GEOTECHNICAL EXPLORATION
PROPOSED WAVEGARDEN COVE
3100 IRVINE AVENUE
NEWPORT BEACH, CALIFORNIA

Prepared For:

Back Barrels, LLC.

1940 Continental Avenue
Costa Mesa, CA 92627

Project No. PWAS_20240507

July 19, 2024

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Back Bay Barrels, LLC.
1940 Continental Avenue
Costa Mesa, CA 92627

Attention: Mr. Adam Cleary

Subject: **Geotechnical Exploration**
Proposed Wavegarden Cove
3100 Irvine Avenue
Newport Beach, California

Per your request, Carl Kim Geotechnical, Inc. (Carl Kim Geo) has performed a geotechnical exploration for the subject project. The purpose of this study was to review and verify engineering properties of onsite soils, identify geologic and seismic hazards that may impact the site, and develop foundation and earthwork recommendations for the project that are in general conformance with the 2022 California Building Code (CBC).

Based on plans prepared by X Engineering and 52nd Street Consultants LLC and a “geotechnical brief” prepared by LPC, Carl Kim Geo understands that the proposed Snug Harbor project will include construction of a 13-foot-deep surf lagoon, a 3-story 50,000-square-foot clubhouse building with one subterranean level, a building for athlete lodging, two additional pools, parking lots with solar panel canopies, a service yard, pavement, landscaping, and utilities. Retaining walls are planned to achieve design grades.

The project site is located at the Newport Beach Golf Course, east of the intersection of Irvine Avenue and Mesa Drive. The project site is an irregularly shaped parcel that includes three holes, a driving range, pro shop, clubhouse, restaurant, and parking areas. The site generally slopes toward the northwest. An existing 15- to 20-foot-high slope descends from the southeast edge of the property from about Elevation (El.) +58 feet mean sea level (msl). The rest of the site generally slopes gently from about El. +50 feet msl to about El. +15 feet msl near the west corner of the property. Based on review of aerial photos, the golf course was constructed between 1972 and 1980. The site is bounded by the Santa Ana-Delhi channel and Irvine Avenue from the north, Mesa Drive from the south, and commercial properties from the southeast.

Carl Kim Geo reviewed and incorporated subsurface geotechnical data previously collected by Moore Twining and performed additional subsurface explorations. Current explorations included two hand-auger borings and seven (7) cone penetration test soundings.

This site is located in the Santa Ana Heights area adjacent to the Delhi Channel approximately ¾ mile north of Upper Newport Bay. Santa Ana Heights is located northwest of the San Joaquin Hills and is mapped as covered by coastal terrace deposits.

The project site is underlain by engineered fill (thickness ranging from 0 to about 15 feet) described clayey sand, sandy lean clay, silty sand, and clay. The fill is underlain by late Quaternary to recent alluvium, which is underlain by Quaternary marine terrace deposits consisting primarily of lean clay with interlayers of fine to medium sand, silty sand, and silt layers.

Groundwater below the site has been encountered in temporary piezometers at approximately El. +4 to +15 feet msl. However, this water level is likely the result of a pressurized confined or semiconfined aquifer. The recommended design groundwater level for the site is at El. +8 feet msl, which is approximately two feet above the adjacent concrete-lined Delhi Channel. Widespread dewatering or lowering of a water table is not anticipated to be required. However, isolated seepage zones may be encountered in excavations.

Based on results of our study, it is our opinion that the proposed development is feasible from a geotechnical standpoint provided that the recommendations presented herein are implemented in the design and construction of the project. No evidence of extraordinarily adverse geological or geotechnical hazards at the site were noted that will preclude the development of the project as currently planned.

We appreciate the opportunity to work with you on this project. If you have any questions, or if we can be of further service, please call us at your convenience.

Respectfully submitted,

Carl Kim Geotechnical, Inc.

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1.0 INTRODUCTION

1.1 SITE LOCATION AND PROJECT DESCRIPTION

The project site (latitude + 33.6585°, longitude -117.8819°) is located within a portion of the Newport Beach Golf Course located at 3100 Irvine Avenue in Newport Beach (Figure 1 – Site Location) (Figure 2 – Aerial Photos). The irregularly shaped property includes three holes, a driving range, pro shop, clubhouse, restaurant, and parking areas. The site generally slopes toward the northwest. An existing 15- to 20-foot-high slope descends from the southeast edge of the property from about Elevation (El.) +58 feet mean sea level (msl). The rest of the site generally slopes gently from about El. +50 feet msl to about El. +15 feet msl near the west corner of the property. Based on review of aerial photos, the golf course was constructed between 1972 and 1980. The site is bounded by the Santa Ana-Delhi channel and Irvine Avenue from the north, Mesa Drive from the south, and commercial properties from the southeast.

Based on preliminary plans and specifications for the project, Carl Kim Geo understands that the proposed Snug Harbor project will include construction of a 13-foot-deep surf lagoon, a 3-story 50,000-square-foot clubhouse building with one subterranean level, a building for athlete lodging, two additional pools, parking lots with solar panel canopies, a service yard, pavement, landscaping, and utilities. Segmental and conventional retaining walls are planned to achieve design grades. A plinth structure approximately 40 feet wide by 350 feet long will be constructed along the central axis of the lagoon to generate waves. The plinth structure will be tied in with a continuous footing that will span the remaining length of the lagoon. The proposed project elements are shown on Plate 1, Explorations.

1.2 PURPOSE AND SCOPE

The purpose of this study was to characterize engineering properties of onsite soils, identify geologic and seismic hazards impacting the site, and develop geotechnical recommendations for foundations and earthwork. The tasks completed as part of this study are described below in more detail.

TASK 1 - DOCUMENT REVIEW

Carl Kim Geo reviewed preliminary plans and specifications prepared by X Engineering, 52nd Street Consultants LLC, and La Playa Consulting Inc. (LPC). In addition, previous geotechnical data gathered by Moore Twining Associates (2019, 2020) were reviewed and incorporated into this report. The documents reviewed are referenced in Appendix A.

TASK 2 –SUBSURFACE EXPLORATION AND LABORATORY TESTING

Current exploration included seven (7) cone penetration test (CPT) soundings, sampling of the near-surface hand excavations for each of the CPTs, and two (2) hand-auger borings advanced to obtain representative subsurface data for grading and foundation design in addition to prior explorations conducted by others. Prior exploration data by Moore Twining included logs from 26 hollow stem auger borings and four CPT soundings. Six (6) of the hollow-stem-auger borings were converted to temporary piezometers. Explorations ranged in depth from 4 to 75 feet below ground surface (bgs). Exploration locations are shown on Plate 1 and logs of current and prior explorations are attached in Appendix B, Explorations.

Laboratory test results from current and prior explorations are attached in Appendix C, Laboratory Tests. The testing included:

- Soil classification (ASTM D2488);
- Moisture and density (ASTM D 2216 and D 2937);
- Expansion Index (ASTM D 4829);
- Direct Shear (ASTM D3080);
- Consolidation (ASTM D 2435);
- Compaction (ASTM D 1557); and
- R-value (CTM 301).

TASK 3 –GEOLOGIC/SEISMIC HAZARDS EVALUATION

Using available geologic data, we have developed information on the general geologic conditions beneath the project including the locations of documented active and potentially active faults near the site. This study addresses the potential for primary earthquake hazards (ground shaking and surface rupture) and secondary earthquake hazards (liquefaction, seismic settlement, seiches, and earthquake-induced landsliding) impacting the site. Seismic design parameters are attached in Appendix D.

TASK 4 - ENGINEERING ANALYSIS AND REPORT

The results of subsurface exploration, laboratory testing, geologic-seismic hazards, and geotechnical design recommendations are summarized below.

2.0 GEOLOGIC CONDITIONS

2.1 GEOLOGIC SETTING

The property is located in the Peninsular Ranges physiographic province of California. This geomorphic province is characterized by north-northwest trending geologic grain, meaning that its primary faults, folds, mountains and valleys are all aligned in north-northwest direction.

The site is located northwest of the pediment of the San Juaquin Hills in the Santa Ana Heights area, approximately ¾-mile north of Upper Newport Bay. According to regional geologic mapping by Douglas M. Morton and others of the United States Geological Survey (USGS, 2006), the Santa Ana Heights area consists of "old paralic deposits overlain by alluvial-fan deposits". A regional scale geologic map compiled by the indicates the site is underlain by Quaternary-age marine terrace deposits that may or may not be covered by river-derived alluvium in places. The older rock units underlying the region (e.g. Monterey, Topanga Formations, etc.) are generally folded into a series of anticlines and synclines with axes that trend and plunge toward the northwest roughly parallel to the Newport-Inglewood Fault Zone and Whittier-Elsinore Fault system to the north (Yerkes, 1965) (USGS, 2006).

The regional geologic conditions of the site and vicinity are shown on Figure 3, *Geology*.

2.2 SITE GEOLOGY

An improved concrete culvert known as the Santa Ana-Delhi Channel traverses the northwest and west edges of the site. The drainage course was known as the Delhi Drainage Ditch for some time prior to improvements (USGS, 1932). This drainage system locally formed the topographically lowest portion of the site as it meanders and drains from north to south generally toward the Upper Newport Bay (aka upper Back Bay). Aerial photos and geomorphology indicate the active channel and lowest fluvial flood plain (where Holocene to recent alluvial deposits would be deposited) was 250 to 300 feet wide extending from roughly the present Santa Ana-Delhi Channel southeastward (Figure 2 – Aerial Photos).

Based on aerial photos reviewed (Appendix A) the site appears to have been used historically for agriculture and was fallow for several decades before it was developed into the Newport Beach Golf Course around or just before 1980. It appears that grading was performed along the periphery of the site and for construction of onsite infrastructure.

Based on subsurface explorations, field mapping, and review of historic maps and aerials photos, earth materials at the site consist of man-made fill, alluvium, and older terrace deposits. The identified and interpreted limits of the earth materials are shown on Plates 1 and 2. The materials underlying the site are described below and in Appendix B.

Undocumented Artificial Fill (afu): The site is mantled by variable thicknesses of man-made fill. Fill was identified in B-3, B-5, B-11, and B-19. A maximum of approximately 15 feet of fill was identified in B-11. Note that fill is expected to occur in other areas explored but was not specifically labeled in many of the explorations. As encountered, fill soils vary from soft to stiff sandy lean clay, and loose to dense and silty sand and clayey sand that is generally moist.

Quaternary Alluvium (Map Symbol - Qal): Quaternary to recent age alluvium encountered in site explorations consisted of layers of lean clay, sandy lean clay, clayey sand, silty sand, and poorly graded sands. Soils with notable organic content were logged in B-3, B-5, B-16, and CKG CPT-2. The materials were generally slightly moist to moist. Fine-grained soils varied from soft to stiff while granular soils encountered were logged as medium dense.

Quaternary Terrace Deposits (Map Symbol - Qt): Quaternary-age terrace deposits encountered in site explorations consisted of layers of lean clay, sandy lean clay, and fat clay with interlayers or intermixed zones of silty sand, poorly graded sand, and silt. The materials were generally moist. Fine-grained soils varied from soft to hard while granular soils encountered were logged as medium dense to very dense.

2.3 GROUNDWATER

According to the California Geological Survey (CGS, 1997a), the historic high groundwater level in the vicinity of the site is approximately 10 feet bgs (Figure 4 – Historic High Groundwater Level).

Subsurface explorations indicate groundwater levels below the site are variable. Explorations appear to intersect laterally discontinuous aquiclude materials confined by clay layers. At most locations where granular materials were encountered, water levels appear to rise above granular soil layers. Six temporary piezometers were constructed in 2020 at B-17, B-18, B-19, B-22, B-23, and B-24 (Moore Twining, 2020a,b).

Available groundwater level measurements from prior explorations and six temporary piezometers are tabulated in Appendix B. Measured water levels and interpreted and perched water zone are also discussed below and shown on Plate 1 and 2.

A pore dissipation test was conducted in CKG CPT-3 at 55.92 feet bgs May 28, 2024 indicates groundwater in the zone tested had the potential to rise to approximate El. +6 feet msl. Three accessible existing temporary piezometers were sounded by Carl Kim Geo May 28, 2024. The highest level measured was in B-24 at a depth of 18.52 feet below top of casing (approximate El. +9.5 feet msl).

Free water was encountered in 7 of 26 hollow stem auger borings. The highest measured groundwater levels were in borings B-9 and B-11 in 2019 at depths of 18 and 20 feet bgs, respectively. The corresponding calculated (2019) groundwater levels are at approximately El. +14 to +16 feet msl.

The water level measured in B-9 appears to be a localized perched water zone. Water levels below the site vary from unobserved to El. +15 feet msl. Given the variability of water levels across the site and the presence of the adjacent Delhi Channel with a flow line at approximately El. +6 feet msl, the recommended design groundwater level is 15 feet bgs.

Perched water and groundwater would be expected to occur where granular soils are encountered. Fluctuation of the groundwater level and localized zones of perched water should be anticipated below grade. Irrigation of landscaped areas can also impact local groundwater levels or likelihood of perched water or seepage to be encountered in excavations.

3.0 GEOLOGIC HAZARDS

Geologic hazards include surface faulting, ground lurching, seismic shaking, landslides, liquefaction, seismically-induced settlement, lateral spreading, seismically-induced landslides, flooding, expansive soils, corrosive soils, and soil gas. The following sections discuss these hazards and their potential impacts at the site in more detail.

3.1 FAULTING AND SEISMICITY

In general, the primary seismic hazards for sites in the region include strong ground shaking and surface fault rupture. Our discussion of faults potentially impacting the site is prefaced with a discussion of California legislation and state policies concerning the classification and land-use criteria associated with faults. By definition of the California Geological Survey (CGS), an active fault is a fault which has had surface displacement within Holocene time (about the last 11,000 years). Similarly, a fault whose recency of past movement is older than 11,700 years is a pre-Holocene fault, and does not meet State criteria as "active." Age-undetermined faults are those whose age of most recent movement is not known and is unconstrained. These updated definitions were necessary to eliminate agency and practitioner confusion for fault investigation reports as mandated by the Alquist-Priolo Earthquake Faulting Zones Act of 1972 (AP Act) and recently revised Special Publication 42 (CGS, 2018). The intent of this act is to prevent siting of habitable structures across traces of "active" faults.

3.1.1 SURFACE RUPTURE HAZARD

According to the State of California Earthquake Fault Zones maps), the site is not located within a currently established Alquist-Priolo Earthquake Fault Zone. Therefore, a surface fault rupture hazard evaluation is not mandated for this site.

The closest zoned active fault is a segment of the Newport-Inglewood-Rose Canyon Fault Zone approximately 5.6 miles to the west (CGS, 1997a,b). Inferred/buried strands of the Newport-Inglewood-Rose Canyon Fault Zone are mapped trending south of the site but are not currently zoned as active. The closest mapped trace is approximately 0.9 mile south of the site. No photo lineaments or other geomorphic evidence of active or potentially active faults intersecting the site were observed or recognized as part of our review of aerial photos and historic topographic maps; therefore, potential for surface fault rupture at the site is expected to be low.

Major active and potentially active faults in the site vicinity are shown on Figure 5, *Regional Faults*.

3.1.2 HISTORICAL SEISMICITY

Although Southern California has been seismically active during the past 200 years, written accounts of only the strongest shocks survive the early part of this period. Early descriptions of earthquakes are rarely specific enough to allow an association with any particular fault zone. It is also not possible to precisely locate epicenters of earthquakes that have occurred prior to the twentieth century.

A search of historical earthquakes was performed using the USGS database (https://earthquake.usgs.gov/earthquakes/search/) for the time period between 1769 and the present. Within that time frame, 353 earthquakes of magnitude 4 or greater were found within a 100-kilometer radius of the site (Figure 6, *Historical Seismicity*).

3.1.3 SEISMICITY

The principal seismic hazard to the site is ground shaking resulting from an earthquake occurring along any of several major active and potentially active faults in southern California (Figure 5). The intensity of ground shaking at a given location depends primarily upon the earthquake magnitude, the distance from the source, and the site response characteristics. Accordingly, design of the project should be performed in accordance with all applicable current codes and standards utilizing the appropriate seismic design parameters to reduce seismic risk as defined by California Geological Survey (CGS) Chapter 2 of Special Publication 117A (CGS, 2008). The 2022 edition of the California Building Code (CBC) is the current edition of the code. Through compliance with these regulatory requirements and the utilization of appropriate seismic design parameters selected by the design professionals, potential effects relating to seismic shaking can be reduced.

The following code-based seismic parameters should be considered for design under the 2022 CBC:

2022 CBC Map Based Ground Motion Parameters

Categorization/Coefficient	Code-Based
Site Latitude	+33.6587°
Site Longitude	-117.8826°
Site Class	D
Mapped Spectral Response Acceleration at Short Period (0.2 sec), S_S	1.311 g
Mapped Spectral Response Acceleration at Long Period (1 sec), S_1	0.468 g
Short Period (0.2 sec) Site Coefficient, F_a	1.0
Long Period (1 sec) Site Coefficient, F_v	1.832[1]
Adjusted Spectral Response Acceleration at Short Period (0.2 sec), S_{MS}	1.311 g
Adjusted Spectral Response Acceleration at Long Period (1 sec), S_{M1}	0.858[1] g
Design Spectral Response Acceleration at Short Period (0.2 sec), S_{DS}	0.874 g
Design Spectral Response Acceleration at Long Period (1 sec), S_{D1}	0.572[1] g
Site Amplification Factor, F_{PGA}	1.1
Site Modified Peak Ground Acceleration, PGA_M	0.620 g

[1] *See Section 11.4.8 of ASCE 7-16. A site-specific ground motion hazard analysis in accordance with Section 21.2 of ASCE 7-16 is required for this site. Per Supplement 3 to ASCE 7-16, a site-specific ground motion hazard analysis is not required where the value of the parameters S_{M1} and S_{D1} in the table are increased by 50%.*

The site is located within a seismically active region, as is all of Southern California. Based on the available subsurface information for the site, the site was designated as Site Class D. Details are presented in Appendix D.

3.2 SECONDARY SEISMIC HAZARDS

In general, secondary seismic hazards for sites in the region could include soil liquefaction, seismically-induced settlement, lateral spreading, landsliding, seiches and tsunamis. These potential secondary seismic hazards are discussed below.

3.2.1 LIQUEFACTION

Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when three general conditions exist: 1) shallow groundwater; 2) low density, fine, clean sandy soils; and 3) high-intensity ground motion. Studies indicate that saturated, loose and medium dense, near-surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential.

As shown on Figure 7, *Seismic Hazards*, a liquefaction hazard zone is delineated by the State of California (CGS, 1997a) along the northwest edge of the site. Based on our site-specific evaluation using a design high groundwater at 15 feet bgs, PGA_M, and a mean magnitude of 6.7, liquefaction hazard is deemed low. The results are presented in Appendix E.

3.2.2 SEISMICALLY-INDUCED SETTLEMENT

Seismically-induced settlement consists of dynamic settlement of unsaturated soil (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within low density sandy soil due to reduction in volume during and shortly after an earthquake event.

Based on our evaluation using the historic high groundwater level of 15 feet bgs, PGA_M, and a mean magnitude of 6.7, the potential total earthquake-induced settlement is estimated to be less than ½ inch (Appendix E). Moore Twining's CPT-3 indicated over 1 inch of seismically-induced settlement but most of the settlement occurred within the undocumented fill in the upper 10 feet, which will be removed and replaced as engineered fill during grading. The differential settlement can be taken as half the total settlement over a horizontal distance of 30 feet.

3.2.3 LATERAL SPREADING OR FLOW FAILURE

Liquefaction may also cause lateral spreading. For lateral spreading to occur, the liquefiable zone must be continuous, unconstrained laterally, and free to move along gently sloping ground toward an unconfined area. Because liquefaction hazard is low, the potential for lateral spreading is deemed low.

3.2.4 SEISMICALLY-INDUCED LANDSLIDES

As shown on Figure 7, *Seismic Hazards*, the site is not mapped within a seismically-induced landslide hazard zone identified by the State of California (CGS, 1999). In addition, due to project site lacking significant slopes, it is our opinion that the potential for seismically-induced landslide hazard at the site is low.

3.2.5 SEICHES AND TSUNAMIS

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Tsunamis are waves generated in large bodies of water by fault displacement or major ground movement. Once built, the Wavegarden lagoon will be an enclosed body of water subject to accelerations from ground movements. An area immediately south of Mesa Drive is within a tsunami hazard Zone (Figure 8, *Tsunami Hazard*). As such, the site and periphery are subject to low to moderate seiche and/or tsunami hazards.

3.3 FLOODING HAZARDS

According to a Federal Emergency Management Agency (FEMA) flood insurance rate map (FEMA, 2008), the project site is located within a flood hazard area identified as “Zone X”, which is defined as an area of minimal flood hazard. Regionally, storm runoff flow is generally directed to the south toward Upper Newport Bay. As shown on Figure 9, *Flood Hazards*, the site is **not** located within a flood hazard zone.

Earthquake-induced flooding can be caused by failure of dams or other water-retaining structures as a result of earthquakes. The site is not mapped within modeled inundation zone associated with proximal reservoirs (Figure 10). Therefore, the risk of seismically-induced flooding due to dam failure is considered very low.

3.4 EXPANSIVE SOILS

Expansive soils contain significant amounts of clay particles that swell considerably when wetted and which shrink when dried. Foundations constructed on these soils are subject to uplifting forces caused by the swelling. Without proper mitigation measures, heaving and cracking of both building foundations and slabs-on-grade could result.

Prior laboratory testing indicates that site soils have very low to medium expansion potential. Low to medium plasticity clays were encountered in explorations. Expansion Index test results range from 0 to 74 and are included in Appendix C.

3.5 CORROSIVE SOILS

Results of corrosion testing are included in Appendix C. The underlying soil should be assumed to be moderately corrosive to buried ferrous metals per ASTM STP 1013. Concrete in contact with the soil is expected to have severe (S2) exposure to sulfate attack per ACI 318 (ACI, 2019). An exposure class of C1 may be assumed for concrete in contact with soil exposed to moisture per ACI 318 but not to external sources of chlorides.

3.6 SUBSURFACE GASES

Based on review of State of California Geologic Energy Management Division (CalGEM, formerly DOGGR) records, the project site is not located within an oil field boundary (CalGEM, 2024). Accordingly, the potential for methane hazards to affect the site is low.

3.7 SUBSIDENCE

Based on review of referenced reports the site is not within an area of known significant subsidence associated with groundwater or petroleum withdrawal, peat oxidation, or hydro-compaction.

4.0 CONCLUSIONS

Based on the results of our study, it is our opinion that the proposed project is feasible from a geotechnical standpoint. In our opinion, the following geotechnical factors should be considered:

- The project site is underlain by variable thicknesses of fill in areas up to 15 feet in thickness. The fill is described as sandy clay and silty sand. The fill is underlain by Quaternary age and younger alluvium and Quaternary age marine terrace deposits consisting of low plasticity clay, sandy clay, silt, and some sand layers.
- Our review of the geologic literature (Appendix A) indicates there are no known active faults that intersect the site. In addition, site-specific data does not indicate the presence of faulting at the site.
- The main seismic hazard that may affect the site is strong ground shaking.
- Groundwater appears to occur in discrete confined layers at different elevations across the site. Perched water may occur at the site at approximately El. +16 feet msl. Design groundwater may be assumed at 15 feet below the existing ground surface.
- The expansion potential of near-surface onsite soils is expected to be low to medium.
- The onsite soils are expected to be severely corrosive to buried ferrous metals and have moderate sulfate exposure to concrete.
- Due to shallow groundwater, the presence of thick clay layers underlying the site that would be expected to have very low to no permeability, and evidence of pressurized aquifers below the site, stormwater infiltration is deemed infeasible.
- Existing temporary piezometers are a potential conduit for groundwater migration and nuisance conditions for the Wavegarden project.
- The planned grading will place up to 20 feet of new fill to establish design elevations along the north side of the site. Raising the ground surface elevation at the site will induce settlement. We estimate about an inch of settlement per foot of new fill placed to raise site grades. Accordingly, we recommend that the rough site grading be performed as far in advance as possible before construction of the proposed improvements.

5.0 RECOMMENDATIONS

The proposed development is feasible from a geotechnical standpoint, provided that the recommendations presented in this report are properly incorporated in design and construction.

The recommendations presented below are based upon the exhibited geotechnical engineering properties of the soils and their anticipated response both during and after construction. The recommendations are also based upon proper field observation and testing during construction. The project geotechnical engineer should be notified of suspected variances in field conditions to determine the effect upon the recommendations subsequently presented. These recommendations are considered minimal and may be superseded by more restrictive requirements of the civil and structural engineers, the City of Newport Beach, and other governing agencies.

Carl Kim Geo should review the grading and foundation plans and project specifications as they become available to verify that the recommendations presented in this report have been incorporated into the plans for this project.

5.1 EARTHWORK AND GRADING

We recommend that earthwork on the site be performed in accordance with the recommendations presented in this report and the project specifications as prepared by others. The *Earthwork and Grading Guide Specifications* included in Appendix F may be used for guidance in developing the project specifications. If conflict arises, the recommendations in Appendix F shall be superseded by the project specifications, recommendations contained in this report and/or the City of Newport Beach requirements, whichever is more stringent. All site grading should be performed in accordance with the applicable local codes and in accordance with the project specifications that are prepared by the appropriate design professional.

5.1.1 SITE PREPARATION

Prior to clearing of the site, existing piezometers B-17, B-18, B-19, B-22, B-23, and B-24 should be destroyed and sealed in accordance with state and local requirements.

After the site is cleared, the soils should be carefully observed for the removal of all unsuitable deposits. We recommend that after removal of pavements and hardscape, and complete demolition of existing structures within the proposed improvement footprints, all undocumented fill soils should be excavated from these proposed improvement footprints, which is expected to occur over most of the northern half of the site. Undocumented fill was encountered as deep as 15 feet bgs in the borings. Deeper fill may be encountered between boring locations.

Overexcavation is not required for footings established directly on undisturbed natural soils. Any underground obstructions encountered should be removed. Those lines should be removed or rerouted where interfering with proposed construction. *It is essential that excavation does not undermine foundations of any existing infrastructure that will remain in place along the boundaries of the project. As-built details of any structure to remain should be provided to Carl Kim Geo and the structural engineer prior to incorporation into the new design.*

Areas outside the structure footprint limits, planned for new asphalt and/or concrete pavement or pavers, should be over-excavated to a minimum depth of 24 inches below existing or finish grade or 18 inches below proposed pavement sections, whichever is deeper.

5.1.2 SUBGRADE PREPARATION

Excavation bottoms should be observed by Carl Kim Geo prior to placement of any backfill or new construction. After overexcavations are completed, and prior to fill placement, exposed surfaces should be scarified to a minimum depth of 6 inches, moisture-conditioned to 2 to 4 percent above optimum moisture content, and recompacted to a minimum 90 percent relative compaction as determined by ASTM D1557 standard test method (modified Proctor compaction curve).

Based on the explorations (Appendix B) saturated subgrade conditions are expected in deep excavations for undocumented fill removal and the planned basement for the 3-story building, which will require stabilization for support of engineered fill or new structures. Adjustment to the stabilization limits should be anticipated based on observed performance during stabilization. The stabilization methodology may vary and it is the contractor’s responsibility to achieve a non-yielding compacted subgrade prior to fill placement or foundation construction. While the laboratory-indicated moisture contents alone may not cause subgrade instability, the exposed moisture conditions may vary from what is currently reported. As such, we provide this information for planning purposes. The following proven geotechnical solution may be considered should subgrade instability occur during grading.

Rock Stabilization*:* If saturated subgrade conditions exist at the bottom of excavation, a 4- to 6-inch layer of 2- to 3-inch crushed rock should be placed in the excavation. Rock should be mechanically compacted under the weight of the equipment to push the rock into the underlying clay soils. Vibratory equipment should <u>not be used</u> to work in the rock blanket as the vibrations may aggravate locally soft saturated clays causing pumping conditions to expand laterally and destabilize the subgrade further. Clay soils removed from the excavation will require drying prior to reuse and are not considered suitable for use behind retaining walls.

Depending upon the degree of subgrade instability, should it occur, the initial lift may completely penetrate the subgrade, and additional lifts will be necessary. Alternatively, the quantity of material may be reduced if a geogrid or geotextile fabric is considered to provide additional reinforcement effect after the placement of the initial lift. Geogrid or geotextile reinforcement should be placed with a minimum 3 feet of overlap between adjacent panels extending a distance of at least 5 feet beyond the footprint on all sides.

5.1.3 FILL MATERIALS

On-site soil that is free of construction debris, organics, or rock larger than 4 inches in largest dimension is suitable to be used as fill for support of structures. Onsite clayey soils with an Expansion Index greater than 20 should not be used within 2 feet of concrete slabs-on-grade to avoid potential for lightly loaded concrete slabs to heave. Any imported fill soil should be approved by the geotechnical engineer prior to import or use onsite. Import soils should be uncontaminated, granular in nature, free of organic material (loss on ignition less than 2 percent), have a very low expansion potential (with an EI of 20 or lower) and have a low corrosion impact to the proposed improvements.

Because of the medium expansive nature of some onsite clay soils, precautions should be taken to reduce the potential heaving of concrete slabs on grade if clay soil is exposed in the subgrade. A 24-inch-thick layer of relatively non-expansive, predominantly granular soils is recommended immediately beneath concrete walks and slabs on grade, including Portland cement concrete paving. This select, non-expansive granular soil should contain sufficient fines as to be relatively impermeable when compacted. Material of this type was observed onsite within the undocumented fill encountered at the boring locations. This granular undocumented fill material may be reused onsite.

5.1.4 FILL PLACEMENT AND COMPACTION

All fill soil should be placed in thin, loose lifts, moisture-conditioned, as necessary, to 2 to 4 percent above optimum moisture content, and compacted to a minimum 90% relative compaction as determined by ASTM D 1557 standard test method (modified Proctor compaction curve) within building footprints. Aggregate base for pavement sections should be compacted to a minimum of 95% relative compaction. At least the upper 12 inches of the exposed soils in roadways and access drives, parking and (concrete –paver) flatwork areas, should be compacted to at least 95 percent relative compaction based on ASTM Test Method D 1557.

5.1.5 SHRINKAGE

The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Field and laboratory data used in our calculations included laboratory-measured maximum dry density for the general soil type encountered at the subject site, the measured in-place densities of near surface soils encountered and our experience.

Based upon the results of the in-place density and the moisture-density relationship exhibited by representative bulk samples of the near surface soils, recompaction of the soils is anticipated to result in volume shrinkage in the range of 10 to 15 percent. The estimated shrinkage does not include material losses due to removal of organic material or other unsuitable bearing materials (debris, rubble, oversize material greater than 6-inches) and the actual shrinkage that occurs during grading may vary throughout the site.

5.1.5 REUSE OF CONCRETE AND ASPHALT IN FILL

Pulverized demolition concrete free of rebar and other materials and demolished asphalt pavement can be pulverized to particles no-larger-than (≤) 3-inches and mixed with site soils for use in compacted fill. Blended pulverized concrete and asphalt should be mixed with at least 25% soils by weight. Such materials must be free of and segregated from any hazardous materials and/or organic material of any kind.

5.2 SHORING

A shoring system for the site may consist of soldier piles and lagging. Soldier piles may consist of steel H-beams vibrated into place or set in pre-drilled holes and backfilled with lean-mix concrete to the ground surface. If the depth of the excavation is less than about 20 feet, tieback anchors or internal bracing will not be required. Due to shallow groundwater, the potential for caving below groundwater may pose difficulties in the installation of soldier piles set in pre-drilled holes. Accordingly, the shoring contractor should be prepared to use special techniques and measures, if necessary, to permit the proper installation of the soldier piles.

5.2.1 LATERAL EARTH PRESSURES

For design of cantilevered shoring, where the surface of the backfill is level, it can be assumed that drained soils will exert a lateral pressure equal to that developed by a fluid with a density of 40 pounds per cubic foot (pcf). For design of braced shoring, where the surface of the backfill is level, it can be assumed that drained soils will exert a uniform lateral pressure of 30 pounds per square feet (psf). In addition to the recommended earth pressure, the shoring should be designed to resist any applicable surcharge loads due to foundation, storage, traffic, or other anticipated loads.

In addition to the recommended earth pressure, the upper 10 feet of shoring adjacent to streets should be designed to resist a uniform lateral pressure 100 psf, acting as a result of an assumed 300 psf surcharge behind the shoring due to normal street traffic. If the traffic is kept back at least 10 feet from the shoring, the traffic surcharge may be neglected. We can determine lateral surcharge pressures for specific cases, such as construction crane, concrete trucks, and other heavy construction equipment adjacent to shoring, if requested.

5.2.2 SURCHARGE PRESSURE FROM ADJACENT BUILDINGS

Where existing building foundations are within a 1:1 plane projected upward from the bottom of the planned shoring and basement walls, a lateral surcharge load should be applied to the active earth pressure to account for the pressure imposed by the foundation. To calculate the design surcharge pressures from adjacent building foundations, the tributary loading area may be assumed to extend from the shoring a distance equal to the depth of excavation. Gravity (dead plus live) loads from the existing building foundations within the tributary loading area should be included in the evaluation of surcharge loads. A coefficient of 0.45 may be used to convert gravity loads to horizontal surcharge loads. The horizontal surcharge load should be applied at a depth equal to 1/3 of the shored excavation height.

5.2.3 DESIGN OF SOLDIER PILES

For the design of soldier piles spaced at least two diameters on centers (OC), the allowable lateral bearing value (passive value) of the soils below the level of excavation may be assumed to be 500 psf at the excavated surface, up to a maximum of 5,000 psf. To develop the full lateral value, provisions should be taken to assure firm contact between the soldier piles and the undisturbed soils. The concrete placed in the soldier pile excavations may be a lean-mix concrete. However, the concrete used in that portion of the soldier pile which is below the planned excavated level should be of sufficient strength to adequately transfer the imposed loads from the soldier pile to the surrounding soils.

The frictional resistance between the soldier piles and the retained earth may be used in resisting the downward component of the design load. The coefficient of friction between the soldier piles and the retained earth may be taken as 0.3. This value is based on the assumption that uniform full bearing will be developed between the steel soldier beam and the lean-mix concrete and between the lean-mix concrete and the retained earth. 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. The frictional resistance between the concrete soldier piles and the soils below the excavated level may be taken as equal to 500 psf.

5.2.4 LAGGING

Continuous lagging will be required between the soldier piles. Careful installation of the lagging will be necessary to achieve bearing against the retained earth.

The soldier piles should be designed for the full anticipated lateral pressure. However, the pressure on the lagging will be less due to arching in the soils. For clear spans up to 8 feet, we recommend that the lagging be designed for a semi-circular distribution of earth pressure where the maximum pressure is 400 psf at the midline between soldier piles, and 0 psf at the soldier piles.

5.2.5 DEFLECTION

It is difficult to accurately predict the amount of deflection of a shored embankment. It should be realized, however, that some deflection will occur. To help protect adjacent existing buildings and infrastructure, the maximum allowable horizontal shoring deflection as measured at the top of the excavation is ½ inch.

If greater deflection occurs during construction, additional bracing may be necessary to minimize settlement of adjacent structures and of any utilities in the adjacent streets. To reduce the deflection of the shoring, if desired, a greater active pressure could be used in the shoring design.

5.2.6 MONITORING

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 is finalized.

We recommend that the adjacent existing streets be surveyed for horizontal and vertical locations. Also, a careful survey of existing cracks and offsets in the streets should be performed and recorded along with photographic records. A pre-construction benchmark survey establishing horizontal locations and vertical elevations for the adjacent buildings combined with documentation of existing cracks and offsets may be useful in responding to claims of building distress and damage (if any).

5.3 FOUNDATIONS

Because structural loading information for the proposed buildings is not yet available, we assumed a maximum dead plus live column load of 450 kips in our evaluation. The design of the plinth structure is anticipated to be governed by dynamic loading with relatively small dead loads. The proposed new structures may be supported on a shallow spread footing foundation system established on engineered fill or undisturbed natural soils.

5.3.1 SPREAD FOOTINGS

Footings for proposed structures should have a minimum embedment of 2 feet and have a minimum width of 24 inches. Footings for proposed temporary structures may be supported directly on grade.

Bearing Value: Footings or post-tensioned concrete slabs with thickened edges established on engineered fill or undisturbed natural soils may be designed to impose an allowable bearing pressure of 2,000 pounds per square foot (psf). The excavations should be deepened as necessary to extend into satisfactory soils.

A 50 percent increase in the bearing value for short duration loading, such as wind or seismic forces, may be used.

The ultimate bearing capacity can be taken as 9,000 psf. This value does not incorporate a factor of safety and may only be used for an ultimate bearing capacity check with appropriate factored loads. A resistance factor of 0.45 may be used for initial bearing capacity evaluation with factored loads.

The recommended bearing value is a net value, and the weight of concrete in the footings can be taken as 50 pounds per cubic foot (pcf); the weight of soil backfill can be neglected when determining the downward loads.

Settlement: The above recommended allowable bearing capacities are generally based on a total post-construction settlement of about 1 inch for column loads not exceeding 450 kips in dead plus live loads.

Differential settlement due to static loading is generally estimated at ½ inch over a horizontal distance of 40 feet. Once developed by the structural engineer, we should review total dead and sustained live loads for each column including plan location and span distance, to evaluate if differential settlements between dissimilarly loaded columns will be tolerable. Excessive differential settlement can be mitigated with the use of reduced bearing pressures, deeper footing embedment, possibly changing overexcavation schemes and using imported base material under spread footings, or possibly other methods.

Lateral Resistance: Soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the soil. The frictional resistance between the base of the foundation and the subgrade soil may be computed using a coefficient of friction of 0.3. The passive resistance may be computed using an equivalent fluid pressure of 250 pounds-per-cubic-foot (pcf) up to a maximum of 2,500 psf, assuming there is constant contact between the footing and undisturbed soil. The passive resistance can be increased by one-third when considering short-duration wind or seismic loads. The friction resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

Modulus of Subgrade Reaction: For static loading, 20 pounds per cubic inch (pci) may be assumed as the modulus of subgrade reaction (*k*) for shallow foundations supported on engineered fill or undisturbed natural soils. For seismic loading, a *k* value of 100 pci may be assumed.

5.3.3 FLAGPOLE TYPE FOUNDATIONS

Canopy structures, light poles, and fencing may be supported on flagpole-type foundations. Flagpole-type foundations may be designed to impose an allowable vertical bearing pressure of 2,000 psf and an allowable lateral bearing pressure of 500 psf per foot below grade. The allowable vertical and lateral bearing pressures may be increased by one-third for short-duration loading such as wind or seismic loading. The recommended bearing value is a net value, and the weight of concrete in the flagpole footings can be taken as 50 pounds per cubic foot.

5.3.4 AUGER PRESSURE GROUTED PILES

Where required, pile foundations may be used to resist high uplift and moment demands, which is expected at the wave-generating plinth structure. Due to shallow groundwater, auger pressure grouted (APG) piles may be an efficient pile foundation option.

APG piles are constructed by advancing a hollow-stem continuous-flight auger into the ground and pumping grout through the hollow shaft of the auger, producing shafts of grout in the soil. Piles are typically designed, built, and installed by specialty pile contractors. Foundation design parameters, including allowable capacities and estimated settlements, must be provided by the specialty contractor.

Based on our recent field explorations, we recommend using allowable pile capacities for piles end bearing into dense to very dense sands encountered at depths greater than 25 feet below existing grades.

The following preliminary axial and lateral design capacities may be used for planning purposes.

Allowable Axial APG Pile Capacities (in Kips)

Pile Length	16-inch-diameter	18-inch-diameter
35	115	130
40	120	140
45	135	160
50	145	180

The top of the pile is anticipated to be at least 3 feet bgs. Dead plus live load capacities are shown in the table above. A one-third increase may be used for wind or seismic loads. A factor of safety of 2 was used in determining the pile capacities.

Uplift capacities may be taken as equal to 60 percent of the downward capacities. The capacities presented are based on the strength of the soils; the strength of the pile section should be checked to verify the structural capacity of the piles.

Piles in groups may be spaced at 3 pile diameters on-centers. If the piles are so spaced, no reduction in axial capacity due to group action needs to be considered in the design.

Settlement: The settlement of proposed improvements supported on APG piling in the manner recommended will be less than ½ inch. Differential settlement over a horizontal distance of 30 feet will be about ¼ inch or less.

Lateral Resistance: Lateral loads may be resisted by the piles and by the passive resistance of the soils. The lateral capacity of the piles will depend on the pile type and size, the permissible deflection, and on the degree of fixity at the top of the pile.

We have calculated the lateral load, maximum moments, and depths to zero moment for 16- and *18-inch-diameter APG piles* using the computer program LPILE by ENSOFT, Inc. Our computations were performed for pile head deflections of ¼ inch and $^{3}/_{8}$ inch. The results are summarized in the tables below. Values may be interpolated for other pile diameters. The results are summarized in the tables below.

Lateral Load Design Data
16-inch APG Pile

	Pile Head Deflection (inch)			
	¼		³/₈	
Pile Head Condition	**Free**	**Fixed**	**Free**	**Fixed**
Lateral Load (kips)	8	19	11	25
Maximum Moment (inch-kips)	360	1,020	480	1,380
Depth to Maximum Moment (ft)	6	0	7	0
Depth to Zero Moment (ft)	18	20	18	20

Lateral Load Design Data
18-inch APG Pile

	Pile Head Deflection (inch)			
	¼		³/₈	
Pile Head Condition	**Free**	**Fixed**	**Free**	**Fixed**
Lateral Load (kips)	10	23	13	30
Maximum Moment (inch-kips)	480	1,605	660	2,395
Depth to Maximum Moment (ft)	7½	0	8	0
Depth to Zero Moment (ft)	20	23	20	24

The capacities presented in the table above are for pile lengths equal to or greater than 30 feet below the bottom of pile cap. The lateral capacity and reduction in the bending moment are based in part on the assumption that any required backfill adjacent to the pile caps and grade beams are properly compacted.

For piles in groups spaced at least 3 pile diameters on-centers, no reduction in the lateral capacity need be considered for the first row of piles. For subsequent rows in the direction parallel to loading, piles in groups spaced closer than 7 pile diameters on-centers will have a reduction in lateral capacity due to group effects. The lateral capacity of piles in groups spaced at 3 pile diameters on-centers may be assumed to be reduced by half. The reduction for other pile spacings may be interpolated between no reduction for piles spaced at 7 pile diameters on-centers and the reduction for piles spaced at 3 pile diameters on-centers.

The passive resistance of properly compacted fill against pile caps, grade beams, and turn-down walls will depend on the method of installation and magnitude of lateral deflection. The passive resistance of properly compacted fill may be assumed to be equal to the pressure developed by a fluid with a density of 250 pcf.

A one-third increase in the quoted passive values may be used for wind or seismic loads. The lateral resistance of the piles and the passive resistance of the soils may be combined without reduction in determining the total lateral resistance.

Pile Installation: Drilling for new APG piles should not be performed within 5 feet of recently installed piles until the concrete has been allowed to set for at least 6 hours. We recommend that piles in groups be drilled and poured in an alternating sequence to minimize the potential for destabilizing adjacent recently installed piles.

The pile excavations will extend below groundwater and through potentially unstable soils that would flow into open excavations. Although not expected to impact APG pile installation, the specialty contractor should evaluate the potential drilling conditions when planning installation methods.

Ultimate Values: The various values recommended for foundation design are for use with loadings determined by a conventional working stress design. If the structures are analyzed based on an ultimate design concept, the recommended axial pile capacities may be multiplied by 1.5.

In no event, however, should the pile lengths be reduced from those required for support of dead plus live loads when using the working stress design method.

5.4 SLABS-ON-GRADE

Concrete slabs-on-grade should be designed by the structural engineer in accordance with 2022 CBC requirements for soils with a high expansion potential. More stringent requirements may be required by the structural engineer and/or architect; however, slabs-on-grade should have the following minimum recommended components:

- **Subgrade:** The near-surface soils can be expansive and will shrink and swell with changes in the moisture content. Therefore, floor slabs-on-grade and adjacent concrete flatwork should be underlain by at least 24 inches of non-expansive fill (EI<21). Existing clay soils at planned basement levels are anticipated to be expansive. Accordingly, removal and replacement with non-expansive fill is recommended at the basement level.

Slab-on-grade subgrade soil should be moisture conditioned to within 2% of optimum moisture content, to a minimum depth of 18 inches within building footprints and compacted to 90% of the modified proctor (ASTM D 1557) laboratory maximum density prior to placing either a moisture barrier, steel and/or concrete. Onsite soil may be suitable for this use; however additional expansion testing should be performed upon completion of grading to verify expansive properties of onsite soil.

- **Moisture Barrier:** A moisture barrier consisting of at least 15-mil-thick Stego-wrap vapor barriers (see: http://www.stegoindustries.com/products/stego_wrap_vapor_barrier.php), or equivalent, should then be placed below slabs where moisture-sensitive floor coverings or equipment will be placed.

- **Reinforced Concrete**: A conventionally reinforced concrete slab-on-grade with a thickness of at least 5 inches within the building footprint and 6 inches for exterior SOG in pedestrian areas without heavy loads may be used. Reinforcing steel should be designed by the structural engineer, but as a minimum should be No. 3 rebar placed at 18 inches on-center, each direction (perpendicularly), mid-depth in the slab. A modulus of subgrade reaction (k) as a linear spring constant, of 75 pounds-per-square-inch per inch deflection (pci) can be used for design of heavily loaded slabs-on-grade, assuming a linear response up to deflections on the order of ¾ inch.

Minor cracking of concrete after curing due to expansion, drying and shrinkage is normal and will occur. However, cracking is often aggravated by a high water-to-cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low-slump concrete or low water/cement ratios can reduce the potential for shrinkage.

5.5 CEMENT TYPE AND CORROSION PROTECTION

Based on the results of laboratory testing, concrete structures in contact with the onsite soil are expected to have moderate (S2) exposure to water-soluble sulfates in the soil. Type II/V cement plus pozzolan may be used for concrete construction onsite and the concrete should be designed in accordance with 2022 CBC requirements.

The onsite soil may be considered moderately corrosive to ferrous metals. Ferrous pipe should be avoided by using high-density polyethylene (HDPE) or other non-ferrous pipe when possible. Ferrous pipe, if used, should be protected by polyethylene bags, tap or coatings, di-electric fittings or other means to separate the pipe from onsite soils.

5.6 LATERAL EARTH PRESSURES

Recommended lateral earth pressures are provided as equivalent fluid unit weights, in psf/ft. or pcf., for retaining walls in drained conditions using onsite sandy soils as backfill.

Condition	Equivalent Fluid Unit Weight (psf/ft)
	Level Backfill, Static Condition
Active	45
At-Rest	65
Passive	250
Coefficient of Friction	0.3

The above passive resistance values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Cantilever walls that are designed for a deflection at the top of the wall of at least 0.001H, where H is equal to the wall height, may be designed using the active earth pressure condition. Rigid walls that are not free to rotate, walls that are braced at the top, and walls that provide indirect support for foundations should be designed using the at-rest condition. A seismic increment of 20 pcf may be added to the active earth pressure above to evaluate seismic loading on walls.

The above lateral earth pressures are based on fully drained conditions. Infiltrating surface water may build-up behind proposed basement walls. Therefore, walls below grade should be designed to resist hydrostatic pressures (additional fluid pressure of 45 pounds per cubic foot) or be provided with positive drainage behind the wall.

Lateral load resistance will be provided by the sliding resistance at the base of the foundation and the passive pressure developed along the front of the foundation. A frictional resistance coefficient of 0.3 may be used at the concrete and soil interface.

In addition to the above lateral forces due to retained earth, the appropriate loads due to surcharges should be considered in the design of retaining structures.

5.7 PAVEMENT DESIGN

5.7.1 ASPHALT CONCRETE PAVING

The paving thicknesses presented in the table below are based on our review of available subsurface data. We assumed an R-value of 5 for design (laboratory test results ranged from 0 to 17). The required paving and base thicknesses will depend on the expected wheel loads and volume of traffic (Traffic Index or TI). Assuming that the paving subgrade will consist of the on-site or comparable soils compacted to at least 95% of the maximum dry density obtainable by the ASTM Designation D1557 method of compaction as recommended, the minimum recommended paving thicknesses are presented in the following table.

Area	**Traffic Index**	**Asphalt Concrete (inches)**	**Base Course (inches)**
Parking Areas	4	3	6½
Light Truck	5	4	7½
Heavy Truck	6	5	9½
Main Drives	7	6	11½

The asphalt paving sections were determined using the Caltrans design method. We can determine the recommended paving and base course thicknesses for other Traffic Indices if required. Careful inspection is recommended to verify that the recommended thicknesses or greater are achieved, and that proper construction procedures are followed.

5.7.2 PORTLAND CEMENT CONCRETE PAVING

We have assumed that the subgrade consisting of a layer of non-expansive fill below Portland cement concrete paving will have an R-value of at least 20, which will need to be verified during grading. Portland cement concrete paving sections were determined in accordance with procedures developed by the Portland Cement Association. Concrete paving sections for a range of Traffic Indices are presented in the following table. We have assumed that the Portland Cement Concrete will have a compressive strength of at least 4,000 pounds per square inch.

Area	Traffic Index	PCC (inches)	Base Course (inches)
Parking Areas	4	5½	4
Light Truck	5	6	4
Heavy Truck	6	6½	4
Main Drives	7	7½	4

The paving should be provided with expansion joints at regular intervals no more than 15 feet in each direction. Load transfer devices, such as dowels or keys, are recommended at joints in the paving to reduce possible offsets. The paving sections in the above table have been developed based on the strength of unreinforced concrete. Steel reinforcing may be added to the paving to reduce cracking and to prolong the life of the paving.

5.7.3 SPECIFICATIONS

The base course should conform to requirements of Section 26 of State of California Department of Transportation Standard Specifications (Caltrans), latest edition, or meet the specifications for untreated base as defined in Section 200-2 of the latest edition of the Standard Specifications for Public Works Construction (Green Book). The existing asphalt paving may be used for base course if it is crushed and processed to meet the requirements of crushed miscellaneous base per the Green Book. The base course should be compacted to at least 95 percent relative compaction. The asphalt concrete should conform to the specifications outlined in Section 203-6 of the Green Book, and asphalt concrete construction methods should meet the requirements of Section 302-5 of the Green Book.

5.8 TEMPORARY EXCAVATIONS

All temporary excavations, including utility trenches, retaining wall excavations, and foundation excavations should be performed in accordance with project plans, specifications, and all OSHA requirements. Excavations 4 feet or deeper should be laid back or shored in accordance with OSHA requirements before personnel are allowed to enter. Shoring recommendations are provided in Section 5.2 above.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the cut, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structure.

Temporary excavations should be treated in accordance with the State of California version of OSHA excavation regulations, Construction Safety Orders for Excavation General Requirements, Article 6, Section 1541, effective October 1, 1995. The sides of excavations should be shored or sloped in accordance with OSHA regulations. OSHA allows the sides of unbraced excavations, up to a maximum height of 20 feet, to be cut to a ¾H:1V (horizontal:vertical) slope for Type A soils, 1H:1V for Type B soils, and 1½H:1V for Type C soils. Onsite soils are to be considered Type C soils which are subject to collapse in shallow unbraced excavations (i.e. approximately 3 feet in vertical height).

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

5.9 TRENCH BACKFILL

Utility trenches should be backfilled with compacted fill in accordance with Sections 306-1 and 306-6 of the Standard Specifications for Public Works Construction, ("Greenbook"), 2018 Edition. Utility trenches can be backfilled with onsite sandy material free of rubble, debris, organic and oversized material up to (≤) 3-inches in largest dimension. Prior to backfilling trenches, pipes should be bedded in and covered with either:

(1) **Sand:** A uniform, sand material that has a Sand Equivalent (SE) greater-than-or-equal-to (≥) 30, passing the No. 4 U.S. Standard Sieve (or as specified by the pipe manufacturer), water densified in place, or

(2) **CLSM:** Controlled Low Strength Material (CLSM) conforming to Section 201-6 of the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2018 Edition.

Pipe bedding should extend at least 4 inches below the pipeline invert and at least 12 inches over the top of the pipeline. Native and clean fill soils can be used as backfill over the pipe bedding zone, and should be placed in thin lifts, moisture conditioned above optimum, and mechanically compacted to at least 95 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

5.10 DRAINAGE AND LANDSCAPING

Building walls below grade should be waterproofed or at least damp proofed, depending upon the degree of moisture protection desired. Surface drainage should be designed to direct water away from foundations and toward approved drainage devices. Irrigation of landscaping should be controlled to maintain, as much as possible, consistent moisture content sufficient to provide healthy plant growth without overwatering.

5.11 ADDITIONAL GEOTECHNICAL SERVICES

The geotechnical recommendations presented in this report are based on subsurface conditions as interpreted from limited subsurface explorations and limited laboratory testing. Our conclusions and recommendations presented in this report should be reviewed and verified by Carl Kim Geo during site construction and revised accordingly if exposed geotechnical conditions vary from our preliminary findings and interpretations. The recommendations presented in this report are only valid if Carl Kim Geo verifies the site conditions during construction. Geotechnical observation and testing should be provided during the following activities:

- Grading and excavation of the site;
- Overexcavation and compaction;
- Compaction of all fill materials;
- Excavation and installation of foundations;
- After excavation of all slabs and footings and prior to placement of steel or concrete to confirm the slabs and footings are founded in firm, compacted fill;
- Utility trench backfilling and compaction; and
- When any conditions are encountered that varies significantly from the conditions described in this report.

Carl Kim Geo should review the final grading and foundation plans and specifications, when available, to comment on the geotechnical aspects. Our recommendations should be revised, as necessary, based on future plans and incorporated into the final design plans and specifications.

6.0 LIMITATIONS

The geotechnical engineering analyses presented in this geotechnical exploration report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No other warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report.

Please also note that our evaluation was limited to assessment of the geologic and seismic aspects of the site, and did not include evaluation of structural issues, environmental concerns or the presence of hazardous materials. Our conclusions, recommendations and opinions are based on an analysis of the observed site conditions, engineering characteristics of the observed site soils and our review of the referenced geologic literature and reports. If geologic conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request.

FIGURES AND PLATES

0 1,000 2,000 4,000 Feet

1 inch =2,000 feet

N

July 2024

Legend

Site Boundary

Imagery Source: California F&W. 2022.

CKGEO

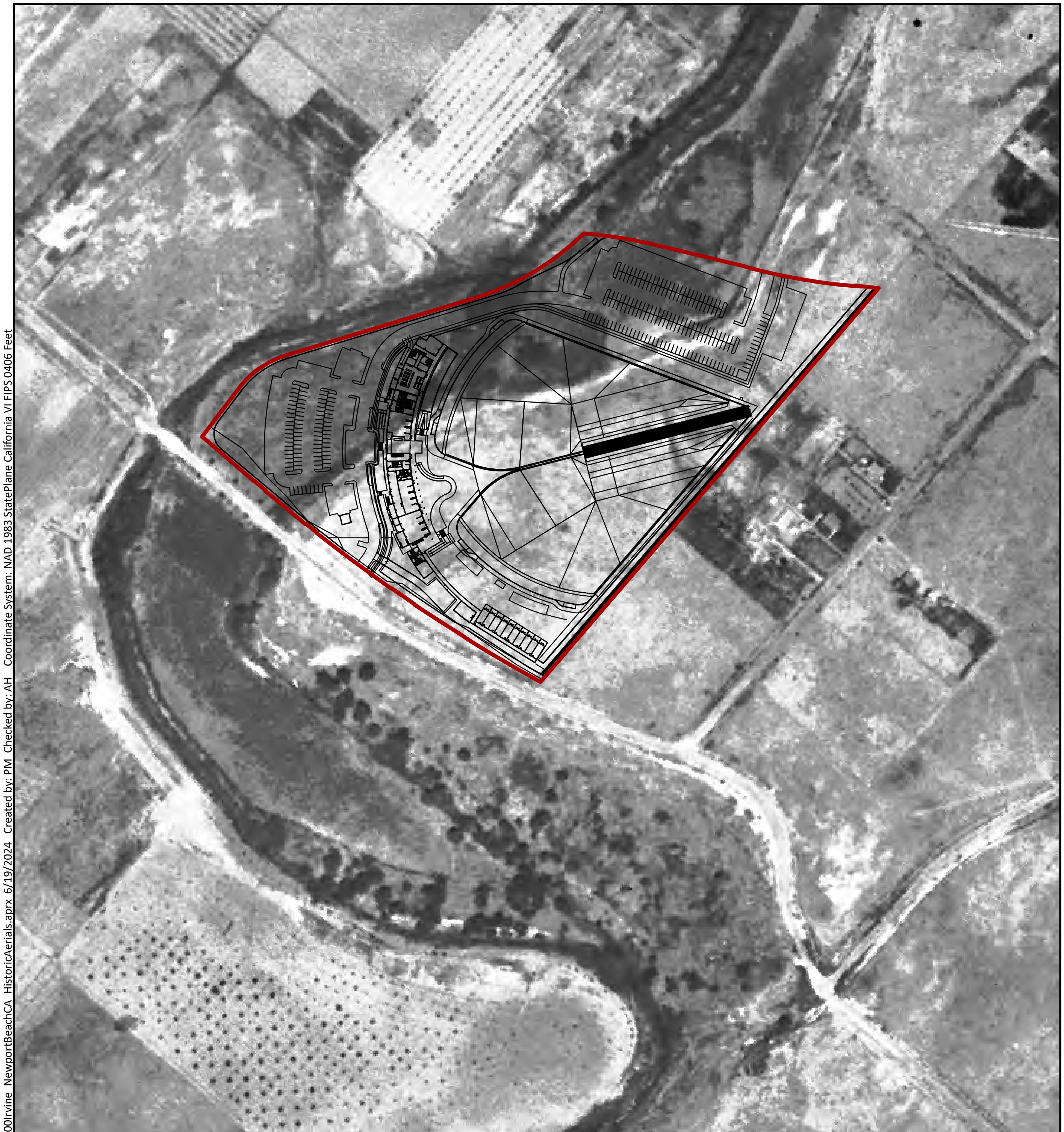
Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
949-441-8143
CARLKIMGEO@GMAIL.COM

CLIENT:	Back Bay Barrels, LLC
PROJECT:	Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA
PROJECT NUMBER:	PWAS_20240507

Site Location

FIGURE 1

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/21/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



0 150 300 600 Feet

1 inch =300 feet

July 2024

N

Legend

Site Boundary (approximate)

CKGEO

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CLIENT: Back Bay Barrels, LLC

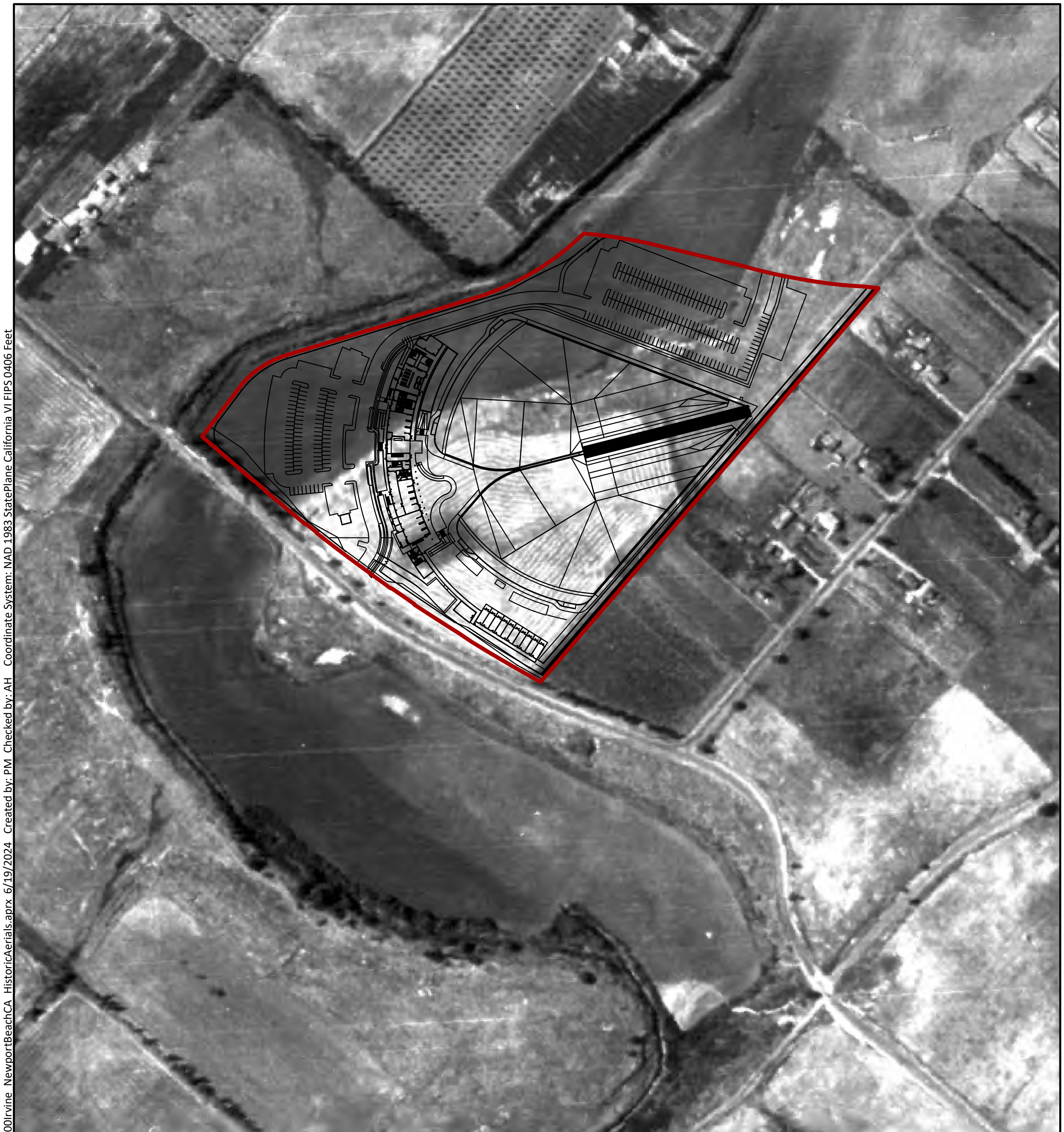
PROJECT: Wavegarden Cove
3100 Irvine Avenue
Newport Beach, CA

PROJECT NUMBER: PWAS_20240507

Historic Aerial (1927)

FIGURE 2A

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA_HistoricAerials.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



0 150 300 600
Feet

1 inch =300 feet

July 2024

N

Legend

Site Boundary (approximate)

CKGEO

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
949-441-8143
CARLKIMGEO@GMAIL.COM

CLIENT: Back Bay Barrels, LLC

PROJECT: Wavegarden Cove
3100 Irvine Avenue
Newport Beach, CA

PROJECT NUMBER: PWAS_20240507

Historic Aerial (1938)

FIGURE 2B

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA_HistoricAerials.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

0 150 300 600 Feet

1 inch =300 feet

N

July 2024

Legend

Site Boundary (approximate)

CKGEO

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
949-441-8143
CARLKIMGEO@GMAIL.COM

CLIENT: Back Bay Barrels, LLC

PROJECT: Wavegarden Cove
3100 Irvine Avenue
Newport Beach, CA

PROJECT NUMBER: PWAS_20240507

Historic Aerial (1963)

FIGURE 2C

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA_HistoricAerials.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

0 150 300 600 Feet

1 inch =300 feet

N

July 2024

Legend

Site Boundary (approximate)

CKGEO

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
949-441-8143
CARLKIMGEO@GMAIL.COM

CLIENT: Back Bay Barrels, LLC

PROJECT: Wavegarden Cove
3100 Irvine Avenue
Newport Beach, CA

PROJECT NUMBER: PWAS_20240507

Historic Aerial (1968)

FIGURE 2D

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA_HistoricAerials.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

0 150 300 600 Feet

1 inch =300 feet

N

July 2024

Legend

Site Boundary (approximate)

CKGEO

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
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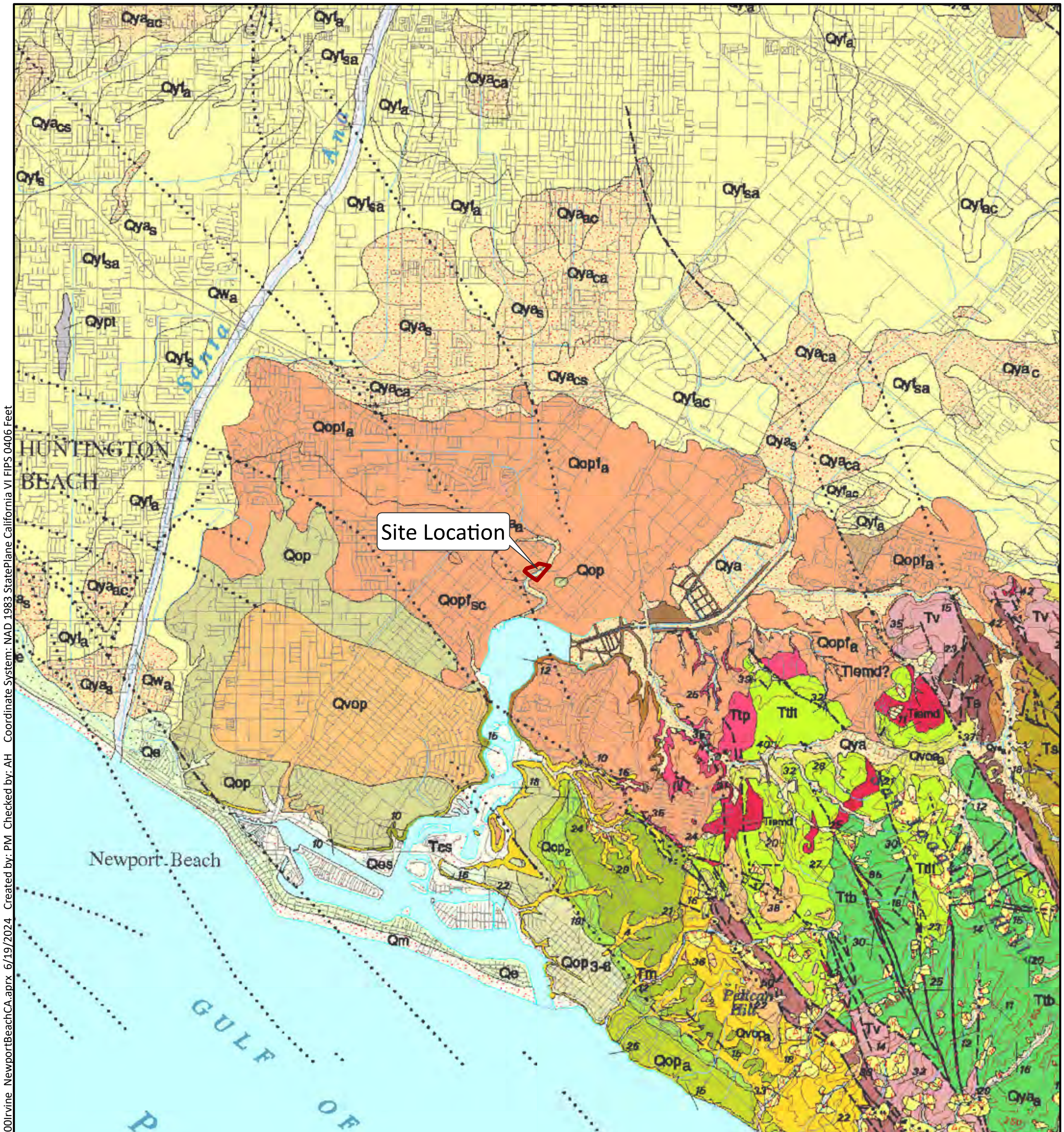
CARLKIMGEO@GMAIL.COM

CLIENT:	Back Bay Barrels, LLC
PROJECT:	Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA
PROJECT NUMBER:	PWAS_20240507

Historic Aerial (2001)

FIGURE 2E

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA_HistoricAerials.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



0 4,000 8,000 16,000 Feet 1 inch =8,000 feet **July 2024**	N

Legend

Site Boundary

Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangles, California, Douglas M. Morton and Fred K. Miller, 2006, USGS Open File report 2006-1217

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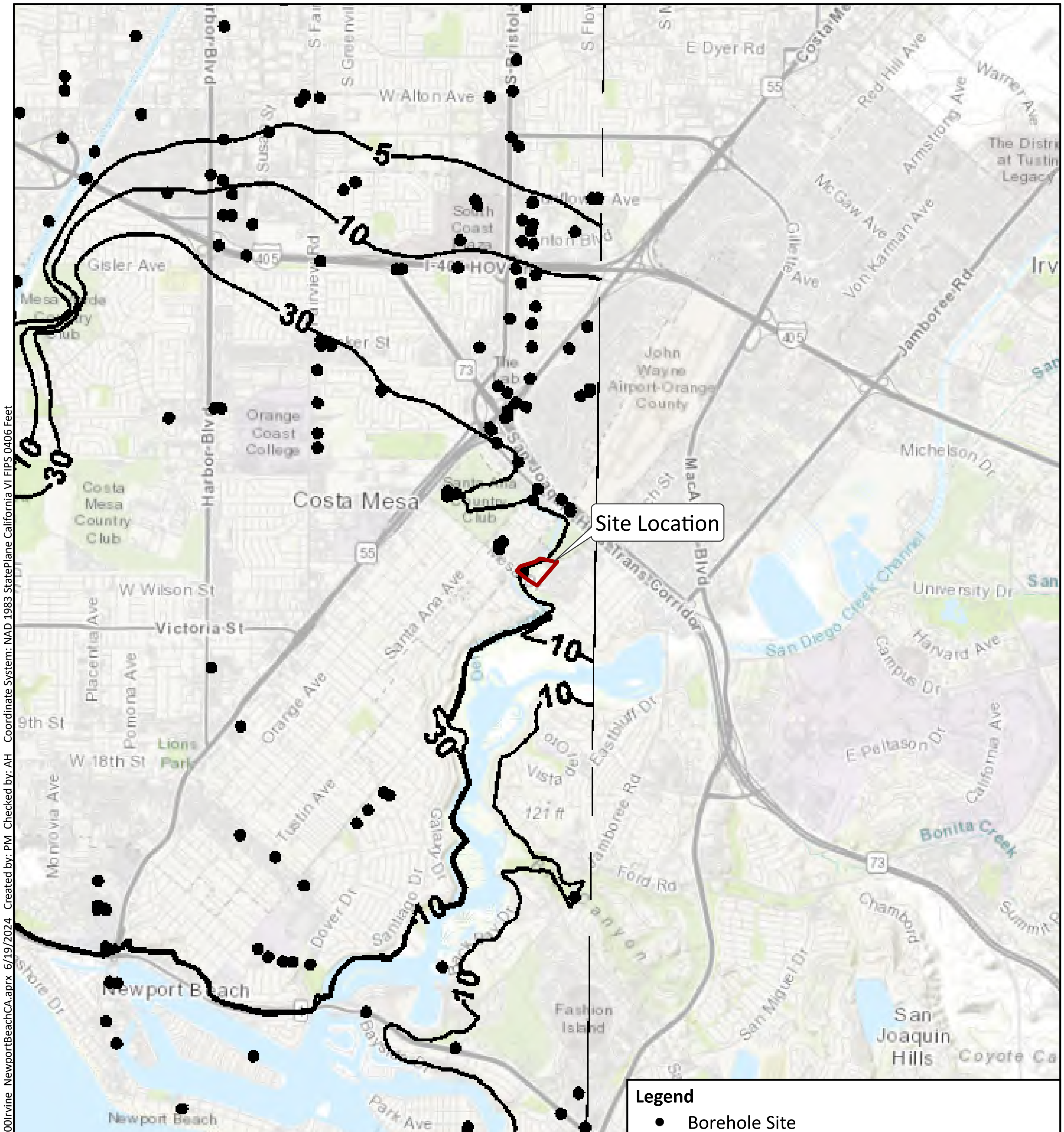
PROJECT:	Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA
PROJECT NUMBER:	PWAS_20240507

Geologic Map

FIGURE 3

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



0 2,500 5,000 10,000 Feet 1 inch =5,000 feet **July 2024**	N

Legend

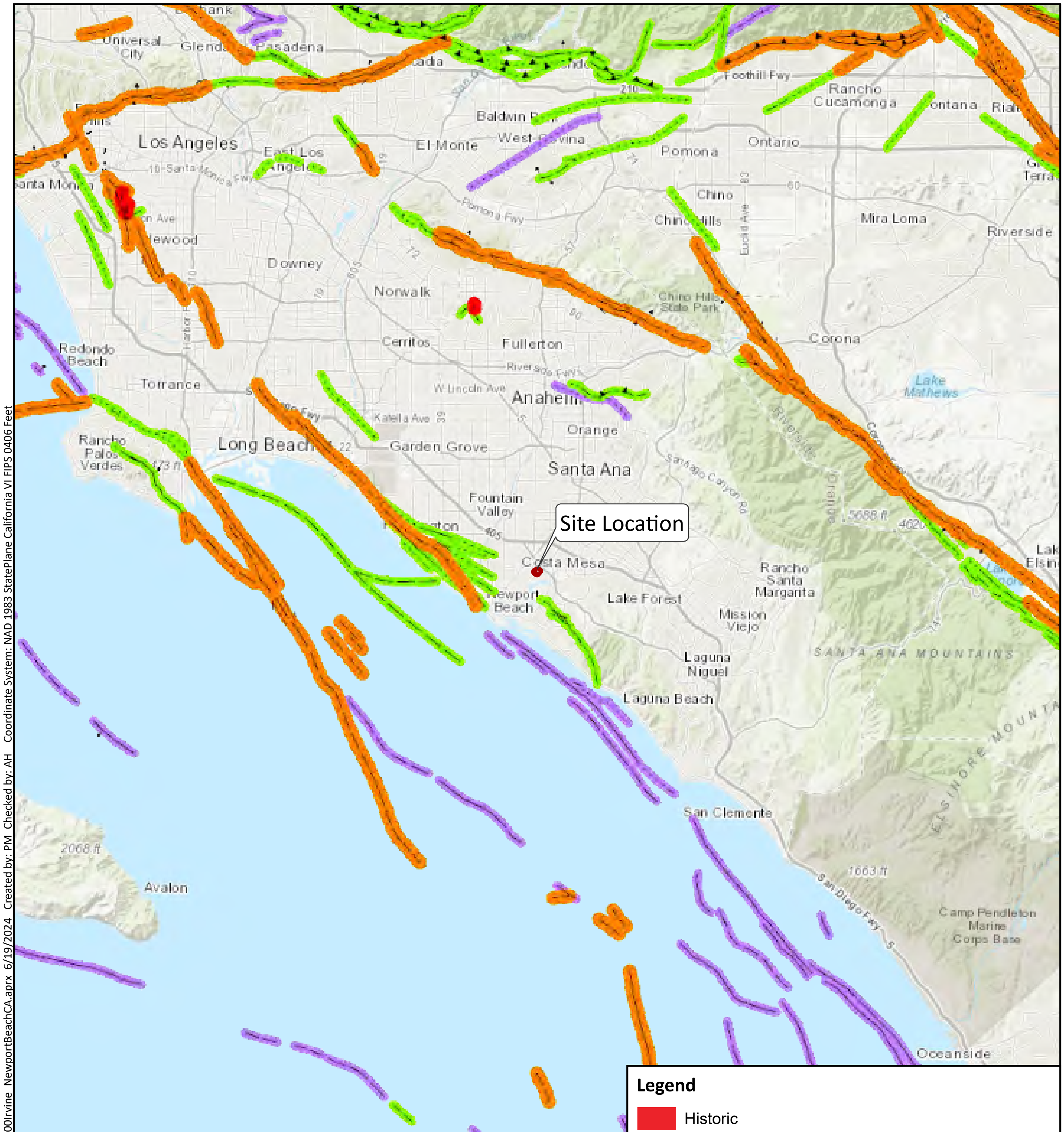
- ● Borehole Site
- Estimated depth to historic high groundwater level in feet
- Site Boundary

Base Map: Seismic Hazard Zone Report for the Newport Beach 7.5 Quadrangle, Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations

CKGEO	CLIENT: Back Bay Barrels, LLC	**Historic High Groundwater Level**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *CARLKIMGEO@GMAIL.COM*	PROJECT: Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA	
	PROJECT NUMBER: PWAS_20240507	**FIGURE 4**

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

Holocene



Legend

- Historic
- Holocene
- Late Quaternary
- Quaternary

Base Map: Fault Activity Map of California, California Department of Conservation

0 25,000 50,000 100,000 Feet

1 inch =50,000 feet

N

July 2024

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CARLKIMGEO@GMAIL.COM

CLIENT: Back Bay Barrels, LLC

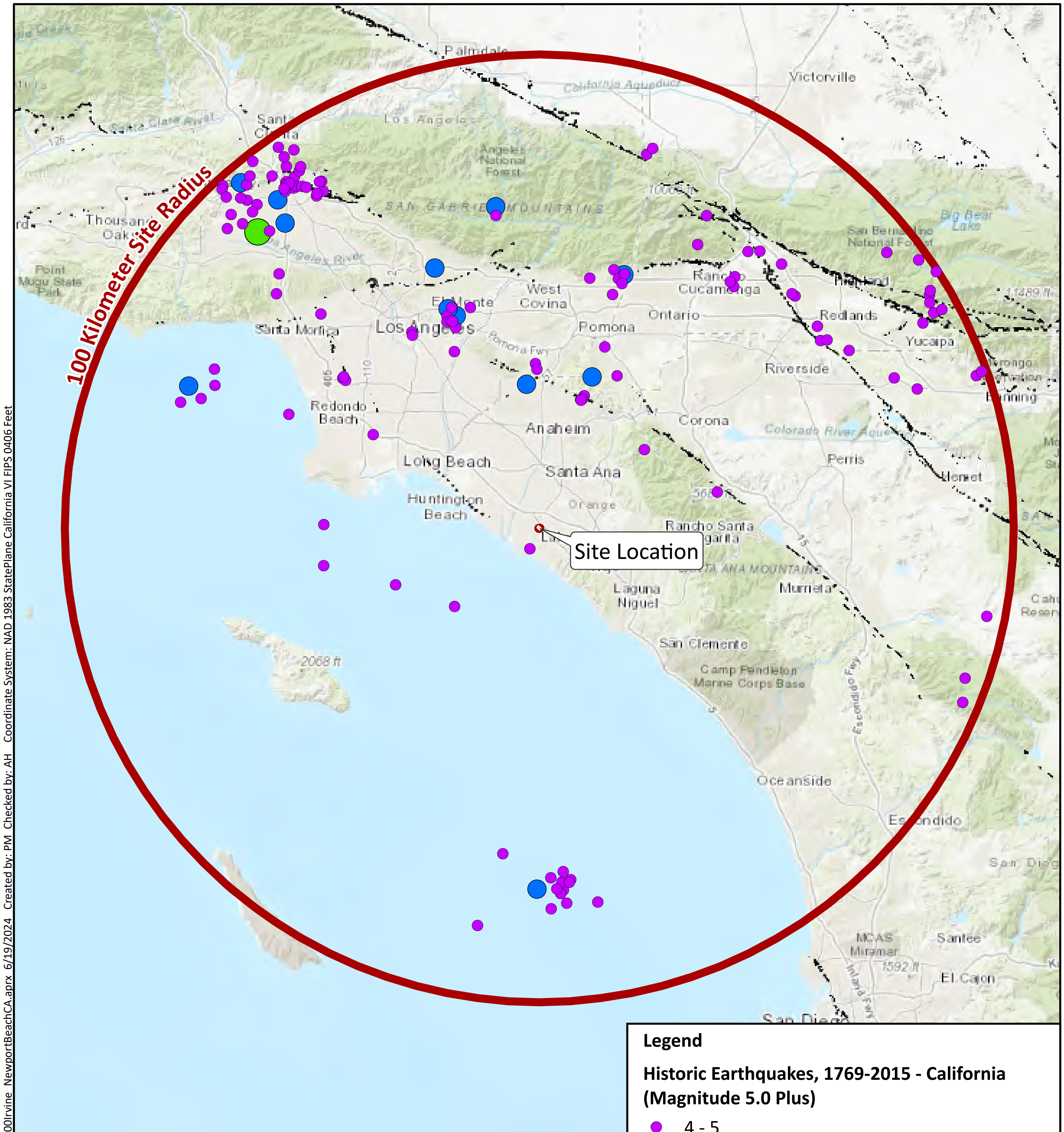
PROJECT: Wavegarden Cove
3100 Irvine Avenue
Newport Beach, CA

PROJECT NUMBER: PWAS_20240507

Regional Faults

FIGURE 5

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



Legend

Historic Earthquakes, 1769-2015 - California (Magnitude 5.0 Plus)

- 4 - 5
- 5 - 6
- 6 - 7
- 7+

Base Map: Earthquake Hazards Program. USGS.

