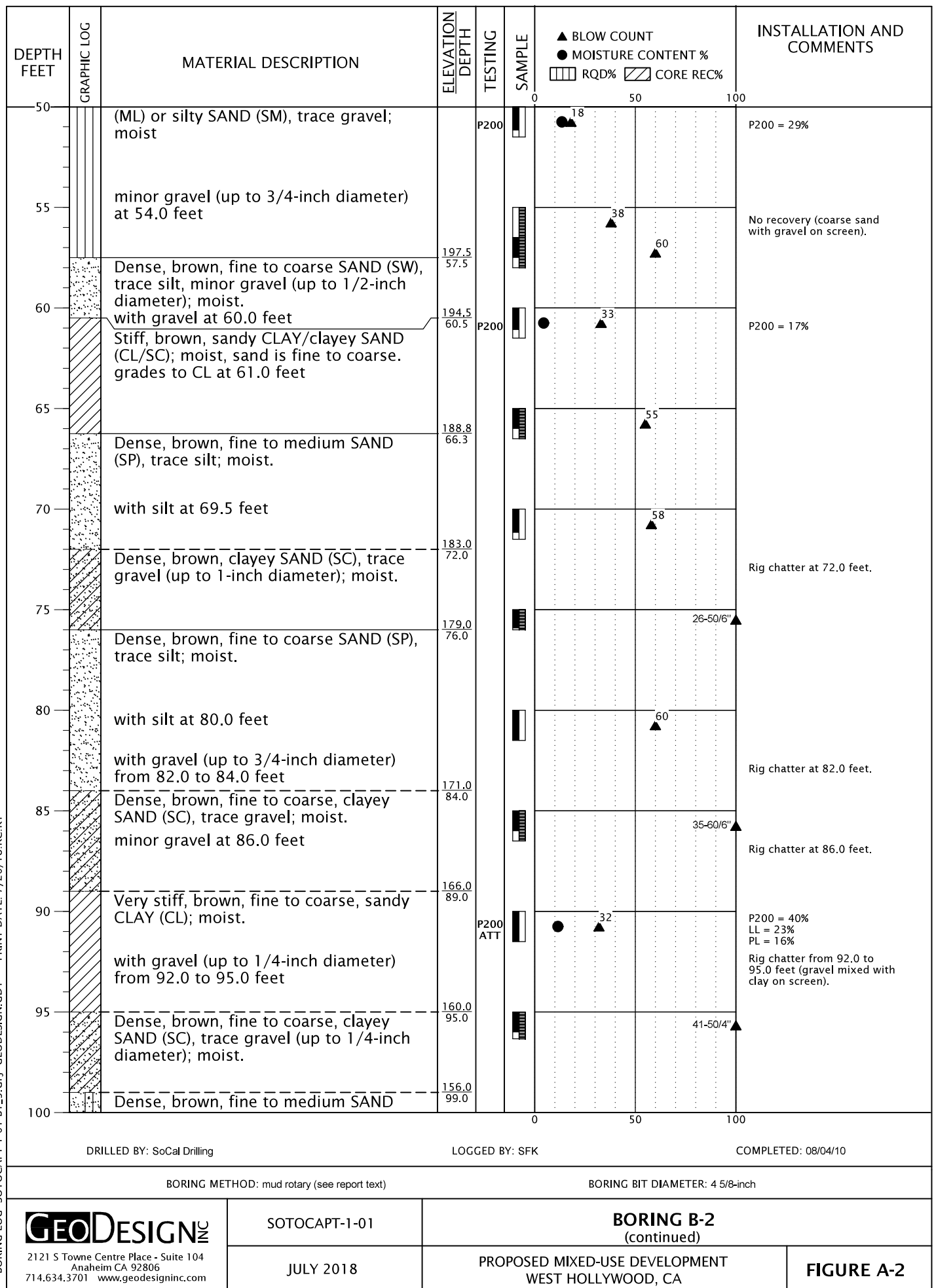
BORING B-2

PROPOSED MIXED-USE DEVELOPMENT
WEST HOLLYWOOD, CA

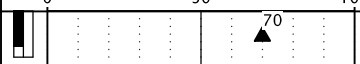
FIGURE A-2

149.0 feet, 15 minutes after drilling

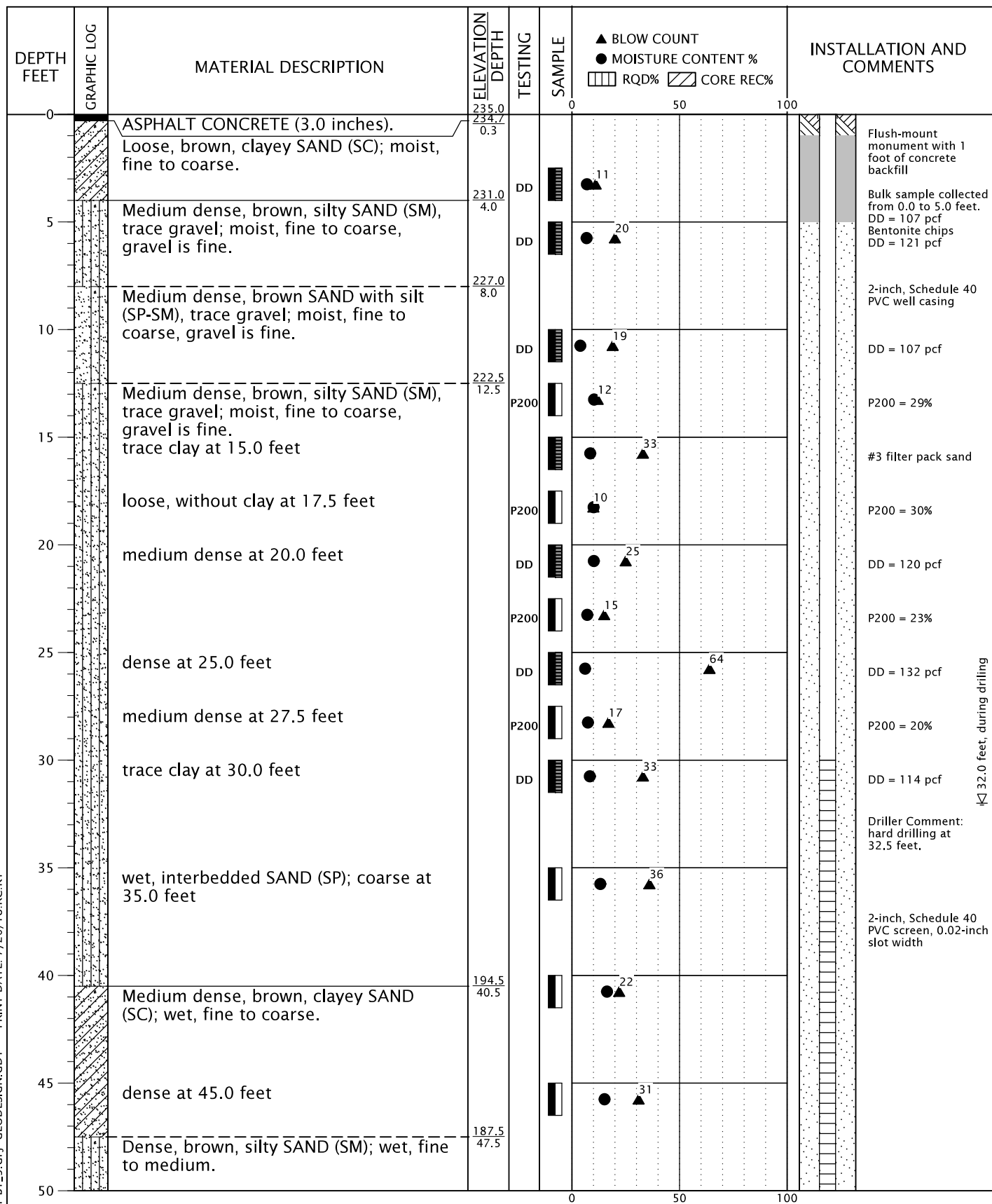
BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT



BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT % ▤ RQD% ▨ CORE REC%	INSTALLATION AND COMMENTS
100		with silt (SP-SM); moist. (continued from previous page) Exploration completed at a depth of 101.5 feet. Groundwater observed at a depth of 49.0 feet 15 minutes after drilling.	153.5 101.5				
105							
110							
115							
120							
125							
130							
135							
140							
145							
150							
DRILLED BY: SoCal Drilling		LOGGED BY: SFK		COMPLETED: 08/04/10			
BORING METHOD: mud rotary (see report text)				BORING BIT DIAMETER: 4 5/8-inch			
 2121 S Towne Centre Place - Suite 104 Anaheim CA 92806 714.634.3701 www.geodesigninc.com		SOTOCAPT-1-01	BORING B-2 (continued)			FIGURE A-2	
		JULY 2018	PROPOSED MIXED-USE DEVELOPMENT WEST HOLLYWOOD, CA				

BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT



32.0 feet, during drilling

DRILLED BY: 2-R Drilling, Inc.

LOGGED BY: CC

COMPLETED: 05/01/17

BORING METHOD: mud rotary (see document text)

BORING BIT DIAMETER: 4 1/2 inches



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SOTOCAPT-1-01

JULY 2018

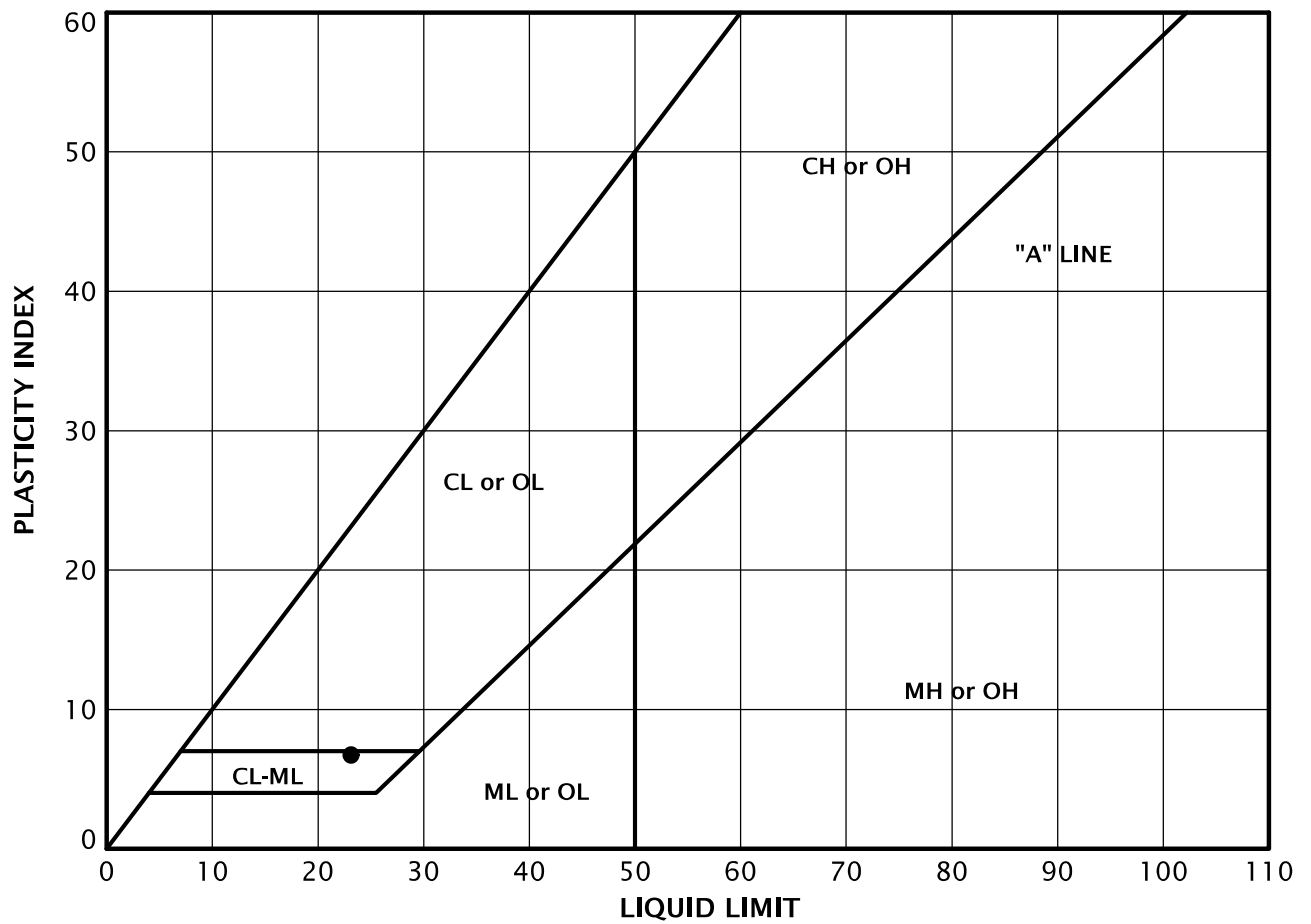
BORING B-3

PROPOSED MIXED-USE DEVELOPMENT
WEST HOLLYWOOD, CA

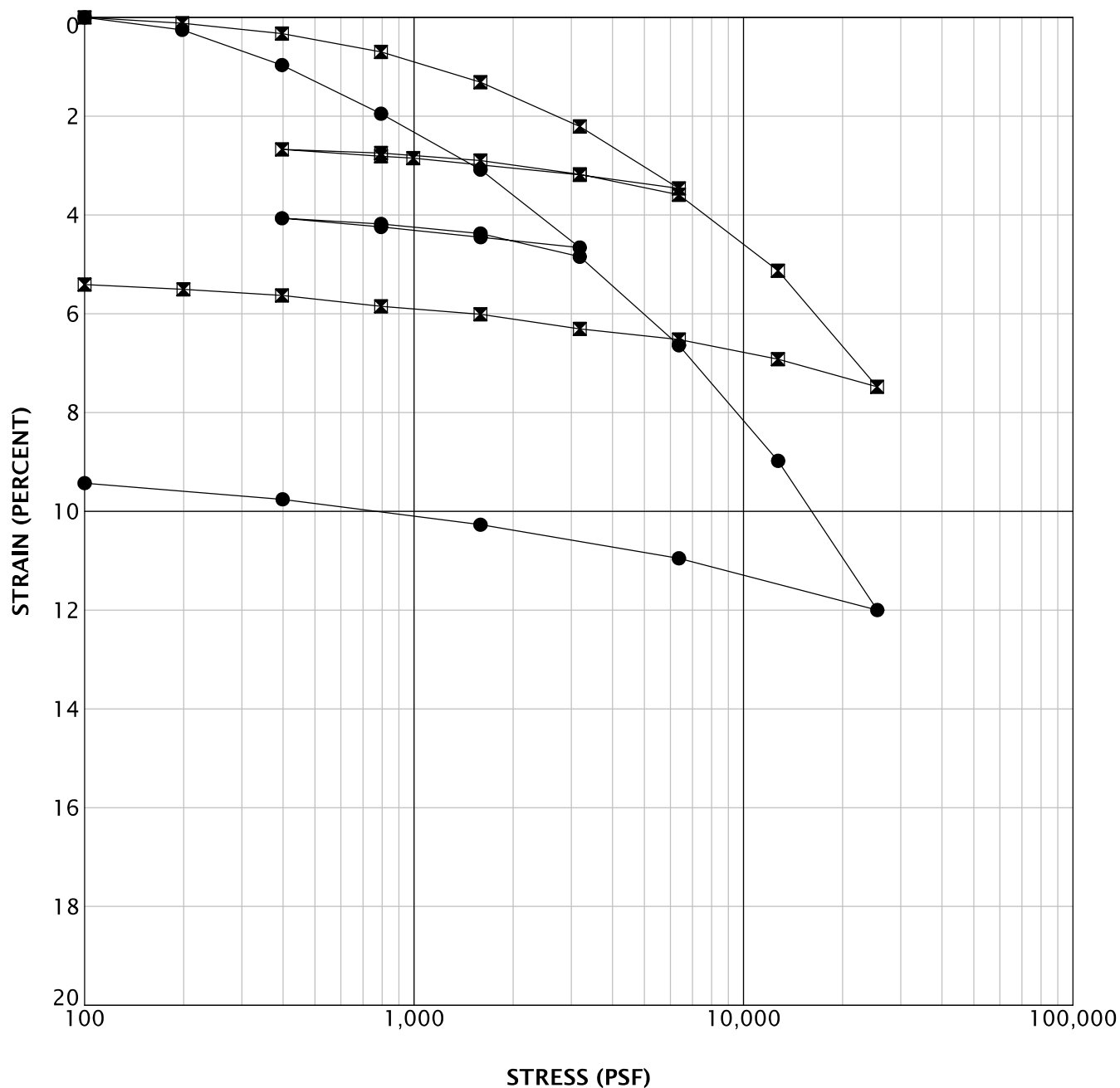
FIGURE A-3

BORING LOG SOTOCAPT-1-01-B1_3.GPJ GEODESIGN.GDT PRINT DATE: 7/20/18 RC:KT

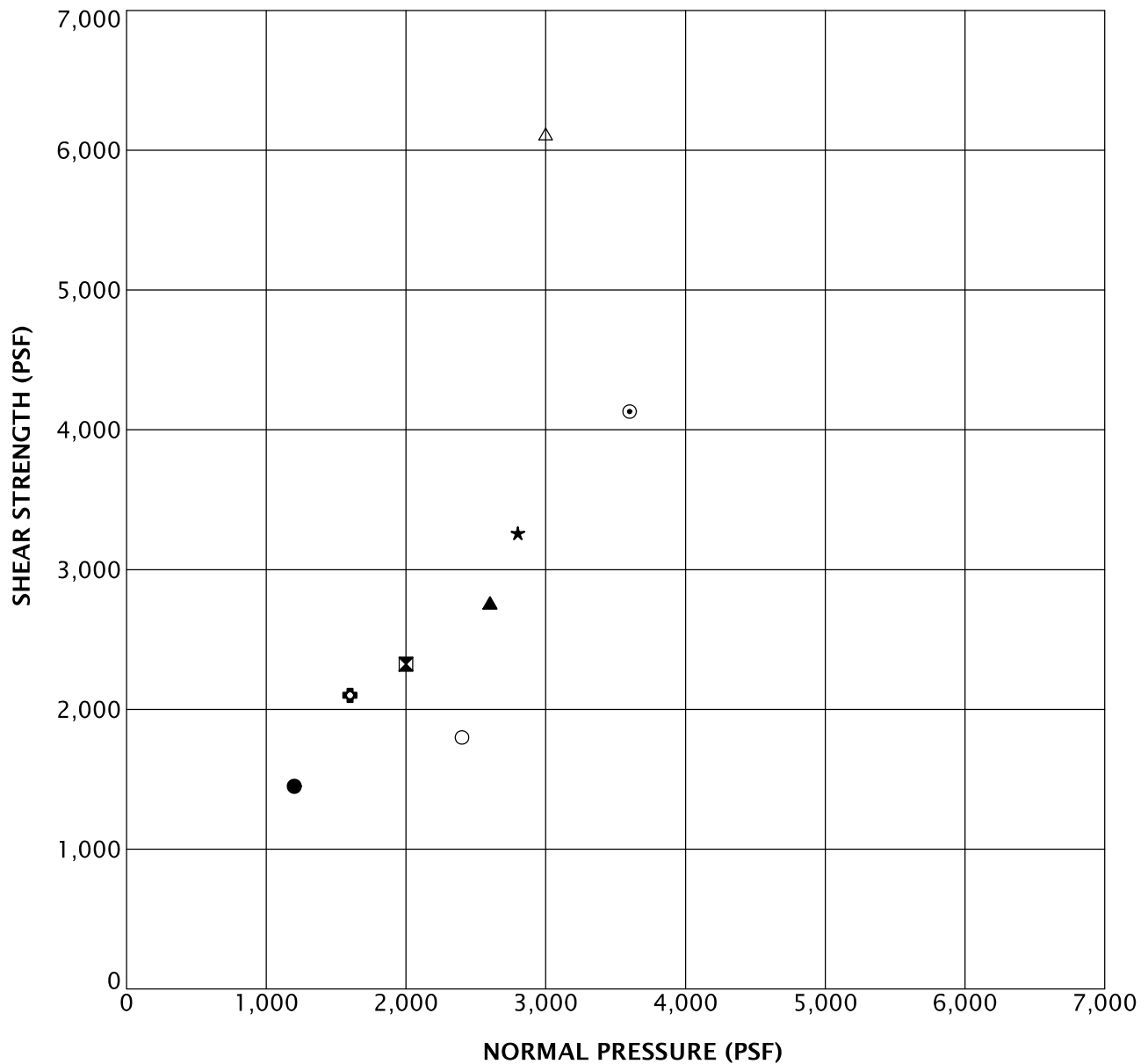
DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT % RQD% CORE REC%	INSTALLATION AND COMMENTS
50		(continued from previous page)	183.5		0	40	
		Exploration completed at 51.5 feet.	51.5				
		Groundwater encountered at 32.0 feet.					
55		Boring converted to groundwater monitoring well.					
60							
65							
70							
75							
80							
85							
90							
95							
100							
DRILLED BY: 2-R Drilling, Inc.		LOGGED BY: CC		COMPLETED: 05/01/17			
BORING METHOD: mud rotary (see document text)				BORING BIT DIAMETER: 4 1/2 inches			
GEODESIGN INC 2121 S Towne Centre Place - Suite 104 Anaheim CA 92806 714.634.3701 www.geodesigninc.com		SOTOCAPT-1-01	BORING B-3 (continued)				
		JULY 2018	PROPOSED MIXED-USE DEVELOPMENT WEST HOLLYWOOD, CA			FIGURE A-3	



KEY	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
●	B-2	90.0	11	23	16	7



KEY	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)
●	B-1	35.0	17	113
⊠	B-1	45.0	11	123



KEY	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SOAKED
●	B-1	10.0	6	104	YES
⊠	B-1	20.0	10	119	YES
▲	B-1	25.0	6	125	YES
★	B-1	35.0	6	131	YES
⊙	B-1	45.0	11	126	YES
⊕	B-2	15.0	12	124	YES
○	B-2	25.0	6	118	YES
△	B-2	35.0	7	123	YES

SAMPLE INFORMATION			MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
B-1	10.0	225.0	6	104						
B-1	20.0	215.0	10	119						
B-1	25.0	210.0	6	125						
B-1	30.0	205.0	12				20			
B-1	35.0	200.0	17	113			25			
B-1	40.0	195.0	16				23			
B-1	45.0	190.0	11	123			35			
B-1	80.0	155.0	8				25			
B-1	100.0	135.0	10							
B-2	15.0	240.0	12	124						
B-2	25.0	230.0	6	118						
B-2	30.0	225.0	11				30			
B-2	35.0	220.0	7	123						
B-2	50.0	205.0	13				29			
B-2	60.0	195.0	4				17			
B-2	90.0	165.0	12				40	23	16	7
B-3	2.5	232.5	7	107						
B-3	5.0	230.0	7	121						
B-3	10.0	225.0	4	107						
B-3	12.5	222.5	10				29			
B-3	15.0	220.0	9							
B-3	17.5	217.5	10				30			
B-3	20.0	215.0	10	120						
B-3	22.5	212.5	7				23			
B-3	25.0	210.0	6	132						
B-3	27.5	207.5	7				20			
B-3	30.0	205.0	8	114						
 2121 S Towne Centre Place - Suite 104 Anaheim CA 92806 714.634.3701 www.geodesigninc.com			SOTOCAPT-1-01		SUMMARY OF LABORATORY DATA					
			JULY 2018		PROPOSED MIXED-USE DEVELOPMENT WEST HOLLYWOOD, CA				FIGURE A-7	

APPENDIX B

SUMMARY OF CONE PENETRATION TEST DATA

Project:

**8555 Santa Monica Blvd.
W. Hollywood, CA
August 5, 2010**

Prepared for:

**Mr. Chris Zadoorian
GeoDesign, Inc.
2121 S. Town Centre Place, Ste 130
Anaheim, CA 92806
Office (714) 634-3701 / Fax (714) 634-3711**

Prepared by:



KEHOE TESTING & ENGINEERING
5415 Industrial Drive
Huntington Beach, CA 92649-1518
Office (714) 901-7270 / Fax (714) 901-7289

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- 2. SUMMARY OF FIELD WORK**
- 3. FIELD EQUIPMENT & PROCEDURES**
- 4. CONE PENETRATION TEST DATA & INTERPRETATION**

APPENDIX

- CPT Plots
- CPT Classification/Soil Behavior Chart
- Interpretation Output (CPTINT)
- Pore Pressure Dissipation Graphs
- CPTINT Correlation Table

SUMMARY OF CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the project located at 8555 Santa Monica Blvd. in W. Hollywood, California. The work was performed by Kehoe Testing & Engineering (KTE) on August 5, 2010. The scope of work was performed as directed by GeoDesign, Inc. personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at three locations to determine the soil lithology. The groundwater measurements were taken in the open CPT hole approximately 10 minutes after completion of CPT. The following **TABLE 2.1** summarizes the CPT soundings performed:

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
CPT-1	60	
CPT-2	75	
CPT-3	60	

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by KTE using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm² cone and recorded the following parameters at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed
- Pore Pressure Dissipation (at selected depths)

The above parameters were recorded and viewed in real time using a portable computer and stored on a diskette for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

The Cone Penetration Test data is presented in graphical form in the attached Appendix. Penetration depths are referenced to ground surface. The soil classification on the CPT plots is derived from the CPT Classification Chart (Robertson, 1986) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance (q_c), sleeve friction (f_s), and penetration pore pressure (u). The friction ratio (R_f), which is sleeve friction divided by cone resistance, is a calculated parameter that is used to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

Output from the interpretation program CPTINT provides averaged CPT data over one-foot intervals. The CPTINT output includes Soil Classification Zones, SPT N Values and Undrained Shear Strength (S_u). A summary of the equations used for the tabulated parameters is provided in the CPTINT Correlation Table in the Appendix.

The interpretation of soils encountered on this project was carried out using correlations developed by Robertson et al, 1986. It should be noted that it is not always possible to clearly identify a soil type based on q_c , f_s and u . In these situations, experience, judgment and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

Sincerely,

KEHOE TESTING & ENGINEERING



Richard W. Koester, Jr.
General Manager

APPENDIX

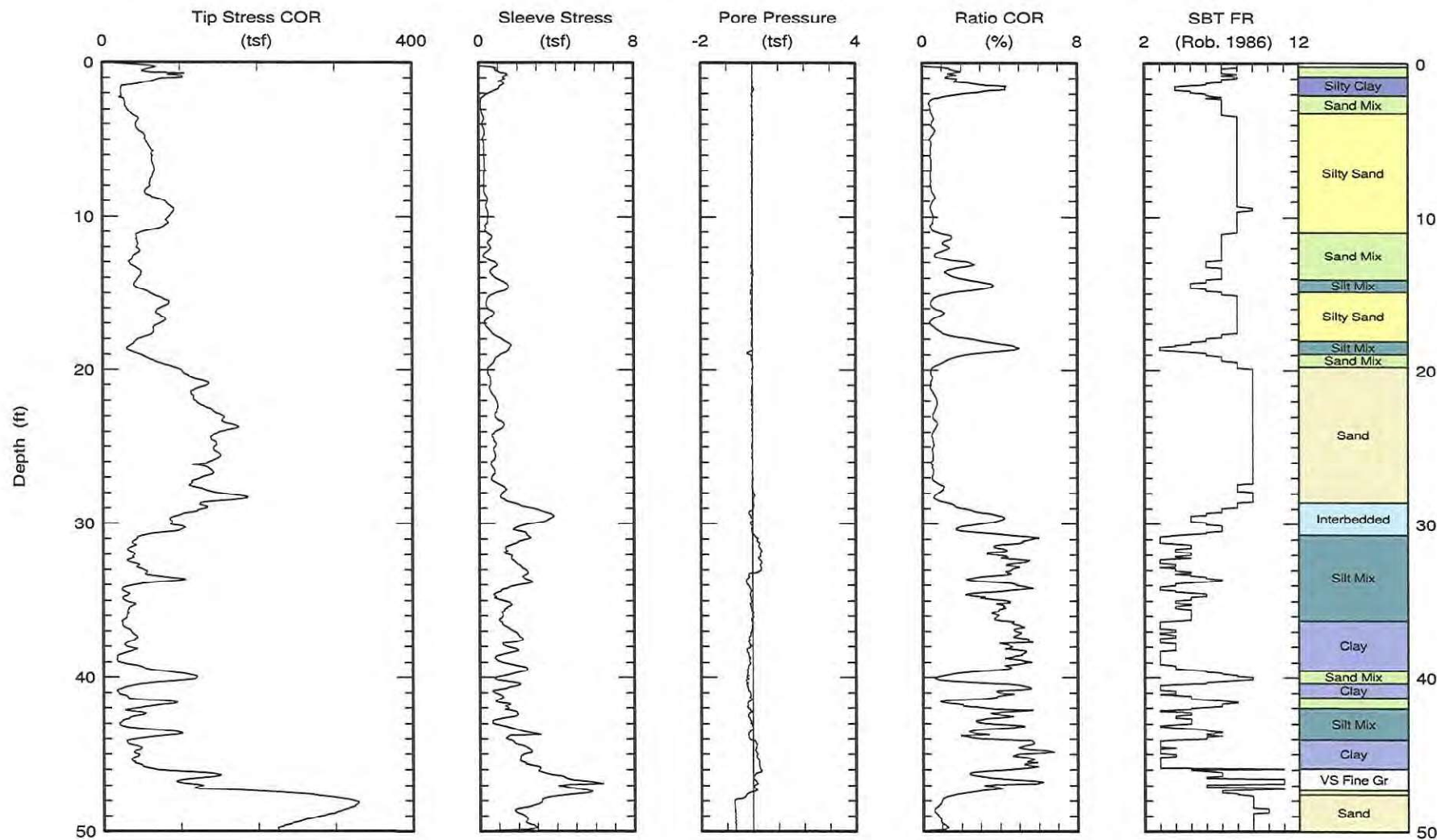


Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 05/Aug/2010
Test ID: CPT-1
Project: Hollywood

Customer: GeoDesign, Inc.
Job Site: 8555 Santa Monica Blvd



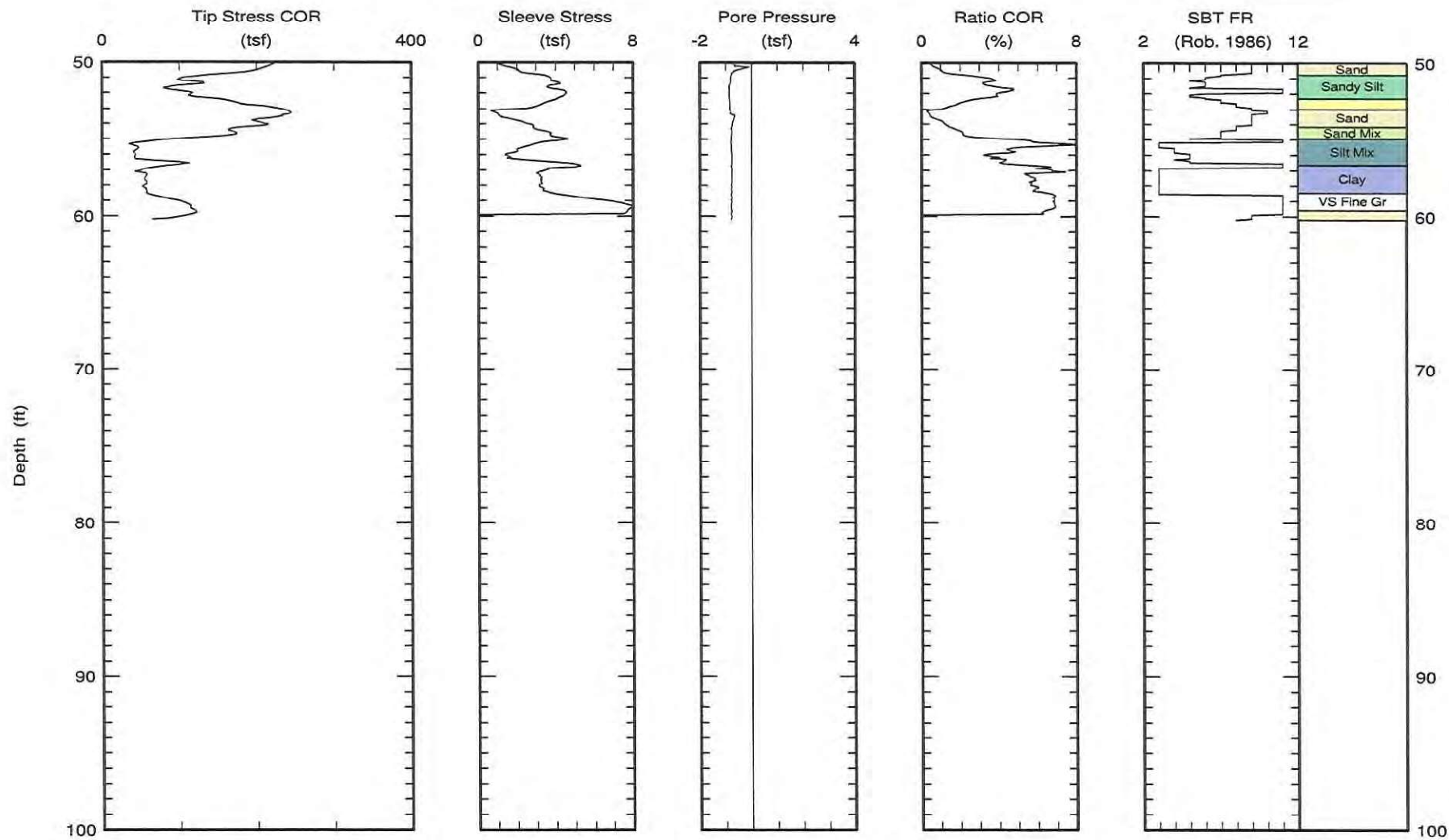


Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 05/Aug/2010
Test ID: CPT-1
Project: Hollywood

Customer: GeoDesign, Inc.
Job Site: 8555 Santa Monica Blvd



Maximum depth: 60.22 (ft)
Page 2 of 2

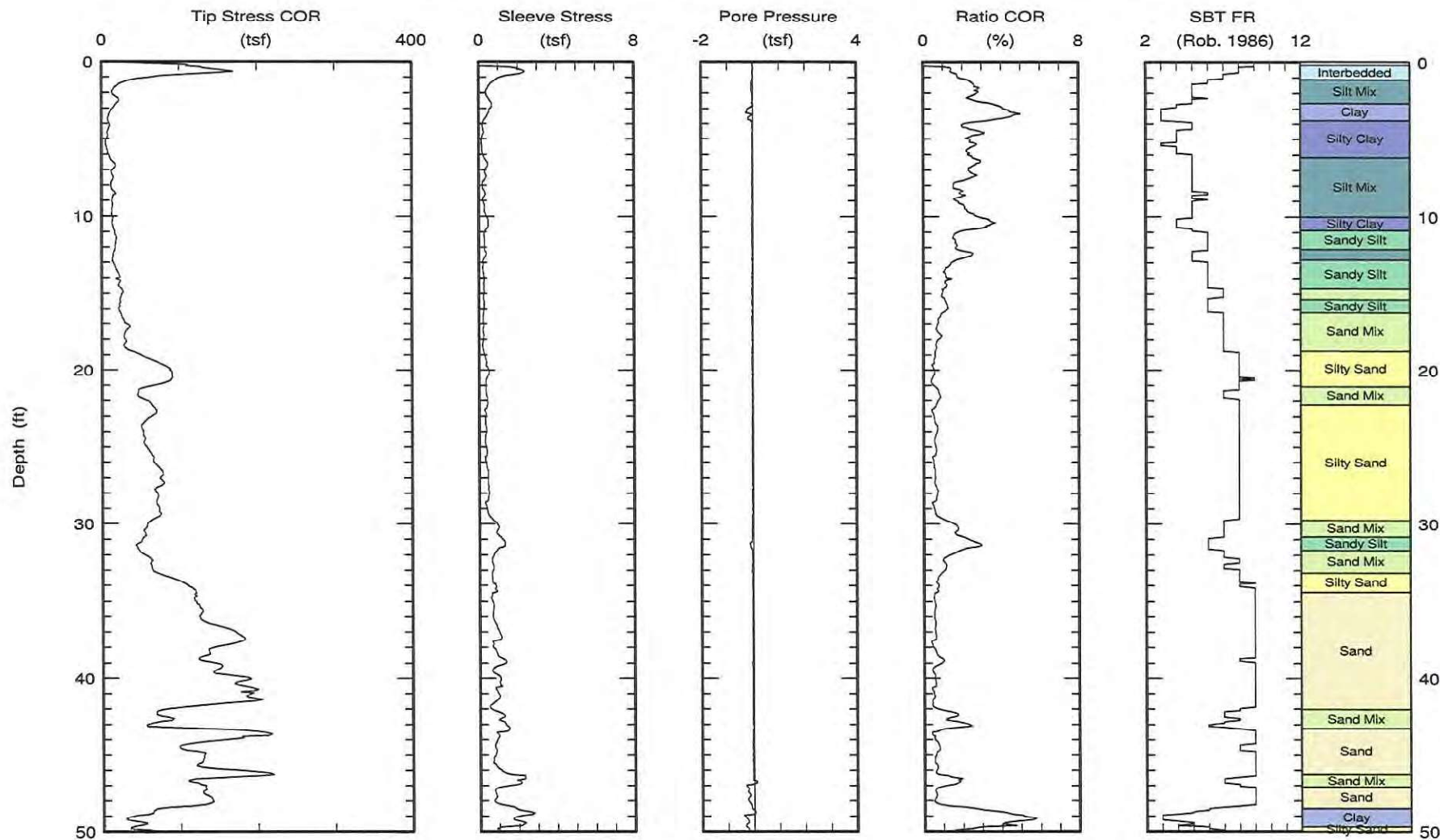


Kehoe Testing & Engineering
Office: (714) 901-7270
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rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 05/Aug/2010
Test ID: CPT-2
Project: Hollywood

Customer: GeoDesign, Inc.
Job Site: 8555 Santa Monica Blvd



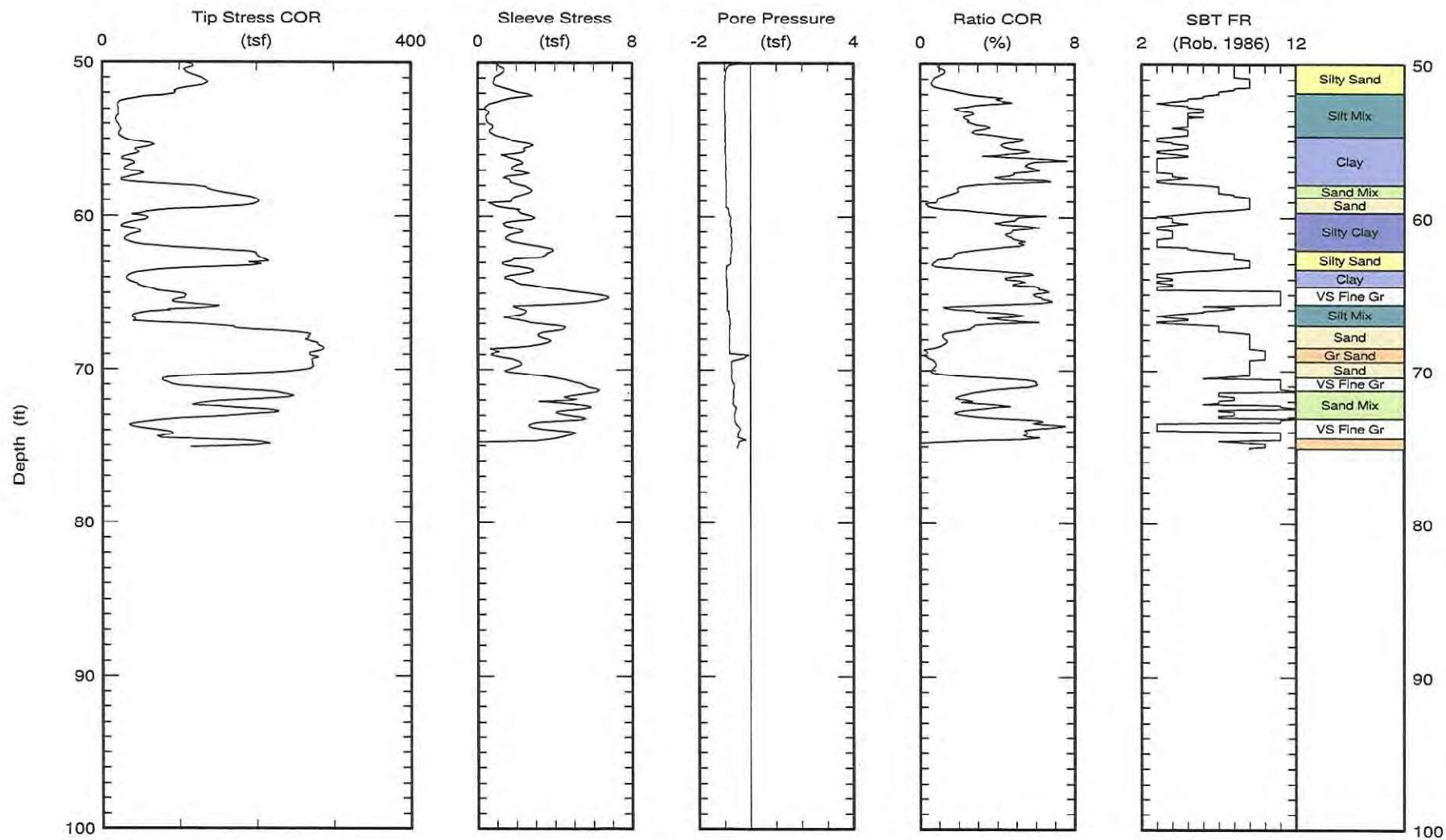


Kehoe Testing & Engineering
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www.kehoetesting.com

CPT Data
30 ton rig

Date: 05/Aug/2010
Test ID: CPT-2
Project: Hollywood

Customer: GeoDesign, Inc.
Job Site: 8555 Santa Monica Blvd



Maximum depth: 75.12 (ft)

Page 2 of 2

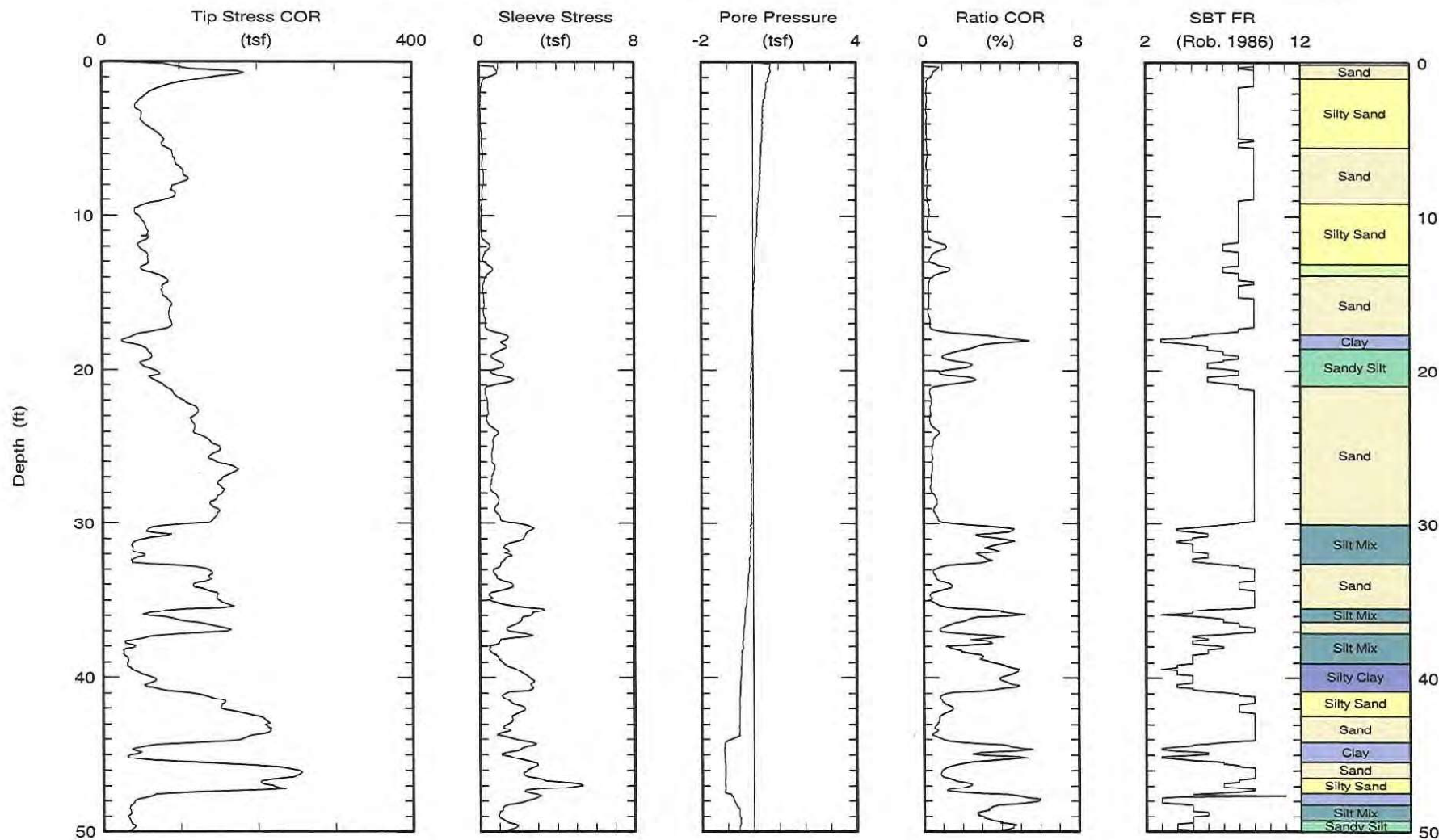


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www.kehoetesting.com

CPT Data
30 ton rig

Date: 05/Aug/2010
Test ID: CPT-3
Project: Hollywood

Customer: GeoDesign, Inc.
Job Site: 8555 Santa Monica Blvd



Maximum depth: 60.27 (ft)

Page 1 of 2

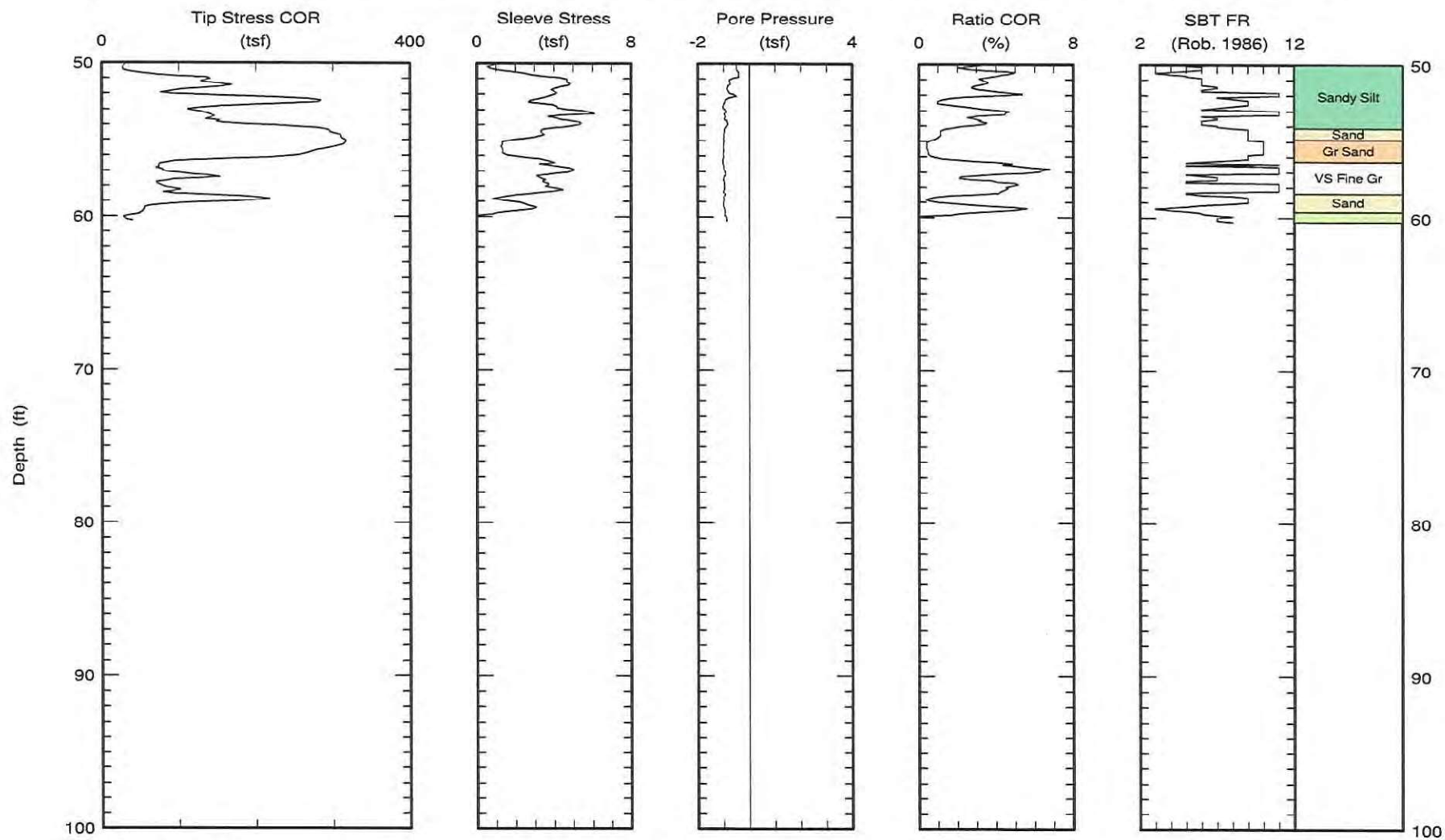


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CPT Data
30 ton rig

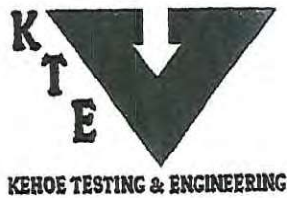
Date: 05/Aug/2010
Test ID: CPT-3
Project: Hollywood

Customer: GeoDesign, Inc.
Job Site: 8555 Santa Monica Blvd



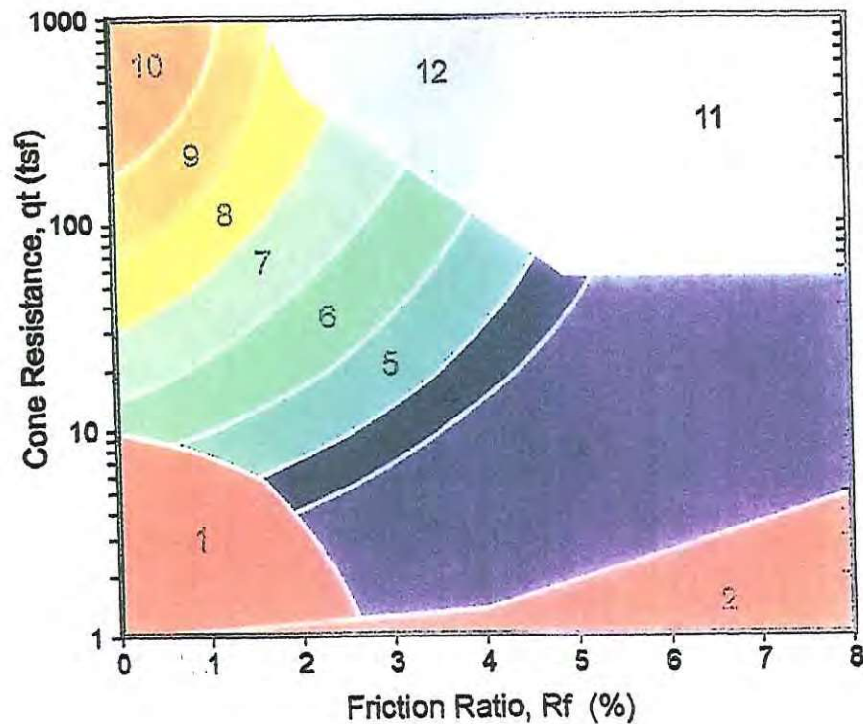
Maximum depth: 60.27 (ft)