0 50,000 100,000 200,000 Feet

1 inch =100,000 feet

N

July 2024

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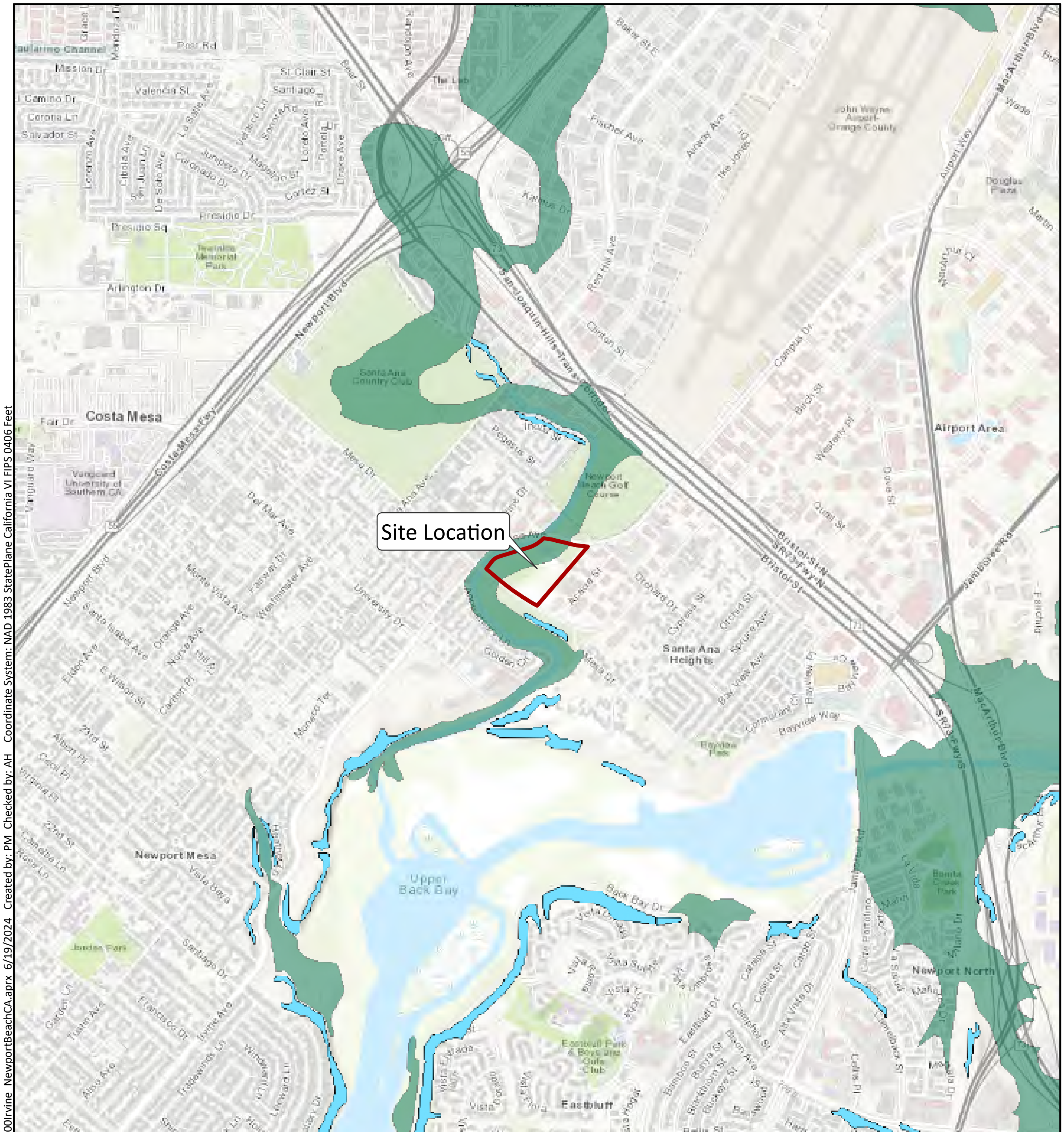
CLIENT:	Back Bay Barrels, LLC
PROJECT:	Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA
PROJECT NUMBER:	PWAS_20240507

Historic Seismicity

FIGURE 6

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



0 1,000 2,000 4,000 Feet

1 inch =2,000 feet

July 2024

N

Legend

- Site Boundary
- Liquefaction Zones
- Landslide Zones

Base Map: CGS Seismic Hazards Program: Liquefaction and Landslide Zones, California Department of Conservation

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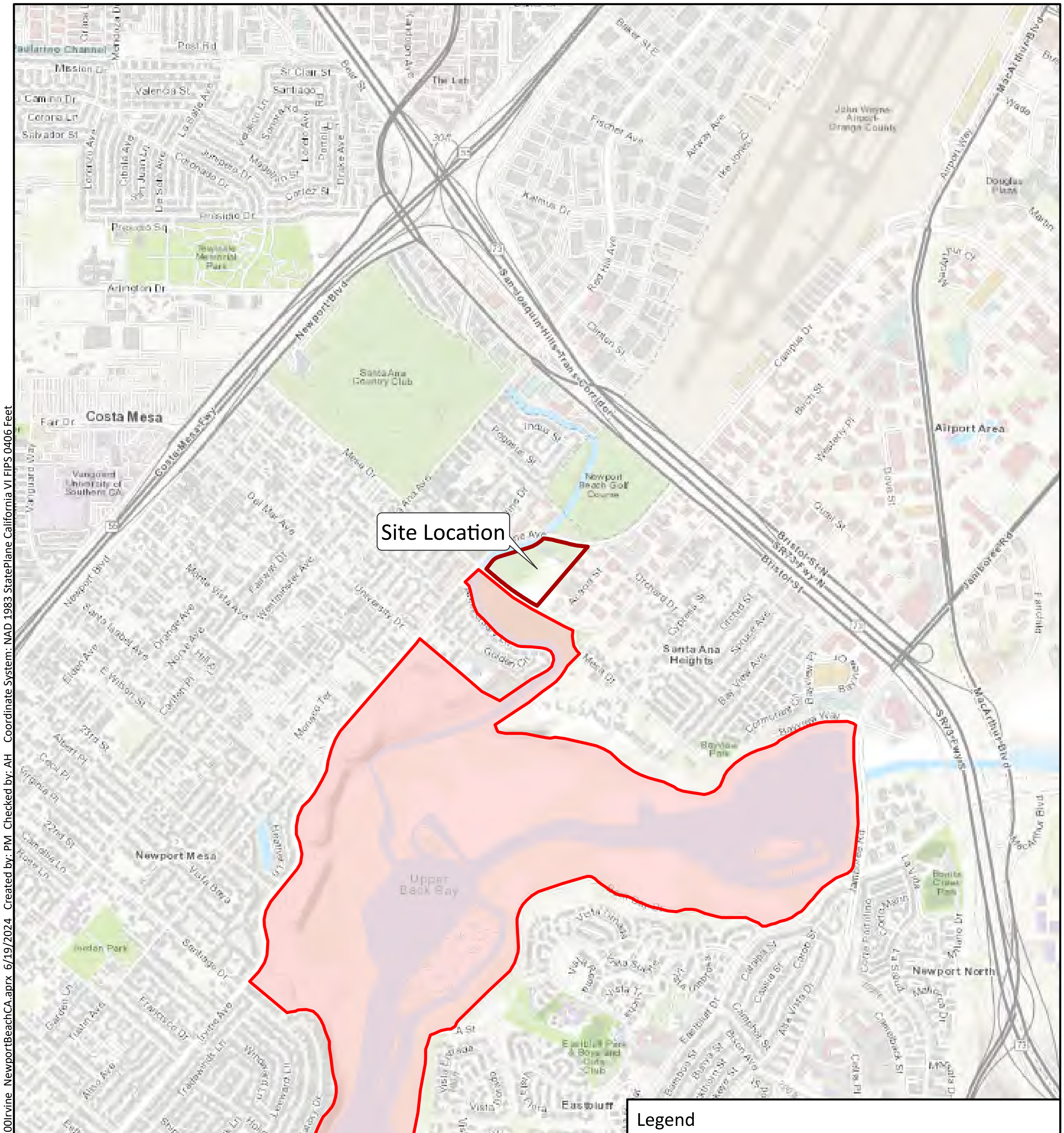
PROJECT:	Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA
PROJECT NUMBER:	PWAS_20240507

Seismic Hazards

FIGURE 7



Legend

Site Boundary

Tsunami Hazard Area

Tsunami Inundation Source: California Department of Conservation. California Tsunami Maps.
https://www.conservation.ca.gov/cgs/tsunami/maps

0 1,000 2,000 4,000 Feet

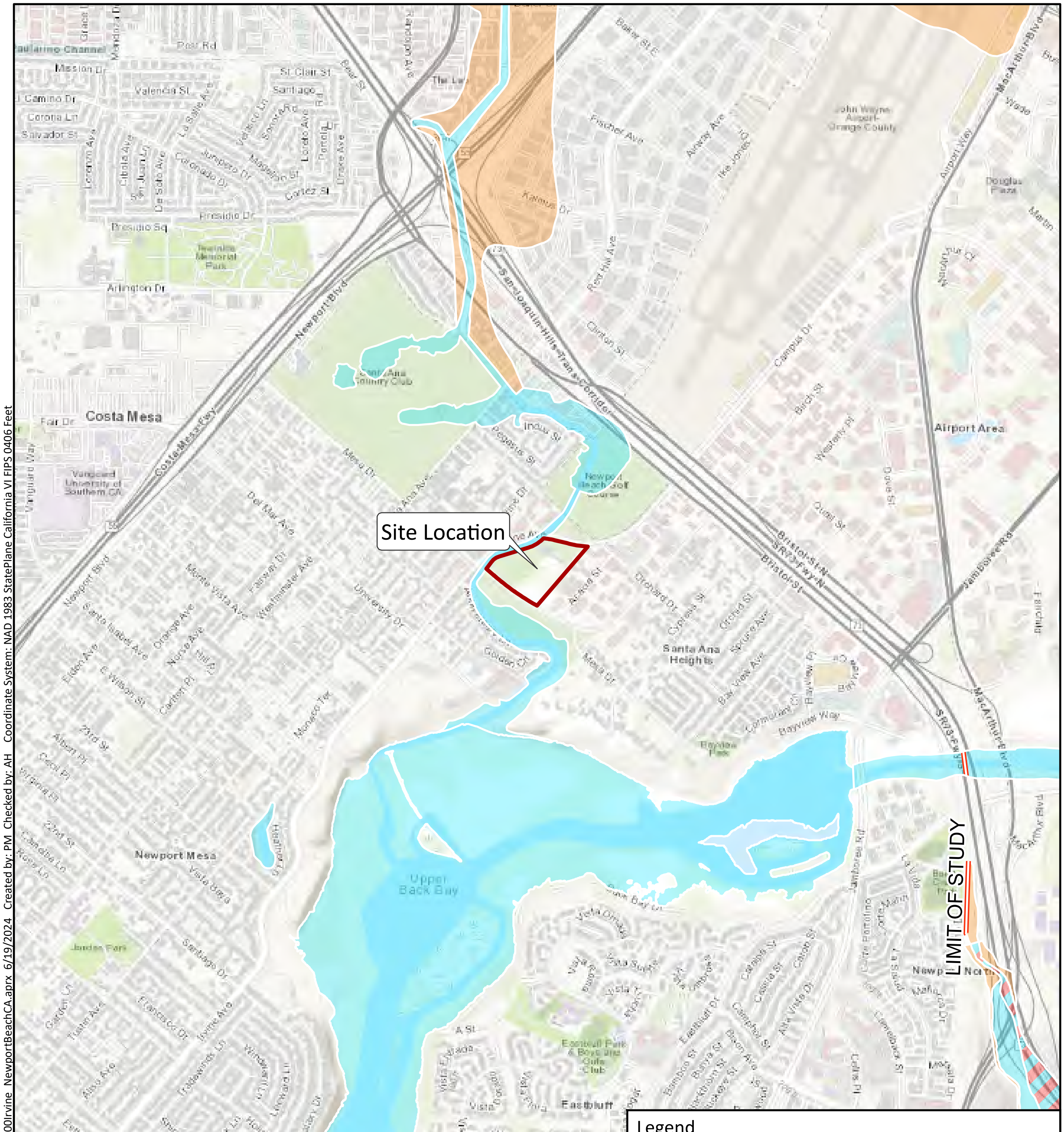
1 inch =2,000 feet

N

July 2024

CKGEO	CLIENT: Back Bay Barrels, LLC	**Tsunami Hazard**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *CARLKIMGEO@GMAIL.COM*	PROJECT: Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA	
	PROJECT NUMBER: PWAS_20240507	**FIGURE 8**

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



0 1,000 2,000 4,000 Feet

1 inch =2,000 feet

July 2024

N

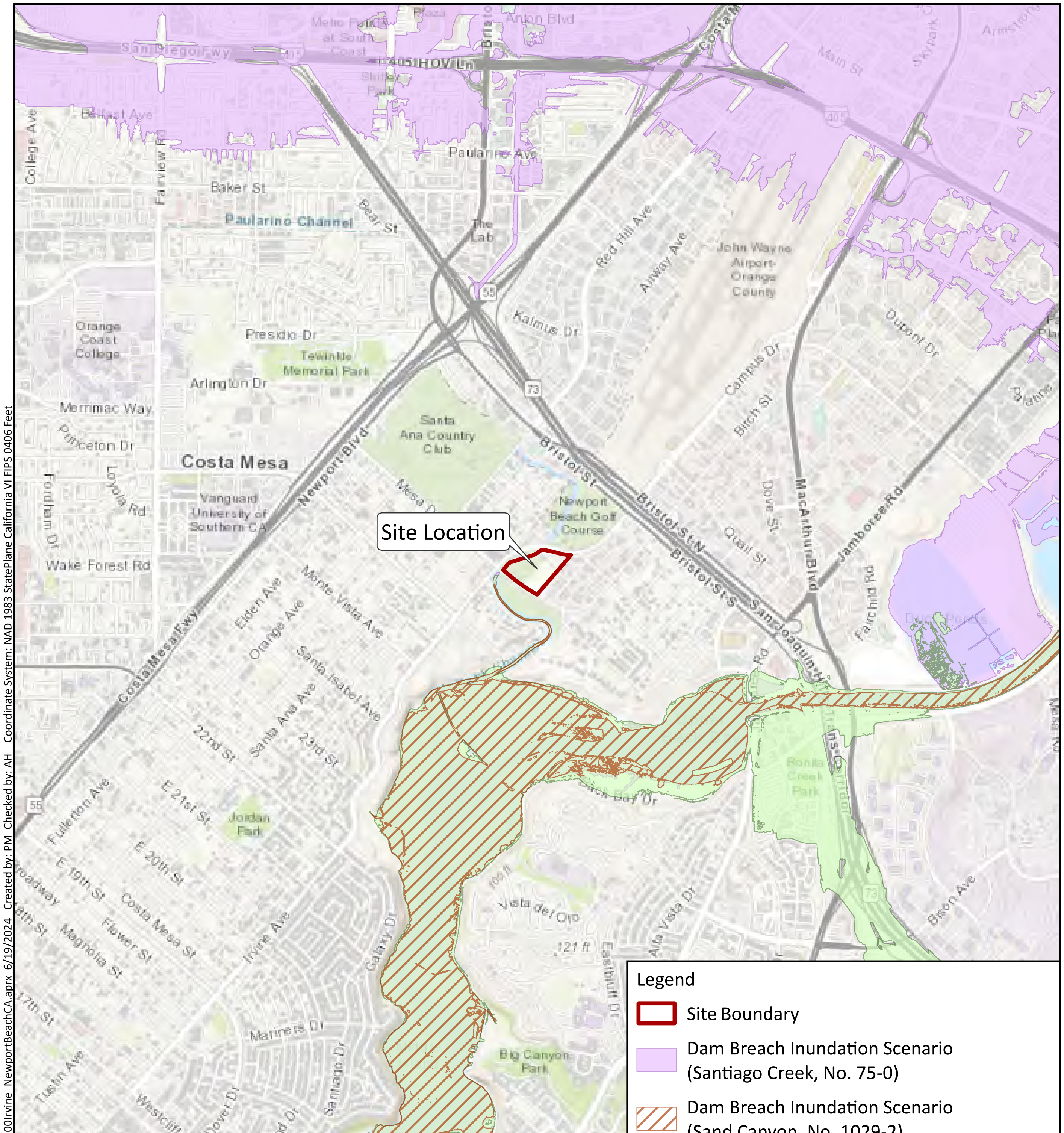
Legend

- Site Boundary
- 1% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard

Flood Layer Source: FEMA's National Flood Hazard Layer

CKGEO	CLIENT: Back Bay Barrels, LLC	**Flood Hazards**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *CARLKIMGEO@GMAIL.COM*	PROJECT: Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA	
	PROJECT NUMBER: PWAS_20240507	**FIGURE 9**

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet



Legend

- Site Boundary
- Dam Breach Inundation Scenario (Santiago Creek, No. 75-0)
- Dam Breach Inundation Scenario (Sand Canyon, No. 1029-2)
- Dam Breach Inundation Scenario (San Juaquin Reservoir, No. 1029-0)

Dam Inundation Source: California Department of Water Resources, Division of Safety of Dams (DSOD). California Dam Breach Inundation Maps.

0 1,500 3,000 6,000 Feet

1 inch =3,000 feet

N

July 2024

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CLIENT:	Back Bay Barrels, LLC
PROJECT:	Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA
PROJECT NUMBER:	PWAS_20240507

Dam Inundation

FIGURE 10

File: X:\CarlKim\California\NewportBeach_CA\3100IrvineAve\3100Irvine_NewportBeachCA.aprx 6/19/2024 Created by: PM Checked by: AH Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

EXPLANATION

CURRENT EXPLORATIONS

- HAND AUGER
- CONE PENETRATION TEST (CPT)

PRIOR EXPLORATIONS

- BORING BY BACA ASSOCIATES (1989)
- BORING BY MOORE TWINING, (P) DENOTES TEMPORARY PIEZOMETER
- CONE PENETRATION TEST (CPT) BY MOORE TWINING

OTHER SYMBOLS

- (GW) GROUNDWATER
- (TD) TOTAL DEPTH

OTHER SYMBOLS (CONTINUED)

- ? GEOLOGIC CONTACT (APPROXIMATE, DOTTED WHERE BURIED, QUIERRIED WHERE UNCERTAIN)
- PROPERTY LINE
- CROSS SECTION TRANSECT

EARTH MATERIALS

- afu ARTIFICIAL FILL (UNDOCUMENTED)
- Qal QUATERNARY (TO HOLOCENE) ALLUVIUM (RIVERINE AND LAGOONAL FACIES)
- Qt QUATERNARY TERRACE DEPOSITS (UPLIFTED MARINE AND NEARSHORE)

* CIRCLED WHERE BURIED

0 50 100 200

N

July 2024

Aerial Imagery Source: ©2024. Microsoft Corporation.

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Hillsborough, CA 94010
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CARLKIMGEO@GMAIL.COM

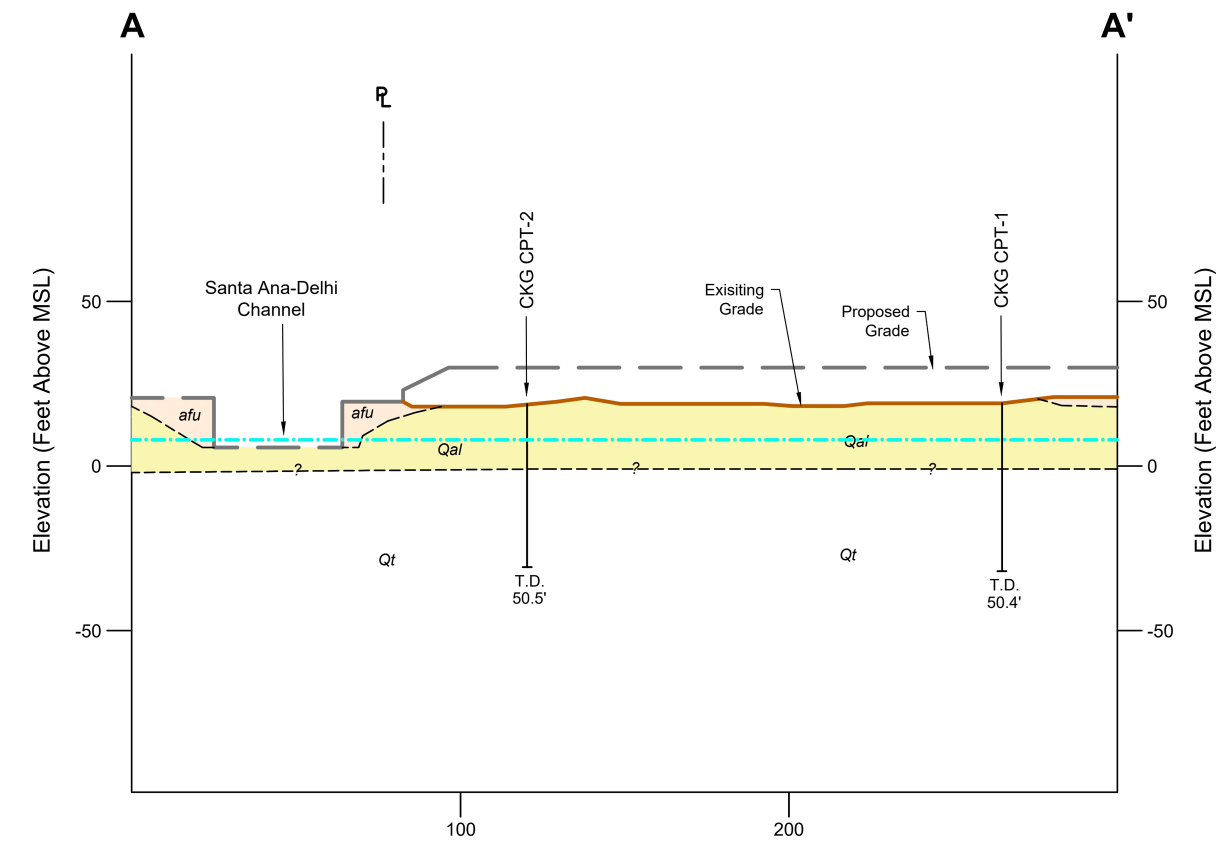
CLIENT: Back Bay Barrels, LLC

PROJECT: Wavegarden Cove, 3100 Irvine Avenue, Newport Beach, CA

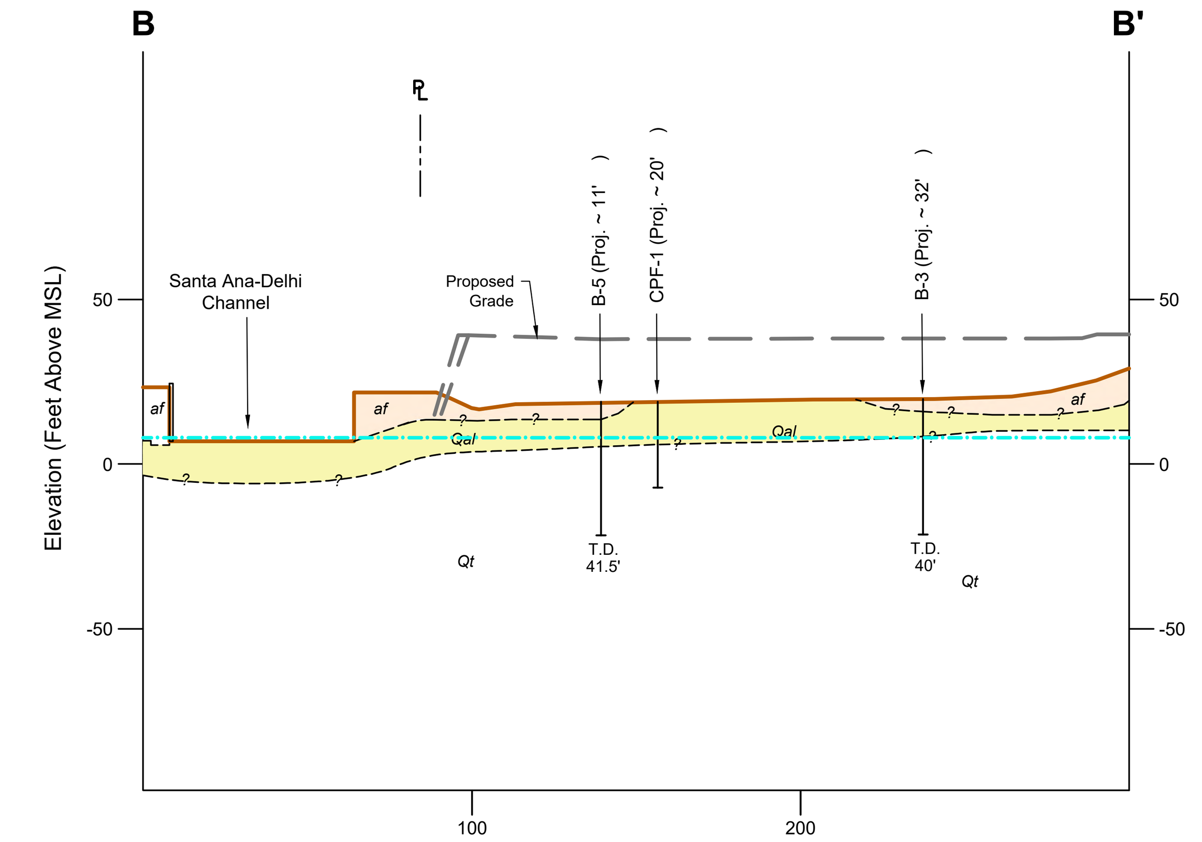
PROJECT NUMBER: PWAS_20240507

EXPLORATIONS

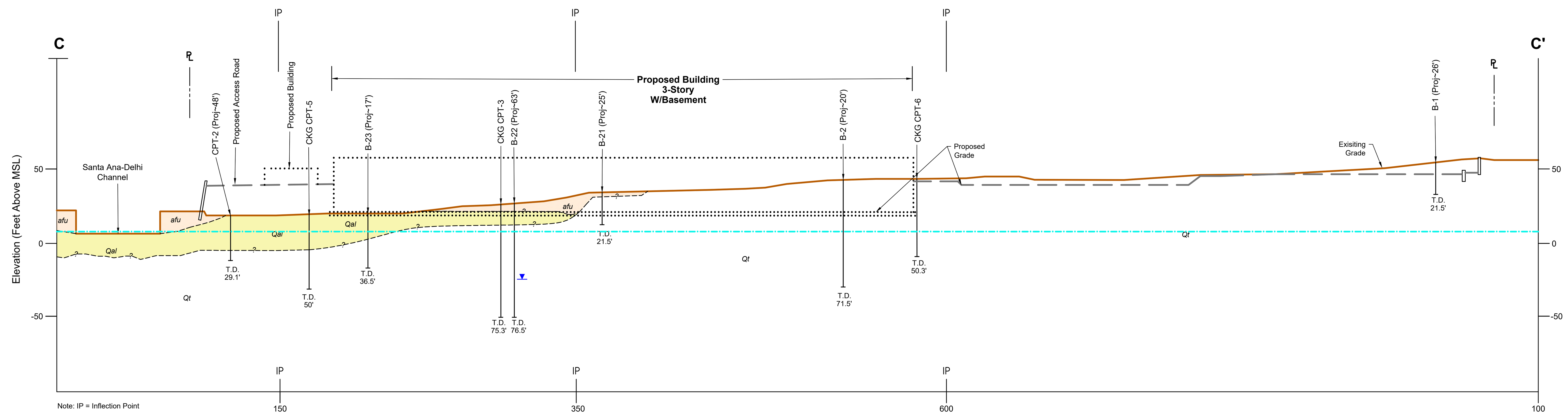
PLATE 1



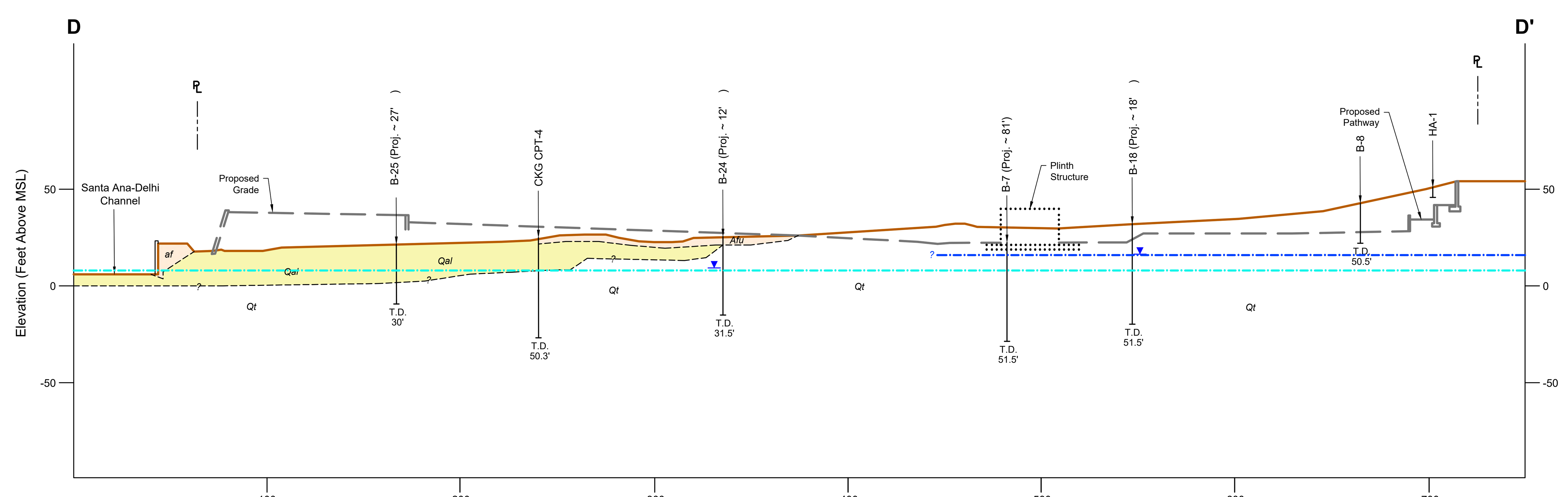
CROSS SECTION A-A'



CROSS SECTION B-B'



CROSS SECTION C-C'

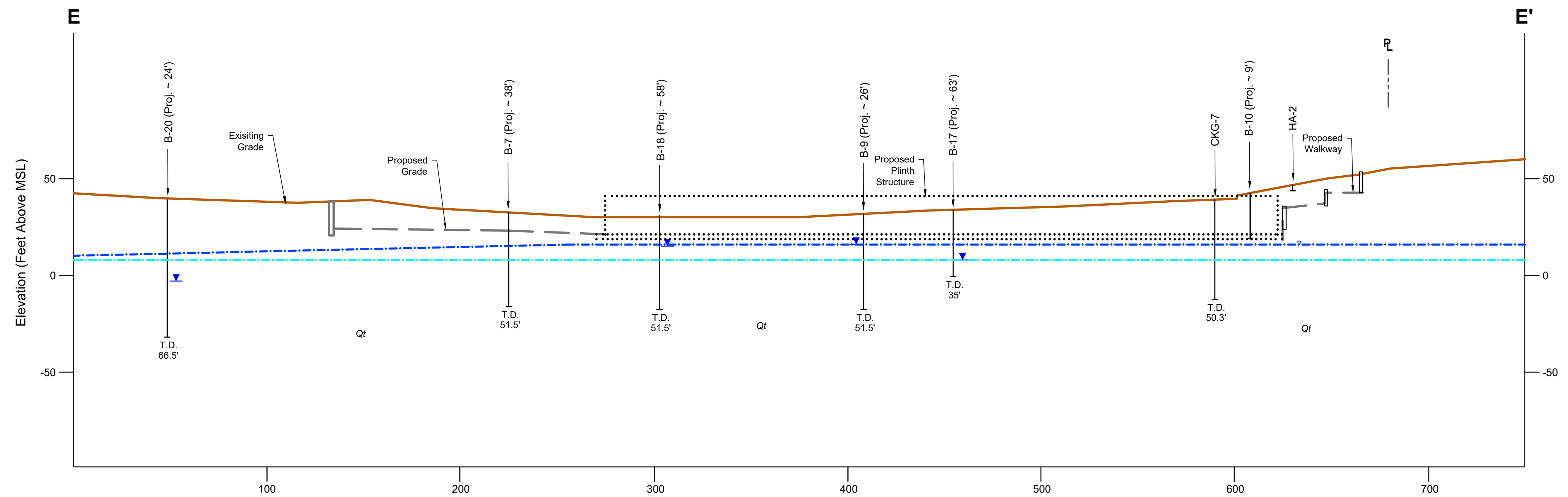


CROSS SECTION D-D'

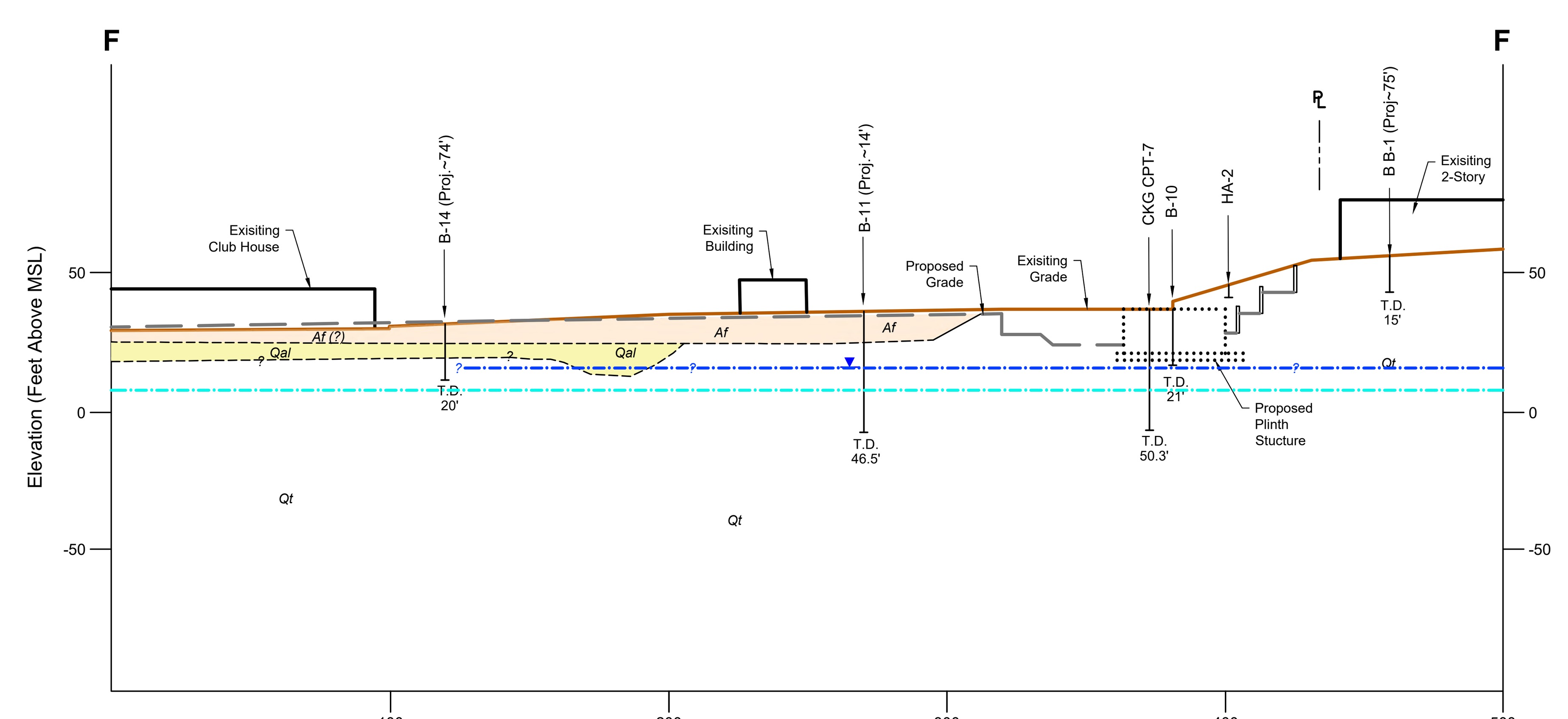
EXPLANATION

- BORING
- EXISTING GRADE
- PROPOSED GRADE
- ℞ PROPERTY LINE
- afu ARTIFICIAL FILL, UNDOCUMENTED/ DOCUMENTED
- Qal ALLUVIUM
- Qr TERRACE DEPOSIT
- MSL MEAN SEA LEVEL
- GROUNDWATER LEVEL
- STATIC GROUNDWATER LEVEL
- PERCHED GROUNDWATER LEVEL

VERTICAL SCALE (IN FEET) 50 / HORIZONTAL SCALE (IN FEET) 50	July 2024	CLIENT: Back Bay Barrels, LLC	CROSS SECTIONS
	CKGEO Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 CARLKIMGEO@GMAIL.COM	PROJECT: Wavegarden Cove 3100 Irvine Avenue Newport Beach, CA	
		PROJECT NUMBER: PWAS_20240507	PLATE 2A



CROSS SECTION E-E'



CROSS SECTION F-F'

EXPLANATION

	BORING
	EXISTING GRADE
	PROPOSED GRADE
	PROPERTY LINE
afu	ARTIFICIAL FILL, UNDOCUMENTED/ DOCUMENTED
Qal	ALLUVIUM
Qt	TERRACE DEPOSIT
MSL	MEAN SEA LEVEL
	GROUNDWATER LEVEL
	STATIC GROUNDWATER LEVEL
	PERCHED GROUNDWATER LEVEL

VERTICAL SCALE (IN FEET) 50

HORIZONTAL SCALE (IN FEET) 50

July 2024

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Carl Kim Geotechnical, Inc.
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Hillsborough, CA 94010
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CARLKIMGEO@GMAIL.COM

CLIENT: Back Bay Barrels, LLC

PROJECT: Wavegarden Cove
3100 Irvine Avenue
Newport Beach, CA

PROJECT NUMBER: PWAS_20240507

CROSS SECTIONS

PLATE 2B

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

52nd Street Consultants, LLC, 2024, Snug Harbor, Newport Beach, CA 92660, Site Development Review [Plans], sheets 1 through 4, scale of 1 inch to 60 feet, dated, 4/29/2024.

Baca Associates, Inc (Baca), 1989, New Office Building Development, EMA Grading permit No. 89-233823, 20351 Acacia Avenue, Sana Heights, County of Orange, California, Project No. A-0675-F, dated August 19, 1989.

California Department of Water Resources (DWR), 2024, SGMA Data Viewer, [Interactive Web Page], https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels

California Geological Survey (CGS; formerly California Division of Mines and Geology, CDMG), 1980, Classification and Mapping of Quaternary Sedimentary Deposits for Purposes of Seismic Zonation, South Coastal Los Angeles Basin, Orange County, California, Open File Report 80-19 L.A., September 1980.

_______, 1981, Geologic Map of Orange County, California, Showing Mines and Mineral Deposits, Bulletin 204, Plate 1.

_______, 1997a, Seismic Hazard Zone Evaluation Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles, California, Seismic Hazard Zone Report 03.

_______, 1997b, Seismic Hazard Zone Evaluation Report for the Laguna Beach 7.5-Minute Quadrangle, California, Seismic Hazard Zone Report 013.

_______, 1998a, Seismic Hazard Zones, Laguna Beach Quadrangle, Official Map dated April 15, 1998.

_______, 1998b, Seismic Hazard Zones, Newport Beach Quadrangle, Official Map dated April 15, 1998.

_______, 2001, Seismic Hazard Zones, Tustin Quadrangle, Revised Official Map dated January 17, 2001.

_______, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, Originally Adopted March 13, 1997, Revised and Re-adopted September 11, 2008.

_______, 2009, Tsunami Inundation Map for Emergency Planning, Newport Beach Quadrangle, Official Map dated March 15, 2009.

_______, 2010, Fault Activity Map of California and Adjacent Areas (Scale 1: 750,000), Geologic Data Map No. 6, Compiled and Interpreted by Charles W. Jennings and William Z. Bryant.

_______, 2015, Radon Potential in Orange County, California, Special Report 232, authored by Ronald K. Churchill, 2015

_______, 2018, Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners 2018. for Assessing Fault Rupture Hazards in California, Special Publication 42, Revised

_______, 2024, Orange County Tsunami Areas, https://www.conservation.ca.gov/cgs/tsunami/maps/orange

California Department of Conservation, Geologic Energy Management Division (CalGEM) (formerly DOGGR), 2024, Interactive Wellfinder Website, https://maps.conservation.ca.gov/doggr/wellfinder/

La Playa Consulting, Inc. (LPC), 2024, NPB2 - Wavegarden Cove, Newport Beach, CA, Geotechnical Brief for Lagoon, LPC Project #: 24003, dated April 8, 2024.

Moore Twining Associates, Inc. (Moore Twining), 2019a, [DRAFT] Preliminary Geotechnical Engineering Design Recommendations, Proposed Drive Shack Restaurant and Golf Driving Range, 3100 Irvine Avenue, Newport Beach, California, Project #: E40550.01, dated September 16, 2019.

______, 2020, [DRAFT] Geotechnical Engineering Investigation, Proposed Drive Shack Restaurant and Golf Driving Range, 3100 Irvine Avenue, Newport Beach, California, Project #: E40550.01, dated April 18, 2020.

Morton, P.K., et. al., 1979, Environmental Geology of Orange County, California, California Department of Conservation, Division of Mines and Geology, OFR 79-08.

Newport Beach (City of), 2024, CDD Docs [Parcel Records Interface], accessed June 2024 https://ecms.newportbeachca.gov/WEB/Browse.aspx?id=205567&dbid=0&repo=CNB

NorCal Engineering, Soils Investigation, Proposed Leonard's Golf Shop Expansion – Located at 3100 Irvine Avenue in the city of Newport Beach, California, Project number 7533-98, dated July 16, 1998.

Orange County Water District (OCWD), 2017, Basin 8-1 Alternative, Submitted by Orange County Water District, City of La Habra, Irvine Ranch Water District, dated January 1, 2017 https://sgma.water.ca.gov/portal/alternative/print/3

Structural Engineers Association/Office of Statewide Health Planning and Development, 2020,

U.S. Seismic Design Maps, web site address: https://seismicmaps.org/ ; Date Accessed: February 5, 2020.

Soils International, Inc., 1988, Geotechnical Investigation Report, Edwards Theatre, Newport Center Drive, Newport Beach, California, Project S-1093-F, dated April 18, 1988.

Tan, S.S., and Edgington, W.J., 1976, Geology and Engineering Geologic Aspects of the Laguna Beach Quadrangle, Orange County, California, California Division of Mines and Geology Special Report 127.

United States Geological Survey (USGS), 1932, Newport Beach Quadrangle, Orange County, California, (Topographic), scale of 1: 31,680, contour interval of 5 feet, dated 1932.

_______, 1949a, Laguna Beach Quadrangle, Orange County, California, 7.5 Minute Series (Topographic).

_______, 1949b, Newport Beach Quadrangle, Orange County, California, 7.5 x 10 Minute Series, W/2 Santa Ana 15' Quadrangle, contour interval 5 feet, scale of 1: 24,000 (Topographic).

_______, 2006, Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangle, Version 1.0, Open File Report 2006-1217, Scale of 1: 100,000, by Morton, D.M. and F.K. Miller, dated 2006

_______, 2020, Unified Hazard Tool, NSHM 2014 Dynamic Deaggregation Program; web site address: https://earthquake.usgs.gov/hazards/interactive/

_______, 2024a, Interactive Fault Map [Quaternary Fault and Fold Database of the United States], https://www.usgs.gov/programs/earthquake-hazards/faults

_______, 2024b, Interactive Geologic Map, http://ngmdb.usgs.gov/maps/MapView/

_______, 2024c, Topoview Interactive Map https://ngmdb.usgs.gov/topoview/viewer/#4/40.01/-100.06

_______, 2024d, Design Ground Motions, https://earthquake.usgs.gov/hazards/designmaps/

X Engineering & consulting, Inc. (X Engineering), 2024, Conceptual Site Plan/Grading (Lagoon) Exhibit, Wavegarden Cove, Scale of 1 inch to 50 feet,

Yerkes, R.F., McCulloh, T.H., Schoellhamer, J.E. and Vedder, J.G. (Yerkes), 1957, Geologic Map of the San Juaquin Hills-San Capistrano Area, Orange County, California, [USGS] Oil and Gas Investigations Map OM 193, scale of 1:24,000, dated 1957

Yerkes, R.F., McCulloh, T.H., Schoellhamer, J.E. and Vedder, J.G. (Yerkes), 1965, Geology of the Los Angeles Basin, California -- An Introduction: U.S. Geological Survey, Professional Paper 420-A, 57 p.

Yerkes, R.F., 1972, Geology and Oil Resources of the Western Puente Hills Area, Southern California: U.S. Geological Survey Professional Paper 420-C, 63 p.

AERIAL PHOTOGRAPHS REVIEWED

Date	***Photograph***	***Source***
10-14-1939	5925-112	Continental Aerial Photo
11-18-1952	AXK-1K-43	Continental Aerial Photo
1-13-75	157 7-23	Continental Aerial Photo
1-20-1992	C85-13-20	Continental Aerial Photo

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APPENDIX B

EXPLORATIONS

APPENDIX B

FIELD EXPLORATIONS

General
This appendix collates available relevant subsurface information from recent investigations by Carl Kim Geotechnical, Inc (Carl Kim Geo) and from prior explorations by others. The bullet points below summarize the data attached in this appendix.

Carl Kim Geo (2024)
- Seven (7) cone penetration test soundings (CKG CPT-1 through CKG CPT-7)
- Two (2) hand auger borings (HA-1 and HA-2)

Moore Twining Associates, Inc. (Moore Twining) (2019-2020)
- 4 CPT soundings (CPT-1 through CPT-4)
- 26 hollow stem auger borings (B-1 through B-26)
    - Six (6) of the 26 borings listed above were converted to temporary piezometers (B-17, B-18, B-19, B-22, B-23, and B-24)

Baca Associates, Inc. (Off site work 1989) (20351 SW Acacia Street)
- Four (4) hollow stem auger borings (BB-1 through BB-4)

Current Investigation
Current geotechnical investigations by Carl Kim Geotechnical, Inc. consisted of cone penetration test (CPT) soundings. As applicable, explorations were supervised and logged by qualified representatives. Earth materials encountered in hand-augered excavations for utility clearance were visually classified in accordance with the Unified Soil Classification System (USCS). Interpreted stratigraphic boundaries are indicated on the logs. Some soil/material types transition gradually.

Reconnaissance and Logistics
Locations of the CPT soundings and hand auger borings were chosen to obtain subsurface information at locations appropriate for the objective of this report. Prior to conducting the subsurface explorations, Carl Kim Geotechnical personnel evaluated each drill site for equipment access and marked proposed locations. Locations were reviewed by Newport Beach Golf Course representatives.

Prior to field explorations an exploration permit was obtained from the County of Orange Environmental Health Division and Underground Service Alert (USA) was contacted greater than 48 hours in advance of subsurface work. USA contacted members (i.e. utility infrastructure owners) to provide clearance for drilling with respect to underground utility lines. No underground utilities were encountered with drilling equipment during the current investigation.

Subsurface Exploration
7 CPT soundings and two hand auger borings were advanced May 28, 2024. Shear wave measurements and a pore dissipation test was conducted at CKG CPT-3. Shallow soils were logged and sampled from each location. Soil descriptions are tabulated below and CPT interpretations are included in this appendix.

Temporary piezometers installed by Moore Twining were sounded using an a Solinst electric well sounder. The accessible wells included B-17, B-18, and B-19. The remaining wells (B-22, B-23, and B-24) were not located because they are located within the artificial turf covered driving range. Each well sounded appeared to be constructed with nominal 1-inch polyvinyl chloride (PVC) casing covered by a metal flush mount surface completion. Each well was outfitted with a compression cap. Depth to water (DTW) below top of casing (BTOC) was measured and recorded to the nearest hundredth of a foot (0.01 feet).

Borehole Sealing
Each borehole was abandoned using cement-bentonite grout emplaced via tremie pipe. Asphalt cold patch/soil was placed as needed to match the existing surface.

Sampling by Carl Kim Geo
Representative bulk (bag) samples of fill and native soils were obtained from CKG CPT-1 through CKG CPT-7 and HA-1 and HA-2. Samples were logged, labeled, and retained for laboratory testing. Bulk samples are designated with a B-[number] and California modified split spoon samples (ring samples) are designated with R-[number] below. No free groundwater was encountered in hand excavations.

Table B-1 - LOG OF HAND AUGER EXCAVATIONS, MAY 28, 2024

EXCAVATION DESIGNATION	SAMPLE IDENTIFIERS.	SOIL DESCRIPTION
CKG CPT-1	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +19 FEET ABOVE MEAN SEAL LEVEL (MSL) lean clay with sand (CL), soft to stiff, dark yellowish brown (10YR 3/6), moist, low plasticity, high dry strength, slow dilatancy; estimate 25-35% fine to coarse sand, trace gravel, few thin black organic-rich zones, trace rootlets TOTAL DEPTH OF HAND AUGER 5 FEET
CKG CPT-2	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +20 MSL organic soil (OL/CL), soft under hand auger, black (10YR 2/1), dry to slightly moist, low to medium plasticity, low toughness, no dilatancy, medium dry strength; feels low density, no odor, micaceous, estimate 10% fine sand TOTAL DEPTH OF HAND AUGER 5 FEET
CKG CPT-3	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +25 MSL silt with sand (ML), soft, dark yellow brown (10YR 3/6), dry to slightly moist, low plasticity, rapid dilatancy, low dry strength, estimate 15 to 20% fine to medium grained sand TOTAL DEPTH OF HAND AUGER 5 FEET
CKG CPT-4	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +24 MSL organic soil (OL/CL), soft under hand auger, black (5YR 2.5/1), slightly moist, low to medium plasticity, low toughness, no dilatancy, high dry strength; micaceous TOTAL DEPTH OF HAND AUGER 5 FEET
CKG CPT-5	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +19 MSL organic soil/ fat clay (OH/CH), soft under hand auger, black (5YR 2.5/1) with few light gray zones, slightly moist, high plasticity, low toughness, no dilatancy, high dry strength TOTAL DEPTH OF HAND AUGER 5 FEET
CKG CPT-6	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +43 MSL lean clay with sand (CL), soft to medium stiff under hand auger, dark yellowish brown (10YR 3/4), nonplastic, slow to rapid dilatancy (rapid, but faint reaction to test), high dry strength; estimate 40% fine to medium sand TOTAL DEPTH OF HAND AUGER 5 FEET

Table B-1 - LOG OF HAND AUGER EXCAVATIONS, MAY 28, 2024

EXCAVATION DESIGNATION	SAMPLE IDENTIFIERS.	SOIL DESCRIPTION
CKG CPT-7	B-1 at 0-5.0’	APPROXIMATE SURFACE ELEVATION +37 MSL Asphalt (0-3”); Base (GW)(0.25’ to 1’) @1’ to 5’: well graded sand with gravel (SW), loose to dense under hand auger, yellowish brown (10YR 5/4), dry, fine to coarse sand, angular to subangular, estimate 15% subrounded fine gravel, estimate 5% fines; noncohesive – easy to excavate with hand auger; mostly “clean” sand TOTAL DEPTH OF HAND AUGER 5 FEET
HA-1	B-1 at 0-5.0’ R-1 at 5.5’	APPROXIMATE SURFACE ELEVATION +45 lean clay/ silt with clay (CL/ML), very stiff under hand auger (difficult to excavate; appears to bulk considerably), dark yellowish brown (10YR 3/4), dry from 0 to 2.2’, moist below, low to medium plasticity, slow dilatancy, medium dry strength, micaceous; estimate 10% fine sand, massive, orange paleosol appearance TOTAL DEPTH SAMPLED ~5.8 FEET BACKFILLED WITH FILL SAND
HA-2	B-1 at 0-4.0’	APPROXIMATE SURFACE ELEVATION +46 fat clay (CH), soft to 1.8’, medium stiff below, dry to slightly moist, light gray, high plasticity, no dilatancy, medium tough, high dry strength TOTAL DEPTH SAMPLED 4 FEET BACKFILLED WITH FILL SAND

<u>Groundwater</u>

The highest reported saturated soils observed at the site were encountered at boring B-9 at a depth of 18 feet bgs (~EL +14 feet msl).

Of the 26 hollow-stem auger borings drilled and logged by Moore Twining, free groundwater was observed in seven (7) of the points. Table B-2 below summarizes groundwater levels where encountered. Note that first encountered groundwater is shown in bold on Table B-2, which differs from subsequent water level measurements. In most cases it appears that free water was encountered in granular strata that is confined by clayey layers and under some pressure (confined/semi-confined conditions).

Similarly, a pore dissipation test was conducted in CKG CPT-3 at 55.92 feet BGS. The pore pressure in that zone was attenuating slowly when the test was concluded. The last pressure of 16 pounds per square inch was recorded suggesting that water in that zone could potentially rise to about EL +6 feet if overlying confining layers were not present.

TABLE B-2 - GROUNDWATER MEASUREMENTS IN BORINGS

FIELD POINT	DTW (FEET BTOC)	APPROX. SURFACE EL (FEET MSL)	CALC. GW EL (FEET MSL)	BORING TD (FEET)	MEASURE DATE
B-4	30	18	-12	31.5	7/22/2019
B-9	18	32	14	51.5	7/29/2019
B-17	**-**	**34**	**-**	**35**	**2/24/2020**
B-17	26	34	8	35	2/25/2020
B-18	**35**	**33**	**-2**	**51.5**	**2/24/2020**
B-18	18	33	15	51.5	2/25/2020
B-19	**38.5**	**36**	**-2.5**	**55.5**	**2/24/2020**
B-19	29	36	7	55.5	2/25/2020
B-20	**42.5**	**34**	**-8.5**	**66.5**	**2/25/2020**
B-20	37	34	-3	66.5	2/26/2020
B-22	-	30	-	55	2/28/2020
B-23	-	20	-	55	2/27/2020
B-24	**30**	**28**	**-2**	**39.5**	**2/26/2020**
B-24	24	28	4	39.5	2/27/2020

<u>NOTES:</u>
TD = TOTAL DEPTH EL = ELEVATION DTW = DEPTH TO WATER
MSL = MEAN SEA LEVEL

1. DEPTH TO 'FIRST ENCOUNTERED GROUNDWATER' IN BOLD.
2. B-22 AND B-23 COMPLETED AS PEIZOMETERS IN DRY HOLES.

Table B-3 summarizes all available groundwater level measurements from temporary piezometers constructed at the direction of Moore Twining.

TABLE B-3 - PIEZOMETER MEASUREMENTS

FIELD POINT	WELL TD (FEET)	APPROX. DATUM EL (FEET MSL)	GEOL./ TECH	DTW MEASURE DATE	DTW (FEET BTOC)	CALC. GW EL (FEET MSL)	NOTES
B-17	35	34		2/28/2020	28	6	
B-17	35	34		4/17/2020	27.7	6.3	
B-18	50	33		2/28/2020	18	15	
B-18	50	33		4/17/2020	19	14	
B-19	55	36		2/28/2020	24	12	
B-19	55	36		4/17/2020	22.2	13.8	
B-22	55	30		2/28/2020	dry	-	
B-22	55	30		4/17/2020	dry	-	
B-22	55	30	**ARH**	**5/28/2024**	**55.26**	-25.3	**WELL TD 55.40'**
B-23	35	20		2/28/2020	dry	-	
B-23	35	20		4/17/2020	dry	-	
B-23	35	20	**ARH**	**5/28/2024**	**34.77**	-14.77	**WELL TD 34.96'**
B-24	40	28		2/28/2020	24	4	
B-24	40	28		4/17/2020	18.4	9.6	
B-24	40	28	**ARH**	**5/28/2024**	**18.52**	9.5	**WELL TD 40.12' (soft)**

NOTES:
TD = TOTAL DEPTH EL = ELEVATION DTW = DEPTH TO WATER MSL = MEAN SEA LEVEL
BTOC = BELOW TOP OF CASING

1. DATA OBTAINED BY CARL KIM GEO IS IN BOLD.
2. SURFACE AND DATUM ELEVATIONS ESTIMATED BASED ON MAPS.
3. THE DATUM IS A MEASURING POINT AT TOP OF PIEZOMETER CASING.

APPENDIX B - ATTACHMENTS

EXPLORATION LOGS (Current Investigation)

CKG CPT-1 through CKG CPT-7
Well Permit

EXPLORATION LOGS (Prior Investigation - Moore Twining Associates, Inc. (2019, 2020)

Borings B-1 through B-26
CPT-1 through CPT-4
Piezometer Sounding Data
Well Permit for Temporary Piezometer Installation

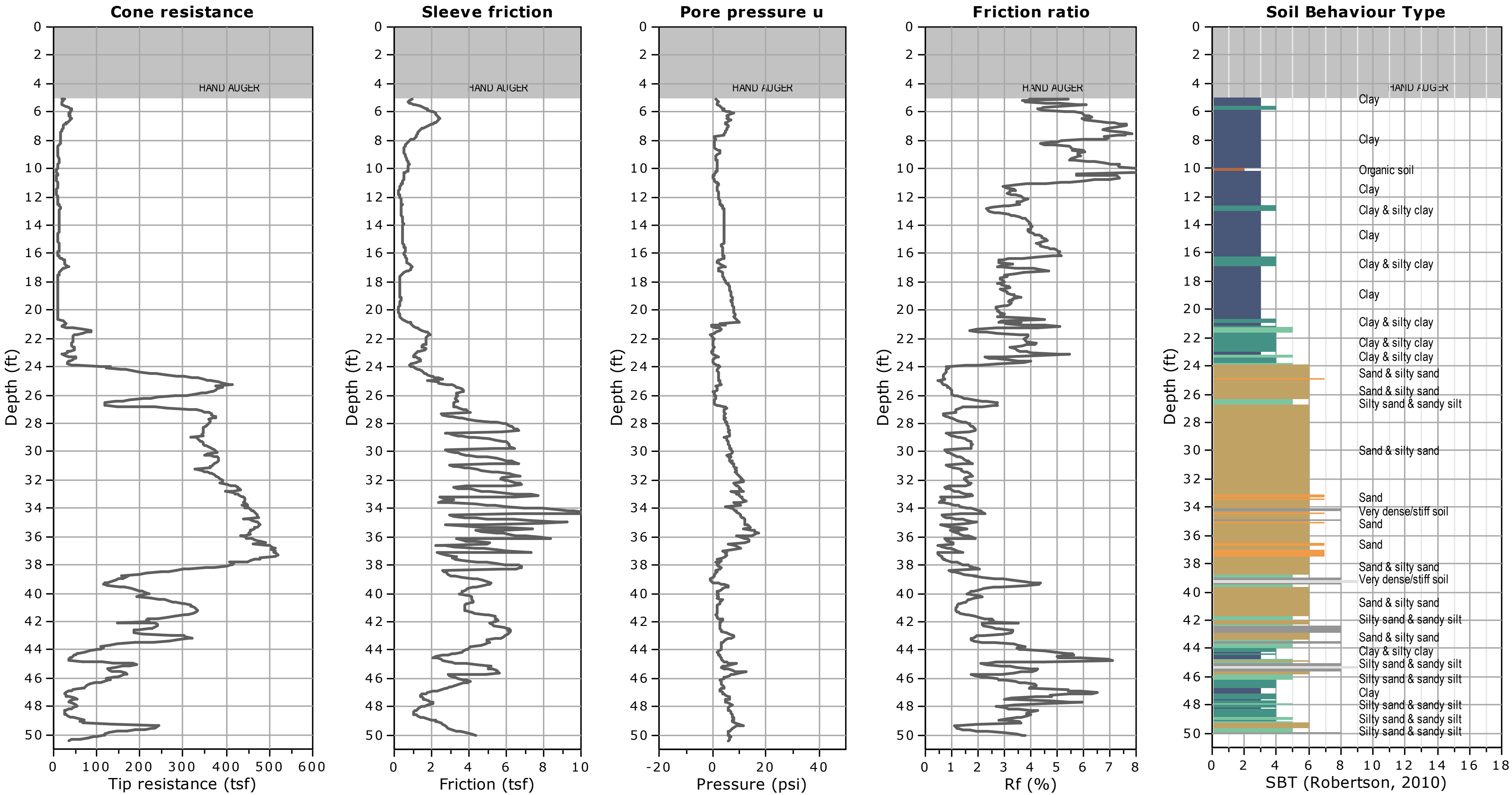
EXPLORATION LOGS (Off-Site – Baca Associates (1989)

Borings BB-1 through BB-4

Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Carl Kim Geotechnical
Location: 3100 Irvine Ave, Newport Beach, CA

CKG CPT-1
Total depth: 50.42 ft, Date: 5/28/2024



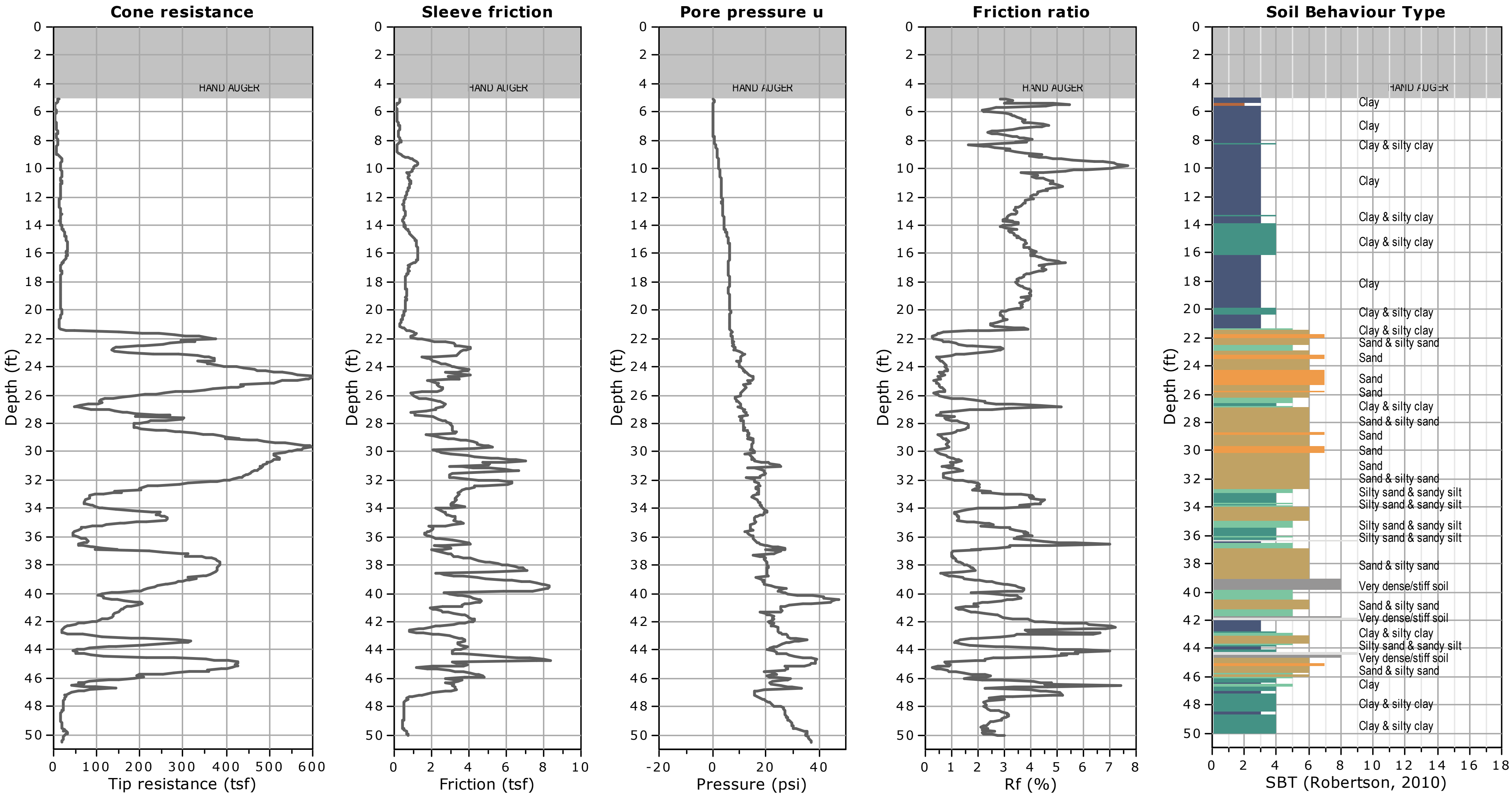
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Carl Kim Geotechnical

Location: 3100 Irvine Ave, Newport Beach, CA

CKG CPT-2

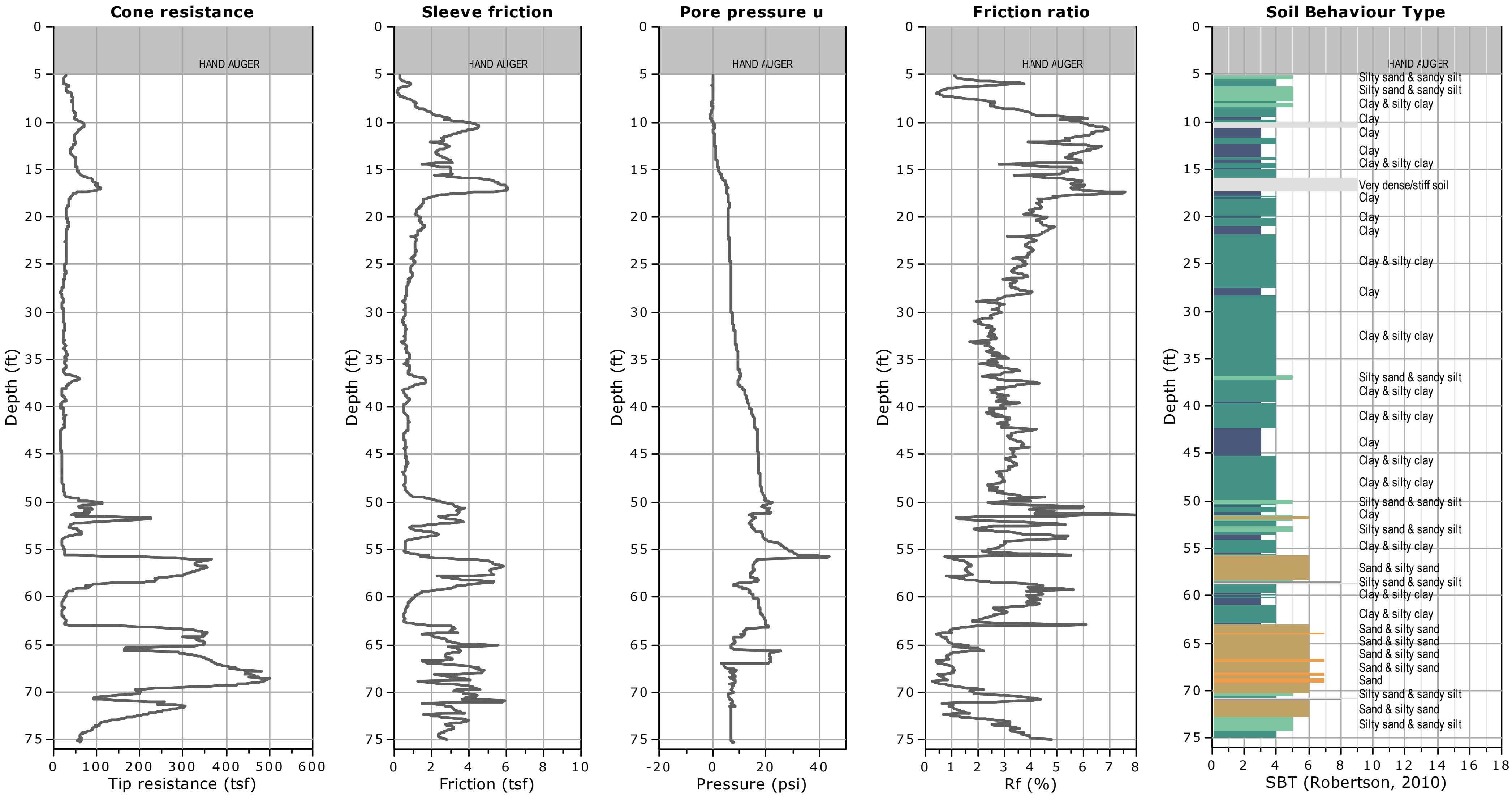
Total depth: 50.48 ft, Date: 5/28/2024



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Carl Kim Geotechnical
Location: 3100 Irvine Ave, Newport Beach, CA

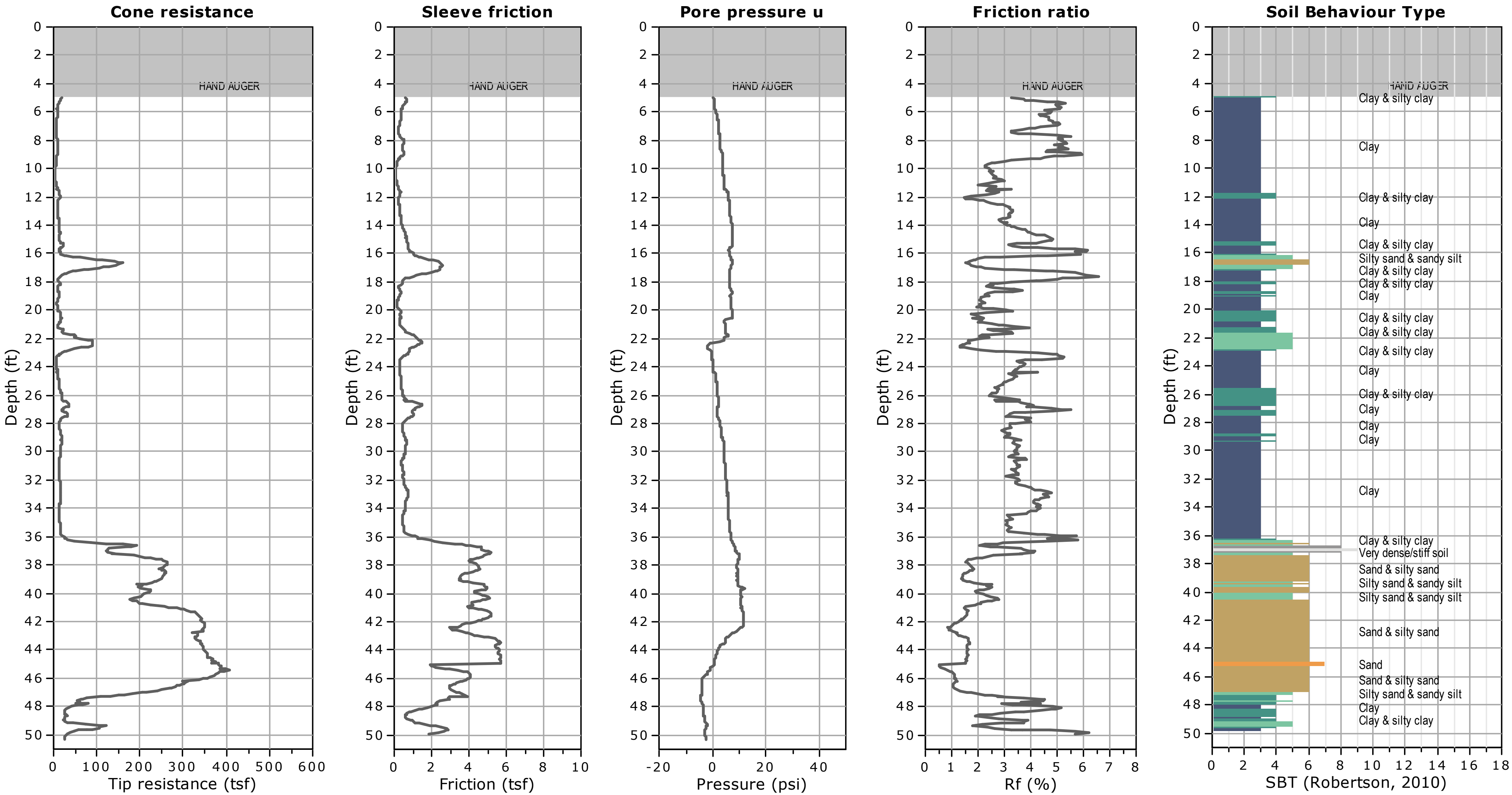
CKG CPT-3
Total depth: 75.29 ft, Date: 5/28/2024



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **Carl Kim Geotechnical**
Location: **3100 Irvine Ave, Newport Beach, CA**

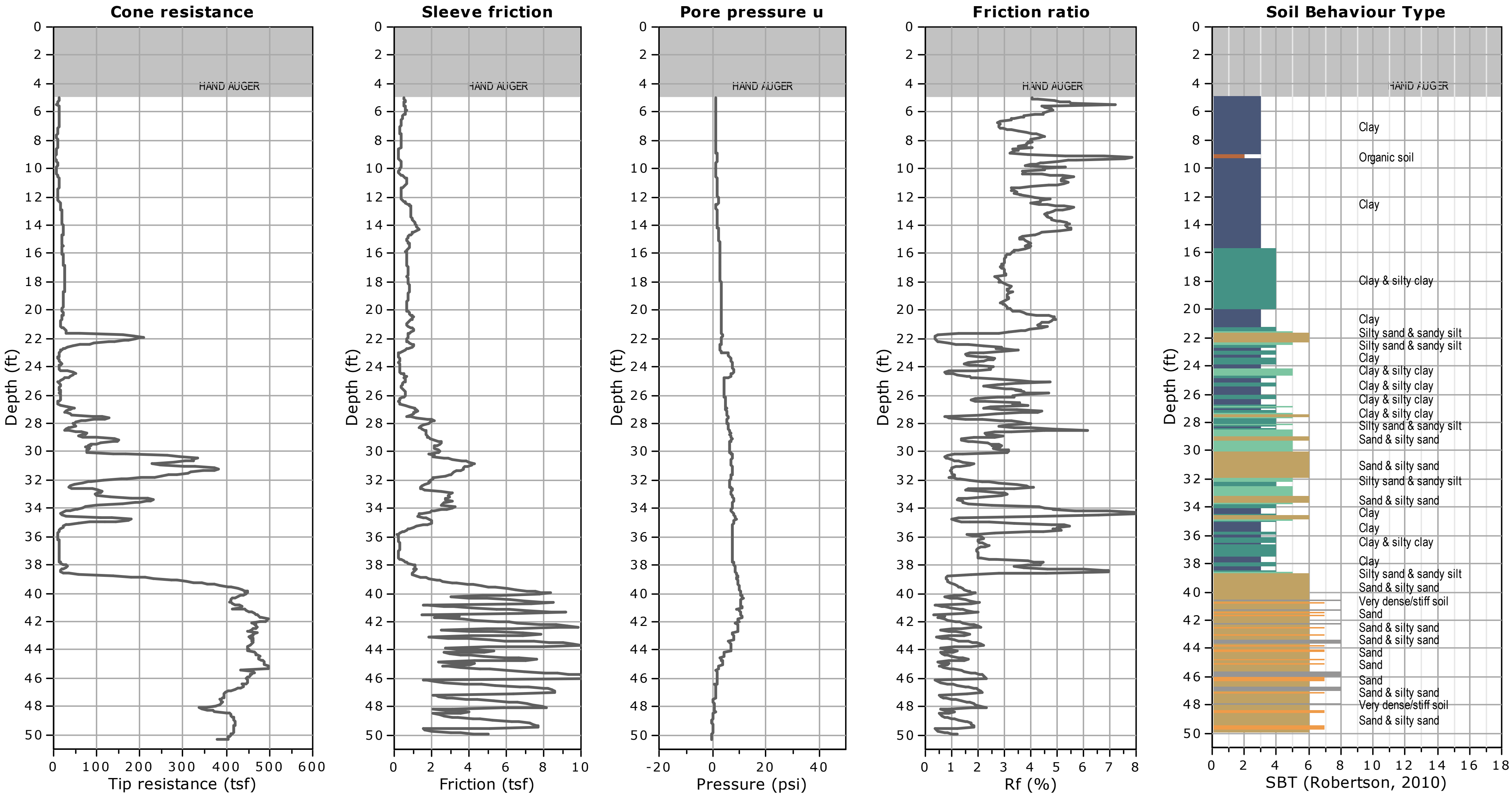
CKG CPT-4
Total depth: 50.27 ft, Date: 5/28/2024



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Carl Kim Geotechnical
Location: 3100 Irvine Ave, Newport Beach, CA

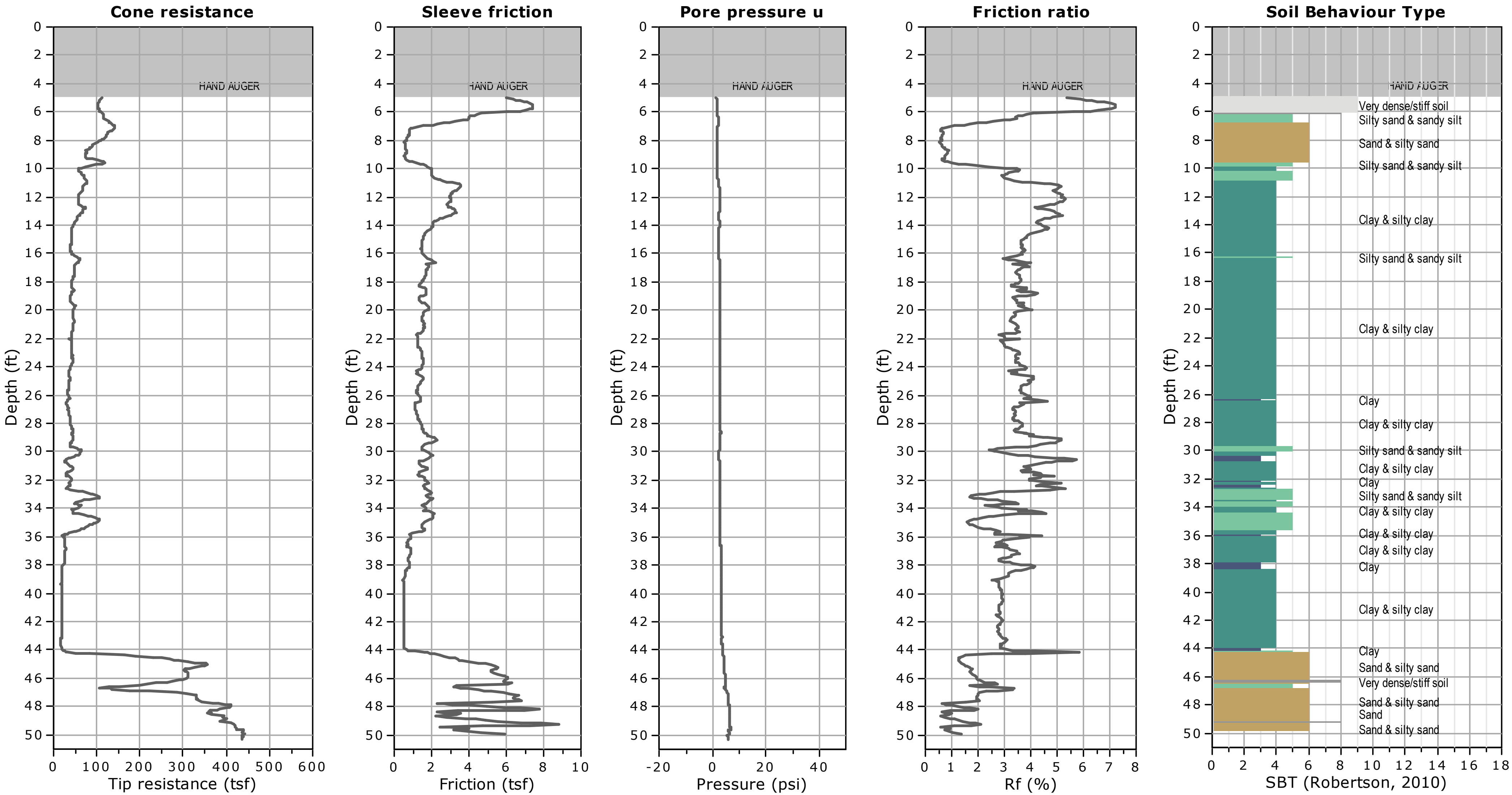
CKG CPT-5
Total depth: 50.34 ft, Date: 5/28/2024



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Carl Kim Geotechnical
Location: 3100 Irvine Ave, Newport Beach, CA

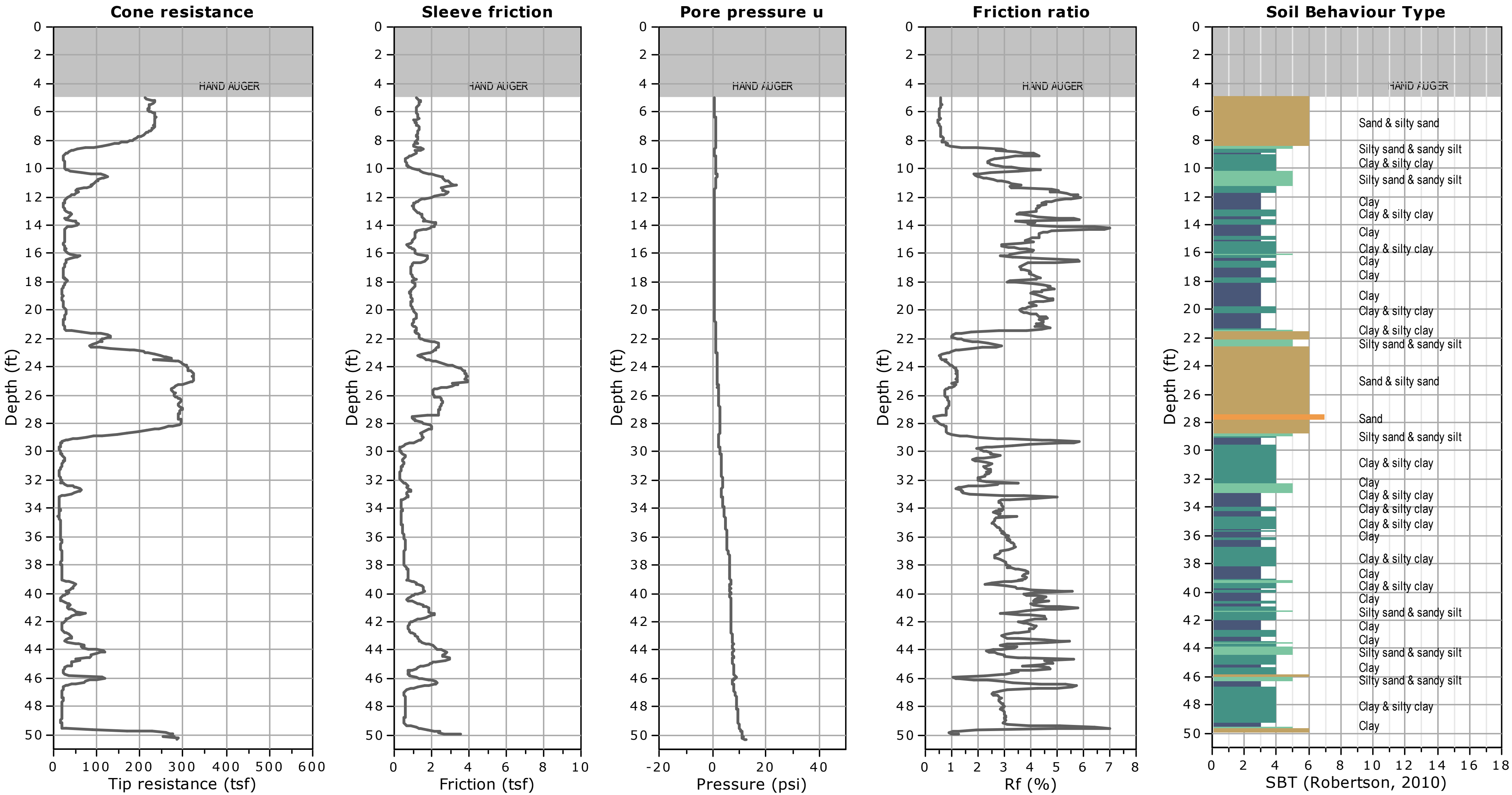
CKG CPT-6
Total depth: 50.27 ft, Date: 5/28/2024



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Carl Kim Geotechnical
Location: 3100 Irvine Ave, Newport Beach, CA

CKG CPT-7
Total depth: 50.34 ft, Date: 5/28/2024



Carl Kim Geotechnical
3100 Irvine Ave.
Newport Beach, CA

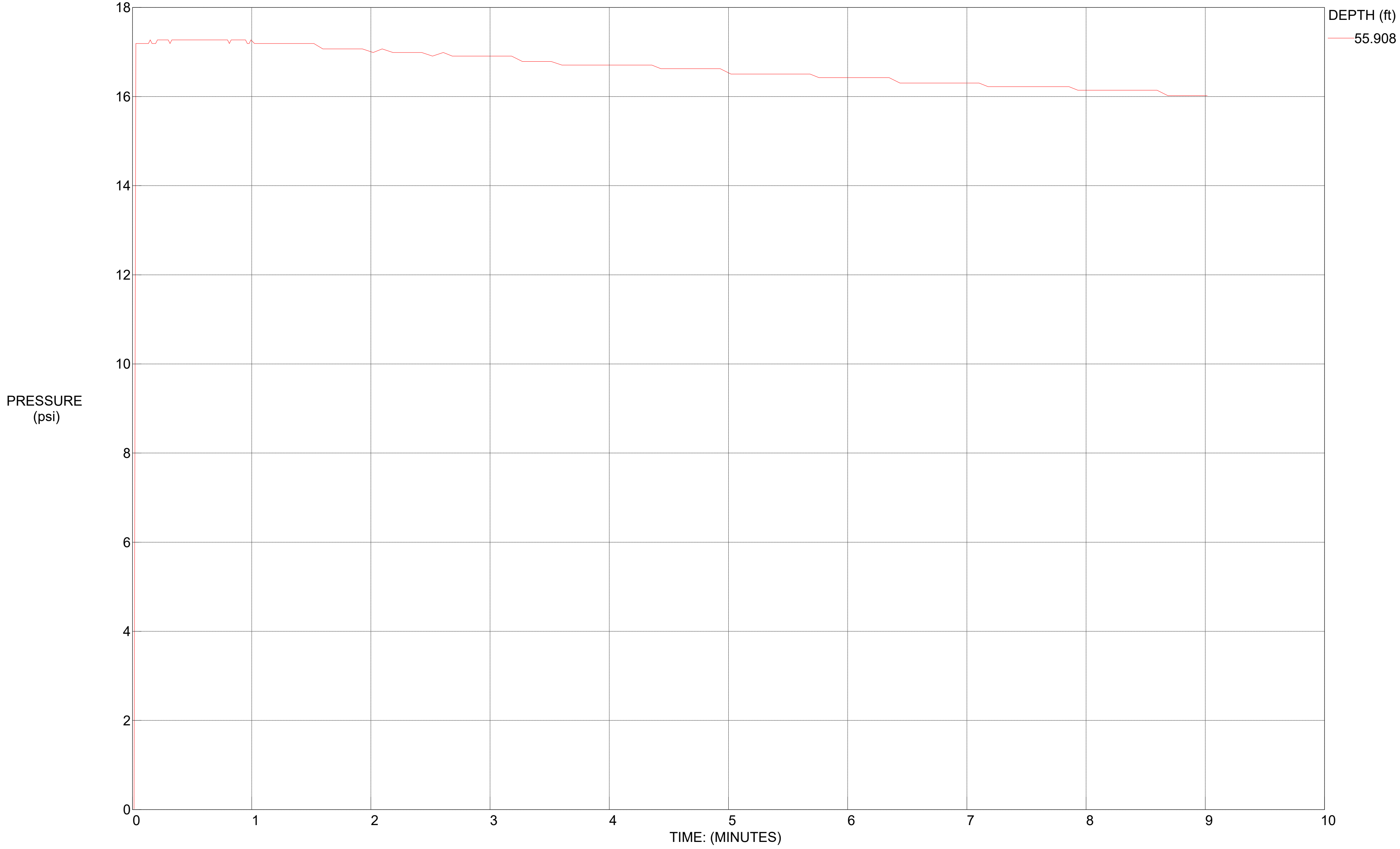
CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
CKG CPT-3	9.97	8.97	9.19	11.04	832	
	20.05	19.05	19.15	22.48	852	871
	30.02	29.02	29.09	34.56	842	822
	40.06	39.06	39.11	46.76	836	822
	50.03	49.03	49.07	61.24	801	688
	60.04	59.04	59.07	72.98	809	852
	70.05	69.05	69.08	82.64	836	1036
	75.07	74.07	74.10	87.46	847	1041

Shear Wave Source Offset - 2 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

TEST ID: CKG CPT-3



APPLICATION FOR WELL/EXPLORATORY BORING PERMIT

ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH DIVISION
1241 E. DYER ROAD, SUITE 120
SANTA ANA, CA 92705-5611
EHOCWELLS@OCHCA.COM
714-433-6000

WELL PERMIT NO. **24-05-22**

For multiple cities, addresses, or locations, complete a separate permit application. **PROPOSED START DATE**

CITY: Newport Beach

WELL LOCATION / STREET INTERSECTION: **NEWPORT BEACH GOLF COURSE 3100 IRVINE AVE.** 3100 Irvine Avenue **APN 119-200-41**

LONGTITUDE (DECIMAL): 33.6588578 **33.658857**

LATITUDE (DECIMAL): -117.881136°

OVERSIGHT AGENCY (if applicable):

EMAIL PERMIT TO: geoandy@gmail.com

■ Consultant ☐ Driller ☐ Well Owner

SERVICE ■ **Construction** ☐ **Destruction (Fee is per well)**

WATER WELLS (complete one permit application for per water well)
☐ Public Domestic/Municipal ☐ Private Domestic & No. of connections ___ ☐ Irrigation

☐ CATHODIC WELL (complete one permit application for per cathodic well)

NON-PRODUCTION WELLS (fee is the same as monitoring well construction) Total No. of Wells ______

☐ Monitoring ___ ☐ Air Sparge ___ ☐ Soil Vapor Extraction ___ ☐ Electrical Grounding Well __
☐ Water Extraction ___ ☐ Inclinometer ___ ☐ Injection/Recharge ___ ☐ Geothermal Heat Exchange __
☐ Piezometer ___ ☐ Horizontal ___ ☐ Soil Vapor Probes ___ ☐ Other ______

EXPLORATORY BORINGS
(complete separate permits for probe survey and soil boring. Also complete the WELL & EXPLORATORY BORING DESTRUCTION section on the next page.)

■ Probe Survey (CPT or Direct Push Only) ~9
☐ Probe Survey Soil Vapor Probes (Direct Push) ___
☐ Soil Boring (hollow stem auger, mud rotary, sonic, or bucket auger, etc...) ___

FOR ACCOUNTING USE ONLY

HSO NO ______ CHECK NO. ______
DATE ______ AMOUNT **$382.00**
INTL ______

APPROVAL BY OTHER AGENCIES

JURISDICTION **CA WELL STANDARDS & OC WELL ORDINANCE**

REMARKS

USE A TREMIE PIPE OR EQUIVALENT TO BACKFILL THE PROBES WITH AN APPROVED SEALING MATERIAL FROM BOTTOM TO WITHIN 5 FEET B.G.S.:

- FREEFALL IS PROHIBITED.
- SOIL CUTTINGS AND UNAPPROVED SEALING MIXTURES ARE PROHIBITED TO BE USED AS BACKFILL.

AUTHORIZED SIGNATURE ______ DATE ______

FOR OFFICE USE ONLY
NO PERMIT IS DEEMED COMPLETED UNTIL THE FOLLOWING ARE MARKED AND SIGNED OFF:
☐ NOTIFICATION OF COMPLETION RECEIVED
☐ FINAL INSPECTION
☐ ALL REQUIRED DOCUMENTS RECEIVED

PRINT NAME ______ PHONE NUMBER ______

DISPOSITION OF PERMIT (FOR OFFICE USE ONLY)

☒ APPROVAL IS SUBJECT TO THE FOLLOWING CONDITIONS:
NOTIFY THIS AGENCY AT LEAST 48 HOURS:
☒ PRIOR TO ANY CHANGES OF THE WORK PLAN.
☐ PRIOR TO SEALING THE ANNULAR SPACE.
☐ PRIOR TO FILLING OF CONDUCTOR CASING.

☒ SUBMIT TO THIS AGENCY, WITHIN 30 DAYS OF COMPLETION OF WORK, A COPY OF THE WELL COMPLETION REPORT(S) AND/OR DRILLING LOG(S). PLEASE REFERENCE PERMIT NO.

☐ SECURE ALL WELLS TO PREVENT TAMPERING.

☒ NOTIFY WHEN ALL WORK IS COMPLETED AND INCLUDE THE DEPTH TO FIRST ENCOUNTERED WATER, PHOTO DOCUMENTATION, AND/OR COPIES OF CEMENT TICKETS/CALCULATIONS.

☐ WORK COMPLETED PRIOR TO SUBMITTING PERMIT APPLICATION TO THIS AGENCY

☒ OTHER **PERMIT EXPIRES ON 05-10-2025**

Juan Anzora **05-09-2024**
PERMIT ISSUED BY DATE

JUAN ANZORA **714-433-6287**
PRINT NAME PHONE NUMBER

WHEN SIGNED BY AN ORANGE COUNTY HEALTH CARE AGENCY REPRESENTATIVE, THIS APPLICATION IS A VALID PERMIT.
(R10/21)

I hereby agree to comply with all applicable requirements of the Health Care Agency and with all ordinances and laws of the County of Orange and of the State of California pertaining to well construction, reconstruction and destruction, including the requirements to maintain the integrity of all significant confining zones. A violation of the California Well Standards and the local Well Ordinances may constitute a misdemeanor (County Well Ordinance Sec. 4-5-31).

WELL OWNER	
WELL OWNER'S NAME Back Bay Barrels LLC BACK BAY BARRELS, LLC	EMAIL ADDRESS Adam@surffarm.com
WELL OWNER'S ADDRESS / CITY / STATE/ ZIP CODE 1940 Continental Ave Costa Mesa, Ca 92627	TELEPHONE NUMBER (949) 836-3055
WELL OWNER'S SIGNATURE	DATE 5-9-24

CONSULTING FIRM		
NAME OF CONSULTING FIRM Carl Kim Geotechnical, Inc. CARL KIM GEOTECHNICAL, INC.	BUSINESS ADDRESS/CITY/STATE/ZIP CODE 945 Baileyana Road Hillsborough, CA 94010	PROFESSIONAL LICENSE NUMBER PG 7720; CEG 2366
CONSULTANT'S SIGNATURE Andrew R. Hillstrand Digitally signed by Andrew R. Hillstrand Date: 2024.05.09 09:43:42 -07'00'	DATE 5/8/2024	EMAIL ADDRESS geoandy@gmail.com

DRILLING CONTRACTOR		
NAME OF DRILLER Kehoe Testing & Engineering, Inc.	EMAIL ADDRESS kte3@kehoetesting.com	C-57 LICENSE NUMBER 786163 786163
DRILLER'S SIGNATURE Digitally signed by Steven P. Kehoe Date: 2024.05.09 10:09:15-07'00'		DATE 05/09/2024

REQUIRED DOCUMENTS

WATER & STORMWATER DRY INJECTION WELL CONSTRUCTION

☐ An approval from the Division of Drinking Water (DDW) for public or municipal water wells.

☐ A cross-section well diagram detailing total depth, borehole diameter, depth and thickness of the sanitary seal(s), type(s) of casing(s), and length(s) of screen(s) / slotting. A top view is required for nested wells that demonstrate the radial thickness separation.

☐ Indicate the number of water aquifers the well will be screened through.

☐ A site map using a 250-foot radius from the proposed water well location that includes locations and distances to:

- All existing, active, inactive, and/or abandoned water wells.
- All existing, abandoned, and/or proposed sewer lines, recycled water lines, and storm drain lines.
- All active and/or abandoned leach fields, cesspits, and septic tanks.
- All animal enclosures (e.g., stables, coops, kennels, etc.).
- All water courses and/or bodies of water, including, but not limited to: rivers, creeks, ponds, retention ponds, and/or swimming pools.
- All other underground storage tanks and open (regulated) remediation sites.
- All nearby structures (e.g., commercial and residential buildings, houses, storage sheds) sanitary hazards and their locations.

NON-PRODUCTION WELL CONSTRUCTION

☐ Written work plan. For regulated sites, an approved work plan by the overseeing regulatory agency must be included for the installation of any type of nested well.

☐ Site map(s) showing the locations of the proposed wells (no topographical maps).

☐ A cross-section well diagram detailing total depth, borehole diameter, depth and thickness of the sanitary seal(s), type(s) of casing(s), and length(s) of screen(s) / slotting. A top view is required for nested wells that demonstrates a 2-inch radial thickness separation between casings and casing and wall of the borehole.

WELL & EXPLORATORY BORING DESTRUCTION

■ Written work plan. For regulated sites, an approval of the work plan by the overseeing regulatory agency must be included.

■ Site map(s) showing the locations of the wells to be destroyed (no topographical maps).

■ Type and amount of sealant (show calculations for water wells):

Total depth 40-70 feet   Borehole diameter 1.44 inches   Sealing material BENTONITE-CEMENT

■ Method of destruction:

☐ Pressure grout / removal of top 5 feet casing / removal of well boxes   ☐ Overdrill   ☐ Excavation

■ Other Approved sealing materials will be place via tremie from total depth to ground surface.

(R10/21)

May 8, 2024 Project No. PWAS_20240507

Orange County Health Care Agency
1241 East Dyer Road, Suite 120
Santa Ana, CA 92705-5611

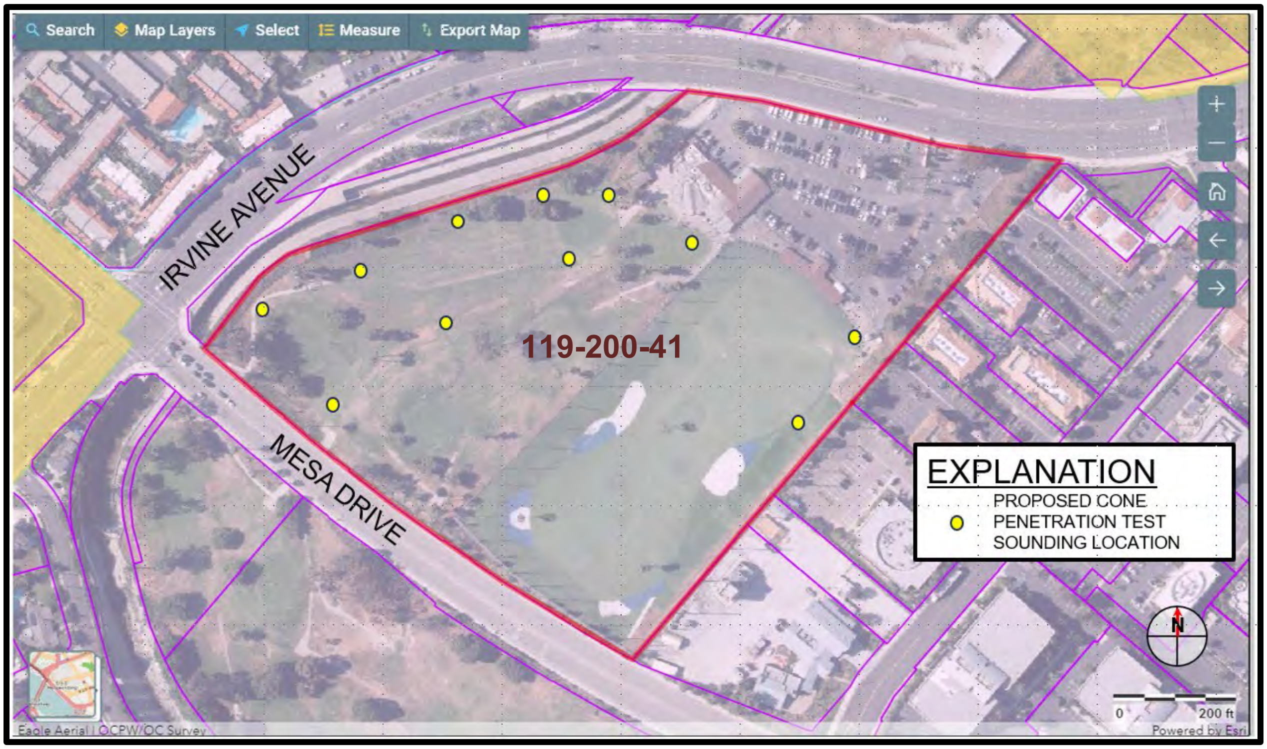
Attn.: Water Quality, Wells Section (EHOCWells@ochca.com)

RE: "Work Plan" for Geotechnical Boring Permit, 3100 Irvine Avenue, Newport Beach, California, Assessor's Parcel Number (APN) 119-200-41

Dear Sir or Madam,

Carl Kim Geotechnical, Inc. (Carl Kim Geo) is planning geotechnical explorations that will include approximately nine (9) cone penetration test soundings to depths of 40 to 70 below ground surface (BGS). The CPT subcontractor is currently scheduled to commence the work on or about May 20, 2024. Carl Kim Geo's staff and subcontractors will use industry standard techniques to seal boreholes to surface. We will adhere to the requirements of the Orange County Well/Boring Permit and California Well Standards. As such, borings will be sealed with neat cement (Portland cement-bentonite grout) using positive displacement methods (tremie pipe) across the intervals explored.

For convenience, the map below was excerpted from https://www.ocgis.com/ocpw/landrecords/ and includes the approximate locations of the proposed explorations, all of which are within parcel number 119-200-41. Note that depths and locations will be adjusted based on field conditions and other technical factors.



The proposed work will be observed and documented by qualified staff or directly by the undersigned.

If you have any questions, please do not hesitate to contact me at 805-573-0315 or geoandy@gmail.com.

Respectfully submitted,

Andrew R. Hillstrand

Andrew R. Hillstrand PG 7720, CEG 2366
Senior Engineering Geologist

Enclosure

APPENDIX B

LOGS OF BORINGS

This appendix contains the final logs of borings. These logs represent our interpretation of the contents of the field logs and the results of the field and laboratory tests.

The logs and related information depict subsurface conditions only at these locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these test boring locations. Also, the passage of time may result in changes in the soil conditions at these test boring locations.

In addition, an explanation of the abbreviations used in the preparation of the logs and a description of the Unified Soil Classification System are provided at the end of Appendix B.

DRAFT

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-1

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 29, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	4/6 4/6 3/6	SM	SILTY SAND; loose, moist, fine, dark-brown		7	
	7/6 7/6 7/6		Medium dense, fine to medium grained, trace fine gravel		14	
5	5/6 8/6 12/6		Weakly cemented		20	
10	9/6 13/6 15/6	SP	POORLY GRADED SAND; medium dense, moist, fine to coarse grained, red-brown, trace fine gravel	DD = 100.7 pcf	28	3.9
15	8/6 11/6 12/6		Iron oxide staining		23	
20	9/6 7/6 10/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, blue and brown	DD = 85.5 pcf	17	33.7
			Bottom of boring			
25						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-2

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 30, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	11/6 10/6 7/6	SM	SIITY SAND; medium dense, damp, fine to medium grained, brown, with rootlets, some clay		17	3.3
	7/6 12/6 8/6		Moist, weakly cemented		20	6.0
5	8/6 10/6 9/6		Increase in sand content, decrease in fines, trace fine gravel		19	6.8
10	1/6 2/6 10/6	CL	SANDY LEAN CLAY; medium stiff, moist, low plasticity, olive- green	DD = 92.6 pcf	12	21.8
15	3/6 6/6 8/6		Stiff, low to medium plasticity, iron oxide staining		14	22.3
20	2/6 4/6 8/6		Dark-brown staining		12	25.3
25	2/6 5/6 9/6				14	24.5

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-2

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 30, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	2/6 5/6 8/6		With sea shells		13	
35	2/6 7/6 10/6		Slight increase in moisture content, blue	DD = 91.7 pcf LL =42 PI = 25	17	26.1
40	2/6 3/6 4/6		Medium stiff		7	35.6
45	15/6 24/6 40/6	SP	POORLY GRADED SAND; dense, moist, fine to medium grained, gray		65	
50	15/6 27/6 27/6		Very dense, fine sand		54	1.6
55	15/6 20/6 28/6		Dense		48	

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC. Since 1898

Test Boring: B-2

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 30, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
60	3/6 4/6 4/6	CL	LEAN CLAY; medium stiff, moist, low to medium plasticity, dark-gray	Sand = 2.0% -#200 = 98.0% LL = 40 PI = 17	8	
65	3/6 5/6 5/6		Stiff, black, 2 inch sandy silt lens		10	
70	3/6 3/6 6/6				9	35.7
			Bottom of boring			
75						
80						
85						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-3

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

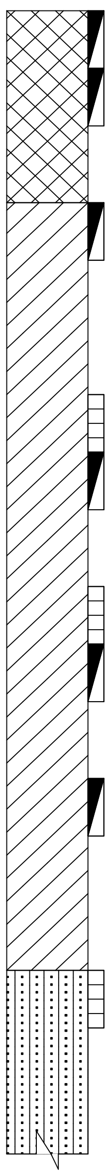
Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 22, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6, 8/6, 10/6	FIII	SANDY LEAN CLAY; very stiff, moist, low to medium plasticity, dark-brown, with rootlets, trace fine gravel, weak to moderate cementation		18	6.5
	6/6, 7/6, 7/6		Stiff, brown to black		14	9.1
5	2/6, 1/6, 1/6	CL	SANDY LEAN CLAY; Soft, moist, low plasticity, black, organics		2	60.5
10	4/6, 7/6, 9/6		Gray to black, iron oxide stains	DD = 87.8 pcf	16	34.6
	3/6, 4/6, 5/6		Tan-brown, iron oxide stains		9	23
15	5/6, 10/6, 12/6		Stiff, bluish-gray to black, with seams of black	DD = 96.6 pcf	22	35.7
	4/6, 5/6, 6/6		Bluish-gray		11	20.4
20	0/6, 2/6, 3/6		Medium stiff, dark-brown		5	46.0
25	5/6, 14/6, 14/6	SM	SILTY SAND with Clay; very stiff, moist, fine to medium grained, dark-gray	DD = 92.5 pcf Gravel= 11.0% Sand = 76.9% -#200 = 12.1% c = 380 psf ø = 36°	28	20.3

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-3

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Logged By: Jovany C.

Drilled By: Allen B.

Date: July 22, 2019

Drill Type: CME 75

Elevation: N/A

Auger Type: 6-5/8" Hollow Stem Augers

Depth to Groundwater First Encountered During Drilling: N/E

Hammer Type: 140 LB Auto Trip Hammer

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	4/6 6/6 12/6	SM	SILTY SAND; medium dense, moist, fine sand, dark- gray, 2 inch clay lens	Sand = 82.9% -#200 =17.1%	18	
	11/6 33/6 50/5		Very dense, trace clay, trace gravel	DD = 107.4 pcf	>83	10.5
35						
	7/6 7/6 11/6	CL	SANDY LEAN CLAY; very stiff, moist, low to medium plasticity, dark-gray		18	
40						24.4
			Bottom of boring			
45						
50						
55						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-4

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Logged By: Jovany C.

Drilled By: Allen B.

Date: July 22, 2019

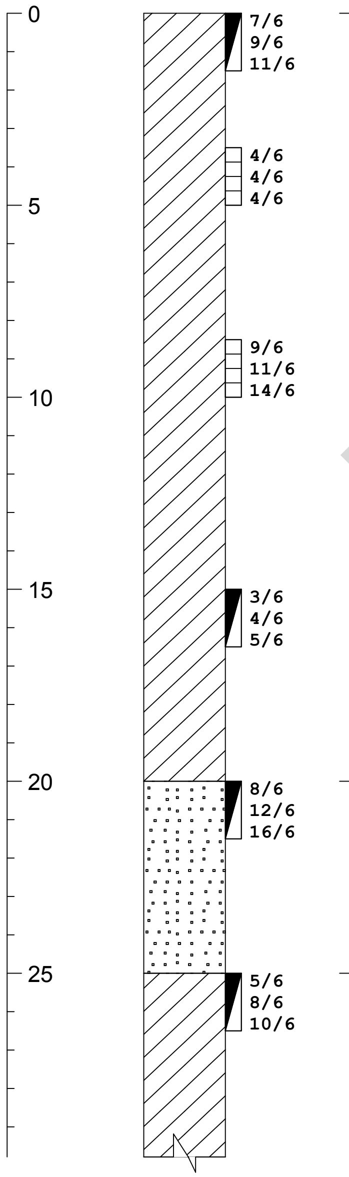
Drill Type: CME 75

Elevation: N/A

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Depth to Groundwater First Encountered During Drilling: 30 feet



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	7/6 9/6 11/6	CL	SANDY LEAN CLAY; very stiff, moist, low plasticity, dark-brown, weak to moderate cementation		20	6.4
	4/6 4/6 4/6		Soft, with rootlets, iron oxide staining		8	18.8
	9/6 11/6 14/6		Very stiff, low to medium plasticity, gray to black	DD = 102.0 pcf	25	21.0
15	3/6 4/6 5/6		Stiff, bluish-gray, iron oxide stains		9	27.2
20	8/6 12/6 16/6	SP	POORLY GRADED SANDS; medium dense, moist, fine sand, bluish-gray		28	10.5
25	5/6 8/6 10/6	CL	LEAN CLAY; very stiff, very moist, low plasticity, dark-gray		18	24.7

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-4

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Logged By: Jovany C.

Drilled By: Allen B.

Date: July 22, 2019

Drill Type: CME 75

Elevation: N/A

Auger Type: 6-5/8" Hollow Stem Augers

Depth to Groundwater First Encountered During Drilling: 30 feet

Hammer Type: 140 LB Auto Trip Hammer

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	9/6 17/6 23/6	SP	POORLY GRADED SAND; dense, wet, fine to medium grained, dark-gray		40	21.4
			Bottom of boring			
35						
40						
45						
50						
55						

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Notes:

Figure Number

Test Boring: B-5

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 22, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6 4/6 3/6	FILL	SANDY LEAN CLAY; medium stiff, moist, low to medium plasticity, brown to black		7	
5	2/6 2/6 4/6		Soft, black, with rootlets, organics	DD = 69.0 pcf LOI=14.1%	6	43.4
	4/6 4/6 4/6	CL	SANDY LEAN CLAY: medium stiff, low plasticity, olive green		8	
10						
	4/6 4/6 5/6		Stiff, brown to blue		9	
15						
	4/6 6/6 10/6	SM	SILTY SAND; loose, moist, fine to medium grained, dark gray	DD = 95.2 pcf Sand = 72.7% -#200 = 27.3% c = 350 psf ø = 30° LL = NV PI = NP	16	21.1
20						
25	5/6 11/6 14/6	SP	POORLY GRADED SAND; medium dense, moist, fine to medium grained, dark-gray, trace coarse gravel, 2 inch clay lens		25	

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-5

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 22, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	8/6 15/6 36/6		Dense, 2 inch clay lens	DD = 112.5 pcf	51	9.1
35	9/6 13/6 7/6		Medium dense		20	2.9
40	2/6 6/6 4/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, dark-gray, 2 inch sandy silt lens		10	35.8
			Bottom of boring			
45						
50						
55						

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-6

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 23, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	4/6 4/6 4/6	CL	SANDY LEAN CLAY; medium stiff, moist, low to medium plasticity, dark-brown, weakly cemented, with rootlets		8	
	3/6 5/6 8/6		Stiff, trace gravel, increase in sand content,		13	
5	4/6 5/6 6/6		Stiff, trace fine to coarse gravel, 1 inch poorly graded sand lens		11	
10	7/6 14/6 18/6		Very stiff, brown, iron oxide stains	DD = 95.6 pcf	32	25.9
15	4/6 6/6 8/6		Stiff, light-brown to brown, iron oxide staining		14	
20	3/6 5/6 7/6		Bluish-brown		12	
25	2/6 3/6 4/6		Medium stiff, blue, interbedded mica		7	

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-6

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 23, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	2/6 2/6 2/6		Soft, dark-gray		4	
			Bottom of boring			
35						
40						
45						
50						
55						

Notes:

Figure Number

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MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-7

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 29, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	2/6 2/6 4/6	CL	LEAN CLAY; medium stiff, moist, low to medium plasticity, olive-brown, iron oxide staining		6	
	3/6 5/6 5/6		Stiff, low plasticity, bluish- grown, iron oxide stains		10	
5	4/6 6/6 9/6		Low plasticity, gray to dark-gray	DD = 86.8pcf LL = 47 PI = 23	15	25.5
10	2/6 5/6 6/6		Low to medium plasticity, blue, iron oxide staining		11	
15	11/6 22/6 35/6	SM	SILTY SAND; dense, moist, fine to medium grained, olive- brown, trace clay	DD =105.6 pcf Sand = 81.3% -#200 = 18.7%	57	7.8
20	10/6 15/6 16/6	SP	POORLY GRADED SAND; dense, moist, fine to medium, brown		31	
25	2/6 2/6 4/6	CL	SANDY LEAN CLAY; medium stiff, moist, low to medium plasticity, blue, iron oxide staining		6	

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.
Since 1898

Test Boring: B-7

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 29, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	3/6 6/6 5/6		Stiff, very moist, 3 inches of interbedded muscovite		11	
35	1/6 2/6 3/6		Medium stiff, low to medium plasticity, dark-gray		5	
40	4/6 6/6 6/6		Stiff, 2 inches of interbedded sandy silt		12	
45	5/6 6/6 8/6	ML	SANDY SILT; stiff, moist, non-plastic, dark-gray		14	
50	3/6 5/6 6/6	CL	SANDY LEAN CLAY; stiff, moist, low plasticity, dark-gray, with organics		11	
			Bottom of boring			
55						

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Notes:

Figure Number

Test Boring: B-8

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 29, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	4/6 4/6 4/6	CL	SANDY LEAN CLAY; medium stiff, moist, low to medium plasticity, dark-brown		8	
	4/6 7/6 7/6		Stiff		14	
5	4/6 8/6 7/6		Red-brown, trace fine gravel	DD = 109.2 pcf	15	11.8
10	2/6 3/6 5/6	SP	POORLY GRADED SAND; loose, moist, fine to coarse grained, red-brown		8	
15	5/6 11/6 13/6	CL	SANDY LEAN CLAY; very stiff, moist, low plasticity, olive brown, iron oxide staining	DD = 94.2 pcf	24	28.8
20	3/6 5/6 8/6		Stiff, low to medium plasticity, brown, iron oxide staining, seams of sand		13	
			Bottom of boring			
25						

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-9

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

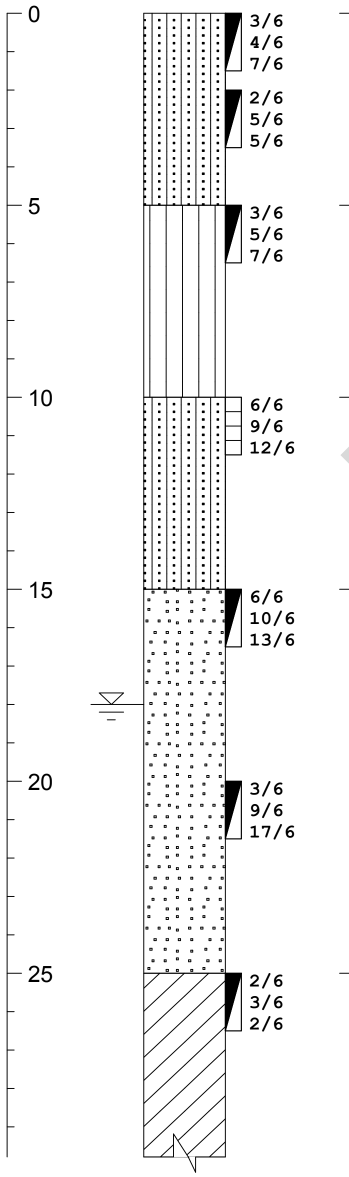
Logged By: Jovany C.

Date: July 29, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 18 feet

ELEVATION/ DEPTH (feet) | **SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA**



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, moist, fine to medium dense, brown		11	
	Trace gravel, 2 inch thick clay lens in sample		10	
ML	Sandy Silt; stiff, moist, slight plasticity, red-brown, iron oxide staining	Sand = 49.6% -#200 = 50.4%	12	
SM	SILTY SAND; medium dense, moist, fine to medium grained, red-brown	DD = 96.7 pcf	21	4.2
SP	POORLY GRADED SAND; moist, medium dense, fine to medium	Sand = 96.8% -#200 = 3.2% LL = NV PI = NP	23	
	2 feet of heave at 18 feet			
	Wet, bluish-gray		26	
CL	SANDY LEAN CLAY; medium stiff, wet, low plasticity, grayish- blue, with weathered interbedded muscovite		5	

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-9

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pacific Drilling

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 29, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 18 feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	3/6 4/6 4/6		Low to medium plasticity, dark-gray		8	
35	3/6 4/6 5/6	ML	SANDY SILT; stiff, moist, low plasticity, dark-gray, organic odor, some clay		9	
40	1/6 3/6 5/6		Medium stiff, low plasticity, increase in clay content		8	
45	6/6 11/6 17/6	SP	POORLY GRADED SAND; medium dense, wet, fine to medium grained, dark gray, trace organics		28	
50	13/6 23/6 25/6		Dense		48	
			Bottom of boring			
55						

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-10

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Logged By: Jovany C.

Drilled By: Allen B.

Date: July 16, 2019

Drill Type: CME 75

Elevation: N/A

Auger Type: 6-5/8" Hollow Stem Augers

Depth to Groundwater First Encountered During Drilling: N/E

Hammer Type: 140 LB Auto Trip Hammer

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	8/6 10/6 12/6	AC	2.0 inches of Asphaltic CONCRETE over 6.5 inches of AGGREGATE BASE		22	
	11/6 14/6 17/6	SP	POORLY GRADED SAND; medium dense, moist, fine to coarse grained, light-brown		31	
5	13/6 20/6 29/6		Dense	DD = 108.0 pcf	49	2.4
10	3/6 9/6 12/6	CL	LEAN CLAY; hard, moist, low plasticity, brown		21	
15	4/6 8/6 8/6		Very stiff, low to medium plasticity, bluish-brown, moderately cemented, iron oxide staining		16	
20	4/6 8/6 12/6				20	
			Bottom of boring			
25						

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-11

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 16, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 20 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		AC	2.0 inches of ASPHALTIC CONCRETE over 6 inches of AGGREGATE BASE			
	8/6 9/6 10/6	FILL			19	
	4/6 4/6 8/6	FILL	CLAYEY SAND; medium dense, moist, fine to medium grained, brown		12	
5	9/6 9/6 9/6		SANDY LEAN CLAY; stiff, moist, low to medium plasticity, red-brown to black Very stiff		18	
10		FILL	SANDY LEAN CLAY; stiff, moist, low plasticity, bluish-gray, iron oxide staining			
15	7/6 9/6 9/6	SM	SILTY SAND; medium dense, moist, fine to medium grained, brown, trace clay		18	
20	7/6 11/6 15/6	SP	POORLY GRADED SAND; medium dense, wet, fine to coarse, bluish-gray	DD =104.5 pcf Sand = 95.5% -#200 = 4.5% LL = NV PI = NP	26	20.6
25	6/6 5/6 6/6	CL	SANDY LEAN CLAY; stiff, wet, low to medium plasticity, blue, sea shells		11	

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Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-11

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 16, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 20 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	3/6 4/6 4/6		LEAN CLAY; medium stiff, wet, low to medium plasticity, bluish-gray, 1 inch poorly graded sand lens		8	
35	4/6 6/6 8/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, bluish-gray (3 feet of heave during drilling)		14	
40	20/6 24/6 22/6	CL	Seam of poorly graded sand SANDY LEAN CLAY; hard, moist, low to medium plasticity, bluish-gray		46	
45	6/6 12/6 29/6	ML	SANDY SILT; hard, moist, non plastic, gray, 1" clay lens		41	
			Bottom of boring			
50						
55						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-12

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 15, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		AC	2.5 inches of ASPHALTIC CONCRETE over 6.0 inches of AGGREGATE BASE			
	8/6 6/6 12/6	SC	CLAYEY SAND; medium dense, moist, fine to medium grained, red-brown to brown, weakly cemented		20	
	10/6 12/6 11/6	CL	SANDY LEAN CLAY; very stiff, moist, low to medium plasticity, brown, moderate cementation With 1" clayey sand lens		23	
5	10/6 15/6 15/6				30	
			Bottom of boring			
10						
15						
20						
25						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC. Since 1898

Test Boring: B-13

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 15, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		AC	2.3 inches of ASPHALTIC CONCRETE over 6.0 inches of AGGREGATE BASE			
	5/6 5/6 6/6	CH	FAT CLAY; stiff, moist, medium to high plasticity, light-brown		11	
5	6/6 12/6 18/6	CL	LEAN CLAY; very stiff, moist, low plasticity, light-brown		30	
10	4/6 6/6 6/6		Stiff, decrease in plasticity, olive		12	
15	6/6 9/6 9/6	ML	SILT; very stiff, moist, non plastic, red-brown		18	
20	4/6 9/6 13/6	SP	POORLY GRADED SAND; medium dense, moist, fine to medium grained, trace coarse sand, brown, iron oxide staining		22	
25			Bottom of boring			

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC. Since 1898

Test Boring: B-14

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

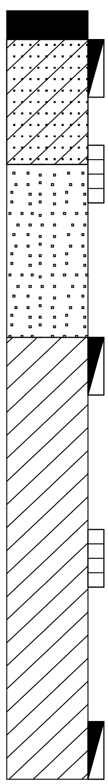
Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 15, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		AC	2.1 inches of ASPHALTIC CONCRETE over 7.5 inches of AGGREGATE BASE			
	5/6 5/6 5/6	SC	CLAYEY SAND; loose, moist, fine to medium grained, dark brown to red-brown, gravel noted in cuttings		10	
	7/6 8/6 11/6		Medium dense, slight increase in fines content		19	
5		SP	POORLY GRADED SAND; loose, moist, fine to coarse, tan brown, trace clay fragments			
10	3/6 4/6 6/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, dark-brown, 1 inch clayey sand lens		10	
15	5/6 16/6 21/6	CL	LEAN CLAY; Very stiff, moist, low to medium plasticity, dark-brown to red-brown, trace sand	DD = 124.3 pcf	37	11.0
	4/6 6/6 8/6		Stiff, gray to brown		14	
20			Bottom of boring			
25						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-15

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 15, 2019

Elevation:

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		AC	2.8 inches of ASPHALTIC CONCRETE over 5.0 inches of AGGREGATE BASE			
	3/6 4/6 5/6	SC	CLAYEY SAND; loose, moist, fine to medium grained, dark- brown to black		9	
	5/6 6/6 7/6	CL			13	
5	6/6 13/6 26/6		SANDY LEAN CLAY; stiff, moist, low plasticity, dark-brown Very stiff, increase in sand content, 2" clayey sand lens	DD = 112.0 pcf	39	11.6
10	5/6 6/6 7/6		Very stiff, low plasticity, dark-brown		13	
15			Low to medium plasticity			
20	2/6 2/6 3/6		Medium stiff, moist, low to medium plasticity, light-gray to light-green		5	
25	2/6 2/6 4/6	CH	FAT CLAY; stiff, moist, medium to high plasticity, bluish-green, interbedded tan, sea shells		6	

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-15

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 15, 2019

Elevation:

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	4/6 6/6 8/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, dark-blue	DD = 84.5 pcf	14	33.2
35	10/6 17/6 21/6	SP	POORLY GRADED SAND; dense, moist, fine sand, gray		38	
40	5/6 7/6 9/6	ML	SANDY SILT; very stiff, moist, non-plastic, dark-gray		16	
45	5/6 7/6 9/6	SP	POORLY GRADED SAND; medium dense, moist, fine, gray		16	
			Bottom of boring			
50						
55						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-16

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 23, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	2/6 4/6 4/6	CL	SANDY LEAN CLAY; medium stiff, moist, low to medium plasticity, black, with rootlets, weak to moderate cementation		8	13.8
	6/6 8/6 10/6		Stiff	DD = 83.2 pcf c = 230 psf ø = 30°	18	29.5
5	3/6 4/6 5/6		Increase in sand content		9	28.7
10	2/6 1/6 2/6		Soft, decrease in plasticity		3	60.2
15	2/6 6/6 8/6	CL	SANDY LEAN CLAY; stiff, moist, low plasticity, black, organics		14	37.7
20	7/6 11/6 13/6	ML	SANDY SILT; very stiff, moist, non-plastic, brown		24	7.9
25	3/6 4/6 5/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, bluish-gray		9	20.0

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-16

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: July 23, 2019

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	0/6 2/6 2/6		Soft, trace gravel		4	29.0
35	2/6 4/6 4/6		Medium stiff, bluish-gray		8	20.5
40	4/6 6/6 8/6	SM	SILTY SAND; medium dense, moist, fine to medium grained, bluish-gray, with trace clay		14	15.8
45	5/6 6/6 7/6				13	9.7
			Bottom of boring			
50						
55						

DRAFT

Notes:

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-17

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

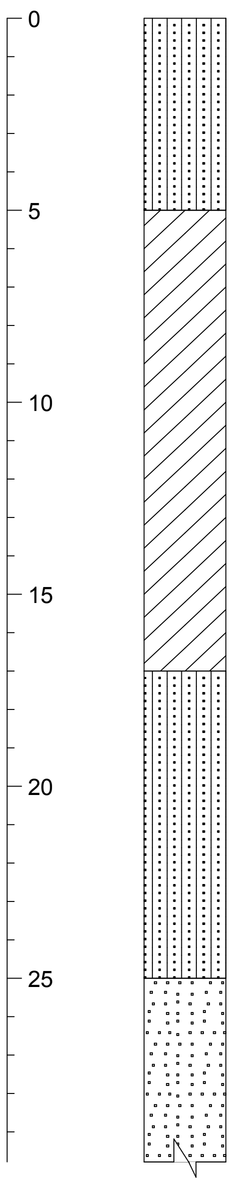
Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 24, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
		SM	SILTY SAND; moist, fine to medium grained, brown Dark-brown			
		CL	SANDY LEAN CLAY; moist, low plasticity, dark-brown Increase in sand content Grayish-blue, low to medium plasticity Greenish-blue, slight increase in moisture			
		SM	SILTY SAND; moist, fine to medium grained, red-brown			
		SP	POORLY GRADED SAND; moist, fine to medium grained, red-brown			

DRAFT

Notes: *Groundwater not encountered during drilling on February 24, 2020. Groundwater was measured at 26 feet BSG on February 25, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-17

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 24, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30						
		CL	LEAN CLAY; moist, low plasticity, grayish-blue			
35			Slight increase in moisture, Bottom of boring B-17 at 35 feet BSG			
40						
45						
50						
55						

DRAFT

Notes: *Groundwater not encountered during drilling on February 24, 2020. Groundwater was measured at 26 feet BSG on February 25, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-18

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 24, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 35 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6 4/6 5/6	SP-SM	POORLY GRADED SAND WITH SILT; loose, moist, fine to coarse grained, brown		9	
5	6/6 4/6 3/6	CL	LEAN CLAY; medium stiff, moist, low plasticity, brown		7	
		SP-SM	POORLY GRADED SAND WITH SILT; loose, moist, fine to coarse grained, brown, some fine subangular gravel			
10	4/6 4/6 5/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, grayish-blue		9	
15	7/6 8/6 10/6	SP-SM	POORLY GRADED SAND with Silt; medium dense, moist, fine to medium grained, brown	Sand=92.2% -#200=7.8%	18	
20	4/6 6/6 8/6	CL	LEAN CLAY; stiff, very moist, low to medium plasticity, grayish-blue, iron oxide staining	DD=88.1 pcf	14	34.8
25	3/6 3/6 3/6		Medium stiff, with shells		6	

DRAFT

Notes: *Groundwater encountered at about 35 feet BSG during drilling on February 24, 2020. Groundwater was measured at 18 feet BSG on February 25, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-18

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 24, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 35 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	7/6 8/6 8/6		Stiff	DD=75.5 pcf	16	37.7
35	6/6 11/6 11/6	ML	SANDY SILT; very stiff, very moist, non-plastic, dark-gray		22	
40	12/6 16/6 10/6				26	
45	3/6 4/6 4/6	CL	LEAN CLAY; medium stiff, wet, medium plasticity, dark-gray		8	
50	3/6 4/6 7/6		Stiff		11	
			Bottom of boring B-18 at 51.5 feet BSG			
55						

DRAFT

Notes: *Groundwater encountered at about 35 feet BSG during drilling on February 24, 2020. Groundwater was measured at 18 feet BSG on February 25, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-19

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 24, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 38.5 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		SM	FILL - SILTY SAND; moist, fine to medium grained, brown to red brown, moderate resistance to hand auger, plastic debris			
	7/6 8/6 8/6	SP-SM	POORLY GRADED SAND WITH SILT; medium dense, moist, fine to coarse grained, brown to red- brown		16	5.0
5	6/6/ 5/6 5/6	CL	SANDY LEAN CLAY; stiff, moist, low plasticity, brown, iron oxide staining		10	
10	11/6 15/6 17/6		Very stiff, low to medium plasticity, green-brown	DD=103.9 pcf	32	20.7
15	4/6 7/6 9/6		Dark greenish-brown, decrease in sand content		16	21.1
20	6/6 13/6 17/6		LEAN CLAY; very stiff, moist, low to medium plasticity, greenish-brown	DD=96.9 pcf	30	24.2
25	5/6 8/6 11/6				19	23.5

DRAFT

Notes: *Groundwater encountered at 38.50 feet BSG during drilling on February 24, 2020. Groundwater was measured at 29 feet BSG on February 25, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-19

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 24, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 38.5 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	9/6 12/6 15/6		Bluish-gray to greenish-brown	DD=97.6 pcf LL=49 PI=31	27	25.1
35	5/6 6/6 9/6		Stiff, dark-gray		15	29.7
40	4/6 3/6 2/6		Medium stiff, wet	DD=81.0 pcf ø=19° C=320 psf	5	34.9
45	3/6 3/6 3/6				6	32.6
50	6/6 8/6 13/6		Very stiff, grayish-blue	DD=89.9 pcf	21	30.6
55	6/6 8/6 12/6				20	24.2
			Bottom of boring B-19 at 56.5 feet BSG			

DRAFT

Notes: *Groundwater encountered at 38.50 feet BSG during drilling on February 24, 2020. Groundwater was measured at 29 feet BSG on February 25, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-20

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Logged By: Jovany C.

Drilled By: Pac Drill

Date: February 25, 2020

Drill Type: Fraste L.A.R.

Elevation: N/A

Auger Type: 6-5/8" Hollow Stem Augers

Depth to Groundwater First Encountered During Drilling: 42.5 Feet

Hammer Type: 140 LB Auto Trip Hammer

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	10/6 6/6 5/6	SP	POORLY GRADED SAND; medium dense, moist, fine to coarse grained, brown		11	
5	3/6 5/6 6/6	CL	SANDY LEAN CLAY; stiff, moist, low plasticity, brown		11	
10	5/6 6/6 8/6		Low to medium plasticity, decrease in sand content		14	
15	10/6 12/6 16/6		Very stiff, iron oxide staining	DD=94.6 pcf	28	26.3
20	5/6 7/6 10/6				17	
25	4/6 4/6 4/6		Medium stiff, grayish-blue, interbedded shells		8	

DRAFT

Notes: *Groundwater encountered at 42.5 feet BSG during drilling on February 25, 2020. Groundwater was measured at 37 feet BSG on February 26, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-20

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 25, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 42.5 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	8/6 9/6 10/6	CH	FAT CLAY; Stiff, moist, high plasticity, gray blue	DD=83.5 pcf ø=18° C=700 psf LL=69 PI=47 Sand=7.0% -#200=93.0%	19	32.4
35	8/6 7/6 5/6	SP-SM	POORLY GRADED SAND with Silt; medium dense, wet, fine-grained, light-gray to brown, 1 inch layer of clay		12	
40	19/6 35/6 50/5.5		Very dense, dry, light-gray		>85	
45	13/6 20/6 26/6		Dense	Sand=90.6% -#200=9.4% LL=NV PI=NP	46	2.7
50	18/6 26/6 28/6		Very dense		54	
55	20/6 24/6 30/6				54	

DRAFT

Notes: *Groundwater encountered at 42.5 feet BSG during drilling on February 25, 2020. Groundwater was measured at 37 feet BSG on February 26, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-20

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 25, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 42.5 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
60	13/6 35/6 13/6		Dense, wet		48	
65	5/6 7/6 7/6		Medium dense, 1 inch layer of clay in sample shoe		14	
			Bottom of boring B-20 at 66.5 feet BSG			
70						
75						
80						
85						

DRAFT

Notes: *Groundwater encountered at 42.5 feet BSG during drilling on February 25, 2020. Groundwater was measured at 37 feet BSG on February 26, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-21

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 27, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	10/6 5/6 4/6	ML	SANDY SILT; medium stiff, moist, non-plastic, red-brown		9	6.4
	16/6 20/6 14/6		Very stiff	DD=122.0 pcf	34	5.7
5	4/6 3/6 7/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, brown		10	15.8
10	14/6 50/6		Hard		>50	
15	5/6 7/6 9/6		Very stiff, low plasticity, blueish-green, decrease in sand content		16	
20	5/6 6/6 8/6		Stiff		14	
			Bottom of boring B-21 at 21.5 feet BSG			
25						

DRAFT

Notes: *Groundwater was not encountered during drilling on February 27, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-22

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 28, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	5/6 2/6 2/6	ML	SANDY SILT; soft, moist, non plastic, dark-brown		4	
5	3/6 3/6 5/6	CL	LEAN CLAY; medium stiff, moist, low plasticity, brown		8	
10	3/6 5/6 7/6		Olive-gray		12	
15	6/6 7/6 8/6		Olive-brown, with shells		15	
20	4/6 5/6 6/6		Stiff, bluish-green		11	
25	5/6 8/6 9/6		Very stiff	DD=96.7 pcf	17	21.8

DRAFT

Notes: *Groundwater was not encountered during drilling on February 28, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-22

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 28, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	5/6 6/6 6/6		Stiff, gray, with shell		12	
35	5/6 8/6 29/6	SM	SILTY SAND; dense, moist, fine to medium grained, gray	DD=100.5 Sand=72.6% -#200=27.4%	37	14.3
40	17/6 22/6 23/6				45	
45	16/6 23/6 22/6				45	
50	0/6 5/6 6/6	CL	LEAN CLAY; stiff, moist, low to medium plasticity, dark-brown	LL=48 PI=19	11	
55	8/6 9/6 10/6		Very stiff, gray	ø=24° C=340 psf	19	

Notes: *Groundwater was not encountered during drilling on February 28, 2020.*

Figure Number

DRAFT

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-22

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 28, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
60	2/6 4/6 3/6		Medium stiff		7	
65	8/6 10/6 8/6		Stiff		18	
70	3/6 10/6 27/6	SC	CLAYEY SAND; dense, moist, fine grained, dark-brown		37	
		SP	POORLY GRADED SAND; dense, moist, fine to medium grained, gray			
75	15/6 33/6 35/6	SP	Very dense, fine to coarse gravel		68	
			Bottom of boring B-22 at 76.5 feet BSG			
80						
85						

DRAFT

Notes: *Groundwater was not encountered during drilling on February 28, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-23

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 27, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	4/6 2/6 2/6	CL	LEAN CLAY; soft, moist, low plasticity, dark-brown		4	
5	1/6 1/6 1/6		Very soft		2	
10	0/6 0/6 1/6		Olive to dark-brown		1	
15	0/6 4/6 5/6		Stiff, low to medium plasticity, gray		9	
20	6/6 6/6 8/6	SC	CLAYEY SAND; stiff, moist, fine to medium grained, light- brown		14	
25	20/6 23/6 21/6		Medium dense		44	

DRAFT

Notes: *Groundwater was not encountered during drilling on February 27, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Test Boring: B-23

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 27, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	4/6 6/6 8/6	CL	LEAN CLAY; stiff, moist, low to medium plasticity, gray		14	
35	7/6 13/6 28/6	SC	CLAYEY SAND; dense, moist, fine to medium grained, gray		41	
			Bottom of boring B-23 at 36.5 feet BSG			
40						
45						
50						
55						

DRAFT

Notes: *Groundwater was not encountered during drilling on February 27, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-24

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 26, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 30 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	10/6 3/6 6/6	CL	SANDY LEAN CLAY; stiff, moist, low plasticity, brown		9	
5	9/6 9/6 8/6		Very stiff, weakly cemented, trace fine gravel		17	
10	15/6 13/6 10/6	SC	CLAYEY SAND; medium dense, moist, fine to medium grained, brown, trace fine gravel		23	
15	9/6 12/6 14/6	CL	SANDY LEAN CLAY; very stiff, moist, low to medium plasticity, brown to blue	DD=102.3 pcf	26	16.8
		SM	SILTY SAND; medium dense, moist, fine to medium grained, dark red-brown			
20	4/6 5/6 8/6	CL	SANDY LEAN CLAY; stiff, moist, low to medium plasticity, blue, iron oxide staining, some organics		13	
25	5/6 8/6 10/6		Stiff, no organics	DD=96.8 pcf	18	26.9

DRAFT

Notes: *Groundwater was encountered at 30.00 feet BSG during drilling on February 26, 2020. Groundwater was measured at 24 feet BSG on February 27, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-24

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 26, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: 30 Feet

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	5/6 5/6 5/6		Wet, dark-gray		10	
35	2/6 3/6 3/6		Medium stiff		6	
	11/6 50/6		Hard		>50	
		SP	POORLY GRADED SAND; very dense, moist, fine to medium grained, light-gray			
40			Bottom of boring B-24 at 39.5 feet BSG			
45						
50						
55						

DRAFT

Notes: *Groundwater was encountered at 30.00 feet BSG during drilling on February 26, 2020. Groundwater was measured at 24 feet BSG on February 27, 2020.*

Figure Number

Test Boring: B-25

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 26, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6 2/6 4/6	CL	LEAN CLAY; medium stiff, moist, low plasticity, brown		6	
5	2/6 2/6 2/6		Soft, dark-brown		4	
10	0/6 0/6 2/6		Low to medium plasticity		2	
15	3/6 4/6 6/6		Medium stiff		10	
20	2/6 2/6 5/6		Medium stiff, gray, with sand		7	
25	8/6 7/6 17/6	SC	CLAYEY SAND; medium dense, moist, fine to medium grained, gray		24	
	7/6 6/6				20	

DRAFT

Notes: *Groundwater was not encountered during drilling on February 26, 2020.*

Figure Number

MOORE TWINING ASSOCIATES, INC.

Since 1898

Test Boring: B-25

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Amanda T.

Date: February 26, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	14/6		Bottom of boring B-25 at 30 feet BSG			
35						
40						
45						
50						
55						

Notes: *Groundwater was not encountered during drilling on February 26, 2020.*

Figure Number

DRAFT

Test Boring: B-26

Project: Proposed Drive Shack - Restaurant and Golf Driving Range

Project Number: E40550.01

Drilled By: Pac Drill

Drill Type: Fraste L.A.R.

Auger Type: 6-5/8" Hollow Stem Augers

Hammer Type: 140 LB Auto Trip Hammer

Logged By: Jovany C.

Date: February 26, 2020

Elevation: N/A

Depth to Groundwater First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	2/6 3/6 3/6	CL	SANDY LEAN CLAY; medium stiff, moist, low plasticity, dark brown, with rootlets		6	13.0
5	3/6 6/6 6/6		Medium stiff	DD=103.5 pcf LL=31 PI=18	12	22.6
10	2/6 2/6 2/6		Soft, low to medium plasticity, black		4	
15	1/6 2/6 2/6				4	
	7/6 9/6 11/6		Stiff, moist, low to medium plasticity, bluish-gray	DD=106.1 pcf	20	18.8
20						
	5/6 4/6 7/6		Stiff, black to gray		11	18.7
25			Bottom of boring B-26 at 25 feet BSG			

DRAFT

Notes: *Groundwater was not encountered during drilling on February 26, 2020.*

Figure Number

KEY TO SYMBOLS

Symbol	Description
	Strata symbols
	SM: Silty sand
	SP: Poorly graded sand
	CL: LEAN CLAY
	Fill
	ML: Silt
	ASPHALTIC CONCRETE
	SC: Clayey sand

DRAFT

Notes:

1. Test borings were drilled between July 15, 2019 and July 30, 2019 using a CME-75 drill rig equipped with 6-5/8" inch outside diameter hollow-stem augers and using a limited access rig (L.A.R.) equipped with 6 inch outside diameter hollow stem augers. Additional soil borings were drilled between Febraury 24, 20 and February 28, 20 using a limited acess rig equipped with 6 inch outisde diameter hollow stem augers.

2. Groundwater was encountered during drilling (see logs).

3. Boring locations were located by pace with reference to the existing site features.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. The "N-value" reported for the California Modified Split Barrel Sampler is the uncorrected field blow count. This value shold not be interpreted as an SPT equivalent N-value.