Page 2 of 2



CPT Classification Chart

(after Robertson and Campanella, 1988)



Zone	q_t / N	Soil Behavior Type	UCSCS
1	2	sensitive fine grained	OL-OH
2	1	organic material	Pt-OH
3	1	clay	CH
4	1.5	silty clay to clay	CL-CH
5	2	clayey silt to silty clay	ML-CL
6	2.5	sandy silt to clayey silt	MH-ML
7	3	silty sand to sandy silt	SM-ML
8	4	sand to silty sand	SP-SM
9	5	sand	SP
10	6	gravelly sand to sand	SW-SP
11	1	very stiff fine grained *	CL-MH
12	2	sand to clayey sand *	SP-SC

* overconsolidated or cemented

INPUT FILE: C:\temp\CPT-1.CSV

" Depth	Qc (avg)	Fs (avg)	Rf	Rf Zone	Spt N	Spt N1	Su
" (feet)	(TSF)	(TSF)	(%)	(zone #)	(blow/ft)	(blow/ft)	(TSF)
0.500	72.150	0.929	1.288	7	23	35	9E9
1.500	39.802	1.056	2.653	6	15	23	2.648
2.500	28.788	0.168	0.582	7	9	14	9E9
3.500	41.830	0.221	0.527	7	13	20	9E9
4.500	50.202	0.270	0.538	8	12	18	9E9
5.500	61.490	0.278	0.451	8	15	23	9E9
6.500	65.845	0.304	0.462	8	16	24	9E9
7.500	64.262	0.289	0.450	8	15	23	9E9
8.500	61.207	0.353	0.577	8	15	23	9E9
9.500	88.020	0.444	0.504	8	21	32	9E9
10.500	77.081	0.422	0.548	8	18	25	9E9
11.500	45.035	0.591	1.313	7	14	18	9E9
12.500	42.050	0.473	1.125	7	13	16	9E9
13.500	45.652	0.788	1.725	7	15	17	9E9
14.500	47.733	1.317	2.758	6	18	20	3.123
15.500	78.268	0.476	0.608	8	19	20	9E9
16.500	75.345	0.571	0.757	8	18	18	9E9
17.500	65.090	0.612	0.941	8	16	15	9E9
18.500	39.102	1.483	3.793	5	19	17	2.530
19.500	69.183	0.799	1.155	8	17	15	9E9
20.500	117.936	0.555	0.470	9	23	19	9E9
21.500	118.913	0.717	0.603	9	23	18	9E9
22.500	138.887	0.927	0.668	9	27	21	9E9
23.500	163.097	1.114	0.683	9	31	23	9E9
24.500	144.867	0.797	0.550	9	28	20	9E9
25.500	147.578	0.793	0.538	9	28	20	9E9
26.500	136.413	0.733	0.538	9	26	18	9E9
27.500	123.418	1.066	0.863	8	30	21	9E9
28.500	155.492	1.518	0.976	9	30	21	9E9
29.500	105.282	3.491	3.316	6	40	27	6.897
30.500	83.825	2.301	2.745	6	32	21	5.463
31.500	39.433	1.735	4.393	4	25	16	2.502
32.500	42.072	1.978	4.695	4	27	18	2.674
33.500	70.270	2.476	3.524	5	34	22	4.545
34.500	29.440	1.116	3.793	5	14	9	1.819
35.500	35.107	1.409	4.013	4	22	14	2.194
36.500	28.993	1.298	4.475	4	19	12	1.782
37.500	37.963	1.910	5.032	3	36	22	2.375
38.500	27.903	1.369	4.912	3	27	16	1.699
39.500	67.377	1.901	2.822	6	26	15	4.327
40.500	62.995	1.372	2.179	6	24	14	4.029
41.499	51.673	1.181	2.286	6	20	12	3.272
42.499	35.375	1.394	3.943	5	17	10	2.181
43.499	64.128	1.840	2.869	6	25	14	4.094
44.499	40.478	2.260	5.580	3	39	22	2.516
45.499	46.345	2.475	5.335	3	44	24	2.904
46.499	117.367	4.425	3.770	6	45	25	7.634
47.499	222.862	4.581	2.056	8	53	29	9E9
48.499	315.613	2.456	0.778	9	60	32	9E9
49.499	249.848	2.563	1.026	9	48	25	9E9

INPUT FILE: C:\temp\CPT-1.CSV

Depth	Qc (avg)	Fs (avg)	Rf	Rf Zone	Spt N	Spt N1	Su
(feet)	(TSF)	(TSF)	(%)	(zone #)	(blow/ft)	(blow/ft)	(TSF)
50.499	193.208	2.019	1.045	9	37	19	9E9
51.499	103.495	3.930	3.803	5	49	25	6.675
52.499	163.147	3.676	2.256	7	52	27	9E9
53.499	223.227	1.506	0.675	9	43	22	9E9
54.499	164.847	3.516	2.135	7	53	27	9E9
55.499	47.705	2.583	5.432	3	46	23	2.940
56.499	68.240	3.413	5.012	11	65	33	9E9
57.499	55.337	3.235	5.861	3	53	27	3.441
58.499	64.852	4.212	6.509	11	62	31	9E9
59.499	114.350	7.614	6.667	11	109	55	9E9
60.499	85.550	0.000	0.000	9	9E9	9E9	9E9

INPUT FILE: C:\temp\CPT-2.CSV

" Depth " (feet)	Qc (avg) (TSF)	Fs (avg) (TSF)	Rf (%)	Rf Zone (zone #)	Spt N (blow/ft)	Spt N1 (blow/ft)	Su (TSF)
0.500	118.810	1.507	1.269	8	28	42	9E9
1.500	23.622	0.596	2.525	6	9	14	1.568
2.500	19.090	0.586	3.068	5	9	14	1.262
3.500	10.065	0.405	4.029	3	10	15	0.655
4.500	8.993	0.223	2.482	4	6	9	0.581
5.500	7.132	0.175	2.453	4	5	8	0.453
6.500	14.753	0.387	2.621	5	7	11	0.957
7.500	14.072	0.325	2.310	5	7	11	0.908
8.500	15.213	0.281	1.847	5	7	11	0.980
9.500	14.295	0.308	2.151	5	7	11	0.915
10.500	15.611	0.458	2.936	5	7	10	0.998
11.500	18.813	0.317	1.683	6	7	9	1.208
12.500	16.120	0.331	2.052	5	8	10	1.025
13.500	20.677	0.260	1.256	6	8	9	1.325
14.500	25.325	0.293	1.157	6	10	11	1.630
15.500	24.743	0.291	1.176	6	9	9	1.587
16.500	26.977	0.254	0.940	7	9	9	9E9
17.500	32.942	0.269	0.816	7	11	11	9E9
18.500	35.047	0.244	0.697	7	11	10	9E9
19.500	70.773	0.398	0.563	8	17	15	9E9
20.500	86.254	0.454	0.526	8	21	18	9E9
21.500	51.200	0.415	0.810	7	16	13	9E9
22.500	67.887	0.406	0.598	8	16	13	9E9
23.500	55.257	0.371	0.671	8	13	10	9E9
24.500	56.113	0.361	0.643	8	13	10	9E9
25.500	64.673	0.403	0.624	8	15	11	9E9
26.500	75.427	0.449	0.596	8	18	13	9E9
27.500	75.533	0.499	0.661	8	18	13	9E9
28.500	72.890	0.466	0.640	8	17	12	9E9
29.500	71.892	0.587	0.816	8	17	12	9E9
30.500	57.518	1.009	1.754	7	18	12	9E9
31.500	50.147	1.119	2.232	6	19	13	3.215
32.500	64.315	0.727	1.130	7	21	14	9E9
33.500	91.810	0.720	0.784	8	22	14	9E9
34.500	119.922	0.780	0.650	9	23	15	9E9
35.500	127.747	0.743	0.582	9	24	15	9E9
36.500	145.968	0.873	0.598	9	28	17	9E9
37.500	174.825	0.952	0.545	9	33	20	9E9
38.500	135.628	1.033	0.762	9	26	16	9E9
39.500	154.828	0.912	0.589	9	30	18	9E9
40.500	186.623	1.054	0.565	9	36	21	9E9
41.499	161.633	0.835	0.517	9	31	18	9E9
42.499	74.920	1.194	1.593	7	24	14	9E9
43.499	165.712	1.209	0.729	9	32	18	9E9
44.499	117.108	0.859	0.734	9	22	12	9E9
45.499	134.175	0.835	0.622	9	26	15	9E9
46.499	159.495	1.934	1.213	8	38	21	9E9
47.499	135.687	0.901	0.664	9	26	14	9E9
48.499	95.573	1.807	1.890	7	31	17	9E9
49.499	44.523	1.771	3.981	5	21	11	2.763

INPUT FILE: C:\temp\CPT-2.CSV

" Depth " (feet)	Qc (avg) (TSF)	Fs (avg) (TSF)	Rf (%)	Rf Zone (zone #)	Spt N (blow/ft)	Spt N1 (blow/ft)	Su (TSF)
50.499	114.398	1.226	1.073	8	27	14	9E9
51.499	124.387	1.152	0.927	8	30	16	9E9
52.499	43.824	1.405	3.218	5	21	11	2.694
53.499	21.452	0.547	2.572	5	10	5	1.199
54.499	25.537	0.961	3.789	4	16	8	1.467
55.499	52.055	2.385	4.598	4	33	17	3.231
56.499	35.140	1.965	5.619	3	33	17	2.099
57.499	45.460	1.975	4.360	4	29	15	2.783
58.499	160.927	2.451	1.525	8	38	19	9E9
59.499	136.203	1.692	1.243	8	33	17	9E9
60.499	44.122	2.129	4.839	4	28	14	2.684
61.499	40.695	1.958	4.826	4	26	13	2.452
62.499	178.593	3.101	1.738	8	43	22	9E9
63.499	91.155	2.175	2.390	7	29	15	9E9
64.499	58.125	3.386	5.842	3	56	28	3.599
65.499	115.552	5.001	4.334	11	111	56	9E9
66.499	57.047	2.277	4.001	5	27	14	3.519
67.499	220.950	3.825	1.732	8	53	27	9E9
68.499	279.857	2.449	0.875	9	54	27	9E9
69.499	275.357	1.829	0.665	9	53	27	9E9
70.499	147.672	3.374	2.287	7	47	24	9E9
71.499	190.688	5.579	2.927	7	61	31	9E9
72.499	176.081	4.861	2.762	7	56	28	9E9
73.499	70.205	3.883	5.538	11	67	34	9E9
74.499	138.228	2.905	2.103	7	44	22	9E9

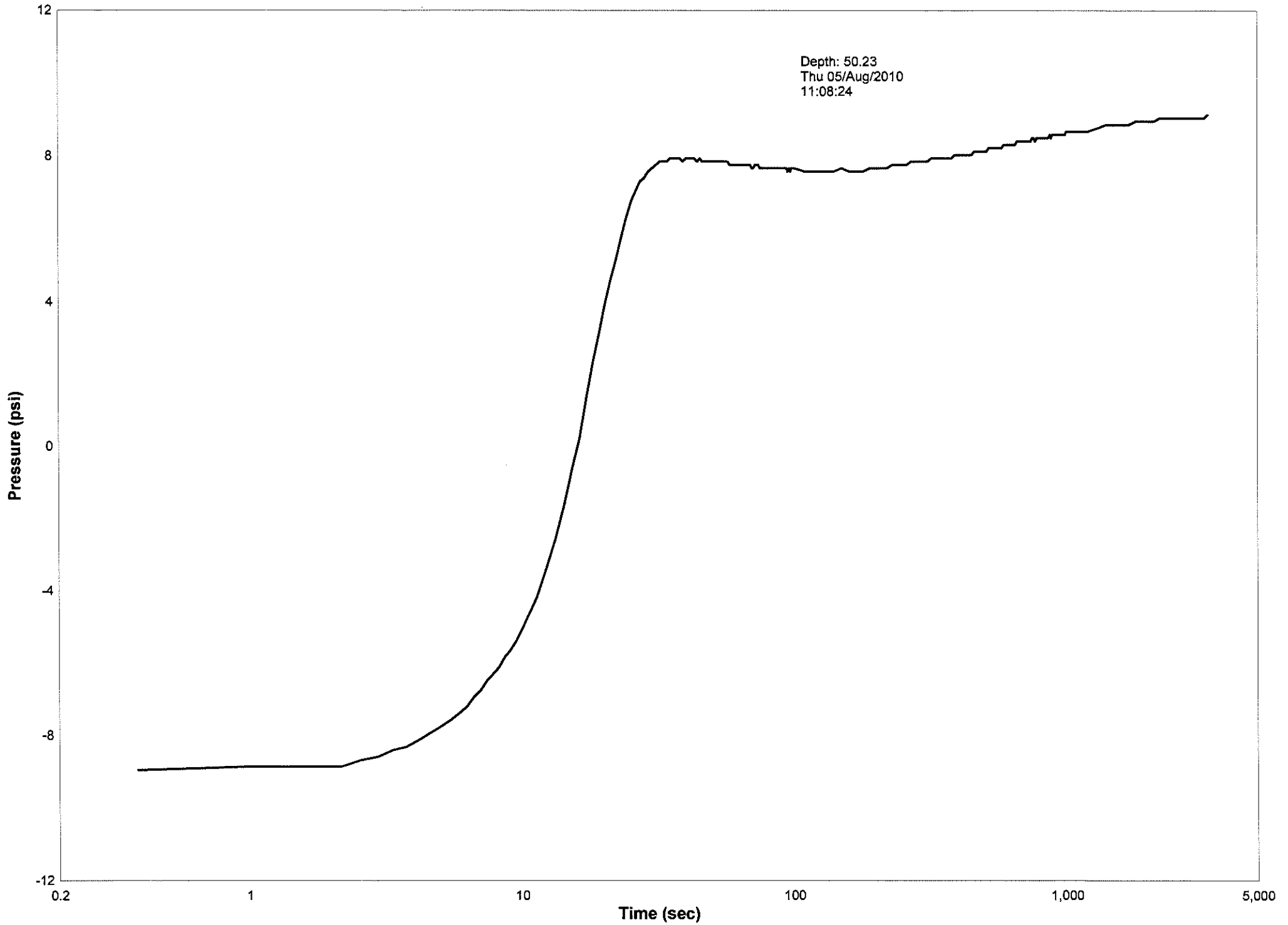
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" Depth " (feet)	Qc (avg) (TSF)	Fs (avg) (TSF)	Rf (%)	Rf Zone (zone #)	Spt N (blow/ft)	Spt N1 (blow/ft)	Su (TSF)
0.500	133.115	0.673	0.505	9	26	39	9E9
1.500	88.077	0.171	0.194	9	17	26	9E9
2.500	48.538	0.090	0.186	8	12	18	9E9
3.500	51.052	0.096	0.188	8	12	18	9E9
4.500	68.718	0.132	0.192	8	16	24	9E9
5.500	83.493	0.175	0.209	9	16	24	9E9
6.500	96.392	0.194	0.201	9	18	27	9E9
7.500	106.902	0.253	0.236	9	20	30	9E9
8.500	92.452	0.197	0.213	9	18	27	9E9
9.500	55.058	0.163	0.295	8	13	19	9E9
10.500	54.734	0.144	0.262	8	13	18	9E9
11.500	54.568	0.323	0.592	8	13	17	9E9
12.500	57.720	0.320	0.554	8	14	17	9E9
13.500	61.492	0.550	0.894	8	15	17	9E9
14.500	81.262	0.251	0.308	8	19	20	9E9
15.500	85.998	0.265	0.308	9	16	16	9E9
16.500	87.937	0.287	0.326	9	17	17	9E9
17.500	67.892	0.796	1.173	8	16	15	9E9
18.500	46.328	1.249	2.696	6	18	16	3.011
19.500	58.805	0.987	1.679	7	19	16	9E9
20.500	70.874	1.135	1.602	7	23	19	9E9
21.500	94.373	0.376	0.399	9	18	14	9E9
22.500	120.045	0.459	0.383	9	23	18	9E9
23.500	118.380	0.594	0.502	9	23	17	9E9
24.500	136.130	0.821	0.603	9	26	19	9E9
25.500	146.183	0.685	0.469	9	28	20	9E9
26.500	166.333	0.774	0.465	9	32	23	9E9
27.500	154.707	0.637	0.412	9	30	21	9E9
28.500	147.113	0.947	0.643	9	28	19	9E9
29.500	147.610	1.016	0.688	9	28	19	9E9
30.500	80.347	2.464	3.067	6	31	21	5.229
31.500	44.827	1.644	3.668	5	21	14	2.857
32.500	75.180	1.203	1.601	7	24	16	9E9
33.500	136.505	1.087	0.796	9	26	17	9E9
34.500	140.707	0.942	0.669	9	27	17	9E9
35.500	117.355	2.262	1.928	7	37	23	9E9
36.500	125.052	1.905	1.524	8	30	18	9E9
37.500	66.937	1.617	2.418	6	26	16	4.302
38.500	32.537	0.782	2.408	6	12	7	2.004
39.500	41.527	1.824	4.400	4	26	15	2.599
40.500	68.217	2.699	3.962	5	33	19	4.374
41.499	145.850	1.644	1.128	8	35	20	9E9
42.499	197.987	1.821	0.920	9	38	22	9E9
43.499	205.883	1.344	0.653	9	39	22	9E9
44.499	72.993	2.163	2.971	6	28	16	4.667
45.499	130.897	2.396	1.833	7	42	23	9E9
46.499	230.498	3.288	1.428	8	55	30	9E9
47.499	126.168	3.094	2.456	7	40	22	9E9
48.499	36.527	1.359	3.732	5	17	9	2.226
49.499	36.358	1.469	4.053	4	23	12	2.212

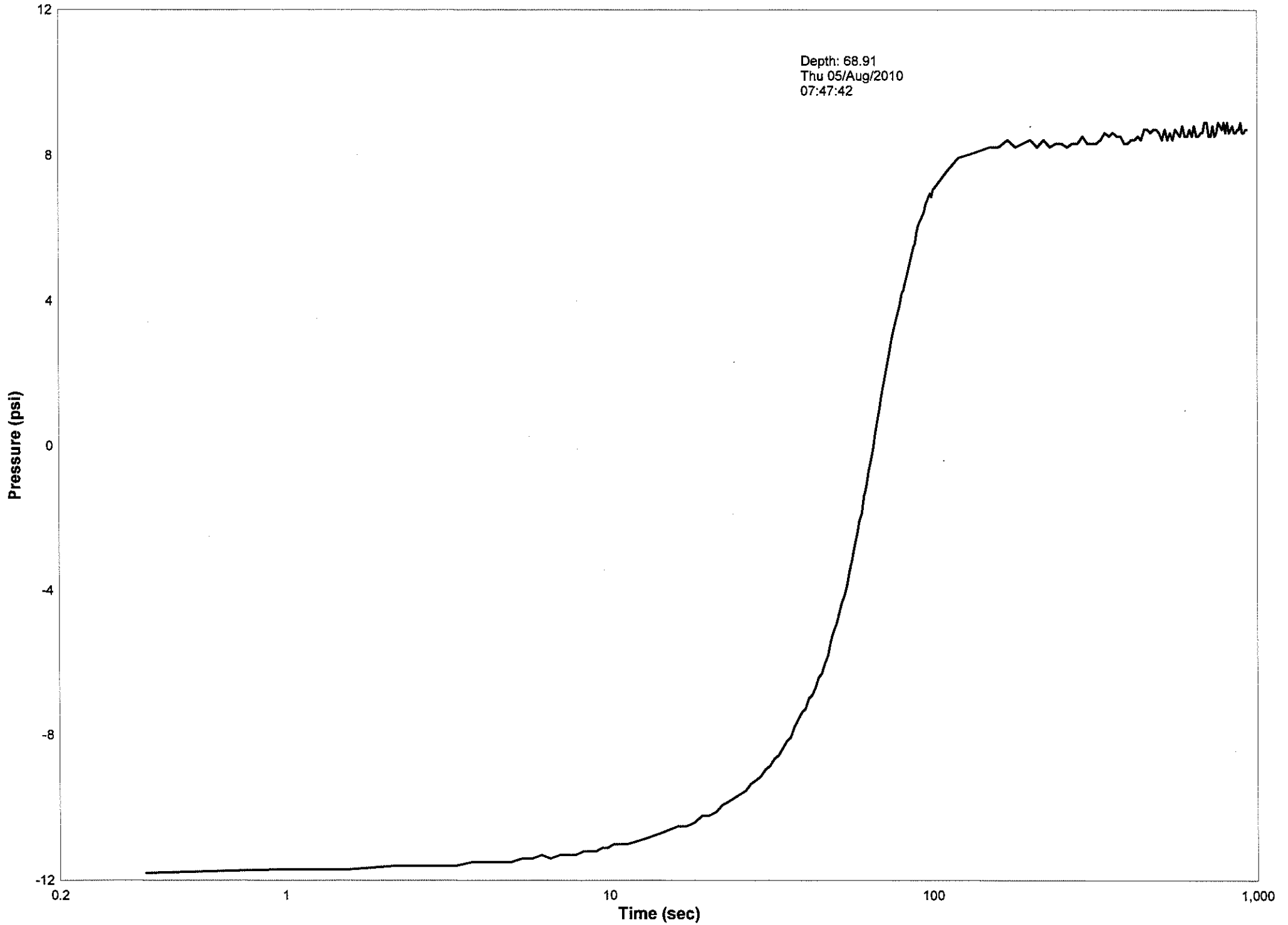
INPUT FILE: C:\temp\CPT-3.CSV

" Depth	Qc (avg)	Fs (avg)	Rf	Rf Zone	Spt N	Spt N1	Su
" (feet)	(TSF)	(TSF)	(%)	(zone #)	(blow/ft)	(blow/ft)	(TSF)
50.499	46.968	1.710	3.647	5	22	12	2.916
51.499	133.515	4.473	3.354	6	51	26	8.677
52.499	185.029	3.769	2.039	7	59	30	9E9
53.499	147.768	5.064	3.431	6	57	29	9.618
54.499	296.602	3.380	1.140	9	57	29	9E9
55.499	292.118	1.388	0.475	10	47	24	9E9
56.499	115.413	3.858	3.348	6	44	22	7.448
57.499	101.738	3.739	3.681	6	39	20	6.532
58.499	132.873	2.768	2.086	7	42	21	9E9
59.499	75.778	2.111	2.792	6	29	15	4.793
60.499	32.775	0.000	0.000	8	9E9	9E9	9E9

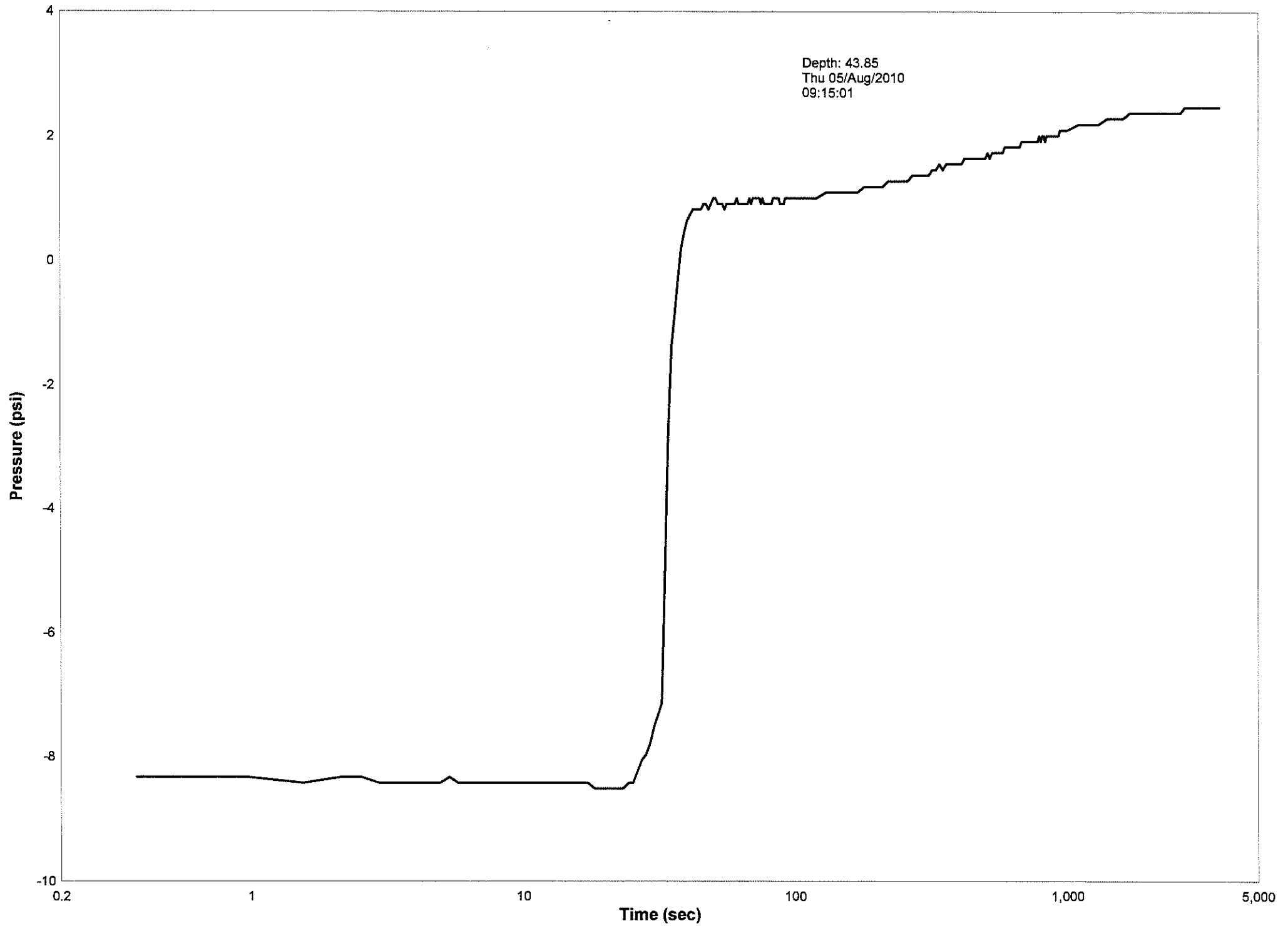
Depth: 50.23
Thu 05/Aug/2010
11:08:24



Depth: 68.91
Thu 05/Aug/2010
07:47:42



Depth: 43.85
Thu 05/Aug/2010
09:15:01



Program: CPTINT - CPT Cone Interpretation Program
 Version: 5.2
 Table File by: Dr. R. G. (DICK) Campanella, P.Eng.
 Rev. Dated: April 3, 2002

Parameter	Methods	Refer. Number	Valid Soil Type	Valid Zone
Depth average see NOTE #1	Depth averaged over specified range (see menu)		All	All
Parameter Averaging	Averaged over range specified for depth. If no values exist, your choice is zero's or no value		All	All
Qc, Tip Stress	measured tip force/area	#6, #8	All	All
Qt corrtd for U2 see NOTE #2 [Note: Input value from input file is used if defined, not calculated]	Qt = Qc + (1 - a) x U2 and a = tip area ratio Defaults to U2 if given or uses U1 or U3 times Const.	#6, #8	All	All
Q (Qt Normalized)	$Q = \frac{Qt - sv}{sv'}$	#9 & 13	All	All
Fs	measured sleeve force/area	#6, #8	All	All
Rf Friction Ratio (if Rf>8, Rf=8)	$Rf = \frac{Fs}{Qt} \times 100\%$	#6, #8	All	All
F (Rf Normalized)	$F = \frac{Fs}{(Qt - sv)} \times 100\%$	#9 & 13	All	All
Gamma	Based on Rf or Bq Classif. Zone			
Total Unit Weight (Soil + Water)	Zone # Gamma = kN/m ³			
	1 Qt<4bar 15.70			
	1 Qt=4bar 17.30			
	2 Rf<5% 13.36			
	2 Rf=5% 11.80			
	2 Bq Zone 12.58			
see NOTE #3	3 Qt<10bar 18.86		All	All
	3 Qt=10bar 19.65			
	4, 5 & 6 Qt<20bar 18.86			
	4, 5 & 6 Qt=20bar 19.65			
	7 18.86			
	8 & 9 19.65			
	10 20.44			
	11 & 12 21.22			

Parameter	Methods	Refer. Number	Valid Soil Type	Valid Zone
U Penetration Pore Pressure see NOTE #4	U1, measured on Face of tip U2, measured Behind Tip at shoulder (std location) U3, measured Behind Friction Sleeve		All	All
Water Table	Depth below ground surface to where pore pressure = 0 Make negative if water level is above ground		All	All
Uo Hydrostatic Pore Pressure see NOTE #4	Uo = water depth, Hw x unit weight water, Gamma or Uo = Hw = depth - depth to water table if depth < water table, Uo = 0		All	All
dU Excess Pore Pressure	dU = U2 - Uo Defaults to U2 if given or uses U1 or U3 x const.		All	All
DPPR (Differential Pore Pressure Ratio)	$DPPR = \frac{dU}{Q_t} = \frac{U - U_o}{Q_t}$ Defaults to U2 if given or uses U1 or U3 x const.	#6, #8	All	All
Bq	$Bq = \frac{dU}{Q_t - sv}$	# 4 # 8 # 13	All	All
OS (Overburden Stress)	OS = sv = S (Gamma x Depth)		All	All
EOS (Effective Overburden Stress)	EOS = sv' = OS - Uo = sv - Uo		All	All
Rf Zone Soil Behavior Type see NOTE #5	Classification chart for Qc and Rf Zone # = Soil Behavior Type 1=sensitive fine grained 2=organic material 3=clay 4=silty clay 5=clayey silt 6=sandy silt 7=silty sand 8=fine sand 9=sand 10=gravelly sand 11=very stiff fine grained ¥ 12=sand to clayey sand ¥ ¥ overconsolidated or cemented	#6 #8, Fig4.3	All	1 < Qt < 1000 bar 0 < Rf < 8%

Parameter	Methods	Refer. Number	Valid Soil Type	Valid Zone																												
Bq Zone Soil Behavior Type	Classification chart for Qc and Bq (same zone #'s as Rf above)	#8 Fig 4.3	All	$0 < Q_t < 1000 \text{ bar}$ $-0.1 < B_q < 1.4$																												
Spt N(60) Standard Penetration Test (Blows/foot) at 60% Energy After R&C(1983) see NOTE #6	Qt/N ratio per zone <table><thead><tr><th>Zone #</th><th>Qt/N</th><th>Zone #</th><th>Qt/N</th></tr></thead><tbody><tr><td>1</td><td>2</td><td>7</td><td>3</td></tr><tr><td>2</td><td>1</td><td>8</td><td>4</td></tr><tr><td>3</td><td>1</td><td>9</td><td>5</td></tr><tr><td>4</td><td>1.5</td><td>10</td><td>6</td></tr><tr><td>5</td><td>2</td><td>11</td><td>1</td></tr><tr><td>6</td><td>2.5</td><td>12</td><td>2</td></tr></tbody></table>	Zone #	Qt/N	Zone #	Qt/N	1	2	7	3	2	1	8	4	3	1	9	5	4	1.5	10	6	5	2	11	1	6	2.5	12	2	# 7 # 8 Fig 4.2	All	All
Zone #	Qt/N	Zone #	Qt/N																													
1	2	7	3																													
2	1	8	4																													
3	1	9	5																													
4	1.5	10	6																													
5	2	11	1																													
6	2.5	12	2																													
Spt N1(60) Normalized for Overburden str	Spt N1(60) = Cn x Spt N(60) where Cn = (sv')^(-0.77)	# 8	All	$0.5 < C_n < 1.5$																												
Dr Relative Density see NOTE #7 Compressibility moderate high all	Specific Sands: $Dr = \frac{100}{C_2} * \ln \left(\frac{Q_c}{C_1 + C_0 sv'} \right)$ where: All are NC & UNAGED <table><thead><tr><th>Sand</th><th>C0</th><th>C1</th><th>C2</th></tr></thead><tbody><tr><td>Ticino</td><td>17.37</td><td>.558</td><td>2.58</td></tr><tr><td>Schmertmann</td><td>15.32</td><td>.520</td><td>2.75</td></tr></tbody></table> ALL SANDS: NC, OC, ALL TESTS $Dr = C_3 + C_4 \log_{10} \left(\frac{Q_c + C_1}{sv' + C_2} \right)$ where: <table><thead><tr><th>C0</th><th>C1</th><th>C2</th><th>C3</th><th>C4</th></tr></thead><tbody><tr><td>0.100</td><td>0.0981</td><td>0.5</td><td>-98</td><td>66</td></tr></tbody></table>	Sand	C0	C1	C2	Ticino	17.37	.558	2.58	Schmertmann	15.32	.520	2.75	C0	C1	C2	C3	C4	0.100	0.0981	0.5	-98	66	# 8 # 1 # 1 # 5	/ Sand-- \ Sand	7 to 10 $0 < Q_t < 500 \text{ bar}$ $0 < sv' < 5 \text{ bar}$ 7 to 10 (6 possible)						
Sand	C0	C1	C2																													
Ticino	17.37	.558	2.58																													
Schmertmann	15.32	.520	2.75																													
C0	C1	C2	C3	C4																												
0.100	0.0981	0.5	-98	66																												
Phi Friction Angle	Methods: 1) Robertson & Campanella 2) Durgunoglu & Mitchell 3) Janbu beta = +15 degree 4) Janbu beta = 0 degree 5) Janbu beta = -15 degree	#6, #8 # 2 #6, #8 #6, #8 #6, #8	/ Sand-- \ Sand	7 to 10 & 6 $0 < Q_t < 500 \text{ bar}$ $0 < sv' < 4 \text{ bar}$ $29 < \phi < 49$																												

Parameter	Methods	Refer. Number	Valid Soil Type	Valid Zone
Gmax Maximum Shear Modulus at very small strains	Clay: Gmax = $\alpha \times Q_t$ Sand: Digitized figure of Q_c vs Gmax with interpolation between sv' curves, R&C method	# 8 Fig4.18 # 6 # 8 Fig4.13	Clay Sand	1 to 6 (6 possible) 7 to 10 .25 < sv' < 8bar
CSR(Q_c), t/s LEVEL ground Liquefaction SAND Resistance see NOTE #8	Seed's CSR vs $N_l(60)$ graph for specified equake Magnitude. Can include silty sand corr. for Zone 7. $N_l(60)$ from CPT correlations.	# 11 # 12	Sand	7 to 10 (6 possible)
CSR(Eq), t/s Cyclic Stress Ratio applied by design quake [Note: Input value from input file is used if defined, & not calculated]	$CSR(Eq) = 0.65 \frac{A_{max}}{g} \frac{sv}{svo'} rd$ A_{max} = max surface acceleratn including Amplification	# 12 # 3	Sand	7 to 10 (6 possible)
rd Reduction Factor to find CSR(Eq)	Digitized graph to use for depth vs rd: 1) Seed's mean 2) Fraser Delta	# 12 # 3	Sand	(6 possible) 7 to 10 0 < depth < 30m
FL, Safety Factor against Liquefaction	FL = CSR(Q_c) / CSR(Eq)	# 3	Sand	7 to 10 (6 possible)
Q_{cr} Critical Bearing required to resist Liquefactn	Q_{cr} backcalculated from CSR(Eq) for a specified FL. Q_{cr} is only for the given GWT, EOS, OS, A_{max}/g & Eq. Mag	# 12	Sand	7 to 10 (6 possible)
S_u , Undrained Shear Strength of CLAY METHODS: see NOTE #9	Nk: $S_u = \frac{Q_c - st}{N_k}$ Nke: $S_u = \frac{Q_t - U_2}{N_{ke}}$ Nkt: $S_u = \frac{Q_t - sv}{N_{kt}}$ Nc: $S_u = \frac{Q_t}{N_c}$ NdU: $S_u = \frac{dU_2 (dU_1 \text{ or } dU_3)}{NdU}$	# 8	Clay Clay Clay Clay Clay	1 to 6 1 to 6 1 to 6 1 to 6 1 to 6

Parameter	Methods	Refer. Number	Valid Soil Type	Valid Zone
Su/EOS	$Su/EOS = \frac{Su}{sv'}$	# 8	Clay	1 to 6
Ko (NC) Normally Consolidated	$(Ko)NC = 1 - \sin(f)$ see NOTE #10	# 8	Sand	7 to 10 (6 possible)
Ko (OC) Over Consolidated	$(Ko)OC = (Ko)NC \times OCR^{0.42}$	# 8	Sand	7 to 10 (6 possible)
E25 Youngs Modulus	$E25 = \alpha \times Qt$ where user input alpha	# 8 4.11&12	Sand	(6) 7 to 10 $0 < Qt < 500 \text{ bar}$
M Constrained Modulus	CLAY: $M = \alpha \times Qt$ where user input alpha SAND: Methods: Qt: $M = \alpha \times Qt$ Baldi: $M = C0 \times pa + \frac{sv' + C1}{pa + C2} \times OCR \times \exp(C3 Dr)$	# 8 Tabl4.3 # 8 Fig4.10	Clay Sand Sand	1 to 6 7 to 10 (6 possible) 7 to 10
OCR (Clay) Over-Consolidation Ratio see NOTE #11	$OCR = \frac{Su + 1.25}{svo'}$ $OCR = \frac{Su + 1.25}{svo' + NC}$	# 6 # 8 Fig4.19	Clay	1 to 6
Ic Material Index After J&D(1993) see NOTE #18	$Ic = \frac{3 - \log(Q(1-Bq))}{10} + 2$ $Ic = \frac{1.5 + 1.3 \log F}{10} + 2 + 0.5$	# 13 # 17	All	All
Spt N(60) Standard Penetration Test (Blows/foot) at 60% Energy After J&D(1993) see NOTE #16	$Qc/N = 8.5(1 - (Ic/4.75))$ where Qc in bars	# 13	All	All

Parameter	Methods	Refer. Number	Valid Soil Type	Valid Zone
State Parameter State, (e-units)	$\ln \frac{3M + 8.5M/F}{Q(1-Bq)}$			
Current Void Ratio minus Critical Void Ratio	$\text{State} = \frac{11.9 - 1.33F}{M = \frac{6 \sin fcv}{3 - \sin fcv}}$ fcv = const. vol. Phi angle	# 14	All	All
Fines Content FC(%) Percent less than #200 Sieve After Davies, 99	$FC(\%) = 42.4179(I_c) - 54.8574$ $FC(\%) = 0\% \text{ if } I_c < 1.2933$ $FC(\%) = 100\% \text{ if } I_c > 3.6508$	# 15	All	All
OCR (Clay) Overcons. Ratio by Pore Press. U1 & U2 or U1 & U3 see NOTE #17	$OCR = 0.5 + 1.50(PPD)$ $PPD = (U1 - U2)/U_o \text{ or } (U1 - U3)/U_o$ and default 0.5 & 1.5 are settable	# 16	Clay	1 to 6

1. Depth averaging may be in 0.5, 1, 2.5 or 5 ft. intervals or 0.1, 0.25, 0.5 or 1.0 m intervals, or no depth averaging if zero is selected. The average is the mean value of the readings in the interval. The depth value is the mid-depth of the averaged interval. It is convenient to start at half the depth averaging interval. For example, if you want "even" depths and the depth averaging is set at 0.50 m then start at 0.25 to get values of depth of 0.5, 1.0, 1.5, etc.

2. Basic input CPTU data columns are for Depth, Qc, Fs, U1, U2, U3, INC and TEMP may be selected. In addition the following parameters may also be specified as an INPUT data column: Qt, Gamma, Uo, Spt N, Rf Zone, Bq Zone and CSR(EQ). These values will be used where required to obtain other interpreted parameters. If they are not specified the program will estimate them when they are required. For example, you can create an OUTPUT data file of any of the above parameters and then edit some or all of the values to suite your measurements or your desires to specify their values. You can do that with "Gamma" values to input your measurements of unit weight, or with "Uo" if you want to input values of pore water pressure other than hydrostatic, or with any of the other input parameters. You would use your edited file of adjusted data as your new INPUT data file. Thus, you can specify these parameters if you want to override the Program's values.

You can also use the designated value of "9E9" to denote an unknown value.

You can use the "OTHER" designation to input other data that exists on your input file and identify its units. This allows you to output it, without operating on it, if you choose.

It is best NOT to use depth averaging when using input data that is not continuous at regular depth intervals. Always use DEPTH AVERAGING with extreme caution since the program averages ALL INPUT parameters over the interval chosen irregardless of soil type. Careful use of start and end depth choices can make depth averaging very effective.

3. Since there is no data in the file within the initial depth interval, a default Gamma (unit weight) must be specified from the surface to the starting depth. This is done in the "Param" Menu in units of kN/m^3 ($1\text{kN/m}^3=6.36\text{pcf}$). Also, you can specify the values of Gamma to be used by the program as in NOTE #2 above.

4. If pore pressures are not measured by the cone then the program will take Qc as being equal to Qt for all interpretations requiring Qt. Also, Uo may be specified in the input file as a column of Uo vs depth values, if the water pressures are not hydrostatic. See NOTE #2 for more info on customizing input data.

5. You can choose to use either the Rf classif. Zone or the Bq classif. Zone to divide soil into Undrained Parameters (Zones 1 to 6) and Drained Parameters (Zones 7 to 10) in the "Param" Menu. (However, in order to use the Bq Zone you must have Pore Pressure, U2, data.) Also, you may choose to switch Zone 6 to a Drained Zone from its Undrained Zone status. This is done if you feel that the soil identified as Zone 6 (sandy silt) is really coarser (using other sources of information) and/or you want it analyzed as a Drained rather than Undrained soil. Finally, the soil behavior names in each zone were shortened in version 5.0 for simplicity. For example, Zone 6 was named "sandy silt to clayey silt" but was shortened to "sandy silt".

6. Spt N is the same as Spt N(60) for 60% transferred energy. This value is calculated from the Q_t/N ratios given for each Soil Zone (you can specify either Rf or Bq Zone) and these values are used in the Level Ground Liquefaction analysis. Values of Spt N may be specified in the Input File, if independently measured values are to be used. We suggest that you not use depth averaging if you only have selected Spt N values at a few depths. You may use "9E9" for missing data.

7. If Dr values are negative then soil is very loose or likely more of an undrained soil like a silty sand rather than a drained soil for which the Dr correlations were developed. Use Dr interpretations very cautiously since they also assume the soil is free draining, uncemented, unaged and has the same compressibility of grains as the soil used for the correlations in chamber calibration tests.

8. The simplified sand liquefaction analysis for level ground according to Seed et al requires Spt N1(60) and earthquake magnitude to obtain the cyclic stress ratio to cause liquefaction, $CSR(Q_c)$. The design maximum ground acceleration, the depth-reduction factor, R_d , and overburden total and effective stresses are required to calculate the cyclic stress ratio applied by the design earthquake, $CSR(EQ)$. The program estimates the N1(60) values from the cone stresses, the operator identifies the earthquake magnitude and Seed et al chart is used to get $CSR(Q_c)$. The program also calculates $CSR(EQ)$ from the user specified maximum ground acceleration including any amplification factors, the calculated overburden stresses and either Seed's mean or the Fraser Delta R_d factor. The Fraser Delta is used only when amplification factors of the order of 2 or more are used. See Reference Nos. 3, 6, 11 and 12 for more information. The user can INPUT specific values for Spt N, $CSR(EQ)$, Soil Zones, Gamma's, etc. in order to customize the analysis for the existing data base of information. It is recommended that you do not use depth averaging when using specific input data but make calculations at specific depths where external input data exists. The calculated value of Q_{cr} is the minimum value of cone bearing stress required at a given depth such that the factor of safety against liquefaction, or the ratio $FL = CSR(Q_c)/CSR(EQ)$ have the specified value for a given earthquake magnitude, max. ground acceleration, depth reduction factor, and calculated overburden stresses. This value of Q_{cr} is useful to identify the required minimum level of soil improvement for a given design condition.

9. The NdU method to calculate undrained shear strength has been extended to allow the user to choose either dU_1 , or dU_2 or dU_3 provided such pore pressure measurements exist.

10. The Overconsolidation Ratio, OCR, for the sand must be estimated by the user in the "Param" menu if you want to estimate K_0 in the sand layers. For the typical normally consolidated sand, $OCR = 1.0$.

11. It is currently only possible to estimate the OCR for a clay, which makes use of the correlations obtained from extensive laboratory tests.

12. An improved calculation and print routine was added to version 5.0 which uses swap routines to reduce memory requirements, but slows down the calculations.

13. The classification charts for R_f has been extended at all boundaries such that values of $R_f > 8$ and values of $Q_c < 1.00$ are possible. The B_q classification chart which requires dU_2 and can now accept values of $B_q > 1.2$ and $Q_t < 1$. Unfortunately, this feature does not work.

14. Version 5.1ppd added several enhancements to the program. You may input an average vertical flow gradient, which is applied over the entire profile depth to be analysed so adjust the depth of interest accordingly. Zero gives hydrostatic and no flow, a negative gradient is upward flow which increases pore pressure and reduces vertical effective stress. A positive gradient gives downward flow.

15. A State Parameter or current void ratio minus critical void ratio is calculated according to the paper by Ref. 14, Flewes, Davies and Jefferies, 1994.

16. An alternate method to estimate SPT from CPT is provided according to Ref. 13, Jefferies and Davies, 1993 in ASTM.

17. An alternate method to estimate OCR in clays is provided which uses the measured pore pressure difference, ppd, so both U_1 and U_2 or U_1 and U_3 must be measured at the same time. (see Ref. 16)

18. Version 5.2 added the value I_c (Material Index) according to Jefferies & Davies, 1993, 1991 (Ref. 13 & 17) which combines all Normalized parameters Q , F and B_q .
(Note: Q_tN was changed to Q and R_fN to F .)

18A. In Version 5.2, if at any depth the value of $B_q > 1$ (in very sensitive saturated soil) then B_q is made equal to 0.99. Also, if $R_f > 8$ it is made 7.99. These changes have a negligible effect on the results.

19. $FC(\%)$ or percent of dry weight less than #200 sieve (.074mm) was also added according to Davies, 1999 Ref.#15)

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APPENDIX C



**SUSPENSION P & S VELOCITIES
AND Vs30
SOTO CAPITAL PROJECT,
BORING B-1**

**August 18, 2010
Report 10262-01 rev A**

**SUSPENSION P & S VELOCITIES
AND Vs30
SOTO CAPITAL PROJECT,
BORING B-1**

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APPENDIX B: OYO Suspension PS velocity logging system NIST traceable calibration

INTRODUCTION

OYO suspension PS velocity measurements were performed in one uncased boring at the SOTO Capital Project, located at 8527 Santa Monica Blvd., in West Hollywood, California. Data acquisition was performed on August 5, 2010 by Charles Carter of GEOVision. Data analysis and report preparation were performed by Robert Steller and reviewed by John Diehl. The work was performed under subcontract with GeoDesign, Inc, with Chris Zadoorian as the point of contact for GeoDesign.

This report describes the field measurements, data analysis, and results of this work.

SCOPE OF WORK

This report presents the results of suspension velocity measurements in one uncased boring, as detailed below. The purpose of these studies was to supplement stratigraphic information obtained from GeoDesign's soil sampling program and to acquire shear wave velocities and compressional wave velocities as a function of depth, as well as to determine Vs30 for the site.

BORING DESIGNATION	DATE LOGGED	BORING DEPTH (FEET)	LOCATION
B-1	8/5/2010	115	8527 SANTA MONICA BLVD, WEST HOLLYWOOD

Table 1. Boring location and logging date

The OYO Model 170 Suspension Logging Recorder and Suspension Logging Probe were used to obtain in-situ horizontal shear and compressional wave velocity measurements at 1.64 ft intervals. The acquired data was analyzed and a profile of velocity versus depth was produced for both compressional and horizontally polarized shear waves.

A detailed reference for the velocity measurement techniques used in this study is:

Guidelines for Determining Design Basis Ground Motions, Report TR-102293,
Electric Power Research Institute, Palo Alto, California, November 1993,
Sections 7 and 8.

INSTRUMENTATION

Suspension soil velocity measurements were performed using the Suspension PS Logging system, manufactured by OYO Corporation, and their subsidiary, Robertson Geologging. This system directly determines the average velocity of a 3.28 ft high segment of the soil column surrounding the boring of interest by measuring the elapsed time between arrivals of a wave propagating upward through the soil column. The receivers that detect the wave, and the source that generates the wave, are moved as a unit in the boring producing relatively constant amplitude signals at all depths.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave source (S_H) and compressional-wave source (P), joined to two biaxial receivers by a flexible isolation cylinder, as shown in Figure 1. The separation of the two receivers is 3.28 ft, allowing average wave velocity in the region between the receivers to be determined by inversion of the wave travel time between the two receivers. The total length of the probe as used in this survey is 21 ft, with the center point of the receiver pair 12.1 ft above the bottom end of the probe. The probe receives control signals from, and sends the amplified receiver signals to, instrumentation on the surface via an armored 4 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data.

The entire probe is suspended in the boring by the cable, therefore, source motion is not coupled directly to the boring walls; rather, the source motion creates a horizontally propagating impulsive pressure wave in the fluid filling the boring and surrounding the source. This pressure wave is converted to P and S_H -waves in the surrounding soil and rock as it passes through the casing and grout annulus and impinges upon the wall of the boring. These waves propagate through the soil and rock surrounding the boring, in turn causing a pressure wave to be generated in the fluid surrounding the receivers as the soil waves pass their location. Separation of the P and S_H -waves at the receivers is performed using the following steps:

1. Orientation of the horizontal receivers is maintained parallel to the axis of the source, maximizing the amplitude of the recorded S_H -wave signals.
2. At each depth, S_H -wave signals are recorded with the source actuated in opposite directions, producing S_H -wave signals of opposite polarity, providing a characteristic S_H -wave signature distinct from the P-wave signal.
3. The 7.0 ft separation of source and receiver 1 permits the P-wave signal to pass and damp significantly before the slower S_H -wave signal arrives at the receiver. In faster soils or rock, the isolation cylinder is extended to allow greater separation of the P- and S_H -wave signals.
4. In saturated soils, the received P-wave signal is typically of much higher frequency than the received S_H -wave signal, permitting additional separation of the two signals by low pass filtering.
5. Direct arrival of the original pressure pulse in the fluid is not detected at the receivers because the wavelength of the pressure pulse in fluid is significantly greater than the dimension of the fluid annulus surrounding the probe (meter versus centimeter scale), preventing significant energy transmission through the fluid medium.

In operation, a distinct, repeatable pattern of impulses is generated at each depth as follows:

1. The source is fired in one direction producing dominantly horizontal shear with some vertical compression, and the signals from the horizontal receivers situated parallel to the axis of motion of the source are recorded.
2. The source is fired again in the opposite direction and the horizontal receiver signals are recorded.
3. The source is fired again and the vertical receiver signals are recorded. The repeated source pattern facilitates the picking of the P and S_H -wave arrivals; reversal of the source changes the polarity of the S_H -wave pattern but not the P-wave pattern.

The data from each receiver during each source activation is recorded as a different channel on the recording system. The Model 170 has six channels (two simultaneous recording channels), each with a 16 bit 1024 sample record. The recorded data is displayed on the controlling computer display. Data is stored on disk for further processing. Up to 8 sampling sequences can be summed to improve the signal to noise ratio of the signals.

Review of the displayed data on the display allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and summing number to optimize the quality of the data before recording. Verification of the calibration of the recorder is performed every twelve months using a NIST traceable frequency source and counter, as outlined in Appendix B.

MEASUREMENT PROCEDURES

The boring was logged uncased, filled with bentonite based drilling mud. The suspension probe was positioned with the mid-point of the receiver spacing at grade, and the mechanical and electronic depth counters were set to zero. The probe was lowered to the bottom of the boring, stopping at 1.64 ft intervals to collect data, as summarized below.