6. Results of tests conducted on samples recovered are reported on the logs. Abbreviations used are:

AMSL	=	Above mean sea level
O.D.	=	Outside diameter
DD	=	Dry density (pcf)
-#200	=	Percent passing #200 sieve (%)
N/A	=	Not applicable
N/E	=	None encountered
pcf	=	pounds per cubic foot
psf	=	pounds per square foot
BSG	=	below site grade
LL	=	Liquid Limit
PI	=	Plasticity Index
C	=	Cohesion
ø	=	Angle of Internal Friction
NV	=	No Value
NP	=	Non Plastic

KEY TO SYMBOLS

Symbol Description

Strata symbols

CH: FAT CLAY

SP-SM: Poorly graded sand with silt

Misc. Symbols

Boring continues

Water table during drilling

Soil Samplers

Standard penetration test

California Modified split barrel ring sampler

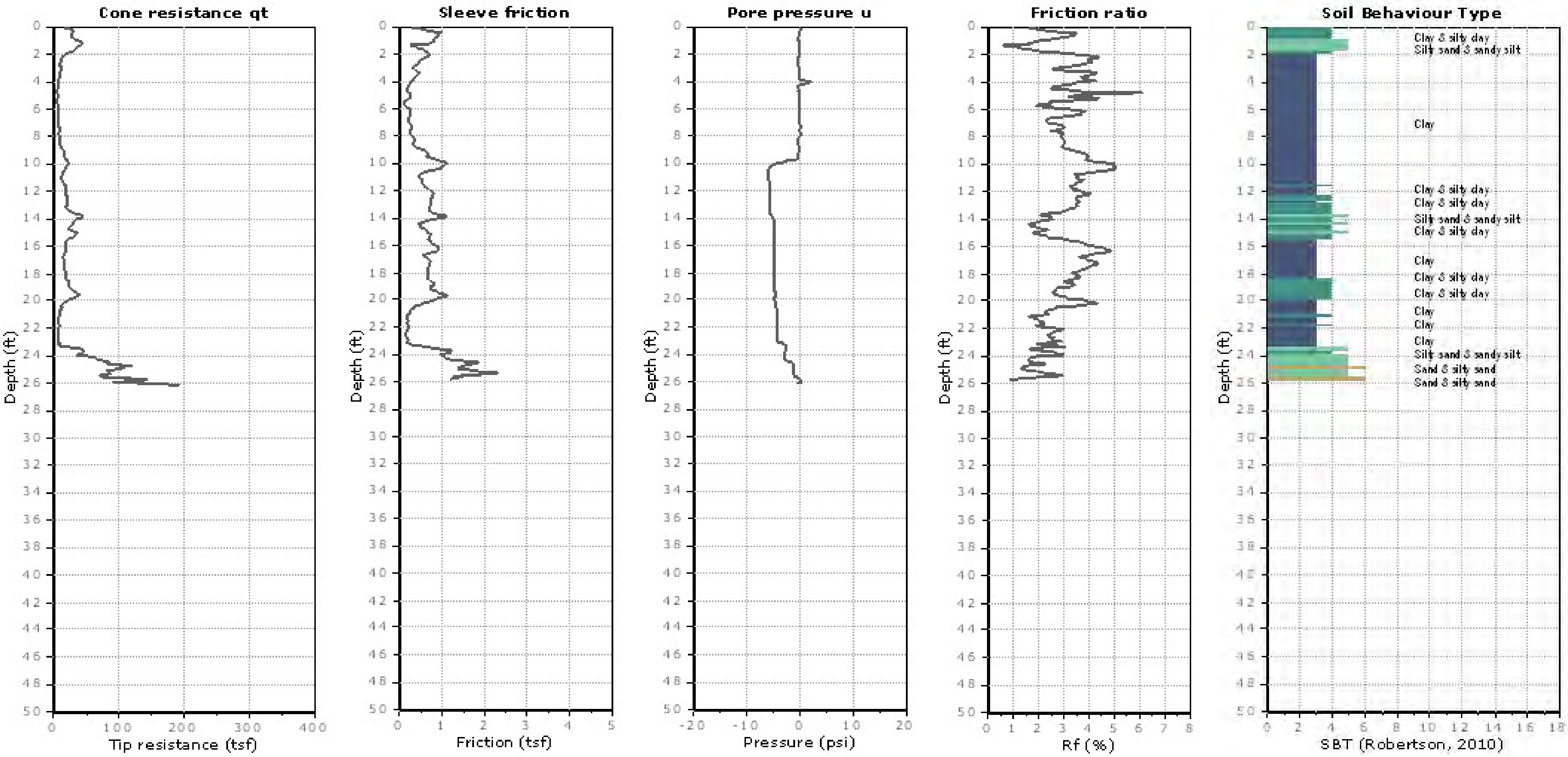
Undisturbed thin wall Shelby tube

DRAFT

Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **Moore Twining Associates**
Location: **Newport Beach Golf Course**

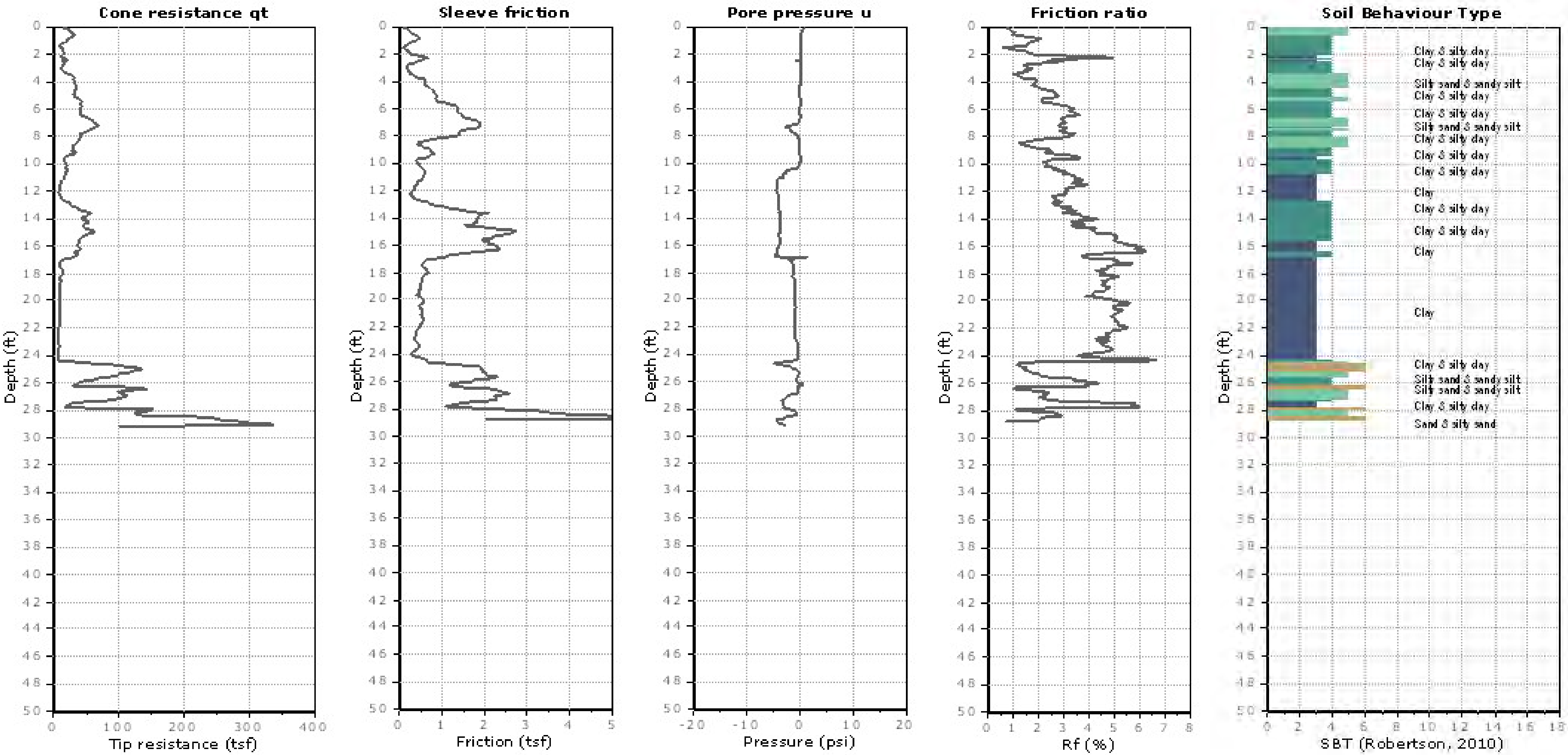
CPT-1
Total depth: 26.13 ft, Date: 7/23/2019



Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Moore Twining Associates **CPT-2**

Location: Newport Beach Golf Course Total depth: 29.14 ft, Date: 7/23/2019



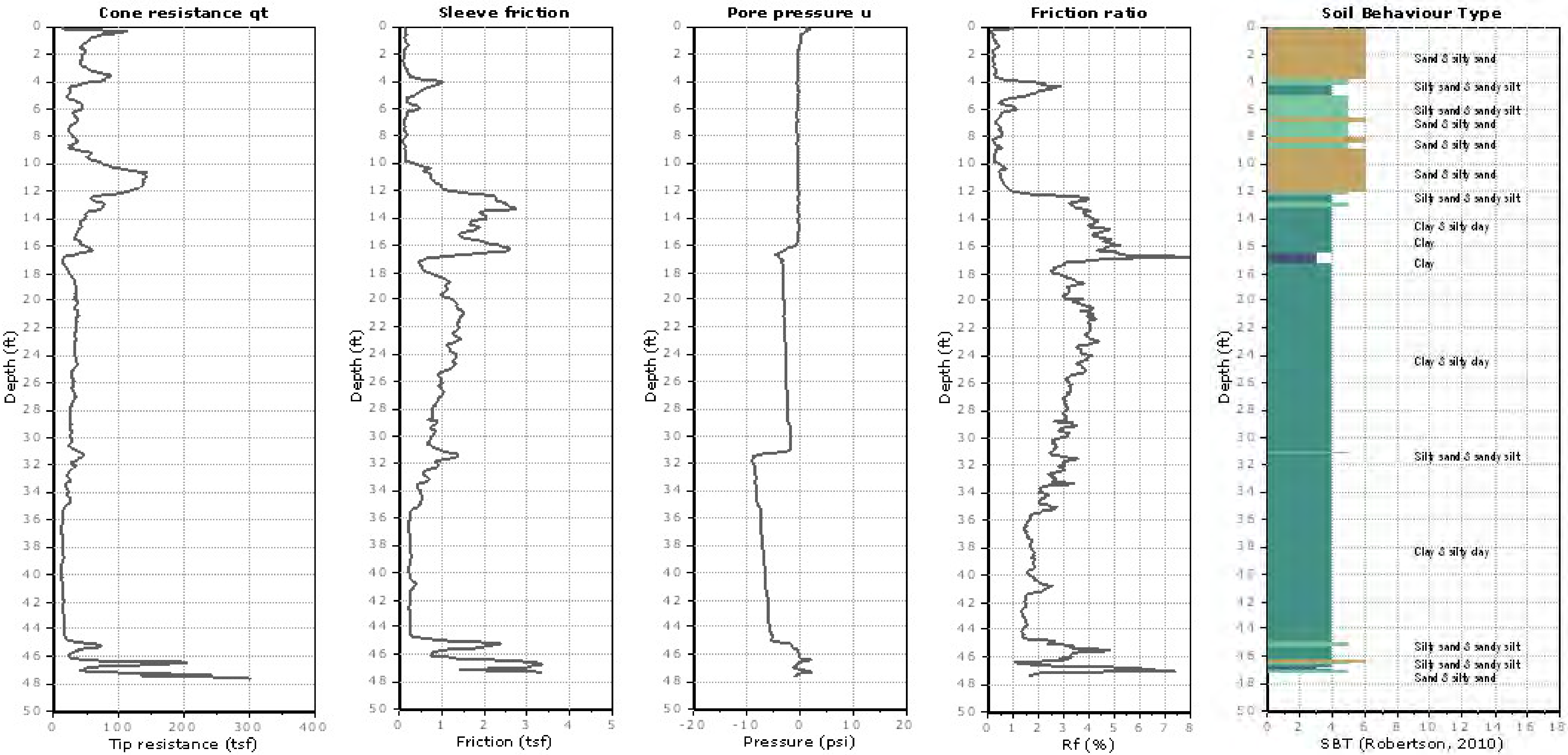
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Moore Twining Associates

Location: Newport Beach Golf Course

CPT-3

Total depth: 47.58 ft, Date: 7/23/2019



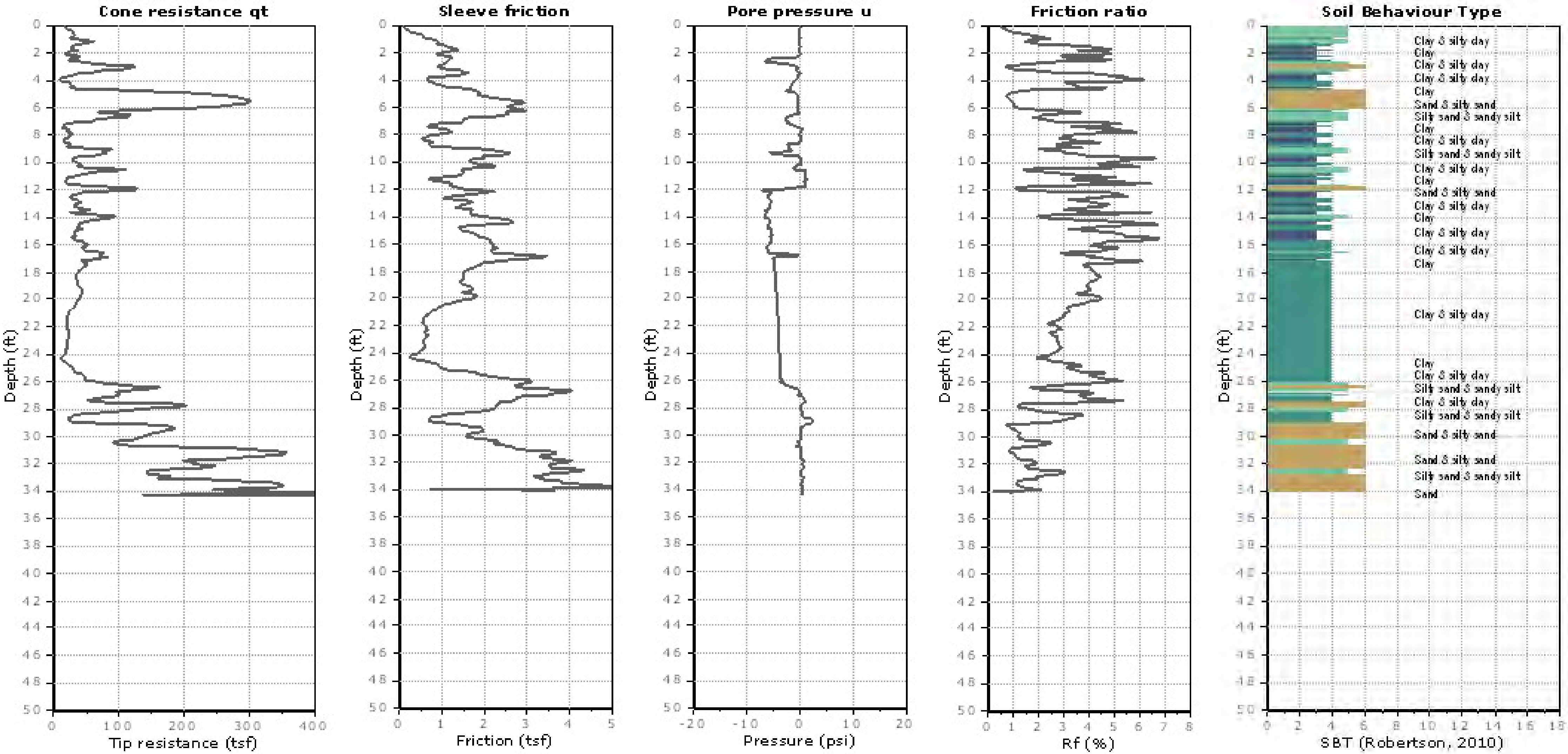
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: Moore Twining Associates

Location: Newport Beach Golf Course

CPT-4

Total depth: 34.40 ft, Date: 7/23/2019



Project Name: **Drive Shack Driving Range and Restaurant** **Project No.:** **E40550.01**
Location: **3100 Irvine Avenue, Newport Beach, CA**

Temporary Piezometers Groundwater Depth

Boring Location	Well Depth, Feet BSG	Date Measured	Depth to Water, Feet BSG	Estimated Surface Elevation* (Feet AMSL)	Approximate Groundwater Elevation (Feet AMSL)
B-17	35	2/28/2020	28	34	6
B-18	50	2/28/2020	18	33	15
B-19	55	2/28/2020	24	36	12
B-22	55	2/28/2020	Dry	30	N/A
B-23	35	2/28/2020	Dry	20	N/A
B-24	40	2/28/2020	24	28	4
B-17	35	4/17/2020	27.7	34	6.3
B-18	50	4/17/2020	19	33	14.0
B-19	55	4/17/2020	22.2	36	13.8
B-22	55	4/17/2020	Dry	30	N/A
B-23	35	4/17/2020	Dry	20	N/A
B-24	40	4/17/2020	18.4	28	9.6

*Surface elevations estimated from topographic survey provided by Kimley-Horn

APPLICATION FOR WELL CONSTRUCTION PERMIT

ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH DIVISION
1241 E. DYER ROAD, SUITE 120
SANTA ANA, CA 92705-5611
(714) 433-6000
FAX: (714) 433-6481

WELL PERMIT NUMBER **20-02-09**

Permit expires on 02.11.2021

CITY: Newport Beach
DATE: 1/31/20

WELL LOCATION (ADDRESS IF AVAILABLE): 3100 Irvine Avenue, Newport Beach, CA

NAME OF WELL OWNER: Brett Feuerstein

ADDRESS: 8294 Mira Mesa Blvd

CITY: San Diego, CA ZIP: 92126 TELEPHONE: (858) 271-4682

NAME OF CONSULTING FIRM: Moore Twining & Associates, Inc

BUSINESS ADDRESS: 2527 Fresno Street

CITY: Fresno ZIP: 93721 TELEPHONE: 559-268-7021

NAME OF DRILLING CO.: Pacific Drilling Co. C-57 LICENSE NO.: 681380

CITY: San Diego ZIP: 92110 TELEPHONE: 619-294-3682

TYPE OF WELL (CHECK)

		PROBE SURVEY	☐
PRIVATE DOMESTIC	☐	MONITORING	☒
PUBLIC DOMESTIC	☐	SOIL BORING	☐
IRRIGATION	☐	OTHER ______	☐
CATHODIC	☐	TOTAL NUMBER 6	

A. WELLS – SUBMIT A WELL CONSTRUCTION DIAGRAM (INCLUDE DIMENSIONS)

B. SOIL BORINGS AND PROBES –
TOTAL DEPTH: depths range from 30' to 55'
SEALING MATERIAL: Bentonite & Concrete

C. PROPOSED START DATE: 2/24

DIAGRAM OF WELL SITE (Use additional sheets and/or attachments)

See attached

☒ SITE PLAN ATTACHED

I hereby agree to comply in every respect with all requirements of the Health Care Agency and with all ordinances and laws of the County of Orange and of the State of California pertaining to well construction, reconstruction and destruction, including the requirements to maintain the integrity of all significant confining zones.

APPLICANT'S SIGNATURE: [signature] DATE: 2/3/20

PRINT NAME: Zubair Anwar

PHONE NUMBER: 559-268-7021 x258 FAX NUMBER:

FOR ACCOUNTING USE ONLY:

HSO NO.: 402986 CHECK NO.: 60605 02/04/20

DATE: 02/06/20 AMOUNT: $1,175.00

INTL.: SL

APPROVAL BY OTHER AGENCIES:

JURISDICTION:

REMARKS:

AUTHORIZED SIGNATURE DATE

DISPOSITION OF PERMIT (DO NOT FILL IN):

☒ **APPROVED** SUBJECT TO THE FOLLOWING CONDITIONS:

A. NOTIFY THIS AGENCY AT LEAST **48 HOURS**

☒ PRIOR TO START. Notify of any changes.

☐ PRIOR TO SEALING THE ANNULAR SPACE OR FILLING OF THE CONDUCTOR CASING.

B. ☐ SUBMIT TO THE AGENCY WITHIN 30 DAYS AFTER COMPLETION OF WORK, A WELL COMPLETION REPORT AND/OR DRILLING LOGS. PLEASE REFERENCE PERMIT NO.

C. ☒ SECURE ALL MONITORING WELLS TO PREVENT TAMPERING.

D. ☒ OTHER Notify when all work is complete and include the depth to 1st water.

☐ **DENIED**

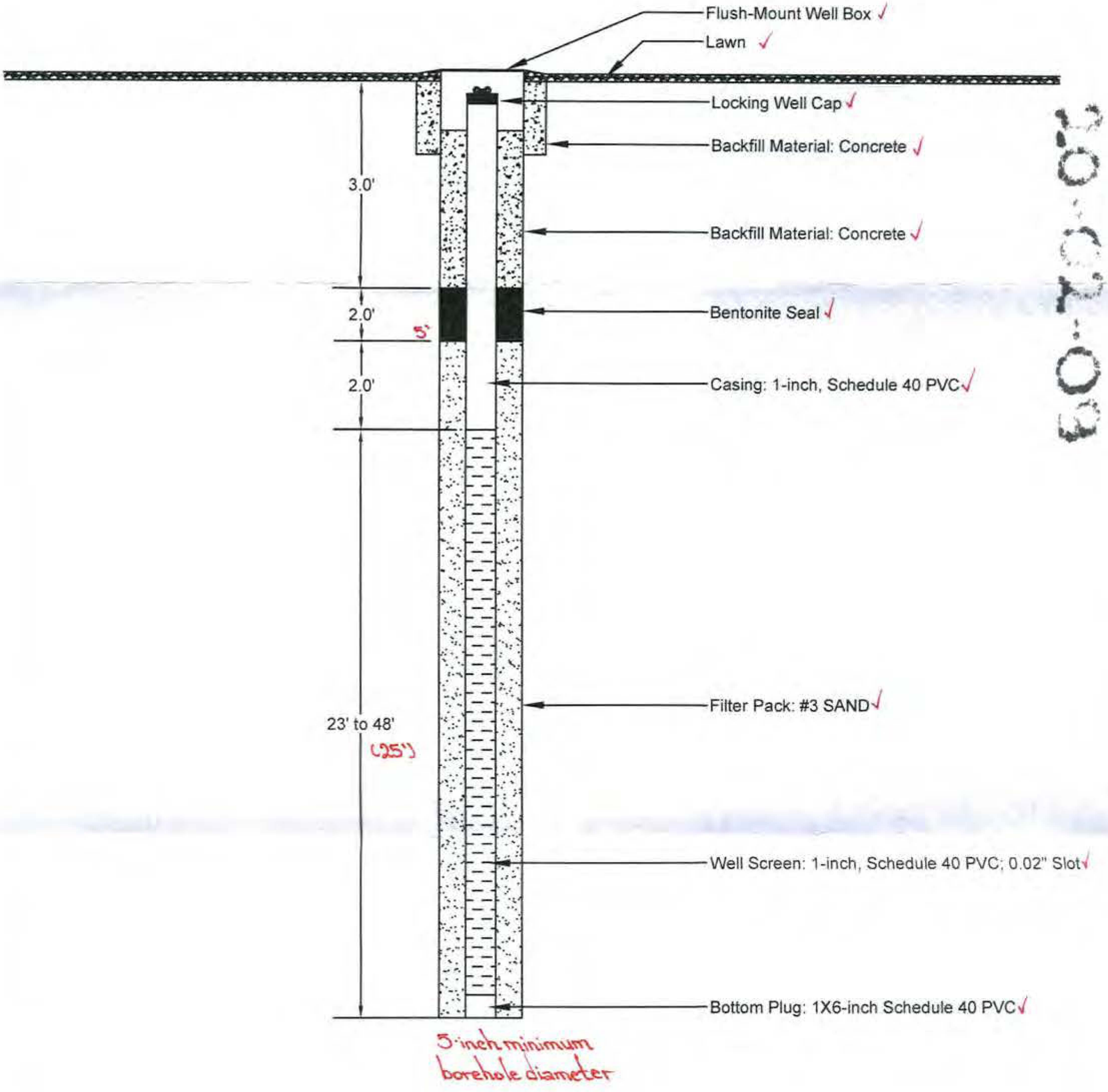
PERMIT ISSUED BY: Juan Arzora DATE: 02.10.2020

PRINT NAME: Juan Anzora PHONE NUMBER: 7144336287

WHEN SIGNED BY ORANGE COUNTY HEALTH CARE AGENCY REPRESENTATIVE, THIS APPLICATION IS A PERMIT.

@.F272-09.0803 (R11/01)

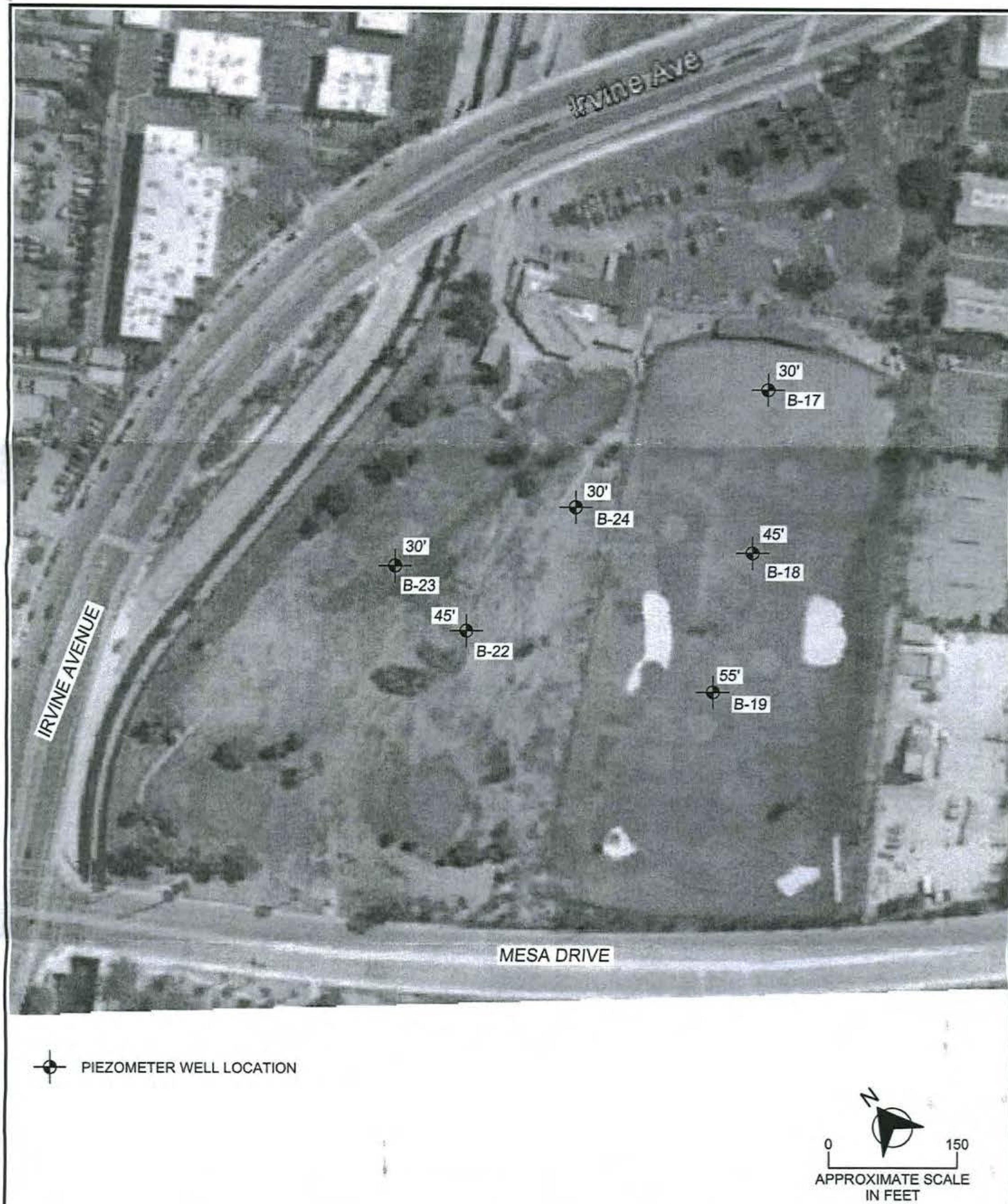
GROUNDWATER MONITORING WELL



50-20-03

NOT TO SCALE

GROUNDWATER MONITORING WELL DIAGRAM 3100 IRVINE AVENUE NEWPORT BEACH, CALIFORNIA	FILE NO. 40550-01-01	DATE DRAWN: 1/31/20	MOORE TWINING ASSOCIATES, INC.
	DRAWN BY: RM	APPROVED BY:	
	PROJECT NO. E40550.01	DRAWING NO. 2	



PROPOSED TEST BORING LOCATION MAP NEC OF MESA DRIVE AND IRVINE AVENUE NEWPORT BEACH, CALIFORINA	FILE NO. 40550-01-01	DATE DRAWN: 11/18/19	MOORE TWINING ASSOCIATES, INC.
	DRAWN BY: RM	APPROVED BY:	
	PROJECT NO. E40550.01	DRAWING NO. 1	

B45691

ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH DIVISION
HEALTH SERVICE ORDER

Wells 402986

Date 2/6/20 Initials SL

Client Name Brett Feuerstein

Address 8294 Mira Mesa Blvd

San Diego, CA 92126 Ph#

Paid By Moore Twining Associates, Inc

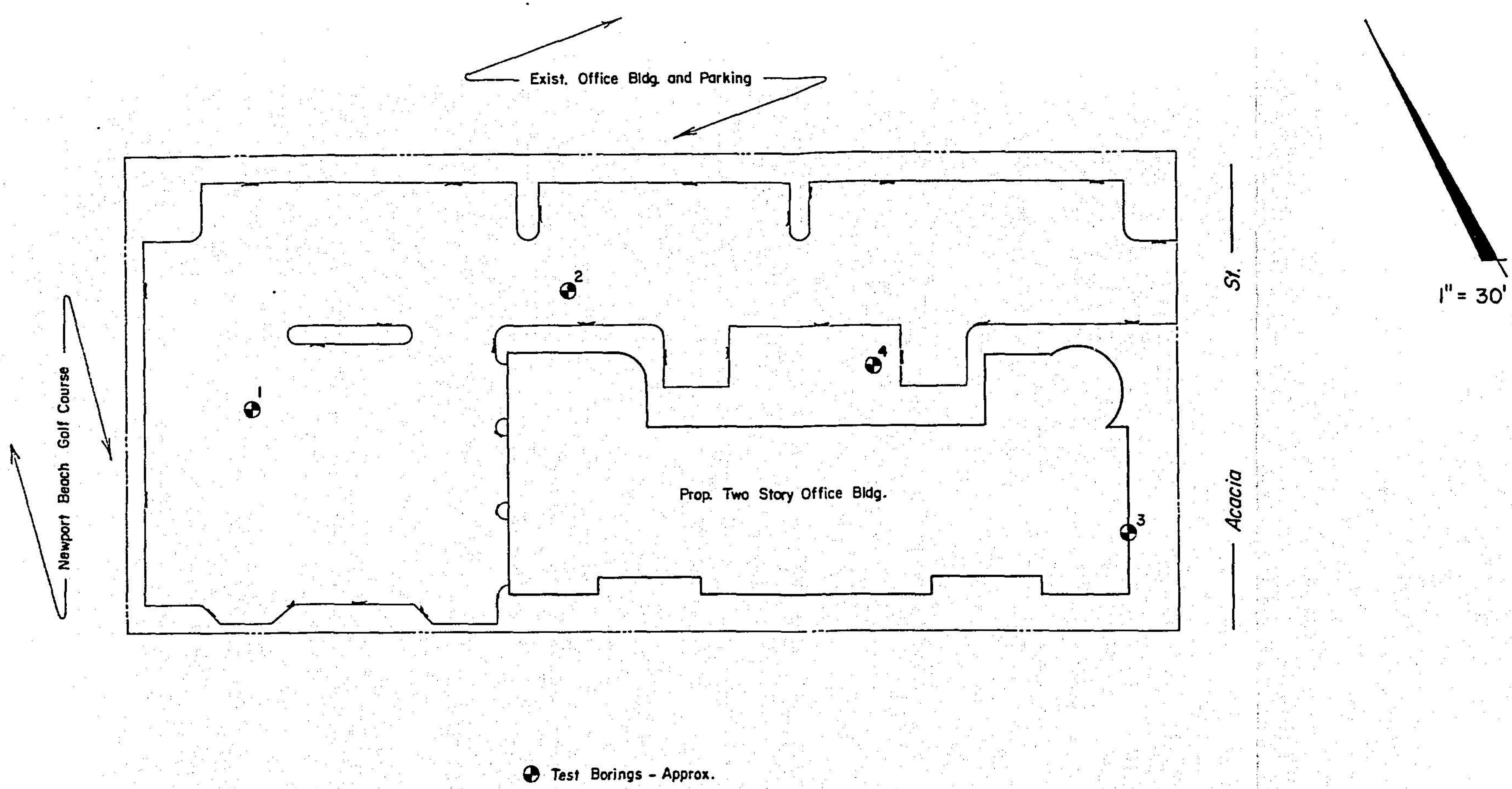
Address 2527 Fresno Street

Fresno, CA 93721 Ph#

Please circle the respective service code(s)

01	CEQ/HSF (Acct/Bat#)	$
02	CEQ Plan Check/Foods (PC#)	$
03	CEQ Plan Check/Pools (PC#)	$
04	Food Vehicles Cat Decal No(s)	$
05	CEQ/ Court Restitution/Judgment Name Case#	$
06	Hotels/Motels (Acct/Bat#)	$
07	Massage Parlor (Acct/Bat#)	$
08	Noise	$
09	Liquid Waste Hauler	$
10	Farm Labor Camp Registration	$
11	Aboveground Petroleum Storage Act	$
12	Hazardous Waste (Acct/Bat#)	$
13	Hazardous Waste Fines	$
14	Hazardous Waste Restitution/Judgment Name Case#	$
15	Hazardous Waste Clean-up	$
16	Medical Waste/Body Art)	$
17	UST/HSF (Acct/Bat#)	$
18	UST Plan Check (PC#)	$
19	UST State Surcharge	$
20	UST Restitution/Judgment Name Case#	$
21	Wells (Const X Recon ___ Destr ___) Water ___ Cath ___ Init. Monit. ___) Add. Monit. ___ #Wells Driller Consultant	$ 1,175.00
22	Backflow/Cross Connection Client(s)	$
23	Small Water Systems	$
24	CUPA - Base Fee	$
25	CUPA - CalArp	$
26	FOG- OC Sanitation District	$
27	Tierred Permitting	$
__	**OTHER**	$
__	**OTHER**	$
__	**OTHER**	$
__	**OTHER**	$

PAID BY CHECK NO: 60605
dated: 02/04/20



PLOT PLAN

BACA ASSOCIATES
Project : A-0675-F
Plate : B

City of Newport Beach

LOG OF BORING Nº 1 BB-1

DATE DRILLED 8/5/89	DRILLING EQUIPMENT Hollow-Stem Flight Auger
DRIVING WEIGHT 140 lbs. - 30" drop	SURFACE ELEVATION

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION (landscape area)	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU.FT.
			SAND, fine to medium, variable clayey to sl. clayey, scat. gravels	brown	moist	mod. comp.	
	●	34					109
5					damp to dry		
	●	22					104
			CLAY, very silty, numerous veins and lenses of fine sand and silty sand	gray and gray brown	very moist	firm	
	●	28					85
10							
	●	29					93
15			End @ 15.0 ft.				
			Notes: (1) No ground water				
20							
25							

SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT
▲ 1 2 3 4 5
MOISTURE CONTENT - % DRY WEIGHT
● 10 20 30 40 50

Acacia Plaza III
Santa Ana Heights, California

PROJECT No.	A-0675-F
PLATE	C

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

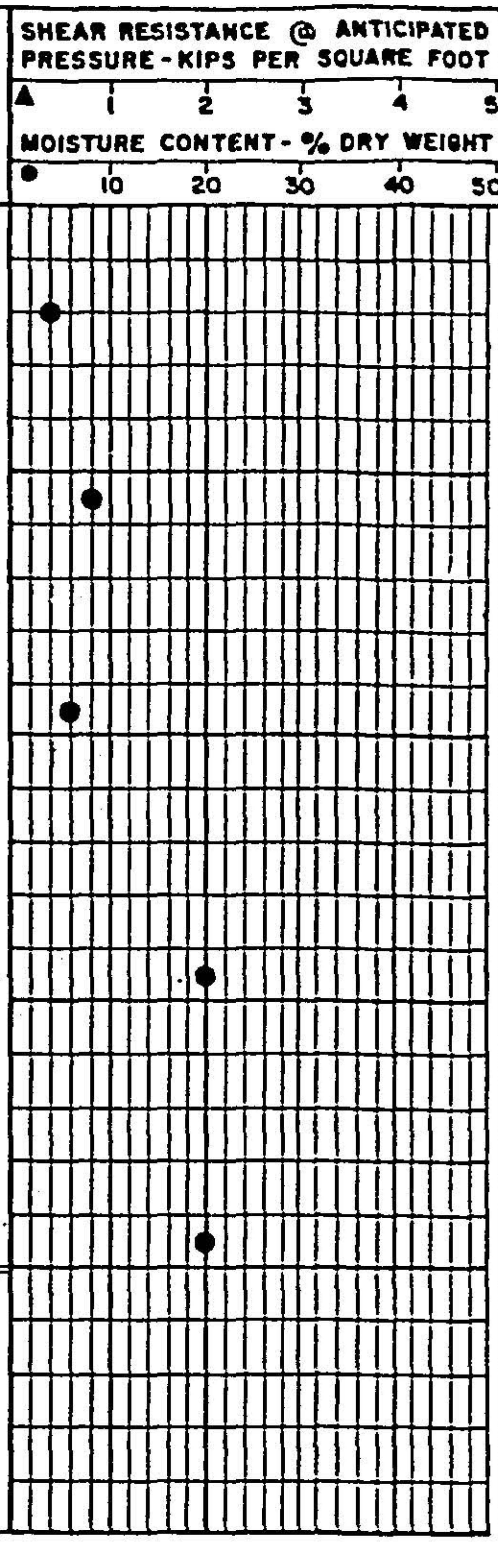
City of Newport Beach

LOG OF BORING Nº 2 BB-2

DATE DRILLED 8/5/89 | **DRILLING EQUIPMENT** Hollow-Stem Flight Auger

DRIVING WEIGHT 140 lbs. - 30" drop | **SURFACE ELEVATION**

Depth in Feet	Samples / Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.
		SAND, fine to medium, variable clayey to sl. clayey, scat. gravels	light brown	dry	loose	
	36			sl. moist	mod. comp.	118
			brown			
5	34					110
		fine to medium, silty to slight silty			comp.	
10	88					118
		CLAY, silty, numerous veins and lenses of sand and silty sand	gray with red brown stains	very moist	firm to stiff	
15	65					97
20	25					102
		End @ 20.0 ft.				
		Notes: (1) No ground water				
25						



Acacia Plaza III
Santa Ana Heights, California

PROJECT No. A-0675-F

PLATE D

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

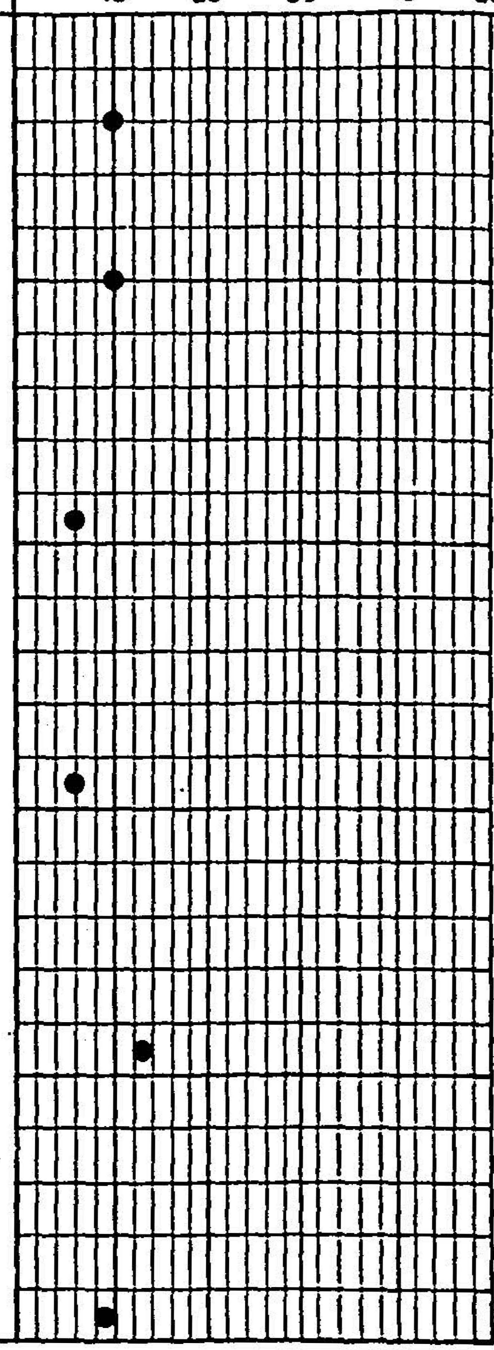
LOG OF BORING Nº 3 BB-3

DATE DRILLED 3/5/89	DRILLING EQUIPMENT Hollow-Stem Flight Auger
DRIVING WEIGHT 140 lbs. - 30" drop	SURFACE ELEVATION

Depth in Feet	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU.FT.
	46	SAND, fine to medium, silty, sl. clayey, scat. gravels	brown	moist	comp.	116
5	28	fine to coarse, sl. clay binder, variable scat. to moderate gravels			mod. comp. to comp.	116
				sl. moist		
10	20					109
15	28					108
		fine to medium, clean, occasional clay/silt veins	tan with pale gray veins	moist	dense	
20	57					103
25	56					101

SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT (▲ 1 2 3 4 5)

MOISTURE CONTENT - % DRY WEIGHT (● 10 20 30 40 50)



End @ 25.0 ft.

Notes: (1) No ground water

Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	E

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

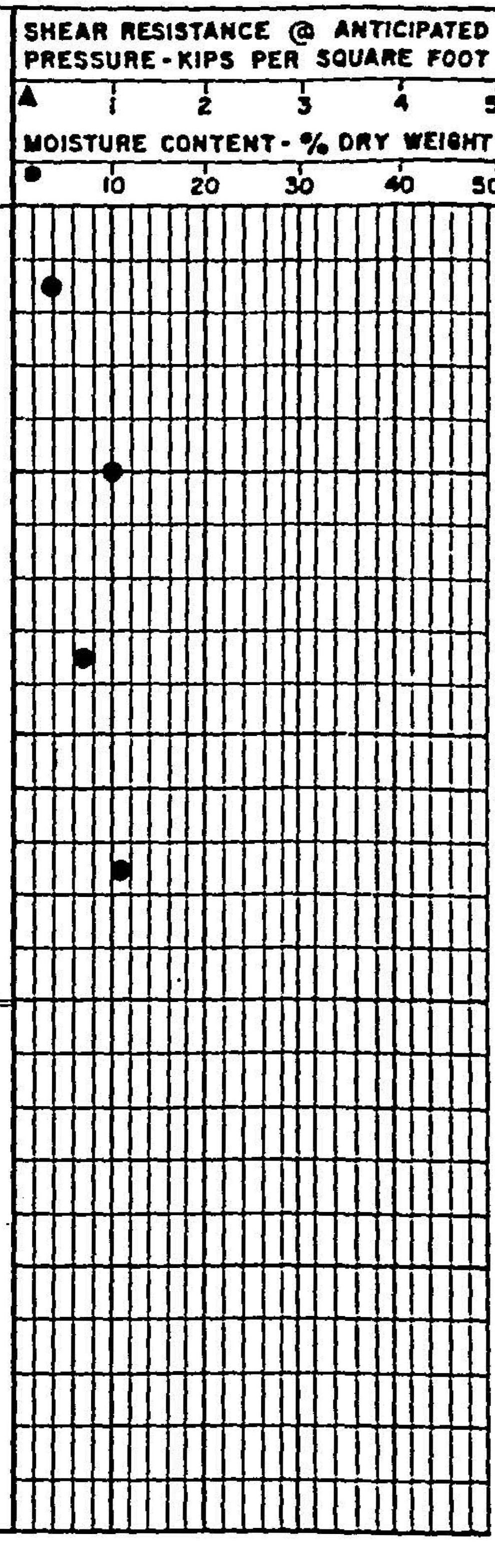
LOG OF BORING Nº4 BB-4

DATE DRILLED 8/5/89 | **DRILLING EQUIPMENT** Hollow-Stem Flight Auger

DRIVING WEIGHT 140 lbs. - 30" drop | **SURFACE ELEVATION**

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.
			SAND, fine to medium, silty, variable clayey to sl. clayey, scat. gravels	brown	dry	loose	
	■	20			sl. moist	mod. comp.	109
					moist	comp.	
5	■	38					115
			medium to coarse, variable sl. clay binder to clean, heavy gravels	red brown	sl. moist		
	■	52					111
10							
			very fine to fine, sl. silty, with minor silt veins	pale gray brown	moist		
	■	35					101
15			End @ 15.0 ft.				
20							
25							

Notes:
(1) No ground water



Acacia Plaza III
Santa Ana Heights, California

PROJECT No.	A-0675-F
PLATE	F

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

APPENDIX C

LABORATORY TESTS

SMITH-EMERY LABORATORIES
An Independent Commercial Testing Laboratory, Established 1904
781 East Washington Boulevard, Los Angeles, California 90021 ♦ *Phone (213) 749-3411* ♦ *Fax (213) 746-0744*

July 2, 2024

SEL File No.: 49262-1
SEL Report No.: G-24-2978

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010

Attention: Mr. Carl Kim

RE: Wave Garden Cove
PWAS_20240507

SUBJECT: Soil Testing

STANDARD: ASTM Standard Test Method and California Test Method.

SAMPLE LOCATION: Wave Garden Cove

DATE SAMPLED: 5/28/2024 DATE RECEIVED: 6/ 6 /2024

REPORT OF TESTS

In compliance with the request of your authorized representative, we have conducted the subject test as per project requirements for the above-referenced project.

Bulk soil and drive ring samples were delivered to our laboratory by Mr. Andy Hillstrand, where samples were processed and tested in accordance to ASTM standard test method requested.

Test results are as follows:

ASTM D3080 Direct Shear of Soil Under Consolidated Drain Condition (intact) : See Plate No.: A-1

CKG-HA1, Sample No. R-1, Depth at 5.5 ft., Plate A-1

Sample Classification	Dry Density (pcf)	Moisture Content (%)		Normal Stress (ksf)	Stress at Peak (ksf)	Strength Intercept (ksf) *C*	Friction Angle (θ)
		Initial	Final				
Very Dark Gray Elastic Silt	121.0	12.3	15.3	1.0	0.960	**0.311**	**29.5°**
	121.4	12.1	15.0	4.0	2436		
	120.9	12.3	15.6	8.0	4.908		

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Liquid Limit, Plastic Limit and Plasticity Index ASTM D4318: Plate No.: B-1A and B-B

Sample I.D.	Liquid Limit	Plastic Limit	Plasticity Index	USCS Group Symbol
CKG-HA1/B-1 @ 0 - 5ft	20	14	6	CL/ML
CKG-HA2/B-1@ 0-4 ft	47	20	27	CL

Expansion Index ASTM D4829: see Plate No.: C-1A, C-1B and C-1C

BH/ Sample No.	Depth (ft)	Soil Classification (Visual)	Dry Density (pcf)	Moisture Content (%)		Potential Expansion	Expansion Index
				Initial	Final		
CKG-CPT-2, B-1	0 to 5	Black OL/a	79.6	19.9	40.3	MEDIUM	**60**
CKG-CPT-3, B-1	0 to 5	Brown Silty Sand	113.0	8.8	16.9	VERY LOW	**10**
CKG-CPT-6, B-1	0 to 5	Brown Silty Sand	120.7	7.5	12.4	VERY LOW	**0**

ASTM D1557-21 Laboratory Compaction Characteristics of Soil: see Plate No.: D-1A to D-1D

BH No.	Sample No.	Depth (ft.)	Soil Classification (Visual)	Max. Dry Density (pcf)	Optimum Moisture Content %
CKG-CPT-2	B-1	0 to 5	Black Lean CLAY	**94.8**	**22.7**
CKG-CPT-3	B-1	0 to 5	Brown Silty Sand	**124.5**	**9.4**
CKG-CPT-6	B-1	0 to 5	Brown Silty Sand	**133.7**	**7.9**
CKG-HA-2	B-1	0 to 4	Clayey Silt	**116.1**	**13.4**

CONSOLIDATION TEST AND TIME RATE: See Plates E-1A and E-1B

Consolidation test was conducted on soil sample, CKG CPT-3, B-1, depth 0 to 5 feet in accordance with ASTM D2435/D2435M. The result of testing for consolidation is shown in Plate E-1A and the time rate is shown in Plate E-1B.

CORROSION TESTS: F-1A to F-1D

BH/ Sample No.	Depth (ft)	Soil Type	Corrosion			
			Min. Resistivity Ohm-cm	Soluble Chloride mg/kg	Soluble Sulfate mg/kg	pH
CKG-B-1	0 to 5	Sandy Silt	**9580**	781	2110	7.6

Attached are the following plates;

Plate No.: A-1 Direct Shear Test ASTM D3080.
Plate No.: B-1A & B-1B ASTM D4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils.
Plate No.: C-1A to C-1C ASTM 4829 Expansion Index of Soils

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781 East Washington Boulevard, Los Angeles, California 90021 ♦ *Phone (213) 749-3411* ♦ *Fax (213) 746-0744*

Plate No.: D-1A to D-1D ASTM SD1557-21 Modified Proctor of Soil.
Plate No.: E-1A ASTM D2435 Consolidation test inundated @ 1.6k.
Plate No.: E-1B ASTM D2435 Consolidation test Time Rate at 3.2k.
Plates No.: F-1A to F-1D Corrosion Tests (Ph, Sulfate, Chloride and Min. Resistivity).

Should you have any further questions regarding the contents of this report, please feel free to contact us.

Respectfully submitted,
SMITH-EMERY Laboratories

Elpidio Saucedo
Geotechnical Laboratory Manager

Ildebrando Resurreccion
Geotechnical Laboratories

AC/ac cc:
2-Addressee

SMITH-EMERY **Laboratories**
791/781 East Washington Boulevard, Los Angeles 90021
Tel. No. (213) 745-5333: Fax No.: (213) 741-8621

)IRECT SHEAR TEST (ASTM D308(

		Lab. Ref. No.:	273
Client:	Carl Kime Geotechnical, Inc.	SEG Report No.:	G-24-2981
Project:	Wave Garden Cove, PWAS 20240507	SEG File No.:	449262-1
Location:	NA	Date Sampled:	5/28/24
Remark:	Intact ring sample of modified California ring.	Date Received:	5/28/24
Other:	Max Dry Den OMC%	Date Test:	6/6/24

Boring/Pit No.: **CKG-HA-1** Sample No.: R-1 Depth(ft): **5.5ft**

Shear Box Dia. , in. 2.419

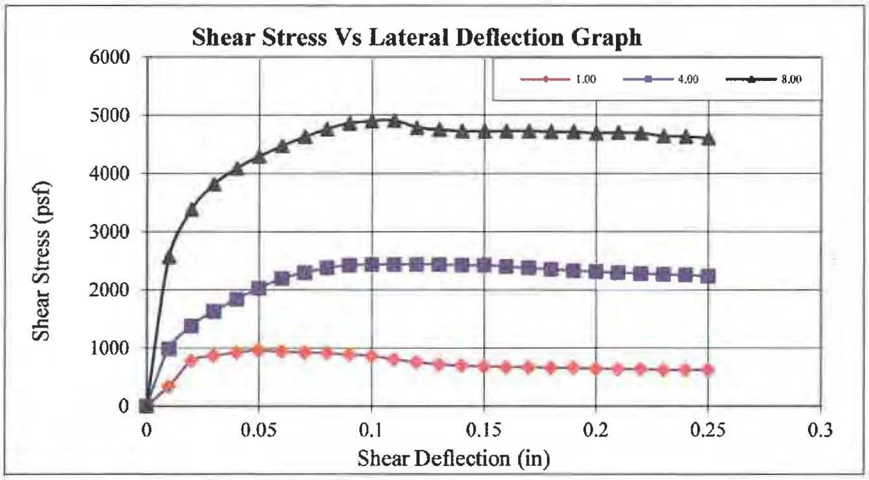
Test/Sample ID:	1	2	3
Initial thickness, in	1.00	1.00	1.00
Initial water content, %	12.3	12.1	12.3
Initial dry density, pcf	121.0	121.4	120.9
Initial degree of saturation, %	89.05	88.89	88.88
Final water content,%	15.3	15.0	16.6
Normal stress, ksf	**1.000**	**4.000**	**8.000**
Peak shear stress, ksf	0.960	2.436	4.908
Ultimate shear stress, ksf	0.624	2.232	4.644

Specimen Type/Soil structure

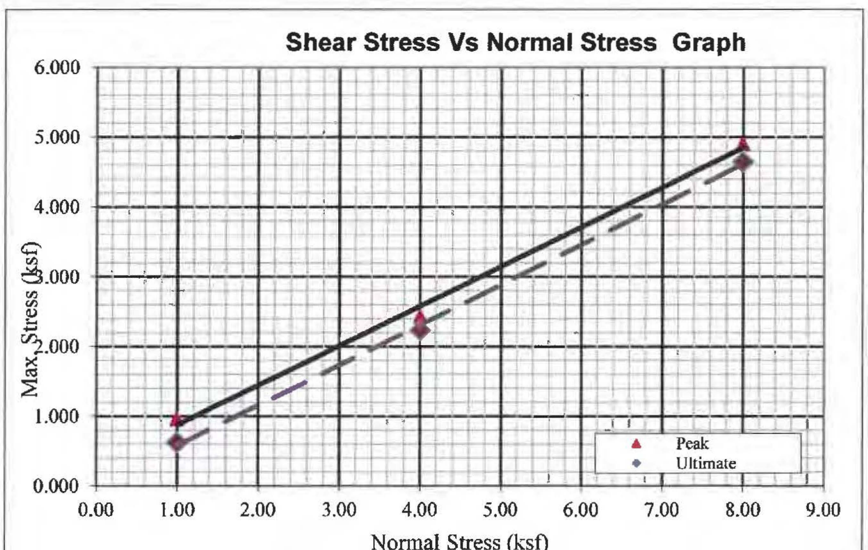
Intact ring sample modified California ring.

Soil description:

Very Dark Gray Elastic SILT



Shearing Rate (in/min): 0.0075
Soaked w/ Water: Yes



Shear Strength Parameters*

	Cohesion psf	Friction Angle, deg.
Peak	311.4	29.5
Ultimate	4.7	29.9

* Labs interpretation only

Lab Note

PLATE No.: A-1A

SMITH-EMERY **Laboratories**
791/781 East Washington Boulevard, Los Angeles 90021
Tel. No. (213) 745-5333: Fax No.: (213) 741-8621

IRECT SHEAR TEST (ASTM D308(

Lab. Ref. No.:	272
SEG Report No.:	G-24-2978
SEG File No.:	49262-1
Date Sampled:	5/28/24
Date Received:	5/28/24
Date Test:	6/19/24

Client: Carl Kime Geotechnical, Inc.
Project: Wave Garden Cove, PWAS 20240507
Location: NA
Remark: Remolded Sample to 90% of MDD
Other: Max Dry Den OMC%

Boring/Pit No.: **CKG-HA-1** Sample No.: B-1 Depth(ft): **0-4 ft**

Shear Box Dia. , in. 2.419

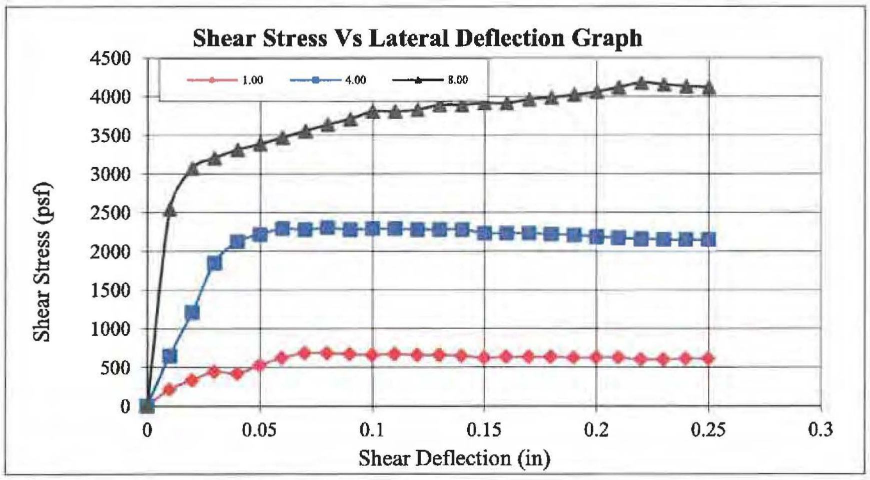
Test/Sample ID:	1	2	3
Initial thickness, in	1.00	1.00	1.00
Initial water content, %	13.4	13.4	13.0
Initial dry density, pcf	103.8	104.1	104.8
Initial degree of saturation, %	59.87	60.55	59.84
Final water content,%	29.9	25.0	23.7
Normal stress, ksf	**1.000**	**4.000**	**8.000**
Peak shear stress, ksf	0.684	2.304	4.176
Ultimate shear stress, ksf	0.612	2.148	4.152

Specimen Type/Soil structure

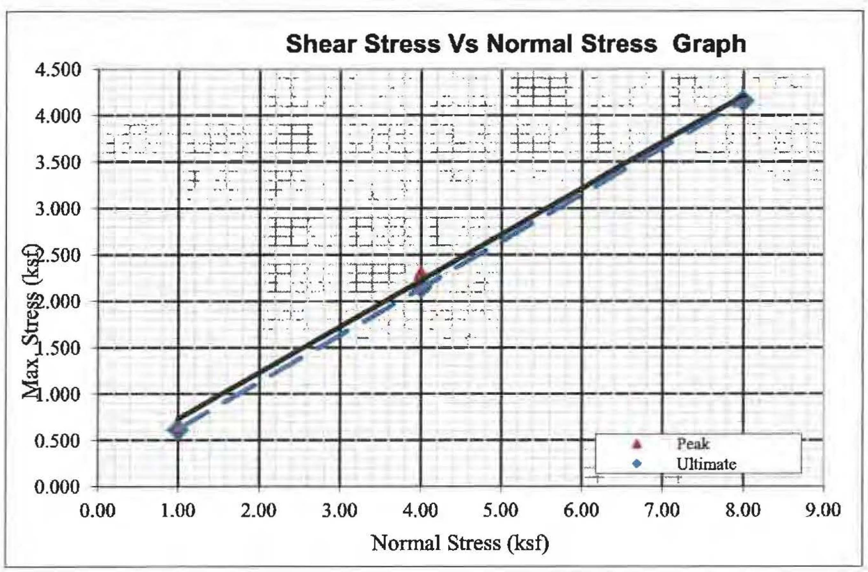
Intact ring sample modified California ring.

Soil description:

Very Dark Gray Elastic SILT



Shearing Rate (in/min): 0.0075
Soaked w/ Water: Yes



Shear Strength Parameters*

	Cohesion psf	Friction Angle, deg.
Peak	233.5	26.4
Ultimate	113.7	26.8

* Labs interpretation only

Lab Note

PLATE No.: A-1B

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318-17

				Lab. Ref. No.:	271
Client:	Carl Kim Geotechnical, Inc.			SEG Report No.:	G-24-2978
Project:	Wave Graden Cove/ Project PWAS_20240507			SEG File No.:	49262-1
Location:	NA			Date Sampled:	5/28/24
Soil Description:	Brown Silty Clay/Clayey Silt (CL/ML)			Date Received:	5/28/24
Liquid Limit App.:	I-4645	Grooving Tool:	# 11	Date Tested:	6/20/24
Balance:	TS2408009	Oven:	SEQ-2	Sampled by:	A. Hillstand
Bore Hole No.:	HA-1	Sample No.:	B-1	Depth (ft):	0 - 5 ft

	Liquid Limit	Plastic Limit	Plasticity Index	Classification
Wet	**20**	**14**	**6**	**CL/ML**
Oven Dried	**0**	LL Oven / LL	**0.00**	
	ORGANIC when	LL dried/LLwet	**≤0.75**	**Inorganic**

PLASTICITY CHART

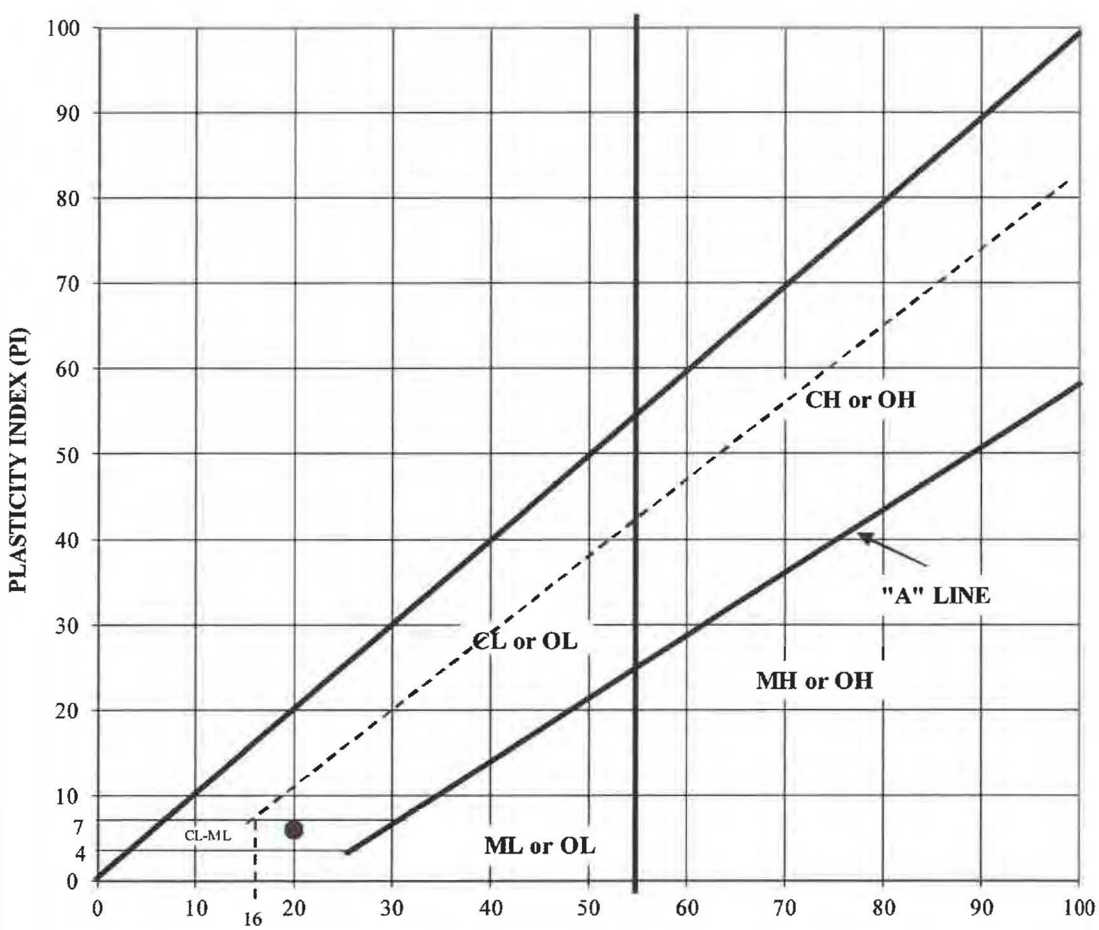


PLATE NO.: B-1A

SMITH-EMERY **Laboratories**

Liquid Limit, Plastic Limit, and Plasticity Index

ASTM D4318-17

Client:	Carl Kim Geotechnical, Inc.	Lab. Ref. No.:	272
Project:	Wave Graden Cove/ Project PWAS_20240507	SEG Report No.:	G-24-2978
Location:	NA	SEG File No.:	49262-1
Soil Description:	Silty Clay- CL	Date Sampled:	5/28/24
		Date Received:	5/28/24

Liquid Limit App.:	I-4645	Grooving Tool:	# 11	Date Tested:	6/20/24
Balance:	TS2408009	Oven:	SEQ-2	Sampled by:	A. Hillstand
Bore Hole No.:	HA-2	Sample No.:	B-1	Depth (ft):	0 - 4 ft

	Liquid Limit	Plastic Limit	Plasticity Index	Classification
Wet	**47**	**20**	**27**	**CL**
Oven Dried	**0**	LL Oven / LL	**0.00**	
	ORGANIC when	LL dried/LLwet	**≤0.75**	**Inorganic**

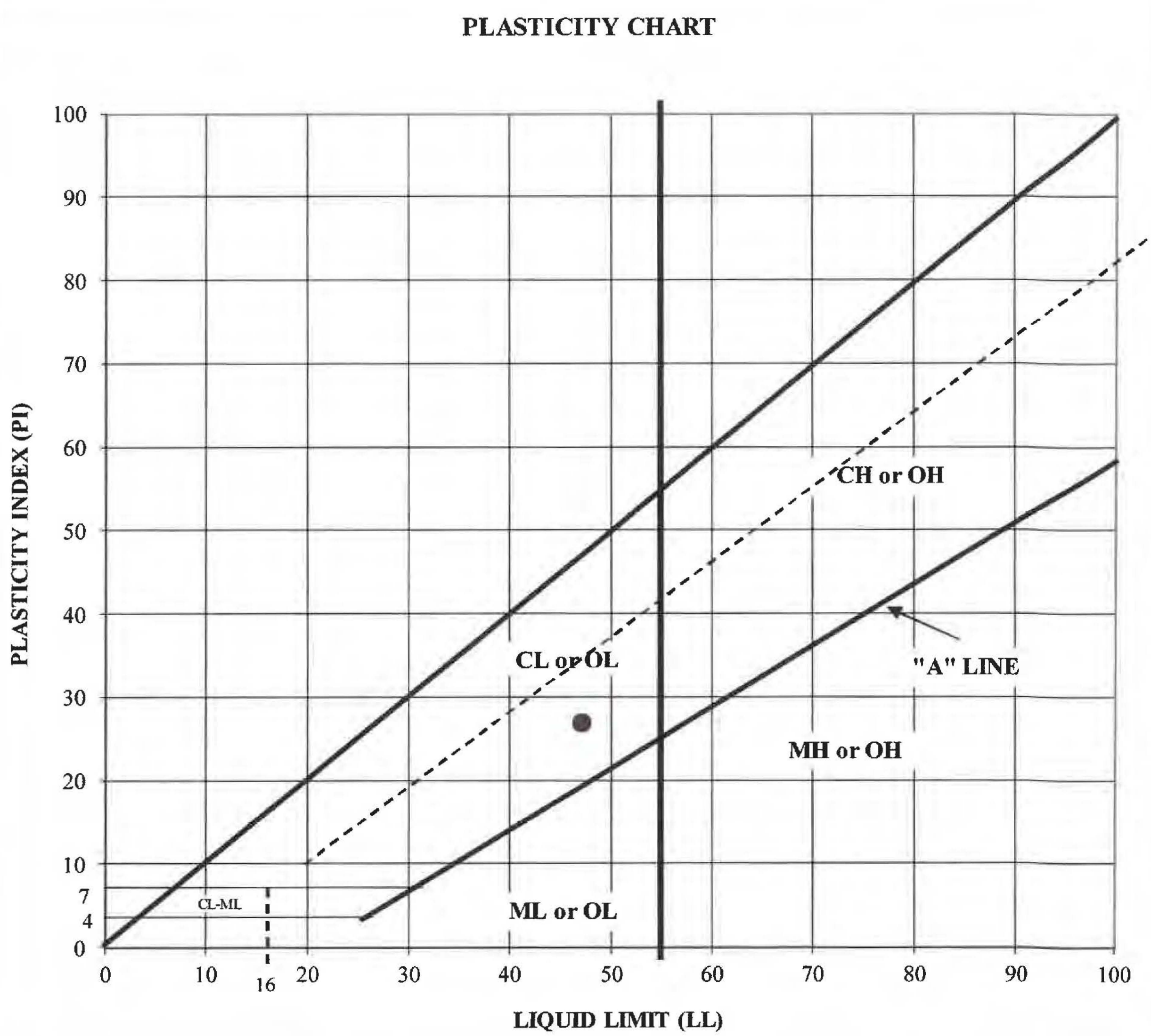


PLATE NO.: B-1B

SMITH-EMERY LABORATORIES

791/781 E. Washington Blvd., Los Angeles CA 90021
Tel.No.: (213) 745-5333; Fax No. (213) 741-8621

Expansion Index
UBC 18-2/ASTM D4829-11

Client:	Carl Kim Geotechnical Inc.	Lab. Ref. No.:	265
Project:	Wave Garden Cove PWAS_20240507	SEL File No.:	49262-1
Location:	NA	Date Sampled:	5/28/24
Material Description:	Black OL/a	Date Received:	5/28/24

Boring No.: CGK-CPT-2 Sample No. B-1 Depth (ft.) 0-5 FT Date Tested: 6/17/24
Equipment: Used: Ring I.D.: A Oven: SE SQ-1 Chamber No.: 1
Balance: B946769478 5 #Rammer: SE SH-1 Porestone (g): Sampled by: `A.Hillstrand
Ring Ht.(in): **1.0000** [X] Ave. Specimen Ht: **1.0149** [ ] | 1.0055 | 1.0130 | 1.0210 | 1.0200 |
Ring Dia.(in) 4.00 Initial Vol. ft^3 0.00738 Final Degree of Saturation: Final Ht Specimen: 1.0753
Test Sample Assumed sp. gr. of soil = 2.700 Final Vol. ft^3 0.00782
Sample Condition as received: WET [ ] DRY [X]

Assumed sp. gr. of soil = 2.700

Moisture content	Original/Initial	After Mold
wt.wet soil + tare (g)	301.1	268.0
dry wt soil + tare wt. (g)	277.6	257.9
tare wt. (g)	160.0	130.9
Moisture content %	20.0	8.0
Retained Sieve #4:	0	
Test Sample Wt.(g):	0.0	
Retained Sieve #4(%):		

Moisture and Density Data

	Initial	Final
Wt. of wet soil + Ring	687.0	741.5
Wt. of dry soil+ Ring	634.0	634.0
Wt. of Moisture	53.0	107.5
Wt. of Ring	367.3	367.3
Wt of dry soil	266.7	266.7
Moisture Content %	19.9	40.3
Wet Density (pcf)	95.4	105.4
Dry Density (pcf)	79.6	75.1
% Saturation	48	88

Date	Time	Time Lapsed	Load (kPa)/(psi)		Dial Reading	
6/17/24	11:40		0	0.0000	0.0000	
	11:50		6.9 kPa/ 1 psi	0.0058	0.0058	
		10 min		0.0058	0.0058	
		6sec	Saturated	0.0058	0.0058	
		15sec		0.0056	0.0002	
		30sec		0.0048	0.0010	
	11:51	1min		0.0033	0.0025	
	11:52	2min		-0.0048	0.0106	
	11:54	4min		-0.0144	0.0202	
	11:58	8min		-0.0264	0.0322	
	12:05	15min		-0.0369	0.0427	
	12:20	30min		-0.0424	0.0482	
	12:50	1hr		-0.0455	0.0513	
	13:50	2 hrs		-0.0478	0.0536	
	14:10:00 PM	3 hrs		-0.0546	0.0604	REPORT
				EI_{50}	60	60

Note: EI_{50} prepare the test specimen in accordance with 8.1-8.4 to achieve degree of saturation 50 ±2%. The deformation of the specimen is recorded for 24H or until the rate of deformation becomes less than 0.0002 in/h.whichever occur first. A minimum recording time of 3 h is required Report EI zero (0) when result is negative (-).

% Saturation: (%mc**x** sp.gr**x** Dd)/(sp.gr**x** 62.4-Dd)

TABLE 18-1-B

PLATE No.: C-1A

Expansion Index		**Potential Expansion**
	Result	
0 - 20	....	VERY LOW
21 - 50	....	LOW
51 - 90	....	**MEDIUM**
91 - 130	....	HIGH
> 130	....	VERY HIGH

Tested By: E. Saucedo Checked By: A. Cabanilla

SMITH-EMERY LABORATORIES

791/781 E. Washington Blvd., Los Angeles CA 90021
Tel.No.: (213) 745-5333; Fax No. (213) 741-8621

Expansion Index
UBC 18-2/ASTM D4829-11

Client:	Carl Kim Geotechnical Inc.	Lab. Ref. No.:	266
Project:	Wave Garden Cove PWAS_20240507	SEL File No.:	49262-1
Location:	NA	Date Sampled:	5/28/24
Material Description:	Brown Silty Sand	Date Received:	5/28/24

Boring No.: CGK-CPT-3 Sample No. B-1 Depth (ft.) 0-5 FT Date Tested: 6/20/24
Equipment: Used: Ring I.D.: A Oven: SE SQ-1 Chamber No.: 1
Balance: B946769478 5 #Rammer: SE SH-1 Porestone (g): Sampled by: `A.Hillstrand
Ring Ht.(in): **1.0000** [X] Ave. Specimen Ht: **1.0029** [ ] | 1.0045 | 1.0045 | 1.0020 | 1.0005 |
Ring Dia.(in) 4.00 Initial Vol. ft^3 0.00729 Final Degree of Saturation: Final Ht Specimen: 1.0132
Test Sample Assumed sp. gr. of soil = 2.700 Final Vol. ft^3 0.00737
Sample Condition as received: WET [ ] DRY [X]

Assumed sp. gr. of soil = 2.700

Moisture content	Original/Initial	After Mold
wt.wet soil + tare (g)	304.4	268.0
dry wt soil + tare wt. (g)	292.7	257.9
tare wt. (g)	160.0	130.9
Moisture content %	8.8	8.0
Retained Sieve #4:	0	
Test Sample Wt.(g):	0.0	
Retained Sieve #4(%):		

Moisture and Density Data

	Initial	Final
Wt. of wet soil + Ring	774.0	804.2
Wt. of dry soil+ Ring	741.0	741.0
Wt. of Moisture	33.0	63.2
Wt. of Ring	366.9	366.9
Wt of dry soil	374.1	374.1
Moisture Content %	8.8	16.9
Wet Density (pcf)	123.0	130.7
Dry Density (pcf)	113.0	111.8
% Saturation	48	90

Date	Time	Time Lapsed	Load (kPa)/(psi)		Dial Reading	
6/20/24	11:30		0	0.0000	0.0000	
	11:40		6.9 kPa/ 1 psi	0.0000	0.0000	
		10 min		0.0040	0.0040	
		6sec	Saturated	0.0043	0.0043	
		15sec		0.0045	-0.0005	
		30sec		0.0046	-0.0006	
	11:41	1min		0.0046	-0.0006	
	11:42	2min		0.0052	-0.0012	
	11:44	4min		0.0052	-0.0012	
	11:48	8min		0.4100	-0.4060	
	11:55	15min		0.0008	0.0032	
	12:10	30min		-0.0025	0.0065	
	12:40	1hr		-0.0041	0.0081	
	13:40	2 hrs		-0.0048	0.0088	
11/2/23	11:40	24 hrs		-0.0063	0.0103	REPORT
				EI_{50}	10	10

Note: EI_{50} prepare the test specimen in accordance with 8.1-8.4 to achieve degree of saturation 50 ±2%. The deformation of the specimen is recorded for 24H or until the rate of deformation becomes less than 0.0002 in/h.whichever occur first. A minimum recording time of 3 h is required Report EI zero (0) when result is negative (-).

% Saturation: (%mc$x$ sp.gr$x$ Dd)/(sp.gr$x$ 62.4-Dd)

TABLE 18-1-B

PLATE No.: C-1B

Expansion Index		**Potential Expansion** Result
0 - 20	....	VERY LOW
21 - 50	....	LOW
51 - 90	....	**MEDIUM**
91 - 130	....	HIGH
> 130	....	VERY HIGH

Tested By: E. Saucedo Checked By: A. Cabanilla

SMITH-EMERY LABORATORIES

791/781 E. Washington Blvd., Los Angeles CA 90021
Tel.No.: (213) 745-5333; Fax No. (213) 741-8621

Expansion Index

UBC 18-2/ASTM D4829-11

Client: Carl Kim Geotechnical Inc. — Lab. Ref. No.: 269

Project: Wave Garden Cove PWAS_20240507 — SEL File No.: 49262-1

Location: NA — Date Sampled: 5/28/24

Material Description: Brown Silty Sand — Date Received: 5/28/24

Boring No.: CGK-CPT-6 Sample No. B-1 Depth (ft.) 0-5 FT — Date Tested: 6/18/24

Equipment: Used: Ring I.D.: A Oven: SE SQ-1 — Chamber No.: 1

Balance: B946769478 5 #Rammer: SE SH-1 Porestone (g): — Sampled by: `A.Hillstrand

Ring Ht.(in): **1.0000** [x] Ave. Specimen Ht: **1.0075** [ ] | 1.0075 | 1.0080 | 1.0040 | 1.0105 |

Ring Dia.(in) 4.00 Initial Vol. ft^3 0.00733 Final Degree of Saturation: Final Ht Specimen: 1.0076

Test Sample Assumed sp. gr. of soil = 2.700 Final Vol. ft^3 0.00733

Sample Condition as received: WET [ ] DRY [x]

Assumed sp. gr. of soil = 2.700

Moisture content	Original/Initial	After Mold
wt.wet soil + tare (g)	303.0	268.0
dry wt soil + tare wt. (g)	293.0	257.9
tare wt. (g)	160.0	130.9
Moisture content %	7.5	8.0
Retained Sieve #4:	0	
Test Sample Wt.(g):	0.0	
Retained Sieve #4(%):		

Moisture and Density Data

	Initial	Final
Wt. of wet soil + Ring	798.6	818.4
Wt. of dry soil+ Ring	768.5	768.5
Wt. of Moisture	30.1	49.9
Wt. of Ring	366.9	366.9
Wt of dry soil	401.6	401.6
Moisture Content %	7.5	12.4
Wet Density (pcf)	129.8	135.7
Dry Density (pcf)	120.7	120.7
% Saturation	51	85

Date	Time	Time Lapsed	Load (kPa)/(psi)		Dial Reading	
6/18/24	11:30		0	0.0000	0.0000	
	11:40		6.9 kPa/ 1 psi	0.0000	0.0000	
		10 min		0.0035	0.0035	
		6sec	Saturated	0.0049	0.0049	
		15sec		0.0052	-0.0017	
		30sec		0.0056	-0.0021	
	11:41	1min		0.0058	-0.0023	
	11:42	2min		0.0056	-0.0021	
	11:44	4min		0.0054	-0.0019	
	11:48	8min		0.0051	-0.0016	
	11:55	15min		0.0048	-0.0013	
	12:10	30min		0.0039	-0.0004	
	12:40	1hr		0.0035	0.0000	
	13:40	2 hrs		0.0034	0.0001	
11/2/23	11:40	24 hrs		0.0034	0.0001	REPORT
				EI_{50}	0	0

Note: EI_{50} prepare the test specimen in accordance with 8.1-8.4 to achieve degree of saturation 50 ±2%. The deformation of the specimen is recorded for 24H or until the rate of deformation becomes less than 0.0002 in/h.whichever occur first. A minimum recording time of 3 h is required Report EI zero (0) when result is negative (-).

% Saturation: (%mc**x** sp.gr**x** Dd)/(sp.gr**x** 62.4-Dd)

TABLE 18-1-B

PLATE No.: C-1C

Expansion Index	**Potential Expansion Result**
0 - 20	VERY LOW
21 - 50	LOW
51 - 90	**MEDIUM**
91 - 130	HIGH
> 130	VERY HIGH

Tested By: E. Saucedo Checked By: A. Cabanilla

Smith-Emery Laboratories

791/781 East Washington Blvd., Los Angeles, CA 90021; Tel (213) 745-5333; Fax (213) 749-8621

LABORATORY COMPACTION CHARACTERISTICS
ASTM D1557-21

Client:	**Carl Kim Geotechnical Inc.**	Lab. Ref No.:	265
Project:	Wave Garden Cove PWAS_20240507	SEL File No.:	49262-1
Location:	NA	Date Sampled:	5/28/24
Soil Class:	Black Lean Clay	Date Received:	5/28/24
Source:		Date Tested:	6/6-12/24
Remarks:	*:if 5-25%ret,rock correction reqr'd*	Sampled by:	A. Hillstrand

Equipment: Scale: B90416085/B846769478 **Drying:** Oven [X] Burner: [ ] Microwave [ ] *Method A* [X] (+)#4≤25%

Rammer: **Mechanical** 10 lbs [X] **Manual** 10 lbs [ ] PREPARATION: *Method B* [ ] (+) 3/8"≤25%

Pie [ ] Round [X] 5.5 lbs [ ] [X] **Wet** [ ] **Dry** *Method C* [ ] (+) 3/4"≤30%

Calibrated Mold Vol. cc:	
4" dia.	6" dia
940	2124

Rock Correction: OD Gs.: #DIV/0! MC%: #DIV/0! % Ret'd #4 0.0

ZAV Assumed Gs.: 2.60 % Pass #4 100.0 Water density: 62.428 Calibrated Mold Vol. cc: 940

Soil Gs ass: 2.60 Boring No.: CGK-CPT-2 Sample No.: **B-1** Depth (ft): **0.5 ft** Water Density: 62.23

Test no.	1	2	3	4	5
wt. of mold + wet soil (g)	3614.0	3684.0	3737.0	3748.0	3720.0
wt. of mold (g)	1985.5	1985.5	1985.5	1985.5	1985.5
wt. of wet soil (g)	1628.5	1698.5	1751.5	1762.5	1734.5
wet density of soil (g/cc)	1.732	1.807	1.863	1.875	1.845
wt. wet soil + tare (g)	511.4	520.1	522.0	520.9	560.1
wt.dry soil + tare (g)	460.3	462.2	458.0	452.5	478.8
Wt of tare (g)	177.2	177.2	176.3	177.4	177.3
moisture content %	18.1	20.3	22.7	24.9	27.0
Density of soil (pcf)	91.6	93.8	94.8	93.7	90.7
corrected moisture content %	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Density of soil (pcf)corrected	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dry Density @ ZAV	86	91	96	101	
100 % Saturation @ ZAV	29.5	27.2	25.0	23.0	

sieve size	ret'd (g)	% ret'd
3/4"		
3/8"		
#4	0.0	0.0
Total	**9914.0**	

pass #4 %Moist content	7.0
wet pass #4 (g)	10608.0
dry pass #4 (g)	9914.0
ASTM D127	
wt OD (g)	0.0
wt SSD	0.0
wt in water (g)	0
OD Gs	#DIV/0!
moist %	#DIV/0!

Max Dry Density (pcf) : 94.8 **OWC %** 22.7 % Saturation: 83.5

Max Dry Density (pcf) corrected : ______ **OWC % Corr** ______ % Saturation: ______

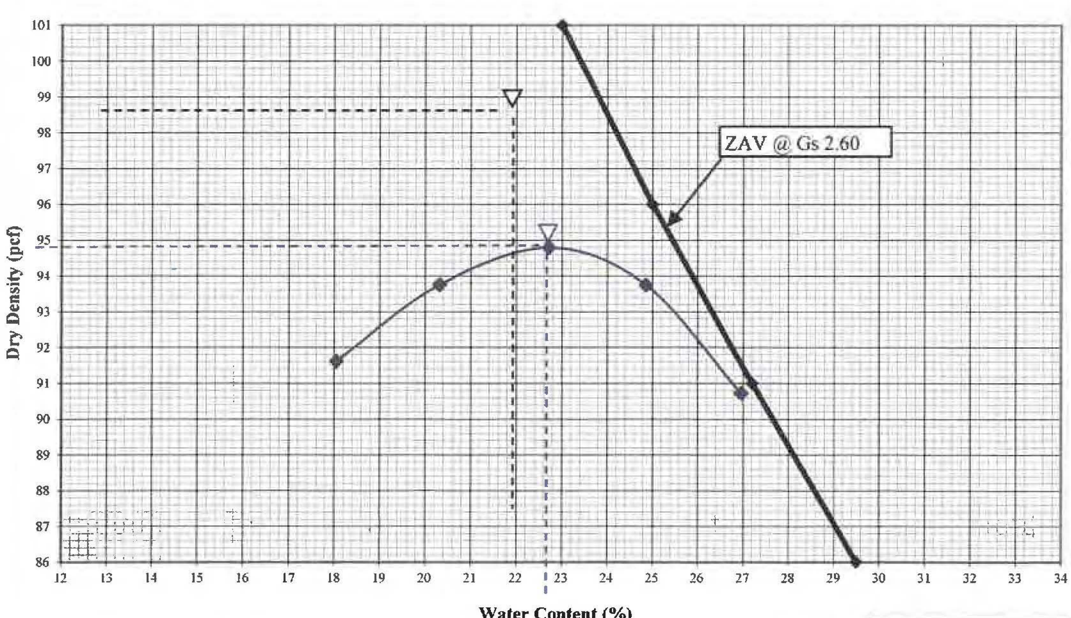


PLATE No.: D-1A

Tested by: E. Saucedo Checked by: A. Cabanilla

Smith-Emery Laboratories

791/781 East Washington Blvd., Los Angeles, CA 90021; Tel (213) 745-5333; Fax (213) 749-8621

LABORATORY COMPACTION CHARACTERISTICS
ASTM D1557-21

Client: **Carl Kim Geotechnical Inc.** | Lab. Ref No.: 266
Project: Wave Garden Cove PWAS_20240507 | SEL File No.: 49262-1
Location: NA | Date Sampled: 5/28/24
Soil Class: Brown Silty Sand | Date Received: 5/28/24
Source: | Date Tested: 6/6-12/24
Remarks: *:if 5-25%ret,rock correction reqr'd* | Sampled by: A. Hillstrand

Equipment: Scale: B90416085/B846769478 | **Drying:** Oven [X] Burner: [ ] Microwave [ ] | *Method A* [X] (+)#4≤25% | Calibrated Mold Vol. cc:

Rammer: **Mechanical** 10 lbs [X] | **Manual** 10 lbs [ ] | PREPARATION: | *Method B* [ ] (+) 3/8"≤25%

Pie [ ] Round [X] | 5.5 lbs [ ] | [X] **Wet** [ ] **Dry** | *Method C* [ ] (+) 3/4"≤30%

4" dia.	6" dia
940	2124

Rock Correction: OD Gs.: #DIV/0! MC%: #DIV/0! % Ret'd #4 0.0

ZAV Assumed Gs.: 2.60 % Pass #4 100.0 Water density: 62.428 Calibrated Mold Vol. cc: 940

Soil Gs ass: 2.60 Boring No.: CGK-CPT-3 Sample No.: **B-1** Depth (ft): **0.5 ft** Water Density: 62.23

Test no.	1	2	3	4	
wt. of mold + wet soil (g)	3941.0	4034.0	4037.0	3957.0	
wt. of mold (g)	1985.5	1985.5	1985.5	1985.5	
wt. of wet soil (g)	1955.5	2048.5	2051.5	1971.5	
wet density of soil (g/cc)	2.080	2.179	2.182	2.097	
wt. wet soil + tare (g)	631.4	663.6	643.3	569.8	
wt.dry soil + tare (g)	598.2	618.0	590.0	515.9	
Wt of tare (g)	127.2	127.9	126.7	127.2	
moisture content %	7.0	9.3	11.5	13.9	
Density of soil (pcf)	121.3	124.5	122.2	115.0	
corrected moisture content %					
Density of soil (pcf)corrected					
Dry Density @ ZAV	113	125	130	135	
100 % Saturation @ ZAV	15.2	11.5	9.7	9.4	

sieve size	ret'd (g)	% ret'd
3/4"		
3/8"		
#4	0.0	0.0
Total	**9914.0**	

pass #4 %Moist content 7.0
wet pass #4 (g) 10608.0
dry pass #4 (g) 9914.0

ASTM D127
wt OD (g) 0.0
wt SSD 0.0
wt in water (g) 0
OD Gs #DIV/0!
moist % #DIV/0!

Max Dry Density (pcf) : 124.5 OWC % **9.4** % Saturation: **81.6**

Max Dry Density (pcf) corrected : OWC % Corr % Saturation:

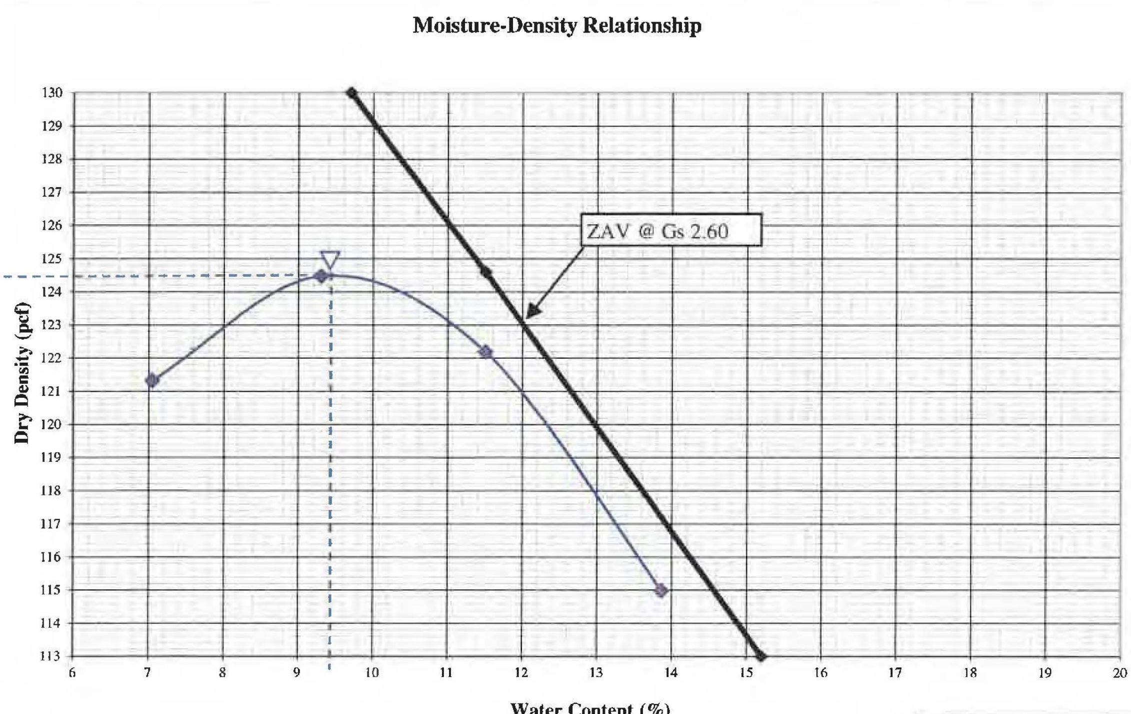


PLATE No.: D-1B

Tested by: E. Saucedo Checked by: A. Cabanilla

Smith-Emery Laboratories

791/781 East Washington Blvd., Los Angeles, CA 90021; Tel (213) 745-5333; Fax (213) 749-8621

LABORATORY COMPACTION CHARACTERISTICS

ASTM D1557-21

Client:	**Carl Kim Geotechnical Inc.**	Lab. Ref No.:	269
Project:	Wave Garden Cove PWAS_20240507	SEL File No.:	49262-1
Location:	NA	Date Sampled:	5/28/24
Soil Class:	Brown Silty Sand	Date Received:	5/28/24
Source:		Date Tested:	6/7-11/24
Remarks:	*:if 5-25%ret,rock correction reqr'd*	Sampled by:	A. Hillstrand

Equipment: Scale: B90416085/B846769478 **Drying:** Oven [X] Burner: [ ] Microwave [ ] *Method A* [X] (+)#4≤25%

Rammer: **Mechnical** 10 lbs [X] **Manual** 10 lbs [ ] PREPARATION: *Method B* [ ] (+) 3/8"≤25%

Pie [ ] Round [X] 5.5 lbs [ ] [X] **Wet** [ ] **Dry** *Method C* [ ] (+) 3/4"≤30%

Calibrated Mold Vol. cc:	
4" dia.	6" dia
940	2124

Rock Correction: OD Gs.: #DIV/0! MC%: #DIV/0! % Ret'd #4 0.0

ZAV Assumed Gs.: 2.60 % Pass #4 100.0 Water density: 62.428 Calibrated Mold Vol. cc: 940

Soil Gs ass: 2.60 Boring No.: CGK-CPT- Sample No.: **B-1** Depth (ft): **0-5.0ft** Water Density: 62.23

Test no.	1	2	3	4	5
wt. of mold + wet soil (g)	3960.0	4052.0	4161.0	4091.0	
wt. of mold (g)	1985.5	1985.5	1985.5	1985.5	
wt. of wet soil (g)	1974.5	2066.5	2175.5	2105.5	
wet density of soil (g/cc)	2.101	2.198	2.314	2.240	
wt. wet soil + tare (g)	720.0	690.0	674.4	666.6	
wt.dry soil + tare (g)	700.0	661.6	637.0	621.5	
Wt of tare (g)	177.8	179.3	174.8	176.9	
moisture content %	3.8	5.9	8.1	10.1	
Density of soil (pcf)	126.3	129.6	133.7	127.0	
corrected moisture content %					
Density of soil (pcf)corrected					
Dry Density @ ZAV	122	127	132	137	
100 % Saturation @ ZAV	12.0	10.6	9.2	7.9	

sieve size	ret'd (g)	% ret'd
3/4"		
3/8"		
#4	0.0	0.0
Total	**7079.6**	

pass #4 %Moist content	8.1
wet pass #4 (g)	7653.0
dry pass #4 (g)	7079.6
ASTM D127	
wt OD (g)	0.0
wt SSD	0.0
wt in water (g)	0
OD Gs	#DIV/0!
moist %	#DIV/0!

Max Dry Density (pcf) : 133.7 **OWC % 7.9** % Saturation: **97.7**

Max Dry Density (pcf) corrected : **OWC % Corr** % Saturation:

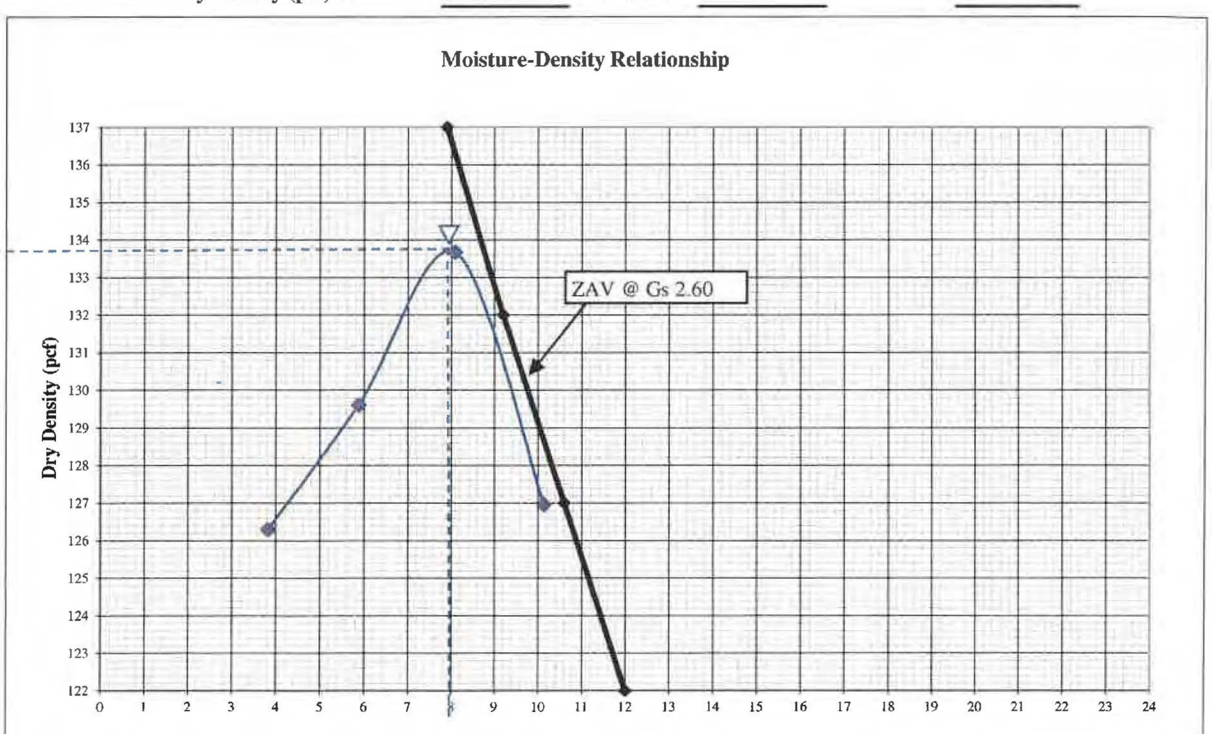


PLATE No.: D-1C

Tested by: E. Saucedo Checked by: A. Cabanilla

Smith-Emery Laboratories

791/781 East Washington Blvd., Los Angeles, CA 90021; Tel (213) 745-5333; Fax (213) 749-8621

LABORATORY COMPACTION CHARACTERISTICS

ASTM D1557-21

Client:	**Carl Kim Geotechnical Inc.**	Lab. Ref No.:	272
Project:	Wave Garden Cove PWAS_20240507	SEL File No.:	49262-1
Location:	NA	Date Sampled:	5/28/24
Soil Class:	Brown Clayey Silt	Date Received:	5/28/24
Source:		Date Tested:	6/7-12/24
Remarks:	*:if 5-25%ret,rock correction reqr'd*	Sampled by:	A. Hillstrand

Equipment: Scale: B90416085/B846769478 **Drying:** Oven [X] Burner: [ ] Microwave [ ] *Method A* [X] (+)#4≤25%

Rammer: **Mechnical** 10 lbs [X] **Manual** 10 lbs [ ] PREPARATION: *Method B* [ ] (+) 3/8"≤25%

Pie [ ] Round [X] 5.5 lbs [ ] [X] **Wet** [ ] **Dry** *Method C* [ ] (+) 3/4"≤30%

Calibrated Mold Vol. cc:	
4" dia.	6" dia
940	2124

Rock Correction: OD Gs.: #DIV/0! MC%: #DIV/0! % Ret'd #4 0.0

ZAV Assumed Gs.: 2.60 % Pass #4 100.0 Water density: 62.428 Calibrated Mold Vol. cc: 940

Soil Gs ass: 2.60 Boring No.: CKG-HA2 Sample No.: **B-1** Depth (ft): **0-4.0 ft** Water Density: 62.23

Test no.	1	2	3	4	5
wt. of mold + wet soil (g)	3884.0	3960.0	3978.0	3939.0	
wt. of mold (g)	1985.5	1985.5	1985.5	1985.5	
wt. of wet soil (g)	1898.5	1974.5	1992.5	1953.5	
wet density of soil (g/cc)	2.020	2.101	2.120	2.078	
wt. wet soil + tare (g)	667.5	670.0	684.2	670.8	
wt.dry soil + tare (g)	620.0	614.0	617.1	597.1	
Wt of tare (g)	180.0	178.4	177.0	174.1	
moisture content %	10.8	12.9	15.2	17.4	
Density of soil (pcf)	113.8	116.2	114.8	110.5	
corrected moisture content %					
Density of soil (pcf)corrected					
Dry Density @ ZAV	105	112	120	124	
100 % Saturation @ ZAV	20.6	17.4	13.6	8.5	

sieve size	ret'd (g)	% ret'd
3/4"		
3/8"		
#4	0.0	0.0
Total	**9813.1**	

pass #4 %Moist content	8.1
wet pass #4 (g)	10608.0
dry pass #4 (g)	9813.1
ASTM D127	
wt OD (g)	
wt SSD	
wt in water (g)	
OD Gs	
moist %	

Max Dry Density (pcf) : 116.1 **OWC %** 13.4 % Saturation: 88.5

Max Dry Density (pcf) corrected : **OWC % Corr** % Saturation:

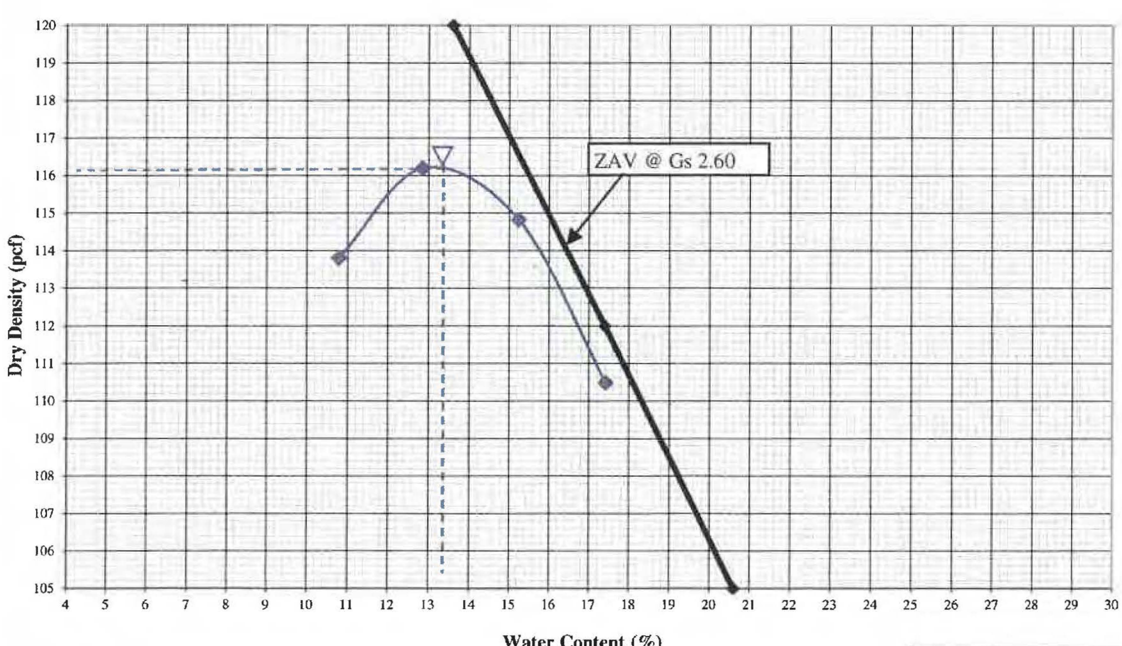


PLATE No.: D-1D

Tested by: E. Saucedo Checked by: A. Cabanilla

Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D1557

SMITH-EMERY LABORATORIES
791 E. Washington Boulevard, Los Angeles, CA 90021
Tel. No. (213) 745-5333; Fax no.: (213) 741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

SEL File No.: 49262-1
SEL Report No.: G-24-2978
Date: 6/17/24
BH No.: CKG-CPT-3
Depth: 0-5.0ft
Sample No.: B1
Moisture Content: 9.6
Saturation: 50.3
Voids Ratio 0.51
Dry Density: 111.2

Client: Carl Kim Geotechnical, Inc.
Project : Wave Garden Cove
Location: NA
Description: Brown Silty Sand

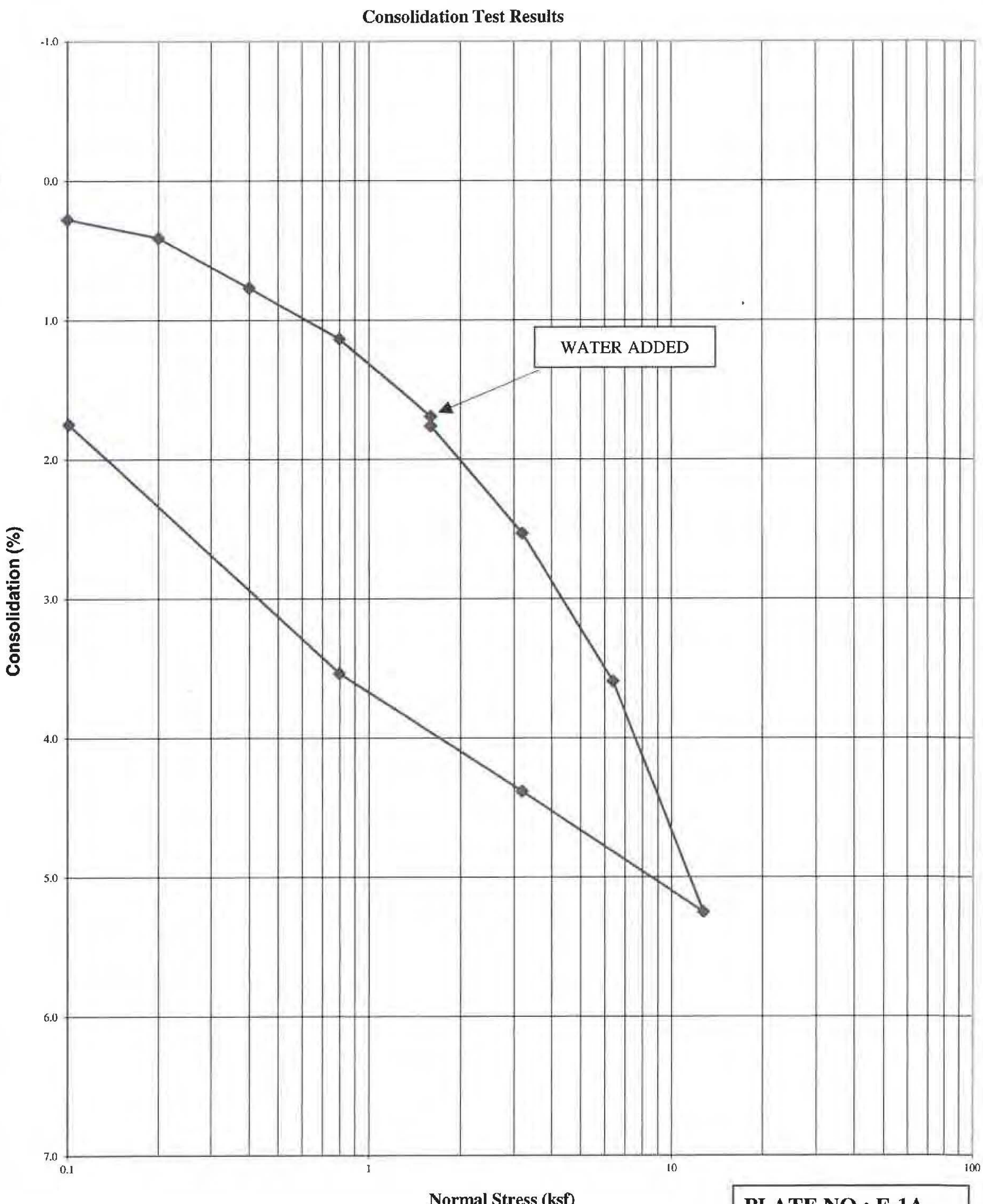


PLATE NO.: E-1A

SMITH-EMERY LABORATORIES

791 E. Washington Boulevard, Los Angeles, CA 90021
Tel. No. (213) 745-5333; Direct Tel No.: (213) 699-7807

SEL File No.: 49262-1
SEL Report No.: G-24-2978
Date Sampled : 5/28/24
Date Received: 5/28/24
Date Tested : 6/17/24

Client: Carl Kim Geotechnical Inc. Dry Density (pcf): 111.0
Project: Front Porch Development Pilgrim Tower Apartment Moisture content%: 9.6
Location: 1207 S. Vermont Ave., Los Angeles, CA Degree of Sat: 50.1
Remarks: Remolded to 90% Relative Density of 124.5 pcf at 9.6 % OMC
BORING NO.: CKG-CPT-3 SAMPLE NO.: B-1 DEPTH (FT.): 0- 5.0ft

SOIL Classification (Visual): Yellowish Brown Lean CLAY w/ Sand

Liquid Limit	Plastic Limit	Plasticity Index	USCS (Visual)
NA	NA	NA	CL
	CONSOL NO. 1		

Loading (Kips) **3.2k**

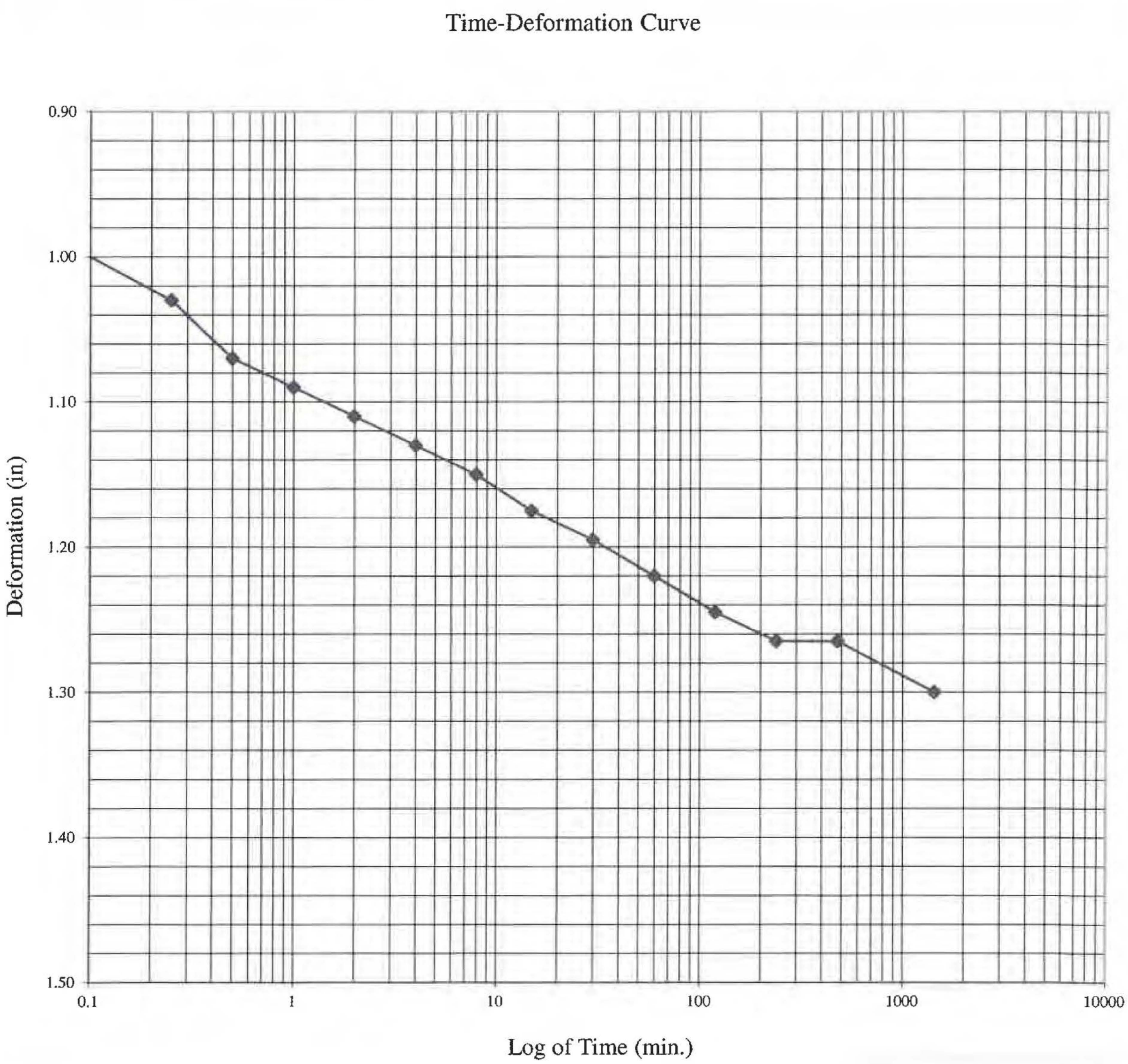


PLATE NO.: E-1B

SMITH-EMERY LABORATORIES
1195 N. Tustin, Anaheim, CA 92807 Tel. (714) 238-6133 Fax (714) 238-6144

R-VALUE (CT 301/ ASTM D2844)

Lab Ref. No.: A24-142

Client:	Smith Emery Los Angeles			Report Date:	07/02/24
Project:	Wave Garden Cove/PWAS 20240507	Tested By:	CL	DateTested	07/01/24
Project #:	49262-1	Checked By:	CL	Date Prepped	07/01/24
Depth:	0-5'			Date Received	06/19/24
Boring No.:.	CKGCPT-2	Sample #:	**BS-1**	Sampled By:	-
Description:	**OL/A**			Date:	05/02/08

Test Specimen ID:	A	B	C	D
Prepared weight (g)	1100	1100	1100	
Compaction Foot Pressure (psi)	300	350	350	
Initial Moisture, %	N/A	N/A	N/A	
Soak Water (ml)	75	75	75	
Water Added for Saturation (g)	75	45	30	
Moisture at Compaction, %	#VALUE!	#VALUE!	#VALUE!	
Exudation Load (Lb.)				
Exudation Pressure (psi)	**0**	**0**	**0**	
Height of Specimen, (in.)	0.00	0.00	2.53	
Wt. of Specimen & Mold (g)	0	0	2972	
Wt. of Mold (g)	2068	2067	2067	
Wt. of Specimen (g)	-2068	-2067	905	
Dry Density (pcf)				
Expansion Dial Reading, In.	0	0	0	
Expansion Pressure (psi)	0.000	0.000	0.000	
Stabilometer P_H @ 2000lb (160psi)	0	0	0	
Turns Displacement, d	0	0	0	
R-Value By Stabilometer				
R-Value By Stab. (corrected)				
Thickness by Stabilometer, in				
Thickness by Exp. Pressure, in	0.0	0.0	0.0	

Equilibrium Thickness, in = 0 (from right chart below)

Initial Moisture:

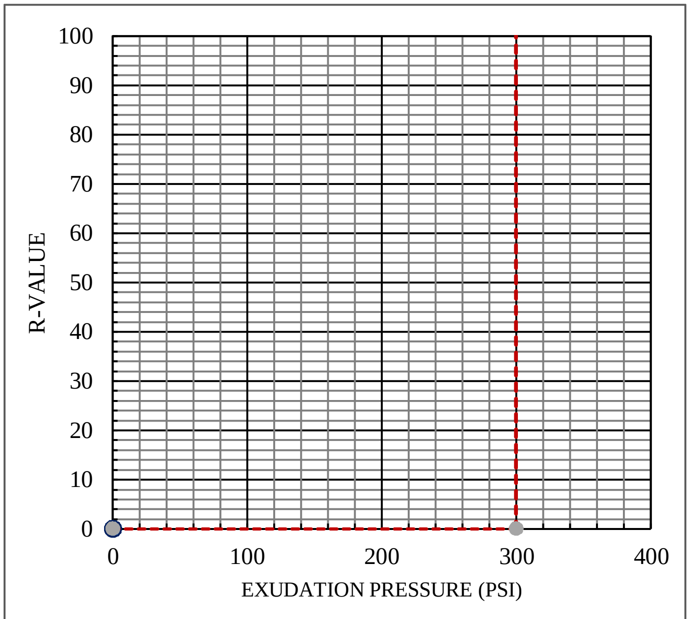
Mass of Wet Soil + Can, g =	0.0
Mass of Can,g =	0.0
Oven-dry Soil +Can,g =	0.0
Moisture Content,% =	N/A

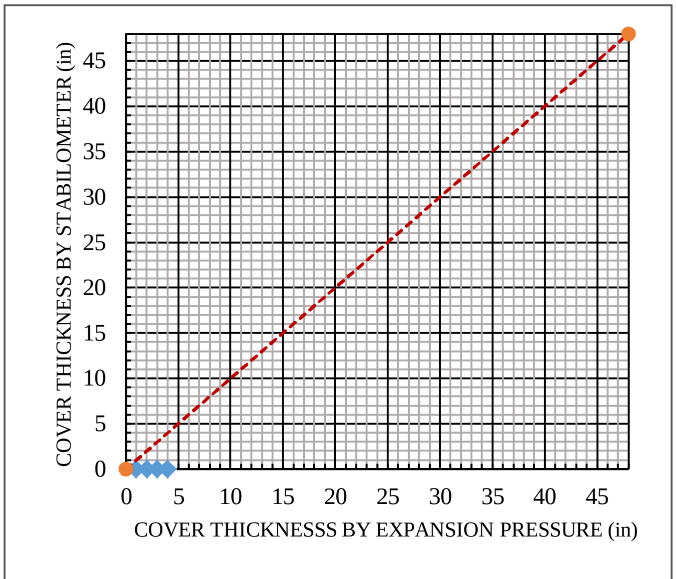
Pavement/Traffic Data

Surface	
Base	
Subbase	

Gravel Equivalent Factor (Gf)

Gf =	1.00
Traffic Index, TI=	5.0
Unit Mass of Cover Mat. = (pcf)	130
Spring Constant for deflection Bar psi/in	303





R-VALUE RESULT

BY EXPANSION PRESSURE:

BY EXCUDATION PRESSURE (from left chart): 0

Remarks

Less than 5

	R-VALUE, AT EQUILIBRIUM:	**0**

S M I TH- E M E RY LABORATORIES
1195 N. Tustin, Anaheim, CA 92807 Tel. (714) 238-6133 Fax (714) 238-6144

R-VALUE (CT 301/ ASTM D2844)

Lab Ref. No.: A24-142

Client:	Smith Emery Los Angeles			Report Date:	06/26/24
Project:	Wave Garden Cove/PWAS 20240507	Tested By:	CL	DateTested	06/25/24
Project #:	49262-1	Checked By:	CL	Date Prepped	06/24/24
Depth:	0-5'			Date Received	06/19/24
Boring No.:.	CKGCPT-6	Sample #:	**BS2**	Sampled By:	-
Description:	**CL/ML**			Date:	05/02/08

Test Specimen ID:	A	B	C	D
Prepared weight (g)	1100	1100	1100	
Compaction Foot Pressure (psi)	250	300	350	
Initial Moisture, %	1.8	1.8	1.8	
Soak Water (ml)	40	40	40	
Water Added for Saturation (g)	49	35	25	
Moisture at Compaction, %	10.1	8.8	7.8	
Exudation Load (Lb.)				
Exudation Pressure (psi)	**228**	**460**	**516**	
Height of Specimen, (in.)	2.67	2.57	2.53	
Wt. of Specimen & Mold (g)	3230	3199	3183	
Wt. of Mold (g)	2069	2066	2070	
Wt. of Specimen (g)	1161	1133	1113	
Dry Density (pcf)	119.8	122.9	123.7	
Expansion Dial Reading, In.	0.0005	0.0008	0.001	
Expansion Pressure (psi)	0.152	0.242	0.303	
Stabilometer P_H @ 2000lb (160psi)	130	104	59	
Turns Displacement, d	3.8	3.87	3.5	
R-Value By Stabilometer	**13**	**26**	**55**	
R-Value By Stab. (corrected)	**14**	**26**	**55**	
Thickness by Stabilometer, in	16.4	14.2	8.6	
Thickness by Exp. Pressure, in	2.0	3.2	4.0	

Equilibrium Thickness, in = 0 (from right chart below)

Initial Moisture:

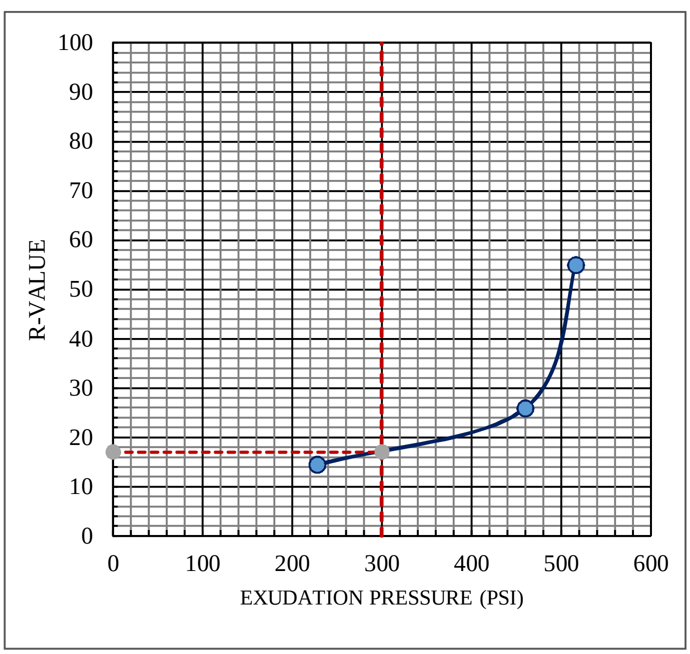
Mass of Wet Soil + Can, g =	101.0
Mass of Can,g =	0.0
Oven-dry Soil +Can,g =	99.2
Moisture Content,% =	1.8

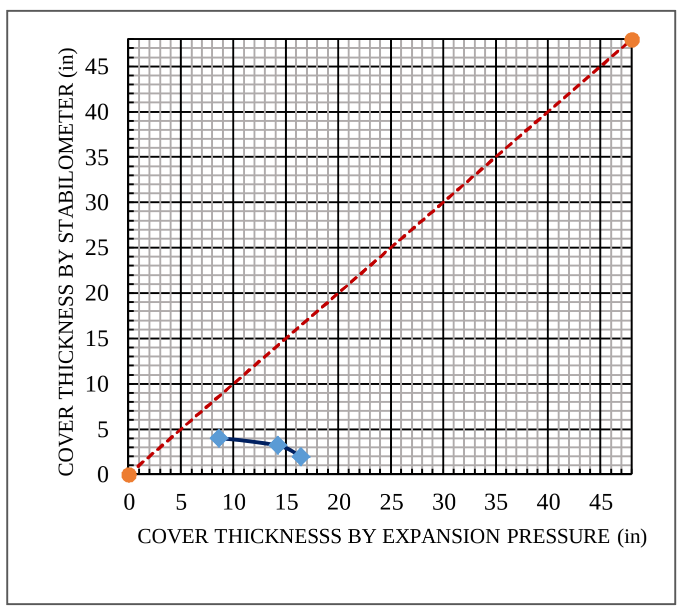
Pavement/Traffic Data

Surface	
Base	
Subbase	

Gravel Equivalent Factor (Gf)

Gf =	1.00
Traffic Index, TI=	5.0
Unit Mass of Cover Mat. = (pcf)	130
Spring Constant for deflection Bar psi/in	303





R-VALUE RESULT

BY EXPANSION PRESSURE:	
BY EXCUDATION PRESSURE (from left chart):	17

Remarks

R-VALUE, AT EQUILIBRIUM: 17

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

June 18, 2024

Angelito Cabanilla
Smith Emery Laboratories
791 East Washington Blvd.
Los Angeles, CA 90021

Report No.: 2406041
Project Name: Carl Kim Geotechnical Inc. / 49262-1, Wavegarden Cove (PWAS 20240507)

Dear Angelito Cabanilla,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on June 06, 2024.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

FILE NO.:	49262-1
PLATE NO.:	F-1A

POSITIVE LAB SERVICE
781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Smith Emery Laboratories
791 East Washington Blvd.
Los Angeles, CA 90021

Attn: Angelito Cabanilla Phone: (213) 745-5333 FAX:(213) 746-0744

File #:73419
Report Date: 06/18/24
Submitted: 06/06/24
PLS Report No.: 2406041

Project: Carl Kim Geotechnical Inc. / 49262-1, Wavegarden Cove (PWAS 20240507)

Sample ID: B-1 ML Sandy Silt Soil (2406041-01) Sampled: 05/28/24 00:00 Received: 06/06/24

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Resistivity, Minimum	**9580**		1	ohm-cm	1.00	- CTM 643	06/07/24	06/07/24	ja	BF40716
Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Soluble Chloride	**781**		1	mg/kg	5.00	- EPA 300.0M	06/12/24	06/18/24	jks	BF41802
Soluble Sulfate	**2110**		1	mg/kg	5.00	- EPA 300.0M	06/12/24	06/18/24	jks	BF41802
Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
pH	**7.6**		1	pH Units	0.1	- EPA 9045C	06/12/24	06/12/24	ss	BF41213

Quality Control Data

Analyte		Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BF41802 - -											
Blank		**Prepared: 06/12/24 Analyzed: 06/18/24**									
Soluble Chloride		ND	5.00	mg/kg							
Soluble Sulfate		ND	5.00	mg/kg							
LCS		**Prepared: 06/12/24 Analyzed: 06/18/24**									
Soluble Chloride		53.7	5.00	mg/kg	50.00		107	70-130			
Soluble Sulfate		56.7	5.00	mg/kg	50.00		113	70-130			
Duplicate	**Source: 2406041-01**	**Prepared: 06/12/24 Analyzed: 06/18/24**									
Soluble Chloride		714	5.00	mg/kg		781			8.99	30	
Soluble Sulfate		1390	5.00	mg/kg		2110			40.9	30	V-2
Matrix Spike	**Source: 2406041-01**	**Prepared: 06/12/24 Analyzed: 06/18/24**									
Soluble Chloride		1020	5.00	mg/kg	50.00	781	474	70-130			V-3
Soluble Sulfate		2210	5.00	mg/kg	50.00	2110	200	70-130			V-3
Matrix Spike Dup	**Source: 2406041-01**	**Prepared: 06/12/24 Analyzed: 06/18/24**									
Soluble Chloride		876	5.00	mg/kg	50.00	781	191	70-130	85.0	30	V-3
Soluble Sulfate		2000	5.00	mg/kg	50.00	2110	NR	70-130	NR	30	V-3
Batch BF41213 - -											
Duplicate	**Source: 2406071-01**	**Prepared & Analyzed: 06/12/24**									
pH		7.4	0.1	pH Units		7.2			1.78	5	

FILE NO.: 49262-1
PLATE NO.: F-1B

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Smith Emery Laboratories
791 East Washington Blvd.
Los Angeles, CA 90021

File #:73419
Report Date: 06/18/24
Submitted: 06/06/24
PLS Report No.: 2406041

Attn: Angelito Cabanilla Phone: (213) 745-5333 FAX:(213) 746-0744

Project: Carl Kim Geotechnical Inc. / 49262-1, Wavegarden Cove (PWAS 20240507)

Notes and Definitions

V-3	Amount spiked was less than 1/4 of concentration in the sample.
V-2	Out-of-Range recovery was due to sample Heterogeneity.
NA	Not Applicable
ND	Analyte NOT DETECTED at or above the reported limit(s)
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Rick Owen Parker

Authorized Signature(s)

FILE NO.: 49262-1
PLATE NO.: F-1C

SMITH-EMERY LABORATORIES

791/781 East Washington Blvd., Los Angeles, CA 90021
Tel. No. (213) 745-5333;Fax No. (213) 741-8621

Chain of Custody

FILE NO.: 49262-1
PLATE NO.: F-1D

#2406041

Client: Carl Kim Geotechnical Inc. Date: 6/4/2024 Page 1 of 1

Project Name: Wavegarden Cove (PWAS 20240507) Project No.: 49262-1

Location: CKG CPT-3 Source: Boring B-1 (0-5') Sampled By: A. Hillstrand

Sample Number	Boring No. / Depth in Ft.	Description	Date Sampled	Time	Container Type	No.	Test Requested and Standard
B-1	B-1/ 0-5'	ML SANDY SILT	5/28/24		PLASTIC BAG	1	Min. Resistivity, pH value, Sol. Sulfate & Sol. Chlorides

Turnaround Time: Same Day 24hr 5 day Other: *Normal

Results Attn: *Angelito Cabnilla Phone / Fax #: /

CHAIN OF CUSTODY:

1. Elpedio [signature] — Signature; LAB TECH — Title; Inclusive Dates
2. [signature] — Signature; Sample Receiving — Title; 6/4/24 10:32a — Inclusive Dates
3. Signature; Title; Inclusive Dates

OBSERV. TEMP: 22.5 °C
CORREC. TEMP: 23.5 °C
THERMO ID: 66 BY: Ae.

6/6/24 @ 11:15a
* VERIFIED TAT & REPORT RESULTS PER ELPEDIO VIA PHONE

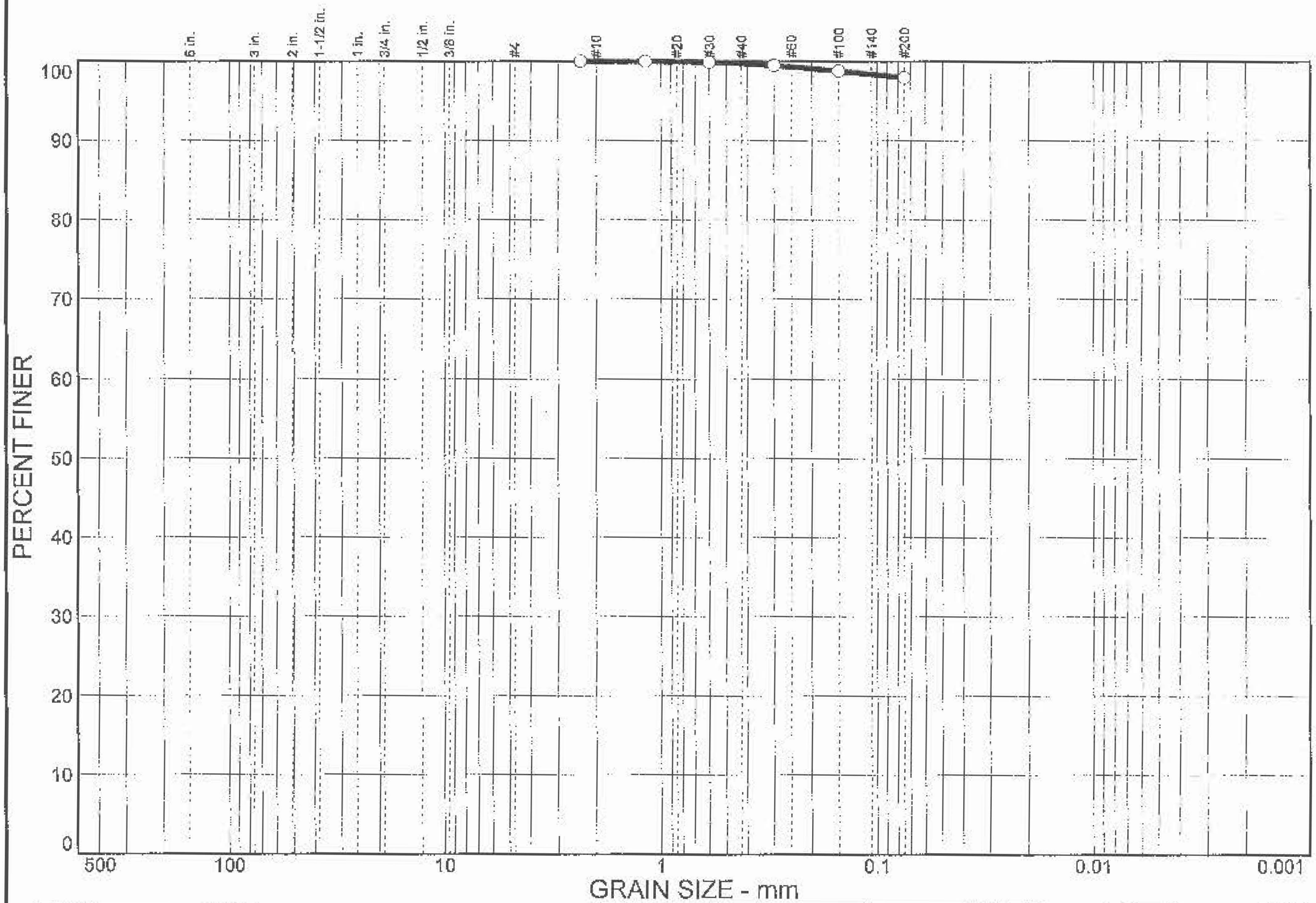
APPENDIX C

RESULTS OF LABORATORY TESTS

This appendix contains the individual results of the following tests. The results of the moisture content and dry density tests are included on the test boring logs in Appendix B. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

These Included:	**To Determine:**
Moisture Content (ASTM D2216)	Moisture contents representative of field conditions at the time the sample was taken.
Density Determination (ASTM D2216)	Dry unit weight of sample representative of in-situ or in-place undisturbed condition.
Grain-Size Distribution (ASTM D422)	Size and distribution of soil particles, i.e., sand, gravel and fines (silt and clay).
Atterberg Limits (ASTM D4318)	Determines the moisture content where the soil behaves as a viscous material (liquid limit) and the moisture content at which the soil reaches a plastic state
Expansion Index (ASTM D4829)	Swell potential of soil with increases in moisture content.
Consolidation (ASTM 2435)	The amount and rate at which a soil sample compresses when loaded, and the influence of saturation on its behavior.
Direct Shear (ASTM D3080)	Soil shearing strength under varying loads and/or moisture conditions.
R-Value (CTM 301)	The capacity of a subgrade or subbase to support a pavement section designed to carry a specified traffic load.
Moisture-Density Relationship (ASTM D1557)	The optimum (best) moisture content for compacting soil and the maximum dry unit weight (density) for a given compactive effort.
Sulfate Content (ASTM D4327)	Percentage of water-soluble sulfate as (SO4) in soil samples. Used as an indication of the relative degree of sulfate attack on concrete and for selecting the cement type.
Chloride Content (ASTM D4327)	Percentage of soluble chloride in soil. Used to evaluate the potential attack on encased reinforcing steel.
Resistivity (ASTM D1125)	The potential of the soil to corrode metal.
pH (ASTM D4972)	The acidity or alkalinity of subgrade material.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	2.0	98.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	100.0		
#30	99.9		
#50	99.5		
#100	98.8		
#200	98.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 23 LL= 40 PI= 17

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

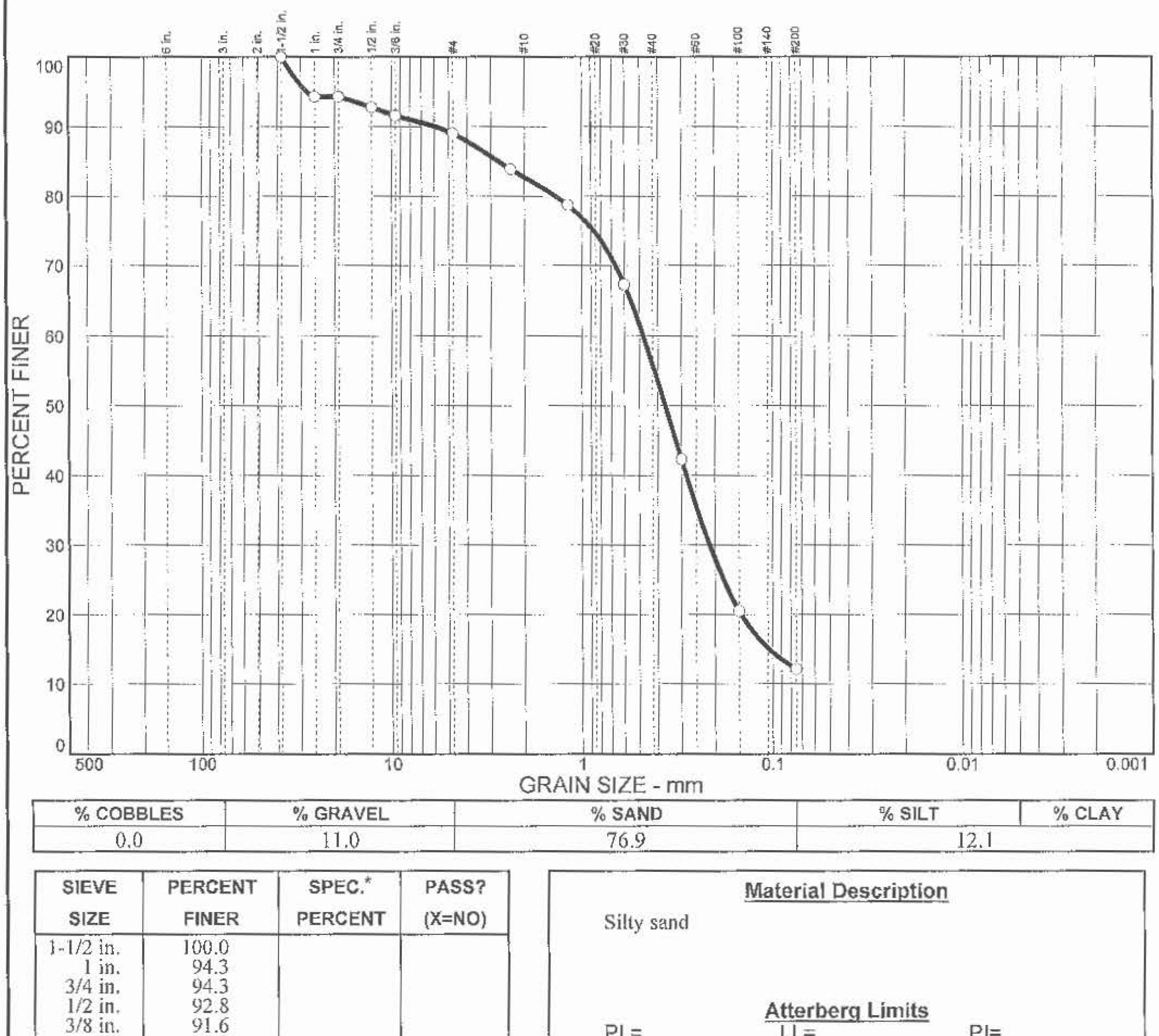
Sample No.: B-2 **Source of Sample:** **Date:** 7/29/19
Location: **Elev./Depth:** 60-61.5'

Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range
Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	11.0	76.9	12.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-1/2 in.	100.0		
1 in.	94.3		
3/4 in.	94.3		
1/2 in.	92.8		
3/8 in.	91.6		
#4	89.0		
#8	83.9		
#16	78.7		
#30	67.3		
#50	42.3		
#100	20.5		
#200	12.1		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.73 D_{60}= 0.477 D_{50}=
D_{30}= 0.213 D_{15}= 0.105 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

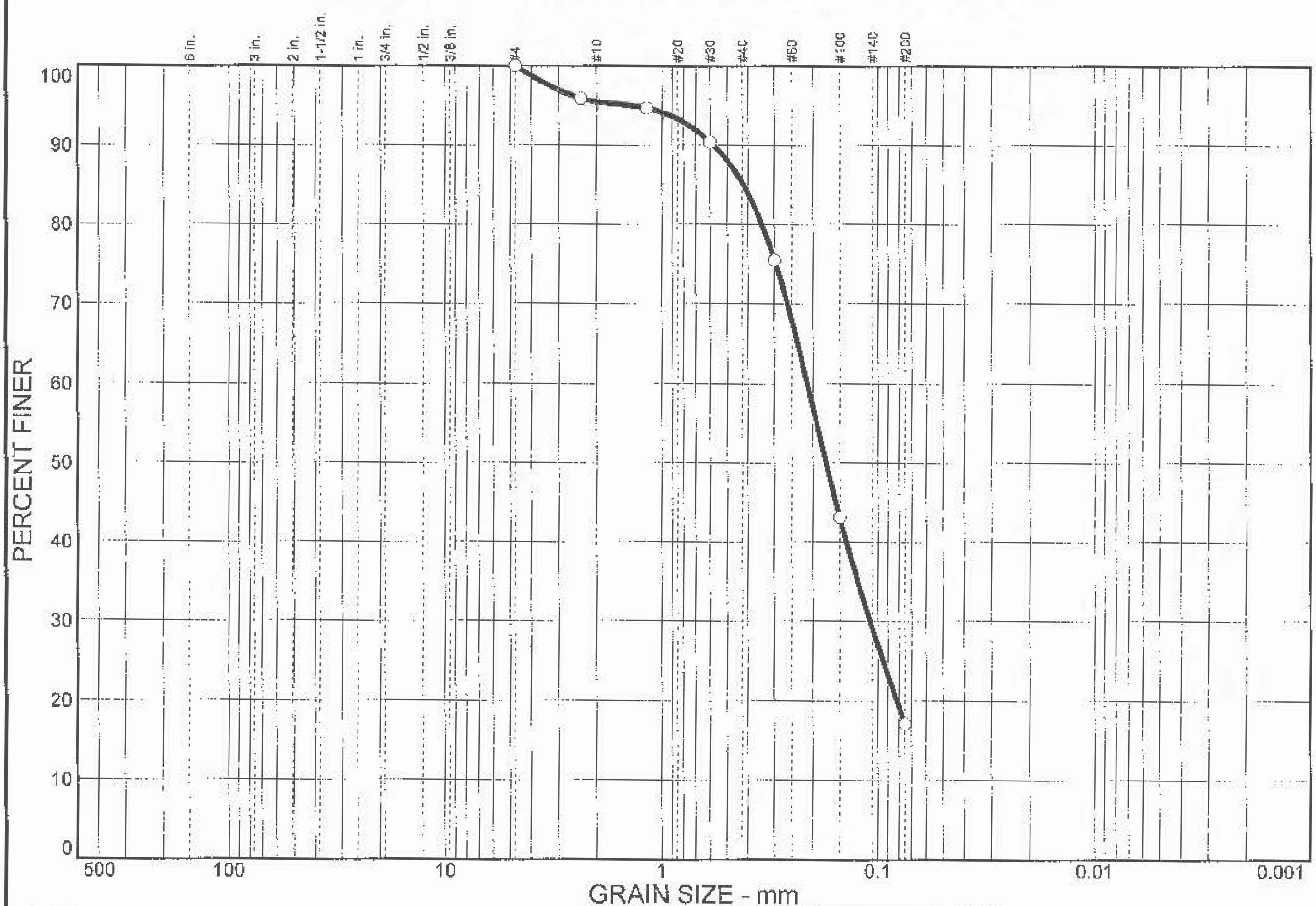
Sample No.: B-3 **Source of Sample:** **Date:** 7/22/19
Location: **Elev./Depth:** 25-26.5'

Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range
Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	82.9	17.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	95.9		
#16	94.7		
#30	90.4		
#50	75.5		
#100	43.1		
#200	17.1		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.420 D_{60}= 0.212 D_{50}= 0.173
D_{30}= 0.109 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

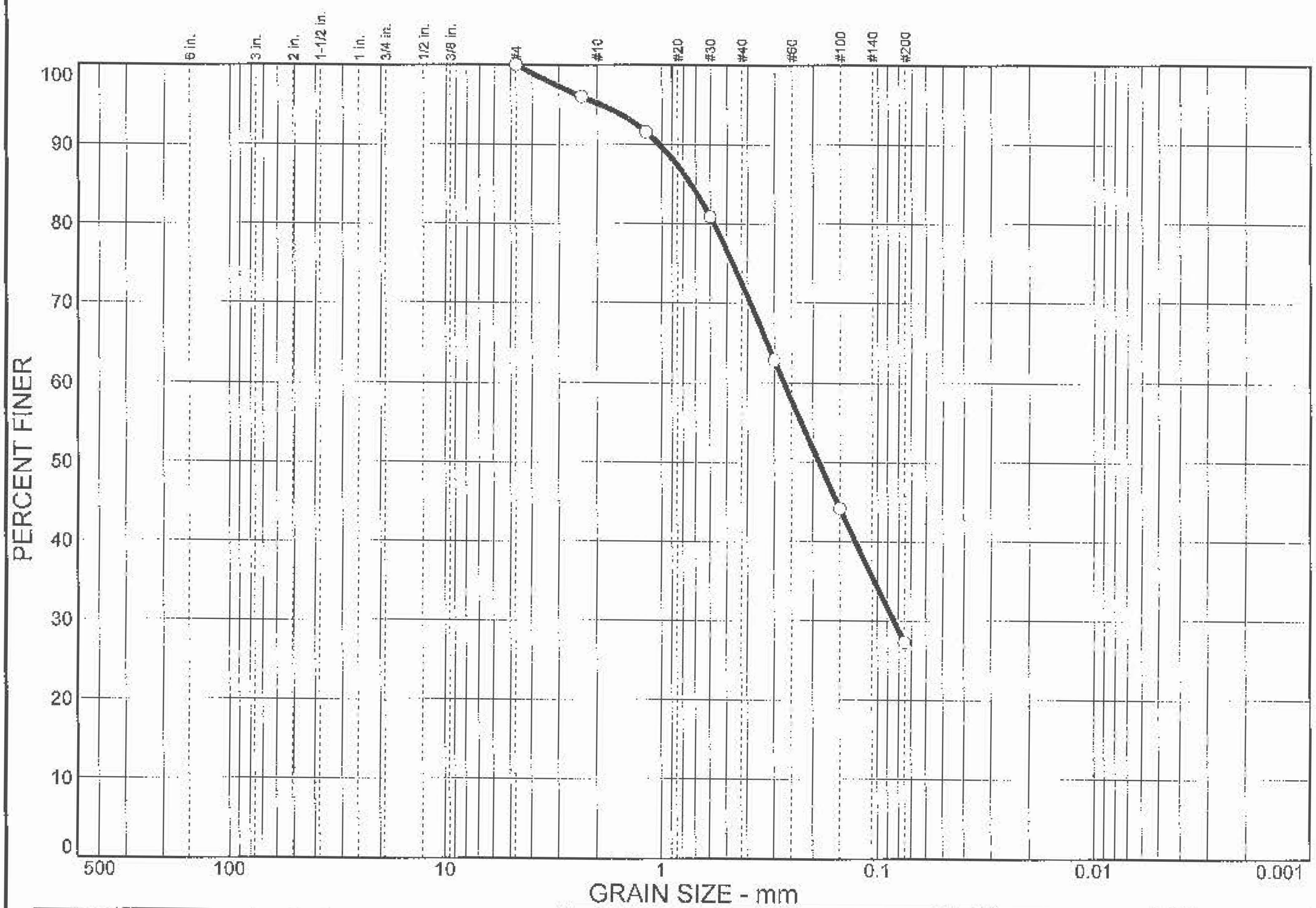
Sample No.: B-3 **Source of Sample:** **Date:** 7/22/19
Location: **Elev./Depth:** 30-31.5'

Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range
Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	72.7	27.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	96.0		
#16	91.6		
#30	80.9		
#50	62.9		
#100	44.2		
#200	27.3		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 0.737 D_{60}= 0.270 D_{50}=
D_{30}= 0.0840 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

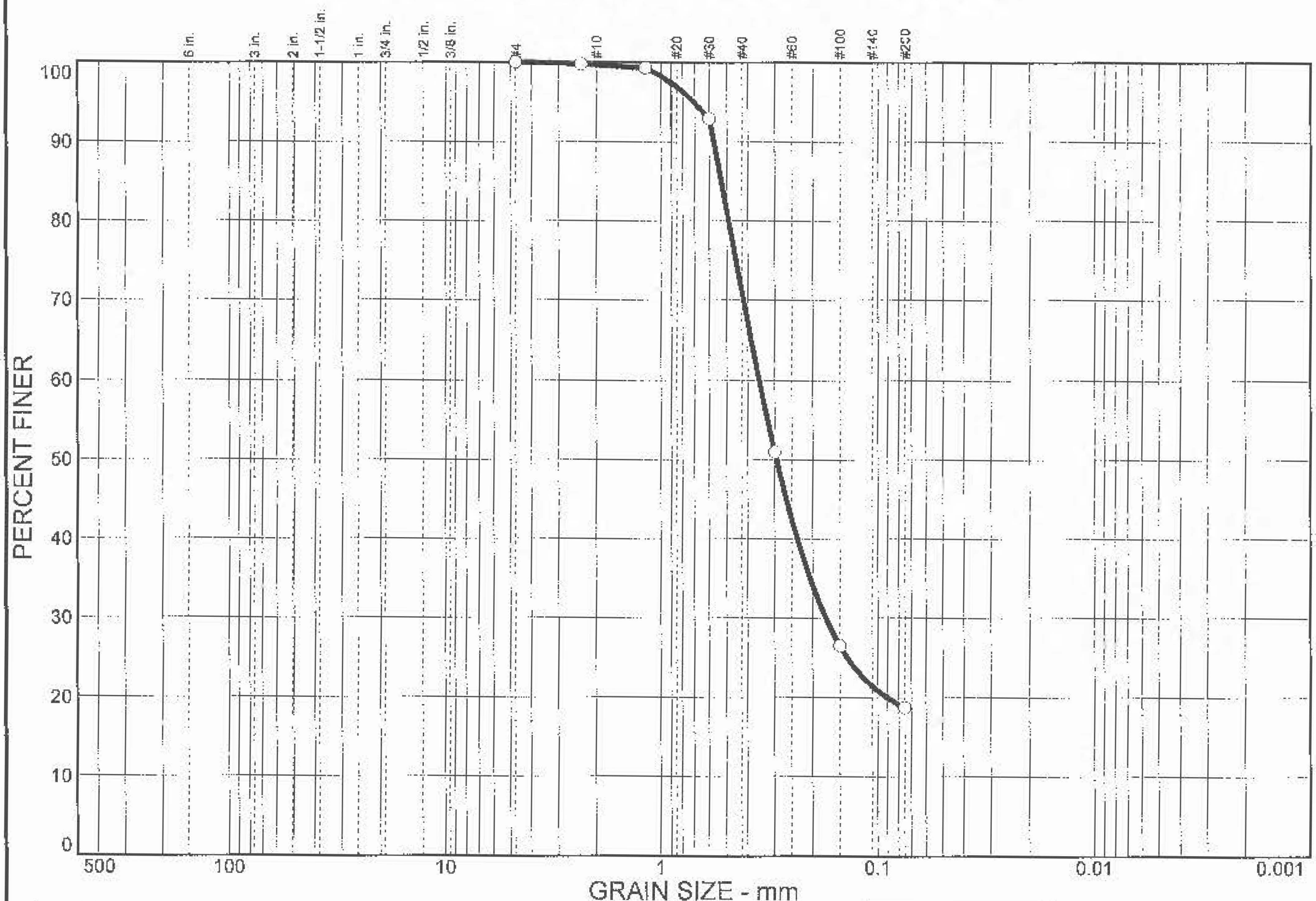
Remarks

Sample No.: B-5 **Source of Sample:** **Date:** 7/22/19
Location: **Elev./Depth:** 18.5-20.0'

Moore Twining Associates, Inc.
Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range
Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	81.3	18.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.8		
#16	99.3		
#30	92.9		
#50	51.0		
#100	26.5		
#200	18.7		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.530 D_{60}= 0.354 D_{50}= 0.294
D_{30}= 0.174 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample No.: B-7 **Source of Sample:** **Date:** 7/29/19
Location: **Elev./Depth:** 15-16.5'