At each measurement depth the measurement sequence of two opposite horizontal records and one vertical record was performed, and the gains were adjusted as required. The data from each depth was checked and recorded on disk before moving to the next depth.

BORING NUMBER	RUN NUMBER	DEPTH RANGE (FEET)	DEPTH AS DRILLED (FEET)	LOST TO SLOUGH (FEET)	SAMPLE INTERVAL (FEET)	DATE LOGGED
B-1	1	3.6 – 101.7	115.0	1.2	1.64	8/5/2010

Table 2. Logging dates and depth ranges

DATA ANALYSIS

The recorded digital records were analyzed to locate the first minima on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between receiver 1 and receiver 2 (R1-R2) arrivals are used to calculate the P-wave velocity for that 3.28 ft segment of the soil column. When observable, P-wave arrivals on the horizontal axis records are used to verify the velocities determined from the vertical axis data.

The P-wave velocity calculated from the travel time over the 7.0 ft interval from source to receiver 1 (S-R1) is calculated and plotted for quality assurance of the velocity derived from the travel time between receivers. During analysis, the depth values as recorded are increased by 5.15 ft to correspond to the mid-point of the 7.0 ft S-R1 interval, as illustrated in Figure 1. Travel times are obtained by picking the first break of the P-wave signal at receiver 1 and subtracting 0.3 milliseconds, the calculated and experimentally verified delay from source trigger pulse (beginning of record) to source impact. This delay corresponds to the duration of acceleration of the solenoid before impact.

The recorded digital records are studied to establish the presence of clear S_H -wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the S_H -wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT - IFFT lowpass filtering was used to remove the higher frequency P-wave signal from the S_H -wave signal. Different filter cutoffs are used to separate P- and S_H -waves at different depths, ranging from 500 Hz in the slowest zones to 2000 Hz in the regions of highest velocity. At each depth, the filter frequency is selected to be at least twice the fundamental frequency of the S_H -wave signal being filtered.

Generally, the first maxima were picked for the 'normal' signals and the first minima for the 'reverse' signals, although other points on the waveform were used if the first pulse was distorted. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in the actuation time of the solenoid source caused by constant mechanical bias in the source or by boring inclination. This variation does not affect the R1-R2 velocity

determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

As with the P-wave data, S_H -wave velocity calculated from the travel time over the 7.0 ft interval from source to receiver 1 is calculated and plotted for verification of the velocity derived from the travel time between receivers. During analysis, the depth values are increased by 5.15 ft to correspond to the mid-point of the 7.0 ft S-R1 interval. Travel times are obtained by picking the first break of the S_H -wave signal at the near receiver and subtracting 0.3 milliseconds, the calculated and experimentally verified delay from the beginning of the record at the source trigger pulse to source impact.

Figure 2 shows an example of R1 - R2 measurements on a filtered sample suspension. In Figure 2, the time difference over the 3.28 ft interval of 2.46 milliseconds for the horizontal signals is equivalent to an S_H -wave velocity of 1334 ft/sec. Final S_H -wave velocity is the average of the horizontal normal and horizontal reverse (HR) signals. Whenever possible, time differences were determined from several phase points on the S_H -waveform records to verify the data obtained from the first arrival of the S_H -wave pulse. Figure 3 displays the same record before filtering of the S_H -waveform record with a 2000 Hz FFT - IFFT digital lowpass filter, illustrating the presence of higher frequency P-wave energy at the beginning of the record, and distortion of the lower frequency S_H -wave by residual P-wave signal.

At the request of the client, V_{s30} was calculated by summing the calculated travel times over each 1.64 ft interval from 8.2 ft (2.5 m) to a depth of 106.6 ft (32.5 m).

RESULTS

Suspension P- and S_H -wave velocities are plotted with the calculated V_{s30} of 367 m/sec (1210 ft/sec) in Figure 4. The calculated suspension travel time curves are presented with V_{s30} in Figure 5. Tabulated measurement depths, pick times and velocities are presented in Table 3.

Calibration procedures and records for the measurement system are presented in Appendix B.

SUMMARY

Discussion of Suspension Results

Suspension PS velocity data are ideally collected in an uncased fluid filled boring, drilled with rotary mud (rotary wash) methods, as this boring was.

Suspension PS velocity data quality is judged based upon 5 criteria:

1. Consistent data between receiver to receiver ($R1 - R2$) and source to receiver ($S - R1$) data.
2. Consistent relationship between P-wave and S_H -wave (excluding transition to saturated soils)
3. Consistency between data from adjacent depth intervals.
4. Clarity of P-wave and S_H -wave onset, as well as damping of later oscillations.
5. Consistency of profile between adjacent borings, if available.

These data show excellent correlation between $R1 - R2$ and $S - R1$ data, as well as excellent correlation between P-wave and S_H -wave velocities. No adjacent borings were logged. P-wave and S_H -wave onsets are generally clear, and later oscillations are well damped. These are excellent quality velocity data. The velocity profile is indicative of very dense soils or soft rock. P-wave velocities rise above 5000 ft/sec (1500 m/sec) at a depth of 29 ft, indicating water table at this depth.

Discussion of Vs30

Vs30 for this site from 8.2 to 106.6 ft (2.5 - 32.5 m) was calculated at 1210 ft/sec (363 m/sec), classifying it as a NEHRP site class C.

Quality Assurance

These velocity measurements were performed using industry-standard or better methods for both measurements and analyses. All work was performed under GEOVision quality assurance procedures, which include:

- Use of NIST-traceable calibrations, where applicable, for field and laboratory instrumentation
- Use of standard field data logs
- Use of independent verification of data by comparison of receiver-to-receiver and source-to-receiver velocities
- Independent review of calculations and results by a registered professional engineer, geologist, or geophysicist.

Data Reliability

P- and S_H-wave velocity measurement using the Suspension Method gives average velocities over a 3.28 ft interval of depth. This high resolution results in the scatter of values shown in the graphs. Individual measurements are very reliable with estimated precision of +/- 5%. Standardized field procedures and quality assurance checks contribute to the reliability of these data.

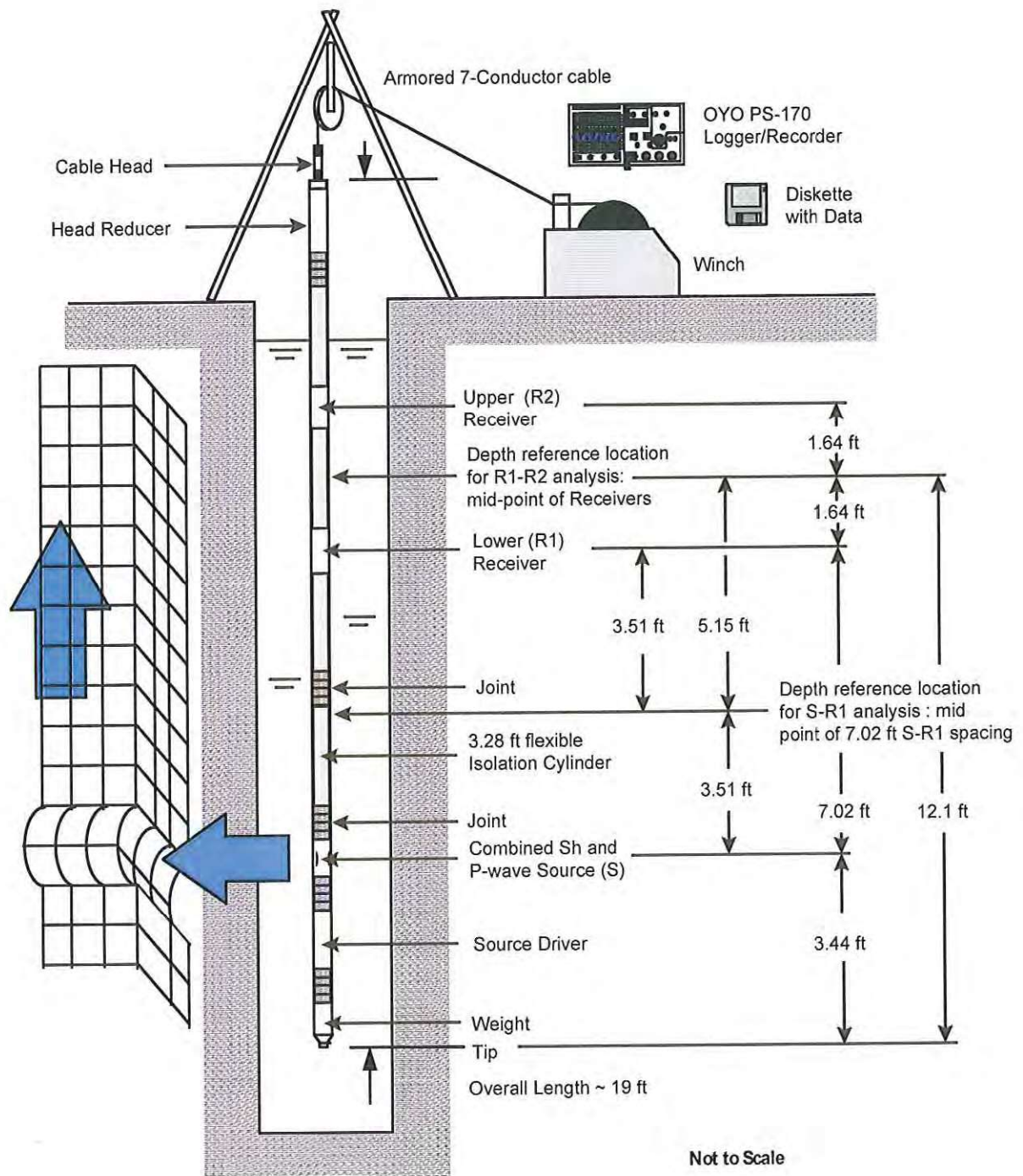


Figure 1. Concept illustration of P-S logging system

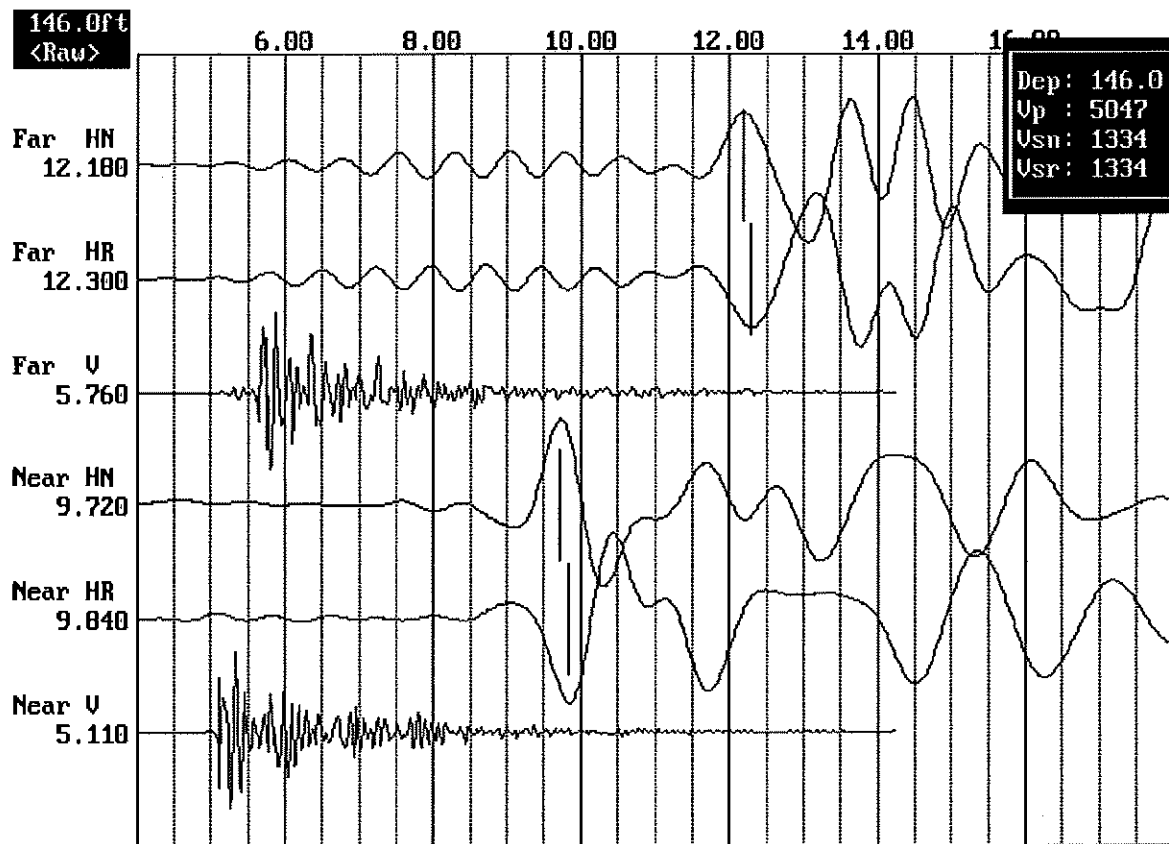


Figure 2. Filtered (2000 Hz lowpass) sample suspension record

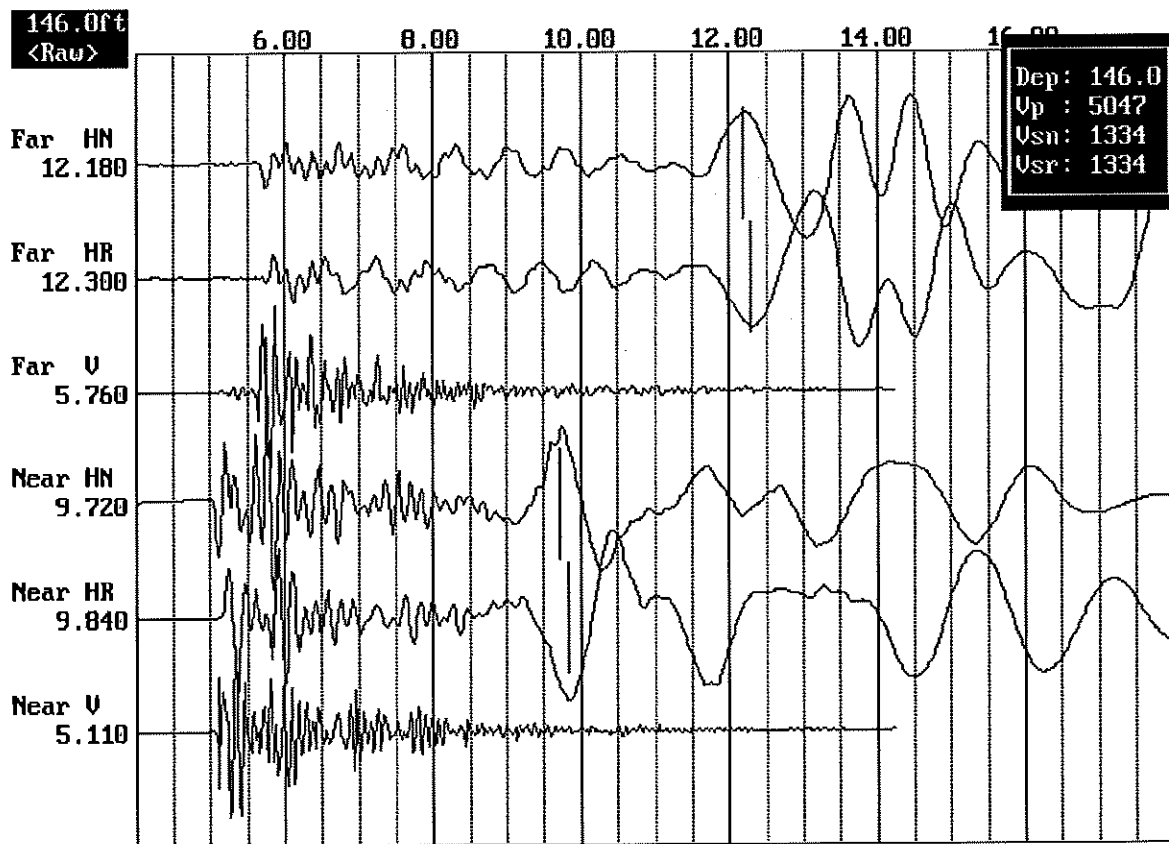


Figure 3. Unfiltered sample suspension record

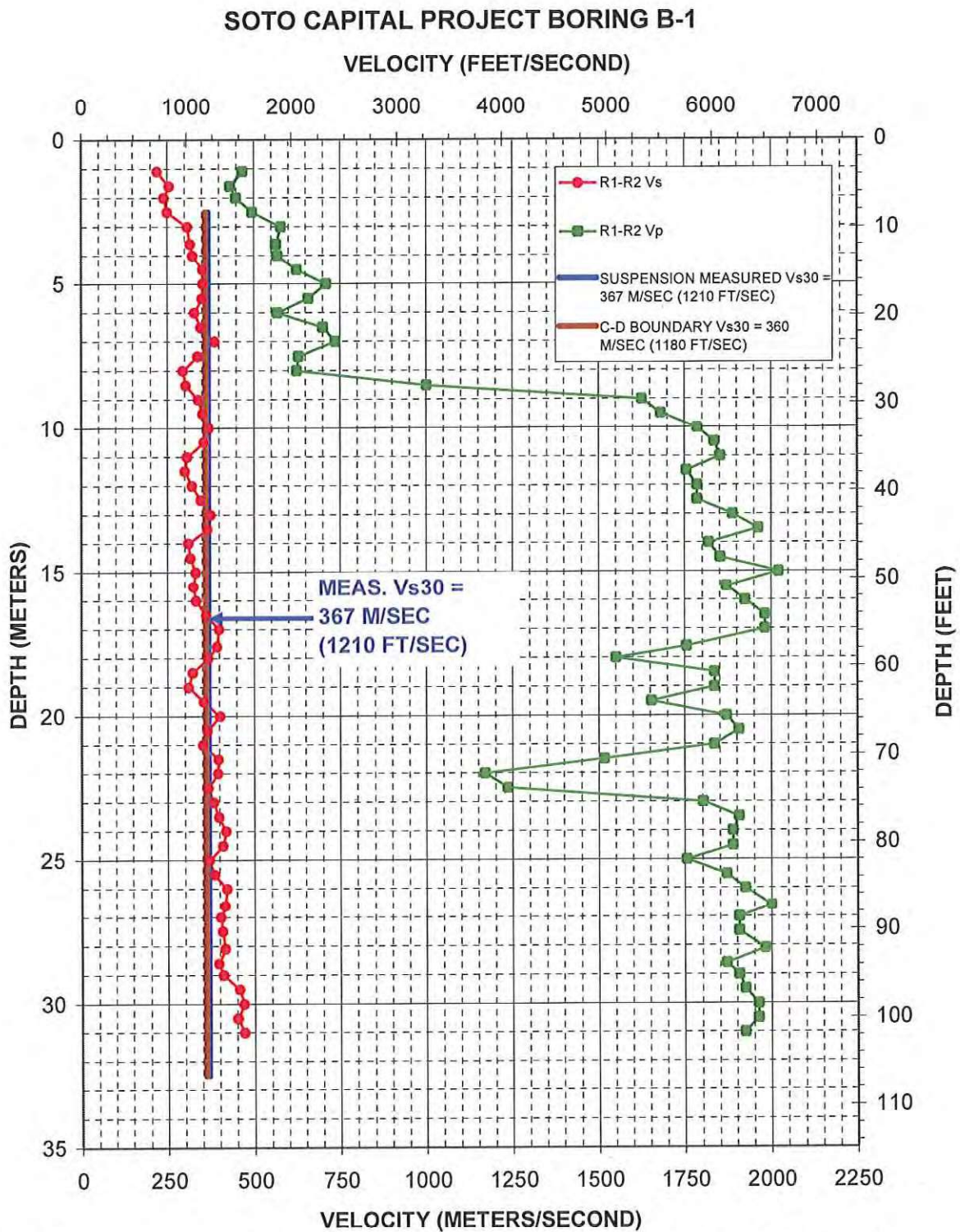


Figure 4. Boring B-2, Suspension P- and S_H-wave Velocities with Vs30 values

Depth		Velocity			
(m)	(feet)	V-S _H (m/sec)	V-P (m/sec)	V-S _H (ft/sec)	V-P (ft/sec)
1.1	223	467	3.61	731	1533
1.6	256	431	5.25	841	1414
2.0	242	448	6.56	792	1471
2.5	252	495	8.20	826	1624
3.0	309	578	9.84	1013	1896
3.6	316	565	11.81	1038	1854
4.0	325	568	13.12	1065	1864
4.5	353	625	14.76	1159	2051
5.0	353	709	16.40	1159	2327
5.5	351	658	18.04	1151	2158
6.0	329	568	19.69	1079	1864
6.5	347	699	21.33	1139	2294
7.0	388	735	22.97	1272	2412
7.5	339	629	24.61	1112	2063
8.0	296	625	26.25	971	2051
8.5	304	1000	27.89	997	3281
9.0	340	1626	29.53	1116	5335
9.5	352	1681	31.17	1155	5514
10.0	370	1786	32.81	1215	5859
10.5	356	1835	34.45	1168	6020
11.0	308	1852	36.09	1009	6076
11.5	301	1754	37.73	988	5756
12.0	322	1786	39.37	1055	5859
12.5	347	1786	41.01	1139	5859
13.0	376	1887	42.65	1233	6190
13.5	366	1961	44.29	1202	6433
14.0	312	1818	45.93	1022	5965
14.5	316	1852	47.57	1038	6076
15.0	332	2020	49.21	1090	6628
15.5	326	1869	50.85	1069	6132
16.0	333	1923	52.49	1094	6309
16.5	362	1980	54.13	1189	6497
17.0	400	1980	55.77	1312	6497
17.6	394	1754	57.74	1292	5756
18.0	368	1550	59.06	1206	5087
18.5	323	1835	60.70	1058	6020
19.0	312	1835	62.34	1022	6020
19.5	355	1653	63.98	1163	5423
20.0	402	1869	65.62	1318	6132
20.5	365	1905	67.26	1197	6249
21.0	352	1835	68.90	1155	6020
21.5	397	1515	70.54	1302	4971
22.0	395	1170	72.18	1297	3837
22.5	368	1235	73.82	1206	4050
23.0	383	1802	75.46	1257	5911
23.5	398	1905	77.10	1307	6249
24.0	418	1887	78.74	1373	6190
24.5	410	1887	80.38	1345	6190
25.0	370	1754	82.02	1215	5756
25.5	386	1869	83.66	1267	6132

Table 3. Boring B-2, Suspension R1-R2 depth and velocities

Depth		Velocity			
(m)	(feet)	V-S _H (m/sec)	V-P (m/sec)	V-S _H (ft/sec)	V-P (ft/sec)
20.0	402	1869	65.62	1318	6132
20.5	365	1905	67.26	1197	6249
21.0	352	1835	68.90	1155	6020
21.5	397	1515	70.54	1302	4971
22.0	395	1170	72.18	1297	3837
22.5	368	1235	73.82	1206	4050
23.0	383	1802	75.46	1257	5911
23.5	398	1905	77.10	1307	6249
24.0	418	1887	78.74	1373	6190
24.5	410	1887	80.38	1345	6190
25.0	370	1754	82.02	1215	5756
25.5	386	1869	83.66	1267	6132
26.0	422	1923	85.30	1384	6309
26.6	417	2000	87.27	1367	6562
27.0	403	1905	88.58	1323	6249
27.5	408	1905	90.22	1339	6249
28.1	417	1980	92.19	1367	6497
28.6	397	1869	93.83	1302	6132
29.0	411	1905	95.14	1347	6249
29.5	457	1923	96.78	1498	6309
30.0	469	1961	98.43	1540	6433
30.5	451	1961	100.07	1481	6433
31.0	472	1923	101.71	1548	6309

Table 3, continued. Boring B-2, Suspension R1-R2 depth and velocities

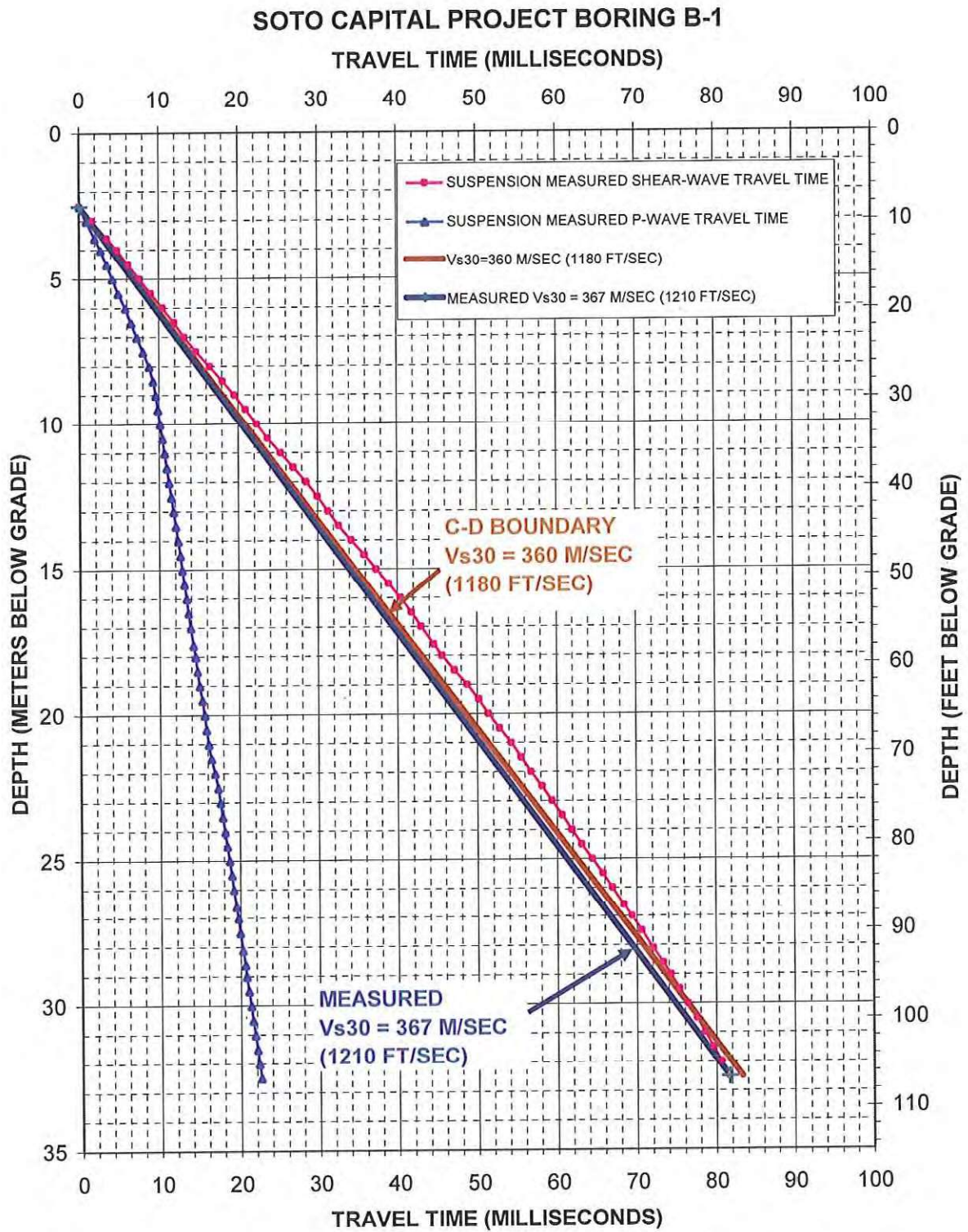


Figure 5. Boring B-2, Suspension P- and S_H -wave travel times with V_{s30} values

APPENDIX A

SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

SOTO CAPITAL PROJECT BORING B-1

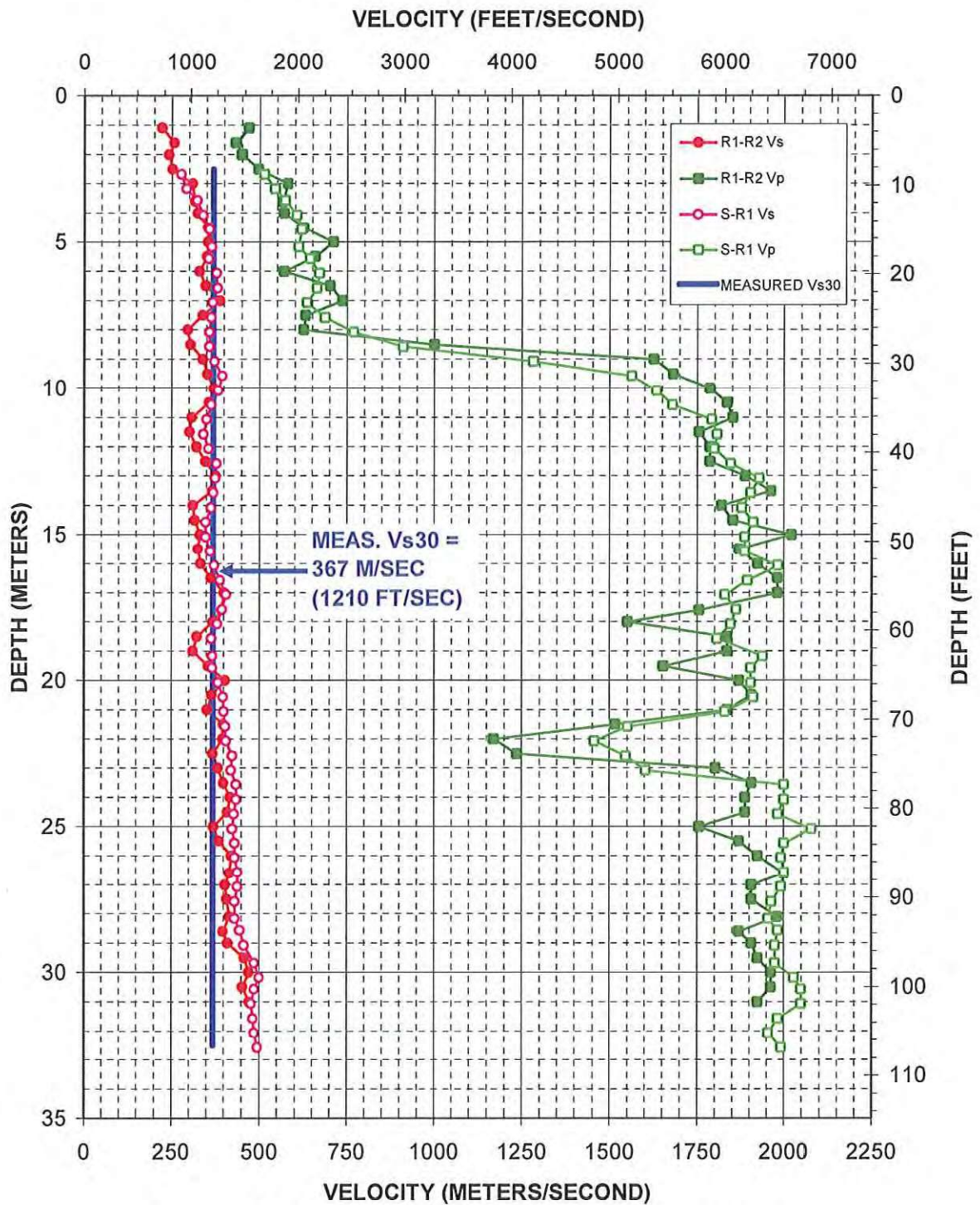


Figure A-1. Boring B-1, R1 - R2 high resolution analysis and S-R1 quality assurance analysis P- and S_H-wave data

Depth (meters)	Velocity		Depth (feet)	Velocity	
	V-S _H (m/sec)	V-p (m/sec)		V- S _H (ft/sec)	V-p (ft/sec)
2.7	277	512	8.76	908	1680
3.2	292	543	10.40	958	1782
3.6	323	571	11.71	1061	1872
4.1	339	605	13.35	1113	1983
4.6	357	618	14.99	1172	2029
5.2	365	610	16.96	1196	2000
5.6	355	643	18.27	1164	2108
6.1	377	669	19.91	1238	2194
6.6	380	663	21.56	1247	2174
7.1	367	633	23.20	1204	2077
7.6	362	686	24.84	1188	2250
8.1	357	767	26.48	1172	2516
8.6	357	911	28.12	1172	2988
9.1	372	1281	29.76	1221	4204
9.6	394	1562	31.40	1293	5125
10.1	383	1634	33.04	1256	5360
10.6	362	1678	34.68	1188	5507
11.1	350	1791	36.32	1149	5875
11.6	341	1806	37.96	1120	5925
12.1	355	1798	39.60	1164	5900
12.6	377	1845	41.24	1238	6053
13.1	375	1928	42.88	1230	6325
13.6	370	1902	44.52	1213	6241
14.1	362	1877	46.16	1188	6159
14.6	348	1911	47.80	1142	6269
15.1	348	1885	49.44	1142	6186
15.6	360	1885	51.08	1180	6186
16.1	372	1981	52.72	1221	6501
16.6	388	1894	54.36	1273	6213
17.1	406	1829	56.00	1332	6001
17.6	394	1861	57.64	1293	6105
18.1	380	1845	59.28	1247	6053
18.6	365	1806	60.93	1196	5925
19.2	367	1937	62.89	1204	6354
19.6	367	1902	64.21	1204	6241
20.1	383	1902	65.85	1256	6241
20.6	397	1911	67.49	1303	6269
21.1	400	1829	69.13	1312	6001
21.6	403	1551	70.77	1322	5088
22.1	406	1456	72.41	1332	4776
22.6	424	1545	74.05	1390	5069
23.1	420	1603	75.69	1379	5259
23.6	434	2000	77.33	1424	6562
24.1	434	2000	78.97	1424	6562
24.6	427	1981	80.61	1401	6501
25.1	424	2078	82.25	1390	6817
25.6	431	2000	83.89	1413	6562
26.1	431	1991	85.53	1413	6531
26.6	438	2000	87.17	1436	6562
27.1	438	1991	88.81	1436	6531

Depth (meters)	Velocity		Depth (feet)	Velocity	
	V-S _H (m/sec)	V-p (m/sec)		V- S _H (ft/sec)	V-p (ft/sec)
27.6	431	1963	90.45	1413	6441
28.2	431	1954	92.42	1413	6412
28.6	445	1981	93.73	1460	6501
29.1	456	1972	95.37	1497	6471
29.7	485	1972	97.34	1592	6471
30.2	499	2028	98.98	1637	6655
30.6	485	2048	100.30	1592	6719
31.1	477	2048	101.94	1564	6719
31.6	481	1981	103.58	1578	6501
32.1	485	1954	105.22	1592	6412
32.6	494	1991	106.86	1621	6531

Table A-1. Boring B-1, S - R1 quality assurance analysis P- and S_H-wave data

APPENDIX B

OYO 170 VELOCITY LOGGING SYSTEM NIST TRACEABLE CALIBRATION PROCEDURE

GEOVision SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION PROCEDURE

Reviewed 7/21/08

Objective

The timing/sampling accuracy of seismic recorders or data loggers is required for several GEOVision field procedures including Seismic Refraction, Downhole P-S Seismic Velocity Logging, and Suspension P-S Seismic Velocity Logging. This procedure describes the method for measuring the timing accuracy of a seismic data logger, such as the OYO Model 170 or OYO/Robertson Model 3403. The objective of this procedure is to verify that the timing accuracy of the recorder is accurate to within 1%.

Frequency of Calibration

The calibration of each GEOVision seismic data logger is twelve (12) months. In the case of rented seismic logger/recorders, calibration must be performed prior to use.

Test Equipment Required

The following equipment is required. Item #2 must have current NIST traceable calibration.

1. Function generator, Krohn Hite 5400B or equivalent
2. Frequency counter, HP 5315A or equivalent
3. Test cables, from item 1 to item 2, and from item 1 to subject data logger.

Procedure

This procedure is designed to be performed using the accompanying Suspension P-S Seismic Logger/Recorder Calibration Data Form with the same revision number. All data must be entered and the procedure signed by the technician performing the test.

1. Record all identification data on the form provided.
2. Connect function generator to data logger (such as OYO Model 170) using test cable
3. Connect the function generator to the frequency counter using test cable.
4. Set signal generator to target frequency specified on data form, 0.25 volt (amplitude is approximate, modify as necessary to yield less than full scale waveforms on



Suspension PS Seismic Logger/Recorder Calibration Procedure
Revision 2.0 Page 1

logger display) peak sine wave. Verify frequency using the counter and note actual frequency on the data form.

5. Set data logger to file length specified on data form and record a data file to disk. Note file name on data form.
6. Measure the duration of 9 complete sine wave cycles on the data file. This measurement must be made using the analysis program PSLOG.EXE version 1.00, and saved as a .sps pick file. Note the duration in milliseconds in the spaces provided on the data form. Calculate average recorded sine wave frequency for each channel pair (Hn, Hr, V) by dividing the duration by 9. Note the average frequency of each channel pair on the data form.
7. Repeat steps 4 through 6 until all target frequencies have been recorded, producing 6 separate data and pick files.

Criteria

The average frequency for the nine cycles (obtained by dividing 9 cycles by the duration in seconds) must be within plus or minus 1% of the actual frequency for each of the 6 records.

If the results are outside this range, the data logger must be marked with a GEOVision REJECT tag until it can be repaired and retested.

If results are acceptable affix label indicating the initials of the person performing the calibration, the date of calibration, and the due date for the next calibration (12 months).

Procedure Approval

Approved by:

John G. Diehl

Name

Signature

President

Title

Date

July 21, 2008

Calibration Laboratory Approval (if required):

Name

Title

Signature

Date



Suspension PS Seismic Logger/Recorder Calibration Procedure
Revision 2.0 Page 2

**EDISON ESISM**A SOUTHERN CALIFORNIA EDISON[®] Company**Calibration Report**

Page 1 of 4

**Metrology**7300 Fenwick Lane
Westminster, CA 92683
Toll Free: 866-723-2257**GEOVision Geophysical Services**1124 Olympic Drive
Corona, CA 92881-3390

Lab Code: 105014-0

Manufacturer: Oyo
Model Number: 3403
Description: Unit, Suspension Telemetry
Asset Number: 160024
Serial Number: 160024
Cal. Procedure: Customer
PO Number: 9200-080716-01

Ambient Temperature: 23° C
Ambient Humidity: 58% RH
Condition As Found: In Tolerance
Condition As Left: In Tolerance - No Adjustment
Calibration Date: 07/17/2009
Calibration Due Date: 07/17/2010
Calibration Interval: 12 Months

Remarks:

The unit was calibrated with the customer's procedure and specification's which have been reviewed by Metrology Engineering and documented in SCE Document M013987. The data can be found on pages 2 and 3 of this report with the original observation data on page 4.

Standards Utilized

ID No.	Manufacturer	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal	01/29/2009	07/29/2009
S1-01347	Hewlett Packard	3326A	Generator, Function, Synthesizer	05/04/2009	11/04/2009
S1-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/24/2009	01/24/2010

Calibration Performed By:				Quality Reviewer:	
Branson, Craig A	<i>CAS</i>	Metrologist	714-895-0714	<i>[Signature]</i>	7/17/09
Name		Title	Phone	Name	Date

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Test No. 573795
Asset No. 160024

Custom Specification Report

Oyo 3403 Unit, Suspension Telemetry,

Page 2 of 4

STEP NUM	FUNCTION TESTED	NOMINAL VALUE	AS FOUND	AS LEFT	Out of Tol	CALIBRATION TOLERANCE
	CH HN Frequency Sine Wave	50.00 Hz	50.00	Same		49.50 to 50.50 Hz [EMU 0.000250]
		100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
		200.0 Hz	200.2	Same		198.0 to 202.0 Hz [EMU 0.001000]
		500.0 Hz	500.0	Same		495.0 to 505.0 Hz [EMU 0.002500]
		1000 Hz	1000	Same		990 to 1010 Hz [EMU 0.005000]
		2000 Hz	2000	Same		1980 to 2020 Hz [EMU 0.010000]
	CH HR Frequency Sine Wave	50.00 Hz	50.00	Same		49.50 to 50.50 Hz [EMU 0.000250]
		100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
		200.0 Hz	200.0	Same		198.0 to 202.0 Hz [EMU 0.001000]
		500.0 Hz	500.0	Same		495.0 to 505.0 Hz [EMU 0.002500]
		1000 Hz	1001	Same		990 to 1010 Hz [EMU 0.005000]
		2000 Hz	2000	Same		1980 to 2020 Hz [EMU 0.010000]
	CH V Frequency Sine Wave	50.00 Hz	50.00	Same		49.50 to 50.50 Hz [EMU 0.000250]
		100.0 Hz	100.0	Same		99.0 to 101.0 Hz [EMU 0.000500]
		200.0 Hz	200.0	Same		198.0 to 202.0 Hz [EMU 0.001000]
		500.0 Hz	500.0	Same		495.0 to 505.0 Hz [EMU 0.002500]
Remarks:						

MedCat CPM: Version 1.1.1 (Professional)
Src DUT: [9548AF1D-C74D-4C9F-AEEF-21EF3608C431] (c)
Doc DUT: [1269C082-5A13-4164-81BF-409D9A87DDDA] (c)

ATTACHMENT 2
Page 1 of 2

Customer



SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMENT DATA

System mfg.:	Oyo	Model no.:	3403
Serial no.:	160024	Calibration date:	7/17/2009
By:	Craig Branson	Due date:	7/17/2010
Counter mfg.:	Hewlett-Packard	Model no.:	5335A
Serial no.:	2626A09881	Calibration date:	1/29/2009
By:	SCE #S1-01252	Due date:	7/29/2009
Signal generator mfg.:	Hewlett-Packard	Model no.:	3325A
Serial no.:	2652A25647	Calibration date:	5/4/2009
By:	SCE #S1-01347	Due date:	11/4/2009

SYSTEM SETTINGS:

Gain:	8
Filter	10KHz
Range:	See sample period in table below
Delay:	0
Stack (1 std)	1
System date = correct date and time	7/17/2009 1037

PROCEDURE:

Set sine wave frequency to target frequency with amplitude of approximately 0.25 volt peak

Note actual frequency on data form.

Set sample period and record data file to disk. Note file name on data form.

Pick duration of 9 cycles using PSLOG.EXE program, note duration on data form, and save as .sps file. Calculate average frequency for each channel pair and note on data form.

Average frequency must be within +/- 1% of actual frequency at all data points.

Maximum error ((AVG-ACT)/ACT*100)% As found 0.10% As left 0.10%

Target Frequency (Hz)	Actual Frequency (Hz)	Sample Period (microS)	File Name	Time for 9 cycles Hr (msec)	Average Frequency Hr (Hz)	Time for 9 cycles Hr (msec)	Average Frequency Hr (Hz)	Time for 9 cycles V (msec)	Average Frequency V (Hz)
50.00	50.00	200	501	180.00	50.00	180.00	50.00	180.00	50.00
100.0	100.0	100	502	90.00	100.0	90.00	100.0	90.00	100.0
200.0	200.0	50	503	44.95	200.2	45.00	200.0	45.00	200.0
500.0	500.0	20	504	18.00	500.0	18.00	500.0	18.00	500.0
1000	1000	10	505	9.000	1000	8.990	1001	9.000	1000
2000	2000	5	506	4.500	2000	4.500	2000	4.500	2000

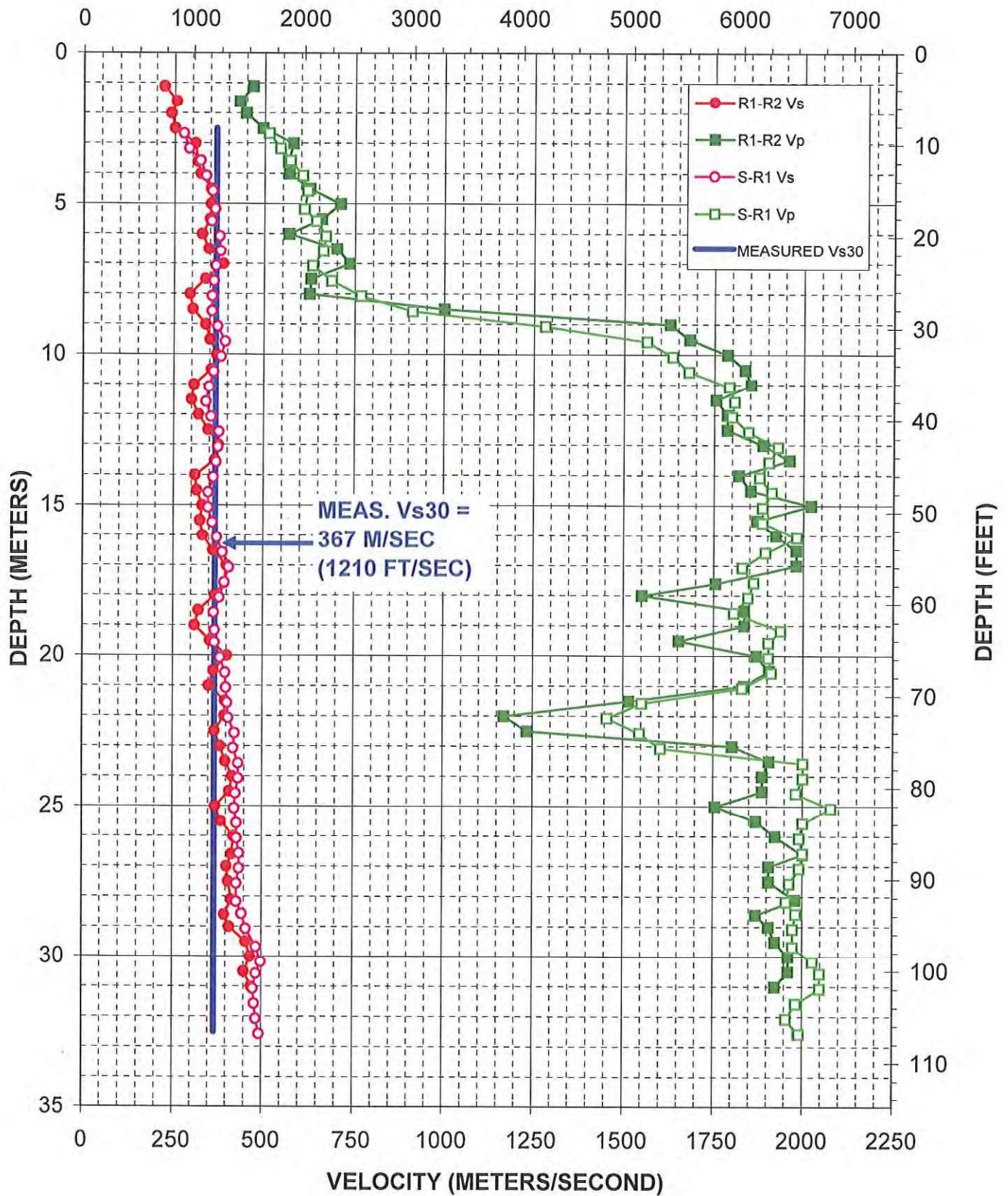
Calibrated by: Craig Branson 7/17/2009 Craig Branson
Name Date Signature

Witnessed by: Robert Steller 7/17/2009 R Steller
Name Date Signature

Suspension PS Seismic Recorder/Logger Calibration Data Form Rev 2.0 July 21, 2008

SOTO CAPITAL PROJECT BORING B-1

VELOCITY (FEET/SECOND)



APPENDIX D

SPT Liquefaction Spreadsheet

PROJECT SotoCapt-1-01
 JOB NAME Proposed Mixed Use Development
 DATE 12/3/2010
 BY DBS
 CHECKED BY CJZ
 DATE 2/1/2011