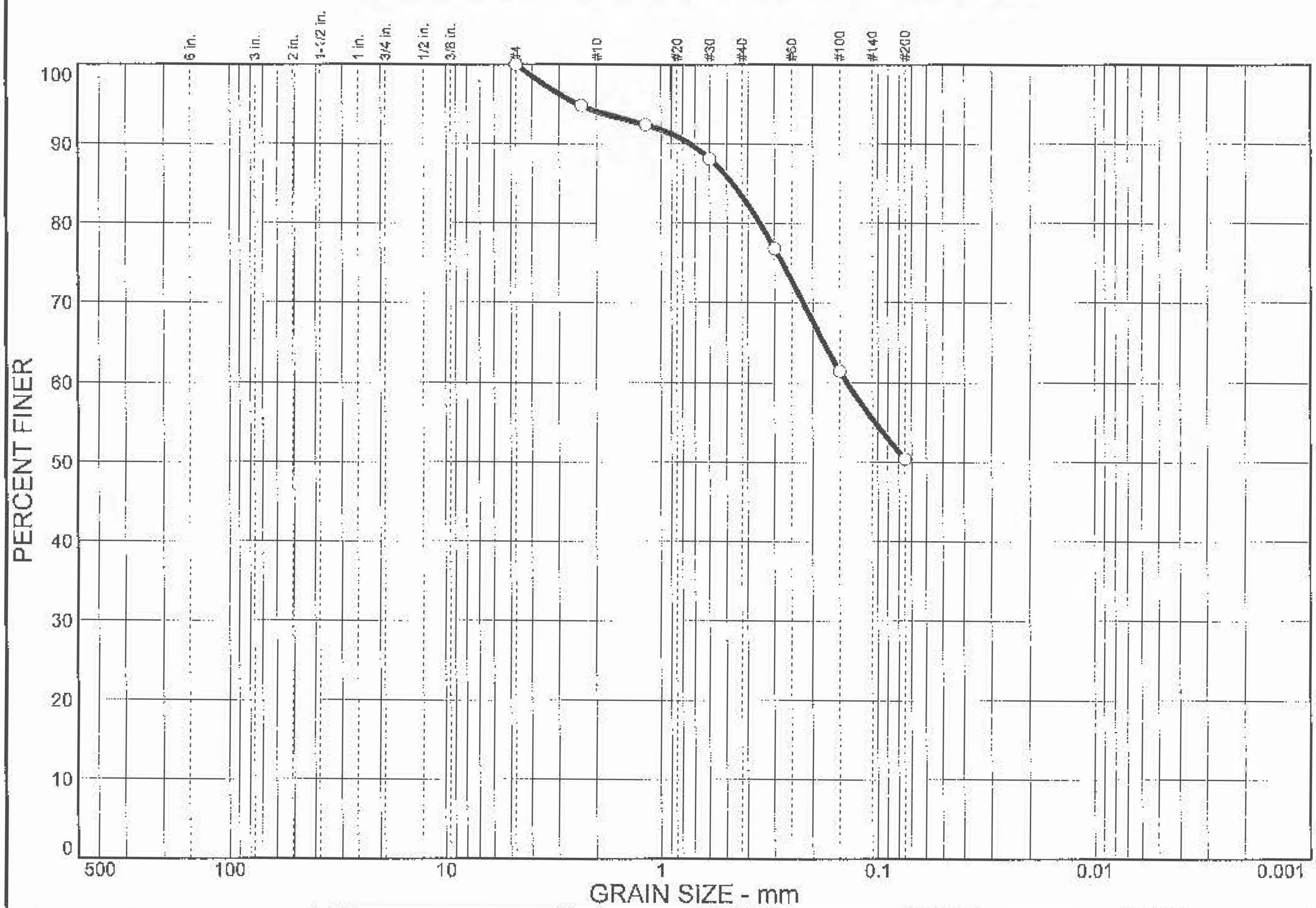
Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range

Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	49.6	50.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	94.8		
#16	92.4		
#30	88.1		
#50	76.8		
#100	61.5		
#200	50.4		

* (no specification provided)

Material Description

Sandy silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.472 D_{60}= 0.139 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample No.: B-9 **Source of Sample:** **Date:** 7/29/19
Location: **Elev./Depth:** 5-6.5'

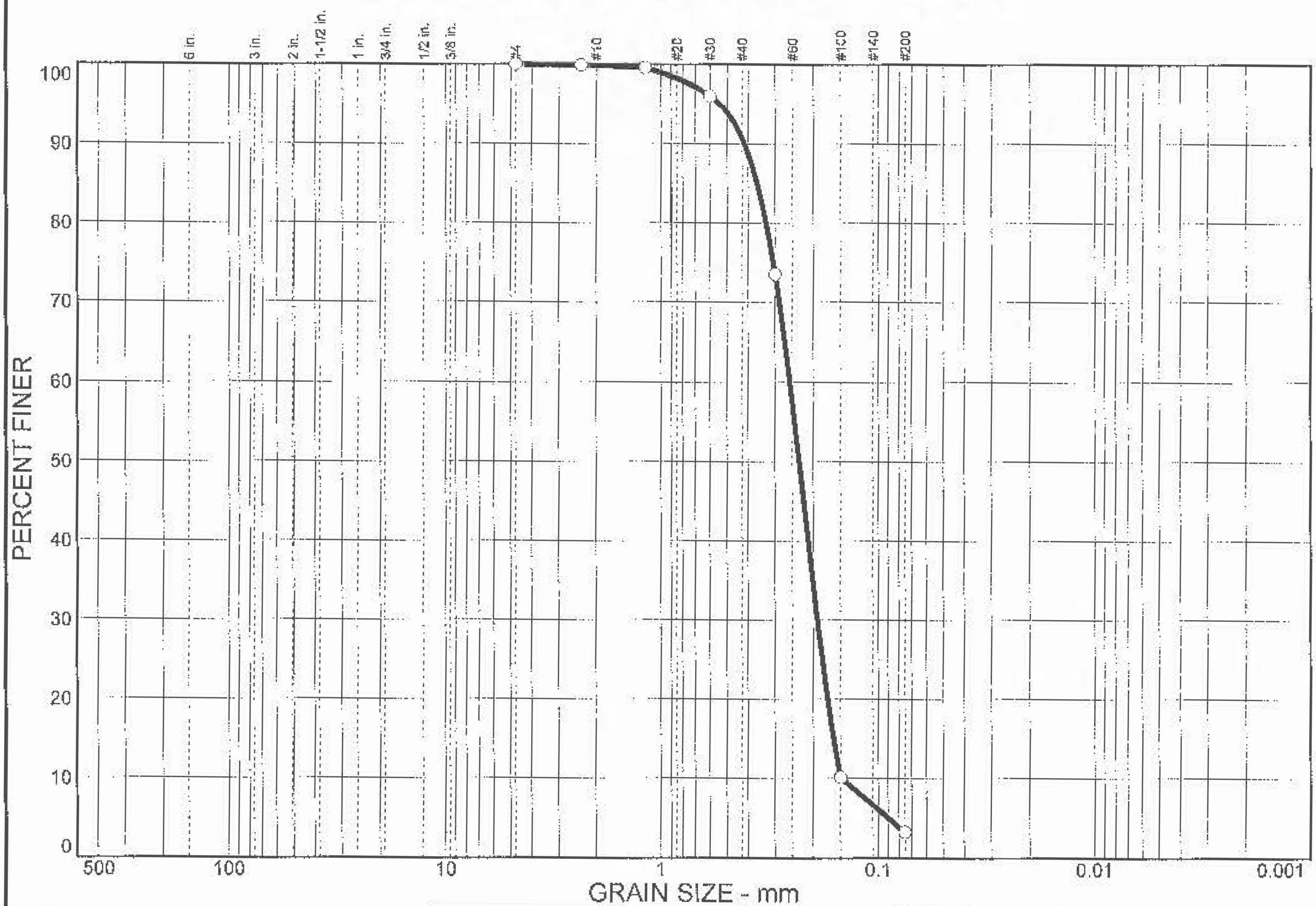
Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range

Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	96.8	3.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.6		
#30	96.0		
#50	73.5		
#100	10.1		
#200	3.2		

* (no specification provided)

Material Description

Poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 0.364 D_{60}= 0.257 D_{50}= 0.232
D_{30}= 0.191 D_{15}= 0.161 D_{10}= 0.149
C_u= 1.73 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

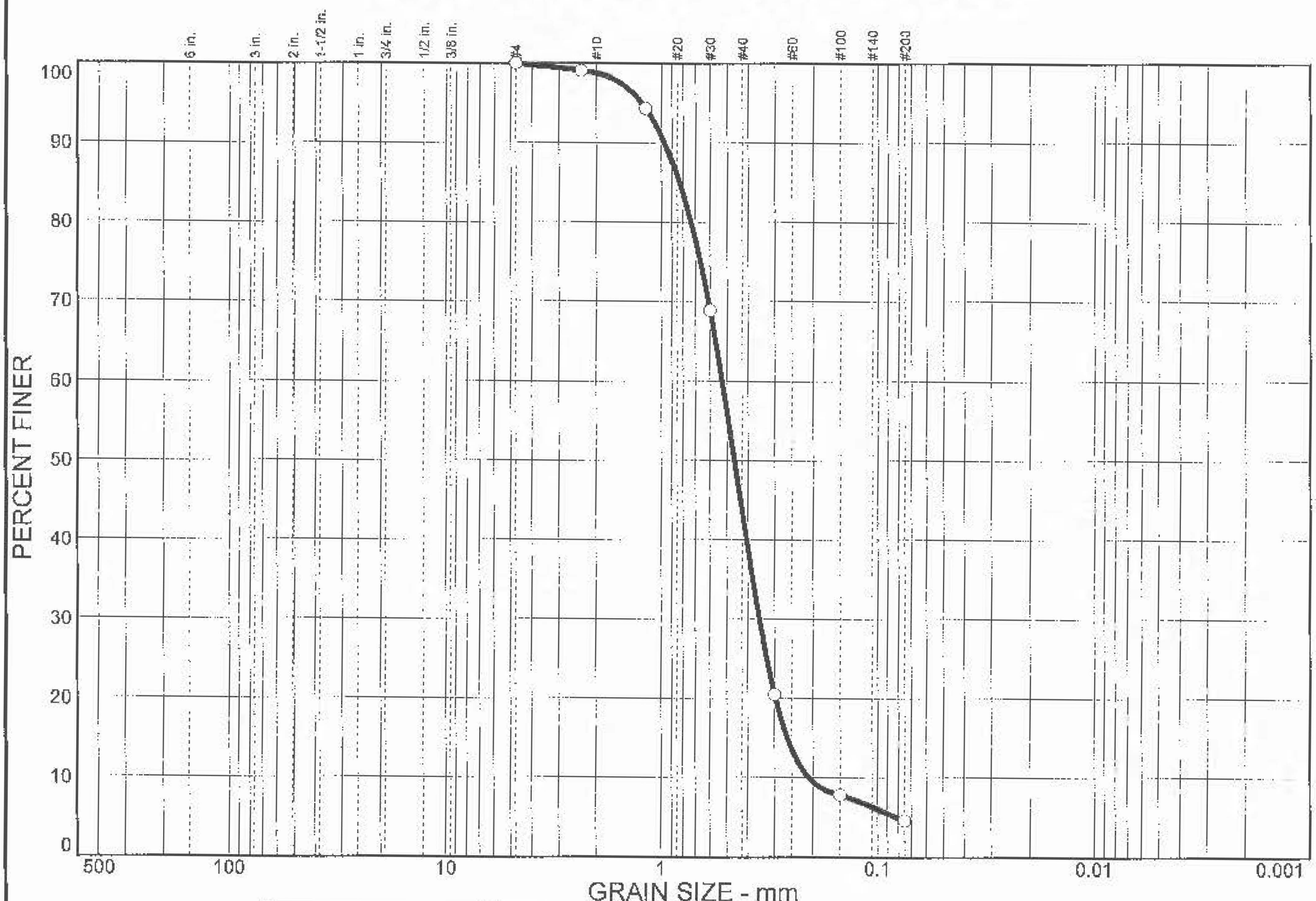
Sample No.: B-9 **Source of Sample:** **Date:** 7/29/19
Location: **Elev./Depth:** 15-16.5'

Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: Proposed Drive Shack Restaurant & Golf Driving Range
Project No: E40550.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	95.5	4.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.1		
#16	94.3		
#30	68.9		
#50	20.5		
#100	7.8		
#200	4.5		

* (no specification provided)

Material Description

Poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.829 D_{60}= 0.527 D_{50}= 0.462
D_{30}= 0.353 D_{15}= 0.262 D_{10}= 0.209
C_u= 2.52 C_c= 1.13

Classification

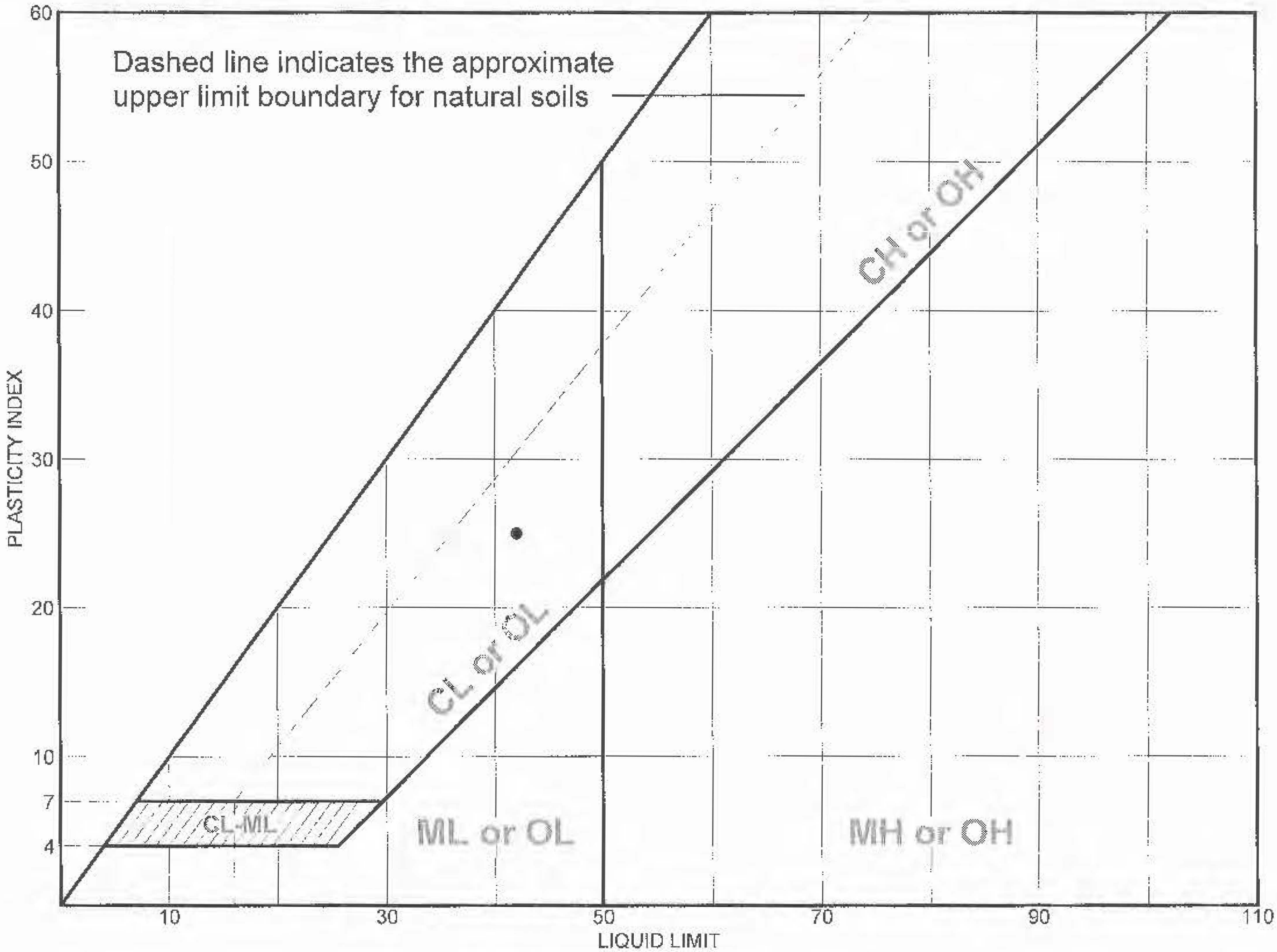
USCS= SP AASHTO=

Remarks

Sample No.: B-11 **Source of Sample:** **Date:** 7/15/19
Location: **Elev./Depth:** 20-21.5'

Moore Twining Associates, Inc.	**Client:**
	Project: Proposed Drive Shack Restaurant & Golf Driving Range
Fresno, CA	**Project No:** E40550.01 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	42	17	25			CL

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-2 **Elev./Depth:** 35-36.5'

Remarks:

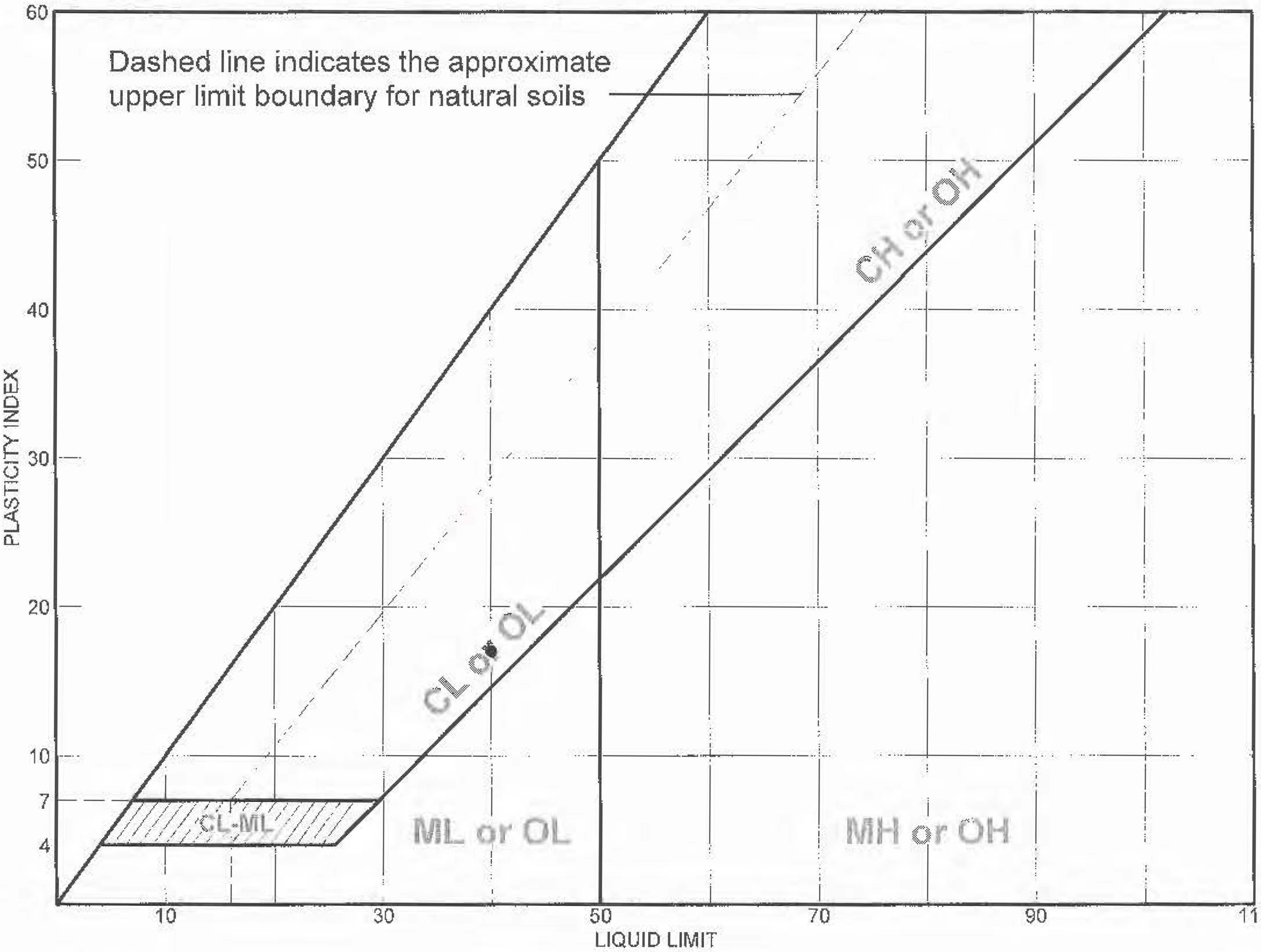
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	40	23	17	99.7	98.0	CL

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-2 **Elev./Depth:** 60-61.5'

Remarks:

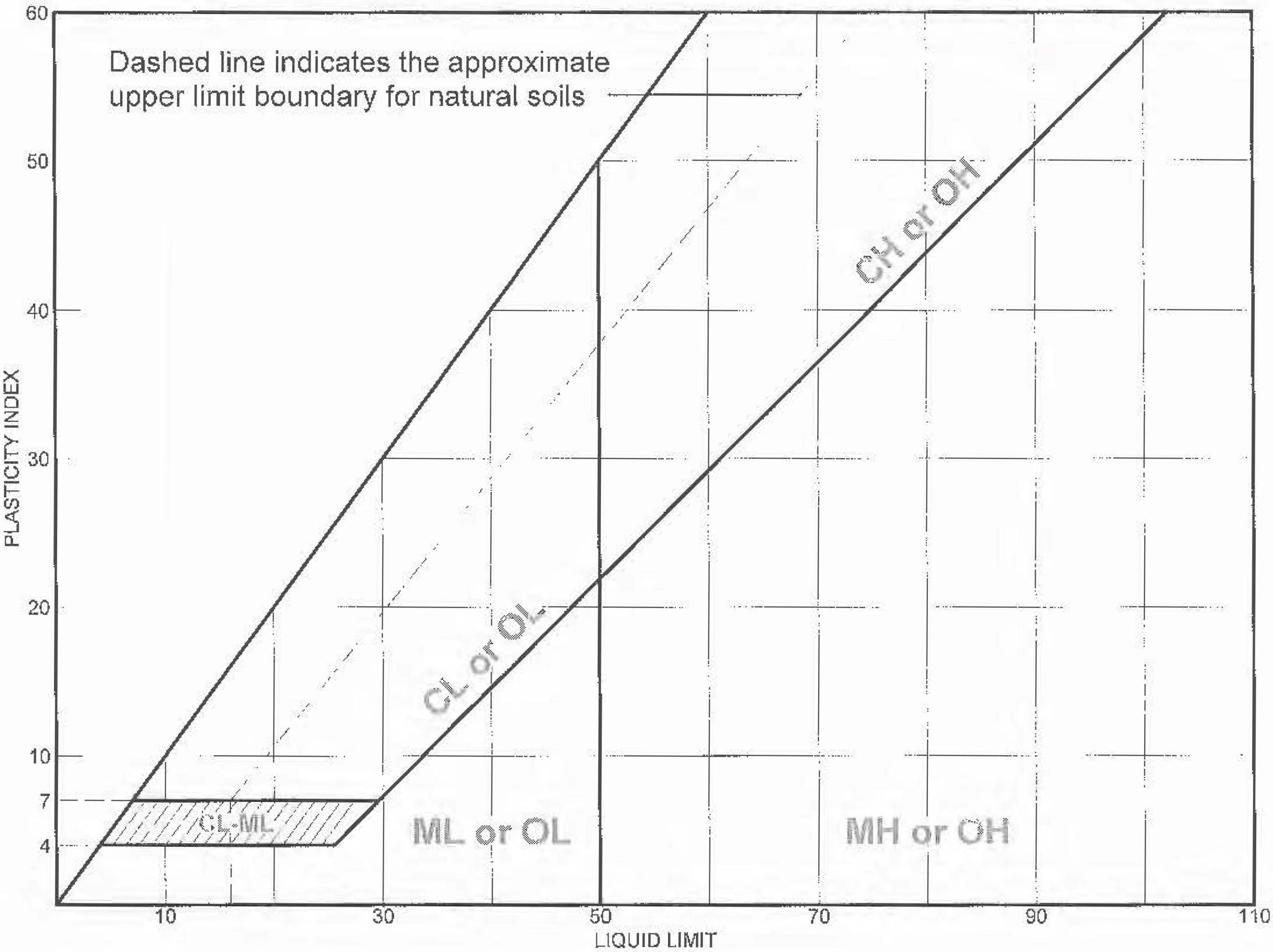
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty sand	NV	NP	NP	72.5	27.3	SM

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-5 **Elev./Depth:** 18.5-20.0'

Remarks:

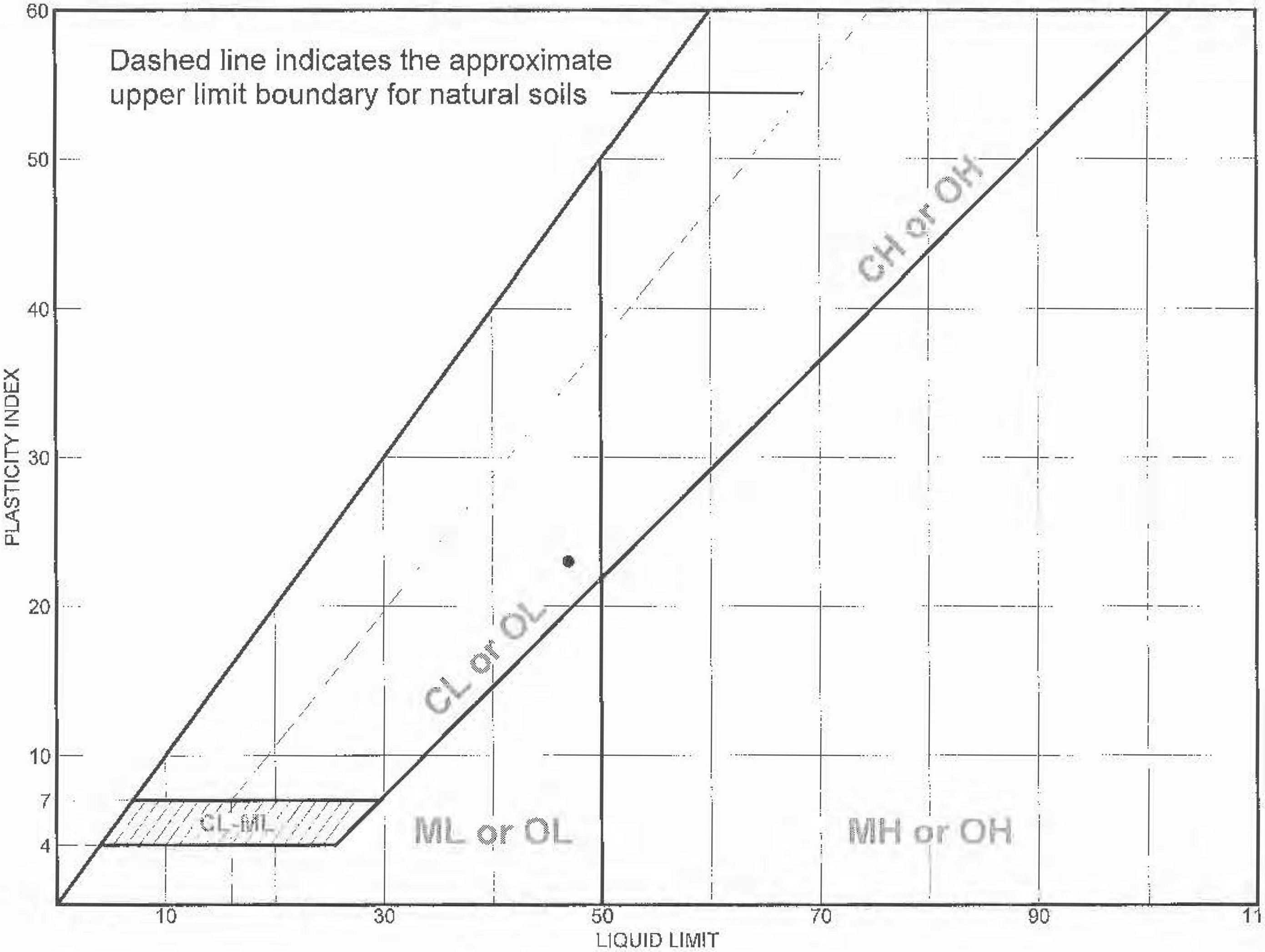
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	47	24	23			CL

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-7 **Elev./Depth:** 5-6.5'

Remarks:

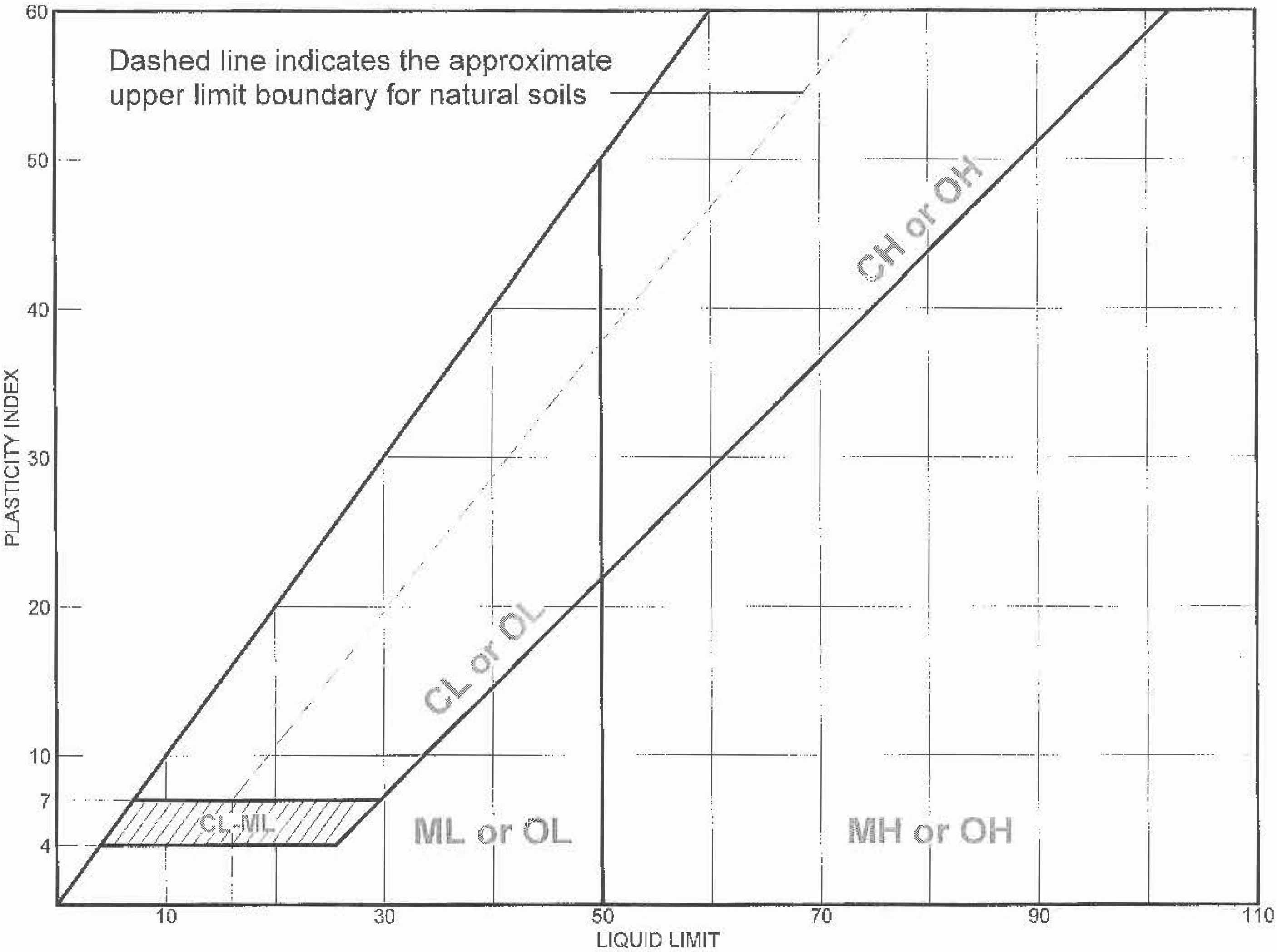
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Poorly graded sand	NV	NP	NP	90.6	3.2	SP

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-9 **Elev./Depth:** 15-16.5'

Remarks:

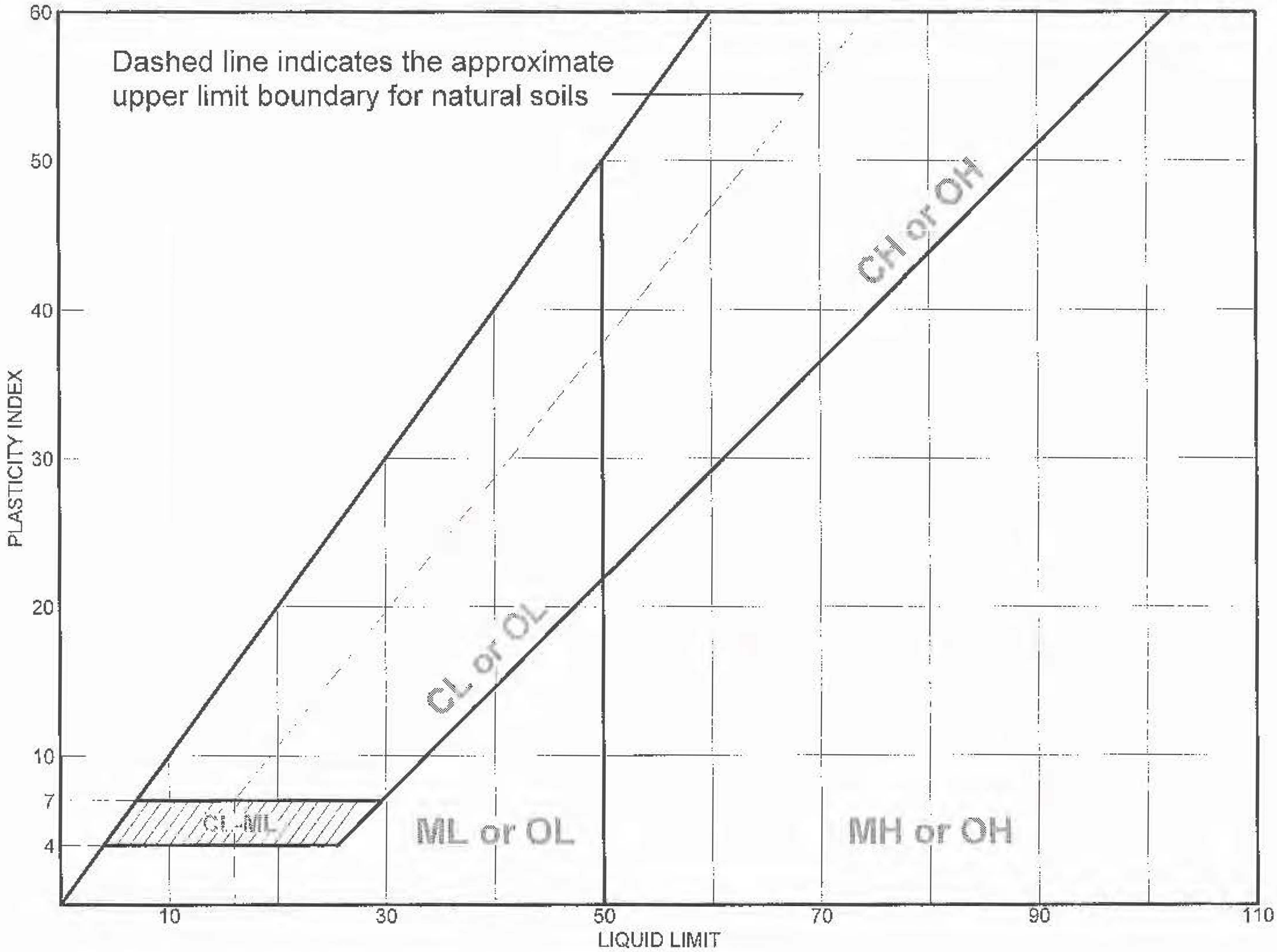
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty sand	NV	NP	NP			SM

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-11 **Elev./Depth:** 15-16.5'

Remarks:

●

Moore Twining Associates, Inc.

Fresno, CA

Figure

MOORE TWINING
ASSOCIATES, INC.

EXPANSION INDEX TEST, ASTM D4829

MTA PROJECT NAME:	Proposed Drive Shack Restaurant and Golf Driving Range	REPORT DATE:	8/19/2019
		TEST DATE:	7/12/2019
MTA PROJECT NO.:	E40550.01		
SAMPLE I.D.:	B-2 @ 0-5'		
SAMPLED BY:	JC		
SAMPLE DATE:	7/29/2019	TESTED BY:	MA

MATERIALS DESCRIPTION: Silty sand

% PASSING # 4 SIEVE: 100

Initial Moisture Determination:		Final Moisture Determination:	
Pan + Wet Soil Wt., gm	250.0	Wet Soil Wt., lbs	0.9714
Pan + Dry Soil Wt., gm	231.8	Dry Soil Wt., lbs	0.8577
Pan Wt., gm	0.0		
Initial % Moisture Content	7.9	Final % Moisture Content	13.3

Initial Expansion Data:		**Final Expansion Data:**	
Ring + Sample Wt., lbs	0.9250	Ring + Sample Wt., lbs	0.9714
Ring Wt., lbs	0.0000	Ring Wt., lbs	0.0000
Remolded Wt., lbs	0.9250	Remolded Wt., lbs	0.9714
Remolded Wet Density, pcf	127.2	Remolded Wet Density, pcf	133.6
Remolded Dry Density, pcf	117.9	Remolded Dry Density, pcf	118.0

Expansion Data:

Initial Volume	Final Volume
0.00727222	0.007269

Initial Gage Reading, in:	0.0500
Final Gage Reading, in:	0.0496
Expansion, in:	-0.0004
Expansion Index	0

Comments: **Very Low Expansion Potential**

Classification of Expansive Soils. (Table No.1 From ASTM D4829)

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

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EXPANSION INDEX TEST, ASTM D4829

MTA PROJECT NAME:	Proposed Drive Shack Restaurant and Golf Driving Range	REPORT DATE:	8/19/2019
		TEST DATE:	7/12/2019
MTA PROJECT NO.:	E40550.01		
SAMPLE I.D.:	B-4 @ 3-5'		
SAMPLED BY:	JC		
SAMPLE DATE:	7/22/2019	TESTED BY:	MA

MATERIALS DESCRIPTION: Sandy lean clay

% PASSING # 4 SIEVE 100

Initial Moisture Determination:		Final Moisture Determination:	
Pan + Wet Soil Wt., gm	250.0	Wet Soil Wt., lbs	0.8018
Pan + Dry Soil Wt., gm	205.8	Dry Soil Wt., lbs	0.5782
Pan Wt., gm	0.0		
Initial % Moisture Content	21.5	Final % Moisture Content	38.7

Initial Expansion Data:		**Final Expansion Data:**	
Ring + Sample Wt., lbs	0.7024	Ring + Sample Wt., lbs	0.8018
Ring Wt., lbs	0.0000	Ring Wt., lbs	0.0000
Remolded Wt., lbs	0.7024	Remolded Wt., lbs	0.8018
Remolded Wet Density, pcf	96.6	Remolded Wet Density, pcf	108.2
Remolded Dry Density, pcf	79.5	Remolded Dry Density, pcf	78.0

Expansion Data:

Initial Volume	Final Volume
0.00727222	0.007412

Initial Gage Reading, in:	0.0500
Final Gage Reading, in:	0.0692
Expansion, in:	0.0192
Expansion Index	19

Comments: **Very Low Expansion Potential**

Classification of Expansive Soils. (Table No.1 From ASTM D4829)

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

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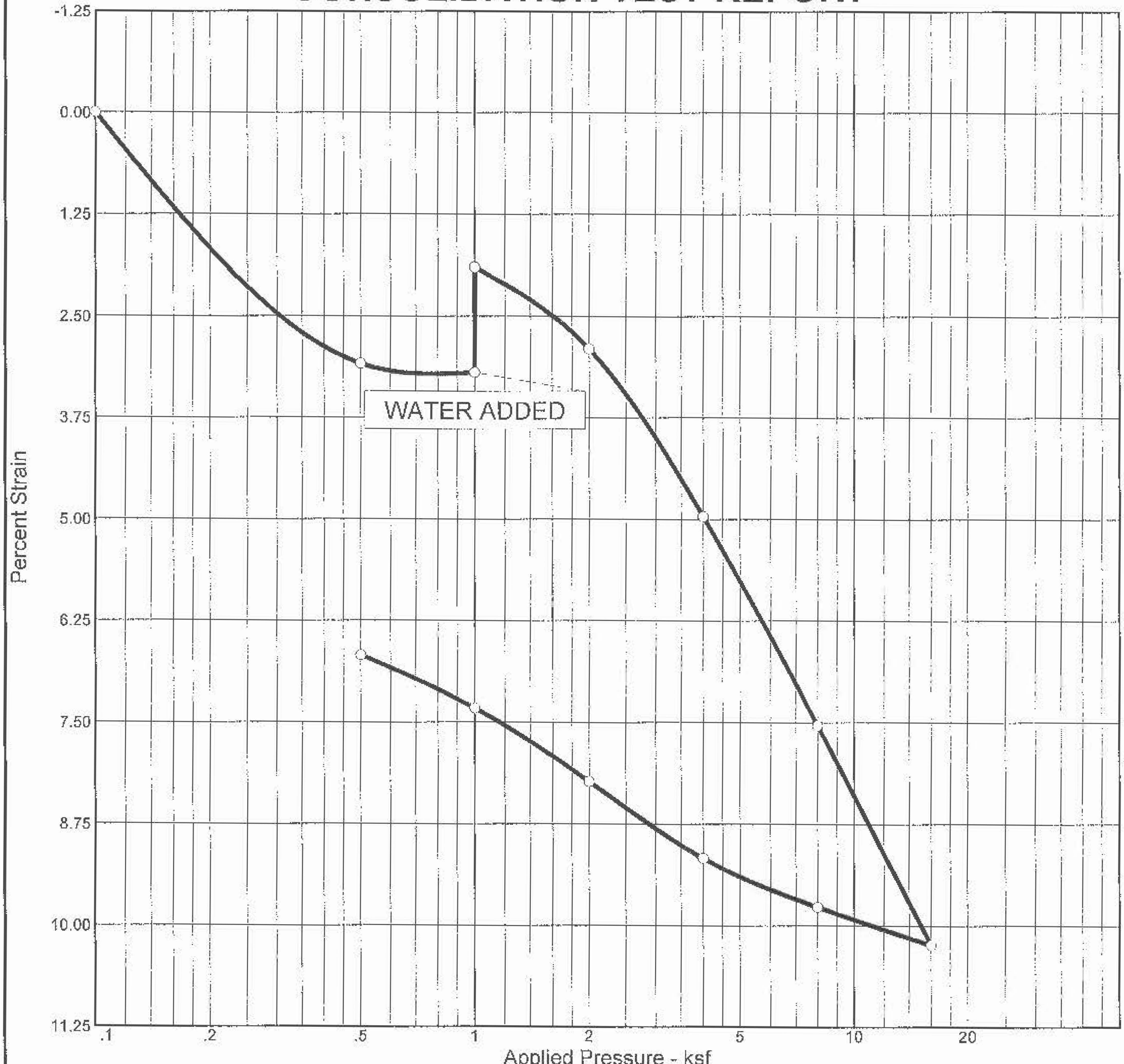
2527 Fresno Street
Fresno, CA 93721

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
84.3 %	14.7 %	113.1			2.65		2.64	0.13	0.03	2.26	1.3	0.462

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy lean clay	CL	

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Source: **Sample No.:** B-4 **Elev./Depth:** 8.5-10'

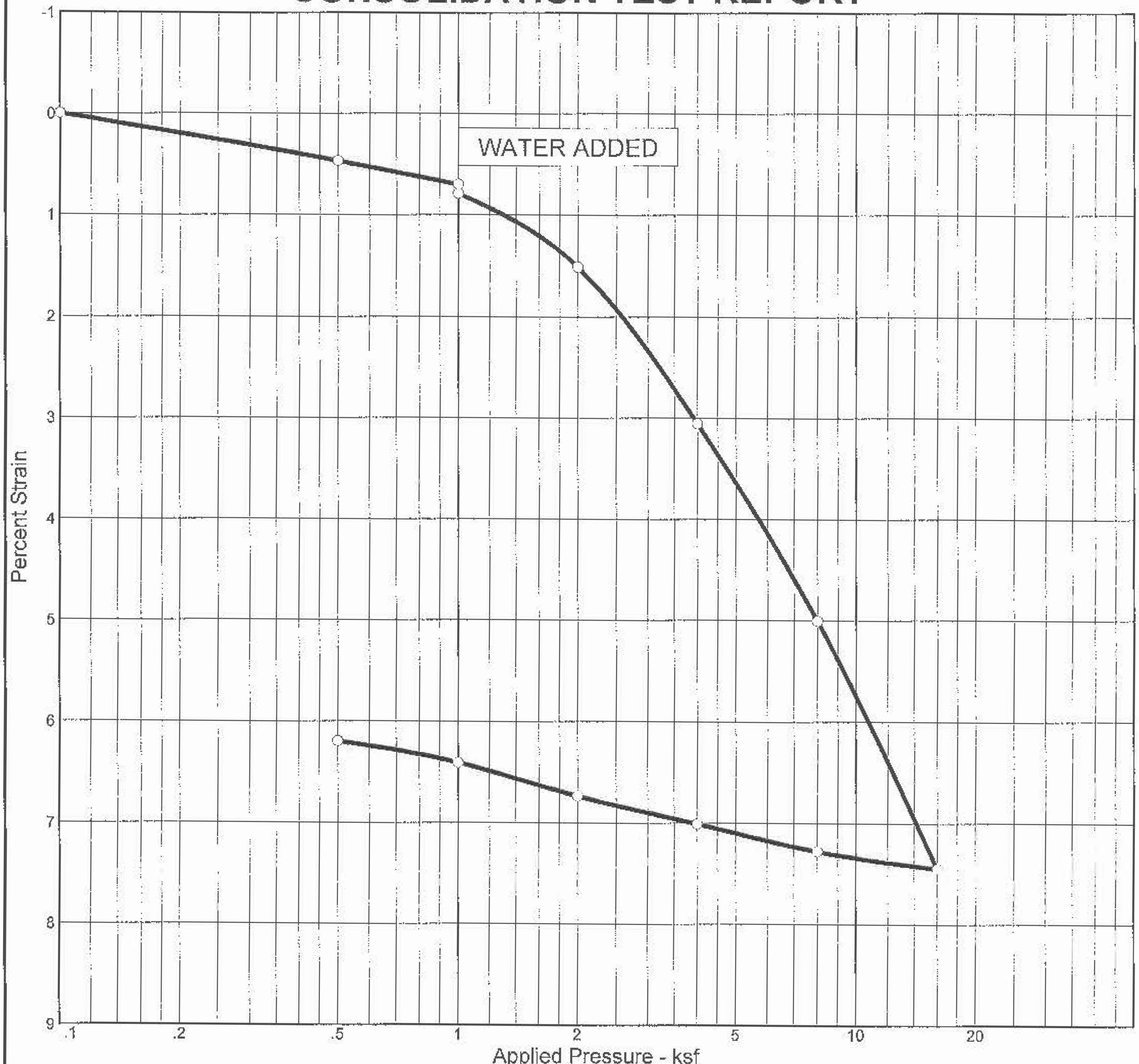
Moore Twining Associates, Inc.

Fresno, CA

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
10.2 %	2.0 %	109.1			2.65		3.46	0.12	0.01		0.1	0.517

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy lean clay	CL	

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

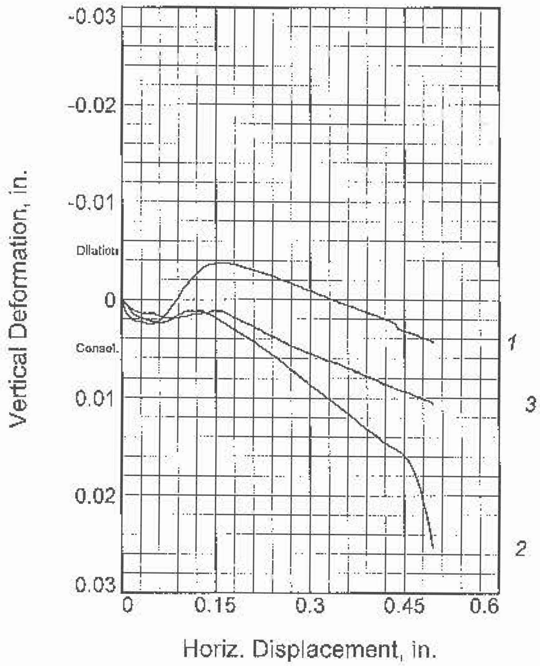
Source: **Sample No.:** B-8 **Elev./Depth:** 5-6.5'

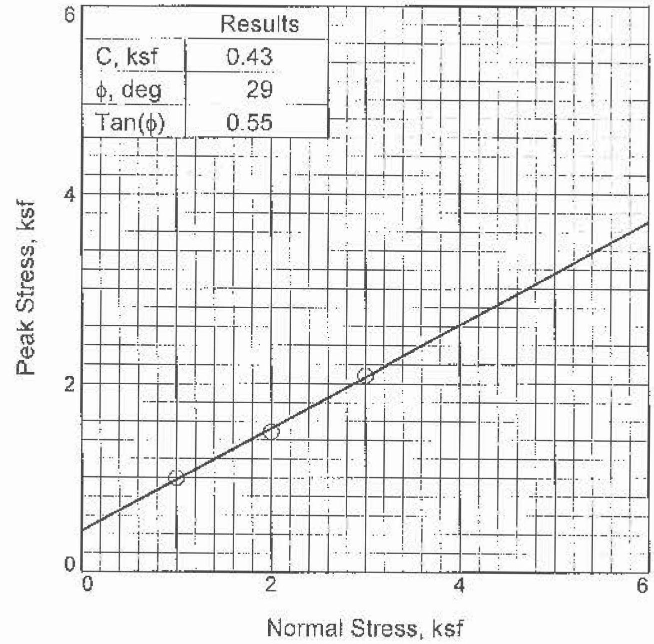
Moore Twining Associates, Inc.

Fresno, CA

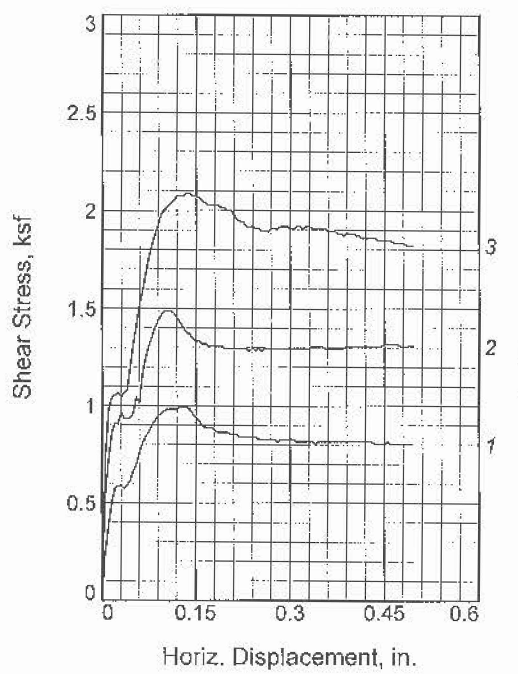
Remarks:

Figure





	Results
C, ksf	0.43
ϕ, deg	29
Tan(ϕ)	0.55



Sample No.		1	2	3
Initial	Water Content, %	26.0	27.5	27.7
	Dry Density, pcf	96.4	95.6	98.9
	Saturation, %	96.2	99.6	109.2
	Void Ratio	0.7154	0.7311	0.6730
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	24.6	24.3	24.5
	Dry Density, pcf	99.6	99.6	103.9
	Saturation, %	98.7	97.6	109.9
	Void Ratio	0.6605	0.6610	0.5918
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.97	0.96	0.95
Normal Stress, ksf		1.00	2.00	3.00
Peak Stress, ksf		1.00	1.49	2.09
Displacement, in.		0.13	0.10	0.14
Ultimate Stress, ksf				
Displacement, in.				
Strain at peak, %		5.2	4.1	5.6

Sample Type:

Description: Sandy lean clay

LL= 42 **PL=** 17 **PI=** 25

Specific Gravity= 2.65

Remarks:

Figure _______

Client:

Project: Proposed Drive Shack Restaurant & Golf Driving Range

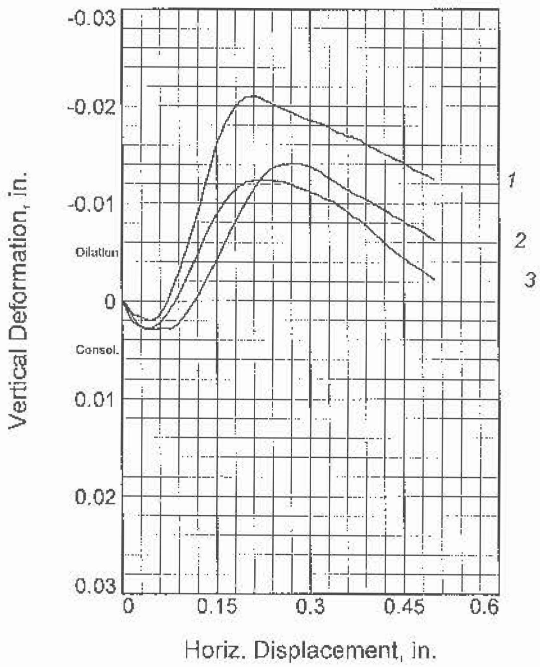
Sample Number: B-2 **Depth:** 35-36.5'

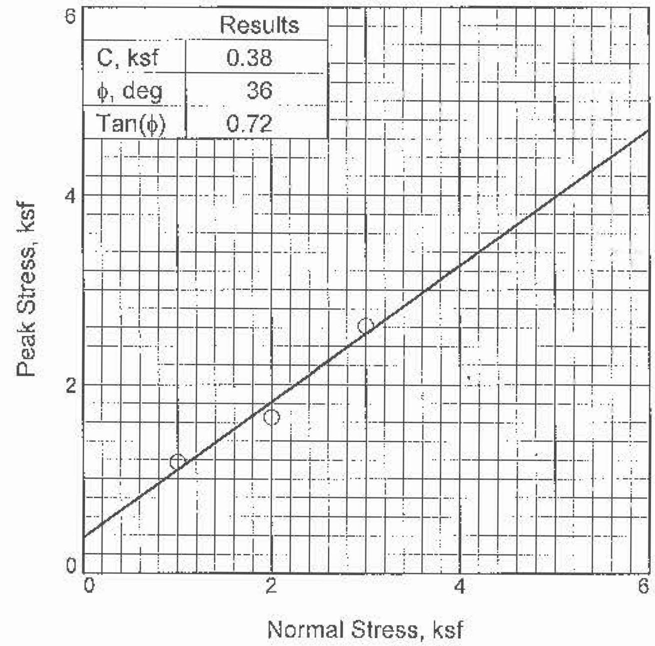
Proj. No.: E40550.01 **Date Sampled:** 7/22/19

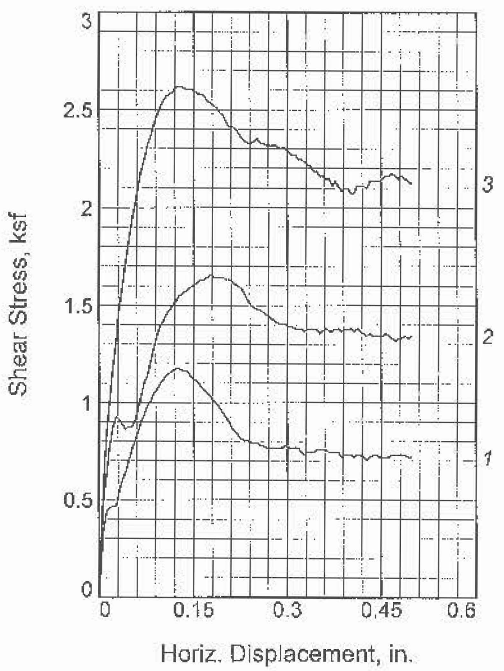
DIRECT SHEAR TEST REPORT

Moore Twining Associates, Inc.

Fresno, CA







	Sample No.	1	2	3
Initial	Water Content, %	18.4	12.6	14.9
	Dry Density, pcf	99.8	97.2	93.4
	Saturation, %	74.2	47.5	51.4
	Void Ratio	0.6576	0.7016	0.7712
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	23.3	24.0	26.4
	Dry Density, pcf	101.5	99.5	96.2
	Saturation, %	98.0	96.2	97.3
	Void Ratio	0.6303	0.6619	0.7193
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.98	0.98	0.97
	Normal Stress, ksf	1.00	2.00	3.00
	Peak Stress, ksf	1.18	1.66	2.62
	Displacement, in.	0.12	0.18	0.12
	Ultimate Stress, ksf			
	Displacement, in.			
	Strain at peak, %	5.0	7.3	5.0

Sample Type:

Description: Silty sand

Specific Gravity= 2.65

Remarks:

Figure ________

Client:

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-3 **Depth:** 25-26.5'

Proj. No.: E40550.01 **Date Sampled:** 7/22/19

DIRECT SHEAR TEST REPORT

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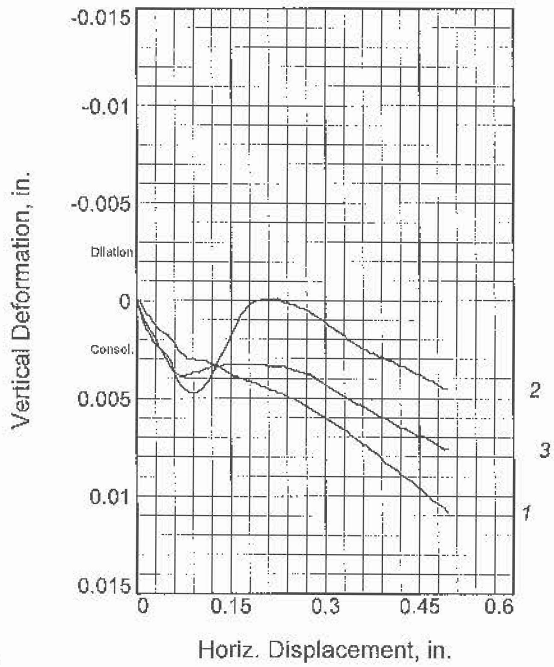
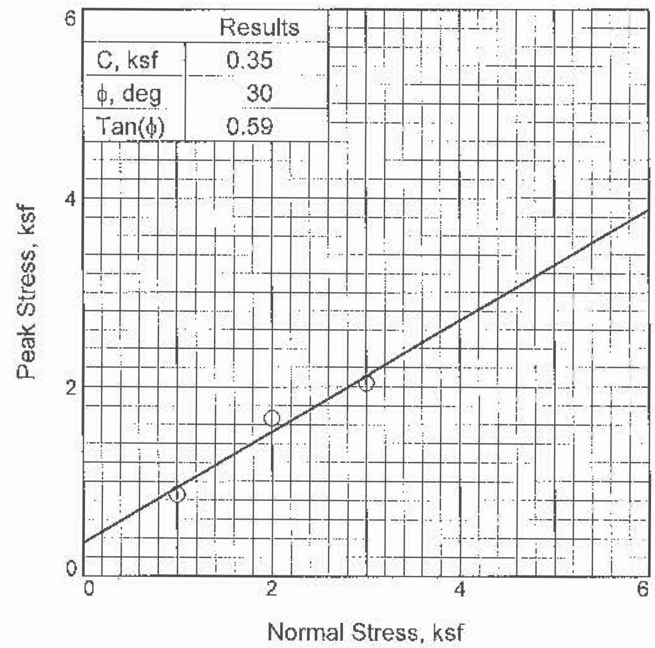
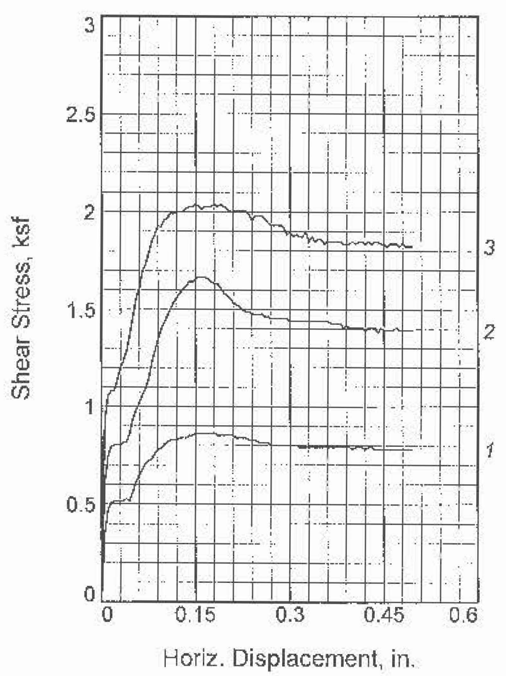
Fresno, CA







	Sample No.	1	2	3
Initial	Water Content, %	35.0	32.2	31.8
	Dry Density, pcf	83.3	88.7	89.2
	Saturation, %	94.1	98.7	98.6
	Void Ratio	0.9868	0.8658	0.8536
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	34.2	29.5	29.1
	Dry Density, pcf	86.3	92.3	93.1
	Saturation, %	99.0	98.7	99.1
	Void Ratio	0.9165	0.7929	0.7765
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.96	0.96	0.96
	Normal Stress, ksf	1.00	2.00	3.00
	Peak Stress, ksf	0.86	1.67	2.04
	Displacement, in.	0.15	0.16	0.15
	Ultimate Stress, ksf			
	Displacement, in.			
	Strain at peak, %	6.2	6.4	6.2

Sample Type:

Description: Silty sand

LL= NV **PI=** NP

Specific Gravity= 2.65

Remarks:

Figure ______

Client:

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-5 **Depth:** 18.5-20.0'

Proj. No.: E40550.01 **Date Sampled:** 7/22/19

DIRECT SHEAR TEST REPORT

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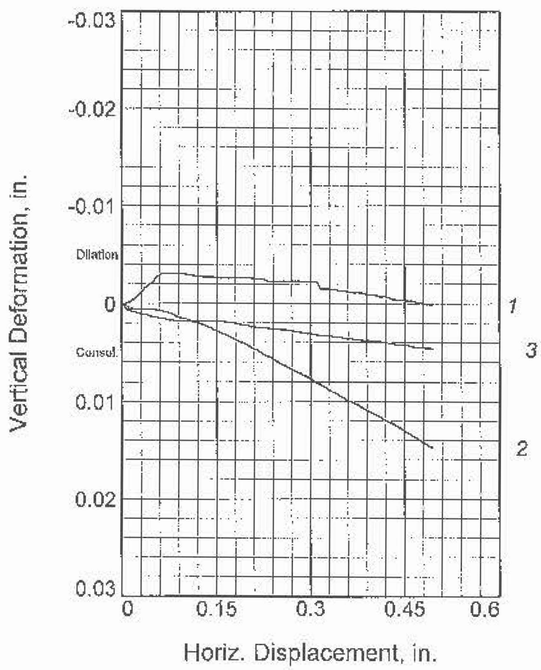

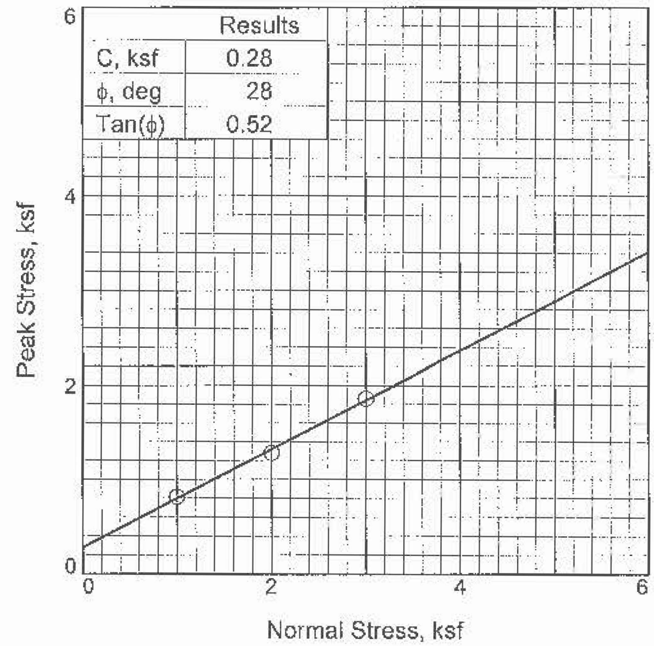

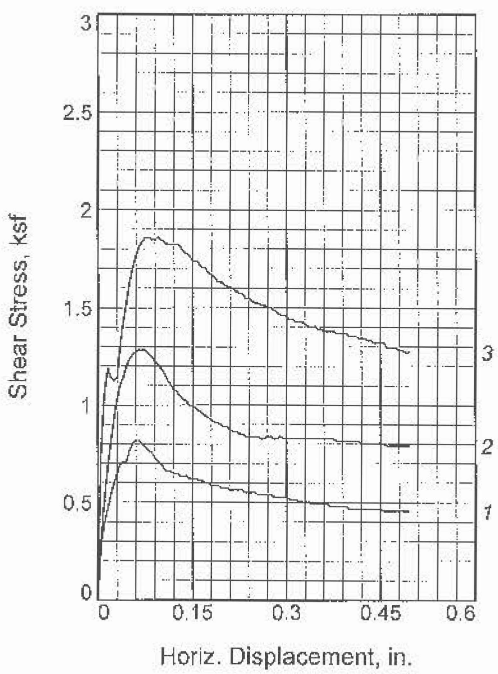

	Sample No.	1	2	3
Initial	Water Content, %	34.5	36.2	33.4
	Dry Density, pcf	83.8	83.3	86.6
	Saturation, %	93.8	97.4	97.4
	Void Ratio	0.9750	0.9849	0.9097
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	35.1	35.4	33.4
	Dry Density, pcf	85.2	85.0	88.6
	Saturation, %	98.9	99.2	102.1
	Void Ratio	0.9406	0.9452	0.8680
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.98	0.98	0.98
Normal Stress, ksf		1.00	2.00	3.00
Peak Stress, ksf		0.82	1.28	1.86
Displacement, in.		0.06	0.07	0.08
Ultimate Stress, ksf				
Displacement, in.				
Strain at peak, %		2.5	2.7	3.1

Sample Type:
Description: Lean clay

LL= 47 **PL=** 24 **PI=** 23
Specific Gravity= 2.65
Remarks:

Figure ________

Client:

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-7 **Depth:** 5-6.5'

Proj. No.: E40550.01 **Date Sampled:** 7/22/19

DIRECT SHEAR TEST REPORT
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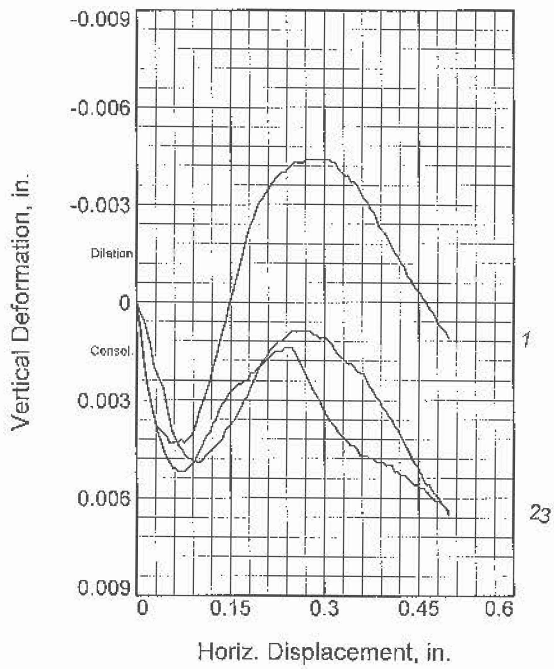
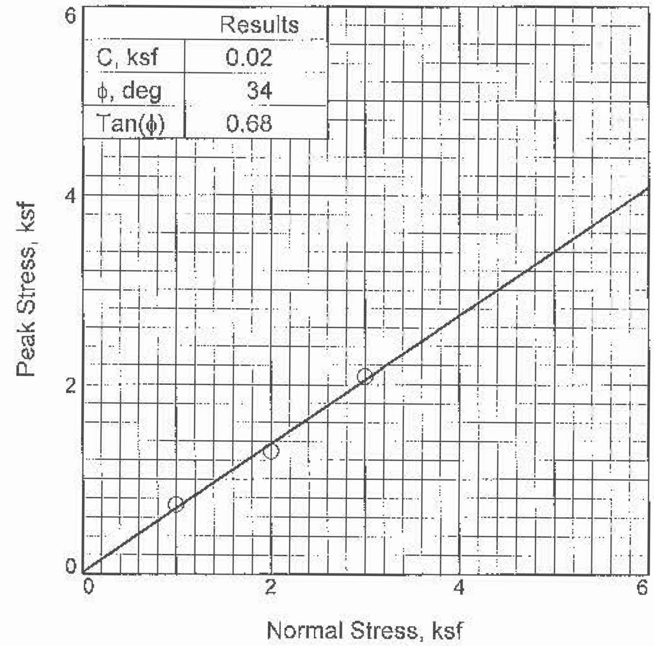
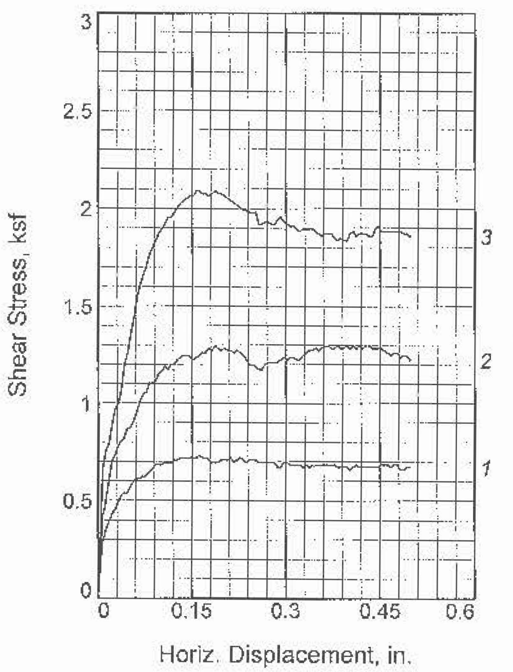
Fresno, CA







	Sample No.	1	2	3
Initial	Water Content, %	16.6	10.7	17.6
	Dry Density, pcf	80.6	87.2	87.9
	Saturation, %	41.8	31.5	52.8
	Void Ratio	1.0524	0.8978	0.8817
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	37.2	31.5	30.2
	Dry Density, pcf	81.7	88.7	89.7
	Saturation, %	96.1	96.4	95.0
	Void Ratio	1.0259	0.8648	0.8439
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.99	0.98	0.98
	Normal Stress, ksf	1.00	2.00	3.00
	Peak Stress, ksf	0.73	1.30	2.09
	Displacement, in.	0.16	0.19	0.16
	Ultimate Stress, ksf			
	Displacement, in.			
	Strain at peak, %	6.7	7.7	6.5

Sample Type:

Description: Silty sand

Specific Gravity= 2.65

Remarks:

Figure _______

Client:

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-9 **Depth:** 10-11.5'

Proj. No.: E40550.01 **Date Sampled:** 7/22/19

DIRECT SHEAR TEST REPORT
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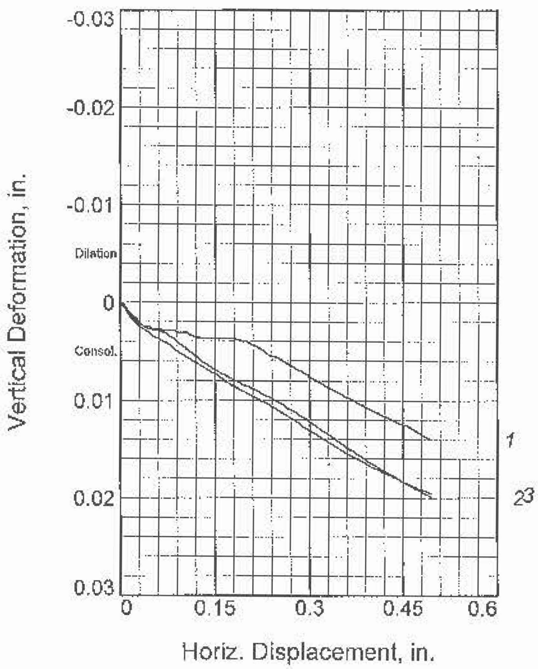
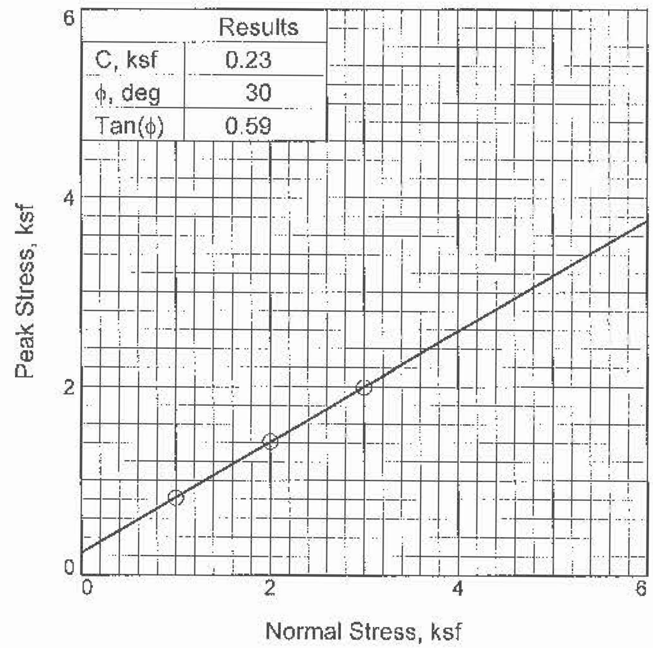
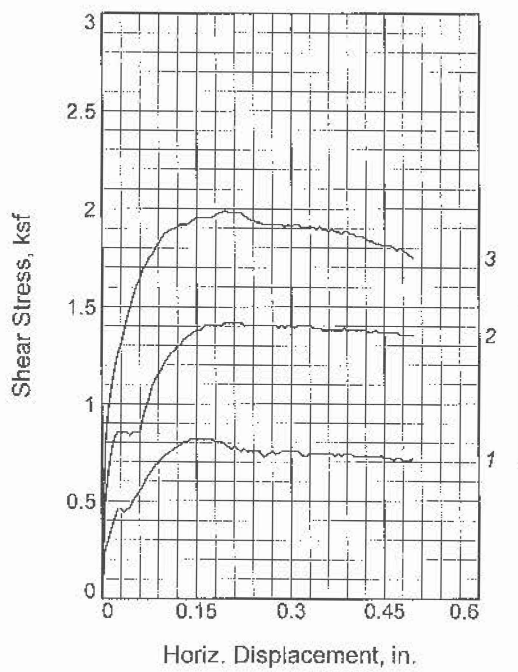
Fresno, CA







	Sample No.	1	2	3
Initial	Water Content, %	30.9	31.9	33.2
	Dry Density, pcf	79.1	80.6	80.8
	Saturation, %	75.1	80.2	84.0
	Void Ratio	1.0922	1.0524	1.0482
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	38.6	36.8	35.3
	Dry Density, pcf	81.5	83.2	83.9
	Saturation, %	99.3	98.6	96.1
	Void Ratio	1.0305	0.9888	0.9726
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.97	0.97	0.96
	Normal Stress, ksf	1.00	2.00	3.00
	Peak Stress, ksf	0.82	1.42	1.99
	Displacement, in.	0.14	0.20	0.20
	Ultimate Stress, ksf			
	Displacement, in.			
	Strain at peak, %	5.8	8.1	8.1

Sample Type:

Description: Sandy lean clay

Specific Gravity= 2.65

Remarks:

Figure _______

Client:

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-16 **Depth:** 3.5-5'

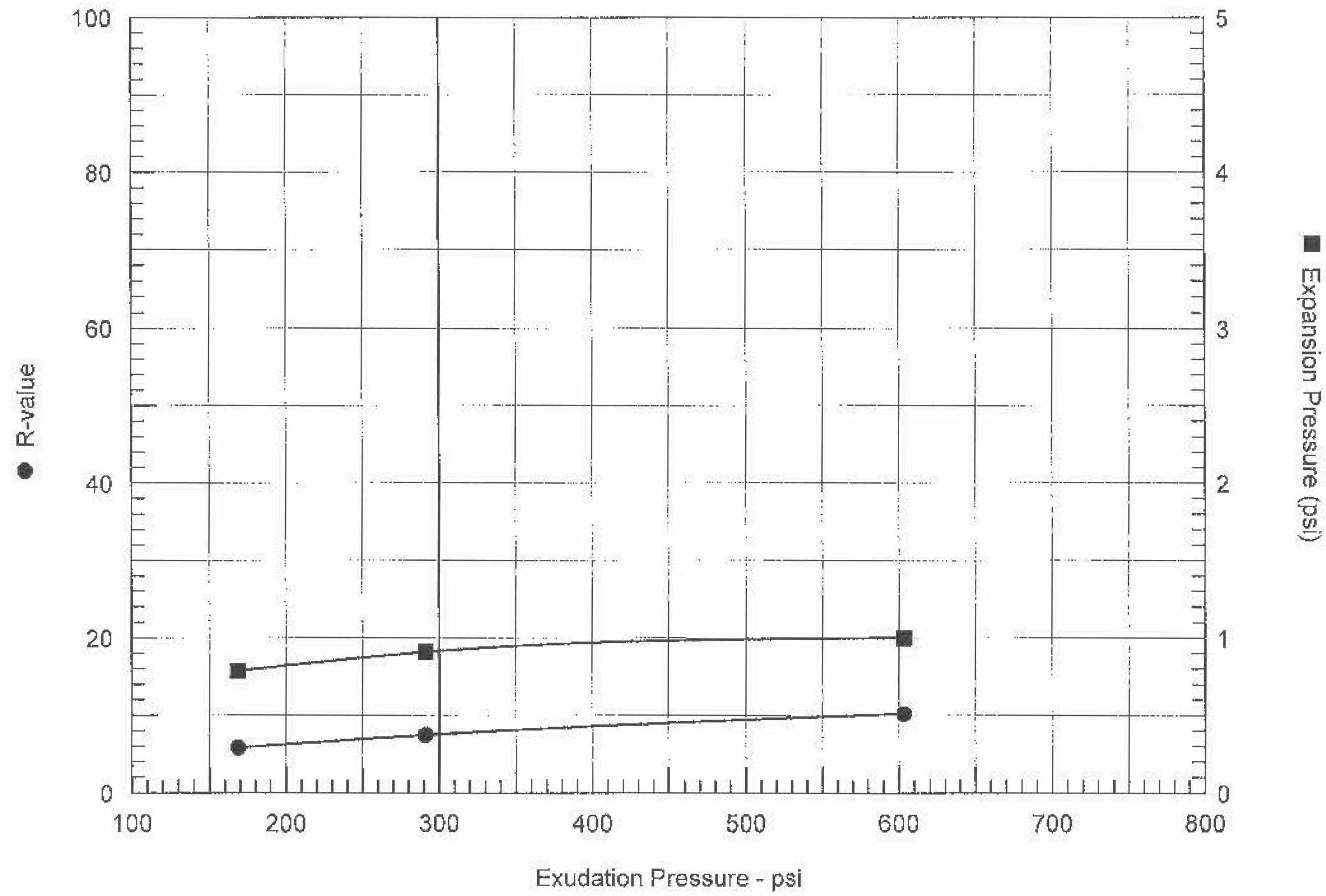
Proj. No.: E40550.01 **Date Sampled:** 7/22/19

DIRECT SHEAR TEST REPORT

Moore Twining Associates, Inc.

Fresno, CA

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	50	115.1	15.7	1.00	127	2.46	603	10	10
2	30	110.4	17.8	0.79	139	2.57	169	6	6
3	30	112.6	16.7	0.91	134	2.51	291	7	7

Test Results	Material Description
R-value at 300 psi exudation pressure = 8 **Exp. pressure at 300 psi exudation pressure =** 0.92 psi	Sandy lean clay

Project No.: E40550.01

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-12 **Depth:** 0.7-5'

Date: 9/13/2019

Tested by:

Checked by:

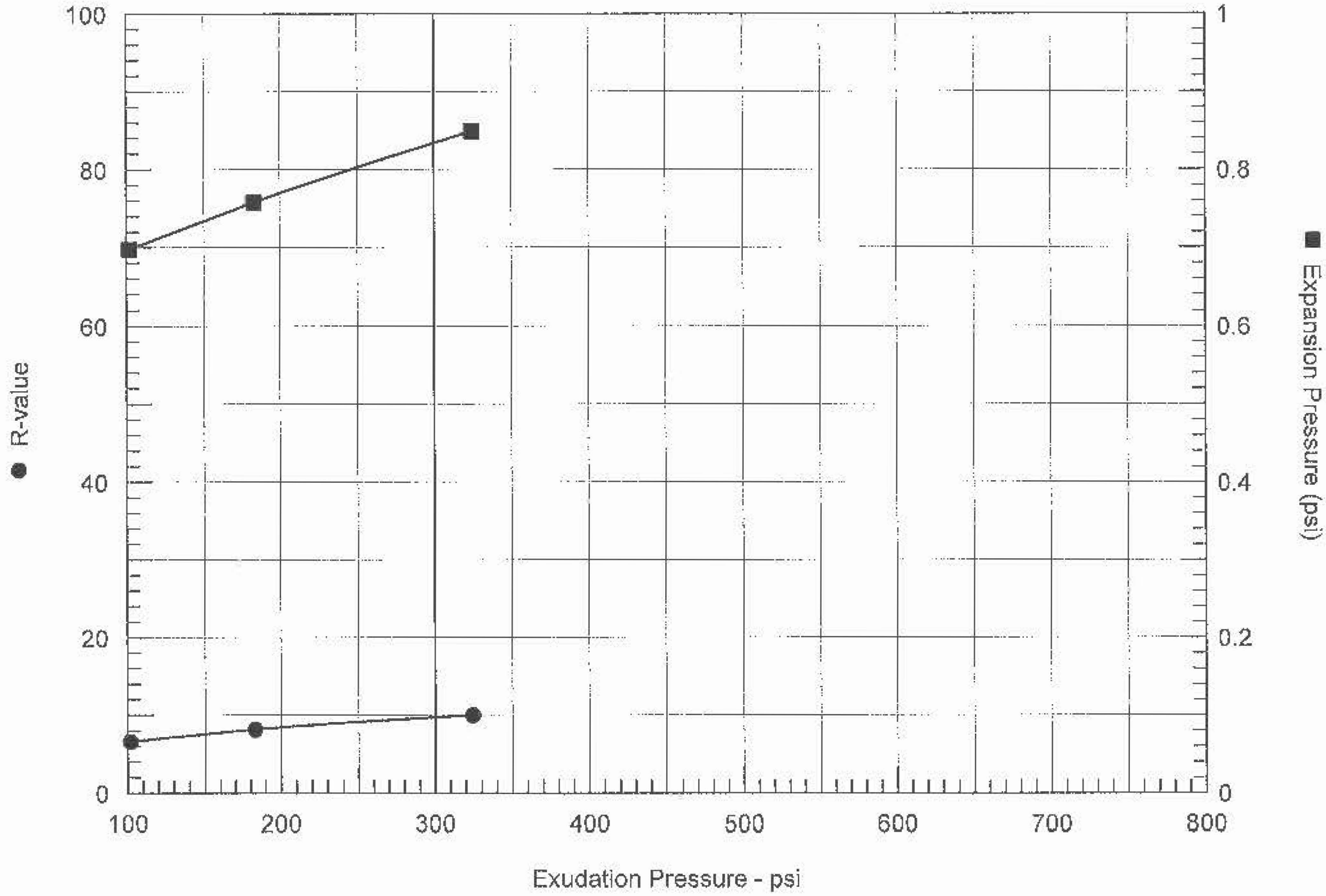
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	100	99.7	25.8	0.85	130	2.52	325	10	10
2	30	96.7	28.2	0.70	139	2.61	102	6	7
3	50	97.9	27.0	0.76	135	2.57	183	8	8

Test Results	Material Description
R-value at 300 psi exudation pressure = 10 **Exp. pressure at 300 psi exudation pressure =** 0.83 psi	Lean clay

Project No.: E40550.01

Project: Proposed Drive Shack Restaurant & Golf Driving Range

Sample Number: B-7 **Depth:** 0-5'

Date: 9/13/2019

Tested by:

Checked by:

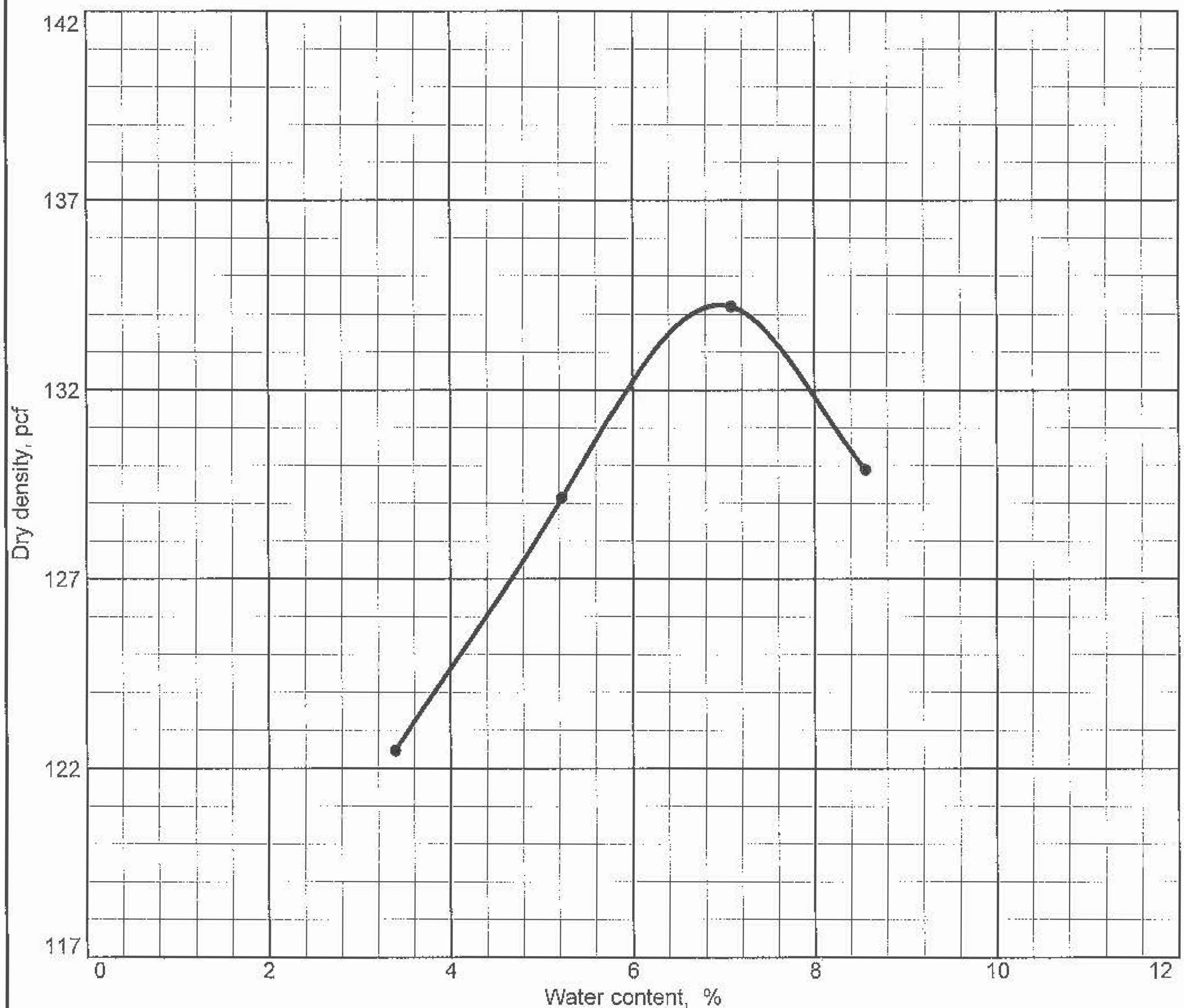
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure ______

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0-5'							1.4	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 134.3 pcf Optimum moisture = 7.0 %	Silty sand

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-2 **Elev./Depth:** 0-5'

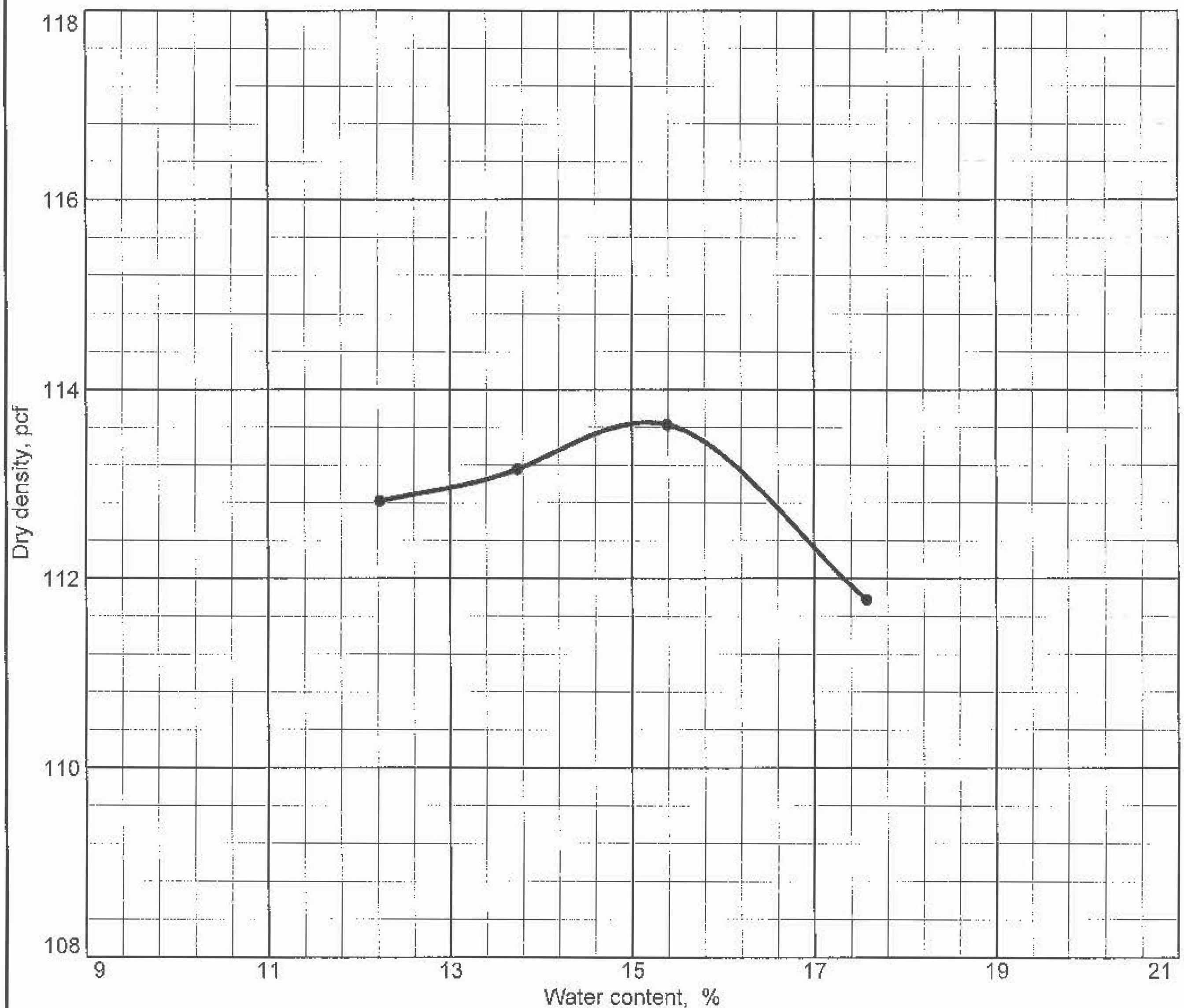
Remarks:

Moore Twining Associates, Inc.

Fresno, CA

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0-5'							0.8	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 113.7 pcf Optimum moisture = 15.2 %	Lean clay

Project No. E40550.01 **Client:**

Project: Proposed Drive Shack Restaurant & Golf Driving Range

● **Source:** **Sample No.:** B-7 **Elev./Depth:** 0-5'

Remarks:

Moore Twining Associates, Inc.

Fresno, CA

Figure

MOORE TWINING ASSOCIATES, INC.
California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

August 14, 2019

Work Order #: **FH07003**

Zubair Anwar
MTA Geotechnical Division
2527 Fresno Street
Fresno, CA 93721

RE: Proposed Drive Shack & Golf Driving Range

Enclosed are the analytical results for samples received by our laboratory on **08/07/19** . For your reference, these analyses have been assigned laboratory work order number **FH07003**.

All analyses have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, Moore Twining Associates, Inc. (MTA) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

Moore Twining Associates, Inc.

Susan Federico

Susan Federico
Client Services Representative

MOORE TWINING
ASSOCIATES, INC.
California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

MTA Geotechnical Division 2527 Fresno Street Fresno CA, 93721	**Project:** Proposed Drive Shack & Golf Driving Range **Project Number:** E40550.01 **Project Manager:** Zubair Anwar	**Reported:** 08/14/2019

Analytical Report for the Following Samples

Sample ID	Notes	Laboratory ID	Matrix	Date Sampled	Date Received
B4 @ 3 - 5		FH07003-01	Soil	08/07/19 00:00	08/07/19 09:18
B9 @ 0 - 5		FH07003-02	Soil	08/07/19 00:00	08/07/19 09:18

MOORE TWINING ASSOCIATES, INC.
California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

MTA Geotechnical Division 2527 Fresno Street Fresno CA, 93721	**Project:** Proposed Drive Shack & Golf Driving Range **Project Number:** E40550.01 **Project Manager:** Zubair Anwar	**Reported:** 08/14/2019

B4 @ 3 - 5

FH07003-01 (Soil) Sampled: 08/07/19 00:00

Analyte	Flag	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Inorganics									
Chloride		**42**	6.0	mg/kg	3	B9H0712	08/07/19	08/09/19	ASTM D4327-84
Chloride		**0.0042**	0.00060	% by Weight	3	[CALC]	08/09/19	08/09/19	ASTM D4327-84
Sulfate as SO4		**0.029**	0.00060	% by Weight	3	[CALC]	08/09/19	08/09/19	ASTM D4327-84
pH		**7.8**	0.10	pH Units	1	B9H0712	08/07/19	08/09/19	ASTM D4972-89 Mod
Sulfate as SO4		**290**	6.0	mg/kg	3	B9H0712	08/07/19	08/09/19	ASTM D4327

B9 @ 0 - 5

FH07003-02 (Soil) Sampled: 08/07/19 00:00

Analyte	Flag	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Inorganics									
Chloride		**180**	12	mg/kg	6	B9H0712	08/07/19	08/09/19	ASTM D4327-84
Chloride		**0.018**	0.0012	% by Weight	6	[CALC]	08/09/19	08/09/19	ASTM D4327-84
Sulfate as SO4		**0.054**	0.0012	% by Weight	6	[CALC]	08/09/19	08/09/19	ASTM D4327-84
pH		**8.6**	0.10	pH Units	1	B9H0712	08/07/19	08/09/19	ASTM D4972-89 Mod
Sulfate as SO4		**540**	12	mg/kg	6	B9H0712	08/07/19	08/09/19	ASTM D4327

Notes and Definitions

µg/L	micrograms per liter (parts per billion concentration units)
mg/L	milligrams per liter (parts per million concentration units)
mg/kg	milligrams per kilogram (parts per million concentration units)
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

Analysis of pH, filtration, and residual chlorine is to take place immediately after sampling in the field.
If the test was performed in the laboratory, the hold time was exceeded. **(for aqueous matrices only)**

MOORE TWINING

CHAIN OF CUSTODY / ANALYSIS REQUEST

2527 Fresno Street • Fresno, CA 93721 • Phone (559) 268-7021 • Fax: (559) 268-0740

Analytical Chemistry Division
California ELAP Certification # 1371

Work Order #: F407003
Page 1 **of** 2

Report To:
Attention: Zubair Answar
Company Name:
Address:
Phone:
Email / Fax:

☐ **Invoice To:**
Attention:
Company Name:
Address:
Phone:
Email / Fax:

☐ **Report Copy To:**

Reporting:
☑ Standard Format ☐ PDF
☐ EDT (SWRCB) ☐ Excel
☐ Geotracker/COELT (LUFT)
Global ID:
☐ County Environmental Health:
☐ State Water Resources Control Board:
☐ Other:

Sample Information
Sampled By (Print):
Signature:
☐ Public System ☑ Routine
☐ Private Well ☐ Repeat
☐ Other ☐ Replacement

Turn Around Time
☐ Standard
☑ Rush, Due On: 5-days

Sample Types
Solid:
BS - Biosolid
CR - Ceramic
SL - Soil/Solid
Liquid:
DW - Drinking Water
GW - Ground Water
OL - Oil
SF - Surface Water
ST - Storm Water
WW - Wastewater

Project Information
Contract / P.O. No.:
Project: Proposed drive shack Resturant and golf driving Range
Project Number: E40550.01
Project Manager: Zubair Answar

Analysis Requested

Notes on Received Condition:
☐ Custody Seal(s) Broken ☐ Samples(s) Damaged
☐ On Ice ☐ Ambient Temp. ☐ Incorrect Preservation

Lab Use	Client Sample ID	Date	Time	Type	Corrosion											Station Code
1	B4@3-5	8/7/19	N/A	SL	✓											
2	B9@0-5	8/7/19	N/A	SL	✓											

Comments / Additional Instructions:

Relinquished By	Company	Date	Time	Received By	Company
Miguel Alcaraz	MTA/MAT	8-7-19	0918	[illegible]	MTA

Payment for services rendered as noted herein are due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in MTA's current Standard Terms and Conditions for Laboratory Services. The person signing for the Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody and agrees to MTA's terms and conditions for laboratory services unless contractually bound otherwise. MTA's current terms and conditions can be obtained by contacting our accounting department at (559) 268-7021.

FL-SC-0005-04 A

Moore Twining Associates

Sample Integrity Page 2 of 2 WO# FH07003 MTA Bottles: Yes or No

COC Info

Was temperature within range? Chemistry ≤6°C Micro <10°C Temp____°C	Yes No N/A	Did all bottle labels agree with COC?	Yes No N/A	Were there bubbles in VOA vials? **(Volatiles Only)**	Yes No N/A
If samples were taken today, is there evidence that chilling has begun? Recvd____C°	Yes No N/A	Was a sufficient amount of sample received?	Yes No N/A	Was PM notified of discrepancies? PM: By/Time:	Yes No N/A
Did all bottles arrive unbroken and intact?	Yes No N/A	Were correct containers and preservatives received for the tests requested?	Yes No N/A		
Do samples have a hold time <72 hours?	Yes No N/A				

Bottles Received

125ml (A) 250ml (B) 1Liter (C) 40ml VOA (V)	1-2															
Bacti $Na_2S_2O_3$																
None (P)																
Cr6 Buffer (P) Borate Carbonate Buffer																
HNO_3 (P)																
H_2SO_4 (P)																
NaOH (P)																
NaOH+ZnAc (P)																
Dissolved Oxygen 300ml (P)																
None (AG)																
None (CG) 500ml																
$Na_2S_2O_3$ 250ml (Brown P) 549																
$Na_2S_2O_3$ (AG)																
$Na_2S_2O_3$ (AG)																
Thio/K Citrate																
NH_4Cl (AG) 552																
HCl (AG)																
None (CG) 500ml																
H_3PO_4 (AG)																
Other:																
Plastic Bag	1															
Low Level Hg/Metals Double Bag																
Client Own																
Glass Jar: 125/ 250/ 500																
Soil Tube: Brass/ Steel/ Plastic																
5 g Encore																
Ascorboc Acid (AG) Voa																
1gallon Cubitainer																

Comments

Filter or Split

	Container	Preservative	Date/Time/Initials
S P F			
S P F			
S P F			
S P F			
S P F			

Labeled by: M @ 0947 Labels checked by: YG @ 0945 FL-SC-0003-06

MOORE TWINING ASSOCIATES, INC.

Project Name:	Proposed Drive Shack Restaurant and Golf Driving Range	Report Date:	8/22/2019
		Sample Date:	7/22/2019
Project Number:	E40550.01		
		Sampled By:	JC
Subject:	Minimum Resistivity, ASTM G187	Tested By:	MA
Material Description:	Clayey sand	Test Date:	8/20/2019
Location:	B-4 @ 3-5'		

Laboratory Test Results, Minimum Resistivity - ASTM G187

Total Water Added, mls	Resistivity, Ohm-cm
50 mls	66,700
100 mls	57,362
150 mls	40,687
200 mls	30,015
250 mls	13,340
300 mls	8,671
350 mls	6,337
400 mls	2,868
450 mls	2,935

Remarks: Min. Resistivity is 2,868 Ohm-cm

www.mooretwining.com

PH: 559.268.7021
FX: 559.268.7126
2527 Fresno Street
Fresno, CA 93721

MOORE TWINING
ASSOCIATES, INC.

Project Name:	Proposed Drive Shack Restaurant and Golf Driving Range	Report Date:	8/23/2019
		Sample Date:	7/22/2019
Project Number:	E40550.01		
		Sampled By:	JC
Subject:	Minimum Resistivity, ASTM G187	Tested By:	MA
Material Description:	Clayey sand	Test Date:	8/20/2019
Location:	B-9 @ 0-5'		

Laboratory Test Results, Minimum Resistivity - ASTM G187

Total Water Added, mls	Resistivity, Ohm-cm
50 mls	62,698
100 mls	41,354
150 mls	27,347
200 mls	18,009
250 mls	13,340
300 mls	10,005
350 mls	7,337
400 mls	8,004

Remarks: Min. Resistivity is 7,337 Ohm-cm

3100 Irvine Ave PC#1349G-98

3100 Irvine Ave.

G 9800394

1349G - 98

9/29/99

City of Newport Beach

NorCal Engineering
Soils and Geotechnical Consultants
10641 Humbolt Street Los Alamitos, CA 90720
(562) 799-9469 Fax (562) 799-9459

May 3, 1999 Project Number 7533-98

Duran Construction Company
22901 Savi Ranch Parkway, Suite A
Yorba Linda, California 92887

Attn. Mr. Ray Duran

Re: **Foundation Excavation Observations** - Proposed Leonard's Golf Shop Expansion - Located at 3100 Irvine Avenue, in the City of Newport Beach, California

Dear Mr. Duran:

Pursuant to your request, this firm has observed and approved foundation excavations for the above referenced project. The foundation excavations for [illegible] addition have been excavated into competent native soils and are considered [illegible] their intended use. We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

REGISTERED PROFESSIONAL ENGINEER
KEITH D. TUCKER
No. 841
Exp. 12/31/00
GEOTECHNICAL
STATE OF CALIFORNIA

Keith D. Tucker
Project Engineer
R.G.E. 841

Gregory H. Bennett
Project Manager

City of Newport Beach

NorCal Engineering
Soils and Geotechnical Consultants
10641 Humbolt Street Los Alamitos, CA 90720
(562) 799-9469 Fax (562) 799-9459

May 6, 1999 Project Number 7533-98

Duran Construction Company
22901 Savi Ranch Parkway, Suite A
Yorba Linda, California 92887

Attn: Mr. Ray Duran

RE: **Observation and Testing of Rough Grading Operations** – Proposed Leonard's Golf Shop Expansion – Located at 3100 Irvine Avenue, in the City of Newport Beach, California

Dear Mr. Duran:

Pursuant to your request, this firm has observed and tested rough grading operations at the above referenced project. Results of the compaction tests are attached and locations of these tests are shown on the accompanying Site Plan. All work was performed in accordance with our Geotechnical Investigation dated July 16, 1998, Project Number 7533-98 and all present day standards of the Geotechnical Engineering Industry.

Site Grading

All vegetation and demolition debris was stripped and removed from the fill area prior to grading operations. The existing low density soils were removed to competent native soils, the exposed subgrade scarified moisture conditioned and then recompacted to a minimum of 90% relative compaction. All excavations were observed and approved by this firm prior to placement of fill material. The overexcavation consisted of a minimum of five horizontal feet or to the depth of fill placed, whichever is greater beyond the outside edge of all proposed foundations with exception.

City of Newport Beach

Fill soils placed were compacted to a minimum of 90% of the laboratory standard in lifts not in excess of eight inches in thickness. The maximum depth of fill placed was 2 feet. A track loader was utilized for compaction control. A water hose provided moisture control. The approximate limits of compacted fill are indicated on the attached Site Plan.

Laboratory/Field Testing

The relative compaction was determined by Sand Cone Method (ASTM: D1556-82) and by the Drive Tube Method (ASTM: D2937). The maximum density of the fill soils was obtained by the laboratory standard (ASTM: D1557-91) and results are shown on Table I. Compaction tests were performed a minimum of every 500 cubic yards placed and every two feet in depth of fill placed. Results of field density tests are presented in Table II.

Conclusions

The geotechnical engineering aspects of the grading have been observed and are in compliance with the geotechnical engineer's recommendations. The development has been graded to the approval of this firm and is suitable for its intended use.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

REGISTERED PROFESSIONAL ENGINEER
KEITH D. TUCKER
No. 841
Exp. 12/31/00
GEOTECHNICAL
STATE OF CALIFORNIA

Scott D. Spensiero
Project Manager

City of Newport Beach

TABLE I
MAXIMUM DENSITY TESTS
(ASTM: D-1557-91)

Soil Type	Classification	Optimum Moisture	Maximum Dry Density (lbs./cu.ft.)
I	Clayey SILT	15.5	116.5

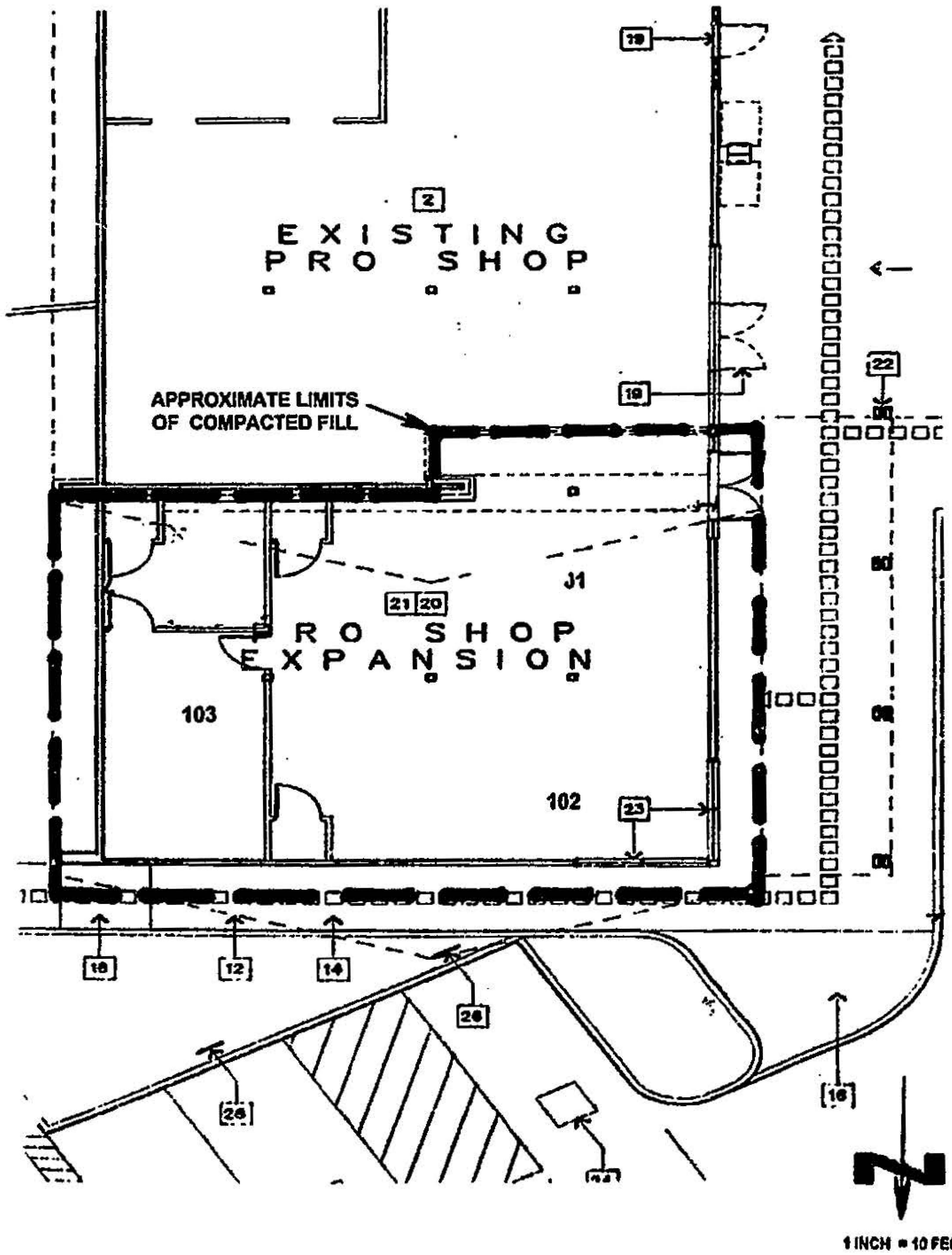
TABLE II
SUMMARY OF COMPACTION TEST RESULTS

Date of Test	Test No.	Depth	Percent Moisture	Unit Wt. lbs./cu.ft.	Relative Compaction	Soil Type
4/29/99	101	2.0-2.5	18.9	105.2	90	I
4/29/99	102	1.0-1.5	17.1	116.1	90	I
4/29/99	103	0.0-0.5	14.3	107.1	92	I

*Depth below finished grade

**Retest of failing tests after area reworked

City of Newport Beach



NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

DURAN

PROJECT 7533-98 | DATE MAY 1999

SITE PLAN
APPROXIMATE LOCATION OF COMPACTION TESTS

City of Newport Beach

P/C1349.98

Soils Investigation
Proposed Leonard's Golf Shop Expansion
3100 Irvine Avenue
Newport Beach, California

APPROVED
FOR PERMIT ISSUANCE
SCOTT FAZEKAS & ASSOCIATES, INC.

BY ____________________ DATE __________

These plans have been reviewed for adherence to the applicable codes and ordinance. Authorization is hereby granted to issue a building permit pending approval by all applicable City agencies.

The issuance or granting of a permit based on approval of these plans shall not be construed to permit or approve any violation of the applicable codes or ordinances. No permit presumed to give authority to violate or cancel the provisions of such

Prepared For:

Durag Construction Corporation
22901 Savi Ranch Parkway, Suite A
Yorba Linda, California 92887

Project Number 7533-98
July 16, 1998

NorCal Engineering

City of Newport Beach

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS
10641 HUMBOLT STREET LOS ALAMITOS, CA 90720
(562)799-9469 FAX (562)799-9459

July 16, 1998 Project Number 7533-98

Duran Construction Corporation
22901 Savi Ranch Parkway, Suite A
Yorba Linda, California 92887

Attn: Mr. Ray Duran

RE: **Soils Investigation** - Proposed Leonard's Golf Shop Expansion - Located at 3100 Irvine Avenue, in the City of Newport Beach, California

Dear Mr. Duran:

Pursuant to your request, this firm has performed a Soils Investigation for the above referenced project in accordance with your authorization. The purpose of this investigation is to evaluate the geotechnical conditions of the subject site and to provide recommendations for the proposed golf shop expansion. This soils engineering report presents the finding of our study along with conclusions and recommendations for development.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

REGISTERED PROFESSIONAL ENGINEER
KEITH D. TUCKER
No. 841
Exp. 12/31/00
GEOTECHNICAL
STATE OF CALIFORNIA

Keith D. Tucker
Project Engineer
R.G.E. 841

Mark A. Burkholder
Project Manager

City of Newport Beach

Structural Considerations

This geotechnical engineering report presents the findings of our study along with engineering analysis and recommendations for the proposed development. It is proposed to construct a one story, 1,300 square feet addition to the existing golf shop facility. Other improvements may consist of asphaltic and/or concrete parking and driveway areas and landscaping. Final building plans shall be reviewed by this firm prior to submittal for city approval to determine the need for any additional study and revised recommendations pertinent to the proposed development, if necessary.

Site Description

The property lies within the Irvine Golf Course in the city of Newport Beach. The proposed expansion area is currently covered with asphaltic concrete pavement and planter areas.

Field Investigation

The purpose of the investigation was to explore the subsurface conditions and to provide preliminary geotechnical engineering design parameters for evaluation of the site with respect to the proposed development. The investigation consisted of the placement of two subsurface exploratory borings by hand auger to a maximum depth of 12 feet placed at accessible locations on the site. The explorations were visually classified and logged by a field engineer with locations of the subsurface explorations shown on the attached Site Plan.

City of Newport Beach

The exploratory explorations revealed the existing earth materials to consist of surficial fill and natural soil zones. A detailed description of the subsurface conditions is listed on the excavation logs in Appendix A. These soils are described as follows:

Fill: Surficial fill soils consisting of slightly clayey SAND were encountered in both borings to a depth of approximately 12 inches. These soils were noted to be moist and loose.

Natural: Native, undisturbed soils also classifying as slightly clayey SAND were observed beneath the upper fill soils. The native soils were observed to be dense and moist. Clayey SILT materials were then encountered beneath the sandy soils.

Groundwater was encountered at a depth of 7 feet below existing grades.

Laboratory Tests

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis for direct shear, consolidation tests, and to determine in-place moisture/densities. These undisturbed samples consisted of one inch rings with inside diameter of 2.5 inches. Bulk bag samples were obtained in the upper soils for expansion index tests and maximum density tests. Wall loadings on the order of 2,000 lbs./lin.ft. and maximum compression loads on the order of 20 kips were utilized for testing and design purposes. All test results are included in Appendix B, unless otherwise noted.

City of Newport Beach

A. The field moisture content (ASTM:D 2216) and the dry densities of the ring samples were determined in the laboratory. This data is listed on the logs of borings.

B. Maximum density tests (ASTM: D-1557-78) were performed on typical samples of the upper soils. Results of these tests are shown on Table I.

C. Expansion index tests in accordance with the Uniform Building Code Standard No. 29-2 were performed on remolded samples of the upper soils to determine the expansive characteristics and to provide any necessary recommendations for reinforcement of the slabs-on-grade and the foundations. Results of these tests are provided on Table II.

D. Direct shear tests (ASTM: D-3080) were performed on undisturbed and disturbed samples of the subsurface soils. These tests were performed to determine parameters for the calculation of the safe bearing capacity. The test is performed under saturated conditions at loads of 500 lbs./sq.ft., 1,000 lbs./sq.ft., and 2,000 lbs./sq.ft. with results shown on Plate A.

E. Consolidation tests (ASTM: D-2435) were performed on undisturbed samples to determine the differential and total settlement which may be anticipated based upon the proposed loads. Water was added to the samples at a surcharge of one KSF and the settlement curves are plotted on Plate B.

City of Newport Beach

F. The potential corrosive effects of the on-site soils to concrete are being determined in the laboratory per EPA test method 9038. The test results will be provided in an addendum to this report.

Conclusions and Recommendations

Based upon our evaluations, the proposed development is acceptable from a geotechnical engineering standpoint. By following the recommendations and guidelines set forth in our report, the structures will be safe from excessive settlements under the anticipated design loadings and conditions. The proposed development shall meet all requirements of the City Building Ordinance and will not impose any adverse effect on existing adjacent structures.

It is recommended that site inspections be performed by a representative of this firm during all grading and construction of the development to verify the findings and recommendations documented in this report. Any unusual conditions which may be encountered in the course of the project development may require the need for additional study and revised recommendations.

Site Grading Recommendations

Any vegetation shall be removed and hauled from proposed grading areas prior to the start of grading operations. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) are removed. All grading operations shall be performed in accordance with the attached "Specifications for Compacted Fill Operations."

City of Newport Beach

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Any vegetation shall be removed and hauled from proposed grading areas prior to the start of grading operations. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) are removed. All grading operations shall be performed in accordance with the attached "Specifications for Compacted Fill Operations."

City of Newport Beach

All upper disturbed soils (±12 inches) in areas to provide structural support shall be removed to competent native material, the exposed surface scarified to a depth of 12 inches, brought to the proper moisture content and compacted to a minimum of 90% of the laboratory standard (ASTM: D-1557-78) prior to placement of any additional compacted fill soils, foundations, slabs-on-grade and pavement. Grading shall extend a minimum of five horizontal feet or to the depth of vertical overexcavation, whichever is greater, beyond the outside edge of the perimeter foundation where possible.

A diligent search shall be conducted during grading operations in an effort to uncover any underground structures, irrigation or utility lines. If found, these structures and lines shall be either removed or properly abandoned prior to the proposed construction. Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase. Adequate drainage away from the structures, pavement and slopes should be provided at all times.

Temporary Excavations

Temporary unsurcharged excavations over 4 feet in height in the existing site materials may be trimmed at a 1 to 1(horizontal to vertical) gradient. Cuts over 8 feet in height must be assessed by this firm prior to excavation activities. In areas where soil with little or no binder is encountered, where adverse geological conditions are exposed, or where excavations are adjacent to existing structures, shoring, slot-cutting, or flatter excavations may be required. The temporary cut slope gradients given above do not preclude local raveling and sloughing. All excavations shall be made in accordance with the requirements of CAL-OSHA and other public agencies having jurisdiction.

City of Newport Beach

Foundation Design

The foundations may be designed utilizing safe being capacity of 1,500 psf for an embedded depth of 24 inches below lowest adjacent grade into approved compacted fill soils or competent native soils. All continuous foundations shall be reinforced with a minimum of one #5 bar, top and bottom. A representative of this firm shall inspect all foundation excavations prior to pouring concrete.

Care should be taken when excavating foundations adjacent to the existing structure so that proper lateral support is not removed from existing foundations. This may require the slot-cutting of new foundations in the area.

Lateral Resistance

The following values may be utilized in resisting lateral loads imposed on the structure. Requirements of the Uniform Building Code should be adhered to when the coefficient of friction and passive pressures are combined.

Coefficient of Friction - 0.35
Equivalent Passive Fluid Pressure = 200 lbs./cu.ft.
Maximum Passive Pressure = 2,000 lbs./cu.ft.

The passive pressure recommendations are valid only for either competent native soils and/or compacted fill soils.

Settlement Analysis

Resultant pressure curves for the consolidation tests are shown on Plate B. Computations utilizing these curves and the recommended safe bearing capacities reveal that the foundations will experience settlements on the order of 1/2 inch and differential settlements of less than 1/4 inch.

City of Newport Beach

Retaining Wall Design Parameters

Active earth pressures against retaining walls will be equal to the pressures developed by the following fluid densities. These values are for **granular backfill material** placed adjacent to the walls at various ground slopes above the walls.

Surface Slope of Retained Materials (Horizontal to Vertical)	Equivalent Fluid Density (lb./cu.ft.)
Level	30
5 to 1	35
4 to 1	38
3 to 1	40
2 to 1	45

Any applicable short-term construction surcharges and seismic forces should be added to the above lateral pressure values. All walls shall be waterproofed as needed and protected from hydrostatic pressure by a reliable permanent subdrain system.

Slab Recommendations

All concrete slabs-on-grade shall be a minimum of four inches in thickness and may be placed on approved compacted fill soils. A vapor barrier should be utilized in areas which would be sensitive to the infiltration of moisture. This membrane should be placed beneath a 4 inch thick sand layer and not directly beneath the concrete due to the possibility of curling of the slab. Slabs shall be reinforced with a minimum of #3 bars, placed 18 inches on center in both directions, positioned mid-height in the slab. All concrete slab areas to receive floor coverings should be moisture tested to meet all manufacturer requirements prior to placement.

City of Newport Beach

Slab subgrade soils shall be moisture conditioned to approximately 120% of optimum moisture levels immediately prior to placement of concrete.

Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the developer, general contractor, grading contractor, city inspector, architect, and soil engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This soils investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied, is made.

City of Newport Beach

SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL

Preparation

Any existing low density soils and/or saturated soils shall be removed to competent natural soil under the inspection of the Soils Engineering Firm. After the exposed surface has been cleansed of debris and/or vegetation, it shall be scarified until it is uniform in consistency, brought to the proper moisture content and compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557-78).

Material For Fill

The on-site soils or approved import soils may be utilized for the compacted fill provided they are free of any deleterious materials and shall not contain any rocks, brick, asphaltic concrete, concrete or other hard materials greater than eight inches in maximum dimensions. Any import soil must be approved by the Soils Engineering firm a minimum of 24 hours prior to importation of site.

Placement of Compacted Fill Soils

The approved fill soils shall be placed in layers not excess of six inches in thickness. Each lift shall be uniform in thickness and thoroughly blended. The fill soils shall be brought to within 15% of the optimum moisture content, unless otherwise specified by the Soils Engineering firm. Each lift shall be compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557-78) and approved prior to the placement of the next layer of soil. Compaction tests shall be obtained at the discretion of the Soils Engineering firm but to a minimum of one test for every 500 cubic yards placed and/or for every 2 feet of compacted fill placed.

City of Newport Beach

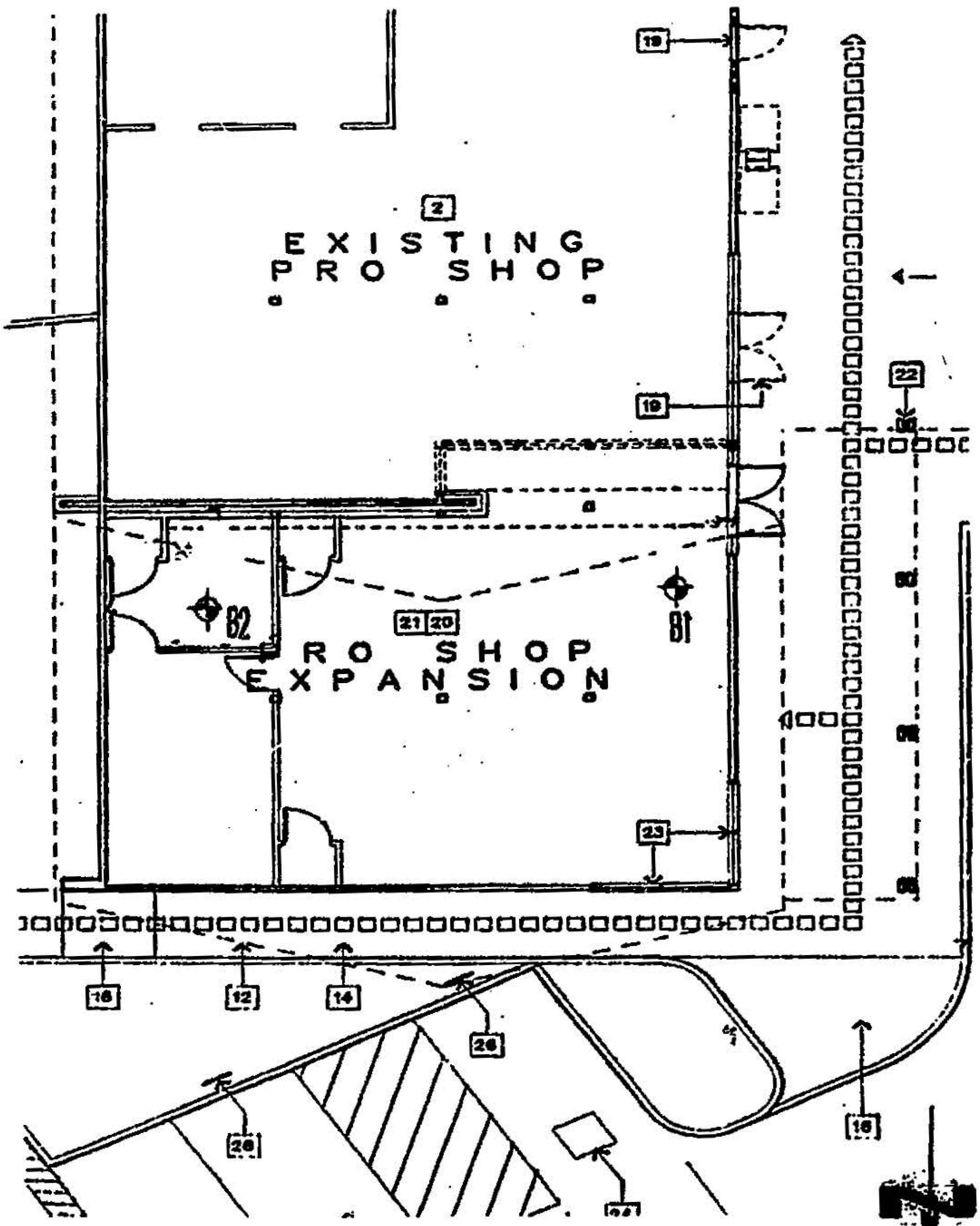
The minimum relative compaction shall be obtained in accordance with accepted methods in the construction industry. The final grade of the structural areas shall be in a dense and smooth condition prior to placement of slabs-on-grade or pavement areas. No fill soils shall be placed, spread or compacted during unfavorable weather conditions. When the grading is interrupted by heavy rains, compaction operations shall not be resumed until approved by the Soils Engineering firm.

Grading Observations

The controlling governmental agencies should be notified prior to commencement of any grading operations. This firm recommends that the grading operations be conducted under the observation of a Soils Engineering firm as deemed necessary. A 24 hour notice must be provided to this firm prior to the time of our initial inspection.

Observation shall include the clearing and grubbing operations to assure that all unsuitable materials have been properly removed; approve the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished grade and designate areas of overexcavation; and perform field compaction tests to determine relative compaction achieved during fill placement. In addition, all foundation excavations shall be observed by the Soils Engineering firm to confirm that appropriate bearing materials are present at the design grades and recommend any modifications to construct footings.

City of Newport Beach



NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

DURAN

PROJECT 7533-98 | DATE JULY 1998

APPROXIMATE
LOCATION OF FIELD EXPLORATIONS

City of Newport Beach

APPENDICES
(In order of appearance)

Appendix A - Logs of Exploratory Explorations
*Logs of Test Borings B1 and B2

Appendix B - Laboratory Analysis
*Table I - Maximum Dry Density Tests
*Table II - Expansion Index Tests

*Plate A - Direct Shear Tests
*Plate B - Consolidation Tests

City of Newport Beach

APPENDIX A

City of Newport Beach

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

BOUNDARY CLASSIFICATIONS. SOILS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

UNIFIED SOIL CLASSIFICATION SYSTEM

PROJECT | DATE

City of Newport Beach

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.	
					0	.ill - Slightly clayey SAND, reddish brown moist, loose	
	10.5	119.7		R/B			
	15.5	114.2		R		Native - Slightly clayey SAND, reddish brown, moist, dense	
					5		
	19.7	109.5		R		Clayey SILT, brown, stiff, moist	
	17.7	108.7		R		Medium to coarse grained, SAND, reddish brown, dense, wet	
	14.6	111.6		R			
					10	Clayey SAND, reddish brown, dense, wet	
					15		
					20		
					25		
					30		
					35		

SAMPLE TYPES

- C Rock Core
- S Standard Split Spoon
- R Ring Sample
- B Bulk Sample
- J Jar Sample

DATE DRILLED: 7-13-98
EQUIPMENT USED: Hand Auger
GROUNDWATER LEVEL: 7.0'

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

LOG OF BORING #1

PROJECT 7533-98 DATE

City of Newport Beach

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.	ELEVATION (FEET)
					0	Fill - Slightly clayey SAND, reddish brown, moist, loose	
	13.9	122.4		R			
	15.9	114.8		R		Native - Slightly clayey SAND, reddish brown, moist, dense	
					5	Clayey SILT grey/brown, moist, stiff - increase in sand content with depth	
					10		
					15		
					20		
					25		
					30		
					35		

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- R Ring Sample
- B Bulk Sample
- J Jar Sample

DATE DRILLED: 7-13-98
EQUIPMENT USED: Hand Auger
GROUNDWATER LEVEL: None encountered

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

LOG OF BORING #2

PROJECT 7533-98 | DATE

City of Newport Beach

July 16, 1998

Project Number 7533-98

APPENDIX B

City of Newport Beach

July 16, 1998 | Project Number 7533-98

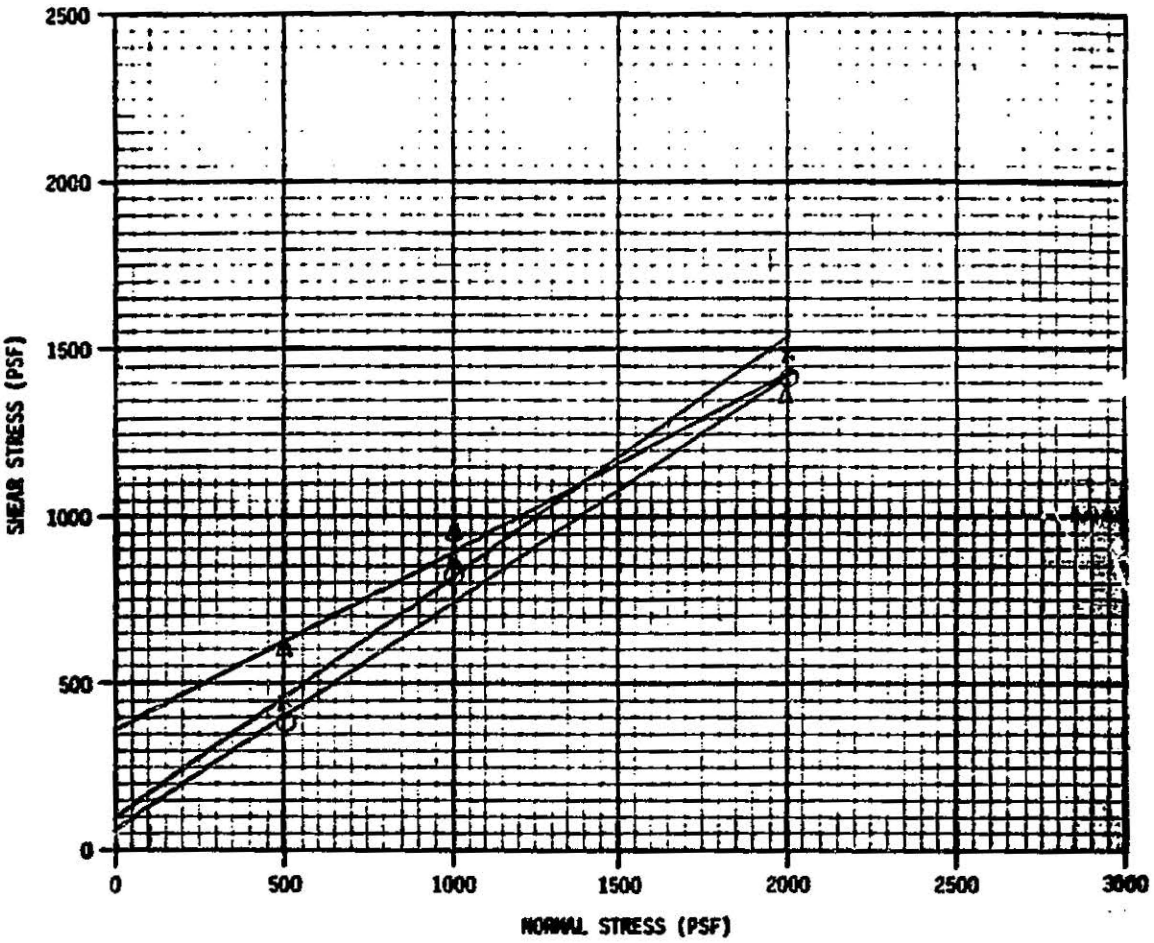
TABLE I
MAXIMUM DENSITY TESTS
(ASTM: D-1557-78)

Sample	Classification	Optimum Moisture	Maximum Dry Density (lbs./cu.ft.)
B1 @ 0-2'	slightly clayey SAND	9.0	128.0
B2 @ 2.5-3	clayey SILT	15.5	116.5

TABLE II
EXPANSION INDEX TESTS
(U.B.C. STD. 29-2)

Sample	Classification	Expansion Index
B1 @ 0-2'	slightly clayey SAND	05
B2 @ 2.5-3	clayey SILT	74

City of Newport Beach



SYMBOL	BORING NUMBER	DEPTH (FEET)	ø (DEGREES)	C (PSF)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)
X	1	2.0	35	100	119.7	10.5
O	2	2.0	33	75	122.4	13.9
Δ	2	4.0	27	375	114.8	16.9
□						

NOTE: TESTS PERFORMED ON SATURATED SAMPLES UNLESS SHOWN BELOW.
(FM) FIELD MOISTURE
TESTS PERFORMED ON UNDISTURBED SAMPLES UNLESS SHOWN BELOW.
(R) SAMPLES REMOLDED AT 90% OF MAXIMUM DRY DENSITY

NorCal Engineering
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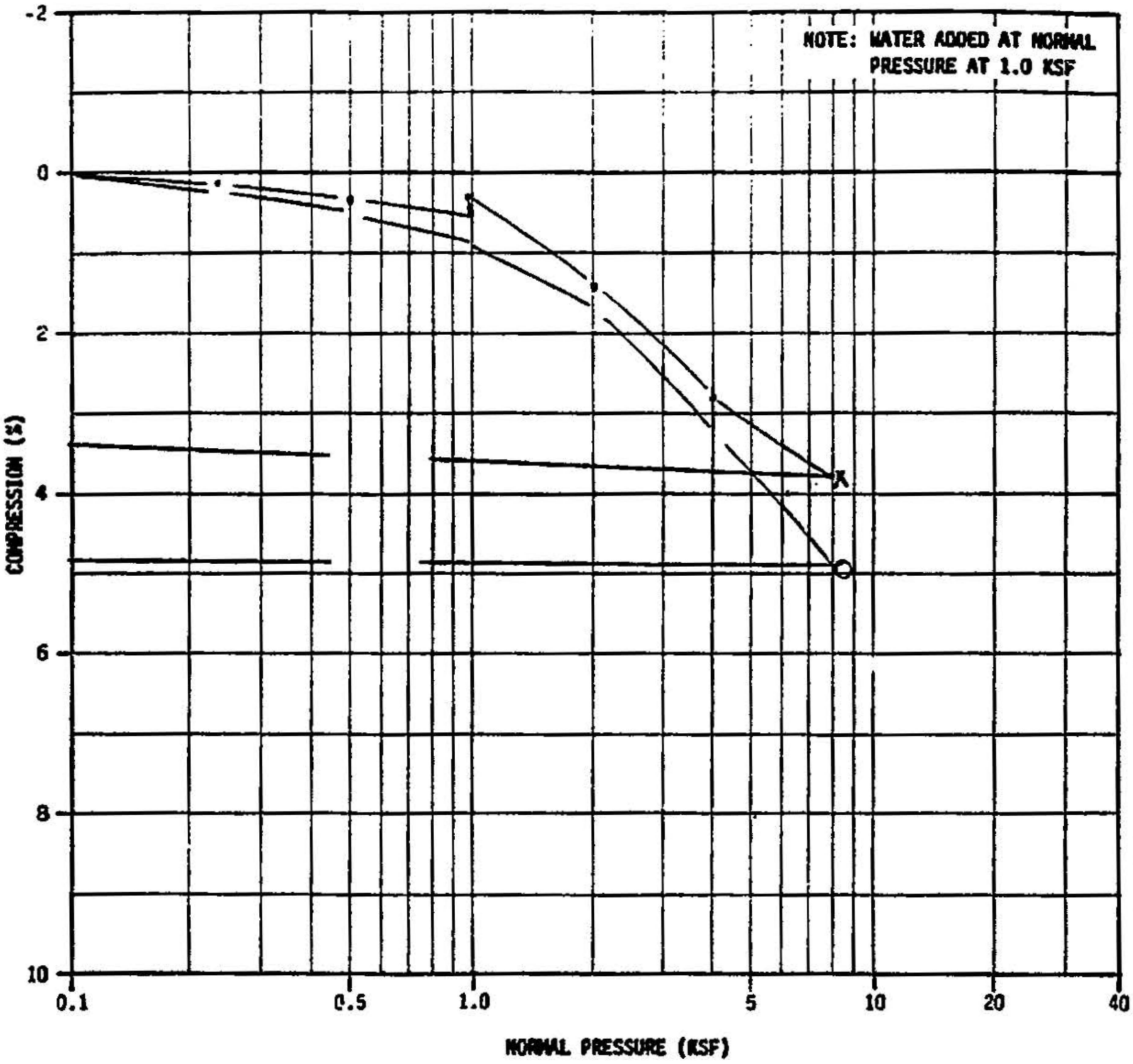
PROJECT 7533-98 | DATE

DIRECT SHEAR TEST RESULTS
Plate A

City of Newport Beach



SYMBOL	BORING NUMBER	DEPTH (FEET)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)
X	1	4.0	114.2	15.5		
O	1	8.0	108.7	17.7		
Δ						
□						

——— COMPRESSION (FM) FIELD MOISTURE - NO WATER ADDED

— — — REBOUND (R) SAMPLE REMOLDED AT 90% OF MAXIMUM DRY DENSITY

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CONSOLIDATION TEST RESULTS

Plate B

PROJECT 7533-98 | DATE

City of Newport Beach

CNB

Soils Investigation
Proposed ~~Leonard's Golf Shop~~ Expansion
3100 ~~Irvine~~ Avenue
Newport Beach, California

1349698

Prepared For:

Duran Construction Corporation
22901 Savi Ranch Parkway, Suite A
Yorba Linda, California 92887

Project Number 7533-98
July 16, 1998

NorCal Engineering

City of Newport Beach

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS
10641 HUMBOLT STREET LOS ALAMITOS, CA 90720
(562)799-9469 FAX (562)799-9459

July 16, 1998 Project Number 7533-98

Duran Construction Corporation
22901 Savi Ranch Parkway, Suite A
Yorba Linda, California 92887

Attn: Mr. Ray Duran

RE: **Soils Investigation** - Proposed Leonard's Golf Shop Expansion - Located at 3100 Irvine Avenue, in the City of Newport Beach, California

Dear Mr. Duran:

Pursuant to your request, this firm has performed a Soils Investigation for the above referenced project in accordance with your authorization. The purpose of this investigation is to evaluate the geotechnical conditions of the subject site and to provide recommendations for the proposed golf shop expansion. This soils engineering report presents the finding of our study along with conclusions and recommendations for development.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

REGISTERED PROFESSIONAL ENGINEER
KEITH D. TUCKER
No. 841
Exp. 12/31/00
GEOTECHNICAL
STATE OF CALIFORNIA

Mark A. Burkholder
Project Manager

City of Newport Beach

Structural Considerations

This geotechnical engineering report presents the findings of our study along with engineering analysis and recommendations for the proposed development. It is proposed to construct a one story, 1,300 square feet addition to the existing golf shop facility. Other improvements may consist of asphaltic and/or concrete parking and driveway areas and landscaping. Final building plans shall be reviewed by this firm prior to submittal for city approval to determine the need for any additional study and revised recommendations pertinent to the proposed development, if necessary.

Site Description

The property lies within the Irvine Golf Course in the city of Newport Beach. The proposed expansion area is currently covered with asphaltic concrete pavement and planter areas.

Field Investigation

The purpose of the investigation was to explore the subsurface conditions and to provide preliminary geotechnical engineering design parameters for evaluation of the site with respect to the proposed development. The investigation consisted of the placement of two subsurface exploratory borings by hand auger to a maximum depth of 12 feet placed at accessible locations on the site. The explorations were visually classified and logged by a field engineer with locations of the subsurface explorations shown on the attached Site Plan.

City of Newport Beach

The exploratory explorations revealed the existing earth materials to consist of surficial fill and natural soil zones. A detailed description of the subsurface conditions is listed on the excavation logs in Appendix A. These soils are described as follows:

Fill: Surficial fill soils consisting of slightly clayey SAND were encountered in both borings to a depth of approximately 12 inches. These soils were noted to be moist and loose.

Natural: Native, undisturbed soils also classifying as slightly clayey SAND were observed beneath the upper fill soils. The native soils were observed to be dense and moist. Clayey SILT materials were then encountered beneath the sandy soils.

Groundwater was encountered at a depth of 7 feet below existing grades.

<u>Laboratory Tests</u>

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis for direct shear, consolidation tests, and to determine in-place moisture/densities. These undisturbed samples consisted of one inch rings with inside diameter of 2.5 inches. Bulk bag samples were obtained in the upper soils for expansion index tests and maximum density tests. Wall loadings on the order of 2,000 lbs./lin.ft. and maximum compression loads on the order of 20 kips were utilized for testing and design purposes. All test results are included in Appendix B, unless otherwise noted.

City of Newport Beach

A. The field moisture content (ASTM:D 2216) and the dry densities of the ring samples were determined in the laboratory. This data is listed on the logs of borings.

B. Maximum density tests (ASTM: D-1557-78) were performed on typical samples of the upper soils. Results of these tests are shown on Table I.

C. Expansion index tests in accordance with the Uniform Building Code Standard No. 29-2 were performed on remolded samples of the upper soils to determine the expansive characteristics and to provide any necessary recommendations for reinforcement of the slabs-on-grade and the foundations. Results of these tests are provided on Table II.

D. Direct shear tests (ASTM: D-3080) were performed on undisturbed and disturbed samples of the subsurface soils. These tests were performed to determine parameters for the calculation of the safe bearing capacity. The test is performed under saturated conditions at loads of 500 lbs./sq.ft., 1,000 lbs./sq.ft., and 2,000 lbs./sq.ft. with results shown on Plate A.

E. Consolidation tests (ASTM: D-2435) were performed on undisturbed samples to determine the differential and total settlement which may be anticipated based upon the proposed loads. Water was added to the samples at a surcharge of one KSF and the settlement curves are plotted on Plate B.

City of Newport Beach

F. The potential corrosive effects of the on-site soils to concrete are being determined in the laboratory per EPA test method 9038. The test results will be provided in an addendum to this report.

Conclusions and Recommendations

Based upon our evaluations, the proposed development is acceptable from a geotechnical engineering standpoint. By following the recommendations and guidelines set forth in our report, the structures will be safe from excessive settlements under the anticipated design loadings and conditions. The proposed development shall meet all requirements of the City Building Ordinance and will not impose any adverse effect on existing adjacent structures.

It is recommended that site inspections be performed by a representative of this firm during all grading and construction of the development to verify the findings and recommendations documented in this report. Any unusual conditions which may be encountered in the course of the project development may require the need for additional study and revised recommendations.

Site Grading Recommendations

Any vegetation shall be removed and hauled from proposed grading areas prior to the start of grading operations. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) are removed. All grading operations shall be performed in accordance with the attached "Specifications for Compacted Fill Operations."

City of Newport Beach

All upper disturbed soils (±12 inches) in areas to provide structural support shall be removed to competent native material, the exposed surface scarified to a depth of 12 inches, brought to the proper moisture content and compacted to a minimum of 90% of the laboratory standard (ASTM: D-1557-78) prior to placement of any additional compacted fill soils, foundations, slabs-on-grade and pavement. Grading shall extend a minimum of five horizontal feet or to the depth of vertical overexcavation, whichever is greater, beyond the outside edge of the perimeter foundation where possible.

A diligent search shall be conducted during grading operations in an effort to uncover any underground structures, irrigation or utility lines. If found, these structures and lines shall be either removed or properly abandoned prior to the proposed construction. Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase. Adequate drainage away from the structures, pavement and slopes should be provided at all times.

__Temporary Excavations__

Temporary unsurcharged excavations over 4 feet in height in the existing site materials may be trimmed at a 1 to 1(horizontal to vertical) gradient. Cuts over 8 feet in height must be assessed by this firm prior to excavation activities. In areas where soil with little or no binder is encountered, where adverse geological conditions are exposed, or where excavations are adjacent to existing structures, shoring, slot-cutting, or flatter excavations may be required. The temporary cut slope gradients given above do not preclude local raveling and sloughing. All excavations shall be made in accordance with the requirements of CAL-OSHA and other public agencies having jurisdiction.

City of Newport Beach

Foundation Design

The foundations may be designed utilizing safe being capacity of 1,500 psf for an embedded depth of 24 inches below lowest adjacent grade into approved compacted fill soils or competent native soils. All continuous foundations shall be reinforced with a minimum of one #5 bar, top and bottom. A representative of this firm shall inspect all foundation excavations prior to pouring concrete.

Care should be taken when excavating foundations adjacent to the existing structure so that proper lateral support is not removed from existing foundations. This may require the slot-cutting of new foundations in the area.

Lateral Resistance

The following values may be utilized in resisting lateral loads imposed on the structure. Requirements of the Uniform Building Code should be adhered to when the coefficient of friction and passive pressures are combined.

Coefficient of Friction - 0.35
Equivalent Passive Fluid Pressure = 200 lbs./cu.ft.
Maximum Passive Pressure = 2,000 lbs./cu.ft.

The passive pressure recommendations are valid only for either competent native soils and/or compacted fill soils.

Settlement Analysis

Resultant pressure curves for the consolidation tests are shown on Plate B. Computations utilizing these curves and the recommended safe bearing capacities reveal that the foundations will experience settlements on the order of 1/2 inch and differential settlements of less than 1/4 inch.

City of Newport Beach

Retaining Wall Design Parameters

Active earth pressures against retaining walls will be equal to the pressures developed by the following fluid densities. These values are for **granular backfill material** placed adjacent to the walls at various ground slopes above the walls.

Surface Slope of Retained Materials (Horizontal to Vertical)	Equivalent Fluid Density (lb./cu.ft.)
Level	30
5 to 1	35
4 to 1	38
3 to 1	40
2 to 1	45

Any applicable short-term construction surcharges and seismic forces should be added to the above lateral pressure values. All walls shall be waterproofed as needed and protected from hydrostatic pressure by a reliable permanent subdrain system.

Slab Recommendations

All concrete slabs-on-grade shall be a minimum of four inches in thickness and may be placed on approved compacted fill soils. A vapor barrier should be utilized in areas which would be sensitive to the infiltration of moisture. This membrane should be placed beneath a 4 inch thick sand layer and not directly beneath the concrete due to the possibility of curling of the slab. Slabs shall be reinforced with a minimum of #3 bars, placed 18 inches on center in both directions, positioned mid-height in the slab. All concrete slab areas to receive floor coverings should be moisture tested to meet all manufacturer requirements prior to placement.

City of Newport Beach

Slab subgrade soils shall be moisture conditioned to approximately 120% of optimum moisture levels immediately prior to placement of concrete.

Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the developer, general contractor, grading contractor, city inspector, architect, and soil engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This soils investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied, is made.

City of Newport Beach

SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL

Preparation

Any existing low density soils and/or saturated soils shall be removed to competent natural soil under the inspection of the Soils Engineering Firm. After the exposed surface has been cleansed of debris and/or vegetation, it shall be scarified until it is uniform in consistency, brought to the proper moisture content and compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557-78).

Material For Fill

The on-site soils or approved import soils may be utilized for the compacted fill provided they are free of any deleterious materials and shall not contain any rocks, brick, asphaltic concrete, concrete or other hard materials greater than eight inches in maximum dimensions. Any import soil must be approved by the Soils Engineering firm a minimum of 24 hours prior to importation of site.

Placement of Compacted Fill Soils

The approved fill soils shall be placed in layers not excess of six inches in thickness. Each lift shall be uniform in thickness and thoroughly blended. The fill soils shall be brought to within 15% of the optimum moisture content, unless otherwise specified by the Soils Engineering firm. Each lift shall be compacted to a minimum of 90% relative compaction (in accordance with ASTM: D-1557-78) and approved prior to the placement of the next layer of soil. Compaction tests shall be obtained at the discretion of the Soils Engineering firm but to a minimum of one test for every 500 cubic yards placed and/or for every 2 feet of compacted fill placed.