Boring B-1
 y 125 pcf
 GW level 30 ft
 HHGL 10 ft
 GS Elevation 235
 LFEE 215

Magnitude a max

6.66 0.584

MSF 1.35

Total Settlement

1.61 INCHES

Elevation (MSL)	Depth (feet)	Soil Type	Nfield	Boulanger and Idriss (2006)	σ _v ' (psf)	σ _v ' (psf)	C _c					(N ₁) ₆₀	Fines Correction				CRR 1998 eq.	Rd	CSR	FOS	SETTLEMENT		
					current psf	HHGWL psf	energy	stress	C ₁ 5" diam	C ₂ w/out liner	C ₃ rod	interim corr.	%fines	Alpha	Beta	ΔN					(N ₁) ₆₀	(%)	(inches)
234	1	CL	10		125	125	1.3	1.75	1.05	1.3	0.75	15	15	2.50	1.05			1.000	0.281	2.00			
233.5	1.5	CL	10		188	188	1.3	1.71	1.05	1.3	0.75	15	15	2.50	1.05			0.998	0.281	2.00			
233	2	CL	10		250	250	1.3	1.67	1.05	1.3	0.75	15	15	2.50	1.05			0.997	0.281	2.00			
232.5	2.5	CL	10		313	313	1.3	1.63	1.05	1.3	0.75	15	15	2.50	1.05			0.996	0.280	2.00			
232	3	CL	10		375	375	1.3	1.60	1.05	1.3	0.75	15	15	2.50	1.05			0.995	0.280	2.00			
231.5	3.5	CL	10		438	438	1.3	1.56	1.05	1.3	0.75	15	15	2.50	1.05			0.994	0.280	2.00			
231	4	CL	10		500	500	1.3	1.53	1.05	1.3	0.75	15	15	2.50	1.05			0.993	0.279	2.00			
230.5	4.5	SW-SM	9		563	563	1.3	1.50	1.05	1.3	0.75	15	15	2.50	1.05			0.991	0.279	2.00			
230	5	SW-SM	9		625	625	1.3	1.47	1.05	1.3	0.75	15	15	2.50	1.05			0.990	0.279	2.00			
229.5	5.5	SW-SM	9		688	688	1.3	1.44	1.05	1.3	0.75	15	15	2.50	1.05			0.989	0.278	2.00			
229	6	SW-SM	9		750	750	1.3	1.42	1.05	1.3	0.75	15	15	2.50	1.05			0.988	0.278	2.00			
228.5	6.5	SW-SM	9		813	813	1.3	1.39	1.05	1.3	0.75	15	15	2.50	1.05			0.987	0.278	2.00			
228	7	SW-SM	9		875	875	1.3	1.36	1.05	1.3	0.75	15	15	2.50	1.05			0.986	0.277	2.00			
227.5	7.5	SW-SM	9		938	938	1.3	1.34	1.05	1.3	0.75	15	15	2.50	1.05			0.985	0.277	2.00			
227	8	SW-SM	9		1000	1000	1.3	1.32	1.05	1.3	0.75	15	15	2.50	1.05			0.983	0.277	2.00			
226.5	8.5	SW-SM	9		1063	1063	1.3	1.29	1.05	1.3	0.75	15	15	2.50	1.05			0.982	0.276	2.00			
226	9	SW-SM	9		1125	1125	1.3	1.27	1.05	1.3	0.75	15	15	2.50	1.05			0.981	0.276	2.00			
225.5	9.5	SW-SM	9		1188	1188	1.3	1.25	1.05	1.3	0.75	15	15	2.50	1.05			0.980	0.276	2.00			
225	10	SW-SM	9		1250	1250	1.3	1.23	1.05	1.3	0.75	14.7	15	2.50	1.05	3.2	18	0.979	0.276	2.00			
224.5	10.5	SW-SM	9		1313	1282	1.3	1.21	1.05	1.3	0.75	14.5	15	2.50	1.05	3.2	18	0.978	0.282	2.00			
224	11	SW-SM	9		1375	1313	1.3	1.19	1.05	1.3	0.75	14.2	15	2.50	1.05	3.2	17	0.977	0.288	2.00			
223.5	11.5	SW-SM	9		1438	1345	1.3	1.17	1.05	1.3	0.75	14.0	15	2.50	1.05	3.2	17	0.976	0.294	2.00			
223	12	SW-SM	9		1500	1376	1.3	1.15	1.05	1.3	0.75	13.8	15	2.50	1.05	3.2	17	0.975	0.299	2.00			
222.5	12.5	SW-SM	9		1563	1408	1.3	1.13	1.05	1.3	0.75	13.6	15	2.50	1.05	3.2	17	0.974	0.304	2.00			
222	13	SW-SM	9		1625	1439	1.3	1.12	1.05	1.3	0.85	15.2	15	2.50	1.05	3.2	18	0.973	0.309	2.00			
221.5	13.5	SW-SM	9		1688	1471	1.3	1.10	1.05	1.3	0.85	15.0	15	2.50	1.05	3.2	18	0.972	0.314	2.00			
221	14	SW-SM	15		1750	1502	1.3	1.09	1.05	1.3	0.85	24.6	15	2.50	1.05	3.7	28	0.971	0.318	2.00			
220.5	14.5	SW-SM	15		1813	1534	1.3	1.07	1.05	1.3	0.85	24.2	15	2.50	1.05	3.7	28	0.970	0.323	2.00			
220	15	SW-SM	15		1875	1565	1.3	1.05	1.05	1.3	0.85	23.9	15	2.50	1.05	3.6	28	0.969	0.327	2.00			
219.5	15.5	SW-SM	15		1938	1597	1.3	1.04	1.05	1.3	0.85	23.5	15	2.50	1.05	3.6	27	0.967	0.330	2.00			
219	16	SW-SM	15		2000	1628	1.3	1.03	1.05	1.3	0.85	23.2	15	2.50	1.05	3.6	27	0.966	0.334	2.00			
218.5	16.5	SW-SM	15		2063	1660	1.3	1.01	1.05	1.3	0.85	22.9	15	2.50	1.05	3.6	26	0.965	0.338	2.00			
218	17	SW-SM	15		2125	1691	1.3	1.00	1.05	1.3	0.85	22.6	15	2.50	1.05	3.6	26	0.964	0.341	2.00			
217.5	17.5	SW-SM	15		2188	1723	1.3	0.98	1.05	1.3	0.85	22.3	15	2.50	1.05	3.6	26	0.963	0.344	2.00			
217	18	SW-SM	15		2250	1754	1.3	0.97	1.05	1.3	0.85	22.0	15	2.50	1.05	3.6	26	0.962	0.347	2.00			
216.5	18.5	SW-SM	15		2313	1786	1.3	0.96	1.05	1.3	0.85	21.7	15	2.50	1.05	3.5	25	0.961	0.350	2.00			
216	19	SW-SM	15		2375	1817	1.3	0.95	1.05	1.3	0.85	21.4	15	2.50	1.05	3.5	25	0.959	0.353	2.00			
215.5	19.5	SW-SM	15		2438	1849	1.3	0.94	1.05	1.3	0.85	21.2	15	2.50	1.05	3.5	25	0.958	0.356	2.00			
215	20	SW-SM	18		2500	1880	1.3	0.92	1.05	1.3	0.95	28.0	15	2.50	1.05	3.8	32	0.957	0.358	2.00			
214.5	20.5	SW-SM	18		2563	1912	1.3	0.91	1.05	1.3	0.95	27.7	15	2.50	1.05	3.8	32	0.956	0.361	2.00			
214	21	SW-SM	18		2625	1943	1.3	0.90	1.05	1.3	0.95	27.4	15	2.50	1.05	3.8	31	0.954	0.363	2.00			
213.5	21.5	SW-SM	18		2688	1975	1.3	0.89	1.05	1.3	0.95	27.0	15	2.50	1.05	3.8	31	0.953	0.365	2.00			
213	22	SW-SM	18		2750	2006	1.3	0.88	1.05	1.3	0.95	26.7	15	2.50	1.05	3.8	30	0.951	0.367	2.00			
212.5	22.5	SW-SM	18		2813	2038	1.3	0.87	1.05	1.3	0.95	26.4	15	2.50	1.05	3.8	30	0.950	0.369	2.00			
212	23	SW-SM	18		2875	2069	1.3	0.86	1.05	1.3	0.95	26.1	15	2.50	1.05	3.8	30	0.457 0.948	0.371	1.67	0.000	0.000	
211.5	23.5	SW-SM	18		2938	2101	1.3	0.85	1.05	1.3	0.95	25.8	15	2.50	1.05	3.7	30	0.438 0.947	0.373	1.59	0.000	0.001	
211	24	SW-SM	20		3000	2132	1.3	0.84	1.05	1.3	0.95	25.3	15	2.50	1.05	3.9	32	0.945	0.374	2.00			
210.5	24.5	SW-SM	20		3063	2164	1.3	0.83	1.05	1.3	0.95	28.0	15	2.50	1.05	3.8	32	0.944	0.376	2.00			
210	25	SW-SM	20		3125	2195	1.3	0.82	1.05	1.3	0.95	27.7	15	2.50	1.05	3.8	32	0.942	0.377	2.00			
209.5	25.5	SW-SM	20		3188	2227	1.3	0.81	1.05	1.3	0.95	27.4	15	2.50	1.05	3.8	31	0.940	0.379	2.00			
209	26	SW-SM	20		3250	2258	1.3	0.80	1.05	1.3	0.95	27.1	15	2.50	1.05	3.8	31	0.938	0.380	2.00			
208.5	26.5	SW-SM	20		3313	2290	1.3	0.80	1.05	1.3	0.95	26.8	15	2.50	1.05	3.8	31	0.936	0.381	2.00			
208	27	SW-SM	20		3375	2321	1.3	0.79	1.05	1.3	0.95	26.5	15	2.50	1.05	3.8	30	0.934	0.382	2.00			
207.5	27.5	SW-SM	20		3438	2353	1.3	0.78	1.05	1.3	0.95	26.3	15	2.50	1.05	3.8	30	0.932	0.383	2.00			
207	28	SW-SM	20		3500	2384	1.3	0.77	1.05	1.3	0.95	26.0	15	2.50	1.05	3.7	29	0.450 0.930	0.384	1.59	0.000	0.001	
206.5	28.5	SW-SM	20		3563	2416	1.3	0.76	1.05	1.3	0.95	25.7	15	2.50	1.05	3.7	29	0.434 0.928	0.385	1.53	0.000	0.001	
206	29	SW-SM	20		3625	2447	1.3	0.76	1.05	1.3	0.95	25.5	15	2.50	1.05	3.7	29	0.419 0.925	0.386	1.47	0.000	0.001	
205.5	29.5	SW-SM	20		3688	2479	1.3	0.75	1.05	1.3	0.95	25.2	15	2.50	1.05	3.7	29	0.406 0.923	0.386	1.42	0.000	0.002	
205	30	SW-SM	18		3750	2510	1.3	0.74	1.05	1.3</													

201.5	33.5	SW-SM	18	3971	2731	1.3	0.72	1.05	1.3	1	22.8	20	3.61	1.08	5.4	28	0.379	0.901	0.389	1.32	0.000	0.002
201	34	SW-SM	18	4002	2762	1.3	0.71	1.05	1.3	1	22.7	20	3.61	1.08	5.4	28	0.375	0.897	0.389	1.31	0.000	0.002
200.5	34.5	SC	10	4034	2794	1.3	0.71	1.05	1.3	1	12.6	17	3.01	1.06	3.8	16	0.174	0.894	0.388	0.61	0.016	0.096
200	35	SC	10	4065	2825	1.3	0.70	1.05	1.3	1	12.5	17	3.01	1.06	3.8	16	0.173	0.891	0.388	0.60	0.016	0.096
199.5	35.5	SC	10	4097	2857	1.3	0.70	1.05	1.3	1	12.4	17	3.01	1.06	3.8	16	0.172	0.887	0.388	0.60	0.016	0.096
199	36	SC	10	4128	2888	1.3	0.70	1.05	1.3	1	12.4	17	3.01	1.06	3.8	16	0.172	0.883	0.387	0.60	0.016	0.096
198.5	36.5	SC	10	4160	2920	1.3	0.69	1.05	1.3	1	12.3	17	3.01	1.06	3.8	16	0.171	0.880	0.387	0.60	0.016	0.096
198	37	SC	10	4191	2951	1.3	0.69	1.05	1.3	1	12.3	17	3.01	1.06	3.7	16	0.171	0.876	0.386	0.60	0.016	0.096
197.5	37.5	SC	10	4223	2983	1.3	0.69	1.05	1.3	1	12.2	17	3.01	1.06	3.7	16	0.170	0.872	0.386	0.60	0.018	0.108
197	38	SC	10	4254	3014	1.3	0.69	1.05	1.3	1	12.2	17	3.01	1.06	3.7	16	0.169	0.868	0.385	0.60	0.018	0.108
196.5	38.5	SC	10	4286	3046	1.3	0.68	1.05	1.3	1	12.1	17	3.01	1.06	3.7	16	0.169	0.864	0.384	0.59	0.018	0.108
196	39	SW-SM	15	4317	3077	1.3	0.68	1.05	1.3	1	18.1	16	2.77	1.05	3.7	22	0.239	0.860	0.383	0.85	0.014	0.084
195.5	39.5	SW-SM	15	4349	3109	1.3	0.68	1.05	1.3	1	18.0	16	2.77	1.05	3.7	22	0.238	0.855	0.382	0.84	0.014	0.084
195	40	SW-SM	15	4380	3140	1.3	0.67	1.05	1.3	1	17.9	16	2.77	1.05	3.7	22	0.237	0.851	0.381	0.84	0.014	0.084
194.5	40.5	SW-SM	15	4412	3172	1.3	0.67	1.05	1.3	1	17.8	16	2.77	1.05	3.7	22	0.236	0.847	0.380	0.84	0.014	0.084
194	41	SW-SM	15	4443	3203	1.3	0.67	1.05	1.3	1	17.7	16	2.77	1.05	3.7	21	0.235	0.842	0.379	0.84	0.014	0.084
193.5	41.5	SW-SM	15	4475	3235	1.3	0.66	1.05	1.3	1	17.7	16	2.77	1.05	3.7	21	0.233	0.837	0.378	0.84	0.014	0.084
193	42	SW-SM	15	4506	3266	1.3	0.66	1.05	1.3	1	17.6	16	2.77	1.05	3.7	21	0.232	0.833	0.377	0.84	0.014	0.084
192.5	42.5	SW-SM	15	4538	3298	1.3	0.66	1.05	1.3	1	17.5	16	2.77	1.05	3.7	21	0.231	0.828	0.376	0.83	0.014	0.084
192	43	SW-SM	31	4569	3329	1.3	0.65	1.05	1.3	1	36.0	15	2.50	1.05	4.2	40	0.823	0.374		2.00		
191.5	43.5	SW-SM	31	4601	3361	1.3	0.65	1.05	1.3	1	35.9	15	2.50	1.05	4.2	40	0.818	0.373		2.00		
191	44	SW-SM	31	4632	3392	1.3	0.65	1.05	1.3	1	35.7	15	2.50	1.05	4.2	40	0.814	0.371		2.00		
190.5	44.5	SW-SM	31	4664	3424	1.3	0.65	1.05	1.3	1	35.6	15	2.50	1.05	4.2	40	0.809	0.370		2.00		
190	45	SC	31	4695	3455	1.3	0.64	1.05	1.3	1	35.4	35	5.00	1.20	12.1	47	0.804	0.368		2.00		
189.5	45.5	SC	31	4727	3487	1.3	0.64	1.05	1.3	1	35.2	35	5.00	1.20	12.0	47	0.799	0.367		2.00		
189	46	SW-SM	31	4758	3518	1.3	0.64	1.05	1.3	1	35.1	15	2.50	1.05	4.2	39	0.794	0.365		2.00		
188.5	46.5	SW-SM	31	4790	3550	1.3	0.64	1.05	1.3	1	34.9	15	2.50	1.05	4.2	39	0.789	0.363		2.00		
188	47	SW-SM	31	4821	3581	1.3	0.63	1.05	1.3	1	34.8	15	2.50	1.05	4.2	39	0.783	0.362		2.00		
187.5	47.5	SW-SM	31	4853	3613	1.3	0.63	1.05	1.3	1	34.6	15	2.50	1.05	4.2	39	0.778	0.360		2.00		
187	48	SW-SM	31	4884	3644	1.3	0.63	1.05	1.3	1	34.5	15	2.50	1.05	4.2	39	0.773	0.358		2.00		
186.5	48.5	SW-SM	31	4916	3676	1.3	0.62	1.05	1.3	1	34.4	15	2.50	1.05	4.2	39	0.768	0.357		2.00		
186	49	SW-SM	31	4947	3707	1.3	0.62	1.05	1.3	1	34.2	15	2.50	1.05	4.1	38	0.763	0.355		2.00		
185.5	49.5	SW-SM	31	4979	3739	1.3	0.62	1.05	1.3	1	34.1	15	2.50	1.05	4.1	38	0.758	0.353		2.00		
185	50	SW-SM	31	5010	3770	1.3	0.62	1.05	1.3	1	33.9	15	2.50	1.05	4.1	38	0.753	0.351		2.00		
184.5	50.5	SW-SM	44	5042	3802	1.3	0.61	1.05	1.3	1	47.9	15	2.50	1.05	4.8	53	0.748	0.349		2.00		
184	51	SW-SM	44	5073	3833	1.3	0.61	1.05	1.3	1	47.7	15	2.50	1.05	4.8	53	0.743	0.348		2.00		
183.5	51.5	SW-SM	44	5105	3865	1.3	0.61	1.05	1.3	1	47.6	15	2.50	1.05	4.8	52	0.738	0.346		2.00		
183	52	SW-SM	44	5136	3896	1.3	0.61	1.05	1.3	1	47.4	15	2.50	1.05	4.8	52	0.733	0.344		2.00		
182.5	52.5	SW-SM	44	5168	3928	1.3	0.60	1.05	1.3	1	47.2	15	2.50	1.05	4.8	52	0.728	0.342		2.00		
182	53	SW-SM	44	5199	3959	1.3	0.60	1.05	1.3	1	47.0	15	2.50	1.05	4.8	52	0.723	0.340		2.00		
181.5	53.5	SW-SM	44	5231	3991	1.3	0.60	1.05	1.3	1	46.8	15	2.50	1.05	4.7	52	0.718	0.339		2.00		
181	54	SW-SM	44	5262	4022	1.3	0.60	1.05	1.3	1	46.6	15	2.50	1.05	4.7	51	0.713	0.337		2.00		
180.5	54.5	SW-SM	44	5294	4054	1.3	0.59	1.05	1.3	1	46.4	15	2.50	1.05	4.7	51	0.708	0.335		2.00		
180	55	SW-SM	44	5325	4085	1.3	0.59	1.05	1.3	1	46.2	15	2.50	1.05	4.7	51	0.703	0.333		2.00		
179.5	55.5	SW-SM	50	5357	4117	1.3	0.59	1.05	1.3	1	52.3	15	2.50	1.05	5.0	57	0.699	0.331		2.00		
179	56	SW-SM	50	5388	4148	1.3	0.59	1.05	1.3	1	52.1	15	2.50	1.05	5.0	57	0.694	0.330		2.00		
178.5	56.5	SW-SM	50	5420	4180	1.3	0.58	1.05	1.3	1	51.9	15	2.50	1.05	5.0	57	0.689	0.328		2.00		
178	57	SW-SM	50	5451	4211	1.3	0.58	1.05	1.3	1	51.7	15	2.50	1.05	5.0	57	0.685	0.326		2.00		
177.5	57.5	SW-SM	50	5483	4243	1.3	0.58	1.05	1.3	1	51.5	15	2.50	1.05	5.0	56	0.680	0.324		2.00		
177	58	SW-SM	50	5514	4274	1.3	0.58	1.05	1.3	1	51.3	15	2.50	1.05	5.0	56	0.676	0.323		2.00		
176.5	58.5	SW-SM	50	5546	4306	1.3	0.58	1.05	1.3	1	51.1	15	2.50	1.05	5.0	56	0.672	0.321		2.00		
176	59	SW-SM	50	5577	4337	1.3	0.57	1.05	1.3	1	50.9	15	2.50	1.05	4.9	56	0.668	0.319		2.00		
175.5	59.5	SW-SM	50	5609	4369	1.3	0.57	1.05	1.3	1	50.7	15	2.50	1.05	4.9	56	0.663	0.318		2.00		
175	60	SW-SM	50	5640	4400	1.3	0.57	1.05	1.3	1	50.5	15	2.50	1.05	4.9	55	0.659	0.316		2.00		
174.5	60.5	SW-SM	50	5672	4432	1.3	0.57	1.05	1.3	1	50.3	15	2.50	1.05	4.9	55	0.655	0.315		2.00		
174	61	SW-SM	50	5703	4463	1.3	0.56	1.05	1.3	1	50.1	15	2.50	1.05	4.9	55	0.651	0.313		2.00		
173.5	61.5	SW-SM	50	5735	4495	1.3	0.56	1.05	1.3	1	49.9	15	2.50	1.05	4.9	55	0.647	0.312		2.00		
173	62	SW-SM	50	5766	4526	1.3	0.56	1.05	1.3	1	49.7	15	2.50	1.05	4.9	55	0.644	0.310		2.00		
172.5	62.5	SW-SM	50	5798	4558	1.3	0.56	1.05	1.3	1	49.5	15	2.50	1.05	4.9	54	0.640	0.309		2.00		
172	63	SW-SM	50	5829	4589	1.3	0.56	1.05	1.3	1	49.4	15	2.50	1.05	4.9	54	0.636	0.307		2.00		
171.5	63.5	SW-SM	50	5861	4621	1.3	0.55	1.05	1.3	1	49.2	15	2.50	1.05	4.9	54	0.632	0.306		2.00		
171	64	SW-SM	50	5892	4652	1.3	0.55	1.05	1.3	1	49.0	15	2.50	1.05	4.9	54	0.629	0.304		2.00		
170.5	64.5	SW-SM	50	5924	4684	1.3	0.55	1.05	1.3	1	48.8	15	2.50	1.05	4.8	54	0.625	0.303		2.00		
170	65	SW-SM	50	5955	4715	1.3	0.55	1.05	1.3	1	48.6	15	2.50	1.05	4.8	53	0.622	0.302		2.00		
169.5	65.5	SW-SM	50	5987	4747	1.3	0.55	1.05	1.3	1	48.4	15	2.50	1.05	4.8	53	0					

156.5	78.5	SW-SM	50	6806	5566	1.3	0.50	1.05	1.3	1	44.2	15	2.50	1.05	4.6	49	0.554	0.275	2.00
156	79	SW-SM	50	6837	5597	1.3	0.50	1.05	1.3	1	44.1	15	2.50	1.05	4.6	49	0.552	0.274	2.00
155.5	79.5	SW-SM	50	6869	5629	1.3	0.49	1.05	1.3	1	43.9	15	2.50	1.05	4.6	49	0.550	0.273	2.00
155	80	SW-SM	37	6900	5660	1.3	0.49	1.05	1.3	1	32.4	24	4.18	1.11	7.7	40	0.548	0.273	2.00
154.5	80.5	SW-SM	37	6932	5692	1.3	0.49	1.05	1.3	1	32.3	24	4.18	1.11	7.7	40	0.546	0.272	2.00
154	81	SW-SM	37	6963	5723	1.3	0.49	1.05	1.3	1	32.2	24	4.18	1.11	7.6	40	0.545	0.271	2.00
153.5	81.5	SW-SM	37	6995	5755	1.3	0.49	1.05	1.3	1	32.1	24	4.18	1.11	7.6	40	0.543	0.271	2.00
153	82	SW-SM	37	7026	5786	1.3	0.49	1.05	1.3	1	32.0	24	4.18	1.11	7.6	40	0.541	0.270	2.00
152.5	82.5	SW-SM	84	7058	5818	1.3	0.49	1.05	1.3	1	72.3	15	2.50	1.05	6.0	78	0.540	0.269	2.00
152	83	SW-SM	84	7089	5849	1.3	0.48	1.05	1.3	1	72.1	15	2.50	1.05	6.0	78	0.538	0.269	2.00
151.5	83.5	SW-SM	84	7121	5881	1.3	0.48	1.05	1.3	1	71.8	15	2.50	1.05	6.0	78	0.537	0.268	2.00
151	84	SW-SM	84	7152	5912	1.3	0.48	1.05	1.3	1	71.6	15	2.50	1.05	5.9	78	0.535	0.268	2.00
150.5	84.5	SW-SM	84	7184	5944	1.3	0.48	1.05	1.3	1	71.4	15	2.50	1.05	5.9	77	0.534	0.267	2.00
150	85	SW-SM	84	7215	5975	1.3	0.48	1.05	1.3	1	71.1	15	2.50	1.05	5.9	77	0.532	0.266	2.00
149.5	85.5	SW-SM	84	7247	6007	1.3	0.48	1.05	1.3	1	70.9	15	2.50	1.05	5.9	77	0.531	0.266	2.00
149	86	SW-SM	84	7278	6038	1.3	0.47	1.05	1.3	1	70.7	15	2.50	1.05	5.9	77	0.530	0.265	2.00
148.5	86.5	SW-SM	84	7310	6070	1.3	0.47	1.05	1.3	1	70.5	15	2.50	1.05	5.9	76	0.528	0.265	2.00
148	87	SW-SM	84	7341	6101	1.3	0.47	1.05	1.3	1	70.2	15	2.50	1.05	5.9	76	0.527	0.264	2.00
147.5	87.5	SW-SM	84	7373	6133	1.3	0.47	1.05	1.3	1	70.0	15	2.50	1.05	5.9	76	0.526	0.264	2.00
147	88	SW-SM	84	7404	6164	1.3	0.47	1.05	1.3	1	69.8	15	2.50	1.05	5.9	76	0.524	0.263	2.00
146.5	88.5	SW-SM	84	7436	6196	1.3	0.47	1.05	1.3	1	69.6	15	2.50	1.05	5.8	75	0.523	0.263	2.00
146	89	SW-SM	84	7467	6227	1.3	0.47	1.05	1.3	1	69.3	15	2.50	1.05	5.8	75	0.522	0.262	2.00
145.5	89.5	SW-SM	84	7499	6259	1.3	0.46	1.05	1.3	1	69.1	15	2.50	1.05	5.8	75	0.520	0.262	2.00
145	90	SW-SM	84	7530	6290	1.3	0.46	1.05	1.3	1	68.9	15	2.50	1.05	5.8	75	0.519	0.261	2.00
144.5	90.5	SW-SM	53	7562	6322	1.3	0.46	1.05	1.3	1	43.3	15	2.50	1.05	4.6	48	0.518	0.261	2.00
144	91	SW-SM	53	7593	6353	1.3	0.46	1.05	1.3	1	43.2	15	2.50	1.05	4.6	48	0.517	0.260	2.00
143.5	91.5	SW-SM	53	7625	6385	1.3	0.46	1.05	1.3	1	43.1	15	2.50	1.05	4.5	48	0.516	0.260	2.00
143	92	SW-SM	53	7656	6416	1.3	0.46	1.05	1.3	1	42.9	15	2.50	1.05	4.6	48	0.515	0.260	2.00
142.5	92.5	SW-SM	53	7688	6448	1.3	0.46	1.05	1.3	1	42.8	15	2.50	1.05	4.6	47	0.514	0.259	2.00
142	93	SW-SM	53	7719	6479	1.3	0.45	1.05	1.3	1	42.7	15	2.50	1.05	4.6	47	0.512	0.259	2.00
141.5	93.5	SW-SM	53	7751	6511	1.3	0.45	1.05	1.3	1	42.5	15	2.50	1.05	4.5	47	0.511	0.258	2.00
141	94	SW-SM	53	7782	6542	1.3	0.45	1.05	1.3	1	42.4	15	2.50	1.05	4.5	47	0.510	0.258	2.00
140.5	94.5	SW-SM	53	7814	6574	1.3	0.45	1.05	1.3	1	42.3	15	2.50	1.05	4.5	47	0.509	0.258	2.00
140	95	SW-SM	53	7845	6605	1.3	0.45	1.05	1.3	1	42.2	15	2.50	1.05	4.5	47	0.508	0.257	2.00
139.5	95.5	SW-SM	53	7877	6637	1.3	0.45	1.05	1.3	1	42.0	15	2.50	1.05	4.5	47	0.507	0.257	2.00
139	96	SW-SM	53	7908	6668	1.3	0.45	1.05	1.3	1	41.9	15	2.50	1.05	4.5	46	0.506	0.256	2.00
138.5	96.5	SW-SM	53	7940	6700	1.3	0.44	1.05	1.3	1	41.8	15	2.50	1.05	4.5	46	0.505	0.256	2.00
138	97	SW-SM	53	7971	6731	1.3	0.44	1.05	1.3	1	41.7	15	2.50	1.05	4.5	46	0.504	0.256	2.00
137.5	97.5	SW-SM	53	8003	6763	1.3	0.44	1.05	1.3	1	41.5	15	2.50	1.05	4.5	46	0.503	0.255	2.00
137	98	SW-SM	53	8034	6794	1.3	0.44	1.05	1.3	1	41.4	15	2.50	1.05	4.5	46	0.502	0.255	2.00
136.5	98.5	SW-SM	53	8066	6826	1.3	0.44	1.05	1.3	1	41.3	15	2.50	1.05	4.5	46	0.501	0.255	2.00
136	99	SW-SM	53	8097	6857	1.3	0.44	1.05	1.3	1	41.2	15	2.50	1.05	4.5	46	0.500	0.254	2.00
135.5	99.5	SW-SM	53	8129	6889	1.3	0.44	1.05	1.3	1	41.0	15	2.50	1.05	4.5	46	0.499	0.254	2.00
135	100	SW-SM	34	8160	6920	1.3	0.44	1.05	1.3	1	26.3	32	4.83	1.17	9.3	36	0.499	0.253	2.00
134.5	100.5	SW-SM	34	8192	6952	1.3	0.43	1.05	1.3	1	26.2	32	4.83	1.17	9.3	35	0.498	0.253	2.00
134	101	SW-SM	34	8223	6983	1.3	0.43	1.05	1.3	1	26.1	32	4.83	1.17	9.3	35	0.497	0.253	2.00
133.5	101.5	SW-SM	34	8255	7015	1.3	0.43	1.05	1.3	1	26.0	32	4.83	1.17	9.3	35	0.496	0.252	2.00
133	102	SW-SM	34	8286	7046	1.3	0.43	1.05	1.3	1	25.9	32	4.83	1.17	9.3	35	0.495	0.252	2.00
132.5	102.5	SW-SM	34	8318	7078	1.3	0.43	1.05	1.3	1	25.9	32	4.83	1.17	9.3	35	0.494	0.252	2.00
132	103	SW-SM	34	8349	7109	1.3	0.43	1.05	1.3	1	25.8	32	4.83	1.17	9.2	35	0.493	0.251	2.00
131.5	103.5	SW-SM	34	8381	7141	1.3	0.43	1.05	1.3	1	25.7	32	4.83	1.17	9.2	35	0.493	0.251	2.00
131	104	SW-SM	34	8412	7172	1.3	0.43	1.05	1.3	1	25.6	32	4.83	1.17	9.2	35	0.492	0.251	2.00
130.5	104.5	SW-SM	34	8444	7204	1.3	0.42	1.05	1.3	1	25.6	32	4.83	1.17	9.2	35	0.491	0.251	2.00
130	105	SW-SM	34	8475	7235	1.3	0.42	1.05	1.3	1	25.5	32	4.83	1.17	9.2	35	0.490	0.250	2.00
129.5	105.5	SW-SM	34	8507	7267	1.3	0.42	1.05	1.3	1	25.4	32	4.83	1.17	9.2	35	0.489	0.250	2.00
129	106	SW-SM	34	8538	7298	1.3	0.42	1.05	1.3	1	25.4	32	4.83	1.17	9.2	35	0.488	0.250	2.00
128.5	106.5	SW-SM	34	8570	7330	1.3	0.42	1.05	1.3	1	25.3	32	4.83	1.17	9.2	34	0.488	0.249	2.00
128	107	SW-SM	34	8601	7361	1.3	0.42	1.05	1.3	1	25.2	32	4.83	1.17	9.1	34	0.487	0.249	2.00
127.5	107.5	SW-SM	34	8633	7393	1.3	0.42	1.05	1.3	1	25.1	32	4.83	1.17	9.1	34	0.486	0.249	2.00
127	108	SW-SM	34	8664	7424	1.3	0.42	1.05	1.3	1	25.1	32	4.83	1.17	9.1	34	0.485	0.248	2.00
126.5	108.5	SW-SM	34	8696	7456	1.3	0.41	1.05	1.3	1	25.0	32	4.83	1.17	9.1	34	0.485	0.248	2.00
126	109	SW-SM	34	8727	7487	1.3	0.41	1.05	1.3	1	24.9	32	4.83	1.17	9.1	34	0.484	0.248	2.00
125.5	109.5	SW-SM	34	8759	7519	1.3	0.41	1.05	1.3	1	24.9	32	4.83	1.17	9.1	34	0.483	0.248	2.00
125	110	SW-SM	34	8790	7550	1.3	0.41	1.05	1.3	1	24.8	32	4.83	1.17	9.1	34	0.482	0.247	2.00
124.5	110.5	SW-SM	34	8822	7582	1.3	0.41	1.05	1.3	1	24.7	32	4.83	1.17	9.1	34	0.482	0.247	2.00
124	111	SW-SM	34	8853	7613	1.3	0.41	1.05	1.3	1	24.7	32	4.83	1.17	9.0	34	0.481	0.247	2.00
123.5	111.5	SW-SM	34	8885	7645	1.3	0.41	1.05	1.3	1	24.6	32	4.83	1.17	9.0	34	0.480	0.246	2.00
123	112	SW-SM	34	8916	7676	1.3	0.41	1.05	1.3	1	24.5	32	4.83	1.17	9.0	34	0.480	0.246	2.00
122.5	112.5	SW-SM	34	8948	7708	1.3	0.41	1.05	1.3	1	24.5	32	4.83	1.17	9.0	33	0.479	0.246	2.00
122	113	SW-SM	34	8979	7739	1.3	0.40	1.05	1.3	1	24.4	32	4.83	1.17	9.0	33	0.478	0.246	2.00
121.5	113.5	SW-SM	34	9011	7771	1.3	0.40	1.05	1.3	1	24.3	32	4.83	1.17	9.0	33	0.477	0.245	2.00</

SPT Liquefaction Spreadsheet

PROJECT SotoCapt-1-01

JOB NAME Proposed Mixed Use Development

DATE 12/3/2010

BY DBS

CHECKED BY 2/1/2011

DATE CJZ

Boring

B-2

y

120

pcf

GW level

49

ft

HHGL

30

ft

GS Elevation

255

LFFE

215

Magnitude a max

6.66

0.584

MSF

1.35

Total Settlement

0.01

INCHES

Elevation (MSL)	Depth (feet)	Soil Type	Nfield	Boulanger and Idriss (2006)	σ _{o'} (psf) current psf	σ _{o'} (psf) HHGWL psf						(N ₁) ₉₀ interim Corr.	Fines Correction				(N ₁) ₉₀	CRR 1998 eq. ≤N=30	Rd	CSR	FOS	SETTLEMENT	
							C _E	C _N	C _B	C _S	C _R					ΔN						(%)	(inches)
							energy	stress	5" diam	w/out liner	rod		%fines	Alpha	Beta								
254	1	CL	6		120	120	1.3	1.75	1.05	1.3	0.75		15	2.50	1.05			1.000	0.281	2.00			
253.5	1.5	CL	6		180	180	1.3	1.71	1.05	1.3	0.75		15	2.50	1.05			0.998	0.281	2.00			
253	2	CL	6		240	240	1.3	1.68	1.05	1.3	0.75		15	2.50	1.05			0.997	0.281	2.00			
252.5	2.5	CL	6		300	300	1.3	1.64	1.05	1.3	0.75		15	2.50	1.05			0.996	0.280	2.00			
252	3	CL	6		360	360	1.3	1.61	1.05	1.3	0.75		15	2.50	1.05			0.995	0.280	2.00			
251.5	3.5	CL	6		420	420	1.3	1.57	1.05	1.3	0.75		15	2.50	1.05			0.994	0.280	2.00			
251	4	CL	6		480	480	1.3	1.54	1.05	1.3	0.75		15	2.50	1.05			0.993	0.279	2.00			
250.5	4.5	CL	6		540	540	1.3	1.51	1.05	1.3	0.75		15	2.50	1.05			0.991	0.279	2.00			
250	5	CL	6		600	600	1.3	1.48	1.05	1.3	0.75		15	2.50	1.05			0.990	0.279	2.00			
249.5	5.5	CL	6		660	660	1.3	1.46	1.05	1.3	0.75		15	2.50	1.05			0.989	0.278	2.00			
249	6	CL	6		720	720	1.3	1.43	1.05	1.3	0.75		15	2.50	1.05			0.988	0.278	2.00			
248.5	6.5	CL	6		780	780	1.3	1.40	1.05	1.3	0.75		15	2.50	1.05			0.987	0.278	2.00			
248	7	CL	6		840	840	1.3	1.38	1.05	1.3	0.75		15	2.50	1.05			0.986	0.277	2.00			
247.5	7.5	CL	6		900	900	1.3	1.35	1.05	1.3	0.75		15	2.50	1.05			0.985	0.277	2.00			
247	8	CL	7		960	960	1.3	1.33	1.05	1.3	0.75		15	2.50	1.05			0.983	0.277	2.00			
246.5	8.5	CL	7		1020	1020	1.3	1.31	1.05	1.3	0.75		15	2.50	1.05			0.982	0.276	2.00			
246	9	CL	7		1080	1080	1.3	1.29	1.05	1.3	0.75		15	2.50	1.05			0.981	0.276	2.00			
245.5	9.5	CL	7		1140	1140	1.3	1.27	1.05	1.3	0.75		15	2.50	1.05			0.980	0.276	2.00			
245	10	CL	7		1200	1200	1.3	1.24	1.05	1.3	0.75		15	2.50	1.05			0.979	0.276	2.00			
244.5	10.5	CL	7		1260	1260	1.3	1.23	1.05	1.3	0.75		15	2.50	1.05			0.978	0.275	2.00			
244	11	CL	7		1320	1320	1.3	1.21	1.05	1.3	0.75		15	2.50	1.05			0.977	0.275	2.00			
243.5	11.5	CL	7		1380	1380	1.3	1.19	1.05	1.3	0.75		15	2.50	1.05			0.976	0.275	2.00			
243	12	CL	7		1440	1440	1.3	1.17	1.05	1.3	0.75		15	2.50	1.05			0.975	0.274	2.00			
242.5	12.5	CL	7		1500	1500	1.3	1.15	1.05	1.3	0.75		15	2.50	1.05			0.974	0.274	2.00			
242	13	CL	7		1560	1560	1.3	1.14	1.05	1.3	0.85		15	2.50	1.05			0.973	0.274	2.00			
241.5	13.5	CL	7		1620	1620	1.3	1.12	1.05	1.3	0.85		15	2.50	1.05			0.972	0.273	2.00			
241	14	CL	7		1680	1680	1.3	1.10	1.05	1.3	0.85		15	2.50	1.05			0.971	0.273	2.00			
240.5	14.5	CL	7		1740	1740	1.3	1.09	1.05	1.3	0.85		15	2.50	1.05			0.970	0.273	2.00			
240	15	CL	7		1800	1800	1.3	1.07	1.05	1.3	0.85		15	2.50	1.05			0.969	0.273	2.00			
239.5	15.5	SP	18		1860	1860	1.3	1.06	1.05	1.3	0.85		5	0.00	1.00			0.967	0.272	2.00			
239	16	SP	18		1920	1920	1.3	1.04	1.05	1.3	0.85		5	0.00	1.00			0.966	0.272	2.00			
238.5	16.5	SP	18		1980	1980	1.3	1.03	1.05	1.3	0.85		5	0.00	1.00			0.965	0.272	2.00			
238	17	SP	18		2040	2040	1.3	1.02	1.05	1.3	0.85		5	0.00	1.00			0.964	0.271	2.00			
237.5	17.5	SP	18		2100	2100	1.3	1.00	1.05	1.3	0.85		5	0.00	1.00			0.963	0.271	2.00			
237	18	SP	18		2160	2160	1.3	0.99	1.05	1.3	0.85		5	0.00	1.00			0.962	0.271	2.00			
236.5	18.5	SP	18		2220	2220	1.3	0.98	1.05	1.3	0.85		5	0.00	1.00			0.961	0.270	2.00			
236	19	SP	18		2280	2280	1.3	0.97	1.05	1.3	0.85		5	0.00	1.00			0.959	0.270	2.00			
235.5	19.5	SP	18		2340	2340	1.3	0.95	1.05	1.3	0.85		5	0.00	1.00			0.958	0.270	2.00			
235	20	SP	18		2400	2400	1.3	0.94	1.05	1.3	0.95		5	0.00	1.00			0.957	0.269	2.00			
234.5	20.5	SP	20		2460	2460	1.3	0.93	1.05	1.3	0.95		5	0.00	1.00			0.956	0.269	2.00			
234	21	SP	20		2520	2520	1.3	0.92	1.05	1.3	0.95		5	0.00	1.00			0.954	0.269	2.00			
233.5	21.5	SP	20		2580	2580	1.3	0.91	1.05	1.3	0.95		5	0.00	1.00			0.953	0.268	2.00			
233	22	SP	20		2640	2640	1.3	0.90	1.05	1.3	0.95		5	0.00	1.00			0.951	0.268	2.00			
232.5	22.5	SP	20		2700	2700	1.3	0.89	1.05	1.3	0.95		5	0.00	1.00			0.950	0.267	2.00			
232	23	SP	20		2760	2760	1.3	0.88	1.05	1.3	0.95		5	0.00	1.00			0.948	0.267	2.00			
231.5	23.5	SP	20		2820	2820	1.3	0.87	1.05	1.3	0.95		5	0.00	1.00			0.947	0.266	2.00			
231	24	SP	20		2880	2880	1.3	0.86	1.05	1.3	0.95		5	0.00	1.00			0.945	0.266	2.00			
230.5	24.5	SP	20		2940	2940	1.3	0.85	1.05	1.3	0.95		5	0.00	1.00			0.944	0.266	2.00			
230	25	SP	20		3000	3000	1.3	0.84	1.05	1.3	0.95		5	0.00	1.00			0.942	0.265	2.00			
229.5	25.5	SP	21		3060	3060	1.3	0.83	1.05	1.3	0.95		5	0.00	1.00			0.940	0.265	2.00			
229	26	SP	21		3120	3120	1.3	0.82	1.05	1.3	0.95		5	0.00	1.00			0.938	0.264	2.00			
228.5	26.5	SP-SM	21		3180	3180	1.3	0.81	1.05	1.3	0.95		15	2.50	1.05			0.936	0.263	2.00			

228	27	SP-SM	21	3240	3240	1.3	0.81	1.05	1.3	0.95	15	2.50	1.05			0.934	0.263	2.00				
227.5	27.5	SP-SM	21	3300	3300	1.3	0.80	1.05	1.3	0.95	15	2.50	1.05			0.932	0.262	2.00				
227	28	SP-SM	21	3360	3360	1.3	0.79	1.05	1.3	0.95	15	2.50	1.05			0.930	0.262	2.00				
226.5	28.5	SP-SM	21	3420	3420	1.3	0.78	1.05	1.3	0.95	15	2.50	1.05			0.928	0.261	2.00				
226	29	SP-SM	21	3480	3480	1.3	0.77	1.05	1.3	0.95	15	2.50	1.05			0.925	0.260	2.00				
225.5	29.5	SP-SC	21	3540	3540	1.3	0.77	1.05	1.3	0.95	30	4.71	1.15			0.923	0.260	2.00				
225	30	SP-SC	24	3600	3600	1.3	0.76	1.05	1.3	0.95	30	4.71	1.15	9.4	40	0.921	0.259	2.00				
224.5	30.5	SP-SC	24	3660	3629	1.3	0.75	1.05	1.3	0.95	30	4.71	1.15	9.4	40	0.918	0.261	2.00				
224	31	SP-SC	24	3720	3658	1.3	0.74	1.05	1.3	0.95	30	4.71	1.15	9.3	39	0.915	0.262	2.00				
223.5	31.5	SP-SC	24	3780	3687	1.3	0.74	1.05	1.3	0.95	30	4.71	1.15	9.3	39	0.913	0.263	2.00				
223	32	SP-SC	24	3840	3716	1.3	0.73	1.05	1.3	0.95	30	4.71	1.15	9.3	39	0.910	0.265	2.00				
222.5	32.5	SP-SC	24	3900	3745	1.3	0.72	1.05	1.3	0.95	30	4.71	1.15	9.2	38	0.907	0.266	2.00				
222	33	SP-SC	24	3960	3774	1.3	0.72	1.05	1.3	1	30.5	30	4.71	1.15	9.4	40	0.904	0.267	2.00			
221.5	33.5	SP-SC	24	4020	3803	1.3	0.71	1.05	1.3	1	30.2	30	4.71	1.15	9.4	40	0.901	0.268	2.00			
221	34	SP-SM	32	4080	3832	1.3	0.70	1.05	1.3	1	39.9	15	2.50	1.05	4.4	44	0.897	0.269	2.00			
220.5	34.5	SP-SM	32	4140	3861	1.3	0.70	1.05	1.3	1	39.6	15	2.50	1.05	4.4	44	0.894	0.270	2.00			
220	35	SP-SM	32	4200	3890	1.3	0.69	1.05	1.3	1	39.2	15	2.50	1.05	4.4	44	0.891	0.271	2.00			
219.5	35.5	SP-SM	32	4260	3919	1.3	0.68	1.05	1.3	1	38.9	15	2.50	1.05	4.4	43	0.887	0.271	2.00			
219	36	SP-SM	32	4320	3948	1.3	0.68	1.05	1.3	1	38.5	15	2.50	1.05	4.4	43	0.883	0.272	2.00			
218.5	36.5	SP-SM	32	4380	3977	1.3	0.67	1.05	1.3	1	38.2	15	2.50	1.05	4.3	43	0.880	0.273	2.00			
218	37	SP-SM	32	4440	4006	1.3	0.67	1.05	1.3	1	37.9	15	2.50	1.05	4.3	42	0.876	0.273	2.00			
217.5	37.5	SP-SM	32	4500	4035	1.3	0.66	1.05	1.3	1	37.6	15	2.50	1.05	4.3	42	0.872	0.274	2.00			
217	38	SP-SM	32	4560	4064	1.3	0.66	1.05	1.3	1	37.2	15	2.50	1.05	4.3	42	0.868	0.274	2.00			
216.5	38.5	SP-SM	32	4620	4093	1.3	0.65	1.05	1.3	1	36.9	15	2.50	1.05	4.3	41	0.864	0.274	2.00			
216	39	SP-SM	32	4680	4122	1.3	0.64	1.05	1.3	1	36.6	15	2.50	1.05	4.3	41	0.860	0.275	2.00			
215.5	39.5	SP-SM	32	4740	4151	1.3	0.64	1.05	1.3	1	36.3	15	2.50	1.05	4.2	41	0.855	0.275	2.00			
215	40	SP-SM	29	4800	4180	1.3	0.63	1.05	1.3	1	32.6	15	2.50	1.05	4.1	37	0.851	0.275	2.00			
214.5	40.5	SP-SM	29	4860	4209	1.3	0.63	1.05	1.3	1	32.4	15	2.50	1.05	4.1	36	0.847	0.275	2.00			
214	41	SP-SM	29	4920	4238	1.3	0.62	1.05	1.3	1	32.1	15	2.50	1.05	4.0	36	0.842	0.275	2.00			
213.5	41.5	SP-SM	29	4980	4267	1.3	0.62	1.05	1.3	1	31.9	15	2.50	1.05	4.0	36	0.837	0.275	2.00			
213	42	SP-SM	29	5040	4296	1.3	0.61	1.05	1.3	1	31.6	15	2.50	1.05	4.0	36	0.833	0.275	2.00			
212.5	42.5	SP-SM	29	5100	4325	1.3	0.61	1.05	1.3	1	31.4	15	2.50	1.05	4.0	35	0.828	0.275	2.00			
212	43	SP-SM	29	5160	4354	1.3	0.60	1.05	1.3	1	31.1	15	2.50	1.05	4.0	35	0.823	0.275	2.00			
211.5	43.5	SP-SM	29	5220	4383	1.3	0.60	1.05	1.3	1	30.9	15	2.50	1.05	4.0	35	0.818	0.274	2.00			
211	44	SP-SM	29	5280	4412	1.3	0.60	1.05	1.3	1	30.6	15	2.50	1.05	4.0	35	0.814	0.274	2.00			
210.5	44.5	SP-SM	36	5340	4441	1.3	0.59	1.05	1.3	1	37.7	15	2.50	1.05	4.3	42	0.809	0.274	2.00			
210	45	SP-SM	36	5400	4470	1.3	0.59	1.05	1.3	1	37.5	15	2.50	1.05	4.3	42	0.804	0.273	2.00			
209.5	45.5	SP-SM	36	5460	4499	1.3	0.58	1.05	1.3	1	37.2	15	2.50	1.05	4.3	41	0.799	0.273	2.00			
209	46	SP-SM	36	5520	4528	1.3	0.58	1.05	1.3	1	36.9	15	2.50	1.05	4.3	41	0.794	0.272	2.00			
208.5	46.5	SP-SM	36	5580	4557	1.3	0.57	1.05	1.3	1	36.6	15	2.50	1.05	4.3	41	0.788	0.272	2.00			
208	47	SP-SM	36	5640	4586	1.3	0.57	1.05	1.3	1	36.4	15	2.50	1.05	4.2	41	0.783	0.271	2.00			
207.5	47.5	SP-SM	36	5700	4615	1.3	0.57	1.05	1.3	1	36.1	15	2.50	1.05	4.2	40	0.778	0.271	2.00			
207	48	SP-SM	36	5760	4644	1.3	0.56	1.05	1.3	1	35.8	15	2.50	1.05	4.2	40	0.773	0.270	2.00			
206.5	48.5	SP-SM	36	5820	4673	1.3	0.56	1.05	1.3	1	35.6	15	2.50	1.05	4.2	40	0.768	0.269	2.00			
206	49	SP-SM	36	5880	4702	1.3	0.55	1.05	1.3	1	35.3	15	2.50	1.05	4.2	40	0.763	0.269	2.00			
205.5	49.5	ML-SM	18	5909	4731	1.3	0.55	1.05	1.3	1	17.6	29	4.64	1.15	7.2	25	0.288	0.758	0.268	1.46	0.000	0.001
205	50	ML-SM	18	5938	4760	1.3	0.55	1.05	1.3	1	17.5	29	4.64	1.15	7.2	25	0.287	0.753	0.267	1.46	0.000	0.001
204.5	50.5	ML-SM	18	5967	4789	1.3	0.55	1.05	1.3	1	17.5	29	4.64	1.15	7.2	25	0.286	0.748	0.266	1.45	0.000	0.001
204	51	ML-SM	18	5996	4818	1.3	0.55	1.05	1.3	1	17.4	29	4.64	1.15	7.2	25	0.284	0.743	0.265	1.45	0.000	0.001
203.5	51.5	ML-SM	18	6025	4847	1.3	0.54	1.05	1.3	1	17.4	29	4.64	1.15	7.2	25	0.283	0.738	0.265	1.45	0.000	0.001
203	52	ML-SM	18	6054	4876	1.3	0.54	1.05	1.3	1	17.3	29	4.64	1.15	7.2	24	0.282	0.733	0.264	1.45	0.000	0.001
202.5	52.5	ML-SM	18	6083	4905	1.3	0.54	1.05	1.3	1	17.2	29	4.64	1.15	7.2	24	0.281	0.728	0.263	1.45	0.000	0.001
202	53	ML-SM	18	6112	4934	1.3	0.54	1.05	1.3	1	17.2	29	4.64	1.15	7.1	24	0.279	0.723	0.262	1.44	0.000	0.001
201.5	53.5	ML-SM	18	6141	4963	1.3	0.54	1.05	1.3	1	17.1	29	4.64	1.15	7.1	24	0.278	0.718	0.261	1.44	0.000	0.001
201	54	ML-SM	18	6170	4992	1.3	0.53	1.05	1.3	1	17.1	29	4.64	1.15	7.1	24	0.277	0.713	0.260	1.44	0.000	0.001
200.5	54.5	ML-SM	18	6199	5021	1.3	0.53	1.05	1.3	1	17.0	29	4.64	1.15	7.1	24	0.276	0.708	0.260	1.44	0.000	0.001
200	55	ML-SM	25	6228	5050	1.3	0.53	1.05	1.3	1	23.6	29	4.64	1.15	8.1	32	0.703	0.259	2.00			
199.5	55.5	ML-SM	25	6257	5079	1.3	0.53	1.05	1.3	1	23.5	29	4.64	1.15	8.1	32	0.699	0.258	2.00			
199	56	ML-SM	25	6286	5108	1.3	0.53	1.05	1.3	1	23.4	29	4.64	1.15	8.1	31	0.694	0.257	2.00			
198.5	56.5	ML-SM	25	6315	5137	1.3	0.53	1.05	1.3	1	23.3	29	4.64	1.15	8.0	31	0.689	0.256	2.00			
198	57	SW	33	6344	5166	1.3	0.52	1.05	1.3	1	30.7	17	3.01	1.06	4.9	36	0.685	0.255	2.00			
197.5	57.5	SW	33	6373	5195	1.3	0.52	1.05	1.3	1	30.6	17	3.01	1.06	4.8	35	0.680	0.254	2.00			
197	58	SW	33	6402	5224	1.3	0.52	1.05	1.3	1	30.5	17	3.01	1.06	4.8	35	0.676	0.254	2.00			
196.5	58.5	SW	33	6431	5253	1.3	0.52	1.05	1.3	1	30.4	17	3.01	1.06	4.8	35	0.672	0.253	2.00			
196	59	SW	33	6460	5282	1.3	0.52	1.05	1.3	1	30.3	17	3.01	1.06	4.8	35	0.668	0.252	2.00			
195.5	59.5	SW	33	6489	5311	1.3	0.52	1.05	1.3	1	30.2	17	3.01	1.06	4.8	35	0.663	0.251	2.00			
195	60	SW	33	6518	5340	1.3	0.51	1.05	1.3	1	30.1	17	3.01	1.06	4.8	35	0.659	0.250	2.00			
194.5	60.5	CL/SC	33	6547	5369	1.3	0.51</															

189.5	65.5	CL/SC	33	6837	5659	1.3	0.50	1.05	1.3	1	29.1	15	2.50	1.05	3.9	33	0.619	0.242	2.00
189	66	CL/SC	33	6866	5688	1.3	0.49	1.05	1.3	1	29.0	15	2.50	1.05	3.9	33	0.616	0.241	2.00
188.5	66.5	SP	58	6895	5717	1.3	0.49	1.05	1.3	1	50.8	5	0.00	1.00	0.1	51	0.612	0.241	2.00
188	67	SP	58	6924	5746	1.3	0.49	1.05	1.3	1	50.6	5	0.00	1.00	0.1	51	0.609	0.240	2.00
187.5	67.5	SP	58	6953	5775	1.3	0.49	1.05	1.3	1	50.5	5	0.00	1.00	0.1	51	0.606	0.239	2.00
187	68	SP	58	6982	5804	1.3	0.49	1.05	1.3	1	50.3	5	0.00	1.00	0.1	50	0.603	0.239	2.00
186.5	68.5	SP	58	7011	5833	1.3	0.49	1.05	1.3	1	50.2	5	0.00	1.00	0.1	50	0.600	0.238	2.00
186	69	SP	58	7040	5862	1.3	0.49	1.05	1.3	1	50.0	5	0.00	1.00	0.1	50	0.597	0.237	2.00
185.5	69.5	SP	58	7069	5891	1.3	0.48	1.05	1.3	1	49.9	5	0.00	1.00	0.1	50	0.595	0.237	2.00
185	70	SP	58	7098	5920	1.3	0.48	1.05	1.3	1	49.7	5	0.00	1.00	0.1	50	0.592	0.236	2.00
184.5	70.5	SP	58	7127	5949	1.3	0.48	1.05	1.3	1	49.6	5	0.00	1.00	0.1	50	0.589	0.236	2.00
184	71	SP	58	7156	5978	1.3	0.48	1.05	1.3	1	49.4	5	0.00	1.00	0.1	49	0.587	0.235	2.00
183.5	71.5	SP	58	7185	6007	1.3	0.48	1.05	1.3	1	49.3	5	0.00	1.00	0.1	49	0.584	0.235	2.00
183	72	SC	50	7214	6036	1.3	0.48	1.05	1.3	1	42.3	15	2.50	1.05	4.5	47	0.582	0.234	2.00
182.5	72.5	SC	50	7243	6065	1.3	0.48	1.05	1.3	1	42.2	15	2.50	1.05	4.5	47	0.579	0.234	2.00
182	73	SC	50	7272	6094	1.3	0.47	1.05	1.3	1	42.1	15	2.50	1.05	4.5	47	0.577	0.233	2.00
181.5	73.5	SC	50	7301	6123	1.3	0.47	1.05	1.3	1	42.0	15	2.50	1.05	4.5	46	0.574	0.233	2.00
181	74	SC	50	7330	6152	1.3	0.47	1.05	1.3	1	41.9	15	2.50	1.05	4.5	46	0.572	0.232	2.00
180.5	74.5	SC	50	7359	6181	1.3	0.47	1.05	1.3	1	41.7	15	2.50	1.05	4.5	46	0.570	0.232	2.00
180	75	SC	50	7388	6210	1.3	0.47	1.05	1.3	1	41.6	15	2.50	1.05	4.5	46	0.568	0.232	2.00
179.5	75.5	SC	50	7417	6239	1.3	0.47	1.05	1.3	1	41.5	15	2.50	1.05	4.5	46	0.566	0.231	2.00
179	76	SP	60	7446	6268	1.3	0.47	1.05	1.3	1	49.6	5	0.00	1.00	0.1	50	0.563	0.231	2.00
178.5	76.5	SP	60	7475	6297	1.3	0.46	1.05	1.3	1	49.5	5	0.00	1.00	0.1	50	0.561	0.230	2.00
178	77	SP	60	7504	6326	1.3	0.46	1.05	1.3	1	49.4	5	0.00	1.00	0.1	49	0.559	0.230	2.00
177.5	77.5	SP	60	7533	6355	1.3	0.46	1.05	1.3	1	49.2	5	0.00	1.00	0.1	49	0.557	0.230	2.00
177	78	SP	60	7562	6384	1.3	0.46	1.05	1.3	1	49.1	5	0.00	1.00	0.1	49	0.555	0.229	2.00
176.5	78.5	SP	60	7591	6413	1.3	0.46	1.05	1.3	1	48.9	5	0.00	1.00	0.1	49	0.554	0.229	2.00
176	79	SP	60	7620	6442	1.3	0.46	1.05	1.3	1	48.8	5	0.00	1.00	0.1	49	0.552	0.229	2.00
175.5	79.5	SP	60	7649	6471	1.3	0.46	1.05	1.3	1	48.6	5	0.00	1.00	0.1	49	0.550	0.228	2.00
175	80	SP	60	7678	6500	1.3	0.46	1.05	1.3	1	48.5	5	0.00	1.00	0.1	49	0.548	0.228	2.00
174.5	80.5	SP	60	7707	6529	1.3	0.45	1.05	1.3	1	48.4	5	0.00	1.00	0.1	48	0.546	0.228	2.00
174	81	SP	60	7736	6558	1.3	0.45	1.05	1.3	1	48.2	5	0.00	1.00	0.1	48	0.545	0.227	2.00
173.5	81.5	SP	60	7765	6587	1.3	0.45	1.05	1.3	1	48.1	5	0.00	1.00	0.1	48	0.543	0.227	2.00
173	82	SP	60	7794	6616	1.3	0.45	1.05	1.3	1	48.0	5	0.00	1.00	0.1	48	0.541	0.227	2.00
172.5	82.5	SP	60	7823	6645	1.3	0.45	1.05	1.3	1	47.8	5	0.00	1.00	0.1	48	0.540	0.226	2.00
172	83	SP	60	7852	6674	1.3	0.45	1.05	1.3	1	47.7	5	0.00	1.00	0.1	48	0.538	0.226	2.00
171.5	83.5	SP	60	7881	6703	1.3	0.45	1.05	1.3	1	47.6	5	0.00	1.00	0.1	48	0.537	0.226	2.00
171	84	SP	60	7910	6732	1.3	0.45	1.05	1.3	1	47.4	15	2.50	1.05	4.8	52	0.535	0.226	2.00
170.5	84.5	SC	60	7939	6761	1.3	0.44	1.05	1.3	1	47.3	15	2.50	1.05	4.8	52	0.534	0.225	2.00
170	85	SC	60	7968	6790	1.3	0.44	1.05	1.3	1	47.2	15	2.50	1.05	4.8	52	0.532	0.225	2.00
169.5	85.5	SC	60	7997	6819	1.3	0.44	1.05	1.3	1	47.0	15	2.50	1.05	4.8	52	0.531	0.225	2.00
169	86	SC	60	8026	6848	1.3	0.44	1.05	1.3	1	46.9	15	2.50	1.05	4.8	52	0.530	0.225	2.00
168.5	86.5	SC	60	8055	6877	1.3	0.44	1.05	1.3	1	46.8	15	2.50	1.05	4.7	52	0.528	0.224	2.00
168	87	SC	60	8084	6906	1.3	0.44	1.05	1.3	1	46.7	15	2.50	1.05	4.7	51	0.527	0.224	2.00
167.5	87.5	SC	60	8113	6935	1.3	0.44	1.05	1.3	1	46.5	15	2.50	1.05	4.7	51	0.526	0.224	2.00
167	88	SC	60	8142	6964	1.3	0.44	1.05	1.3	1	46.4	15	2.50	1.05	4.7	51	0.524	0.224	2.00
166.5	88.5	SC	60	8171	6993	1.3	0.43	1.05	1.3	1	46.3	15	2.50	1.05	4.7	51	0.523	0.224	2.00
166	89	CL	32	8200	7022	1.3	0.43	1.05	1.3	1	24.6	40	5.00	1.20	9.9	35	0.522	0.223	2.00
165.5	89.5	CL	32	8229	7051	1.3	0.43	1.05	1.3	1	24.5	40	5.00	1.20	9.9	34	0.520	0.223	2.00
165	90	CL	32	8258	7080	1.3	0.43	1.05	1.3	1	24.5	40	5.00	1.20	9.9	34	0.519	0.223	2.00
164.5	90.5	CL	32	8287	7109	1.3	0.43	1.05	1.3	1	24.4	40	5.00	1.20	9.9	34	0.518	0.223	2.00
164	91	CL	32	8316	7138	1.3	0.43	1.05	1.3	1	24.4	40	5.00	1.20	9.9	34	0.517	0.223	2.00
163.5	91.5	CL	32	8345	7167	1.3	0.43	1.05	1.3	1	24.3	40	5.00	1.20	9.9	34	0.516	0.222	2.00
163	92	CL	32	8374	7196	1.3	0.43	1.05	1.3	1	24.2	40	5.00	1.20	9.8	34	0.515	0.222	2.00
162.5	92.5	CL	32	8403	7225	1.3	0.43	1.05	1.3	1	24.2	40	5.00	1.20	9.8	34	0.514	0.222	2.00
162	93	CL	32	8432	7254	1.3	0.42	1.05	1.3	1	24.1	40	5.00	1.20	9.8	34	0.512	0.222	2.00
161.5	93.5	CL	32	8461	7283	1.3	0.42	1.05	1.3	1	24.0	40	5.00	1.20	9.8	34	0.511	0.222	2.00
161	94	CL	32	8490	7312	1.3	0.42	1.05	1.3	1	24.0	40	5.00	1.20	9.8	34	0.510	0.222	2.00
160.5	94.5	CL	32	8519	7341	1.3	0.42	1.05	1.3	1	23.9	40	5.00	1.20	9.8	34	0.509	0.221	2.00
160	95	SC	50	8548	7370	1.3	0.42	1.05	1.3	1	37.3	15	2.50	1.05	4.3	42	0.508	0.221	2.00
159.5	95.5	SC	50	8577	7399	1.3	0.42	1.05	1.3	1	37.2	15	2.50	1.05	4.3	41	0.507	0.221	2.00
159	96	SC	50	8606	7428	1.3	0.42	1.05	1.3	1	37.1	15	2.50	1.05	4.3	41	0.506	0.221	2.00
158.5	96.5	SC	50	8635	7457	1.3	0.42	1.05	1.3	1	37.0	15	2.50	1.05	4.3	41	0.505	0.221	2.00
158	97	SC	50	8664	7486	1.3	0.42	1.05	1.3	1	36.9	15	2.50	1.05	4.3	41	0.504	0.221	2.00
157.5	97.5	SC	50	8693	7515	1.3	0.41	1.05	1.3	1	36.8	15	2.50	1.05	4.3	41	0.503	0.220	2.00
157	98	SC	50	8722	7544	1.3	0.41	1.05	1.3	1	36.7	15	2.50	1.05	4.3	41	0.502	0.220	2.00
156.5	98.5	SC	50	8751	7573	1.3	0.41	1.05	1.3	1	36.6	15	2.50	1.05	4.3	41	0.501	0.220	2.00
156	99	SP-SM	70	8780	7602	1.3	0.41	1.05	1.3	1	51.1	5	0.00	1.00	0.1	51	0.500	0.220	2.00
155.5	99.5	SP-SM	70	8809	7631	1.3	0.41	1.05	1.3	1	51.0	5	0.00	1.00	0.1	51	0.499	0.220	2.00
155	100	SP-SM	70	8838	7660	1.3	0.41	1.05	1.3	1	50.8	5	0.00	1.00	0.1	51	0.499	0.220	2.00
154.5	100.5	SP-SM	70	8867	7689	1.3	0.41	1.05	1.3	1	50.7	5	0.00	1.00	0.1	51	0.498	0.220	2.00
154	101	SP-SM	70	8896	7718	1.3	0.41	1.05	1.3	1	50.6	5	0.00	1.00	0.1	51	0.497	0.220	2.00
153.5																			

Project: Proposed Mixed Use Development
Probe ID: CPT-1
Date: 2/3/2011

Design Earthquake Magnitude 6.66 MW
Magnitude Scaling Factor (MSF) 1.35 %
p_{ga} 0.584 g
Groundwater Depth: 28 ft
Elevation at GS 237.0 ft
HHGWL 12.0 ft

total settlement
(inch)
0.35

total settlement
below BOF (inch)
0.35

note: eff overburden set to depth increments of 0.1 meter

Elevation	Depth		In-Situ Soil Condition					Overburden Stress			CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement
			Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Current GW	Effective HHGWL	Tip Resistance	Sleeve Friction																			
			γ_{10} pcf	w %	γ_m pcf	n	σ_o psf	σ'_o psf	σ'_o psf	q_{tsf}	f_{tsf}																			
ft	m	ft															Liquefiable yes/no	CSR	CRR _i	CRR	F_{Seq}	I_c	AFC	D_{50}	q_c/N	N	N_{clean}	Φ	(in)	(in)
236.8	0.0	0.2	92	18	109	0.64	18	18	18	50.08	0	1.70	80.42	0.01	1.000	no	0.3796	0.090	0.12	2.0	1.75	8	0.187	4.75	17	18	no	zero	0.00	
236.7	0.1	0.3	92	18	109	0.58	36	36	36	68.03	0.7919	1.70	109.24	1.16	1.00	no	0.3796	0.280	0.36	2.0	1.92	12	0.180	4.71	23	25	no	zero	0.00	
236.5	0.1	0.5	92	18	109	0.63	53	53	53	53.63	0.8641	1.70	86.10	1.61	1.00	no	0.3796	0.287	0.39	2.0	2.10	17	0.172	4.65	19	24	no	zero	0.00	
236.3	0.2	0.7	92	18	109	0.57	71	71	71	71.51	1.163	1.70	114.80	1.63	1.00	no	0.3796	0.305	0.41	2.0	2.01	14	0.177	4.68	25	27	no	zero	0.00	
236.2	0.2	0.8	92	18	109	0.53	89	89	89	87.43	1.4779	1.70	140.38	1.69	1.00	no	0.3796	0.320	0.43	2.0	1.96	13	0.179	4.70	30	32	no	zero	0.00	
236.0	0.3	1.0	92	18	109	0.49	107	107	107	102.23	1.2797	1.70	164.12	1.25	1.00	no	0.3796	0.310	0.42	2.0	1.82	10	0.184	4.74	35	36	no	zero	0.00	
235.9	0.3	1.1	92	18	109	0.58	125	125	125	69.39	1.2281	1.70	111.35	1.77	1.00	no	0.3796	0.305	0.41	2.0	2.04	15	0.175	4.67	24	30	no	zero	0.00	
235.7	0.4	1.3	92	18	109	0.62	142	142	142	55.89	1.2948	1.70	89.66	2.32	1.00	no	0.3796	0.310	0.42	2.0	2.19	20	0.167	4.61	19	25	no	zero	0.00	
235.5	0.4	1.5	92	18	109	0.68	160	160	160	39.56	1.2529	1.70	63.41	3.17	1.00	no	0.3796	0.300	0.41	2.0	2.40	27	0.155	4.52	14	20	no	zero	0.00	
235.4	0.5	1.6	92	18	109	0.75	178	178	178	25.21	1.0791	1.70	40.35	4.30	1.00	no	0.3796	0.290	0.39	2.0	2.63	38	0.138	4.38	9	16	no	zero	0.00	
235.2	0.5	1.8	92	18	109	0.76	196	196	196	24.32	0.8832	1.70	38.91	3.65	1.00	no	0.3796	0.285	0.38	2.0	2.59	36	0.141	4.40	9	16	no	zero	0.00	
235.0	0.6	2.0	92	18	109	0.76	214	214	214	24.48	0.5977	1.70	39.15	2.45	1.00	no	0.3796	0.285	0.38	2.0	2.47	30	0.150	4.48	9	15	no	zero	0.00	
234.9	0.6	2.1	92	18	109	0.75	232	232	232	25.28	0.3414	1.70	40.42	1.36	1.00	no	0.3796	0.203	0.27	2.0	2.30	24	0.161	4.57	9	13	no	zero	0.00	
234.7	0.7	2.3	92	18	109	0.75	249	249	249	25.79	0.1764	1.70	41.22	0.69	1.00	no	0.3795	0.130	0.18	2.0	2.13	18	0.170	4.64	9	13	no	zero	0.00	
234.5	0.7	2.5	92	18	109	0.73	267	267	267	29.26	0.12	1.70	46.78	0.41	1.00	no	0.3793	0.075	0.10	2.0	1.98	14	0.178	4.69	10	11	no	zero	0.00	
234.4	0.8	2.6	92	18	109	0.73	285	285	285	30.32	0.1037	1.70	48.47	0.34	1.00	no	0.3791	0.045	0.06	2.0	1.94	12	0.180	4.70	10	12	no	zero	0.00	
234.2	0.8	2.8	92	18	109	0.73	303	303	303	30.11	0.1258	1.70	48.12	0.42	1.00	no	0.3789	0.075	0.10	2.0	1.98	13	0.178	4.69	10	12	no	zero	0.00	
234.0	0.9	3.0	92	18	109	0.72	321	321	321	31.99	0.138	1.70	51.12	0.43	1.00	no	0.3786	0.083	0.11	2.0	1.96	13	0.179	4.70	11	13	no	zero	0.00	
233.9	0.9	3.1	92	18	109	0.70	338	338	338	34.68	0.154	1.70	55.43	0.45	1.00	no	0.3784	0.100	0.13	2.0	1.93	12	0.180	4.71	12	14	no	zero	0.00	
233.7	1.0	3.3	92	18	109	0.69	356	356	356	37.56	0.1867	1.70	60.04	0.50	1.00	no	0.3782	0.130	0.18	2.0	1.92	12	0.180	4.71	13	15	no	zero	0.00	
233.6	1.0	3.4	92	18	109	0.67	374	374	374	42.23	0.2302	1.70	67.53	0.55	1.00	no	0.3780	0.156	0.21	2.0	1.90	11	0.181	4.72	14	16	no	zero	0.00	
233.4	1.1	3.6	92	18	109	0.65	392	392	392	46.83	0.2748	1.70	74.90	0.59	1.00	no	0.3777	0.180	0.24	2.0	1.88	11	0.182	4.72	16	18	no	zero	0.00	
233.2	1.1	3.8	92	18	109	0.65	410	410	410	46.46	0.2637	1.70	74.30	0.57	0.99	no	0.3775	0.180	0.24	2.0	1.87	11	0.182	4.72	16	18	no	zero	0.00	
233.1	1.2	3.9	92	18	109	0.66	427	427	427	43.23	0.2145	1.70	69.09	0.50	0.99	no	0.3773	0.145	0.20	2.0	1.87	11	0.182	4.72	15	17	no	zero	0.00	
232.9	1.2	4.1	92	18	109	0.66	445	445	445	43.85	0.2074	1.70	70.07	0.48	0.99	no	0.3770	0.160	0.22	2.0	1.86	10	0.183	4.73	15	17	no	zero	0.00	
232.7	1.3	4.3	92	18	109	0.66	463	463	463	44.94	0.2766	1.70	71.81	0.62	0.99	no	0.3768	0.190	0.26	2.0	1.90	12	0.181	4.71	15	17	no	zero	0.00	
232.6	1.3	4.4	92	18	109	0.65	481	481	481	48.14	0.319	1.70	76.94	0.67	0.99	no	0.3766	0.190	0.26	2.0	1.90	11	0.181	4.72	16	18	no	zero	0.00	
232.4	1.4	4.6	92	18	109	0.63	499	499	499	52.98	0.3149	1.70	84.70	0.60	0.99	no	0.3763	0.193	0.26	2.0	1.84	10	0.184	4.73	18	19	no	zero	0.00	
232.2	1.4	4.8	92	18	109	0.62	516	516	516	55.77	0.2754	1.70	89.16	0.50	0.99	no	0.3761	0.177	0.24	2.0	1.77	9	0.186	4.75	19	20	no	zero	0.00	
232.1	1.5	4.9	92	18	109	0.62	534	534	534	55.57	0.2267	1.70	88.83	0.41	0.99	no	0.3758	0.167	0.23	2.0	1.73	8	0.187	4.76	19	20	no	zero	0.00	
231.9	1.5	5.1	92	18	109	0.61	552	552	552	56.7	0.2476	1.70	90.63	0.44	0.99	no	0.3756	0.183	0.25	2.0	1.74	8	0.187	4.76	19	20	no	zero	0.00	
231.8	1.6	5.2	92	18	109	0.61	570	570	570	58.89	0.2758	1.70	94.13	0.47	0.99	no	0.3753	0.193	0.26	2.0	1.74	8	0.187	4.76	20	21	no	zero	0.00	
231.6	1.6	5.4	92	18	109	0.60	588	588	588	60.73	0.2845	1.70	97.07	0.47	0.99	no	0.3751	0.193	0.26	2.0	1.73	8	0.187	4.76	20	21	no	zero	0.00	
231.4	1.7	5.6	92	18	109	0.60	605	605	605	62.8	0.2754	1.70	100.38	0.44	0.99	no	0.3749	0.200	0.27	2.0	1.70	7	0.188	4.76	21	22	no	zero	0.00	
231.3	1.7	5.7	92	18	109	0.59	623	623	623	66.06	0.2959	1.70	105.60	0.45	0.99	no	0.3746	0.210	0.28	2.0	1.69	7	0.189	4.77	22	23	no	zero	0.00	
231.1	1.8	5.9	92	18	109	0.59	641	641	641	63.78	0.2863	1.70	101.93	0.45	0.99	no	0.3744	0.210	0.28	2.0	1.70	7	0.188	4.76	21	22	no	zero	0.00	
230.9	1.8	6.1	92	18	109	0.59	659	659	659	65.49	0.2699	1.70	104.68	0.41	0.99	no	0.3741	0.200	0.27	2.0	1.67	7	0.189	4.77	22	23	no	zero	0.00	
230.8	1.9	6.2	92	18	109	0.59	677	677	677	64.52	0.2997	1.70	103.09	0.47	0.98	no	0.3739	0.210	0.28	2.0	1.71	7	0.188	4.76	22	23	no	zero	0.00	
230.6	1.9	6.4	92	18	109	0.59	695	695	695	64.2	0.2965	1.70	102.56	0.46	0.98	no	0.3736	0.210	0.28	2.0	1.71	7	0.188	4.76	22	23	no	zero	0.00	
230.4	2.0	6.6	92	18	109	0.59	712	712	712	65.91	0.3116	1.70	105.29	0.48	0.98	no	0.3733	0.210	0.28	2.0	1.70	7	0.188	4.76	22	23	no	zero	0.00	
230.3	2.0	6.7	92	18	109	0.58	730	730	730	67.08	0.3214	1.70	107.16	0.48	0.98	no	0.3731	0.210	0.28	2.0	1.70									

Elevation	Depth	In-Situ Soil Condition				Overburden Stress Effective		CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement		
		Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Current GW	HHGW	Tip Resistance																			Sleeve Friction	
		γ_{dry}	w	γ_{moist}	n	σ_v	σ'_v	σ_{HGW}	q_c																			f_{cs}	
		pcf	%	pcf		psf	psf	psf	tsf																			tsf	
ft	m	ft																	AFC	D ₅₀	q _{c/N}	N	N _{clean}	⊘	(in)	(in)			
226.2	3.3	10.8	92	18	109	0.58	1175	1175	1175	68.07	0.3618	1.41	89.65	0.54	0.96	no	0.3662	0.183	0.25	2.0	1.79	9	0.185	4.74	19	20	no	zero	0.00
226.0	3.3	11.0	92	18	109	0.63	1193	1193	1193	53.57	0.3965	1.43	71.65	0.75	0.96	no	0.3659	0.200	0.27	2.0	1.95	13	0.179	4.70	15	17	no	zero	0.00
225.8	3.4	11.2	92	18	109	0.61	1211	1211	1211	44.67	0.5496	1.44	60.16	1.25	0.96	no	0.3656	0.245	0.33	2.0	2.14	18	0.170	4.63	13	17	no	zero	0.00
225.7	3.4	11.3	92	18	109	0.66	1229	1229	1229	44.85	0.6935	1.43	59.79	1.57	0.96	no	0.3653	0.248	0.33	2.0	2.21	20	0.167	4.61	13	18	no	zero	0.00
225.5	3.5	11.5	92	18	109	0.66	1247	1247	1247	43.96	0.6525	1.42	58.13	1.51	0.96	no	0.3650	0.248	0.33	2.0	2.21	20	0.167	4.61	13	18	no	zero	0.00
225.4	3.5	11.6	92	18	109	0.66	1264	1264	1264	45.52	0.5122	1.40	59.46	1.14	0.96	no	0.3647	0.215	0.29	2.0	2.12	18	0.171	4.64	13	17	no	zero	0.00
225.2	3.6	11.8	92	18	109	0.65	1282	1282	1282	46.48	0.5043	1.39	60.05	1.10	0.96	no	0.3644	0.230	0.31	2.0	2.11	17	0.172	4.65	13	17	no	zero	0.00
225.0	3.6	12.0	92	18	109	0.66	1300	1300	1300	44.75	0.6355	1.38	57.45	1.44	0.96	no	0.3641	0.248	0.33	2.0	2.20	20	0.167	4.61	12	16	no	zero	0.00
224.9	3.7	12.1	92	18	109	0.65	1318	1318	1309	47.65	0.6074	1.36	60.34	1.29	0.96	no	0.3662	0.245	0.33	2.0	2.15	18	0.170	4.63	13	18	no	zero	0.00
224.7	3.7	12.3	92	18	109	0.65	1336	1336	1317	47.61	0.4318	1.35	59.76	0.92	0.96	no	0.3687	0.195	0.26	2.0	2.07	16	0.174	4.66	13	17	no	zero	0.00
224.5	3.8	12.5	92	18	109	0.67	1353	1353	1324	42.85	0.2865	1.35	53.68	0.68	0.96	no	0.3712	0.150	0.20	2.0	2.03	15	0.175	4.67	11	13	no	zero	0.00
224.4	3.8	12.6	92	18	109	0.68	1371	1371	1332	40.24	0.2846	1.34	50.15	0.72	0.96	no	0.3737	0.160	0.22	2.0	2.07	16	0.174	4.66	11	15	no	zero	0.00
224.2	3.9	12.8	92	18	109	0.68	1389	1389	1339	38.69	0.4679	1.33	47.90	1.23	0.96	no	0.3760	0.211	0.29	2.0	2.22	21	0.166	4.60	10	14	no	zero	0.00
224.0	3.9	13.0	92	18	109	0.70	1407	1407	1347	35.29	0.7602	1.33	43.50	2.20	0.95	no	0.3784	0.290	0.39	2.0	2.41	28	0.154	4.51	10	15	no	zero	0.00
223.9	4.0	13.1	92	18	109	0.69	1425	1425	1355	36.55	0.9741	1.32	44.57	2.72	0.95	no	0.3807	0.290	0.39	2.0	2.46	30	0.151	4.48	10	15	no	zero	0.00
223.7	4.0	13.3	92	18	109	0.67	1442	1442	1362	41.26	0.9433	1.29	49.59	2.33	0.95	no	0.3830	0.295	0.40	2.0	2.38	27	0.156	4.53	11	16	no	zero	0.00
223.5	4.1	13.5	92	18	109	0.65	1460	1460	1370	46.6	0.6994	1.27	55.20	1.52	0.95	no	0.3853	0.248	0.33	2.0	2.23	21	0.166	4.60	12	17	no	zero	0.00
223.4	4.1	13.6	92	18	109	0.64	1478	1478	1377	50.69	0.5968	1.26	59.31	1.19	0.95	no	0.3875	0.215	0.29	2.0	2.14	18	0.170	4.64	13	17	no	zero	0.00
223.2	4.2	13.8	92	18	109	0.64	1496	1496	1385	50.73	0.683	1.25	58.89	1.37	0.95	no	0.3897	0.233	0.31	2.0	2.17	19	0.168	4.62	13	17	no	zero	0.00
223.1	4.2	13.9	92	18	109	0.65	1514	1514	1392	48.12	0.8295	1.24	55.57	1.75	0.95	no	0.3918	0.265	0.36	2.0	2.26	22	0.163	4.58	12	17	no	zero	0.00
222.9	4.3	14.1	92	18	109	0.66	1532	1532	1400	45.34	1.0355	1.24	52.08	2.32	0.95	no	0.3940	0.300	0.41	2.0	2.36	26	0.157	4.54	11	17	no	zero	0.00
222.7	4.3	14.3	92	18	109	0.67	1549	1549	1408	42.96	1.3363	1.23	49.07	3.17	0.95	no	0.3960	0.295	0.40	2.0	2.48	31	0.150	4.47	11	17	no	zero	0.00
222.6	4.4	14.4	92	18	109	0.68	1567	1567	1415	40.8	1.4942	1.23	46.32	3.73	0.95	no	0.3981	0.295	0.40	2.0	2.54	34	0.144	4.43	10	16	no	zero	0.00
222.4	4.4	14.6	92	18	109	0.66	1585	1585	1423	44.4	1.5471	1.21	49.87	3.55	0.95	no	0.4001	0.295	0.40	2.0	2.50	32	0.147	4.46	11	17	no	zero	0.00
222.2	4.5	14.8	92	18	109	0.63	1603	1603	1430	52.75	1.4608	1.19	58.46	2.81	0.95	no	0.4021	0.300	0.41	2.0	2.38	27	0.156	4.52	13	19	no	zero	0.00
222.1	4.5	14.9	92	18	109	0.60	1621	1621	1438	60.13	1.0256	1.17	65.85	1.73	0.94	no	0.4041	0.275	0.37	2.0	2.20	20	0.167	4.61	14	19	no	zero	0.00
221.9	4.6	15.1	92	18	109	0.58	1638	1638	1445	66.22	0.6897	1.16	71.78	1.05	0.94	no	0.4060	0.260	0.35	2.0	2.04	15	0.175	4.67	15	17	no	zero	0.00
221.7	4.6	15.3	92	18	109	0.56	1656	1656	1453	74.01	0.5137	1.15	79.37	0.70	0.94	no	0.4079	0.200	0.27	2.0	1.90	11	0.181	4.72	17	19	no	zero	0.00
221.6	4.7	15.4	92	18	109	0.55	1674	1674	1461	80.42	0.4306	1.14	85.45	0.54	0.94	no	0.4098	0.183	0.25	2.0	1.81	9	0.185	4.74	18	19	no	zero	0.00
221.4	4.7	15.6	92	18	109	0.53	1692	1692	1468	86.35	0.4012	1.13	90.98	0.47	0.94	no	0.4117	0.193	0.26	2.0	1.75	8	0.187	4.75	19	20	no	zero	0.00
221.3	4.8	15.7	92	18	109	0.53	1710	1710	1476	84.5	0.3877	1.12	88.59	0.46	0.94	no	0.4135	0.177	0.24	2.0	1.76	8	0.186	4.75	19	20	no	zero	0.00
221.1	4.8	15.9	92	18	109	0.55	1727	1727	1483	78.11	0.4315	1.12	81.64	0.56	0.94	no	0.4153	0.193	0.26	2.0	1.83	10	0.184	4.73	17	18	no	zero	0.00
220.9	4.9	16.1	92	18	109	0.57	1745	1745	1491	71.21	0.5435	1.12	74.19	0.77	0.94	no	0.4171	0.210	0.28	2.0	1.95	13	0.179	4.70	16	18	no	zero	0.00
220.8	4.9	16.2	92	18	109	0.57	1763	1763	1498	69.94	0.7616	1.11	72.47	1.10	0.94	no	0.4188	0.260	0.35	2.0	2.05	15	0.175	4.67	16	21	no	zero	0.00
220.6	5.0	16.4	92	18	109	0.56	1781	1781	1506	73.05	0.7677	1.10	75.17	1.06	0.94	no	0.4205	0.260	0.35	2.0	2.02	15	0.176	4.68	16	18	no	zero	0.00
220.4	5.0	16.6	92	18	109	0.55	1799	1799	1514	78.08	0.5968	1.09	79.77	0.77	0.94	no	0.4222	0.210	0.28	2.0	1.92	12	0.180	4.71	17	19	no	zero	0.00
220.3	5.1	16.7	92	18	109	0.54	1816	1816	1521	81.77	0.4371	1.09	83.00	0.54	0.94	no	0.4239	0.183	0.25	2.0	1.82	10	0.184	4.74	18	19	no	zero	0.00
220.1	5.1	16.9	92	18	109	0.55	1834	1834	1529	78.02	0.3711	1.08	78.84	0.92	0.93	no	0.4255	0.190	0.27	2.0	1.78	9	0.186	4.75	17	18	no	zero	0.00
219.9	5.2	17.1	92																										

Elevation	Depth	In-Situ Soil Condition					Overburden Stress Effective		CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement	
		Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Current σ_v	HHGWL	Tip Resistance	Sleeve Friction																			
		γ_{so}	W %	γ_{mo}	n	σ_o	σ_v	psf	tsf	tsf																			
213.7	7.1	23.3	92	18	109	0.39	2529	2529	1824	155.5	1.1148	0.93	135.86	0.72	0.90	no	0.4727	0.250	0.34	2.0	1.72	7	0.188	4.76	29	30	no	zero	0.00
213.5	7.1	23.5	92	18	109	0.38	2547	2547	1832	161.87	1.2834	0.93	141.33	0.80	0.90	no	0.4736	0.253	0.34	2.0	1.73	8	0.187	4.76	30	31	no	zero	0.00
213.4	7.2	23.6	92	18	109	0.36	2564	2564	1839	175.11	1.2863	0.93	153.15	0.74	0.90	no	0.4744	0.257	0.35	2.0	1.68	7	0.189	4.77	32	33	no	zero	0.00
213.2	7.2	23.8	92	18	109	0.37	2582	2582	1847	171.39	1.1666	0.93	149.33	0.69	0.90	no	0.4753	0.250	0.34	2.0	1.67	7	0.189	4.77	31	32	no	zero	0.00
213.0	7.3	24.0	92	18	109	0.39	2600	2600	1854	157.84	0.9264	0.92	136.49	0.59	0.89	no	0.4761	0.235	0.32	2.0	1.66	6	0.189	4.77	29	30	no	zero	0.00
212.9	7.3	24.1	92	18	109	0.41	2618	2618	1862	147.37	0.777	0.92	126.55	0.53	0.89	no	0.4769	0.223	0.30	2.0	1.66	6	0.189	4.77	27	28	no	zero	0.00
212.7	7.4	24.3	92	18	109	0.42	2636	2636	1869	142.86	0.6983	0.91	122.10	0.49	0.89	no	0.4777	0.223	0.30	2.0	1.66	6	0.190	4.77	26	27	no	zero	0.00
212.6	7.4	24.4	92	18	109	0.42	2653	2653	1877	140.81	0.7533	0.91	119.89	0.54	0.89	no	0.4784	0.217	0.29	2.0	1.69	7	0.189	4.77	25	26	no	zero	0.00
212.4	7.5	24.6	92	18	109	0.41	2671	2671	1885	143.77	0.8071	0.91	122.23	0.57	0.89	no	0.4792	0.230	0.31	2.0	1.69	7	0.189	4.77	26	27	no	zero	0.00
212.2	7.5	24.8	92	18	109	0.41	2689	2689	1892	147.34	0.8745	0.91	125.12	0.60	0.89	no	0.4799	0.230	0.31	2.0	1.70	7	0.188	4.77	26	27	no	zero	0.00
212.1	7.6	24.9	92	18	109	0.41	2707	2707	1900	147.06	0.8741	0.90	124.52	0.60	0.89	no	0.4806	0.230	0.31	2.0	1.70	7	0.188	4.76	26	27	no	zero	0.00
211.9	7.6	25.1	92	18	109	0.41	2725	2725	1907	144.26	0.7911	0.90	121.65	0.55	0.89	no	0.4814	0.230	0.31	2.0	1.69	7	0.189	4.77	26	27	no	zero	0.00
211.7	7.7	25.3	92	18	109	0.41	2742	2742	1915	145.5	0.7848	0.90	122.43	0.54	0.89	no	0.4821	0.223	0.30	2.0	1.68	7	0.189	4.77	26	27	no	zero	0.00
211.6	7.7	25.4	92	18	109	0.40	2760	2760	1922	150.45	0.8154	0.90	126.57	0.55	0.89	no	0.4827	0.223	0.30	2.0	1.67	7	0.189	4.77	27	28	no	zero	0.00
211.4	7.8	25.6	92	18	109	0.40	2778	2778	1930	153.55	0.859	0.90	129.04	0.56	0.88	no	0.4834	0.230	0.31	2.0	1.67	7	0.189	4.77	27	28	no	zero	0.00
211.2	7.8	25.8	92	18	109	0.40	2796	2796	1938	149.75	0.8156	0.89	125.27	0.55	0.88	no	0.4841	0.223	0.30	2.0	1.67	7	0.189	4.77	26	27	no	zero	0.00
211.1	7.9	25.9	92	18	109	0.42	2814	2814	1945	141.98	0.6942	0.89	117.96	0.49	0.88	no	0.4847	0.217	0.29	2.0	1.67	7	0.189	4.77	25	26	no	zero	0.00
210.9	7.9	26.1	92	18	109	0.43	2832	2832	1953	134.98	0.6338	0.88	111.39	0.47	0.88	no	0.4854	0.217	0.29	2.0	1.68	7	0.189	4.77	23	24	no	zero	0.00
210.8	8.0	26.2	92	18	109	0.45	2849	2849	1960	126.1	0.6698	0.88	103.20	0.54	0.88	no	0.4860	0.210	0.28	2.0	1.74	8	0.187	4.76	22	23	no	zero	0.00
210.6	8.0	26.4	92	18	109	0.43	2867	2867	1968	136.77	0.7315	0.88	112.37	0.54	0.88	no	0.4866	0.217	0.29	2.0	1.71	7	0.188	4.76	24	25	no	zero	0.00
210.4	8.1	26.6	92	18	109	0.42	2885	2885	1975	141.71	0.833	0.88	116.47	0.59	0.88	no	0.4872	0.225	0.30	2.0	1.72	7	0.188	4.76	24	25	no	zero	0.00
210.3	8.1	26.7	92	18	109	0.41	2903	2903	1983	143.71	0.8107	0.88	117.95	0.57	0.88	no	0.4878	0.225	0.30	2.0	1.71	7	0.188	4.76	25	26	no	zero	0.00
210.1	8.2	26.9	92	18	109	0.43	2921	2921	1991	135.25	0.7216	0.87	110.12	0.54	0.88	no	0.4883	0.217	0.29	2.0	1.72	7	0.188	4.76	23	24	no	zero	0.00
209.9	8.2	27.1	92	18	109	0.45	2938	2938	1998	125.78	0.6674	0.86	101.48	0.54	0.88	no	0.4889	0.210	0.28	2.0	1.74	8	0.187	4.75	21	22	no	zero	0.00
209.8	8.3	27.2	92	18	109	0.46	2956	2956	2006	116.37	0.7391	0.86	92.97	0.64	0.87	no	0.4895	0.217	0.29	2.0	1.82	10	0.184	4.74	20	21	no	zero	0.00
209.6	8.3	27.4	92	18	109	0.46	2974	2974	2013	116.16	0.9677	0.85	92.52	0.84	0.87	no	0.4900	0.240	0.32	0.7	1.89	12	0.182	4.72	20	22	no	zero	0.00
209.4	8.4	27.6	92	18	109	0.47	2992	2992	2021	115.03	1.2858	0.85	91.28	1.13	0.87	no	0.4905	0.273	0.37	0.8	1.98	13	0.178	4.69	19	21	no	zero	0.00
209.3	8.4	27.7	92	18	109	0.44	3010	3010	2028	129.39	1.382	0.86	103.53	1.08	0.87	no	0.4910	0.280	0.38	2.0	1.92	12	0.180	4.71	22	24	no	zero	0.00
209.1	8.5	27.9	92	18	109	0.42	3027	3027	2036	137.81	1.3511	0.86	110.65	0.99	0.87	no	0.4915	0.273	0.37	2.0	1.87	11	0.182	4.72	23	25	no	zero	0.00
208.9	8.5	28.1	92	18	109	0.40	3045	3042	2044	154.05	1.2092	0.87	124.80	0.79	0.87	yes	0.4920	0.247	0.33	0.7	1.77	9	0.186	4.75	26	27	0.010	0.02	0.02
208.8	8.6	28.2	92	18	109	0.35	3063	3050	2051	183.47	1.1266	0.88	151.16	0.62	0.87	yes	0.4925	0.247	0.33	0.7	1.64	6	0.190	4.78	32	33	0.001	0.00	0.02
208.6	8.6	28.4	92	18	109	0.35	3081	3057	2059	183.48	1.2326	0.88	151.03	0.68	0.87	yes	0.4930	0.255	0.34	0.7	1.66	6	0.189	4.77	32	33	0.001	0.00	0.02
208.5	8.7	28.5	92	18	109	0.40	3099	3065	2066	151.89	1.4405	0.86	122.49	0.96	0.87	yes	0.4935	0.277	0.37	0.8	1.83	10	0.184	4.73	26	27	0.010	0.02	0.04
208.3	8.7	28.7	92	18	109	0.44	3116	3072	2074	126.61	1.8798	0.85	100.13	1.50	0.87	yes	0.4939	0.290	0.39	0.8	2.03	15	0.176	4.68	21	23	0.015	0.03	0.07
208.1	8.8	28.9	92	18	109	0.43	3134	3080	2082	133.54	2.2176	0.85	106.06	1.68	0.86	yes	0.4943	0.300	0.41	0.8	2.04	15	0.175	4.67	23	29	0.010	0.02	0.09
208.0	8.8	29.0	92	18	109	0.44	3152	3087	2089	131	2.9066	0.85	103.72	2.25	0.86	no	0.4948	0.330	0.45	2.0	2.14	18	0.170	4.64	22	28	no	zero	0.09
207.8	8.9	29.2	92	18	109	0.45	3170	3095	2097	122.51	3.2992	0.84	96.23	2.73	0.86	no	0.4952	0.320	0.43	2.0	2.23	21	0.166	4.60	21	27	no	zero	0.09
207.6	8.9	29.4	92	18	109	0.49	3188	3103	2104	104.71	3.7532	0.83	80.85	3.64	0.86	no	0.4956	0.310	0.42	2.0	2.37	25	0.157	4.53	18	25	no		

Elevation	Depth	In-Situ Soil Condition					Overburden Stress		CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement		
		Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Effective		Tip Resistance	Sleeve Friction																				
							Current	HHGW																					q _c	f _s
m	ft	γ _{so} pcf	W %	γ _{mo} pcf	n	σ _v psf	σ _h psf	HHGW psf	q _c tsf	f _s tsf	C _q	q _{c1}	F	r _d	Liquefiable yes/no	CSR	CRR _i	CRR	F _{S_{eq}}	I _c	AFC	D ₅₀	q _c /N	N	N _{clean}	ϕ	(in)	(in)		
2012	10.9	35.8	92	18	109	0.71	3882	3398	2400	33.19	1.1823	0.71	21.10	3.78	0.82	no	0.5048	0.269	0.36	2.0	2.80	47	0.123	4.24	5	10	no	zero	0.12	
201.1	10.9	35.9	92	18	109	0.72	3900	3406	2407	31.73	1.2072	0.71	20.00	4.05	0.82	no	0.5049	0.269	0.36	2.0	2.84	49	0.119	4.20	5	10	no	zero	0.12	
200.9	11.0	36.1	92	18	109	0.71	3918	3413	2415	32.32	1.2007	0.71	20.39	3.92	0.82	no	0.5050	0.269	0.36	2.0	2.82	48	0.120	4.22	5	10	no	zero	0.12	
200.7	11.0	36.3	92	18	109	0.74	3936	3421	2422	27.62	1.0538	0.70	16.99	4.11	0.82	no	0.5051	0.257	0.35	2.0	2.89	53	0.113	4.15	4	9	no	zero	0.12	
200.6	11.1	36.4	92	18	109	0.76	3953	3428	2430	25.05	1.1623	0.69	15.15	5.04	0.82	no	0.5052	0.251	0.34	2.0	2.99	59	0.103	4.04	4	9	no	zero	0.12	
200.4	11.1	36.6	92	18	109	0.75	3971	3436	2437	25.93	1.2552	0.70	15.73	5.24	0.82	no	0.5052	0.251	0.34	2.0	2.99	59	0.103	4.04	4	9	no	zero	0.12	
200.3	11.2	36.7	92	18	109	0.74	3989	3443	2445	27.58	1.4533	0.70	16.86	5.68	0.82	no	0.5053	0.257	0.35	2.0	2.99	59	0.103	4.04	4	9	no	zero	0.12	
200.1	11.2	36.9	92	18	109	0.70	4007	3451	2453	35.51	1.6608	0.71	22.50	4.96	0.81	no	0.5053	0.269	0.36	2.0	2.86	50	0.117	4.19	5	10	no	zero	0.12	
199.9	11.3	37.1	92	18	109	0.69	4025	3459	2460	37.62	1.8612	0.71	23.99	5.23	0.81	no	0.5054	0.269	0.36	2.0	2.85	50	0.118	4.19	6	12	no	zero	0.12	
199.8	11.3	37.2	92	18	109	0.67	4043	3466	2468	41.35	2.0358	0.72	26.67	5.18	0.81	no	0.5054	0.274	0.37	2.0	2.81	48	0.121	4.22	6	12	no	zero	0.12	
199.6	11.4	37.4	92	18	109	0.66	4060	3474	2475	44.67	2.1489	0.72	29.07	5.04	0.81	no	0.5054	0.274	0.37	2.0	2.78	46	0.124	4.26	7	13	no	zero	0.12	
199.4	11.4	37.6	92	18	109	0.67	4078	3481	2483	41.84	2.2602	0.72	26.94	5.68	0.81	no	0.5055	0.274	0.37	2.0	2.84	49	0.119	4.20	6	12	no	zero	0.12	
199.3	11.5	37.7	92	18	109	0.71	4096	3489	2490	33.54	1.8972	0.70	20.88	6.02	0.81	no	0.5055	0.289	0.36	2.0	2.94	55	0.109	4.10	5	11	no	zero	0.12	
199.1	11.5	37.9	92	18	109	0.73	4114	3496	2498	28.67	1.255	0.69	17.40	4.72	0.81	no	0.5055	0.257	0.35	2.0	2.93	55	0.110	4.11	4	9	no	zero	0.12	
198.9	11.6	38.1	92	18	109	0.70	4132	3504	2506	35.88	1.6401	0.70	22.48	4.85	0.81	no	0.5055	0.269	0.36	2.0	2.85	50	0.118	4.19	5	11	no	zero	0.12	
198.8	11.6	38.2	92	18	109	0.68	4149	3512	2513	40.42	2.0018	0.71	25.72	5.22	0.81	no	0.5055	0.274	0.37	2.0	2.83	49	0.120	4.21	6	12	no	zero	0.12	
198.6	11.7	38.4	92	18	109	0.72	4167	3519	2521	31.55	1.6643	0.69	19.32	5.65	0.81	no	0.5055	0.263	0.35	2.0	2.94	56	0.108	4.10	5	10	no	zero	0.12	
198.5	11.7	38.5	92	18	109	0.77	4185	3527	2528	22.07	1.1166	0.67	12.71	5.59	0.80	no	0.5055	0.246	0.33	2.0	3.08	65	0.093	3.93	3	8	no	zero	0.12	
198.3	11.8	38.7	92	18	109	0.80	4203	3534	2536	18.99	0.8497	0.66	10.61	5.03	0.80	no	0.5055	0.240	0.32	2.0	3.11	67	0.089	3.89	3	8	no	zero	0.12	
198.1	11.8	38.9	92	18	109	0.80	4221	3542	2543	18.35	0.9429	0.66	10.16	5.81	0.80	no	0.5055	0.240	0.32	2.0	3.16	71	0.083	3.81	3	8	no	zero	0.12	
198.0	11.9	39.0	92	18	109	0.75	4238	3549	2551	26.09	1.3422	0.68	15.38	5.60	0.80	no	0.5054	0.251	0.34	2.0	3.01	60	0.100	4.01	4	9	no	zero	0.12	
197.8	11.9	39.2	92	18	109	0.66	4256	3557	2559	43.67	1.8778	0.71	27.82	4.52	0.80	no	0.5054	0.274	0.37	2.0	2.76	45	0.126	4.27	7	13	no	zero	0.12	
197.6	12.0	39.4	92	18	109	0.62	4274	3565	2566	53.86	2.4414	0.72	35.29	4.72	0.80	no	0.5054	0.285	0.38	2.0	2.70	41	0.132	4.32	8	15	no	zero	0.12	
197.5	12.0	39.5	92	18	109	0.58	4292	3572	2574	67.92	2.4512	0.74	45.89	3.73	0.80	no	0.5053	0.295	0.40	2.0	2.55	34	0.144	4.43	10	16	no	zero	0.12	
197.3	12.1	39.7	92	18	109	0.51	4310	3580	2581	94.62	1.9465	0.76	66.82	2.11	0.80	no	0.5053	0.300	0.41	2.0	2.26	22	0.164	4.59	15	20	no	zero	0.12	
197.1	12.1	39.9	92	18	109	0.46	4327	3587	2589	117.96	1.3453	0.78	85.80	1.16	0.80	yes	0.5053	0.267	0.36	0.7	2.00	14	0.177	4.68	18	20	0.015	0.03	0.15	
197.0	12.2	40.0	92	18	109	0.45	4345	3595	2596	121.3	0.8353	0.79	88.49	0.70	0.80	yes	0.5052	0.213	0.29	0.6	1.86	10	0.183	4.73	19	21	0.015	0.03	0.18	
196.8	12.2	40.2	92	18	109	0.49	4363	3602	2604	102.24	1.0823	0.77	72.73	1.08	0.79	yes	0.5051	0.260	0.35	0.7	2.04	15	0.175	4.67	16	21	0.015	0.03	0.21	
196.6	12.3	40.4	92	18	109	0.59	4381	3610	2612	66.09	1.8966	0.73	44.18	2.97	0.79	no	0.5051	0.290	0.39	2.0	2.49	31	0.149	4.47	10	16	no	zero	0.21	
196.5	12.3	40.5	92	18	109	0.67	4399	3618	2619	41.83	2.0579	0.70	26.14	5.19	0.79	no	0.5050	0.274	0.37	2.0	2.82	48	0.120	4.22	6	12	no	zero	0.21	
196.3	12.4	40.7	92	18	109	0.74	4416	3625	2627	27.41	1.5249	0.67	19.98	6.05	0.79	no	0.5049	0.251	0.34	2.0	3.02	61	0.099	4.00	4	9	no	zero	0.21	
196.2	12.4	40.8	92	18	109	0.80	4434	3633	2634	18.88	0.8334	0.65	10.24	5.00	0.79	no	0.5049	0.240	0.32	2.0	3.12	68	0.088	3.87	3	8	no	zero	0.21	
196.0	12.5	41.0	92	18	109	0.77	4452	3640	2642	22.06	0.8322	0.66	12.31	4.20	0.79	no	0.5048	0.246	0.33	2.0	3.01	60	0.101	4.02	3	8	no	zero	0.21	
195.8	12.5	41.2	92	18	109	0.74	4470	3648	2649	28.49	1.1924	0.67	16.63	4.54	0.79	no	0.5047	0.257	0.35	2.0	2.93	55	0.109	4.11	4	9	no	zero	0.21	
195.7	12.6	41.3	92	18	109	0.71	4488	3655	2657	33.28	1.2071	0.68	19.90	3.89	0.79	no	0.5046	0.263	0.35	2.0	2.83	49	0.120	4.21	5	10	no	zero	0.21	
195.5	12.6	41.5	92	18	109	0.59	4506	3663	2665	64.73	0.9532	0.72	42.73	1.53	0.79	yes	0.5045	0.220	0.30	0.6	2.31	24	0.160	4.56	9	13	0.020	0.04	0.25	
195.3	12.7	41.7	92	18	109	0.51	4523	3671	2672	95.72	1.0909	0.76	66.77	1.17	0.78	yes	0.5044	0.245	0.33	0.7	2.09	16	0.173	4.65	14	19	0.015	0.03	0.28	
195.2	12.7	41.8	92	18	109	0.57	4541	3678	2680	49.98	1.4572	0.73	46.60	2.15	0.78	no	0.5043	0.295	0.40	2.0	2.38	27	0.156	4.53	10	15	no	zero	0.28	
195.0	12.8	42.0	92	18	109	0.65	4559	3686	2687	47.34	1.5344	0.70	29.71	3.41	0.78	no	0.5042	0.												

Elevation	Depth	In-Situ Soil Condition					Total σ _o psf	Overburden Stress Effective		CPT Input		Overburden Resistance Correction C _q	Normalized Tip Resistance q _{c1}	Normalized Friction Ratio F	Depth Reduction Factor r _d	Robertson's ECPT Chart Check Liquefiable yes/no	Cyclic Stress Ratio CSR	Cyclic Resistance Ratio CRR _i	Magnitude Adjusted CRR CRR	Liquefaction Factor of Safety FS _{eq}	Soil-Type Behavior Index I _e	Fines Content AFC	Mean Grain Size D ₅₀	CPT/SPT Correlation Factor q _c /N	Equivalent SPT N	Corrected SPT (Clean Sand) N _{clean}	Vertical Strain ϕ	Liquefaction Induced Settlement	Cumulative Settlement
		Dry Density γ _{dry} pcf	Percent Moisture w %	Moist Density γ _{mo} pcf	Stress Exponent n	Current σ _v psf		HGWL σ _v psf	Tip Resistance q _c tsf	Sleeve Friction f _s tsf																			
		ft	m	ft																									
188.8	14.7	48.2	92	18	109	0.19	5236	3973	2975	328.55	3.0504	0.89	273.51	0.94	0.74	no	0.4974	0.280	0.38	2.0	1.58	5	0.192	4.79	57	57	no	zero	0.28
188.6	14.7	48.4	92	18	109	0.19	5253	3981	2983	323.56	2.5252	0.89	268.43	0.79	0.74	no	0.4971	0.260	0.35	2.0	1.53	4	0.193	4.80	56	56	no	zero	0.28
188.4	14.8	48.6	92	18	109	0.20	5271	3989	2990	314.49	1.8843	0.88	250.33	0.60	0.74	no	0.4969	0.250	0.34	2.0	1.46	3	0.195	4.81	54	54	no	zero	0.28
188.3	14.8	48.7	92	18	109	0.21	5289	3996	2998	303.09	1.883	0.87	248.01	0.63	0.74	no	0.4966	0.250	0.34	2.0	1.48	4	0.194	4.80	52	52	no	zero	0.28
188.1	14.9	48.9	92	18	109	0.22	5307	4004	3005	292.67	2.1567	0.87	237.73	0.74	0.74	no	0.4964	0.260	0.35	2.0	1.55	4	0.193	4.79	50	50	no	zero	0.28
188.0	14.9	49.0	92	18	109	0.24	5325	4011	3013	278.15	2.3639	0.86	223.59	0.86	0.74	no	0.4961	0.270	0.36	2.0	1.61	5	0.191	4.78	47	47	no	zero	0.28
187.8	15.0	49.2	92	18	109	0.25	5343	4019	3020	264	2.4895	0.85	209.97	0.95	0.74	no	0.4959	0.290	0.39	2.0	1.66	6	0.189	4.77	44	45	no	zero	0.28
187.6	15.0	49.4	92	18	109	0.26	5360	4026	3028	253.92	2.4009	0.84	200.33	0.96	0.74	no	0.4956	0.290	0.39	2.0	1.67	7	0.189	4.77	42	43	no	zero	0.28
187.5	15.1	49.5	92	18	109	0.28	5378	4034	3036	243.52	2.7216	0.84	190.48	1.07	0.74	no	0.4954	0.300	0.41	2.0	1.72	8	0.187	4.76	40	41	no	zero	0.28
187.3	15.1	49.7	92	18	109	0.29	5396	4042	3043	232.15	2.9016	0.83	179.83	1.26	0.74	no	0.4951	0.310	0.42	2.0	1.80	9	0.185	4.74	38	39	no	zero	0.28
187.1	15.2	49.9	92	18	109	0.30	5414	4049	3051	226.59	2.6498	0.83	174.61	1.18	0.73	no	0.4948	0.300	0.41	2.0	1.78	9	0.186	4.75	37	38	no	zero	0.28
187.0	15.2	50.0	92	18	109	0.30	5432	4057	3058	225.61	0.9371	0.82	173.61	0.42	0.73	no	0.4946	0.240	0.32	2.0	1.49	4	0.194	4.80	36	36	no	zero	0.28
186.8	15.3	50.2	92	18	109	0.31	5449	4064	3066	217.73	1.326	0.82	166.31	0.62	0.73	no	0.4943	0.250	0.34	2.0	1.61	5	0.191	4.78	35	36	no	zero	0.28
186.6	15.3	50.4	92	18	109	0.32	5467	4072	3073	207.3	1.8421	0.81	156.78	0.90	0.73	yes	0.4940	0.277	0.37	0.8	1.73	8	0.187	4.76	33	34	0.001	0.00	0.28
186.5	15.4	50.5	92	18	109	0.33	5485	4079	3081	197.09	2.1237	0.80	147.55	1.09	0.73	yes	0.4938	0.293	0.40	0.8	1.81	9	0.185	4.74	31	32	0.001	0.00	0.28
186.3	15.4	50.7	92	18	109	0.37	5503	4087	3089	172.8	2.4346	0.79	126.14	1.43	0.73	yes	0.4935	0.300	0.41	0.8	1.94	12	0.180	4.70	27	29	0.010	0.02	0.30
186.1	15.5	50.9	92	18	109	0.42	5521	4095	3096	138.02	3.4483	0.76	96.64	2.55	0.73	no	0.4932	0.320	0.43	2.0	2.20	20	0.167	4.61	21	27	no	zero	0.30
186.0	15.5	51.0	92	18	109	0.49	5538	4102	3104	105.31	3.7598	0.72	70.22	3.67	0.73	no	0.4930	0.300	0.41	2.0	2.41	28	0.154	4.51	16	22	no	zero	0.30
185.8	15.6	51.2	92	18	109	0.50	5556	4110	3111	99.41	3.7523	0.72	65.55	3.88	0.73	no	0.4927	0.300	0.41	2.0	2.45	30	0.151	4.49	15	21	no	zero	0.30
185.7	15.6	51.3	92	18	109	0.44	5574	4117	3119	131.15	4.2607	0.75	90.75	3.32	0.73	no	0.4924	0.320	0.43	2.0	2.31	24	0.161	4.56	20	26	no	zero	0.30
185.5	15.7	51.5	92	18	109	0.48	5592	4125	3126	108.14	3.7976	0.73	72.23	3.60	0.72	no	0.4921	0.300	0.41	2.0	2.40	27	0.155	4.52	16	22	no	zero	0.30
185.3	15.7	51.7	92	18	109	0.54	5610	4132	3134	83.01	3.6415	0.70	52.86	4.54	0.72	no	0.4918	0.300	0.41	2.0	2.56	35	0.143	4.42	12	18	no	zero	0.30
185.2	15.8	51.8	92	18	109	0.51	5627	4140	3142	92.97	4.3682	0.71	60.33	4.85	0.72	no	0.4915	0.300	0.41	2.0	2.55	34	0.144	4.43	14	21	no	zero	0.30
185.0	15.8	52.0	92	18	109	0.46	5645	4148	3149	115.9	4.5551	0.73	78.15	4.03	0.72	no	0.4912	0.300	0.41	2.0	2.41	28	0.154	4.51	17	24	no	zero	0.30
184.8	15.9	52.2	92	18	109	0.47	5663	4156	3157	112.03	4.433	0.73	75.01	4.06	0.72	no	0.4910	0.300	0.41	2.0	2.43	28	0.153	4.50	17	23	no	zero	0.30
184.7	15.9	52.3	92	18	109	0.43	5681	4163	3164	137.19	4.1204	0.75	95.23	3.07	0.72	no	0.4907	0.320	0.43	2.0	2.27	22	0.163	4.58	21	27	no	zero	0.30
184.5	16.0	52.5	92	18	109	0.38	5699	4170	3172	164.44	3.7518	0.77	117.97	2.32	0.72	no	0.4904	0.332	0.45	2.0	2.11	17	0.172	4.65	25	31	no	zero	0.30
184.3	16.0	52.7	92	18	109	0.36	5716	4178	3179	177.47	3.3653	0.78	129.09	1.93	0.72	yes	0.4901	0.323	0.44	0.9	2.03	15	0.176	4.68	28	30	0.010	0.02	0.32
184.2	16.1	52.8	92	18	109	0.32	5734	4185	3187	205.16	3.085	0.80	153.39	1.53	0.72	yes	0.4898	0.315	0.43	0.9	1.90	11	0.181	4.71	33	35	0.001	0.00	0.32
184.0	16.1	53.0	92	18	109	0.29	5752	4193	3195	228.68	2.4243	0.82	174.60	1.07	0.72	no	0.4895	0.300	0.41	2.0	1.75	8	0.187	4.75	37	38	no	zero	0.32
183.9	16.2	53.1	92	18	109	0.28	5770	4201	3202	240.52	0.6828	0.83	185.43	0.29	0.72	no	0.4892	0.230	0.31	2.0	1.38	2	0.196	4.82	38	38	no	zero	0.32
183.7	16.2	53.3	92	18	109	0.28	5788	4208	3210	243.16	1.014	0.83	187.78	0.42	0.71	no	0.4889	0.240	0.32	2.0	1.46	3	0.194	4.81	39	39	no	zero	0.32
183.5	16.3	53.5	92	18	109	0.29	5806	4216	3217	233.65	1.137	0.82	178.87	0.49	0.71	no	0.4886	0.250	0.34	2.0	1.52	4	0.193	4.80	37	37	no	zero	0.32
183.4	16.3	53.6	92	18	109	0.31	5823	4223	3225	216.05	1.5345	0.81	162.70	0.72	0.71	no	0.4883	0.260	0.35	2.0	1.66	6	0.190	4.77	34	35	no	zero	0.32
183.2	16.4	53.8	92	18	109	0.33	5841	4231	3232	196.64	2.1612	0.79	145.23	1.12	0.71	yes	0.4880	0.293	0.40	0.8	1.82	10	0.184	4.74	31	32	0.001	0.00	0.33
183.0	16.4	54.0	92	18	109	0.32	5859	4238	3240	208.48	2.5073	0.80	155.69	1.22	0.71	yes	0.4876	0.305	0.41	0.8	1.83	10	0.184	4.73	33	34	0.001	0.00	0.33
182.9	16.5	54.1	92	18	109	0.32	5877	4246	3248	206.63	2.8698	0.80	153.94	1.41	0.71	yes	0.4873	0.315	0.43	0.9	1.88	11	0.182	4.72	33	35	0.001	0.00	0.33
182.7	16.5	54.3	92	18	109	0.37	5895	4254	3255	170.9	2.8766	0.77	122.53	1.71	0.71	yes	0.4870	0.310	0.42	0.9	2.01	14	0.177						

Project: Proposed Mixed Use Development
Probe ID: CPT-2
Date: 2/3/2011

Design Earthquake Magnitude 6.66 MW
Magnitude Scaling Factor (MSF) 1.35 %
p_{gs} 0.584 g
Groundwater Depth: 47 ft
Elevation at GS 253.0 ft
HHGWL 28.0 ft

total settlement
(inch)
0.98

total settlement
below BOF (inch)
0.98

Elevation	Depth		In-Situ Soil Condition					Overburden Stress Effective			CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement
			Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Current	Effective	Tip Resistance	Sleeve Friction																			
			γ _{so} pcf	W %	γ _m pcf	n	σ _{so} psf	σ' _o psf	HHGWL σ _o psf	q _e tsf	f _s tsf																			
ft	m	ft																												
252.8	0.0	0.2	92	18	109	0.49	18	18	18	101.58	0	1.70	163.14	0.01	1.000	no	0.3796	0.207	0.28	2.0	1.48	4	0.194	4.80	34	34	no	zero	0.00	
252.7	0.1	0.3	92	18	109	0.44	36	36	36	129.21	1.5224	1.70	207.51	1.18	1.00	no	0.3796	0.300	0.41	2.0	1.73	8	0.187	4.76	44	45	no	zero	0.00	
252.5	0.1	0.5	92	18	109	0.41	53	53	53	148.1	2.1314	1.70	237.84	1.44	1.00	no	0.3796	0.320	0.43	2.0	1.76	8	0.186	4.75	50	51	no	zero	0.00	
252.3	0.2	0.7	92	18	109	0.38	71	71	71	163.04	2.3959	1.70	261.82	1.47	1.00	no	0.3796	0.320	0.43	2.0	1.74	8	0.187	4.76	55	56	no	zero	0.00	
252.2	0.2	0.8	92	18	109	0.48	89	89	89	106.18	1.863	1.70	170.47	1.76	1.00	no	0.3796	0.330	0.45	2.0	1.92	12	0.180	4.71	38	38	no	zero	0.00	
252.0	0.3	1.0	92	18	109	0.59	107	107	107	64.77	1.1304	1.70	103.95	1.75	1.00	no	0.3796	0.300	0.41	2.0	2.06	16	0.174	4.66	22	28	no	zero	0.00	
251.9	0.3	1.1	92	18	109	0.67	125	125	125	42.02	0.9321	1.70	67.39	2.22	1.00	no	0.3796	0.300	0.41	2.0	2.27	22	0.163	4.58	15	20	no	zero	0.00	
251.7	0.4	1.3	92	18	109	0.73	142	142	142	29.51	0.7338	1.70	47.28	2.49	1.00	no	0.3796	0.295	0.40	2.0	2.42	28	0.154	4.51	10	15	no	zero	0.00	
251.5	0.4	1.5	92	18	109	0.77	160	160	160	22.68	0.5931	1.70	36.30	2.62	1.00	no	0.3796	0.285	0.38	2.0	2.52	32	0.146	4.45	8	14	no	zero	0.00	
251.4	0.5	1.6	92	18	109	0.80	178	178	178	18.55	0.502	1.70	29.65	2.72	1.00	no	0.3796	0.274	0.37	2.0	2.59	36	0.140	4.40	7	13	no	zero	0.00	
251.2	0.5	1.8	92	18	109	0.83	196	196	196	15.03	0.421	1.70	23.98	2.82	1.00	no	0.3796	0.269	0.36	2.0	2.68	40	0.134	4.34	6	12	no	zero	0.00	
251.0	0.6	2.0	92	18	109	0.84	214	214	214	13.89	0.3957	1.70	22.14	2.87	1.00	no	0.3796	0.269	0.36	2.0	2.71	42	0.131	4.32	5	11	no	zero	0.00	
250.9	0.6	2.1	92	18	109	0.82	232	232	232	16	0.4103	1.70	25.51	2.58	1.00	no	0.3796	0.274	0.37	2.0	2.63	38	0.138	4.37	6	12	no	zero	0.00	
250.7	0.7	2.3	92	18	109	0.78	249	249	249	21.6	0.4846	1.70	34.49	2.26	1.00	no	0.3795	0.280	0.38	2.0	2.49	31	0.148	4.46	8	13	no	zero	0.00	
250.5	0.7	2.5	92	18	109	0.77	267	267	267	22.42	0.5956	1.70	35.80	2.67	1.00	no	0.3793	0.285	0.38	2.0	2.53	33	0.146	4.44	8	14	no	zero	0.00	
250.4	0.8	2.6	92	18	109	0.79	285	285	285	20.38	0.6757	1.70	32.51	3.34	1.00	no	0.3791	0.280	0.38	2.0	2.62	37	0.138	4.38	7	13	no	zero	0.00	
250.2	0.8	2.8	92	18	109	0.80	303	303	303	18.05	0.6911	1.70	28.75	3.86	1.00	no	0.3789	0.274	0.37	2.0	2.70	42	0.131	4.32	7	13	no	zero	0.00	
250.0	0.9	3.0	92	18	109	0.82	321	321	321	16.07	0.6561	1.70	25.55	4.12	1.00	no	0.3786	0.274	0.37	2.0	2.76	45	0.126	4.27	6	12	no	zero	0.00	
249.9	0.9	3.1	92	18	109	0.85	338	338	338	12.44	0.5533	1.70	19.71	4.51	1.00	no	0.3784	0.263	0.35	2.0	2.87	51	0.115	4.17	5	10	no	zero	0.00	
249.7	1.0	3.3	92	18	109	0.87	356	356	356	11.09	0.5269	1.70	17.53	4.83	1.00	no	0.3782	0.257	0.35	2.0	2.93	55	0.109	4.11	4	9	no	zero	0.00	
249.6	1.0	3.4	92	18	109	0.88	374	374	374	10.03	0.4544	1.70	15.81	4.62	1.00	no	0.3780	0.251	0.34	2.0	2.95	56	0.107	4.09	4	9	no	zero	0.00	
249.4	1.1	3.6	92	18	109	0.90	392	392	392	8.71	0.3611	1.70	13.68	4.24	1.00	no	0.3777	0.246	0.33	2.0	2.98	58	0.104	4.06	3	8	no	zero	0.00	
249.2	1.1	3.8	92	18	109	0.90	410	410	410	8.36	0.2982	1.70	13.10	3.66	0.99	no	0.3775	0.246	0.33	2.0	2.95	56	0.107	4.09	3	8	no	zero	0.00	
249.1	1.2	3.9	92	18	109	0.89	427	427	427	9.62	0.2333	1.70	15.11	2.48	0.99	no	0.3773	0.251	0.34	2.0	2.80	47	0.122	4.24	4	9	no	zero	0.00	
248.9	1.2	4.1	92	18	109	0.87	445	445	445	10.73	0.2181	1.70	16.88	2.08	0.99	no	0.3770	0.257	0.35	2.0	2.72	42	0.130	4.31	4	9	no	zero	0.00	
248.7	1.3	4.3	92	18	109	0.88	463	463	463	10.02	0.223	1.70	15.72	2.28	0.99	no	0.3768	0.251	0.34	2.0	2.77	45	0.126	4.27	4	9	no	zero	0.00	
248.6	1.3	4.4	92	18	109	0.89	481	481	481	9.18	0.2406	1.70	14.36	2.69	0.99	no	0.3766	0.251	0.34	2.0	2.84	49	0.118	4.20	3	8	no	zero	0.00	
248.4	1.4	4.6	92	18	109	0.91	499	499	499	7.82	0.2514	1.70	12.16	3.32	0.99	no	0.3763	0.246	0.33	2.0	2.95	56	0.107	4.08	3	8	no	zero	0.00	
248.2	1.4	4.8	92	18	109	0.90	516	516	516	8.29	0.2212	1.70	12.90	2.75	0.99	no	0.3761	0.246	0.33	2.0	2.88	52	0.114	4.16	3	8	no	zero	0.00	
248.1	1.5	4.9	92	18	109	0.91	534	534	534	7.92	0.1849	1.70	12.29	2.42	0.99	no	0.3758	0.246	0.33	2.0	2.87	51	0.116	4.17	3	8	no	zero	0.00	
247.9	1.5	5.1	92	18	109	0.93	552	552	552	6.34	0.1589	1.70	9.74	2.62	0.99	no	0.3756	0.238	0.32	2.0	2.97	58	0.105	4.06	2	7	no	zero	0.00	
247.8	1.6	5.2	92	18	109	0.94	570	570	570	5.95	0.1461	1.70	9.10	2.58	0.99	no	0.3753	0.238	0.32	2.0	2.99	59	0.102	4.04	2	7	no	zero	0.00	
247.6	1.6	5.4	92	18	109	0.93	588	588	588	6.23	0.1693	1.70	9.53	2.85	0.99	no	0.3751	0.238	0.32	2.0	3.00	60	0.102	4.03	2	7	no	zero	0.00	
247.4	1.7	5.6	92	18	109	0.92	605	605	605	7.14	0.1727	1.70	10.98	2.53	0.99	no	0.3749	0.240	0.32	2.0	2.92	54	0.110	4.12	3	8	no	zero	0.00	
247.3	1.7	5.7	92	18	109	0.90	623	623	623	8.44	0.1874	1.70	13.06	2.31	0.99	no	0.3746	0.246	0.33	2.0	2.84	49	0.119	4.20	3	8	no	zero	0.00	
247.1	1.8	5.9	92	18	109	0.90	641	641	641	8.7	0.2156	1.70	13.46	2.57	0.99	no	0.3744	0.246	0.33	2.0	2.85	50	0.117	4.19	3	8	no	zero	0.00	
246.9	1.8	6.1	92	18	109	0.87	659	659	659	10.57	0.2593	1.70	16.45	2.53	0.99	no	0.3741	0.257	0.35	2.0	2.78	46	0.125	4.26	4	9	no	zero	0.00	
246.8	1.9	6.2	92	18	109	0.86	677	677	677	11.71	0.305	1.70	18.27	2.68	0.98	no	0.3739	0.263	0.35	2.0	2.76	44	0.127	4.28	4	9	no	zero	0.00	
246.6	1.9	6.4	92	18	109	0.84	695	695	695	13.64	0.406	1.70	21.35	3.05	0.98	no	0.3736	0.269	0.36	2.0	2.74	43	0.128	4.29	5	10	no	zero	0.00	
246.4	2.0	6.6	92	18	109	0.81	712	712	712	16.75	0.4772	1.70	26.33	2.91	0.98	no	0.3733	0.274	0.37	2.0	2.65	39	0.136	4.36	6	12	no	zero	0.00	
246.3	2.0	6.7	92	18	109	0.80	730	730	730	18.67																				

Elevation	Depth	In-Situ Soil Condition					Overburden Stress			CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement		
		Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Effective Current GW	HHGW	Tip Resistance	Sleeve Friction																					
		γ_{m0}	w	γ_m	n	σ_o	σ'_o	σ''_o	q_c	f_{fs}																					
		pcf	%	pcf		psf	psf	psf	tsf	tsf																					
ft	m	ft																													
242.2	3.3	10.8	92	18	109	0.82	1175	1175	1175	1175	1175	16.49	0.4284	1.62	24.29	2.69	0.96	no	0.3662	0.269	0.36	2.0	2.66	39	0.135	4.35	6	12	no	zero	0.00
242.0	3.3	11.0	92	18	109	0.81	1193	1193	1193	1193	1193	17.62	0.3334	1.59	25.55	1.96	0.96	no	0.3659	0.243	0.33	2.0	2.56	34	0.143	4.42	6	11	no	zero	0.00
241.8	3.4	11.2	92	18	109	0.80	1211	1211	1211	1211	1211	18.27	0.3079	1.56	26.12	1.74	0.96	no	0.3656	0.224	0.30	2.0	2.52	33	0.146	4.45	6	11	no	zero	0.00
241.7	3.4	11.3	92	18	109	0.79	1229	1229	1229	1229	1229	18.90	0.3077	1.54	27.34	1.60	0.96	no	0.3653	0.210	0.30	2.0	2.49	31	0.149	4.47	6	11	no	zero	0.00
241.5	3.5	11.5	92	18	109	0.79	1247	1247	1247	1247	1247	19.58	0.3191	1.52	27.24	1.68	0.96	no	0.3650	0.224	0.30	2.0	2.50	32	0.148	4.46	6	11	no	zero	0.00
241.4	3.5	11.6	92	18	109	0.80	1264	1264	1264	1264	1264	18.92	0.3237	1.51	26.05	1.77	0.96	no	0.3647	0.224	0.30	2.0	2.52	33	0.146	4.44	6	11	no	zero	0.00
241.2	3.6	11.8	92	18	109	0.80	1282	1282	1282	1282	1282	18.34	0.3244	1.49	24.99	1.83	0.96	no	0.3644	0.236	0.32	2.0	2.55	34	0.144	4.43	6	11	no	zero	0.00
241.0	3.6	12.0	92	18	109	0.80	1300	1300	1300	1300	1300	18.36	0.317	1.48	24.73	1.79	0.96	no	0.3641	0.217	0.29	2.0	2.55	34	0.144	4.43	6	11	no	zero	0.00
240.9	3.7	12.1	92	18	109	0.80	1318	1318	1318	1318	1318	18.2	0.3274	1.46	24.24	1.87	0.96	no	0.3638	0.236	0.32	2.0	2.56	35	0.143	4.42	5	10	no	zero	0.00
240.7	3.7	12.3	92	18	109	0.81	1336	1336	1336	1336	1336	18.67	0.386	1.46	24.36	1.67	0.96	no	0.3636	0.236	0.33	2.0	2.56	40	0.135	4.40	5	10	no	zero	0.00
240.5	3.8	12.5	92	18	109	0.82	1353	1353	1353	1353	1353	16.07	0.4047	1.44	20.98	2.63	0.96	no	0.3632	0.269	0.36	2.0	2.70	42	0.131	4.32	5	10	no	zero	0.00
240.4	3.8	12.6	92	18	109	0.82	1371	1371	1371	1371	1371	15.51	0.3492	1.43	20.04	2.36	0.96	no	0.3629	0.269	0.36	2.0	2.69	41	0.132	4.33	5	10	no	zero	0.00
240.2	3.9	12.8	92	18	109	0.83	1389	1389	1389	1389	1389	14.98	0.2759	1.42	19.14	1.93	0.96	no	0.3626	0.229	0.31	2.0	2.66	39	0.135	4.35	4	9	no	zero	0.00
240.0	3.9	13.0	92	18	109	0.83	1407	1407	1407	1407	1407	15.32	0.242	1.40	19.35	1.66	0.95	no	0.3623	0.211	0.28	2.0	2.61	37	0.139	4.38	4	9	no	zero	0.00
239.9	4.0	13.1	92	18	109	0.81	1425	1425	1425	1425	1425	17.17	0.2477	1.38	21.43	1.51	0.95	no	0.3620	0.191	0.26	2.0	2.56	34	0.144	4.43	5	10	no	zero	0.00
239.7	4.0	13.3	92	18	109	0.80	1442	1442	1442	1442	1442	18.42	0.253	1.37	22.87	1.32	0.95	no	0.3617	0.166	0.24	2.0	2.52	33	0.146	4.45	5	10	no	zero	0.00
239.5	4.1	13.5	92	18	109	0.79	1460	1460	1460	1460	1460	19.59	0.2343	1.34	23.91	1.24	0.95	no	0.3614	0.175	0.24	2.0	2.47	30	0.150	4.48	5	10	no	zero	0.00
239.4	4.1	13.6	92	18	109	0.78	1478	1478	1478	1478	1478	21.84	0.2314	1.32	26.34	1.10	0.95	no	0.3611	0.166	0.22	2.0	2.41	28	0.154	4.51	6	10	no	zero	0.00
239.2	4.2	13.8	92	18	109	0.77	1496	1496	1496	1496	1496	23.14	0.2843	1.31	27.61	1.27	0.95	no	0.3608	0.180	0.24	2.0	2.42	28	0.153	4.50	6	10	no	zero	0.00
239.1	4.2	13.9	92	18	109	0.76	1514	1514	1514	1514	1514	23.84	0.3064	1.29	28.17	1.33	0.95	no	0.3604	0.180	0.24	2.0	2.43	28	0.153	4.50	6	10	no	zero	0.00
238.9	4.3	14.1	92	18	109	0.75	1532	1532	1532	1532	1532	23.51	0.2961	1.28	27.53	1.30	0.95	no	0.3601	0.180	0.24	2.0	2.43	29	0.153	4.50	6	10	no	zero	0.00
238.7	4.3	14.3	92	18	109	0.76	1549	1549	1549	1549	1549	24.29	0.2967	1.27	29.12	1.22	0.95	no	0.3598	0.180	0.24	2.0	2.39	27	0.155	4.52	6	10	no	zero	0.00
238.6	4.4	14.4	92	18	109	0.77	1567	1567	1567	1567	1567	22.79	0.2824	1.26	26.21	1.28	0.95	no	0.3595	0.180	0.24	2.0	2.44	29	0.152	4.49	6	10	no	zero	0.00
238.4	4.4	14.6	92	18	109	0.76	1585	1585	1585	1585	1585	24.94	0.3129	1.24	28.39	1.30	0.95	no	0.3592	0.180	0.24	2.0	2.42	28	0.154	4.51	6	10	no	zero	0.00
238.2	4.5	14.8	92	18	109	0.74	1603	1603	1603	1603	1603	27.24	0.2753	1.23	30.71	1.04	0.95	no	0.3589	0.170	0.23	2.0	2.34	25	0.159	4.55	7	11	no	zero	0.00
238.1	4.5	14.9	92	18	109	0.74	1621	1621	1621	1621	1621	28.39	0.2958	1.22	31.72	1.07	0.94	no	0.3585	0.170	0.24	2.0	2.33	25	0.159	4.55	7	11	no	zero	0.00
237.9	4.5	15.1	92	18	109	0.73	1638	1638	1638	1638	1638	28.04	0.2732	1.21	30.67	1.08	0.94	no	0.3582	0.166	0.23	2.0	2.36	26	0.158	4.54	7	11	no	zero	0.00
237.7	4.6	15.3	92	18	109	0.75	1656	1656	1656	1656	1656	25.6	0.2648	1.20	28.15	1.07	0.94	no	0.3579	0.178	0.22	2.0	2.38	26	0.156	4.53	6	10	no	zero	0.00
237.6	4.7	15.4	92	18	109	0.76	1674	1674	1674	1674	1674	24.09	0.2863	1.20	26.27	1.23	0.94	no	0.3576	0.180	0.24	2.0	2.43	29	0.152	4.50	6	10	no	zero	0.00
237.4	4.7	15.6	92	18	109	0.76	1692	1692	1692	1692	1692	24.59	0.3176	1.19	26.59	1.34	0.94	no	0.3572	0.180	0.24	2.0	2.45	29	0.151	4.49	6	10	no	zero	0.00
237.3	4.8	15.7	92	18	109	0.76	1710	1710	1710	1710	1710	24.18	0.3095	1.18	25.93	1.33	0.94	no	0.3569	0.180	0.24	2.0	2.46	30	0.151	4.49	6	10	no	zero	0.00
237.1	4.8	15.9	92	18	109	0.76	1727	1727	1727	1727	1727	23.97	0.3103	1.17	25.49	1.34	0.94	no	0.3566	0.180	0.24	2.0	2.46	30	0.150	4.48	6	11	no	zero	0.00
236.9	4.9	16.1	92	18	109	0.75	1745	1745	1745	1745	1745	23.79	0.2893	1.16	25.09	1.26	0.94	no	0.3563	0.166	0.23	2.0	2.41	28	0.151	4.49	6	10	no	zero	0.00
236.8	4.9	16.2	92	18	109	0.75	1763	1763	1763	1763	1763	23.6	0.2588	1.15	26.80	1.05	0.94	no	0.3559	0.166	0.22	2.0	2.39	27	0.156	4.52	6	10	no	zero	0.00
236.6	5.0	16.4	92	18	109	0.75	1781	1781	1781	1781	1781	26.52	0.2456	1.14	27.56	0.98	0.94	no	0.3556	0.156	0.21	2.0	2.36	26	0.157	4.54	6	10	no	zero	0.00
236.4	5.0	16.6	92	18	109	0.75	1799	1799	1799	1799	1799	26.69	0.2398	1.13	27.51	0.93	0.94	no	0.3553	0.146	0.20	2.0	2.35	26	0.158	4.54	6	10	no	zero	0.00
236.3	5.1	16.7	92	18	109	0.73	1816	1816	1816	1816	1816	28.73	0.2312	1.12	29.41	0.83	0.93	no	0.3550	0.127	0.17	2.0	2.30	24	0.161	4.57	6	10	no	zero	0.00
236.1	5.1	16.9	92	18	109	0.72	1834	1834	1834	1834	1834	30.55	0.2569	1.11	31.06	0.87	0.93	no	0.3546	0.140	0.19	2.0	2.29	23	0.162	4.57	7	11	no	zero	0.00
235.9	5.2	17.1	92	18	109	0.72	1852	1852	1852	1852	1852	35.48	0.2733	1.10	33.84	0.73	0.93	no	0.3543	0.127	0.18	2.0	2.22	21	0.163	4.60	12	12	no	zero	0.00
235.8	5.2	17.2	92	18	109	0.69	1870	1870	1870	1870	1870	36.67	0.2712	1.09	36.80	0.76	0.93	no	0.3540	0.140	0.19	2.0	2.20	20	0.167	4.61	8	12	no	zero	0.00
235.6	5.3	17.4	92	18	109	0.71	1888	1888	1888	1888	1888	33.6	0.2405	1.08	33.46	0.74	0.93	no	0.3536	0.120	0.16	2.0	2.23	21	0.165	4.60	7	11	no	zero	0.00
235.4	5.3	17.6	92	18	109	0.72	1905	1905	1905	1905	1905	31.83	0.2564	1.08	31.46	0.83	0.93	no	0.3533	0.130	0.18	2.0	2.28	23	0.163	4.58	7	11	no	zero	0.00
235.3	5.4	17.7	92	18	109	0.73	1923																								

Elevation	Depth	In-Situ Soil Condition					Total σ _o psf	Overburden Stress Effective		CPT Input		Overburden Resistance Correction C _q	Normalized Tip Resistance q _{c1}	Normalized Friction Ratio F	Depth Reduction Factor r _d	Robertson's ECPT Chart Check Liquefiable yes/no	Cyclic Stress Ratio CSR	Cyclic Resistance Ratio CRR _i	Magnitude Adjusted CRR CRR	Liquefaction Factor of Safety FS _{eq}	Soil-Type Behavior Index I _c	Fines Content AFC	Mean Grain Size D ₅₀	CPT/SPT Correlation Factor q _c /N	Equivalent SPT N	Corrected SPT (Clean Sand) N _{clean}	Vertical Strain ϕ	Liquefaction Induced Settlement	Cumulative Settlement
		Dry Density γ _{so} pcf	Percent Moisture w %	Moist Density γ _{mo} pcf	Stress Exponent n	Current σ _v psf		HHGWL σ _h psf	Tip Resistance q _c tsf	Sleeve Friction f _s tsf																			
		ft	m	ft																									
229.7	7.1	23.3	92	18	109	0.61	2529	2529	2529	57.94	0.3449	0.90	48.04	0.61	0.90	no	0.3410	0.129	0.17	2.0	2.05	15	0.175	4.67	10	14	no	zero	0.00
229.5	7.1	23.5	92	18	109	0.62	2547	2547	2547	54.31	0.3507	0.89	44.66	0.66	0.90	no	0.3406	0.130	0.18	2.0	2.10	17	0.172	4.65	10	14	no	zero	0.00
229.4	7.2	23.6	92	18	109	0.63	2564	2564	2564	51.78	0.3857	0.89	42.26	0.76	0.90	no	0.3403	0.150	0.20	2.0	2.14	18	0.170	4.63	9	13	no	zero	0.00
229.2	7.2	23.8	92	18	109	0.63	2582	2582	2582	52.71	0.3923	0.88	42.87	0.76	0.90	no	0.3399	0.150	0.20	2.0	2.10	18	0.170	4.63	9	13	no	zero	0.00
229.0	7.3	24.0	92	18	109	0.62	2600	2600	2600	54.32	0.3973	0.88	44.07	0.75	0.89	no	0.3395	0.140	0.19	2.0	2.13	18	0.171	4.64	9	13	no	zero	0.00
228.9	7.3	24.1	92	18	109	0.62	2618	2618	2618	54.71	0.3836	0.88	44.21	0.72	0.89	no	0.3392	0.140	0.19	2.0	2.12	17	0.171	4.64	10	14	no	zero	0.00
228.7	7.4	24.3	92	18	109	0.62	2636	2636	2636	54.94	0.3585	0.87	44.22	0.67	0.89	no	0.3388	0.130	0.18	2.0	2.10	17	0.172	4.65	10	14	no	zero	0.00
228.6	7.4	24.4	92	18	109	0.61	2653	2653	2653	57.11	0.3573	0.87	45.88	0.64	0.89	no	0.3384	0.129	0.17	2.0	2.08	16	0.173	4.66	10	14	no	zero	0.00
228.4	7.5	24.6	92	18	109	0.62	2671	2671	2671	56.23	0.3428	0.87	44.93	0.62	0.89	no	0.3381	0.119	0.16	2.0	2.08	16	0.173	4.66	10	14	no	zero	0.00
228.2	7.5	24.8	92	18	109	0.62	2689	2689	2689	55.8	0.3486	0.86	44.38	0.64	0.89	no	0.3377	0.119	0.16	2.0	2.09	17	0.173	4.65	10	14	no	zero	0.00
228.1	7.6	24.9	92	18	109	0.61	2707	2707	2707	57.9	0.3744	0.86	45.97	0.66	0.89	no	0.3373	0.140	0.19	2.0	2.09	16	0.173	4.66	10	14	no	zero	0.00
227.9	7.6	25.1	92	18	109	0.60	2725	2725	2725	60.05	0.4117	0.86	47.61	0.70	0.89	no	0.3370	0.150	0.20	2.0	2.09	16	0.173	4.66	10	14	no	zero	0.00
227.7	7.7	25.3	92	18	109	0.60	2742	2742	2742	62.13	0.4355	0.86	49.18	0.72	0.89	no	0.3366	0.150	0.20	2.0	2.08	16	0.173	4.66	11	15	no	zero	0.00
227.6	7.7	25.4	92	18	109	0.59	2760	2760	2760	64.7	0.4249	0.86	51.16	0.67	0.89	no	0.3362	0.150	0.20	2.0	2.05	15	0.175	4.67	11	15	no	zero	0.00
227.4	7.8	25.6	92	18	109	0.58	2778	2778	2778	66.5	0.4303	0.85	52.49	0.66	0.88	no	0.3358	0.150	0.20	2.0	2.04	15	0.175	4.67	11	13	no	zero	0.00
227.2	7.8	25.8	92	18	109	0.58	2796	2796	2796	67.64	0.347	0.85	53.25	0.52	0.88	no	0.3355	0.113	0.15	2.0	1.98	13	0.178	4.69	11	13	no	zero	0.00
227.1	7.9	25.9	92	18	109	0.58	2814	2814	2814	67.03	0.3705	0.85	52.53	0.56	0.88	no	0.3351	0.126	0.17	2.0	2.00	14	0.177	4.68	11	13	no	zero	0.00
226.9	7.9	26.1	92	18	109	0.58	2832	2832	2832	69.14	0.3786	0.85	54.11	0.56	0.88	no	0.3347	0.126	0.17	2.0	1.99	14	0.178	4.69	12	14	no	zero	0.00
226.8	8.0	26.2	92	18	109	0.57	2849	2849	2849	72.35	0.419	0.84	56.62	0.59	0.88	no	0.3344	0.140	0.19	2.0	1.98	13	0.178	4.69	12	14	no	zero	0.00
226.6	8.0	26.4	92	18	109	0.56	2867	2867	2867	75.49	0.4364	0.84	59.07	0.59	0.88	no	0.3340	0.140	0.19	2.0	1.97	13	0.178	4.70	13	15	no	zero	0.00
226.4	8.1	26.6	92	18	109	0.55	2885	2885	2885	78.65	0.4816	0.84	61.53	0.62	0.88	no	0.3336	0.164	0.22	2.0	1.96	13	0.179	4.70	13	15	no	zero	0.00
226.3	8.1	26.7	92	18	109	0.55	2903	2903	2903	79.29	0.4955	0.84	61.86	0.64	0.88	no	0.3332	0.164	0.22	2.0	1.97	13	0.178	4.70	13	15	no	zero	0.00
226.1	8.2	26.9	92	18	109	0.55	2921	2921	2921	77.64	0.485	0.84	60.25	0.64	0.88	no	0.3328	0.164	0.22	2.0	1.98	13	0.178	4.69	13	15	no	zero	0.00
225.9	8.2	27.1	92	18	109	0.55	2938	2938	2938	76.75	0.474	0.83	59.29	0.63	0.88	no	0.3325	0.151	0.20	2.0	1.98	13	0.178	4.69	13	15	no	zero	0.00
225.8	8.3	27.2	92	18	109	0.55	2956	2956	2956	80.28	0.4936	0.83	62.05	0.63	0.87	no	0.3321	0.164	0.22	2.0	1.96	13	0.179	4.70	13	15	no	zero	0.00
225.6	8.3	27.4	92	18	109	0.55	2974	2974	2974	80.16	0.4933	0.83	61.74	0.63	0.87	no	0.3317	0.164	0.22	2.0	1.96	13	0.179	4.70	13	15	no	zero	0.00
225.4	8.4	27.6	92	18	109	0.56	2992	2992	2992	75.31	0.5087	0.82	57.48	0.69	0.87	no	0.3313	0.160	0.22	2.0	2.01	14	0.176	4.68	12	14	no	zero	0.00
225.3	8.4	27.7	92	18	109	0.57	3010	3010	3010	69.64	0.4937	0.82	52.59	0.72	0.87	no	0.3310	0.160	0.22	2.0	2.06	16	0.174	4.67	11	15	no	zero	0.00
225.1	8.5	27.9	92	18	109	0.57	3027	3027	3027	71.09	0.531	0.82	53.60	0.76	0.87	no	0.3306	0.170	0.23	2.0	2.06	16	0.174	4.66	11	15	no	zero	0.00
224.9	8.5	28.1	92	18	109	0.57	3045	3045	3042	72.29	0.5447	0.81	54.40	0.77	0.87	no	0.3306	0.170	0.23	2.0	2.06	16	0.174	4.67	12	16	no	zero	0.00
224.8	8.6	28.2	92	18	109	0.56	3063	3063	3050	73.56	0.5211	0.81	55.26	0.72	0.87	no	0.3313	0.170	0.23	2.0	2.04	15	0.175	4.67	12	14	no	zero	0.00
224.6	8.6	28.4	92	18	109	0.57	3081	3081	3057	72.67	0.5025	0.81	54.34	0.77	0.87	no	0.3320	0.180	0.22	2.0	2.04	15	0.175	4.67	12	14	no	zero	0.00
224.5	8.7	28.5	92	18	109	0.57	3099	3099	3065	72.13	0.4662	0.81	53.72	0.66	0.87	no	0.3327	0.150	0.20	2.0	2.03	15	0.176	4.68	11	13	no	zero	0.00
224.3	8.7	28.7	92	18	109	0.57	3116	3116	3072	71.94	0.3549	0.80	53.38	0.50	0.87	no	0.3334	0.113	0.15	2.0	1.97	13	0.178	4.69	11	13	no	zero	0.00
224.1	8.8	28.9	92	18	109	0.56	3134	3134	3080	74.76	0.4087	0.80	55.50	0.56	0.86	no	0.3341	0.140	0.19	2.0	1.98	13	0.178	4.69	12	14	no	zero	0.00
224.0	8.8	29.0	92	18	109	0.56	3152	3152	3087	75.45	0.4453	0.80	55.88	0.60	0.86	no	0.3348	0.151	0.20	2.0	1.99	14	0.177	4.69	12	14	no	zero	0.00
223.9	8.9	29.2	92	18	109	0.56	3170	3170	3095	75.72	0.4667	0.80	56.92	0.63	0.86	no	0.3355	0.151	0.20	2.0	2.00	14	0.177	4.68	12	14	no	zero	0.00
223.6	8.9	29.4	92	18	109	0.55	3188	3188	3103	77.19	0.5047	0.80	56.94	0.67	0.86	no	0.3361	0.160	0.22	2.0	2.01	14	0.177	4.69	12	14</			

Elevation	Depth	In-Situ Soil Condition					Stress Exponent n	Total σ _o psf	Overburden Stress Effective		CPT Input		Overburden Resistance C _q	Normalized Tip Resistance q _{c1}	Normalized Friction Ratio F	Depth Reduction Factor r _d	Robertson's ECPT Chart Check Liquefiable yes/no	Cyclic Stress Ratio CSR	Cyclic Resistance Ratio CRR _i	Magnitude Adjusted CRR CRR	Liquefaction Factor of Safety FS _{eq}	Soil-Type Behavior Index I _c	Fines Content AFC	Mean Grain Size D ₅₀	CPT/SPT Correlation Factor q _c /N	Equivalent SPT N	Corrected SPT (Clean Sand) N _{clean}	Vertical Strain ϕ	Liquefaction Induced Settlement	Cumulative Settlement
		Dry Density γ _{dry} pcf	Percent Moisture W %	Moist Density γ _{mo} pcf	σ _o psf	HHGW σ _o psf			Tip Resistance q _c tsf	Sleeve Friction f _s tsf																				
217.2	m	ft	92	18	109	0.44	3882	3882	3398	129.69	0.7321	0.77	92.51	0.57	0.82	no	0.3565	0.207	0.28	2.0	1.79	9	0.185	4.74	20	21	no	zero	0.00	
217.1	10.9	35.9	92	18	109	0.44	3900	3900	3406	127.49	0.7104	0.76	90.51	0.57	0.82	no	0.3569	0.207	0.28	2.0	1.80	9	0.185	4.74	19	20	no	zero	0.00	
216.9	11.0	36.1	92	18	109	0.44	3918	3918	3413	127.33	0.7258	0.76	90.19	0.58	0.82	no	0.3573	0.207	0.28	2.0	1.81	9	0.185	4.74	19	20	no	zero	0.00	
216.7	11.0	36.3	92	18	109	0.44	3936	3936	3421	130.03	0.7804	0.76	92.22	0.61	0.82	no	0.3577	0.217	0.29	2.0	1.81	9	0.185	4.74	19	20	no	zero	0.00	
216.6	11.1	36.4	92	18	109	0.42	3953	3953	3428	137.58	0.8406	0.77	98.29	0.62	0.82	no	0.3580	0.217	0.29	2.0	1.79	9	0.185	4.74	21	22	no	zero	0.00	
216.4	11.1	36.6	92	18	109	0.40	3971	3971	3436	149.07	0.9167	0.78	107.72	0.62	0.82	no	0.3584	0.230	0.31	2.0	1.76	8	0.186	4.75	23	24	no	zero	0.00	
216.3	11.2	36.7	92	18	109	0.39	3989	3989	3443	161.12	0.9496	0.78	117.76	0.60	0.82	no	0.3588	0.225	0.30	2.0	1.72	7	0.188	4.76	25	26	no	zero	0.00	
216.1	11.2	36.9	92	18	109	0.37	4007	4007	3451	170.68	1.0268	0.79	125.79	0.61	0.81	no	0.3591	0.237	0.32	2.0	1.70	7	0.188	4.76	26	27	no	zero	0.00	
215.9	11.3	37.1	92	18	109	0.36	4025	4025	3459	175.04	1.0787	0.79	129.35	0.62	0.81	no	0.3595	0.237	0.32	2.0	1.70	7	0.188	4.77	27	28	no	zero	0.00	
215.8	11.3	37.2	92	18	109	0.36	4043	4043	3466	179.17	1.1435	0.79	132.74	0.65	0.81	no	0.3598	0.240	0.32	2.0	1.70	7	0.188	4.77	28	29	no	zero	0.00	
215.6	11.4	37.4	92	18	109	0.35	4060	4060	3474	184.31	1.1548	0.80	137.02	0.63	0.81	no	0.3602	0.240	0.32	2.0	1.68	7	0.189	4.77	29	30	no	zero	0.00	
215.4	11.4	37.6	92	18	109	0.35	4078	4078	3481	183.04	0.8735	0.79	135.69	0.48	0.81	no	0.3605	0.230	0.31	2.0	1.61	6	0.191	4.78	28	29	no	zero	0.00	
215.3	11.5	37.7	92	18	109	0.37	4096	4096	3489	172.3	0.7466	0.78	128.13	0.44	0.81	no	0.3608	0.213	0.29	2.0	1.62	6	0.191	4.78	26	27	no	zero	0.00	
215.1	11.5	37.9	92	18	109	0.39	4114	4114	3496	155.13	0.7156	0.77	111.25	0.47	0.81	no	0.3612	0.217	0.29	2.0	1.68	7	0.189	4.77	23	24	no	zero	0.00	
214.9	11.6	38.1	92	18	109	0.42	4132	4132	3504	141.35	0.7605	0.76	99.52	0.55	0.81	no	0.3615	0.197	0.27	2.0	1.76	8	0.186	4.75	21	22	no	zero	0.00	
214.8	11.6	38.2	92	18	109	0.42	4149	4149	3512	138.9	0.8866	0.75	97.31	0.65	0.81	no	0.3618	0.217	0.29	2.0	1.81	9	0.185	4.74	21	22	no	zero	0.00	
214.6	11.7	38.4	92	18	109	0.42	4167	4167	3519	140.02	0.9384	0.75	98.05	0.68	0.81	no	0.3621	0.217	0.29	2.0	1.82	9	0.184	4.74	21	22	no	zero	0.00	
214.5	11.7	38.5	92	18	109	0.43	4185	4185	3527	131.71	0.9887	0.74	91.06	0.76	0.80	no	0.3624	0.230	0.31	2.0	1.87	11	0.182	4.72	19	21	no	zero	0.00	
214.3	11.8	38.7	92	18	109	0.45	4203	4203	3534	125.79	1.2355	0.74	86.08	1.00	0.80	no	0.3627	0.257	0.35	2.0	1.96	13	0.179	4.70	18	20	no	zero	0.00	
214.1	11.8	38.9	92	18	109	0.43	4221	4221	3542	136.04	1.3884	0.74	94.24	1.04	0.80	no	0.3630	0.273	0.37	2.0	1.94	12	0.180	4.70	20	20	no	zero	0.00	
214.0	11.9	39.0	92	18	109	0.40	4238	4238	3549	152.15	1.3027	0.76	107.40	0.87	0.80	no	0.3633	0.260	0.35	2.0	1.85	10	0.183	4.73	23	25	no	zero	0.00	
213.8	11.9	39.2	92	18	109	0.39	4256	4256	3557	155.57	0.9016	0.76	110.08	0.59	0.80	no	0.3636	0.225	0.30	2.0	1.74	8	0.187	4.76	23	24	no	zero	0.00	
213.6	12.0	39.4	92	18	109	0.40	4274	4274	3565	150.86	0.7148	0.75	105.95	0.48	0.80	no	0.3638	0.210	0.28	2.0	1.70	7	0.188	4.76	22	23	no	zero	0.00	
213.5	12.0	39.5	92	18	109	0.41	4292	4292	3572	145.37	0.6961	0.75	101.21	0.49	0.80	no	0.3641	0.210	0.28	2.0	1.72	8	0.188	4.76	21	22	no	zero	0.00	
213.3	12.1	39.7	92	18	109	0.40	4310	4310	3580	151.19	0.8317	0.75	105.86	0.56	0.80	no	0.3644	0.220	0.30	2.0	1.74	8	0.187	4.76	22	23	no	zero	0.00	
213.1	12.1	39.9	92	18	109	0.37	4327	4327	3587	173.84	1.0261	0.77	124.84	0.60	0.80	no	0.3646	0.230	0.31	2.0	1.70	7	0.188	4.76	26	27	no	zero	0.00	
213.0	12.2	40.0	92	18	109	0.34	4345	4345	3595	192.19	1.1227	0.78	140.58	0.59	0.80	no	0.3649	0.240	0.32	2.0	1.65	6	0.190	4.77	29	30	no	zero	0.00	
212.8	12.2	40.2	92	18	109	0.36	4363	4363	3602	180.92	1.0948	0.77	130.55	0.61	0.79	no	0.3651	0.240	0.32	2.0	1.69	7	0.189	4.77	27	28	no	zero	0.00	
212.6	12.3	40.4	92	18	109	0.37	4381	4381	3610	172.47	1.0748	0.77	123.09	0.63	0.79	no	0.3654	0.237	0.32	2.0	1.72	7	0.188	4.76	26	27	no	zero	0.00	
212.5	12.3	40.5	92	18	109	0.35	4399	4399	3618	186.73	1.2122	0.78	135.21	0.66	0.79	no	0.3656	0.245	0.33	2.0	1.69	7	0.188	4.77	28	29	no	zero	0.00	
212.3	12.4	40.7	92	18	109	0.33	4416	4416	3625	200.25	0.8687	0.78	146.88	0.44	0.79	no	0.3659	0.227	0.31	2.0	1.56	5	0.192	4.79	31	31	no	zero	0.00	
212.2	12.4	40.8	92	18	109	0.35	4434	4434	3633	187.2	0.9521	0.77	135.22	0.51	0.79	no	0.3661	0.230	0.31	2.0	1.63	6	0.190	4.78	28	29	no	zero	0.00	
212.0	12.5	41.0	92	18	109	0.34	4452	4452	3640	193.51	0.9963	0.78	140.54	0.52	0.79	no	0.3663	0.237	0.32	2.0	1.62	6	0.191	4.78	29	30	no	zero	0.00	
211.8	12.5	41.2	92	18	109	0.35	4470	4470	3648	187.6	1.0639	0.77	135.18	0.57	0.79	no	0.3666	0.235	0.32	2.0	1.66	6	0.190	4.77	28	29	no	zero	0.00	
211.7	12.6	41.3	92	18	109	0.33	4488	4488	3655	200.82	1.0184	0.78	146.59	0.51	0.79	no	0.3668	0.237	0.32	2.0	1.60	5	0.191	4.78	31	32	no	zero	0.00	
211.5	12.6	41.5	92	18	109	0.34	4506	4506	3663	195.1	0.8778	0.78	141.35	0.46	0.79	no	0.3670	0.237	0.32	2.0	1.59	5	0.192	4.79	30	31	no	zero	0.00	
211.3	12.7	41.7	92	18	109	0.40	4523	4523	3671	151.38	0.7072	0.74	103.91	0.47	0.78	no	0.3672	0.210	0.28	2.0	1.71	7	0.188	4.76	22	23	no	zero	0.00	
211.2	12.7	41.8	92	18	109	0.46	4541	4541	3678	117.21	0.5607	0.70	76.31	0.69	0.78	no	0.3674	0.190	0.22	2.0	1.83	10	0.184	4.73	16	17	no	zero	0.00	
211.0	12.8	42.0	92	18	109	0.53	4559	4559	3686	85.83	0.6202	0.67																		

Elevation	Depth	In-Situ Soil Condition					Overburden Stress Effective		CPT Input		Overburden Resistance C _{eq}	Normalized Tip Resistance q _{c1}	Normalized Friction Ratio F	Depth Reduction Factor r _d	Robertson's ECPT Chart Check Liquefiable yes/no	Cyclic Stress Ratio CSR	Cyclic Resistance Ratio CRR ₁	Magnitude Adjusted CRR CRR	Liquefaction Factor of Safety FS _{eq}	Soil-Type Behavior Index I _c	Fines Content AFC	Mean Grain Size D ₅₀	CPT/SPT Correlation Factor q _N /N	Equivalent SPT N	Corrected SPT (Clean Sand) N _{clean}	Vertical Strain ϕ	Liquefaction Induced Settlement	Cumulative Settlement	
		Dry Density γ _{d,s} pcf	Percent Moisture w %	Moist Density γ _{m,s} pcf	Stress Exponent n	Total σ _o psf	Current GW																						
							σ _v psf	HHGWL σ _v psf																					
									q _c tsf	f _s tsf																			
204.8	14.7	48.2	92	18	109	0.43	5236	5159	3973	134.44	1.0778	0.68	84.92	0.82	0.74	yes	0.3724	0.230	0.31	0.8	1.91	12	0.181	4.71	18	20	0.015	0.03	0.24
204.6	14.7	48.4	92	18	109	0.50	5253	5167	3981	100.23	1.7438	0.64	59.15	1.79	0.74	yes	0.3724	0.265	0.36	1.0	2.25	22	0.164	4.59	13	18	0.020	0.04	0.28
204.4	14.8	48.6	92	18	109	0.57	5271	5174	3989	70.25	1.9552	0.60	38.28	2.89	0.74	no	0.3725	0.285	0.38	2.0	2.53	33	0.146	4.44	9	15	no	zero	0.28
204.3	14.8	48.7	92	18	109	0.58	5289	5182	3996	66.29	2.622	0.59	35.63	4.12	0.74	no	0.3726	0.285	0.38	2.0	2.65	39	0.136	4.36	8	15	no	zero	0.28
204.1	14.9	48.9	92	18	109	0.61	5307	5189	4004	58.72	2.6871	0.58	30.70	4.79	0.74	no	0.3726	0.280	0.38	2.0	2.75	44	0.127	4.28	7	13	no	zero	0.28
204.0	14.9	49.0	92	18	109	0.69	5325	5197	4011	38.45	1.9508	0.54	18.27	5.45	0.74	no	0.3726	0.263	0.35	2.0	2.95	56	0.107	4.09	4	9	no	zero	0.28
203.8	15.0	49.2	92	18	109	0.72	5343	5204	4019	32.15	1.7633	0.53	14.63	5.98	0.74	no	0.3727	0.251	0.34	2.0	3.05	63	0.096	3.97	4	9	no	zero	0.28
203.6	15.0	49.4	92	18	109	0.64	5360	5212	4026	49.03	2.2543	0.56	24.55	4.86	0.74	no	0.3727	0.269	0.36	2.0	2.82	48	0.120	4.22	6	12	no	zero	0.28
203.5	15.1	49.5	92	18	109	0.62	5378	5220	4034	56.32	2.276	0.57	29.05	4.24	0.74	no	0.3728	0.274	0.37	2.0	2.73	43	0.129	4.30	7	13	no	zero	0.28
203.3	15.1	49.7	92	18	109	0.68	5396	5227	4042	39.58	1.4272	0.54	18.84	3.87	0.74	no	0.3728	0.263	0.35	2.0	2.84	50	0.118	4.20	4	9	no	zero	0.28
203.1	15.2	49.9	92	18	109	0.63	5414	5235	4049	51.37	0.955	0.56	25.91	1.96	0.73	yes	0.3728	0.243	0.33	0.9	2.55	34	0.144	4.43	6	11	0.025	0.05	0.32
203.0	15.2	50.0	92	18	109	0.48	5432	5242	4057	106.16	1.0782	0.64	62.97	1.04	0.73	yes	0.3729	0.230	0.31	0.8	2.08	16	0.173	4.66	14	19	0.015	0.03	0.35
202.8	15.3	50.2	92	18	109	0.46	5449	5250	4064	120.14	1.1206	0.66	73.28	0.95	0.73	yes	0.3729	0.250	0.34	0.9	2.00	14	0.177	4.68	16	18	0.020	0.04	0.39
202.6	15.3	50.4	92	18	109	0.47	5467	5257	4072	114.62	1.3464	0.65	69.10	1.20	0.73	yes	0.3729	0.258	0.35	0.9	2.09	16	0.173	4.66	15	20	0.015	0.03	0.42
202.5	15.4	50.5	92	18	109	0.48	5485	5265	4079	108.88	1.4195	0.65	64.81	1.34	0.73	yes	0.3729	0.245	0.33	0.9	2.14	18	0.170	4.64	14	19	0.015	0.03	0.45
202.3	15.4	50.7	92	18	109	0.47	5503	5273	4087	113.52	1.3211	0.65	68.18	1.19	0.73	yes	0.3729	0.245	0.33	0.9	2.09	16	0.173	4.65	15	20	0.015	0.03	0.48
202.1	15.5	50.9	92	18	109	0.45	5521	5280	4095	122.18	1.0727	0.66	74.61	0.90	0.73	yes	0.3730	0.230	0.31	0.8	1.98	13	0.178	4.69	16	18	0.020	0.04	0.52
202.0	15.5	51.0	92	18	109	0.44	5538	5288	4102	131.06	0.9378	0.67	81.32	0.73	0.73	yes	0.3730	0.213	0.29	0.8	1.90	11	0.181	4.72	17	19	0.015	0.03	0.55
201.8	15.6	51.2	92	18	109	0.43	5556	5295	4110	136.3	0.8981	0.68	85.31	0.67	0.73	yes	0.3730	0.203	0.27	0.7	1.86	10	0.183	4.73	18	20	0.015	0.03	0.58
201.7	15.6	51.3	92	18	109	0.42	5574	5303	4117	138.42	0.8336	0.68	86.91	0.61	0.73	yes	0.3730	0.203	0.27	0.7	1.83	10	0.184	4.73	18	19	0.015	0.03	0.61
201.5	15.7	51.5	92	18	109	0.44	5592	5310	4125	130.34	0.9917	0.67	80.60	0.78	0.72	yes	0.3730	0.220	0.30	0.8	1.92	12	0.180	4.71	17	19	0.015	0.03	0.64
201.3	15.7	51.7	92	18	109	0.47	5610	5318	4132	112.14	1.3854	0.65	66.85	1.27	0.72	yes	0.3730	0.258	0.35	0.9	2.11	17	0.172	4.65	14	19	0.015	0.03	0.67
201.2	15.8	51.8	92	18	109	0.50	5627	5326	4140	96.98	1.8653	0.63	55.84	1.98	0.72	yes	0.3730	0.283	0.38	1.0	2.30	23	0.161	4.57	12	17	0.020	0.04	0.71
201.0	15.8	52.0	92	18	109	0.51	5645	5333	4148	96.29	2.4621	0.63	55.30	2.63	0.72	no	0.3730	0.300	0.41	2.0	2.38	27	0.156	4.53	12	18	no	zero	0.71
200.8	15.9	52.2	92	18	109	0.57	5663	5341	4155	72.5	2.8458	0.59	38.97	4.08	0.72	no	0.3730	0.285	0.38	2.0	2.62	38	0.138	4.38	9	16	no	zero	0.71
200.7	15.9	52.3	92	18	109	0.66	5681	5348	4163	44.23	1.7102	0.54	21.19	4.13	0.72	no	0.3730	0.289	0.36	2.0	2.82	48	0.120	4.22	5	11	no	zero	0.71
200.5	16.0	52.5	92	18	109	0.75	5699	5356	4170	25.71	1.1738	0.50	10.75	5.13	0.72	no	0.3730	0.240	0.32	2.0	3.11	67	0.089	3.89	3	8	no	zero	0.71
200.3	16.0	52.7	92	18	109	0.77	5716	5363	4178	22.33	0.6842	0.49	8.97	3.51	0.72	no	0.3730	0.236	0.32	2.0	3.07	65	0.093	3.93	2	7	no	zero	0.71
200.2	16.1	52.8	92	18	109	0.78	5734	5371	4185	21.94	0.5086	0.49	8.75	2.67	0.72	no	0.3729	0.236	0.32	2.0	3.02	61	0.100	4.01	2	7	no	zero	0.71
200.0	16.1	53.0	92	18	109	0.77	5752	5379	4193	22.52	0.4469	0.49	9.04	2.28	0.72	no	0.3729	0.238	0.32	2.0	2.97	57	0.105	4.07	2	7	no	zero	0.71
199.9	16.2	53.1	92	18	109	0.77	5770	5386	4201	22.42	0.6052	0.49	8.97	3.10	0.72	no	0.3729	0.236	0.32	2.0	3.04	62	0.097	3.98	2	7	no	zero	0.71
199.7	16.2	53.3	92	18	109	0.77	5788	5394	4208	22.52	0.5867	0.49	9.01	2.99	0.71	no	0.3729	0.238	0.32	2.0	3.03	62	0.098	3.99	2	7	no	zero	0.71
199.5	16.3	53.5	92	18	109	0.78	5806	5401	4216	21.56	0.4872	0.48	8.51	2.61	0.71	no	0.3729	0.236	0.32	2.0	3.02	61	0.099	4.00	2	7	no	zero	0.71
199.4	16.3	53.6	92	18	109	0.79	5823	5409	4223	19.52	0.4759	0.48	7.46	2.87	0.71	no	0.3728	0.233	0.32	2.0	3.09	66	0.091	3.91	2	6	no	zero	0.71
199.2	16.4	53.8	92	18	109	0.79	5841	5416	4231	19.95	0.486	0.48	7.66	2.85	0.71	no	0.3728	0.233	0.32	2.0	3.08	65	0.093	3.93	2	6	no	zero	0.71
199.0	16.4	54.0	92	18	109	0.78	5859	5424	4238	21.67	0.6425	0.48	8.52	3.43	0.71	no	0.3728	0.236	0.32	2.0	3.09	66	0.092	3.92	2	7	no	zero	0.71
198.9	16.5	54.1	92	18	109	0.77	5877	5432	4246	23.19	0.8242	0.49	9.29	4.07	0.71	no	0.3727	0.238	0.32	2.0	3.00	66	0.090	3.90	2	7	no	zero	0.71
198.7	16.5	54.3	92	18	109	0.75	5895	5439	4254	23.67	0.7977	0.49	10.56	3.51	0.71	no	0.3727	0.240	0.32	2.0	3.02	61	0.100	4.01	3	8	no	zero	0.71
198.6	16.5	54.5	92	18	109	0.76	5912	5447	4261	24.71	0.6622	0.49	10.05	3.04	0.71	no													

Elevation	Depth	In-Situ Soil Condition					Stress Exponent n	Total σ _o psf	Overburden Stress Effective		CPT Input		Overburden Resistance C _q	Normalized Tip Resistance q _{t1}	Normalized Friction Ratio F	Depth Reduction Factor r _d	Robertson's ECPT Chart Check Liquefiable yes/no	Cyclic Stress Ratio CSR	Cyclic Resistance Ratio CRR _c	Magnitude Adjusted CRR CRR	Liquefaction Factor of Safety FS _{eq}	Soil-Type Behavior Index I _c	Fines Content AFC	Mean Grain Size D ₅₀	CPT/SPT Correlation Factor q _c /N	Equivalent SPT N	Corrected SPT (Clean Sand) N _{clean}	Vertical Strain ϕ	Liquefaction Induced Settlement	Cumulative Settlement
		Dry Density γ _{so} pcf	Percent Moisture W %	Moist Density γ _{mo} pcf	σ _o psf	HHGW σ _o psf			q _c tsf	Sleeve Friction f _s tsf																				
		γ _{so}	W	γ _{mo}																										
											Current GW σ _o psf	HHGW σ _o psf																		
192.3	18.5	60.7	92	18	109	0.73	6589	5735	4549	28.72	1.6585	0.48	11.56	6.52	0.67	no	0.3699	0.240	0.32	2.0	3.15	70	0.084	3.82	3	8	no	zero	0.87	
192.1	18.5	60.9	92	18	109	0.65	6607	5742	4556	46.01	2.1754	0.52	21.01	5.09	0.67	no	0.3698	0.269	0.36	2.0	2.89	52	0.114	4.16	5	11	no	zero	0.87	
192.0	18.6	61.0	92	18	109	0.64	6625	5750	4564	50.95	2.3797	0.53	23.86	5.00	0.67	no	0.3697	0.269	0.36	2.0	2.84	49	0.119	4.20	6	12	no	zero	0.87	
191.8	18.6	61.2	92	18	109	0.67	6643	5757	4572	42.04	1.848	0.51	18.71	4.77	0.67	no	0.3696	0.263	0.35	2.0	2.90	53	0.112	4.14	5	10	no	zero	0.87	
191.6	18.7	61.4	92	18	109	0.71	6660	5765	4579	33.5	1.5699	0.49	14.01	5.20	0.67	no	0.3695	0.251	0.34	2.0	3.02	61	0.099	4.00	4	9	no	zero	0.87	
191.5	18.7	61.5	92	18	109	0.72	6678	5772	4587	30.43	1.5199	0.48	12.37	5.61	0.67	no	0.3694	0.246	0.33	2.0	3.09	66	0.092	3.92	3	8	no	zero	0.87	
191.3	18.8	61.7	92	18	109	0.70	6696	5780	4594	35.89	1.817	0.50	15.26	5.58	0.67	no	0.3693	0.251	0.34	2.0	3.02	61	0.100	4.01	4	9	no	zero	0.87	
191.2	18.8	61.8	92	18	109	0.64	6714	5788	4602	50.6	2.6126	0.53	23.53	5.53	0.67	no	0.3692	0.269	0.36	2.0	2.87	51	0.115	4.17	6	12	no	zero	0.87	
191.0	18.9	62.0	92	18	109	0.54	6732	5795	4609	82.98	3.3284	0.58	43.73	4.18	0.67	no	0.3691	0.290	0.39	2.0	2.60	36	0.140	4.40	10	17	no	zero	0.87	
190.8	18.9	62.2	92	18	109	0.41	6749	5803	4617	143.49	3.985	0.66	87.19	2.84	0.66	no	0.3690	0.310	0.42	2.0	2.27	22	0.163	4.58	19	25	no	zero	0.87	
190.7	19.0	62.3	92	18	109	0.34	6767	5810	4625	195.42	3.8683	0.71	129.28	2.01	0.66	no	0.3689	0.333	0.45	2.0	2.04	15	0.175	4.67	28	34	no	zero	0.87	
190.5	19.0	62.5	92	18	109	0.33	6785	5818	4632	202	3.6052	0.72	134.84	1.82	0.66	yes	0.3688	0.328	0.44	1.2	2.00	14	0.177	4.69	29	31	0.001	0.00	0.87	
190.3	19.1	62.7	92	18	109	0.32	6803	5825	4640	205.64	3.5482	0.72	137.92	1.75	0.66	yes	0.3687	0.315	0.43	1.2	1.98	13	0.178	4.69	29	31	0.001	0.00	0.87	
190.2	19.1	62.8	92	18	109	0.31	6821	5833	4647	213.6	3.4777	0.73	144.77	0.90	0.66	yes	0.3686	0.285	0.36	1.0	1.76	8	0.186	4.75	30	31	0.001	0.00	0.87	
190.0	19.2	63.0	92	18	109	0.32	6838	5841	4655	206.09	1.4902	0.72	138.18	0.74	0.66	yes	0.3684	0.250	0.34	0.9	1.72	7	0.188	4.76	29	30	0.001	0.00	0.88	
189.8	19.2	63.2	92	18	109	0.33	6856	5848	4662	201.8	1.4632	0.72	134.42	0.74	0.66	yes	0.3683	0.250	0.34	0.9	1.73	8	0.187	4.76	28	29	0.010	0.02	0.90	
189.7	19.3	63.3	92	18	109	0.41	6874	5856	4670	146.17	2.4168	0.66	88.89	1.69	0.66	yes	0.3682	0.287	0.39	1.1	2.10	17	0.172	4.65	19	25	0.010	0.02	0.92	
189.5	19.3	63.5	92	18	109	0.56	6892	5863	4678	76.03	2.9566	0.57	38.89	4.07	0.66	no	0.3681	0.285	0.38	2.0	2.62	38	0.138	4.38	9	16	no	zero	0.92	
189.4	19.4	63.6	92	18	109	0.64	6910	5871	4685	50.52	2.7845	0.52	23.23	5.92	0.66	no	0.3679	0.269	0.36	2.0	2.90	53	0.113	4.14	6	12	no	zero	0.92	
189.2	19.4	63.8	92	18	109	0.69	6927	5878	4693	37.91	1.9968	0.50	16.12	5.80	0.66	no	0.3678	0.257	0.35	2.0	3.01	60	0.101	4.02	4	9	no	zero	0.92	
189.0	19.5	64.0	92	18	109	0.71	6945	5886	4700	33.51	1.4301	0.48	13.75	4.76	0.66	no	0.3677	0.246	0.33	2.0	3.01	60	0.101	4.02	3	8	no	zero	0.92	
188.9	19.5	64.1	92	18	109	0.70	6963	5894	4708	34.82	1.8161	0.49	14.42	5.80	0.65	no	0.3676	0.251	0.34	2.0	3.05	63	0.097	3.97	4	9	no	zero	0.92	
188.7	19.6	64.3	92	18	109	0.67	6981	5901	4715	42.69	2.0624	0.50	18.69	5.26	0.65	no	0.3675	0.263	0.35	2.0	2.93	55	0.109	4.11	5	10	no	zero	0.92	
188.5	19.6	64.5	92	18	109	0.65	6999	5909	4723	48.18	2.6607	0.52	21.76	5.95	0.65	no	0.3673	0.269	0.36	2.0	2.92	54	0.110	4.12	5	11	no	zero	0.92	
188.4	19.7	64.6	92	18	109	0.61	7017	5916	4731	58.46	3.3562	0.53	27.76	6.48	0.65	no	0.3672	0.274	0.37	2.0	2.87	51	0.116	4.17	7	13	no	zero	0.92	
188.2	19.7	64.8	92	18	109	0.57	7034	5924	4738	69.88	4.5714	0.55	34.73	6.89	0.65	no	0.3671	0.280	0.38	2.0	2.82	48	0.120	4.22	8	15	no	zero	0.92	
188.0	19.8	65.0	92	18	109	0.51	7052	5931	4746	93.75	5.6458	0.59	50.28	6.26	0.65	no	0.3670	0.300	0.41	2.0	2.68	41	0.133	4.34	12	19	no	zero	0.92	
187.9	19.8	65.1	92	18	109	0.48	7070	5939	4753	110.64	6.5544	0.61	61.97	6.12	0.65	no	0.3668	0.300	0.41	2.0	2.62	37	0.139	4.38	14	22	no	zero	0.92	
187.7	19.9	65.3	92	18	109	0.48	7088	5947	4761	108.76	6.8604	0.61	60.59	6.52	0.65	no	0.3667	0.300	0.41	2.0	2.64	39	0.136	4.36	14	21	no	zero	0.92	
187.5	19.9	65.5	92	18	109	0.51	7106	5954	4768	96.19	6.4788	0.59	51.83	6.99	0.65	no	0.3666	0.300	0.41	2.0	2.71	42	0.131	4.31	12	19	no	zero	0.92	
187.4	20.0	65.6	92	18	109	0.50	7123	5962	4776	99.04	5.5675	0.60	53.74	5.83	0.65	no	0.3664	0.300	0.41	2.0	2.84	38	0.137	4.37	12	19	no	zero	0.92	
187.2	20.0	65.8	92	18	109	0.43	7141	5969	4784	137.15	2.4938	0.64	81.22	1.87	0.65	yes	0.3663	0.298	0.40	1.1	2.16	19	0.169	4.63	18	23	0.015	0.03	0.94	
187.1	20.1	65.9	92	18	109	0.42	7159	5977	4791	140.57	2.0492	0.65	83.77	1.50	0.65	yes	0.3662	0.277	0.37	1.0	2.08	16	0.173	4.66	18	23	0.015	0.03	0.97	
186.9	20.1	66.1	92	18	109	0.52	7177	5984	4799	88.73	2.5234	0.58	46.65	2.96	0.64	no	0.3661	0.295	0.40	2.0	2.47	30	0.150	4.48	10	16	no	zero	0.97	
186.7	20.2	66.3	92	18	109	0.61	7195	5992	4806	58.9	2.5457	0.53	27.76	4.60	0.64	no	0.3659	0.274	0.37	2.0	2.77	45	0.126	4.27	7	13	no	zero	0.97	
186.6	20.2	66.4	92	18	109	0.67	7212	6000	4814	42.67	2.2178	0.50	18.42	5.68	0.64	no	0.3658	0.263	0.35	2.0	2.96	57	0.106	4.08	5	10	no	zero	0.97	
186.4	20.3	66.6	92	18	109	0.68	7230	6007	4822	40.83	1.3633	0.49	17.39	3.66	0.64	no	0.3657	0.257	0.35	2.0	2.86	50	0.117	4.49	4	9	no	zero	0.97	
186.2	20.3	66.8	92	18	109	0.66	7248	6015	4829	44.76	2.2391	0.50	19.53	5.44	0.64	no	0.3655	0.263	0.35	2.0	2.82	55	0.110	4.11	5	10	no	zero	0.97	
186.1	20.4	66.9	92	18	109	0.59	7266	6022	4837	65.52	2.7702	0.54	31.66	4.48	0.64	no	0.3654	0.280	0.38	2.0	2.72									

Elevation	Depth		In-Situ Soil Condition				Overburden Stress				CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement	
			Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Effective		Tip Resistance	Sleeve Friction																				
								Current GW	HHGWL			q_c tsf																			f_s tsf
ft	m	ft										C_q	q_{c1}	F	r_d	Liquefiable yes/no	CSR	CRR _i	CRR	FS_{eq}	I_c	AFC	D_{50}	q_c/N	N	N_{clean}	ϕ	(in)	(in)		
179.8	22.3	73.2	92	18	109	0.44	7943	6310	5124	128.87	5.5671	0.62	72.98	4.46	0.61	no	0.3600	0.300	0.41	2.0	2.46	30	0.150	4.48	16	23	no	zero	0.98		
179.7	22.3	73.3	92	18	109	0.54	7960	6318	5132	81.53	5.1535	0.55	40.50	6.65	0.61	no	0.3598	0.290	0.39	2.0	2.76	45	0.126	4.27	9	16	no	zero	0.98		
179.5	22.4	73.5	92	18	109	0.63	7978	6325	5140	52.38	3.0835	0.50	22.94	6.37	0.61	no	0.3597	0.269	0.36	2.0	2.92	54	0.110	4.12	6	12	no	zero	0.98		
179.3	22.4	73.7	92	18	109	0.69	7996	6333	5147	37.11	2.6994	0.47	14.66	8.15	0.61	no	0.3595	0.251	0.34	2.0	3.14	69	0.086	3.84	4	9	no	zero	0.98		
179.2	22.5	73.8	92	18	109	0.65	8014	6340	5155	48.12	2.8987	0.49	20.53	6.57	0.61	no	0.3594	0.269	0.36	2.0	2.97	57	0.105	4.07	5	11	no	zero	0.98		
179.0	22.5	74.0	92	18	109	0.57	8032	6348	5162	72.69	3.8982	0.54	34.85	5.68	0.61	no	0.3592	0.280	0.38	2.0	2.76	45	0.126	4.27	8	15	no	zero	0.98		
178.9	22.6	74.1	92	18	109	0.52	8049	6355	5170	92.16	5.1265	0.57	47.22	5.82	0.61	no	0.3591	0.295	0.40	2.0	2.68	40	0.134	4.34	11	18	no	zero	0.98		
178.7	22.6	74.3	92	18	109	0.53	8067	6363	5177	86.13	4.7281	0.56	43.26	5.76	0.61	no	0.3589	0.290	0.39	2.0	2.70	41	0.132	4.32	10	17	no	zero	0.98		
178.5	22.7	74.5	92	18	109	0.55	8085	6371	5185	76.95	4.2398	0.54	37.40	5.82	0.61	no	0.3588	0.285	0.38	2.0	2.75	44	0.128	4.28	9	16	no	zero	0.98		
178.4	22.7	74.6	92	18	109	0.39	8103	6378	5193	159.34	3.335	0.65	95.61	2.15	0.61	no	0.3586	0.320	0.43	2.0	2.15	18	0.170	4.63	21	27	no	zero	0.98		

Project: Proposed Mixed Use Development
Probe ID: CPT-3
Date: 2/3/2011

Design Earthquake Magnitude 6.66 MW
Magnitude Scaling Factor (MSF) 1.35 %
pgs 0.584 g
Groundwater Depth: 32 ft
Elevation at GS 237.0 ft
HHGWL 12.0 ft

total settlement
(inch)
1.06

total settlement
below BOF (inch)
1.06

note: eff overburden set to depth increments of 0.1 meter

Elevation	Depth		In-Situ Soil Condition					Overburden Stress Effective			CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement
			Dry Density	Percent Moisture	Moist Density	Stress Exponent		σ _o	σ' _o	HHGWL	Tip Resistance	Sleeve Friction																		
			γ _{so}	w	γ _m	n		psf	psf	psf	q _{tsf}	f _{tsf}																		
ft	m	ft	pcf	%	pcf												yes/no	CSR	CRR _r	CRR	F _s _{eq}	I _c	AFC	D ₅₀	q _c /N	N	N _{clean}	ϕ	(in)	(in)
236.8	0.0	0.2	92	18	109	0.54	18	18	18	80.82	0	1.70	129.80	0.01	1.000	no	0.3796	0.165	0.22	2.0	1.56	5	0.192	4.79	27	27	no	zero	0.00	
236.7	0.1	0.3	92	18	109	0.50	36	36	36	98.85	0.8173	1.70	158.74	0.83	1.00	no	0.3796	0.267	0.36	2.0	1.70	7	0.188	4.76	33	34	no	zero	0.00	
236.5	0.1	0.5	92	18	109	0.45	53	53	53	122.43	0.8461	1.70	196.60	0.69	1.00	no	0.3796	0.260	0.35	2.0	1.58	5	0.192	4.79	41	42	no	zero	0.00	
236.3	0.2	0.7	92	18	109	0.36	71	71	71	178.63	0.9649	1.70	286.86	0.54	1.00	no	0.3796	0.250	0.34	2.0	1.39	2	0.196	4.82	60	60	no	zero	0.00	
236.2	0.2	0.8	92	18	109	0.37	89	89	89	173.67	0.8587	1.70	278.88	0.49	1.00	no	0.3796	0.250	0.34	2.0	1.37	2	0.196	4.82	58	58	no	zero	0.00	
236.0	0.3	1.0	92	18	109	0.41	107	107	107	145.07	0.5519	1.70	232.93	0.38	1.00	no	0.3796	0.240	0.32	2.0	1.36	2	0.197	4.82	48	48	no	zero	0.00	
235.9	0.3	1.1	92	18	109	0.45	125	125	125	123.28	0.282	1.70	197.91	0.23	1.00	no	0.3796	0.230	0.31	2.0	1.31	1	0.198	4.83	41	41	no	zero	0.00	
235.7	0.4	1.3	92	18	109	0.49	142	142	142	105.54	0.1907	1.70	169.40	0.18	1.00	no	0.3796	0.230	0.31	2.0	1.33	2	0.197	4.82	35	35	no	zero	0.00	
235.5	0.4	1.5	92	18	109	0.52	160	160	160	90.19	0.1734	1.70	144.73	0.19	1.00	no	0.3796	0.210	0.28	2.0	1.40	3	0.196	4.82	30	30	no	zero	0.00	
235.4	0.5	1.6	92	18	109	0.55	178	178	178	77.92	0.1479	1.70	125.01	0.19	1.00	no	0.3796	0.190	0.26	2.0	1.46	3	0.195	4.81	26	26	no	zero	0.00	
235.2	0.5	1.8	92	18	109	0.57	196	196	196	70.16	0.1223	1.70	112.53	0.17	1.00	no	0.3796	0.180	0.24	2.0	1.49	4	0.194	4.80	23	23	no	zero	0.00	
235.0	0.6	2.0	92	18	109	0.60	214	214	214	62	0.109	1.70	99.41	0.18	1.00	no	0.3796	0.142	0.19	2.0	1.54	4	0.193	4.79	21	21	no	zero	0.00	
234.9	0.6	2.1	92	18	109	0.61	232	232	232	57.27	0.1061	1.70	91.80	0.19	1.00	no	0.3796	0.142	0.19	2.0	1.58	5	0.192	4.79	19	20	no	zero	0.00	
234.7	0.7	2.3	92	18	109	0.62	249	249	249	54.09	0.101	1.70	86.68	0.19	1.00	no	0.3795	0.113	0.15	2.0	1.61	6	0.191	4.78	18	19	no	zero	0.00	
234.5	0.7	2.5	92	18	109	0.64	267	267	267	48.38	0.1024	1.70	77.49	0.21	1.00	no	0.3793	0.100	0.14	2.0	1.67	7	0.189	4.77	16	17	no	zero	0.00	
234.4	0.8	2.6	92	18	109	0.66	285	285	285	44.9	0.078	1.70	71.89	0.17	1.00	no	0.3791	0.085	0.11	2.0	1.68	7	0.189	4.77	15	16	no	zero	0.00	
234.2	0.8	2.8	92	18	109	0.66	303	303	303	43.3	0.0857	1.70	69.31	0.20	1.00	no	0.3789	0.071	0.10	2.0	1.71	7	0.188	4.76	15	16	no	zero	0.00	
234.0	0.9	3.0	92	18	109	0.66	321	321	321	43.78	0.0698	1.70	70.06	0.16	1.00	no	0.3786	0.085	0.11	2.0	1.68	7	0.189	4.77	15	16	no	zero	0.00	
233.9	0.9	3.1	92	18	109	0.64	338	338	338	48.55	0.0761	1.70	77.71	0.16	1.00	no	0.3784	0.085	0.11	2.0	1.63	6	0.190	4.78	16	17	no	zero	0.00	
233.7	1.0	3.3	92	18	109	0.63	356	356	356	51.24	0.0981	1.70	82.02	0.19	1.00	no	0.3782	0.113	0.15	2.0	1.64	6	0.190	4.78	17	18	no	zero	0.00	
233.6	1.0	3.4	92	18	109	0.63	374	374	374	51.41	0.1001	1.70	82.27	0.20	1.00	no	0.3780	0.113	0.15	2.0	1.64	6	0.190	4.78	17	18	no	zero	0.00	
233.4	1.1	3.6	92	18	109	0.63	392	392	392	51.4	0.1125	1.70	82.24	0.22	1.00	no	0.3777	0.123	0.17	2.0	1.65	6	0.190	4.77	17	18	no	zero	0.00	
233.2	1.1	3.8	92	18	109	0.64	410	410	410	50.62	0.0874	1.70	80.98	0.17	0.99	no	0.3775	0.113	0.15	2.0	1.63	6	0.190	4.78	17	18	no	zero	0.00	
233.1	1.2	3.9	92	18	109	0.63	427	427	427	53.55	0.1039	1.70	85.67	0.19	0.99	no	0.3773	0.113	0.15	2.0	1.62	6	0.191	4.78	18	19	no	zero	0.00	
232.9	1.2	4.1	92	18	109	0.62	445	445	445	56.45	0.108	1.70	90.31	0.19	0.99	no	0.3770	0.142	0.19	2.0	1.60	5	0.191	4.78	19	20	no	zero	0.00	
232.7	1.3	4.3	92	18	109	0.60	463	463	463	62.51	0.1077	1.70	100.03	0.19	0.99	no	0.3768	0.170	0.23	2.0	1.55	5	0.192	4.79	21	21	no	zero	0.00	
232.6	1.3	4.4	92	18	109	0.58	481	481	481	67.38	0.122	1.70	107.84	0.18	0.99	no	0.3766	0.170	0.23	2.0	1.52	4	0.193	4.80	22	22	no	zero	0.00	
232.4	1.4	4.6	92	18	109	0.57	499	499	499	72.01	0.1341	1.70	115.26	0.19	0.99	no	0.3763	0.180	0.24	2.0	1.49	4	0.194	4.80	24	24	no	zero	0.00	
232.2	1.4	4.8	92	18	109	0.56	516	516	516	76.1	0.1377	1.70	121.82	0.21	0.99	no	0.3761	0.190	0.26	2.0	1.49	4	0.194	4.80	25	25	no	zero	0.00	
232.1	1.5	4.9	92	18	109	0.55	534	534	534	78.28	0.1335	1.70	125.30	0.20	0.99	no	0.3758	0.190	0.26	2.0	1.47	3	0.194	4.81	26	26	no	zero	0.00	
231.9	1.5	5.1	92	18	109	0.54	552	552	552	80.94	0.143	1.70	129.58	0.18	0.99	no	0.3756	0.190	0.26	2.0	1.44	3	0.195	4.81	27	27	no	zero	0.00	
231.8	1.6	5.2	92	18	109	0.55	570	570	570	78.34	0.1558	1.70	125.37	0.20	0.99	no	0.3753	0.190	0.26	2.0	1.47	3	0.194	4.81	26	26	no	zero	0.00	
231.6	1.6	5.4	92	18	109	0.55	588	588	588	78.19	0.1544	1.70	125.12	0.20	0.99	no	0.3751	0.190	0.26	2.0	1.47	3	0.194	4.81	26	26	no	zero	0.00	
231.4	1.7	5.6	92	18	109	0.54	605	605	605	83.18	0.1776	1.70	133.12	0.21	0.99	no	0.3749	0.200	0.27	2.0	1.45	3	0.195	4.81	28	28	no	zero	0.00	
231.3	1.7	5.7	92	18	109	0.52	623	623	623	89.74	0.2071	1.70	143.64	0.23	0.99	no	0.3746	0.210	0.28	2.0	1.44	3	0.195	4.81	30	30	no	zero	0.00	
231.1	1.8	5.9	92	18	109	0.52	641	641	641	90.97	0.2095	1.70	145.60	0.23	0.99	no	0.3744	0.210	0.28	2.0	1.43	3	0.195	4.81	30	30	no	zero	0.00	
230.9	1.8	6.1	92	18	109	0.52	659	659	659	91.87	0.2213	1.70	147.03	0.24	0.99	no	0.3741	0.210	0.28	2.0	1.44	3	0.195	4.81	31	31	no	zero	0.00	
230.8	1.9	6.2	92	18	109	0.51	677	677	677	93.27	0.1988	1.70	149.27	0.21	0.98	no	0.3739	0.210	0.28	2.0	1.41	3	0.196	4.81	31	31	no	zero	0.00	
230.6	1.9	6.4	92	18	109	0.51	695	695	695	94.95	0.1923	1.70	151.95	0.20	0.98	no	0.3736	0.220	0.30	2.0	1.39	2	0.196	4.82	32	32	no	zero	0.00	
230.4	2.0	6.6	92	18	109	0.51	712	712	712	96.28	0.1742	1.70	154.07	0.18	0.98	no	0.3733	0.220	0.30	2.0	1.37	2	0.196	4.82	32	32	no	zero	0.00	
230.3	2.0																													

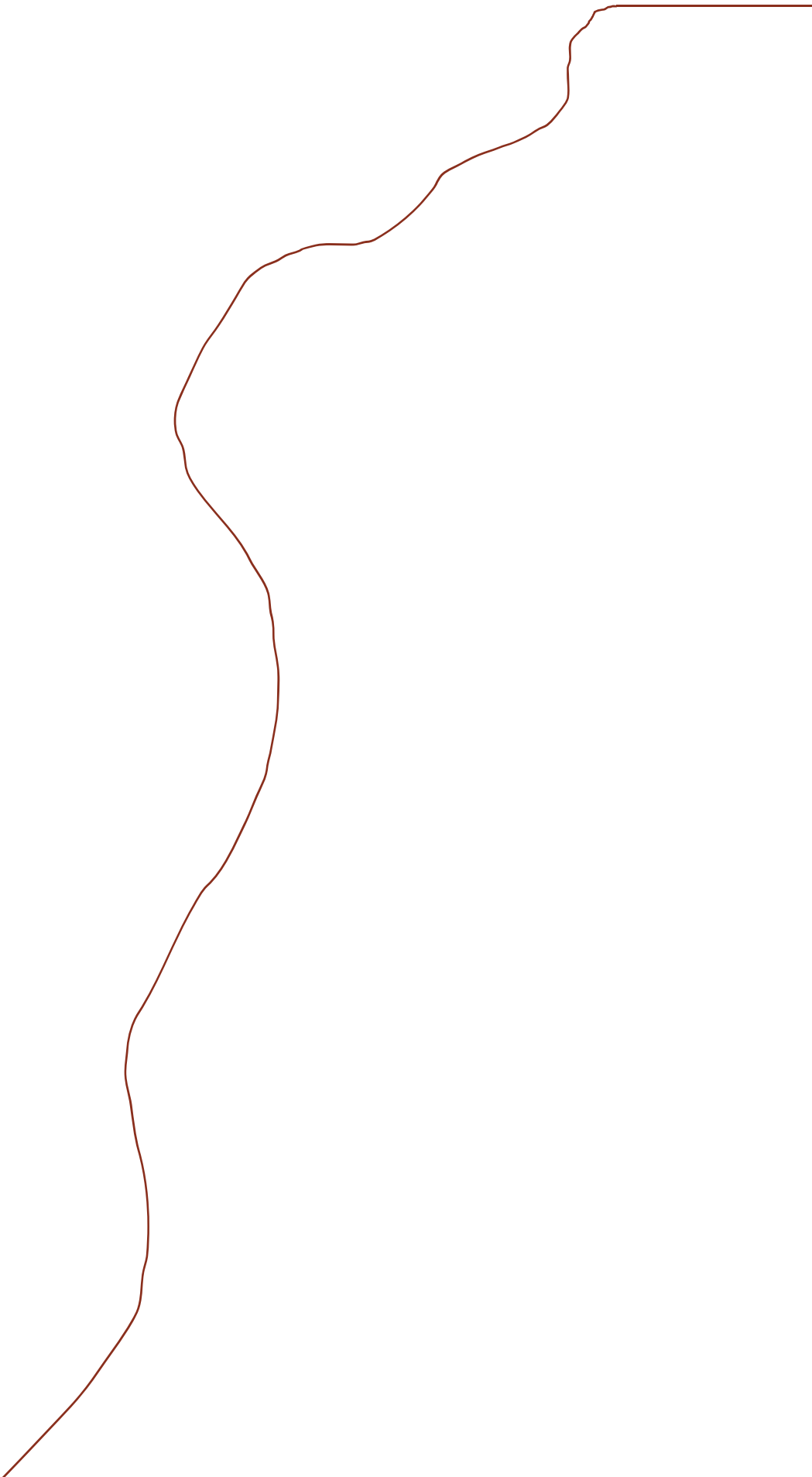
Elevation	Depth	In-Situ Soil Condition					Stress Exponent	Total	Overburden Stress Effective		CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement		
		Dry Density	Percent Moisture	Moist Density	n	σ _o			Current σ _v	HHGWL	Tip Resistance	Sleeve Friction																				
		γ _d	w	γ _m																											q _c	f _s
		pcf	%	pcf																												
ft	m	pcf	%	pcf		pcf	pcf	pcf	tsf	tsf	C _q	q _{c1}	F	r _d	Liquefiable yes/no	CSR	CRR _i	CRR	F _{S_{eq}}	I _c	AFC	D ₅₀	q _c /N	N	N _{clean}	⊘	(in)	(in)				
226.2	3.3	10.8	92	18	109	0.61	1175	1175	1175	58.29	0.1306	1.43	78.04	0.23	0.96	no	0.3662	0.100	0.14	2.0	1.68	7	0.189	4.77	16	17	no	zero	0.00			
226.0	3.3	11.0	92	18	109	0.60	1193	1193	1193	59.96	0.183	1.41	79.31	0.31	0.96	no	0.3659	0.130	0.18	2.0	1.72	8	0.188	4.76	17	18	no	zero	0.00			
225.8	3.4	11.2	92	18	109	0.60	1211	1211	1211	59.94	0.1589	1.40	78.56	0.27	0.96	no	0.3656	0.116	0.16	2.0	1.70	7	0.188	4.76	16	17	no	zero	0.00			
225.7	3.4	11.3	92	18	109	0.61	1229	1229	1229	57.77	0.1615	1.39	75.31	0.28	0.96	no	0.3653	0.115	0.16	2.0	1.73	8	0.187	4.76	16	17	no	zero	0.00			
225.5	3.5	11.5	92	18	109	0.60	1247	1247	1247	60.35	0.1989	1.38	77.66	0.33	0.96	no	0.3650	0.130	0.18	2.0	1.75	8	0.187	4.75	16	17	no	zero	0.00			
225.4	3.5	11.6	92	18	109	0.62	1264	1264	1264	54.11	0.3222	1.38	69.67	0.60	0.96	no	0.3647	0.177	0.24	2.0	1.91	12	0.181	4.71	15	17	no	zero	0.00			
225.2	3.6	11.8	92	18	109	0.65	1282	1282	1282	47.51	0.508	1.38	61.26	1.08	0.96	no	0.3644	0.230	0.31	2.0	2.10	17	0.172	4.65	13	18	no	zero	0.00			
225.0	3.6	12.0	92	18	109	0.65	1300	1300	1300	47.91	0.5911	1.37	61.19	1.25	0.96	no	0.3641	0.245	0.33	2.0	2.14	18	0.170	4.64	13	18	no	zero	0.00			
224.9	3.7	12.1	92	18	109	0.64	1318	1318	1309	50.98	0.5356	1.35	64.24	1.06	0.96	no	0.3662	0.230	0.31	2.0	2.08	16	0.173	4.66	14	19	no	zero	0.00			
224.7	3.7	12.3	92	18	109	0.62	1336	1336	1317	55.53	0.381	1.33	68.93	0.69	0.96	no	0.3687	0.180	0.24	2.0	1.95	13	0.179	4.70	15	17	no	zero	0.00			
224.5	3.8	12.5	92	18	109	0.61	1353	1353	1324	59.65	0.299	1.31	73.04	0.51	0.96	no	0.3712	0.170	0.23	2.0	1.85	10	0.183	4.73	15	17	no	zero	0.00			
224.4	3.8	12.6	92	18	109	0.61	1371	1371	1332	59.57	0.2585	1.30	72.36	0.44	0.96	no	0.3737	0.150	0.20	2.0	1.83	10	0.184	4.73	15	16	no	zero	0.00			
224.2	3.9	12.8	92	18	109	0.60	1389	1389	1339	60.16	0.226	1.29	72.45	0.38	0.96	no	0.3760	0.140	0.19	2.0	1.80	9	0.185	4.74	15	16	no	zero	0.00			
224.0	3.9	13.0	92	18	109	0.60	1407	1407	1347	60.58	0.2191	1.28	72.35	0.37	0.95	no	0.3784	0.140	0.19	2.0	1.79	9	0.185	4.74	15	16	no	zero	0.00			
223.9	4.0	13.1	92	18	109	0.60	1425	1425	1355	59.84	0.3946	1.27	70.98	0.67	0.95	no	0.3807	0.190	0.26	2.0	1.93	12	0.180	4.71	15	17	no	zero	0.00			
223.7	4.0	13.3	92	18	109	0.63	1442	1442	1362	53.56	0.5764	1.27	63.47	1.09	0.95	no	0.3830	0.230	0.31	2.0	2.09	16	0.173	4.65	14	19	no	zero	0.00			
223.5	4.1	13.5	92	18	109	0.63	1460	1460	1370	51.05	0.7201	1.27	60.18	1.43	0.95	no	0.3853	0.255	0.34	2.0	2.18	19	0.168	4.62	13	18	no	zero	0.00			
223.4	4.1	13.6	92	18	109	0.62	1478	1478	1377	56.39	0.6876	1.25	65.60	1.24	0.95	no	0.3875	0.258	0.35	2.0	2.11	17	0.172	4.65	14	19	no	zero	0.00			
223.2	4.2	13.8	92	18	109	0.57	1496	1496	1385	69.69	0.5154	1.22	79.52	0.75	0.95	no	0.3897	0.250	0.27	2.0	1.91	12	0.181	4.71	17	19	no	zero	0.00			
223.1	4.2	13.9	92	18	109	0.55	1514	1514	1392	78.52	0.407	1.20	88.36	0.52	0.95	no	0.3918	0.183	0.25	2.0	1.79	9	0.185	4.74	17	19	no	zero	0.00			
222.9	4.3	14.1	92	18	109	0.53	1532	1532	1400	84.61	0.3002	1.19	94.18	0.36	0.95	no	0.3940	0.173	0.23	2.0	1.68	7	0.189	4.77	20	21	no	zero	0.00			
222.7	4.3	14.3	92	18	109	0.53	1549	1549	1408	86.25	0.2878	1.18	95.29	0.34	0.95	no	0.3960	0.163	0.22	2.0	1.67	7	0.189	4.77	20	21	no	zero	0.00			
222.6	4.4	14.4	92	18	109	0.55	1567	1567	1415	80.31	0.2412	1.18	88.53	0.30	0.95	no	0.3981	0.147	0.20	2.0	1.68	7	0.189	4.77	19	20	no	zero	0.00			
222.4	4.4	14.6	92	18	109	0.55	1585	1585	1423	79.4	0.2186	1.17	87.03	0.28	0.95	no	0.4001	0.137	0.18	2.0	1.67	7	0.189	4.77	18	19	no	zero	0.00			
222.2	4.5	14.8	92	18	109	0.55	1603	1603	1430	78.36	0.2324	1.17	85.41	0.30	0.95	no	0.4021	0.137	0.18	2.0	1.69	7	0.189	4.77	18	19	no	zero	0.00			
222.1	4.5	14.9	92	18	109	0.55	1621	1621	1438	78.73	0.2242	1.16	85.26	0.29	0.94	no	0.4041	0.137	0.18	2.0	1.68	7	0.189	4.77	18	19	no	zero	0.00			
221.9	4.6	15.1	92	18	109	0.55	1638	1638	1445	79.21	0.2349	1.15	85.24	0.30	0.94	no	0.4060	0.137	0.18	2.0	1.69	7	0.189	4.77	18	19	no	zero	0.00			
221.7	4.6	15.3	92	18	109	0.54	1656	1656	1453	82.07	0.2627	1.14	87.65	0.32	0.94	no	0.4079	0.147	0.20	2.0	1.69	7	0.188	4.77	18	19	no	zero	0.00			
221.6	4.7	15.4	92	18	109	0.53	1674	1674	1461	85.61	0.2711	1.13	90.75	0.32	0.94	no	0.4098	0.163	0.22	2.0	1.68	7	0.189	4.77	19	20	no	zero	0.00			
221.4	4.7	15.6	92	18	109	0.52	1692	1692	1468	89.45	0.2755	1.12	94.12	0.31	0.94	no	0.4117	0.163	0.22	2.0	1.66	6	0.190	4.77	20	21	no	zero	0.00			
221.3	4.8	15.7	92	18	109	0.52	1710	1710	1476	90.96	0.2797	1.12	95.11	0.31	0.94	no	0.4135	0.163	0.22	2.0	1.65	6	0.190	4.77	20	21	no	zero	0.00			
221.1	4.8	15.9	92	18	109	0.52	1727	1727	1483	88.72	0.2665	1.11	92.34	0.30	0.94	no	0.4153	0.163	0.22	2.0	1.66	6	0.189	4.77	19	20	no	zero	0.00			
220.9	4.9	16.1	92	18	109	0.53	1745	1745	1491	88.16	0.2336	1.11	91.28	0.27	0.94	no	0.4171	0.158	0.21	2.0	1.64	6	0.190	4.78	19	20	no	zero	0.00			
220.8	4.9	16.2	92	18	109	0.53	1763	1763	1498	86.55	0.237	1.10	89.17	0.28	0.94	no	0.4188	0.137	0.18	2.0	1.66	6	0.190	4.77	19	20	no	zero	0.00			
220.6	5.0	16.4	92	18	109	0.53	1781	1781	1506	86.98	0.2736	1.10	89.12	0.32	0.94	no	0.4205	0.147	0.20	2.0	1.68	7	0.189	4.77	19	20	no	zero	0.00			
220.4	5.0	16.6	92	18	109	0.53	1799	1799	1514	87.48	0.2954	1.09	89.14	0.34	0.94	no	0.4222	0.147	0.20	2.0	1.70	7	0.188	4.77	19	20	no	zero	0.00			
220.3	5.1	16.7	92	18	109	0.53	1816	1816	1521	88.24	0.3482	1.08	89.42	0.40	0.94	no	0.4239	0.157	0.21	2.0	1.73	8	0.187	4.76	19	20	no	zero	0.00			
220.1	5.1	16.9	92	18	109	0.52	1834	1834	1529	90.23	0.3315	1.08	90.92	0.37	0.93	no	0.4255	0.173	0.23	2.0	1.71	7	0.188	4.76	19	20	no	zero	0.00			
219.9	5.2	17.1	92																													

Elevation	Depth	In-Situ Soil Condition					Total	Overburden Stress Effective		CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement
		Dry Density	Percent Moisture	Moist Density	Stress Exponent	Current σ_v		HHGW	Tip Resistance	Sleeve Friction																			
		γ_{dry}	w	γ_{moist}	n	σ_v		σ_{psf}	q_c	f_s																			
		pcf	%	pcf		psf		psf	tsf	tsf																			
213.7	7.1	23.3	92	18	109	0.46	2529	2529	1824	116.85	0.4122	0.92	100.58	0.36	0.90	no	0.4727	0.190	0.26	2.0	1.66	6	0.190	4.77	21	22	no	zero	0.00
213.5	7.1	23.5	92	18	109	0.46	2547	2547	1832	118.29	0.466	0.92	101.55	0.40	0.90	no	0.4736	0.190	0.26	2.0	1.68	7	0.189	4.77	21	22	no	zero	0.00
213.4	7.2	23.6	92	18	109	0.46	2564	2564	1839	120.61	0.5842	0.92	103.30	0.49	0.90	no	0.4744	0.210	0.28	2.0	1.72	7	0.188	4.76	22	23	no	zero	0.00
213.2	7.2	23.8	92	18	109	0.46	2582	2582	1847	119.79	0.7512	0.91	102.24	0.63	0.90	no	0.4753	0.230	0.31	2.0	1.78	9	0.186	4.75	22	23	no	zero	0.00
213.0	7.3	24.0	92	18	109	0.46	2600	2600	1854	119.32	0.9459	0.91	101.48	0.80	0.89	no	0.4761	0.250	0.34	2.0	1.85	10	0.183	4.73	21	23	no	zero	0.00
212.9	7.3	24.1	92	18	109	0.45	2618	2618	1862	121.61	0.9921	0.91	103.22	0.82	0.89	no	0.4769	0.250	0.34	2.0	1.85	10	0.183	4.73	22	24	no	zero	0.00
212.7	7.4	24.3	92	18	109	0.44	2636	2636	1869	128.97	0.9029	0.91	109.52	0.71	0.89	no	0.4777	0.240	0.32	2.0	1.79	9	0.185	4.74	23	24	no	zero	0.00
212.6	7.4	24.4	92	18	109	0.43	2653	2653	1877	134.48	0.7834	0.91	114.16	0.59	0.89	no	0.4784	0.225	0.30	2.0	1.72	8	0.187	4.76	24	25	no	zero	0.00
212.4	7.5	24.6	92	18	109	0.42	2671	2671	1885	139.65	0.7379	0.91	118.50	0.53	0.89	no	0.4792	0.217	0.29	2.0	1.69	7	0.189	4.77	25	26	no	zero	0.00
212.2	7.5	24.8	92	18	109	0.42	2689	2689	1892	142.97	0.7692	0.91	121.16	0.54	0.89	no	0.4799	0.223	0.30	2.0	1.68	7	0.189	4.77	25	26	no	zero	0.00
212.1	7.6	24.9	92	18	109	0.40	2707	2707	1900	149.04	0.7433	0.91	126.32	0.50	0.89	no	0.4806	0.223	0.30	2.0	1.65	6	0.190	4.77	26	27	no	zero	0.00
211.9	7.6	25.1	92	18	109	0.40	2725	2725	1907	152.44	0.7379	0.90	129.06	0.49	0.89	no	0.4814	0.223	0.30	2.0	1.64	6	0.190	4.78	27	28	no	zero	0.00
211.7	7.7	25.3	92	18	109	0.40	2742	2742	1915	153.09	0.6877	0.90	129.30	0.45	0.89	no	0.4821	0.223	0.30	2.0	1.62	6	0.191	4.78	27	28	no	zero	0.00
211.6	7.7	25.4	92	18	109	0.41	2760	2760	1922	146.74	0.6633	0.90	123.22	0.46	0.89	no	0.4827	0.223	0.30	2.0	1.64	6	0.190	4.78	26	27	no	zero	0.00
211.4	7.8	25.6	92	18	109	0.42	2778	2778	1930	140.86	0.6537	0.89	117.60	0.47	0.88	no	0.4834	0.217	0.29	2.0	1.66	6	0.189	4.77	25	26	no	zero	0.00
211.2	7.8	25.8	92	18	109	0.42	2796	2796	1938	138.7	0.691	0.89	115.34	0.50	0.88	no	0.4841	0.217	0.29	2.0	1.68	7	0.189	4.77	24	25	no	zero	0.00
211.1	7.9	25.9	92	18	109	0.41	2814	2814	1945	145.22	0.6767	0.89	120.87	0.47	0.88	no	0.4847	0.223	0.30	2.0	1.65	6	0.190	4.77	25	26	no	zero	0.00
210.9	7.9	26.1	92	18	109	0.40	2832	2832	1953	153.1	0.7251	0.89	127.64	0.48	0.88	no	0.4854	0.223	0.30	2.0	1.63	6	0.190	4.78	27	28	no	zero	0.00
210.8	8.0	26.2	92	18	109	0.38	2849	2849	1960	164.65	0.8116	0.89	137.75	0.50	0.88	no	0.4860	0.230	0.31	2.0	1.62	6	0.191	4.78	29	30	no	zero	0.00
210.6	8.0	26.4	92	18	109	0.37	2867	2867	1968	173.67	0.8382	0.89	145.61	0.49	0.88	no	0.4866	0.237	0.32	2.0	1.59	5	0.191	4.79	30	31	no	zero	0.00
210.4	8.1	26.6	92	18	109	0.36	2885	2885	1975	175.42	0.8145	0.89	146.87	0.47	0.88	no	0.4872	0.237	0.32	2.0	1.58	5	0.192	4.79	31	32	no	zero	0.00
210.3	8.1	26.7	92	18	109	0.37	2903	2903	1983	169.53	0.7642	0.89	141.18	0.45	0.88	no	0.4878	0.237	0.32	2.0	1.59	5	0.192	4.79	29	30	no	zero	0.00
210.1	8.2	26.9	92	18	109	0.38	2921	2921	1991	161.59	0.6899	0.88	133.67	0.43	0.88	no	0.4883	0.220	0.30	2.0	1.59	5	0.191	4.79	28	29	no	zero	0.00
209.9	8.2	27.1	92	18	109	0.39	2938	2938	1998	156.19	0.6698	0.88	128.50	0.43	0.88	no	0.4889	0.213	0.29	2.0	1.61	5	0.191	4.78	27	28	no	zero	0.00
209.8	8.3	27.2	92	18	109	0.40	2956	2956	2006	152.67	0.647	0.88	125.03	0.43	0.87	no	0.4895	0.213	0.29	2.0	1.62	6	0.191	4.78	26	27	no	zero	0.00
209.6	8.3	27.4	92	18	109	0.40	2974	2974	2013	150.47	0.649	0.87	122.76	0.44	0.87	no	0.4900	0.213	0.29	2.0	1.63	6	0.190	4.78	26	27	no	zero	0.00
209.4	8.4	27.6	92	18	109	0.40	2992	2992	2021	153.54	0.5837	0.87	125.20	0.38	0.87	no	0.4905	0.207	0.28	2.0	1.59	5	0.191	4.79	26	27	no	zero	0.00
209.3	8.4	27.7	92	18	109	0.39	3010	3010	2028	157.59	0.6069	0.87	128.51	0.39	0.87	no	0.4910	0.207	0.28	2.0	1.58	5	0.192	4.79	27	28	no	zero	0.00
209.1	8.5	27.9	92	18	109	0.39	3027	3027	2036	157.76	0.6637	0.87	126.36	0.42	0.87	no	0.4915	0.213	0.29	2.0	1.60	5	0.191	4.78	27	28	no	zero	0.00
208.9	8.5	28.1	92	18	109	0.39	3045	3045	2044	155.75	0.8328	0.87	126.27	0.54	0.87	no	0.4920	0.223	0.30	2.0	1.67	7	0.189	4.77	26	27	no	zero	0.00
208.8	8.6	28.2	92	18	109	0.40	3063	3063	2051	150.57	0.9344	0.86	121.36	0.63	0.87	no	0.4925	0.237	0.32	2.0	1.72	7	0.188	4.76	25	26	no	zero	0.00
208.6	8.6	28.4	92	18	109	0.40	3081	3081	2059	149.35	1.0096	0.86	119.99	0.68	0.87	no	0.4930	0.235	0.32	2.0	1.75	8	0.187	4.75	25	26	no	zero	0.00
208.5	8.7	28.5	92	18	109	0.41	3099	3099	2066	143.92	1.0214	0.85	114.91	0.72	0.87	no	0.4935	0.243	0.33	2.0	1.77	9	0.186	4.75	24	25	no	zero	0.00
208.3	8.7	28.7	92	18	109	0.42	3116	3116	2074	139.9	0.9934	0.85	111.10	0.72	0.87	no	0.4939	0.243	0.33	2.0	1.79	9	0.185	4.75	23	24	no	zero	0.00
208.1	8.8	28.9	92	18	109	0.41	3134	3134	2082	143.16	0.8878	0.85	113.68	0.63	0.86	no	0.4943	0.233	0.32	2.0	1.74	8	0.187	4.76	24	25	no	zero	0.00
208.0	8.8	29.0	92	18	109	0.40	3152	3152	2089	149.67	0.8183	0.85	119.14	0.55	0.86	no	0.4948	0.225	0.30	2.0	1.69	7	0.188	4.77	25	26	no	zero	0.00
207.8	8.9	29.2	92	18	109	0.40	3170	3170	2097	151.71	0.8368	0.85	120.66	0.56	0.86	no	0.4952	0.230	0.31	2.0	1.69	7	0.189	4.77	25	26	no	zero	0.00
207.6	8.9	29.4	92	18	109	0.40	3188	3188	2104	149.74	0.9623	0.85	118.65	0.65	0.86	no	0.4956	0.233	0.32	2.0	1.74	8	0.187	4.76	25	26	no	zero	0.00
207.5	9.0	29.5	92	18	109	0.41	3206	3206	2112	147.69	1.0808	0.84	116.57	0.74	0.86	no	0.4960	0.2											

Elevation	Depth	In-Situ Soil Condition					Overburden Stress Effective		CPT Input		Overburden Resistance Correction	Normalized Tip Resistance	Normalized Friction Ratio	Depth Reduction Factor	Robertson's ECPT Chart Check	Cyclic Stress Ratio	Cyclic Resistance Ratio	Magnitude Adjusted CRR	Liquefaction Factor of Safety	Soil-Type Behavior Index	Fines Content	Mean Grain Size	CPT/SPT Correlation Factor	Equivalent SPT	Corrected SPT (Clean Sand)	Vertical Strain	Liquefaction Induced Settlement	Cumulative Settlement					
		Dry Density	Percent Moisture	Moist Density	Stress Exponent	Total	Current GW		Tip Resistance	Sleeve Friction																							
							γ _{so}	w																					γ _{ms}	n	σ _o	σ _o '	HHGWL
ft	m	pcf	%	pcf		psf	psf	psf	tsf	tsf	psf	tsf	psf	tsf	yes/no	CSR	CRR _i	CRR	FS _{eq}	I _c	AFC	D ₅₀	q _N /N	N	N _{clean}	⊖	(in)	(in)					
2012	10.9	35.8	92	18	109	0.57	3882	3648	2400	72.13	2.8862	0.73	48.70	4.11	0.82	no	0.5048	0.295	0.40	2.0	2.56	34	0.143	4.42	11	17	no	zero	0.50				
201.1	10.9	35.9	92	18	109	0.62	3900	3655	2407	53.96	2.7626	0.71	34.58	5.31	0.82	no	0.5049	0.280	0.38	2.0	2.74	43	0.128	4.29	8	15	no	zero	0.50				
200.9	11.0	36.1	92	18	109	0.55	3918	3663	2415	79.91	2.3244	0.74	54.58	2.98	0.82	no	0.5050	0.300	0.41	2.0	2.42	28	0.153	4.50	12	18	no	zero	0.50				
200.7	11.0	36.3	92	18	109	0.51	3936	3670	2422	96.78	2.2052	0.76	67.83	2.33	0.82	no	0.5051	0.300	0.41	2.0	2.28	23	0.162	4.58	15	20	no	zero	0.50				
200.6	11.1	36.4	92	18	109	0.46	3953	3678	2430	117.08	2.096	0.77	84.23	1.82	0.82	yes	0.5052	0.298	0.40	0.8	2.14	18	0.170	4.64	18	23	0.015	0.03	0.53				
200.4	11.1	36.6	92	18	109	0.43	3971	3685	2437	137.17	1.8612	0.79	100.91	1.38	0.82	yes	0.5052	0.280	0.38	0.7	2.00	14	0.177	4.69	22	24	0.015	0.03	0.56				
200.3	11.2	36.7	92	18	109	0.40	3989	3693	2445	152.93	1.5319	0.80	114.24	1.01	0.82	yes	0.5053	0.283	0.38	0.8	1.87	11	0.182	4.72	24	26	0.010	0.02	0.58				
200.1	11.2	36.9	92	18	109	0.38	4007	3701	2453	166.1	1.4132	0.81	125.55	0.86	0.81	yes	0.5053	0.263	0.36	0.7	1.79	9	0.185	4.74	26	27	0.010	0.02	0.60				
199.9	11.3	37.1	92	18	109	0.41	4025	3708	2460	145.12	1.8178	0.79	107.36	1.27	0.81	yes	0.5054	0.280	0.38	0.7	1.96	13	0.179	4.70	23	25	0.015	0.03	0.63				
199.8	11.3	37.2	92	18	109	0.53	4043	3716	2468	86.45	2.6433	0.74	59.21	3.13	0.81	no	0.5054	0.300	0.41	2.0	2.41	28	0.154	4.51	13	19	no	zero	0.63				
199.6	11.4	37.4	92	18	109	0.61	4060	3723	2475	59.31	2.2701	0.71	38.43	3.96	0.81	no	0.5054	0.285	0.38	2.0	2.62	37	0.138	4.38	9	16	no	zero	0.63				
199.4	11.4	37.6	92	18	109	0.66	4078	3731	2483	43.42	1.0462	0.69	26.83	2.53	0.81	no	0.5055	0.274	0.37	2.0	2.61	37	0.139	4.39	6	12	no	zero	0.63				
199.3	11.5	37.7	92	18	109	0.73	4096	3738	2490	29.82	1.0139	0.66	17.35	3.65	0.81	no	0.5055	0.257	0.35	2.0	2.86	50	0.117	4.19	4	9	no	zero	0.63				
199.1	11.5	37.9	92	18	109	0.69	4114	3746	2498	37.08	0.9113	0.67	22.30	2.60	0.81	no	0.5055	0.269	0.36	2.0	2.68	40	0.133	4.34	5	11	no	zero	0.63				
198.9	11.6	38.1	92	18	109	0.67	4132	3754	2506	42.01	0.5685	0.68	25.71	1.42	0.81	yes	0.5055	0.196	0.26	0.5	2.48	31	0.149	4.47	6	11	0.025	0.05	0.68				
198.8	11.6	38.2	92	18	109	0.74	4149	3761	2513	28.37	0.5306	0.66	16.28	2.02	0.81	no	0.5055	0.257	0.35	2.0	2.73	43	0.129	4.30	4	9	no	zero	0.68				
198.6	11.7	38.4	92	18	109	0.74	4167	3769	2521	28.16	0.6061	0.65	16.11	2.32	0.81	no	0.5055	0.257	0.35	2.0	2.76	45	0.126	4.27	4	9	no	zero	0.68				
198.5	11.7	38.5	92	18	109	0.73	4185	3776	2528	29.03	0.876	0.65	16.66	3.25	0.80	no	0.5055	0.257	0.35	2.0	2.84	49	0.119	4.20	4	9	no	zero	0.68				
198.3	11.8	38.7	92	18	109	0.71	4203	3784	2536	32.93	1.0051	0.66	19.27	3.26	0.80	no	0.5055	0.263	0.35	2.0	2.79	46	0.123	4.25	5	10	no	zero	0.68				
198.1	11.8	38.9	92	18	109	0.70	4221	3791	2543	34.28	1.1045	0.66	20.15	3.43	0.80	no	0.5055	0.269	0.36	2.0	2.79	46	0.124	4.25	5	10	no	zero	0.68				
198.0	11.9	39.0	92	18	109	0.71	4238	3799	2551	33.15	1.2186	0.66	19.35	3.93	0.80	no	0.5054	0.263	0.35	2.0	2.84	49	0.119	4.20	5	10	no	zero	0.68				
197.8	11.9	39.2	92	18	109	0.71	4256	3807	2559	33.18	1.3868	0.66	19.34	4.47	0.80	no	0.5054	0.263	0.35	2.0	2.87	51	0.115	4.17	5	10	no	zero	0.68				
197.6	12.0	39.4	92	18	109	0.69	4274	3814	2566	36.83	1.7031	0.67	21.80	4.91	0.80	no	0.5054	0.269	0.36	2.0	2.86	51	0.116	4.18	5	11	no	zero	0.68				
197.5	12.0	39.5	92	18	109	0.67	4292	3822	2574	41.54	1.9983	0.67	25.02	5.07	0.80	no	0.5053	0.274	0.37	2.0	2.83	49	0.120	4.21	6	12	no	zero	0.68				
197.3	12.1	39.7	92	18	109	0.65	4310	3829	2581	47.71	2.2095	0.68	28.33	4.85	0.80	no	0.5053	0.274	0.37	2.0	2.76	45	0.126	4.27	7	13	no	zero	0.68				
197.1	12.1	39.9	92	18	109	0.62	4327	3837	2589	56.26	2.4261	0.69	35.42	4.48	0.80	no	0.5053	0.285	0.38	2.0	2.68	40	0.133	4.34	8	15	no	zero	0.68				
197.0	12.2	40.0	92	18	109	0.59	4345	3844	2596	66.09	2.6118	0.71	42.59	4.09	0.80	no	0.5052	0.290	0.39	2.0	2.60	36	0.140	4.40	10	17	no	zero	0.68				
196.8	12.2	40.2	92	18	109	0.57	4363	3852	2604	69.72	2.8298	0.71	45.24	4.19	0.79	no	0.5051	0.295	0.40	2.0	2.59	36	0.141	4.40	10	17	no	zero	0.68				
196.6	12.3	40.4	92	18	109	0.60	4381	3860	2612	61.87	2.731	0.70	39.37	4.58	0.79	no	0.5051	0.285	0.38	2.0	2.66	39	0.135	4.36	9	16	no	zero	0.68				
196.5	12.3	40.5	92	18	109	0.62	4399	3867	2619	55.57	2.7128	0.69	35.02	5.05	0.79	no	0.5050	0.285	0.38	2.0	2.72	43	0.130	4.30	8	15	no	zero	0.68				
196.3	12.4	40.7	92	18	109	0.58	4416	3875	2627	69.01	2.8031	0.71	44.54	4.20	0.79	no	0.5049	0.290	0.39	2.0	2.59	36	0.141	4.40	10	17	no	zero	0.68				
196.2	12.4	40.8	92	18	109	0.53	4434	3882	2634	86.11	2.5054	0.72	57.45	2.99	0.79	no	0.5049	0.300	0.41	2.0	2.41	28	0.154	4.51	13	19	no	zero	0.68				
196.0	12.5	41.0	92	18	109	0.46	4452	3890	2642	117.55	1.3731	0.76	82.28	1.19	0.79	yes	0.5048	0.267	0.36	0.7	2.02	15	0.176	4.68	18	20	0.015	0.03	0.71				
195.8	12.5	41.2	92	18	109	0.43	4470	3897	2649	133.95	1.1971	0.77	95.67	0.91	0.79	yes	0.5047	0.253	0.34	0.7	1.90	11	0.181	4.72	20	22	0.015	0.03	0.74				
195.7	12.6	41.3	92	18	109	0.41	4488	3905	2657	144.52	1.2956	0.78	104.43	0.91	0.79	yes	0.5046	0.260	0.35	0.7	1.87	11	0.182	4.72	22	24	0.015	0.03	0.77				
195.5	12.6	41.5	92	18	109	0.39	4506	3913	2665	157.23	1.5351	0.79	115.12	0.99	0.79	yes	0.5045	0.273	0.37	0.7	1.86	10	0.183	4.73	24	26	0.010	0.02	0.79				
195.3	12.7	41.7	92	18	109	0.39	4523	3920	2672	157.63	1.6984	0.79	115.37	1.09	0.78	yes	0.5044	0.283	0.38	0.8	1.89	11	0.182	4.72	24	26	0.010	0.02	0.81				
195.1	12.7	41.8	92	18	109	0.40	4541	3928	2680	154.96	2.0357	0.78	113.00	1.35	0.78	yes	0.5043	0.285	0.38	0.8	1.96	13	0.179	4.70	24	26	0.010	0.02	0.83				
195.0	12.8	42.0	92	18	109	0.40	4559	3935	2687	154.46	2.3.2																						

Elevation	Depth	In-Situ Soil Condition					Stress Exponent n	Total σ _o psf	Overburden Stress Effective		CPT Input		Overburden Resistance Correction C _Q	Normalized Tip Resistance q _{t1}	Normalized Friction Ratio F	Depth Reduction Factor r _d	Robertson's ECPT Chart Check Liquefiable yes/no	Cyclic Stress Ratio CSR	Cyclic Resistance Ratio CRR _i	Magnitude Adjusted CRR CRR	Liquefaction Factor of Safety FS _{eq}	Soil-Type Behavior Index I _c	Fines Content AFC	Mean Grain Size D ₅₀	CPT/SPT Correlation Factor q _c /N	Equivalent SPT N	Corrected SPT (Clean Sand) N _{clean}	Vertical Strain ϕ	Liquefaction Induced Settlement	Cumulative Settlement
		Dry Density γ _{so} pcf	Percent Moisture W %	Moist Density γ _{mo} pcf	Stress Exponent n	Current σ _v psf			HHGWL σ _{v0} psf	Tip Resistance q _c tsf	Sleeve Friction f _s tsf																			
ft	m	ft	ft	ft		psf	psf	psf	tsf	tsf											0									
188.8	14.7	48.2	92	18	109	0.69	5236	4223	2975	37.8	1.5085	0.62	20.66	4.29	0.74	no	0.4974	0.269	0.36	2.0	2.84	49	0.118	4.20	5	10	no	zero	0.97	
188.6	14.7	48.4	92	18	109	0.70	5253	4231	2983	34.79	1.211	0.62	18.75	3.75	0.74	no	0.4971	0.263	0.35	2.0	2.84	49	0.119	4.20	4	9	no	zero	0.97	
188.4	14.8	48.6	92	18	109	0.70	5271	4238	2990	35.07	1.1754	0.61	18.84	3.62	0.74	no	0.4969	0.263	0.35	2.0	2.83	49	0.120	4.21	4	9	no	zero	0.97	
188.3	14.8	48.7	92	18	109	0.70	5289	4246	2998	35.79	1.0079	0.62	19.27	3.04	0.74	no	0.4966	0.263	0.35	2.0	2.77	45	0.125	4.26	5	10	no	zero	0.97	
188.1	14.9	48.9	92	18	109	0.70	5307	4253	3005	34.5	0.9646	0.61	18.41	3.03	0.74	no	0.4964	0.263	0.35	2.0	2.78	46	0.124	4.25	4	9	no	zero	0.97	
188.0	14.9	49.0	92	18	109	0.72	5325	4261	3013	32.05	0.9947	0.61	16.83	3.38	0.74	no	0.4961	0.257	0.35	2.0	2.85	50	0.118	4.20	4	9	no	zero	0.97	
187.8	15.0	49.2	92	18	109	0.71	5343	4268	3020	33.84	1.1224	0.61	17.93	3.60	0.74	no	0.4959	0.257	0.35	2.0	2.84	49	0.119	4.20	4	9	no	zero	0.97	
187.6	15.0	49.4	92	18	109	0.70	5360	4276	3028	35.07	1.4062	0.61	18.69	4.34	0.74	no	0.4956	0.263	0.35	2.0	2.88	52	0.115	4.16	4	9	no	zero	0.97	
187.5	15.1	49.5	92	18	109	0.69	5378	4284	3036	38.3	1.7931	0.62	20.74	5.04	0.74	no	0.4954	0.269	0.36	2.0	2.89	52	0.114	4.16	5	10	no	zero	0.97	
187.3	15.1	49.7	92	18	109	0.67	5396	4291	3043	41.2	1.9071	0.62	22.60	4.95	0.74	no	0.4951	0.269	0.36	2.0	2.85	50	0.117	4.19	5	11	no	zero	0.97	
187.1	15.2	49.9	92	18	109	0.69	5414	4299	3051	37.1	1.5934	0.61	19.91	4.63	0.73	no	0.4948	0.263	0.35	2.0	2.88	51	0.115	4.17	5	10	no	zero	0.97	
187.0	15.2	50.0	92	18	109	0.72	5432	4306	3058	31.83	1.0553	0.60	16.53	3.62	0.73	no	0.4946	0.257	0.35	2.0	2.87	51	0.116	4.17	4	9	no	zero	0.97	
186.8	15.3	50.2	92	18	109	0.73	5449	4314	3066	28.58	0.5542	0.59	14.48	2.14	0.73	no	0.4943	0.251	0.34	2.0	2.78	46	0.124	4.25	3	8	no	zero	0.97	
186.6	15.3	50.4	92	18	109	0.74	5467	4321	3073	28.04	0.8204	0.59	14.12	3.24	0.73	no	0.4940	0.251	0.34	2.0	2.89	53	0.113	4.15	3	8	no	zero	0.97	
186.5	15.4	50.5	92	18	109	0.70	5485	4329	3081	35.57	1.7337	0.61	18.81	5.28	0.73	no	0.4938	0.263	0.35	2.0	2.93	55	0.109	4.11	5	10	no	zero	0.97	
186.3	15.4	50.7	92	18	109	0.60	5503	4337	3089	60.58	2.6257	0.65	35.47	4.54	0.73	no	0.4935	0.285	0.38	2.0	2.69	41	0.133	4.33	8	15	no	zero	0.97	
186.1	15.5	50.9	92	18	109	0.51	5521	4344	3096	96.67	3.4678	0.70	61.69	3.99	0.73	no	0.4932	0.300	0.41	2.0	2.45	30	0.151	4.49	14	20	no	zero	0.97	
186.0	15.5	51.0	92	18	109	0.42	5538	4352	3104	139.46	4.629	0.74	95.35	3.39	0.73	no	0.4930	0.320	0.43	2.0	2.30	23	0.161	4.57	21	27	no	zero	0.97	
185.8	15.6	51.2	92	18	109	0.44	5556	4359	3111	131.27	4.6851	0.73	88.63	3.65	0.73	no	0.4927	0.310	0.42	2.0	2.34	25	0.158	4.55	19	26	no	zero	0.97	
185.7	15.6	51.3	92	18	109	0.41	5574	4367	3119	148.78	4.8429	0.75	102.85	3.32	0.73	no	0.4924	0.300	0.45	2.0	2.27	22	0.163	4.58	22	28	no	zero	0.97	
185.5	15.7	51.5	92	18	109	0.38	5592	4374	3126	162.69	4.5623	0.76	114.40	2.85	0.72	no	0.4921	0.332	0.45	2.0	2.19	20	0.168	4.62	25	31	no	zero	0.97	
185.3	15.7	51.7	92	18	109	0.44	5610	4382	3134	126.35	4.0605	0.72	84.46	3.29	0.72	no	0.4918	0.310	0.42	2.0	2.32	24	0.160	4.56	19	25	no	zero	0.97	
185.2	15.8	51.8	92	18	109	0.52	5627	4390	3142	91.64	4.0579	0.69	57.55	4.57	0.72	no	0.4915	0.300	0.41	2.0	2.54	34	0.145	4.43	13	20	no	zero	0.97	
185.0	15.8	52.0	92	18	109	0.53	5645	4397	3149	84.65	4.0978	0.68	52.31	5.01	0.72	no	0.4912	0.300	0.41	2.0	2.60	36	0.140	4.40	12	19	no	zero	0.97	
184.8	15.9	52.2	92	18	109	0.35	5663	4405	3157	181.82	3.6704	0.77	130.42	2.05	0.72	no	0.4910	0.335	0.45	2.0	2.04	15	0.175	4.67	28	34	no	zero	0.97	
184.7	15.9	52.3	92	18	109	0.25	5681	4412	3164	270.79	3.1457	0.83	211.39	1.17	0.72	no	0.4907	0.300	0.41	2.0	1.72	8	0.187	4.76	44	45	no	zero	0.97	
184.5	16.0	52.5	92	18	109	0.23	5699	4420	3172	282.56	2.7055	0.84	222.59	0.97	0.72	no	0.4904	0.290	0.39	2.0	1.65	6	0.190	4.78	47	48	no	zero	0.97	
184.3	16.0	52.7	92	18	109	0.31	5716	4427	3179	216.61	3.8025	0.80	160.89	1.78	0.72	no	0.4901	0.330	0.45	2.0	1.94	12	0.180	4.70	34	36	no	zero	0.97	
184.2	16.1	52.8	92	18	109	0.41	5734	4435	3187	144.68	4.1621	0.74	98.78	2.93	0.72	no	0.4898	0.320	0.43	2.0	2.24	21	0.165	4.59	22	28	no	zero	0.97	
184.0	16.1	53.0	92	18	109	0.47	5752	4443	3195	112.95	4.799	0.71	73.36	4.36	0.72	no	0.4895	0.300	0.41	2.0	2.46	30	0.151	4.49	16	22	no	zero	0.97	
183.9	16.2	53.1	92	18	109	0.44	5770	4450	3202	129.51	5.8669	0.72	86.35	4.83	0.72	no	0.4892	0.310	0.42	2.0	2.43	29	0.153	4.50	19	26	no	zero	0.97	
183.7	16.2	53.3	92	18	109	0.42	5788	4458	3210	140.61	5.5698	0.73	95.23	4.04	0.71	no	0.4889	0.320	0.43	2.0	2.36	26	0.158	4.54	21	28	no	zero	0.97	
183.5	16.3	53.5	92	18	109	0.41	5806	4465	3217	145.42	3.8429	0.74	99.09	2.70	0.71	no	0.4886	0.320	0.43	2.0	2.21	20	0.166	4.61	22	28	no	zero	0.97	
183.4	16.3	53.6	92	18	109	0.43	5823	4473	3225	135.8	4.4241	0.73	91.19	3.33	0.71	no	0.4883	0.320	0.43	2.0	2.31	24	0.161	4.56	20	26	no	zero	0.97	
183.2	16.4	53.8	92	18	109	0.40	5841	4480	3232	149.73	5.2818	0.74	102.48	3.60	0.71	no	0.4880	0.330	0.45	2.0	2.30	23	0.161	4.57	22	28	no	zero	0.97	
183.0	16.4	54.0	92	18	109	0.35	5859	4488	3240	184.5	5.4006	0.77	131.80	2.97	0.71	no	0.4876	0.335	0.45	2.0	2.17	19	0.169	4.63	28	34	no	zero	0.97	
182.9	16.5	54.1	92	18	109	0.26	5877	4496	3248	255.34	4.6225	0.82	195.72	1.83	0.71	no	0.4873	0.340	0.46	2.0	1.89	11	0.181	4.72	41	43	no	zero	0.97	
182.7	16.5	54.3	92	18	109	0.22	5895	4503	3255	290.98	3.4854	0.84	229.70	1.21	0.71	no	0.4870	0.310	0.42	2.0										

[illegible]



June 7, 2022

Ben Soroudi
Shoreham Capital LP
P.O. Box 17119
Beverly Hills, CA 90209

**RE: Response to Public Comments to Environmental Impact Report (EIR)
Proposed Mixed-Use Development
8555 Santa Monica Boulevard
West Hollywood, CA 90069
Langan Project: 700110701**

Dear Mr. Soroudi:

You furnished us with comments prepared by and/or on behalf of the West Hollywood North Neighbors Association, the West Knoll Condominium Association and/or the North West Knoll Drive Association regarding the Recirculated Draft Environmental Impact Report (EIR) that was prepared for the proposed mixed-used development to be constructed at 8555 Santa Monica Boulevard in West Hollywood, California.

Geotechnical and geological data summarized in the recirculated Draft EIR is based on information provided in a geotechnical report dated July 23, 2018 prepared by GeoDesign, Incorporated (GDI).

The lowest finish floor level of the proposed mixed-use building will be established between Elevations 225 to 227 mean sea level (msl).

The proposed building will be supported on a mat foundation established approximately three to five feet below the lowest finish floor level, corresponding to approximately Elevation 221 to 224 msl.

The site is bi-level and the ground surface levels ranges from approximately Elevation 264 at the north side of the site to Elevation 235 at the southeastern corner of the site.

To supplement the data provided in the prior geotechnical report, we performed supplemental field explorations. A brief summary of our supplemental field explorations is presented below followed by our responses to the public comments.

Supplemental Field Explorations

As part of our supplemental investigation, we drilled two borings (B-4 and B-5) to depths of 60 and 50 feet, respectively, below the existing ground surface below the existing ground surface level. The borings were drilled using a truck-mounted drill rig equipped with 8-inch hollow-stem auger at the approximate locations shown on Figure 1.

We collected relatively undisturbed split spoon and bulk samples and performed standard penetration testing (SPT) at regular intervals while maintaining a log of the subsurface conditions encountered.

The samples collected from the borings were transported to our office for further review, classification, and assignment of geotechnical laboratory testing.

Upon completion of drilling, we installed ground water monitoring wells at each location.

Groundwater was encountered in boring B-4 at a depth of 58 feet below the existing ground surface and in boring B-5 at a depth of 48 feet below the existing ground surface.

Logs of the supplemental borings are presented in Attachment A.

Generalized Public Comments

The comments provided summarize a variety of concerns with the proposed development including the following geotechnical and geologic items:

1. Groundwater (Historic, Current, During and Post-Construction)
2. Temporary Excavation Support
3. Global Slope Stability and Permanent Support for Building Walls Below Grade
4. Geologic and Seismic Hazards
5. Expansive Soils

Item 1 – Groundwater

Current Groundwater Levels

The prior GDI investigation included three borings (B1 through B-3) and three cone penetrometer test (CPT) soundings (CPTs 1 through 3).

Borings B-1 and B-2 were drilled in August 2010 and CPTs 1 through 3 were also advanced in August 2010.

Boring B-3 was drilled in May 2017 and upon completion of drilling a groundwater monitoring well was installed at this location.

The locations of the prior explorations are shown on Figure 1.

As noted previously, groundwater monitoring wells were installed in our supplemental borings B-4 and B-5.

Groundwater levels were measured in each boring at the time of drilling and subsequent measurements were made in the groundwater monitoring well installed in boring B-3 in June 2018 and January 2022 and in borings B-4 and B-5 in February 2022.

Table 1 summarizes the groundwater level data collected at the site.

Table 1 – Summary of Groundwater Levels

Exploration	Exploration Elevation (MSL)	Date	Depth to Groundwater Below Existing Ground Surface ¹ (feet)	Groundwater Elevation	
				MSL	Project Reference Datum
B-1	235	August 2010	30	205	56
B-2	255	August 2010	49	206	57
B-3	235	May 2017	32	203	54
		June 2018	34	201	52
		January 2022	31	204	55
B-4	258	February 2022	58	200	51
B-5	253	February 2022	48	205	57
CPT-1	237	August 2010	30	207	58
CPT-2	253	August 2010	47	206	57
CPT-3	237	August 2010	30	207	58

¹Groundwater levels reported to the nearest foot.

The current groundwater level at the site is at least 14 feet below the lowest foundation level.

Historical High Groundwater Levels

Historical high groundwater levels (HHGWL) at the site and in the general site vicinity are available from Figure 10-2 of the City of West Hollywood General Plan 2035.

As shown on Figure 2, the HHGWL at the site ranges is generally between approximately 13 and 17 feet below the existing ground surface, corresponding to approximately Elevation 222 to 219 msl along Santa Monica Boulevard.

Conclusions Regarding Groundwater

Over the approximately 12 years in which site-specific groundwater data is available, the groundwater levels have remained essentially stable and the groundwater level across the site (from south to north) is roughly flat.

Additionally, there is no information suggesting the groundwater level will rise appreciably in the near or distant future.

Based on the data available at this time, groundwater is not anticipated to be encountered during construction nor is it anticipated to impact construction as the mass excavation for the proposed mat foundation will extend to approximately Elevation 220. The current groundwater level ranges from approximately Elevation 201 to 207, at least 13 feet below the lowest planned mass excavation level.

Groundwater pumping is not anticipated as part of the proposed development and the proposed development will not alter the current groundwater conditions at and adjacent to the site.

The potential for the current groundwater levels to rise to the HHGWL, while possible, is considered to be highly unlikely, noting that the primary reason that the current groundwater levels are considerably lower now than 50 to 100 year ago is due to large-scale groundwater pumping that has been on-going since the turn of last century. Since the 1960s, groundwater injection initiatives throughout the Greater Los Angeles area have resulted in relatively stable groundwater levels.

To account for the a potential rise in groundwater levels, though highly unlikely, the HHGWL is used in engineering analysis including evaluation of geotechnical and seismic hazards as well as in designing building walls below grade, the planned mat foundation any other features planned.

Thus, the building will be designed assuming the HHGWL is present, even though it's highly unlikely that the HHGWL will occur during the life of the building.

The design methods for this process are clearly established in the California Building Code and are commonly employed successfully in similar projects throughout the City of West Hollywood, Los Angeles, and Beverly Hills.

This is a very conservative design approach that provides added layers of safety and protection to neighboring properties by designing for loading conditions that are highly unlikely to occur.

Item 2 – Temporary Excavation Support

Temporary Shoring

Shoring will be required to temporarily support the planned excavation. Temporary shoring is a common construction activity and the design and construction methodology are fairly well established in Southern California.

The shoring system envisioned for the proposed development includes vertical elements, referred to as soldier piles that consist of W-shaped steel beams, post-grouted steel tie-back anchors, and timber or shotcrete lagging.

The methodology includes installation of the shoring wall from the top to the bottom of the planned excavation and essentially pre-loads the shoring wall using post-tensioned tie-back anchors, so that the retained soil is fully supported with a factor of safety before the excavation is advanced. Noting that the shoring is designed with a factor of safety of at least 1.5, the actual support provided by the shoring system will be approximately 50 percent greater than the current support provided for neighboring properties.

It's also common for temporary shoring systems to provide support for adjacent building foundations and in this case, design and construction considerations will be required to provide support to adjacent buildings as well as the public right-of-way.

The current geotechnical report presents design recommendations for temporary shoring systems and the recommendations presented are reasonable and consistent with similar projects successfully constructed in Southern California.

The required temporary shoring system will be designed by a licensed civil engineer in accordance with the recommendations presented in the geotechnical report that were prepared by a licensed geotechnical engineer and certified engineering geologist. The temporary shoring plans will be reviewed and approved by the City of West Hollywood's Department of Building and Safety.

Item 3 – Global Slope Stability and Permanent Support for Building Walls Below Grade

Slope instability is common in parts of the greater Los Angeles region, in particular where sedimentary (layered) bedrock is present and the layered bedrock is inclined adversely.

The geologic deposits at the site consist of Holocene and Pleistocene alluvial fan deposits. The alluvial soils consist of varying mixtures of sand and clay. Bedrock materials were not encountered to the depths explored (approximately 125 feet below the existing ground surface) and will not be encountered during the planned construction.

The planned excavations will not encounter bedrock materials.

The site is not located in a seismic-slope stability zone per State of California and City of West Hollywood seismic hazard mapping.

Permanent building walls below grade will be design to resist static and dynamic earth pressures. The walls below grade will be designed by a licensed structural engineer based on the recommendations in the geotechnical report that were prepared by a licensed geotechnical engineer certified engineering geologist.

Once completed, the permanent walls below grade will allow the decommissioning of the temporary shoring system.

The permanent below grade walls will provide more support to the slope and uphill developments than currently exists by virtue of the need to design the walls below grade for dynamic (seismic) forces. Thus, existing conditions and associated support do not provide the added level of support during an earthquake that the permanent wall below grade system will provide.

Item 4 – Geologic and Seismic Hazards

The site is not located within an active fault zone and therefore is not subject to the potential for ground surface rupture.

The site is located within an area with a potential for strong ground shaking and also soil liquefaction, however, these hazards are common in Southern California and are mitigated by following well documented geotechnical analytical methods and design and construction methods.

Specifically, for this site some of the native soils at depth are subject to liquefaction settlement in the event of strong ground shaking and a rise in the groundwater level to the HHGWL.

Although, it's highly unlikely that these two conditions will occur simultaneously, the California Building Code (CBC) requires that the foundation design assume that they can occur at the same and therefore, the current foundation recommendations take into account the potential for liquefaction.

The resulting foundation recommendations include a mat foundation which allows the weight of the building to be distributed uniformly and as a result can tolerate larger settlement than other foundation systems.

The mat foundation will be designed by a licensed structural engineer based on the recommendations presented in the geotechnical report that was prepared by a licensed geotechnical engineer and certified engineering geologist.

The foundation plans will be reviewed and approved by the City of West Hollywood Department of Building and Safety.

The geologic and seismic evaluation and design requirements presented in the CBC provide protection to neighboring properties by assuring that new developments will not result of loss of lateral support to existing neighboring properties.

It's also worth noting that current CBC geologic and seismic design requirements are appreciably more stringent than prior versions. As a result, the proposed development will be designed to appreciable higher standards than neighboring properties that were permitted prior to 2019.

Lastly, it's also worth noting that the use of a monolithic mat foundation will also provide an added degree of protection to neighboring properties when compared to other foundation types by greatly reducing and spreading the intensity of column and wall loads such that the applied foundation loading is marginally greater than the weight of the existing soil at the site. This combination of conditions essentially assures that foundation settlement will be minimal.

Item 5 – Expansive Soils

The data from the geotechnical investigation did not identify the presence of expansive soils at the site. In general, expansive soils are most commonly located within low-lying areas adjacent to major drainage courses and result from multiple episodes over geologic time of flooding that carries the smaller (aka fine-grained) soil particles (silt and clay-size particles) and deposits those particles outside of the main drainage path. The main drainage path typically consists of sand and gravel-sized particles that are referred to as 'high-energy' deposits in this case. Fine-grained deposits are commonly referred to as 'low-energy' deposits.

The geologic deposits at the site and in the immediate vicinity consist of varying mixtures of high energy and low energy deposits and these resulting mixtures are not expansive.

CLOSING

We appreciate the opportunity to provide professional services for this project and trust that the responses presented herein adequately address the respective comments. Please contact us with any questions or comments.

Sincerely,

Langan Engineering and Environmental Services, Inc.



Andrew Nieblas
Project Geologist

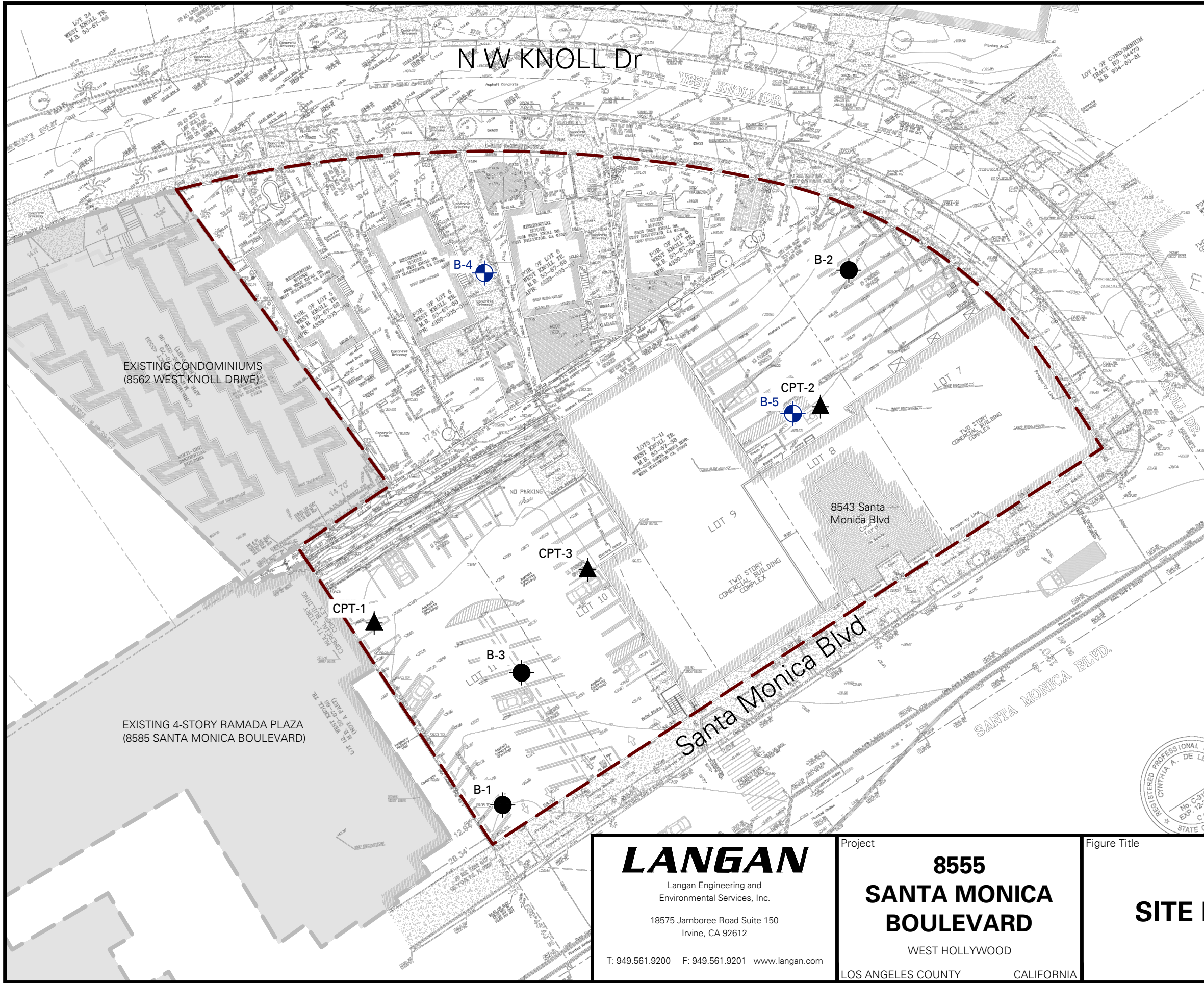


Christopher J. Zadoorian
Senior Associate



Attachments: Figures

FIGURES



- LEGEND:**
- SITE LIMITS
 - EXISTING BUILDINGS
 - B-4 BORING LOCATION
 - B-1 PRIOR BORING LOCATION (GeoDesign, 2018)
 - CPT-1 PRIOR CONE PENETRATION (GeoDesign, 2018)

- NOTES:**
- BACKGROUND PLAN REFERENCED FROM "TOPOGRAPHIC SURVEY", PREPARED BY M & G CIVIL AND LAND SURVEYING, DATED APRIL 10, 2019.
 - PRIOR BORINGS REFERENCED FROM, "PROPOSED MIXED-USE DEVELOPMENT WEST HOLLYWOOD, CA," PREPARED BY GEODESIGN INC. DATED 2018.

 Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project 8555 SANTA MONICA BOULEVARD WEST HOLLYWOOD LOS ANGELES COUNTY CALIFORNIA	Figure Title SITE PLAN	Project No. 700110701	Figure No. 1
			Date JUNE 2022	
			Scale AS SHOWN	
			Drawn By CR	



ATTACHMENT A

Project 8555 Santa Monica Boulevard			Project No. 700110701		
Location 8555 Santa Monica Boulevard			Elevation and Datum Approx. 258 (feet, MSL)		
Drilling Company 2R Drilling			Date Started 2/7/22		Date Finished 2/7/22
Drilling Equipment CME-75 Truck Mounted Drill Rig			Completion Depth 60 ft		Rock Depth -
Size and Type of Bit 8-inch O.D. Hollow Stem Auger			Number of Samples 8		Disturbed 2
Casing Diameter (in) -			Casing Depth (ft) -		Core -
Casing Hammer -			Weight (lbs) -		Drop (in) -
Sampler Bulk; 2-inch O.D. Split-Barrel SPT; 2.5-inch I.D. Cal Mod			Field Engineer A. Nieblas		
Sampler Hammer Automatic			Weight (lbs) 140		Drop (in) 30

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				Number	Type	Recov. (in)	Penetr. resist	Water Content	
	258.0	PCC = 4-inches thick, Base = 6-inches thick.	0						
	257.2	Clayey SAND (SC) to Sandy CLAY (CL), dark reddish brown, moist.	1						
			2						
			3						
			4						
			5						
			6						
			7						
			8						
			9						
	248.0	Sandy CLAY (CL), reddish brown, medium stiff, moist, well graded sand.	10						
			11	S-1	CR	18	4	3	
			12				4		
			13						
			14						
			15						
	242.0	Sandy SILT (ML), dark reddish brown, soft, moist, well graded sand, micaceous.	16						
			17						
			18						
			19						
			20						

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Project			8555 Santa Monica Boulevard			Project No.			700110701		
Location			8555 Santa Monica Boulevard			Elevation and Datum			Approx. 258 (feet, MSL)		
MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data			Remarks				
	+238.0			Number	Type	Recov. (in)	Penetr. resist. BL/6in	Water Content	(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)		
		Coarse sand.	20	S-2	SPT		3		Auger chatter.		
			21			18	2				
			22								
			23								
			24								
			25								
			26								
	+231.0	Clayey SAND (SC) to Sandy CLAY (CL), reddish brown, medium dense to very stiff, moist, well graded sand, borderline composition.	27	S-3	CR		9		Bulk sample collected from 35-40 feet.		
			28			18	11				
			29				15				
			30								
			31								
			32								
	+225.0	SAND (SP), reddish brown, medium dense to slightly moist, well graded, some fine sand.	33	S-4	SPT		5		Heavy auger chatter due to gravel bed.		
			34			18	7				
			35				7				
			36								
			37								
			38	S-5	SPT		8				
		39				18	12				
		40					10				
		41									
		42									
			43								
			44								
			45								

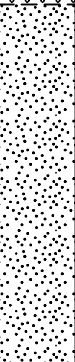
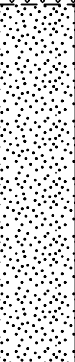
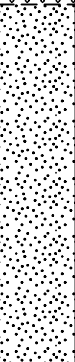
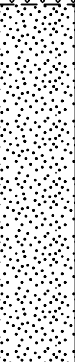
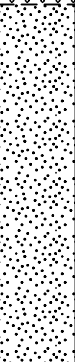
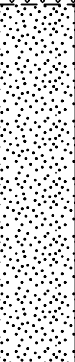
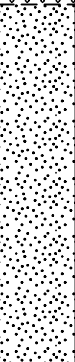
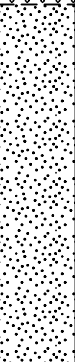
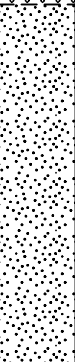
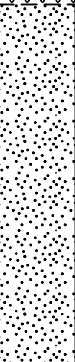
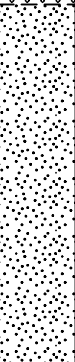
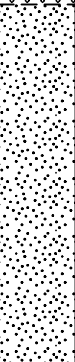
Project			8555 Santa Monica Boulevard			Project No.			700110701		
Location			8555 Santa Monica Boulevard			Elevation and Datum			Approx. 258 (feet, MSL)		
MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data			Remarks				
				Number	Type	Recov. (in)	Penetr. resist. BL/6in	Water Content	(Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)		
	213.0	Slightly moist.	45	S-6	SPT	18	9				
			46				9				
			47								
			48								
			49								
		Dry to slightly moist.	50	S-7	SPT	18	7				
			51				9				
			52								
			53								
			54								
		55	S-8	SPT	18	5					
		56				5					
		57				10					
			58	S-9	SPT	18	9				
			59				14				
	198.0	Brown, medium dense to dense, wet.	60				16		Groundwater encountered at 58.3 feet.		
		Total Depth = 60 feet Groundwater encountered at 58.3 feet. Groundwater well installed per LA County Guidelines.	61								
			62								
			63								
			64								
			65								
			66								
			67								
			68								
			69								
			70								

Groundwater encountered at 58.3 feet.

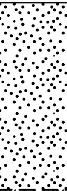
Project 8555 Santa Monica Boulevard			Project No. 700110701		
Location 8555 Santa Monica Boulevard			Elevation and Datum Approx. 251 (feet, MSL)		
Drilling Company 2R Drilling			Date Started 2/7/22		Date Finished 2/7/22
Drilling Equipment CME-75 Truck Mounted Drill Rig			Completion Depth 50 ft		Rock Depth -
Size and Type of Bit 8-inch O.D. Hollow Stem Auger			Number of Samples	Disturbed 6	Undisturbed 2
Casing Diameter (in) -			Casing Depth (ft) -	Water Level (ft.) First 47.7	Completion 24 HR. -
Casing Hammer	Weight (lbs) -	Drop (in) -	Drilling Foreman		
Sampler 2-inch O.D. Split-Barrel SPT; 2.5-inch I.D. Cal Mod			Field Engineer		
Sampler Hammer	Automatic	Weight (lbs) 140	Drop (in) 30	A. Nieblas	

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data					Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				Number	Type	Recov. (in)	Penetr. resist	Water Content	
	251.0		0						
	250.5	PCC = 6-inches thick.	1						
		Sandy CLAY (CL), brown to dark brown, moist.	2						
			3						
			4						
			5						
			6						
			7						
			8						
			9						
		Reddish brown.	10						
	241.0	Sandy SILT (ML), orangish brown, medium stiff, slightly moist, fine to very coarse sand.	11	S-1	SPT	18	2	3	
			12				2		
			13						
			14						
			15						
	235.0	SAND with Silt and Sand (SW), orangish brown, loose, slightly moist to dry.	16						
			17						
			18						
			19						
			20						

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Project			8555 Santa Monica Boulevard			Project No.			700110701		
Location			8555 Santa Monica Boulevard			Elevation and Datum			Approx. 251 (feet, MSL)		
MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data			Water Content		Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)		
	231.0	SAND (SP), dark reddish brown, medium dense, dry to slightly moist, fine to very coarse sand.	20	S-2	CR		Recov. (in)	Penetr. resist. BL/6in			
			21								18
	229.0		22								
			23								
			24								
			25								
			26	S-3	SPT		18	5	5		
			27								
	223.0	Clayey SAND (SC) to Sandy CLAY (CL), dark reddish brown, moist, loose to medium stiff.	28								
			29								
			30								
			31								
			32	S-4	SPT		18	5	4		
			33								
	218.0	Clayey SAND (SC), dark reddish brown, medium dense, slightly moist, fine to coarse sand.	34								
			35								
			36	S-5	SPT		18	5	8		
			37								
			38								
			39								
			40								
			41								
			42	S-6	SPT		18	6	10		
			43								
	208.0	SAND (SP), dark reddish brown, medium dense, slightly moist.	44								
			45								

Project		8555 Santa Monica Boulevard		Project No.		700110701	
Location		8555 Santa Monica Boulevard		Elevation and Datum		Approx. 251 (feet, MSL)	

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data				Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				Number	Type	Recov. (in)	Penetr. resist. BL/6in	
	206.0		45	S-7	CR	18	14	
	46		15					
	203.0	Sandy CLAY (CL), dark reddish brown, stiff, wet.	47				22	
	48							
	201.0	Total Depth = 50 feet Groundwater encountered at 47.7 feet. Groundwater well installed per LA County Guidelines.	49	S-8	SPT	18	3	
	50		6					
			51				8	
			52					
			53					
			54					
			55					
			56					
			57					
			58					
			59					
			60					
			61					
			62					
			63					
			64					
			65					
			66					
			67					
			68					
			69					
			70					