City of Newport Beach

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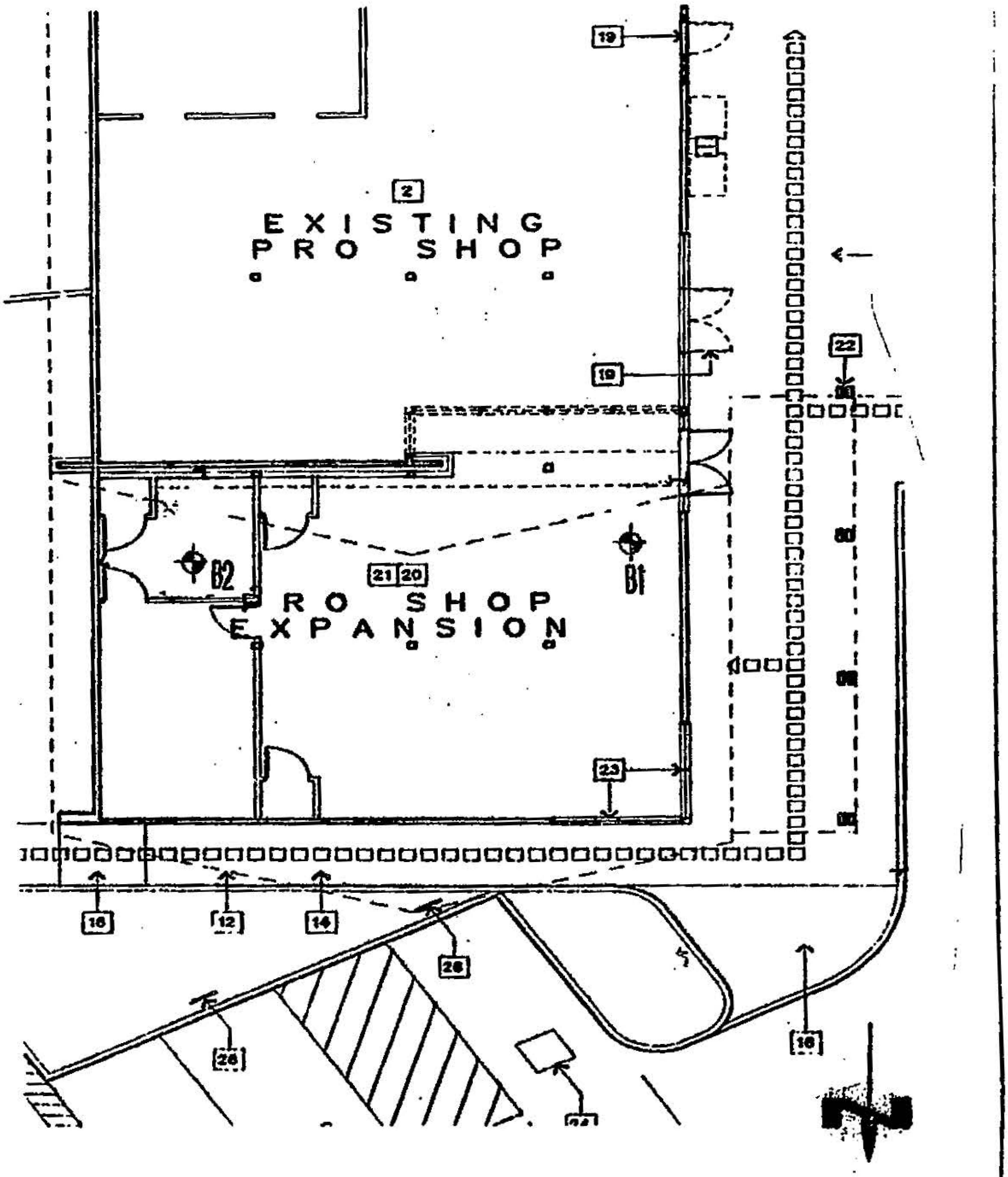
Grading Observations

The controlling governmental agencies should be notified prior to commencement of any grading operations. This firm recommends that the grading operations be conducted under the observation of a Soils Engineering firm as deemed necessary. A 24 hour notice must be provided to this firm prior to the time of our initial inspection.

Observation shall include the clearing and grubbing operations to assure that all unsuitable materials have been properly removed; approve the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished grade and designate areas of overexcavation; and perform field compaction tests to determine relative compaction achieved during fill placement. In addition, all foundation excavations shall be observed by the Soils Engineering firm to confirm that appropriate bearing materials are present at the design grades and recommend any modifications to construct footings.

City of Newport Beach



NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

DURAN

PROJECT 7533-98 | DATE JULY 1998

APPROXIMATE
LOCATION OF FIELD EXPLORATIONS

City of Newport Beach

July 16, 1998 Project Number 7533-98

APPENDICES

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City of Newport Beach

July 16, 1998 Project Number 7533-98

APPENDIX A

NorCal Engineering

City of Newport Beach

MAJOR DIVISIONS			SYMBOLS	TYPICAL NAMES
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			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
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FINE GRAINED SOILS (MORE THAN 50% OF MATERIAL IS SMALLER THAN 200 SIEVE SIZE)	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
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	SILTS AND CLAYS (LIQUID LIMIT MORE THAN 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.
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HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

BOUNDARY CLASSIFICATIONS. SOILS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

UNIFIED SOIL CLASSIFICATION SYSTEM

PROJECT | DATE

City of Newport Beach

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE
10.5	119.7		R/B
15.5	114.2		R
19.7	109.5		R
17.7	108.7		R
14.6	111.6		R

DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30, 35

ELEVATION (FEET)

DESCRIPTION OF SUBSURFACE MATERIALS

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Fill - Slightly clayey SAND, reddish brown moist, loose

Native - Slightly clayey SAND, reddish brown, moist, dense

Clayey SILT, brown, stiff, moist

Medium to coarse grained, SAND, reddish brown, dense, wet

Clayey SAND, reddish brown, dense, wet

SAMPLE TYPES

C Rock Core
S Standard Split Spoon
R Ring Sample
B Bulk Sample
J Jar Sample

DATE DRILLED: 7-13-98
EQUIPMENT USED: Hand Auger
GROUNDWATER LEVEL: 7.0'

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

LOG OF BORING #1

PROJECT 7533-98 | DATE

City of Newport Beach

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.	
					0	Fill - Slightly clayey SAND, reddish brown, moist, loose	
	13.9	122.4		R			
	15.9	114.8		R		Native - Slightly clayey SAND, reddish brown, moist, dense	
					5	Clayey SILT grey/brown, moist, stiff - increase in sand content with depth	
					10		
					15		
					20		
					25		
					30		
					35		

SAMPLE TYPES

- [C] Rock Core
- [S] Standard Split Spoon
- [R] Ring Sample
- [B] Bulk Sample
- [J] Jar Sample

DATE DRILLED: 7-13-98
EQUIPMENT USED: Hand Auger
GROUNDWATER LEVEL: None encountered

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

LOG OF BORING #2

PROJECT 7533-98 DATE

City of Newport Beach

July 16, 1998 Project Number 7533-98

APPENDIX B

NorCal Engineering

City of Newport Beach

July 16, 1998 Project Number 7533-98

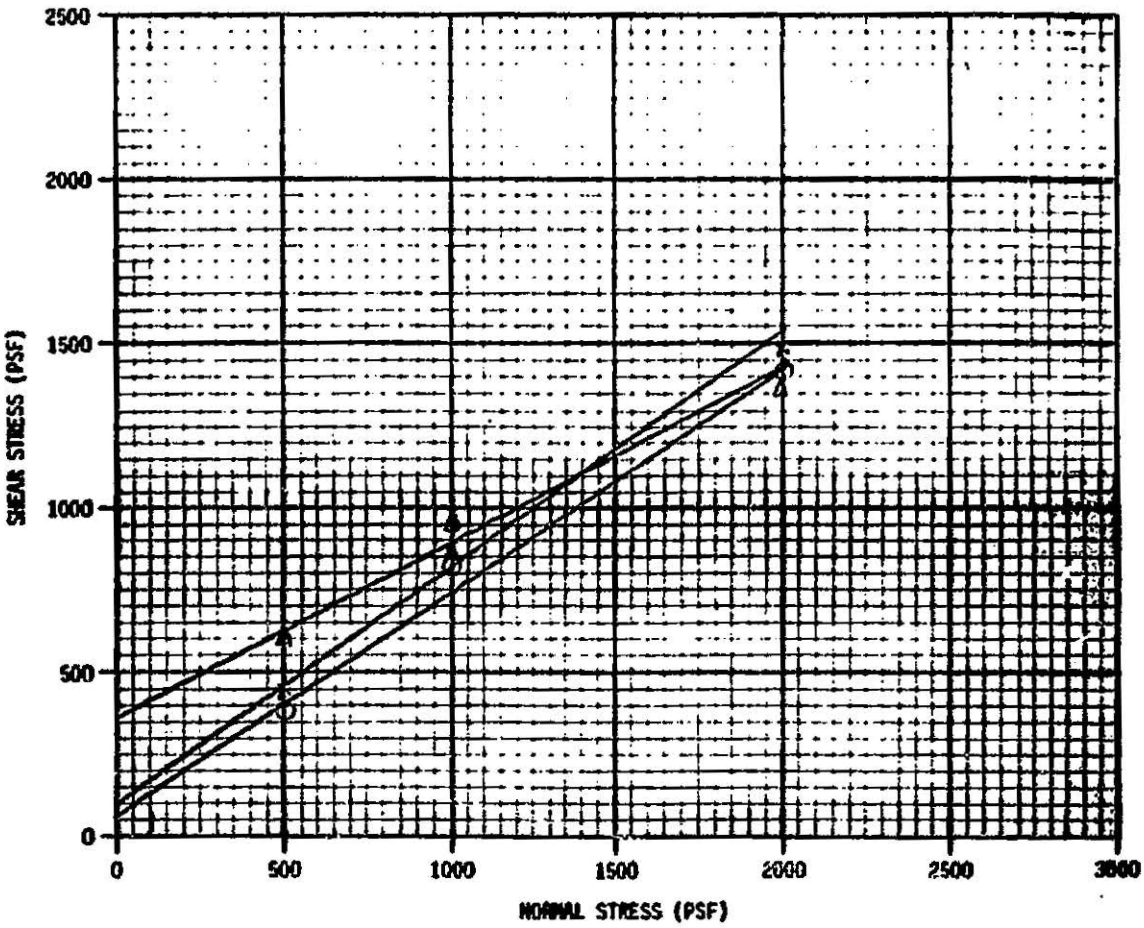
TABLE I
MAXIMUM DENSITY TESTS
(ASTM: D-1557-78)

Sample	Classification	Optimum Moisture	Maximum Dry Density (lbs./cu.ft.)
B1 @ 0-2'	slightly clayey SAND	9.0	128.0
B2 @ 2.5-3	clayey SILT	15.5	116.5

TABLE II
EXPANSION INDEX TESTS
(U.B.C. STD. 29-2)

Sample	Classification	Expansion Index
B1 @ 0-2'	slightly clayey SAND	05
B2 @ 2.5-3	clayey SILT	74

City of Newport Beach



SYMBOL	BORING NUMBER	DEPTH (FEET)	Ø (DEGREES)	C (PSF)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)
X	1	2.0	35	100	119.7	10.5
O	2	2.0	33	75	122.4	13.9
Δ	2	4.0	27	375	114.8	16.9
□						

NOTE: TESTS PERFORMED ON SATURATED SAMPLES UNLESS SHOWN BELOW.
(FM) FIELD MOISTURE
TESTS PERFORMED ON UNDISTURBED SAMPLES UNLESS SHOWN BELOW.
(R) SAMPLES REMOLDED AT 90% OF MAXIMUM DRY DENSITY

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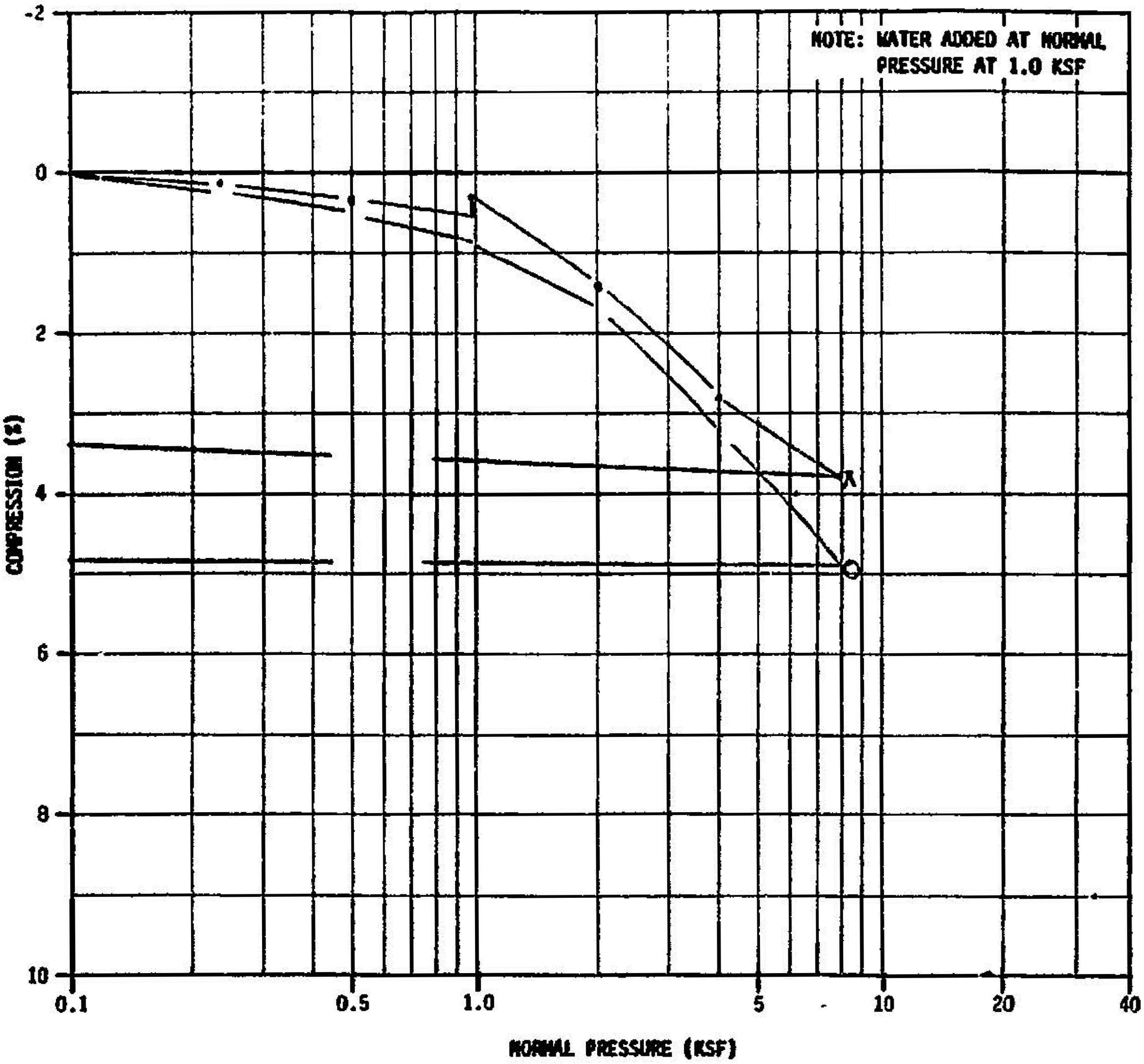
PROJECT 7533-98 | DATE

DIRECT SHEAR TEST RESULTS
Plate A

City of Newport Beach



SYMBOL	BORING NUMBER	DEPTH (FEET)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)
X	1	4.0	114.2	15.5		
O	1	8.0	108.7	17.7		
Δ						
□						

——— COMPRESSION (FM) FIELD MOISTURE - NO WATER ADDED

– – – REBOUND (R) SAMPLE REMOLDED AT 90% OF MAXIMUM DRY DENSITY

NorCal Engineering
SOILS AND GEOTECHNICAL CONSULTANTS

PROJECT 7533-98 DATE

CONSOLIDATION TEST RESULTS

Plate B

City of Newport Beach

BACA ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS
Soils - Foundations - Geology

1141 N. LEMON STREET, ANAHEIM, CALIFORNIA 92801 (714) 778-0702

August 19, 1989

Project: A-0675-F

DeMille and Healy Development
20301 Acacia Street
Suite 240
Santa Ana Heights, CA. 92707

Attention: Mr. Dan DeMille

Gentlemen:

Submitted herewith is the report of a geotechnical soils and foundation investigation conducted by this office for the proposed Acacia Plaza III office building project located on Acacia Street in the Orange County district of Santa Ana Heights, California.

The project site is currently occupied by several one-story residence and garage buildings, as well as other associated features such as paved drives, fences and yard walls, walkways, various moderate to large size trees, etc. It is possible that subterranean waste disposal structures (septic tanks, cesspools, etc.) may also occur within the property. Partial excavation and recompaction is recommended to provide for a firm, uniform, subgrade support condition under the building, particularly in view of the considerable amount of site demolition clearing and associated disturbance to be performed. Conventional shallow footings will provide adequate foundation support for proposed buildings and other structures.

The investigation was made in accordance with generally accepted engineering procedures and included such field and laboratory tests considered necessary in the circumstances. In the opinion of the undersigned, the accompanying report has been substantiated by mathematical data in conformity with generally accepted engineering principles and presents fairly the design information requested by your organization.

Respectfully submitted,

BACA ASSOCIATES

Albert Baca, RCE #28927, GE #106

REGISTERED PROFESSIONAL ENGINEER
ALBERT BACA
No. 106
Exp. 3-31-91
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
ALBERT BACA
No. 28927
Exp. 3-31-91
CIVIL
STATE OF CALIFORNIA

AB/se

Distribution: (5) DeMille and Healy Development
(1) Nuttall-Uchizono Associates

City of Newport Beach

INTRODUCTION

The primary objectives of this study were to explore subsurface conditions beneath the project site and evaluate the existing earth materials relative to foundation support, lateral pressure design considerations, floor slab support and A.C. pavement design. Also presented in this report are general observations, data and recommendations relating to site preparation, grading and earthwork compaction, as well as soil concrete corrosion potential.

The general scope of work directed at meeting the study objectives included the following:

(1) Review of current tentative project plans, as well as periodic discussion of various project development features and considerations with the client.

(2) Subsurface exploration by means of four test borings with a flight-auger drill rig.

(3) Laboratory testing to establish earth material characteristics.

(4) Geotechnical evaluation and analysis of field and laboratory test data.

(5) Preparation of report.

City of Newport Beach

This report has been prepared for the exclusive use of the client and their consultants in the design of the proposed Acacia Plaza III office building development.

SITE CONDITIONS

The rectangular shaped, approximate one acre property is located on the northwest side of Acacia Street about 500 feet southwest of its intersection with Orchard Drive in the unincorporated Orange County community of Santa Ana Heights, California. The Newport Beach Golf Course borders the rear property line on the northwest. The adjacent property to the northeast is occupied by an existing office building complex (Acacia Plaza II), while lots to the southwest are occupied by older residences. The approximate site location with respect to surrounding streets and highways, the general topographical setting of the area, and other landmarks is shown on Plate A, Vicinity Map.

Topographically, the subject property and adjacent lots to the northeast and southwest are essentially level, with a slight southeast to northwest drainage gradient towards the somewhat lower golf course area. The total on-site topographical relief is estimated to be on the order of 4 to 5 feet.

The project site is occupied by several small one-story residence and garage structures. Other typical appurtenances include paved driveways, concrete walkways, yard fences and walls, lawns, other landscaped areas and numerous moderate to large size trees. It is understood that now abandoned on-site waste disposal systems

City of Newport Beach

(septic tanks, cesspools, etc.) may possibly occur within the property, probably in close proximity to the existing residences.

PROPOSED CONSTRUCTION

It is understood that the existing buildings and all other appurtenant features will be demolished and/or removed in the course of preparing the site for new construction.

The primary element of the proposed development will consist of a two-story office building. The approximate tentative building location is shown on Plate B, Plot Plan. It is understood that the planned building structure will probably be of typical woodframe construction with lower level concrete floor slabs on grade.

Based on past experience with similar types of construction, it is estimated that structural foundation loads will be on the order of 1500 to 2500 pounds per lineal foot along continuous bearing walls, and/or 30 to 50 kips at isolated column supports.

The major portion of remaining non-building site areas will be employed as A.C. paved driveways and parking stalls with some local perimeter and interior planters.

It is anticipated that grading required to prepare the site for construction will involve relatively modest grade changes, possibly on the order of 3 to 4 foot maximum depth cuts and/or fills (exclusive of subterranean excavation if any).

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FIELD INVESTIGATION

The field investigation consisted of subsurface exploration by means of four (4) test borings made with a hollow-stem, continuous flight auger drill rig. Exploration depths ranged between 15 to 25 feet. Approximate test boring locations are shown on Plate B.

A continuous record of the earth materials encountered during exploratory drilling was made by the field engineer and is presented on Plates C and F, "Logs of Borings". It should be noted that the lines designating the interfaces between various strata on the boring logs represent approximate boundaries only since the actual transition between materials may be somewhat gradual.

"Undisturbed" samples were secured at selected depth intervals for laboratory examination and testing. Sampling was accomplished with a 2.5 inch I. D. steel barrel lined with a series of one-inch long thin brass rings. The sample barrel was driven approximately 12 inches with a 140-pound weight dropped 30 inches. Recorded blow counts for 12 inches of sampler penetration are tabulated in the "Blows per Foot" column of the boring logs. Disturbed bulk samples of the various predominant materials observed were also obtained.

It should be noted that the hollow-stem drilling equipment employed uses continuous flight auger sections resulting in full temporary casing of the test boring, thereby not allowing caving to occur. It is probable that an open boring would have

City of Newport Beach

experienced only slight to occasional local moderate caving, however.

SUBSURFACE CONDITIONS

In addition to the existing building slabs, immediate surface conditions include various walkway and drive concrete pavements, lawn grass covers, other landscaping, and local areas of exposed earth. It is possible that the upper, variable 1 to 3 foot zone may consist of fill and/or processed native materials associated with the original development of the site.

Natural deposits beneath the project site are mapped as Pleistocene age marine terrace deposits reportedly consisting of essentially flat lying, interbedded silty/clayey sands and silty/sandy clays. These upper terrace deposits have been estimated to be in excess of 100 feet thick in the site vicinity, followed by the Niguel (Pliocene age) and older Tertiary sedimentary formations (bedrock) which extend down to the granitic basement complex at a depth estimated to be about 15,000 feet.

The soil profile as observed within the 25-foot maximum depth explored generally consisted of fine to medium grained sands with a variable moderate to very slight clay content. A silty clay deposit encountered in borings 1 and 2 at a depth of about 7 feet and 12 feet, respectively, apparently feathers out to the southeast, or at least dips below the bottom of boring 3 and 4. Also, the sand texture coarseness and clay/silt content appear to increase and decrease, respectively, toward the southeast.

City of Newport Beach

As reflected by the common moderate to high sampler blow counts recorded during exploratory drilling operations (see Plates C to F, the site deposits exhibit a firm to very firm in-situ consistency, generally improving gradually with depth.

No groundwater or local perched seepage zones were observed within the 25-foot maximum depth explored.

More detailed descriptions of the soil profile as observed in the test borings are presented on Plates C to F.

LABORATORY TESTING

In-situ density and/or moisture content values were determined for all the undisturbed samples obtained during exploratory drilling operations. Test results are plotted and tabulated on Plates C to F, Logs of Borings.

Mechanical analyses by the hydrometer test method were performed on selected samples to confirm field classifications. Test results were as follows:

Boring No.	Depth (feet)	Percent Sand	Percent Silt	Percent Clay
2	2.0	60	25	15
2	5.5	72	10	18
2	9.5	75	12	13
2	14.5	27	31	42
2	19.5	15	40	45
* 4	2.5	65	18	17

*Bulk Sample

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An Expansion Index test was performed on a bulk sample selected as being generally representative of the existing near surface clayey sand soils (boring #4 @ 2.5 feet). Test results were as follows:

(1) Moisture @ Compaction = 7.7 percent

(2) Dry Unit Weight = 119.0 pcf

(3) Expansion Index = 24 (Low expansive per UBC Table 29)

Direct shear testing was concentrated on various "undisturbed" samples representative of the common clayey to slight clayey sands within the upper 5 to 10 foot zone. Testing was performed under various normal loads in the saturated-drained condition. Individual plotted test results, as well as the estimated average friction angle and cohesion values are presented on Plate G.

Consolidation (load-deformation) tests were also performed on various typical undisturbed soil samples. Plotted test results are presented on Plates H, I, J. and K.

A chemical analysis was performed on a bulk sample specimen obtained in boring #4 at a depth of 2.5 feet. Test results indicated a soluble sulfate content of 169 ppm (Test Method No. Calif. 417A). Based on this test result, the site soils are characterized by a very low concrete corrosion potential and the use of special sulfate resistant cement is not considered necessary.

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CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this investigation, it is concluded that development of the site as planned is feasible relative to soils foundation conditions.

Conventional shallow spread footings should provide adequate foundation support for proposed building structure. In view of the considerable amount of demolition, site clearing and probable attendant surficial disturbance anticipated to prepare the site for grading and construction, as well as possible local non-uniformities of the upper clayey sand soils, partial excavation and recompaction is recommended for the building area in order to secure a known uniform subgrade support condition.

Following are more specific observations, conclusions, and design recommendations.

A. Site Preparation Earthwork:

Prior to grading, the site should be cleared of existing buildings, pavement, slabs and other structures, as well as any significant vegetation, debris, demolition rubble, etc. Tree roots should be removed to a depth of at least 3.0 feet below existing or finished grades, whichever is lower. Any buried

City of Newport Beach

debris, rubble or other contaminated material exposed during subsequent earthwork operations should also be removed. Excavations made for removal of any existing foundations, utility lines, septic tanks, other subterranean structures, tree roots, etc., should be cleared of loose material and backfilled with clean compacted soil.

Existing cesspools, if any, should be broken off at a depth of at least 5.0 feet, cleared of any significant bottom sludge, mud, debris, etc., filled with clean pea gravel and covered over with clean compacted fill. Removal of bottom debris and/or sludge can usually be accomplished fairly readily by "drilling out" with a large diameter auger.

In order to improve the general consistency and uniformity of the upper subgrade soils, expose and correct any possible existing loose and/or contaminated local backfills, shallow buried structures, etc., and recompact any demolition disturbance, it is recommended that the building area be processed in the following manner to a distance of at least 5 feet outside the exterior building wall perimeter:

(1) Remove the existing surface soils to a depth of at least 2.5 feet below the existing or final ground surface, whichever is lower, and stockpile for subsequent recompaction.

(2) The exposed over-cut surface should then be scarified to an additional depth of at least 6 inches, watered or aerated as required, thoroughly mixed to a uniform near optimum moisture condition, and recompacted to at least 90 percent of the ASTM D-1557-78 laboratory test standard.

City of Newport Beach

(3) Backfill with the stockpiled excavation material and/or other approved native or import soils. All backfill should be spread, watered, mixed, and compacted by mechanical means in approximate 6-inch thick lifts. The degree of compaction obtained should be at least 90 percent of the ASTM D-1557-78 laboratory test standard.

(4) Continue filling as required to secure final building pad subgrade elevations.

Prior to placing new fill in other non-building areas, the exposed cleared surface should be plowed, scarified, or otherwise processed to a depth of at least 8 inches, watered and/or aerated as required, thoroughly mixed to a uniform, near optimum moisture condition, and recompacted to at least 90 percent of the ASTM D-1557-78 test standard. The final exposed surface within cut or "at grade" A.C. or concrete paved areas should also be processed in this manner.

All new fill should be spread, watered, mixed and compacted by mechanical means in approximate 6-inch thick lifts to at least 90 percent of the aforementioned standard.

Backfill placed in narrow, restricted areas, such as along utility trenches, may be placed in 12- to 24-inch thick lifts. Backfill consolidation by flooding or jetting should not be allowed. All backfill should be mechanically compacted to at least 90 percent of the aforementioned test standard.

Completed building, exterior concrete and A.C. pavement subgrades should be trimmed and rolled to a firm smooth surface. Final

City of Newport Beach

watering and rolling should be performed immediately prior to placing concrete or paving.

Imported fill material should consist of clean, granular soils free from vegetation, debris, or rocks larger than 3 inches. The Expansion Index Value should not exceed a maximum of 20.

All earthwork operations should be subject to compaction control inspection and testing by the Soils Engineer. The Soils Engineer should be notified at least two days in advance of the start of grading. A joint meting between a representative of the client, the contractor and the Soils Engineer is recommended prior to grading to discuss specific procedures and scheduling.

B. Foundation Support:

Assuming compliance with site preparation and earthwork compaction recommendations, the proposed building structure may be supported on conventional shallow spread footings bearing on the new compacted backfill-fill zone. A maximum allowable bearing value of 2000 psf may be used for design purposes. The recommended design bearing value is for dead plus live loads and may be increased one-third for combined dead, live and seismic forces.

Footings should be at least 12 inches in width and should extend to a depth of at least 18 inches below the lowest adjacent finished subgrade or interior floor slab surface. It is also recommended that nominal steel reinforcement at least equivalent to one #5 bar both top and bottom be employed in all continuous bearing walls.

City of Newport Beach

Bearing value analysis by the "Terzaghi" method and using shear strength values shown on Plate G indicates a safety factor of at least 4.4 for the recommended recommended 2000 psf design value. Also, the actual safety factor will probably be somewhat greater due to the recommended excavation and recompaction.

Estimated average settlements in inches for footings under the full recommended loading condition are as follows:

Footing Size (feet)	Continuous Footing	Square Footing
1.0	0.25	----
2.0	0.40	0.25
3.5	0.55	0.35
5.0	----	0.45

C. Concrete Slabs:

Based on field observations and laboratory test results, the upper clayey sand subgrade soils are generally classified as "low" or slightly expansive. Although not considered critical, it is recommended that nominal reinforcement such as "6x6-10/10" welded wire mesh be employed for all concrete floor slabs on grade (properly placed at near midpoint of the slab section). Also, the exposed finished subgrade surface should be maintained or restored to a moist, near optimum condition prior to placing concrete.

It is recommended that a moisture barrier be provided under office floors, carpeted areas, or other concrete slabs where slab moisture would be detrimental. A 6-mil vinyl plastic membrane with 6 inch sealed laps and 1 to 2 inches of protective clean sand bedding and cover should be adequate.

City of Newport Beach

It is recommended that concrete slabs which are placed directly over a native soil subgrade and are subject to vehicle traffic loads be at least 5.0 inches in thickness. It is also suggested that nominal reinforcement such as "6x6-10/10" welded wire mesh be employed in new exterior concrete slabs and paving.

D. Lateral Pressure:

An allowable lateral bearing value against the sides of footings of 300 pounds per square foot per foot of depth to a maximum of 4500 pounds per square foot may be used provided there is positive contact between the vertical bearing surface and the adjacent soil.

Friction between the base of footings and/or floor slabs and the underlying soil may be assumed as 40 percent of the dead load. Friction and lateral pressure may be combined provided the assumed lateral bearing resistance does not exceed two-thirds of the allowable.

Recommended active lateral soil pressure values for design of drained retaining walls and/or depressed ramp walls are as follows:

*Slope of Retained Earth	Equivalent Fluid Pressure (pcf)
Level	30
4:1	35
2:1	45
1-1/2:1	55

*Slope inclination in a direction perpendicular to the wall face.

City of Newport Beach

A pipe and gravel drain (4-inch perforated PVC schedule 40 embedded in at least 3 cubic feet of filter gravel per lineal foot of pipe) should be provided on the retained earth side and near the base of all retaining walls. Water intercepted near the base of the wall by the perforated PVC pipe should be directed to appropriate outlets. Typical weep-holes leading out of the gravel drain (no pipe) would be satisfactory for walls which face into open patio or yard areas.

All backfill placed behind retaining walls should be spread, watered or aerated as required, thoroughly mixed to a uniform near optimum moisture condition and compacted by mechanical means to at least 90 percent of the ASTM D-1557-78 laboratory test standard.

E. A.C. Paving:

In view of the unknown grading changes to be made in the course of developing the site, it is somewhat difficult to anticipate actual final subgrade soil mixtures and stabilometer test were, therefore, not performed. In any case, however, it is estimated that an "R" value of 30 would reasonably represent the near surface site soils. Based on this parameter, recommended pavement sections for probable traffic conditions and estimated Traffic Index design values are as follows:

Traffic Conditions	Assumed T. I.	A.C. (inches)	Rock Base (inches)
(1) Driveways	5.0	3.0	6.0
(2) Parking Stalls	4.0	2.5	4.0

City of Newport Beach

It is recommended that the top 6 inches of the finished soil subgrade be watered, rolled and compacted at near the optimum moisture content to at least 90 percent of the ASTM D-1557-78 laboratory compaction standard. Final subgrade watering, rolling and compaction should be accomplished immediately prior to paving. The completed subgrade should be trimmed and rolled to a firm, smooth surface.

Base course material should be at least equivalent to "crushed miscellaneous base" as defined by the Standard Specifications for Public Works Construction, 1985 Edition (section 200-2.4, page #84). All rock base should be compacted to at least 95 percent of the ASTM D-1557-78 laboratory test standard.

REMARKS

Conclusions and recommendations presented in this report represent our best engineering judgement only based on the available preliminary design information and the data developed during the course of our study. No other warranty or responsibility is expressed or implied.

Soil conditions have been interpreted from existing surface exposures and the materials encountered in the test borings. These conditions may not necessarily represent other areas between or beyond the test borings.

All shoring and bracing should be in accordance with current requirements to CAL-OSHA, and the Industrial Accident Commission

City of Newport Beach

of the State of California, and all other public agencies having jurisdiction.

A reasonable effort was made to restore drill hole sites to their original condition. This included backfilling and tamping of the test borings and general surface cleanup. It should be noted that as with any backfill, residual consolidation and surface subsidence resulting in a possible hazardous condition could occur at the test borings. The client is cautioned to periodially examine the test boring sites, and, if necessary, backfill any resulting depressions.

This office will be further available for consultation or to make a final review of project plans and specifications to assist in assuring correct interpretation of this report's recommendations for use in applicable sections.

This report may be subject to review by the controlling public agencies for the project.

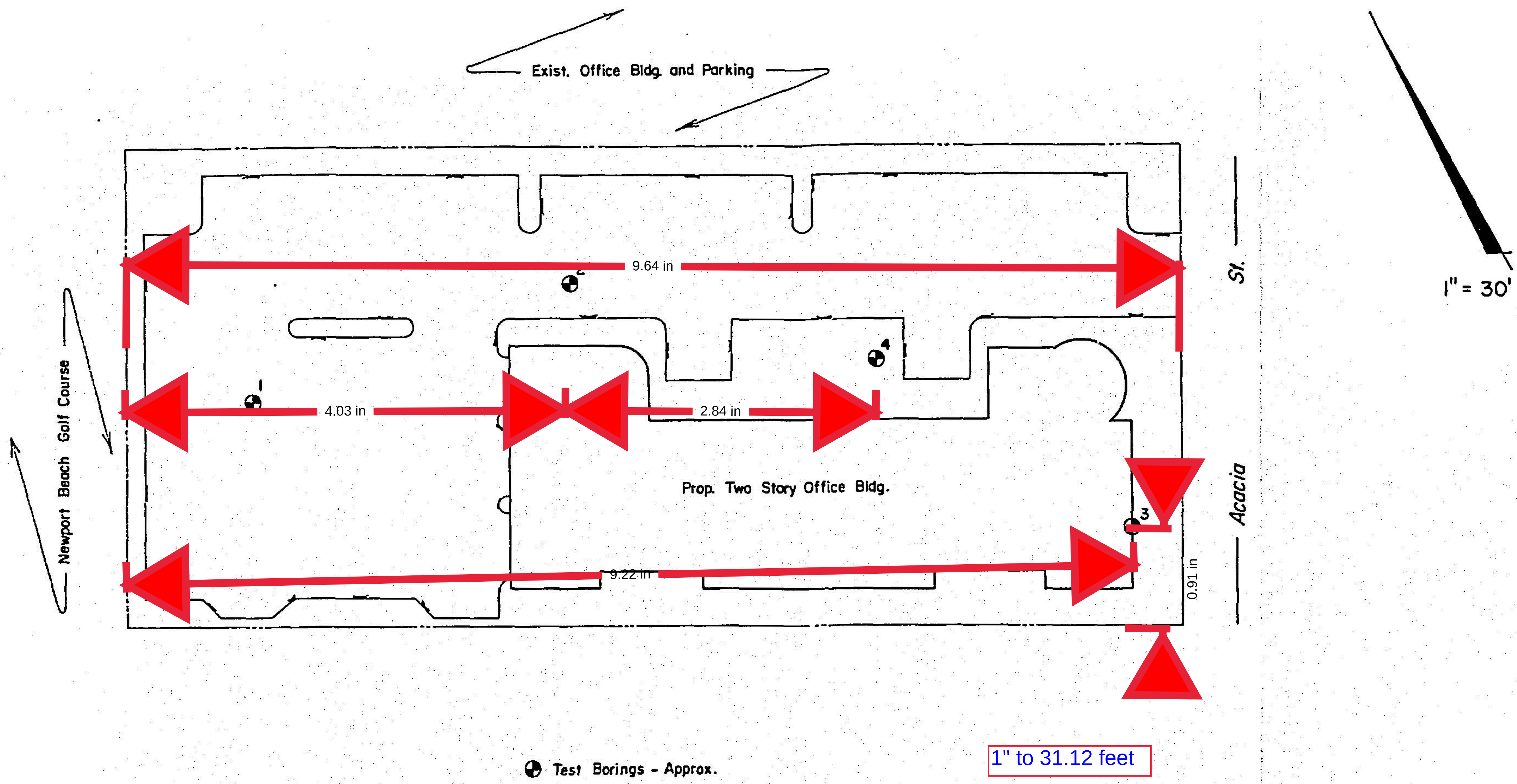
City of Newport Beach

VICINITY MAP

Ref : USGS Newport Beach Quad.

BACA ASSOCIATES
Project : A-0675- F
Plate : A

City of Newport Beach



PLOT PLAN

BACA ASSOCIATES
Project: A-0675-F
Plate: B

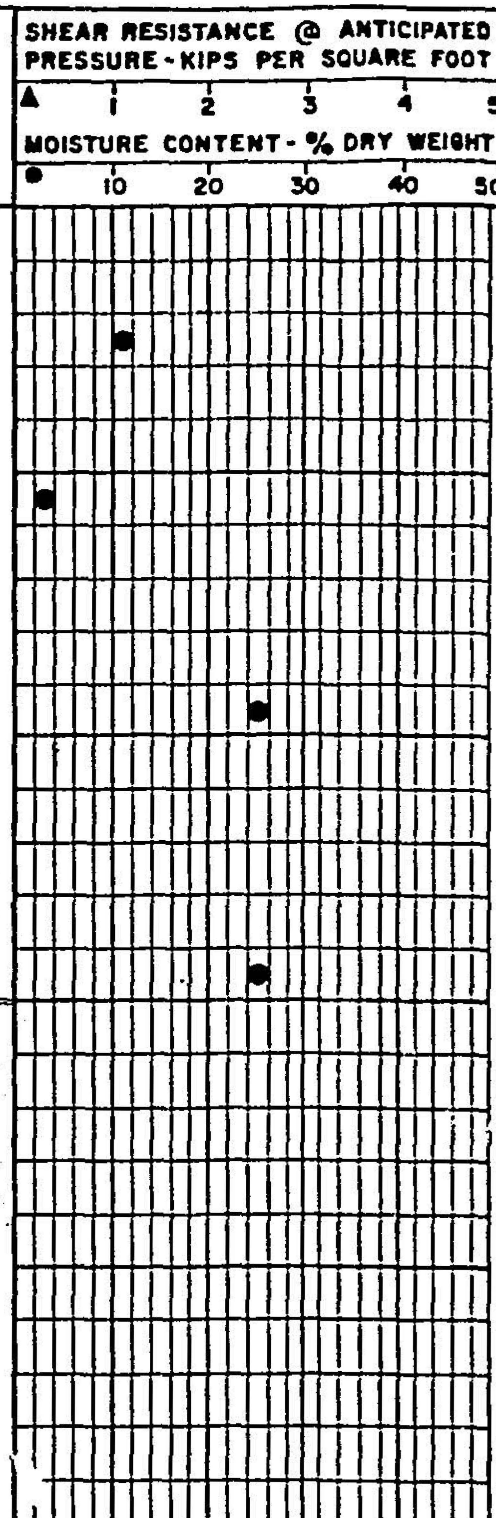
City of Newport Beach

LOG OF BORING Nº 1

DATE DRILLED 8/5/89	DRILLING EQUIPMENT Hollow-Stem Flight Auger
DRIVING WEIGHT 140 lbs. - 30" drop	SURFACE ELEVATION

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION (landscape area)	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.
			SAND, fine to medium, variable clayey to sl. clayey, scat. gravels	brown	moist	mod. comp.	
	●	34					109
5					damp to dry		
	●	22					104
			CLAY, very silty, numerous veins and lenses of fine sand and silty sand	gray and gray brown	very moist	firm	
10	●	28					85
	●	29					93
15			End @ 15.0 ft.				
20							
25							

Notes:
(1) No ground water



Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	C

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

LOG OF BORING Nº 2

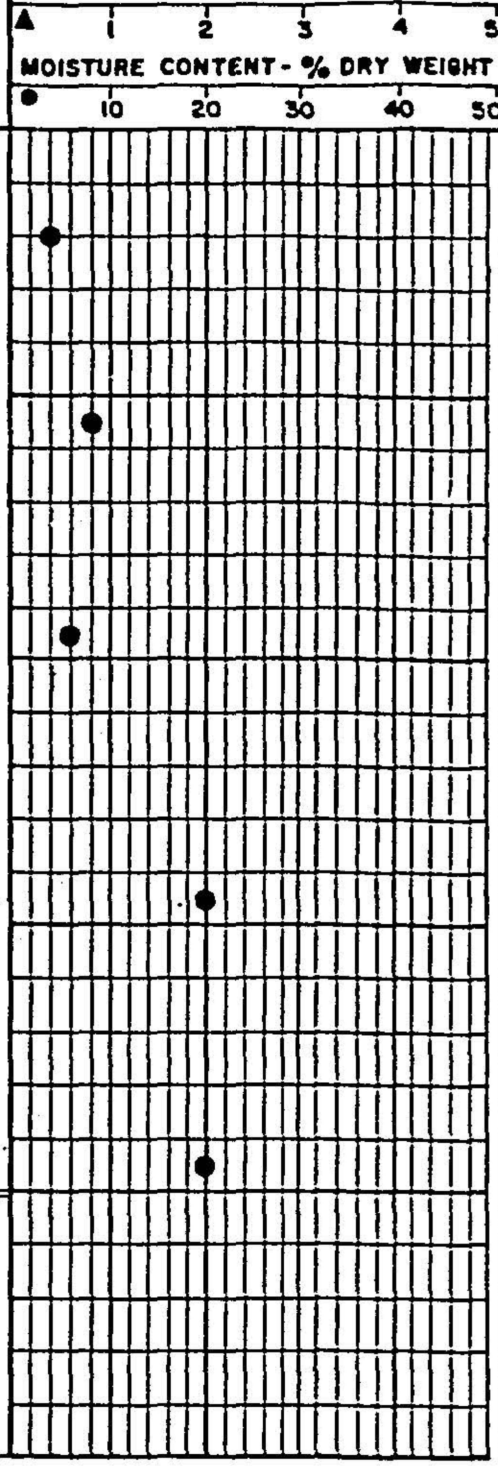
DATE DRILLED 8/5/89 | **DRILLING EQUIPMENT** Hollow-Stem Flight Auger

DRIVING WEIGHT 140 lbs. - 30" drop | **SURFACE ELEVATION**

Depth in Feet	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.
		SAND, fine to medium, variable clayey to sl. clayey, scat. gravels	light brown	dry	loose	
	36			sl. moist	mod. comp.	118
			brown			
5	34					110
		fine to medium, silty to slight silty			comp.	
10	88					118
		CLAY, silty, numerous veins and lenses of sand and silty sand	gray with red brown stains	very moist	firm to stiff	
15	55					97
20	25					102
		End @ 20.0 ft.				
		Notes: (1) No ground water				
25						

SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT

MOISTURE CONTENT - % DRY WEIGHT



Acacia Plaza III
Santa Ana Heights, California

PROJECT No. A-0675-F

PLATE D

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

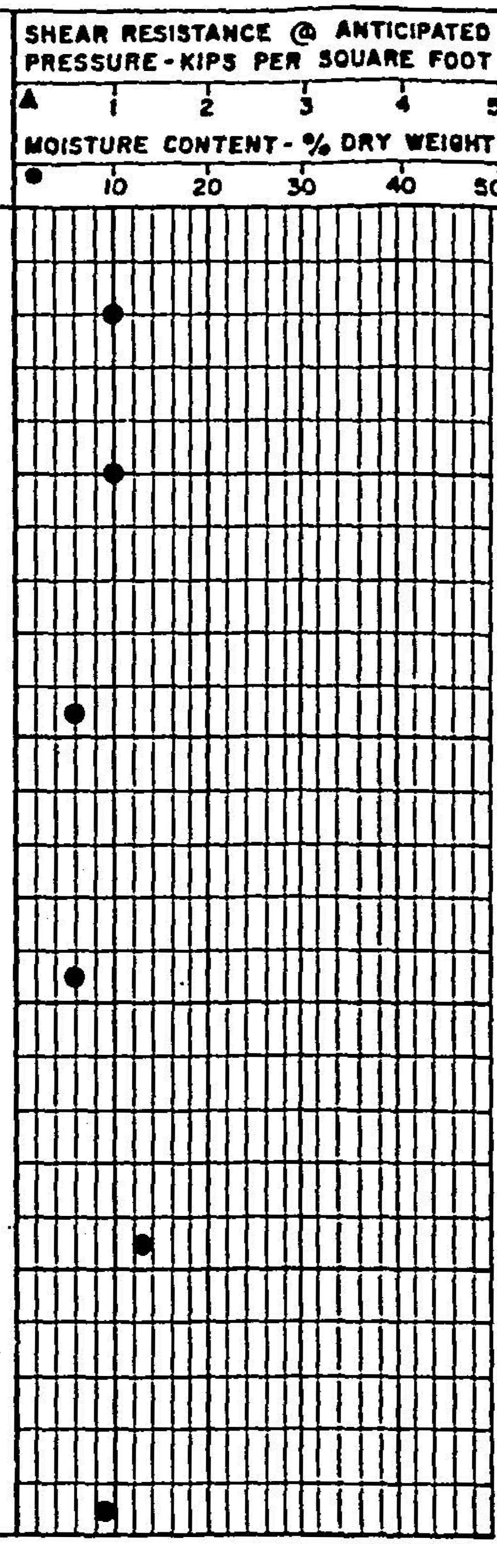
City of Newport Beach

LOG OF BORING № 3

DATE DRILLED 3/5/89 | DRILLING EQUIPMENT Hollow-Stem Flight Auger

DRIVING WEIGHT 140 lbs. - 30" drop | SURFACE ELEVATION

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU.FT.
			SAND, fine to medium, silty, sl. clayey, scat. gravels	brown	moist	comp.	
	●	46					116
			fine to coarse, sl. clay binder, variable scat. to moderate gravels			mod. comp. to comp.	
5	●	28					116
					sl. moist		
10	●	20					109
15	●	28					108
			fine to medium, clean, occasional clay/silt veins	tan with pale gray veins	moist	dense	
20	●	67					103
25	●	56					101



End @ 25.0 ft.

Notes: (1) No ground water

Acacia Plaza III
Santa Ana Heights, California

PROJECT No. A-0675-F

PLATE E

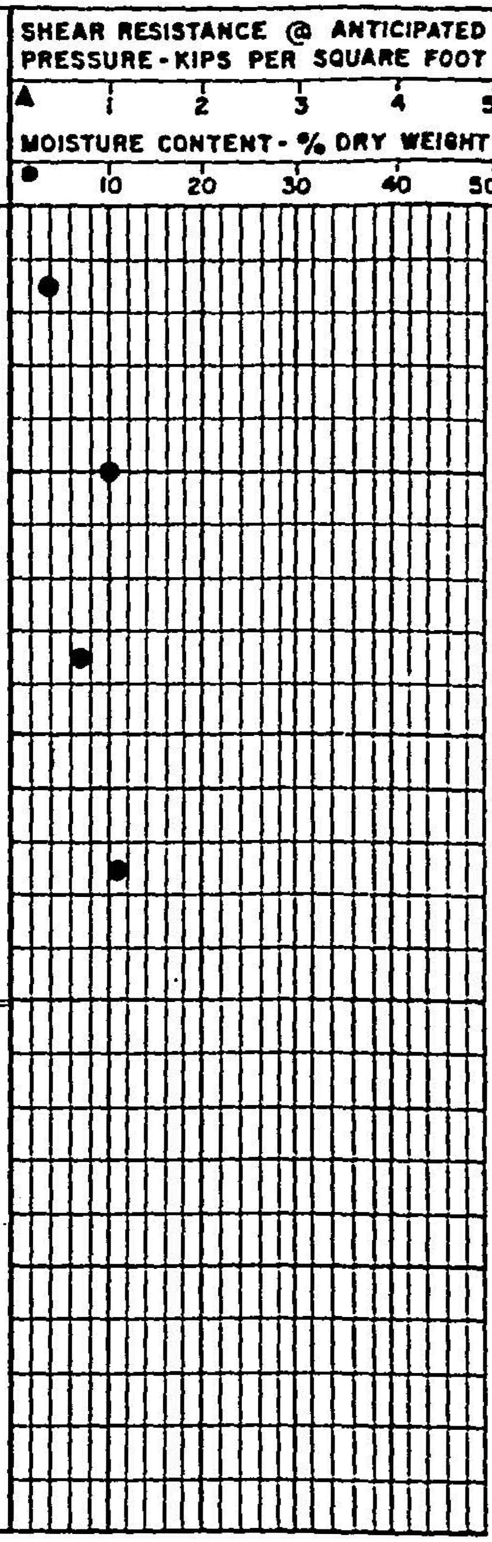
BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

LOG OF BORING No 4

DATE DRILLED 8/5/89	DRILLING EQUIPMENT Hollow-Stem Flight Auger
DRIVING WEIGHT 140 lbs. - 30" drop	SURFACE ELEVATION

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.
			SAND, fine to medium, silty, variable	brown	dry	loose	
	■	20	clayey to sl. clayey, scat. gravels		sl. moist	mod. comp.	109
					moist	comp.	
5	■	38					115
	■	52	medium to coarse, variable sl. clay binder to clean, heavy gravels	red brown	sl. moist		111
10							
	■	35	very fine to fine, sl. silty, with minor silt veins	pale gray brown	moist		101
15			End @ 15.0 ft.				
			Notes: (1) No ground water				
20							
25							



Acacia Plaza III
Santa Ana Heights, California

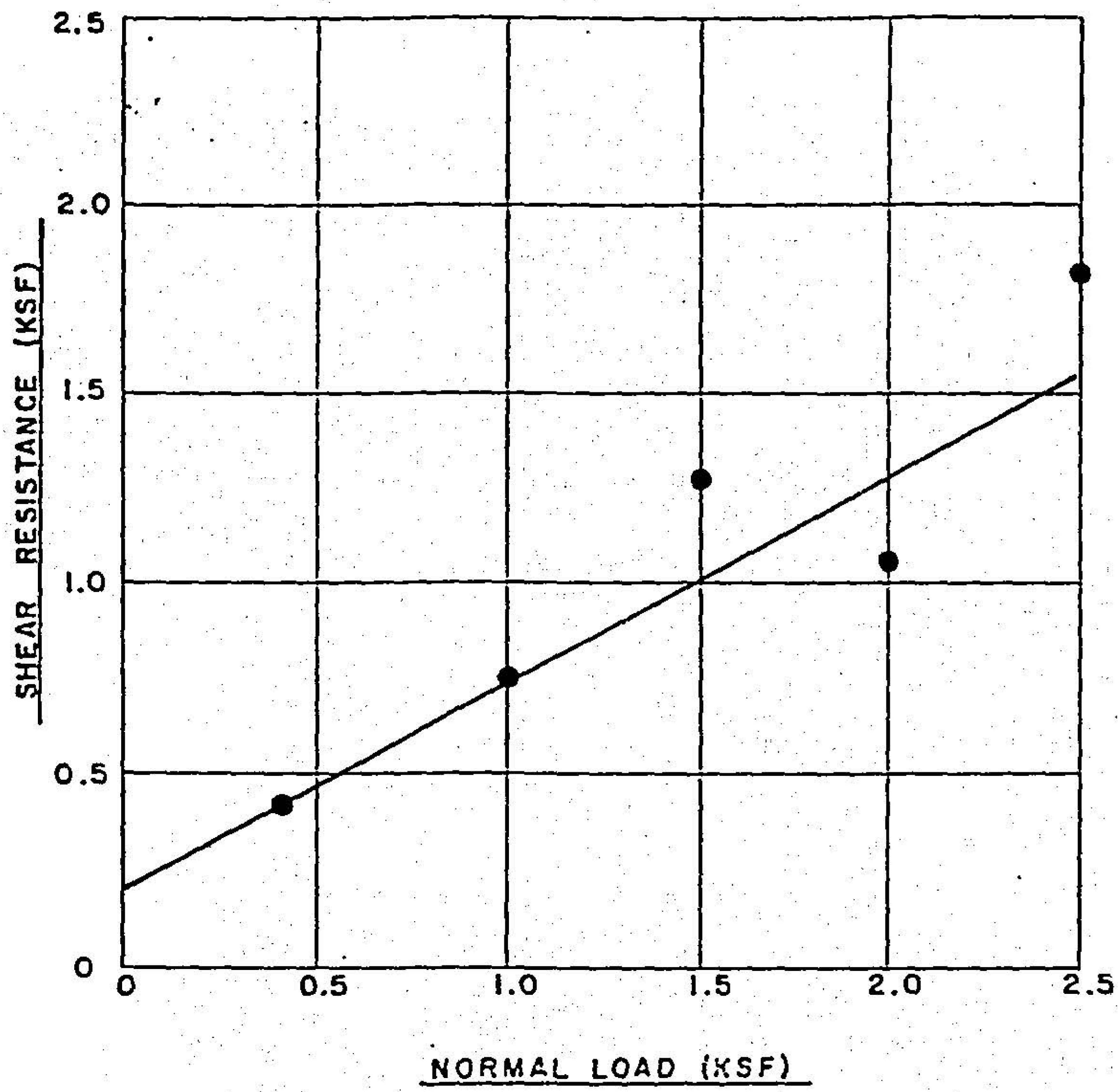
PROJECT No. A-0675-F
PLATE F

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

DIRECT SHEAR TESTS

UPPER CLAYEY SANDS



(1) Saturated-Drained Condition

(2) Friction Angle = 28°

(3) Cohesion = 200 psf

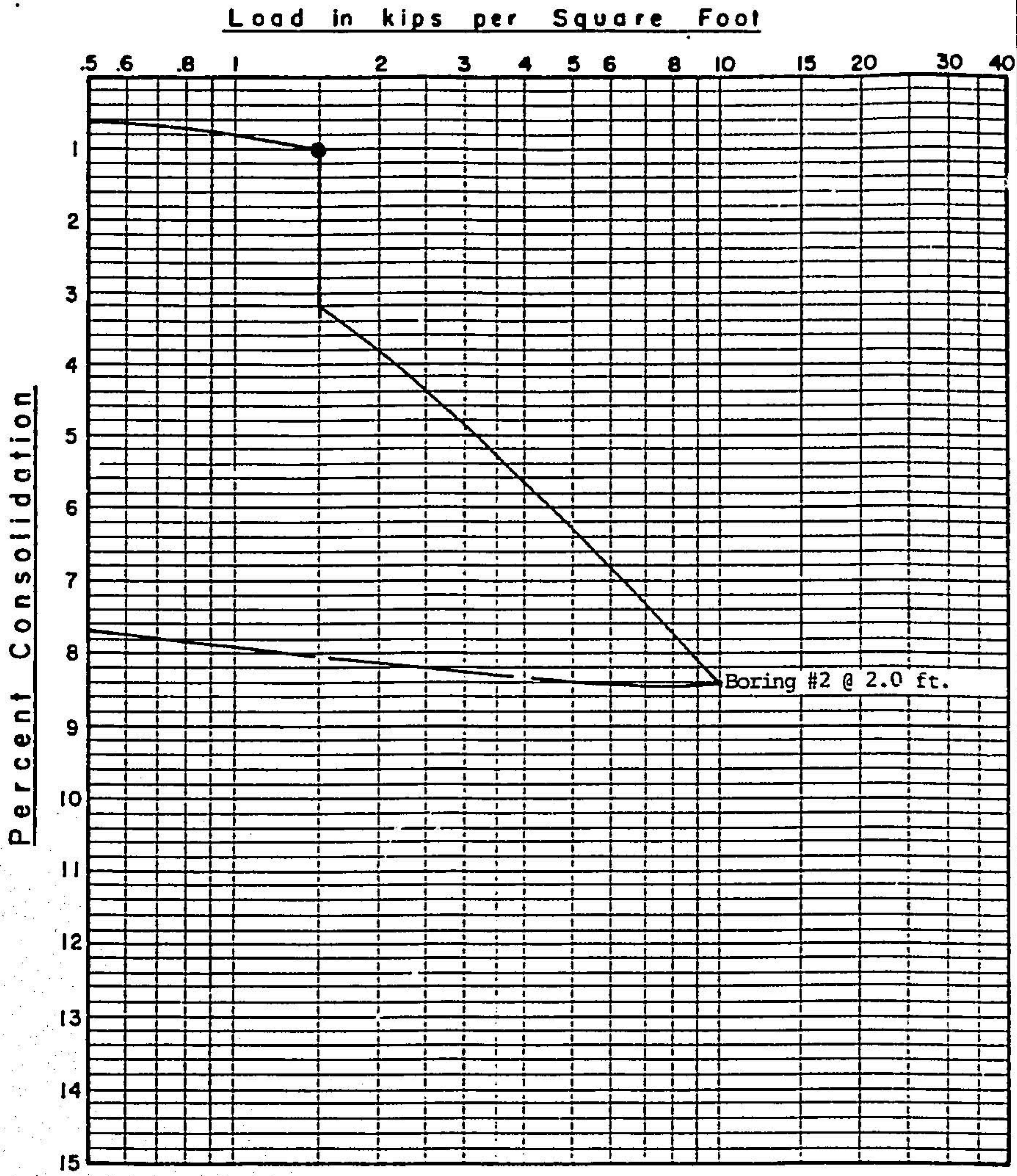
Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	G

BACA ASSOCIATES

CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

CONSOLIDATION TESTS



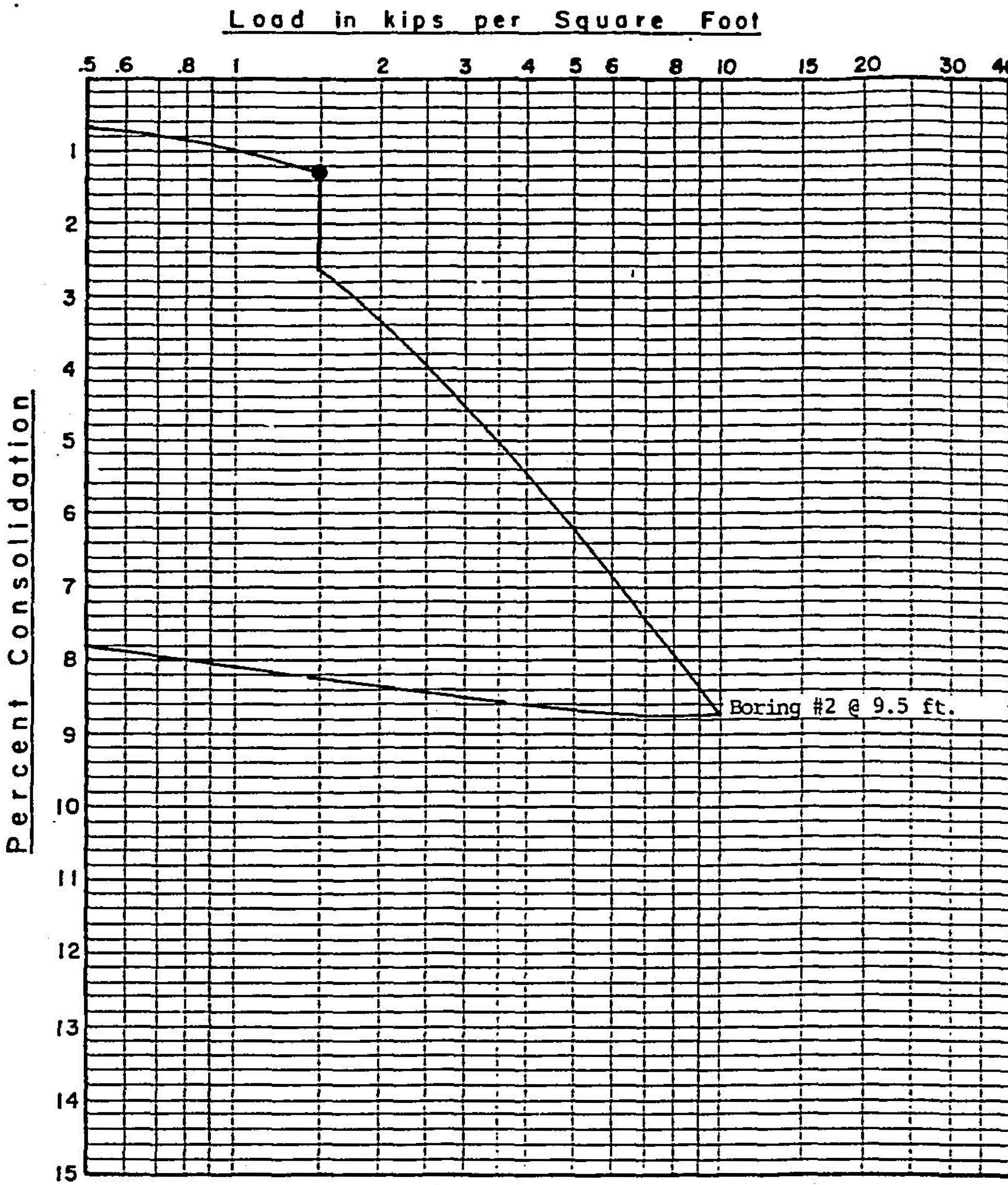
● WATER PERMITTED TO CONTACT SAMPLE

Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	H

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

CONSOLIDATION TESTS



● WATER PERMITTED TO CONTACT SAMPLE

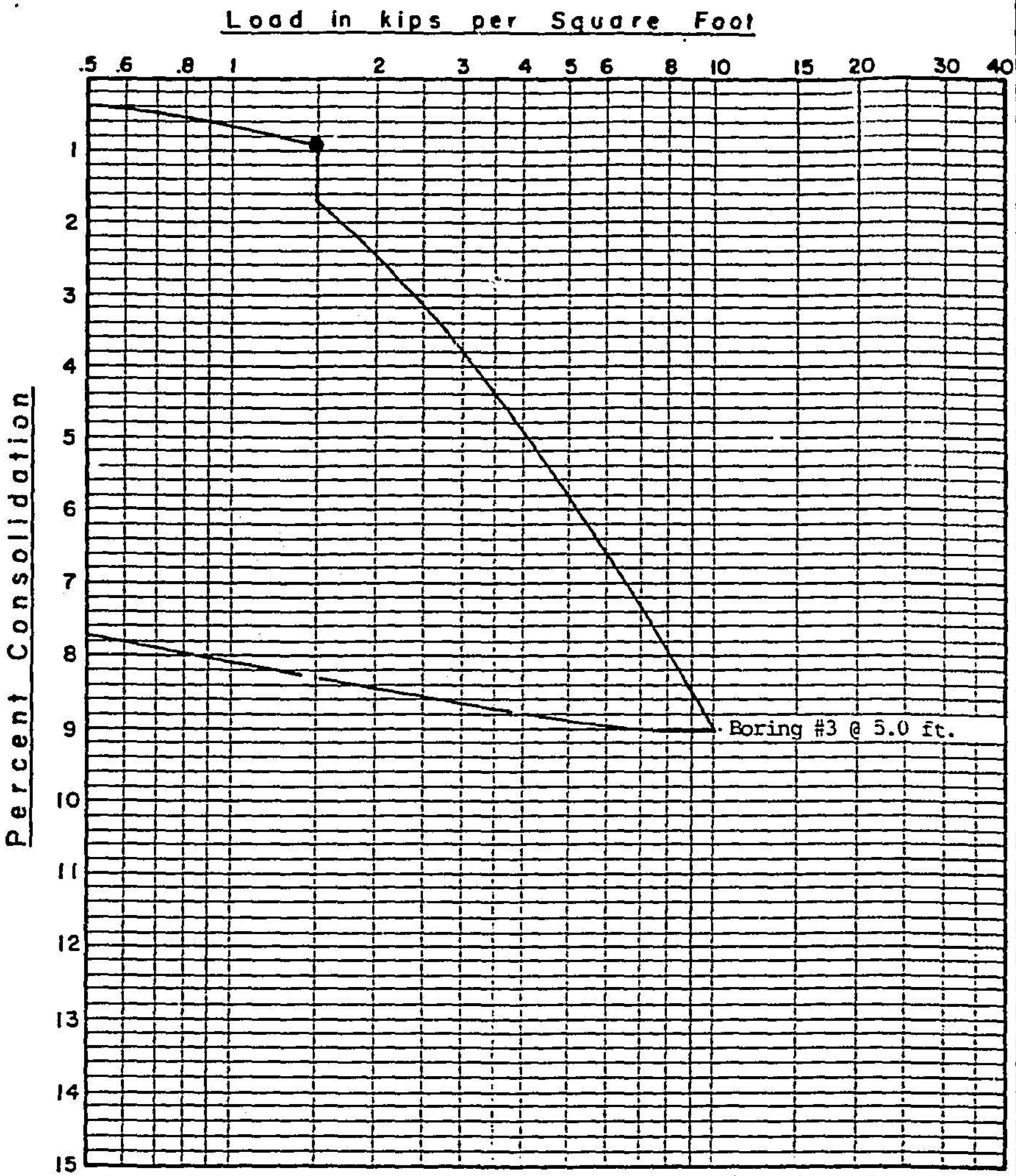
Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	1

BACA ASSOCIATES

CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

CONSOLIDATION TESTS



● WATER PERMITTED TO CONTACT SAMPLE

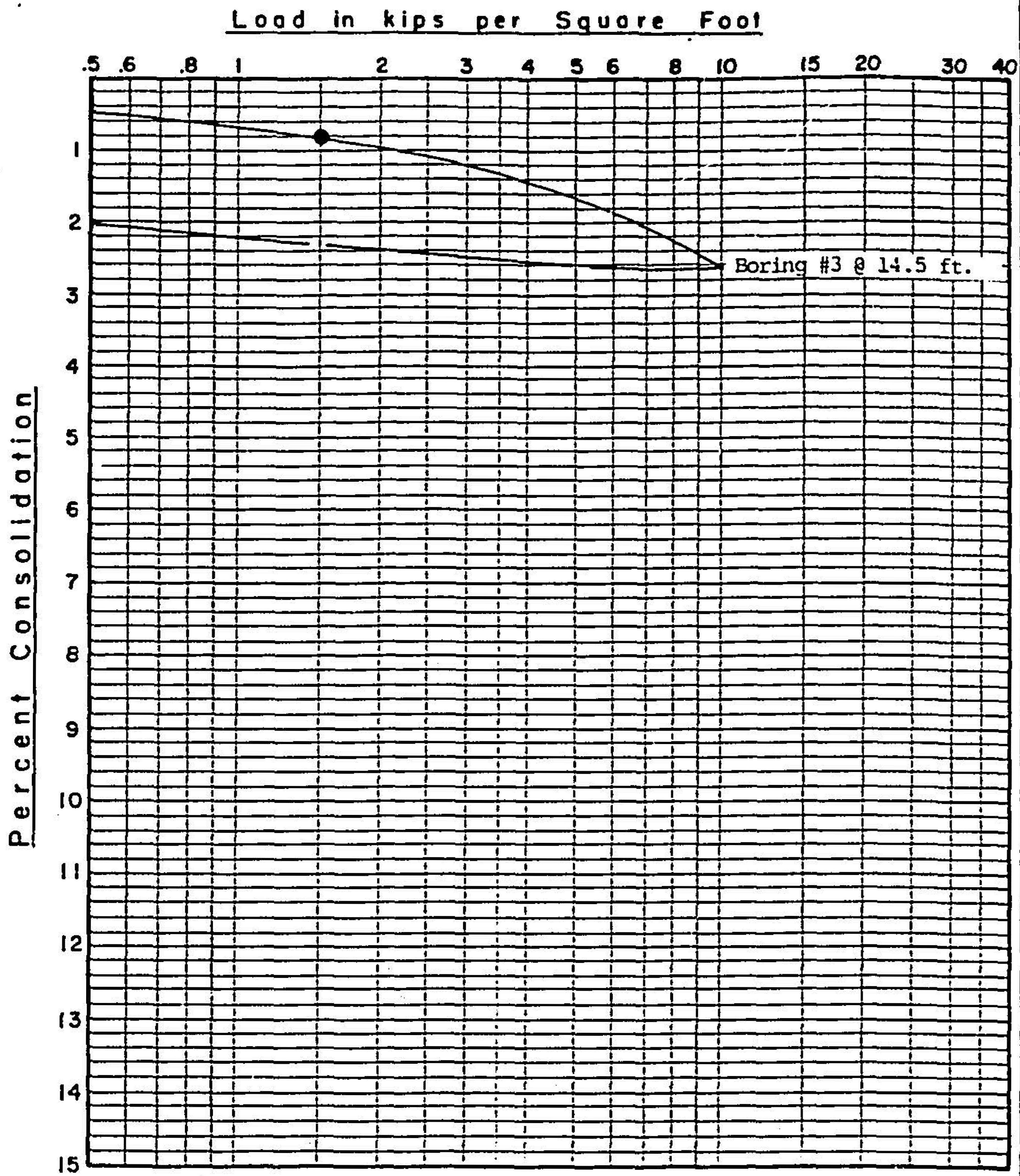
Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	J

BACA ASSOCIATES

CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

CONSOLIDATION TESTS



● WATER PERMITTED TO CONTACT SAMPLE

Acacia Plaza III Santa Ana Heights, California	PROJECT No.	A-0675-F
	PLATE	K

BACA ASSOCIATES
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

City of Newport Beach

APPENDIX D

SEISMIC DESIGN PARAMETERS

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

Wavegarden Cove NB

Latitude, Longitude: 33.6587, -117.8826

Date	5/7/2024, 3:12:53 PM
Design Code Reference Document	NEHRP-2015
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.311	MCE_R ground motion. (for 0.2 second period)
S_1	0.468	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.311	Site-modified spectral acceleration value
S_{M1}	0.858 -See Section 11.4.7	Site-modified spectral acceleration value
S_{DS}	0.874	Numeric seismic design value at 0.2 second SA
S_{D1}	0.572 -See Section 11.4.7	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D -See Section 11.4.7	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.832 -See Section 11.4.7	Site amplification factor at 1.0 second
PGA	0.564	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.62	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.311	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.424	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.468	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.506	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.823	Factored deterministic acceleration value. (1.0 second)
PGAd	1.021	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.564	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.921	Mapped value of the risk coefficient at short periods
C_{R1}	0.926	Mapped value of the risk coefficient at a period of 1 s
C_V	1.362	Vertical coefficient

DISCLAIMER

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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

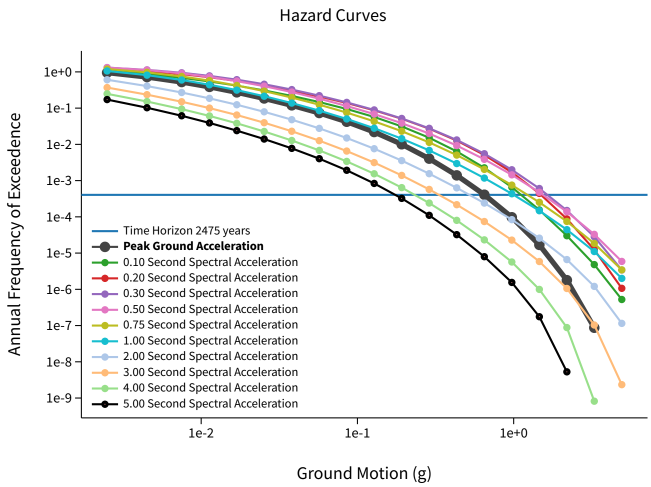
Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

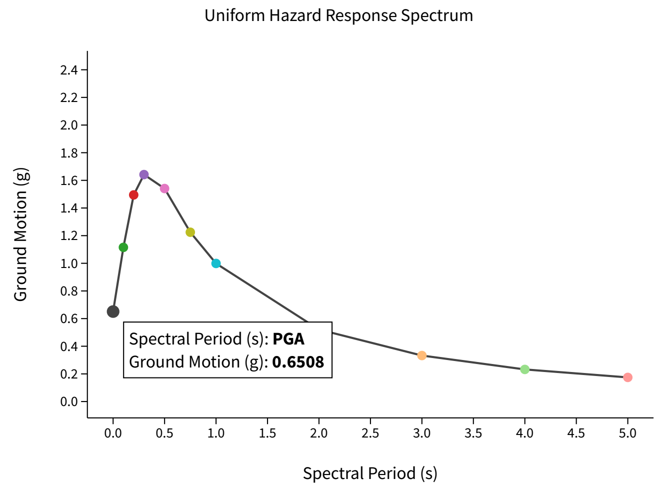
Please also see the new USGS Earthquake Hazard Toolbox for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

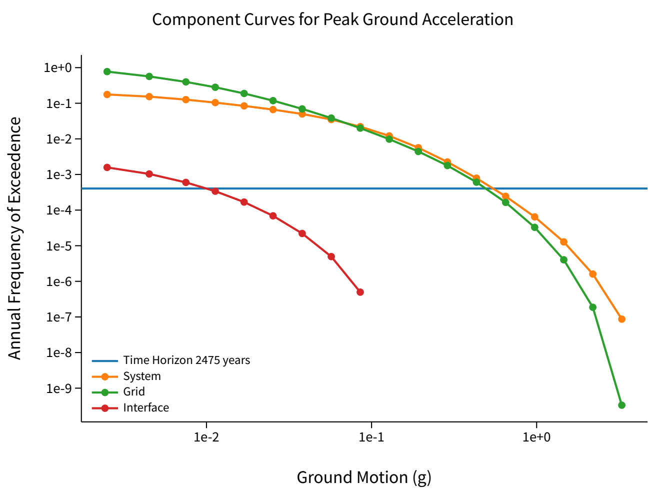
Input

Edition	**Spectral Period**
Dynamic: Conterminous U.S. 2014 (u…	Peak Ground Acceleration
Latitude Decimal degrees	**Time Horizon** Return period in years
33.6587	2475
Longitude Decimal degrees, negative values for western longitudes	
-117.8826	
Site Class	
259 m/s (Site class D)	

Hazard Curve





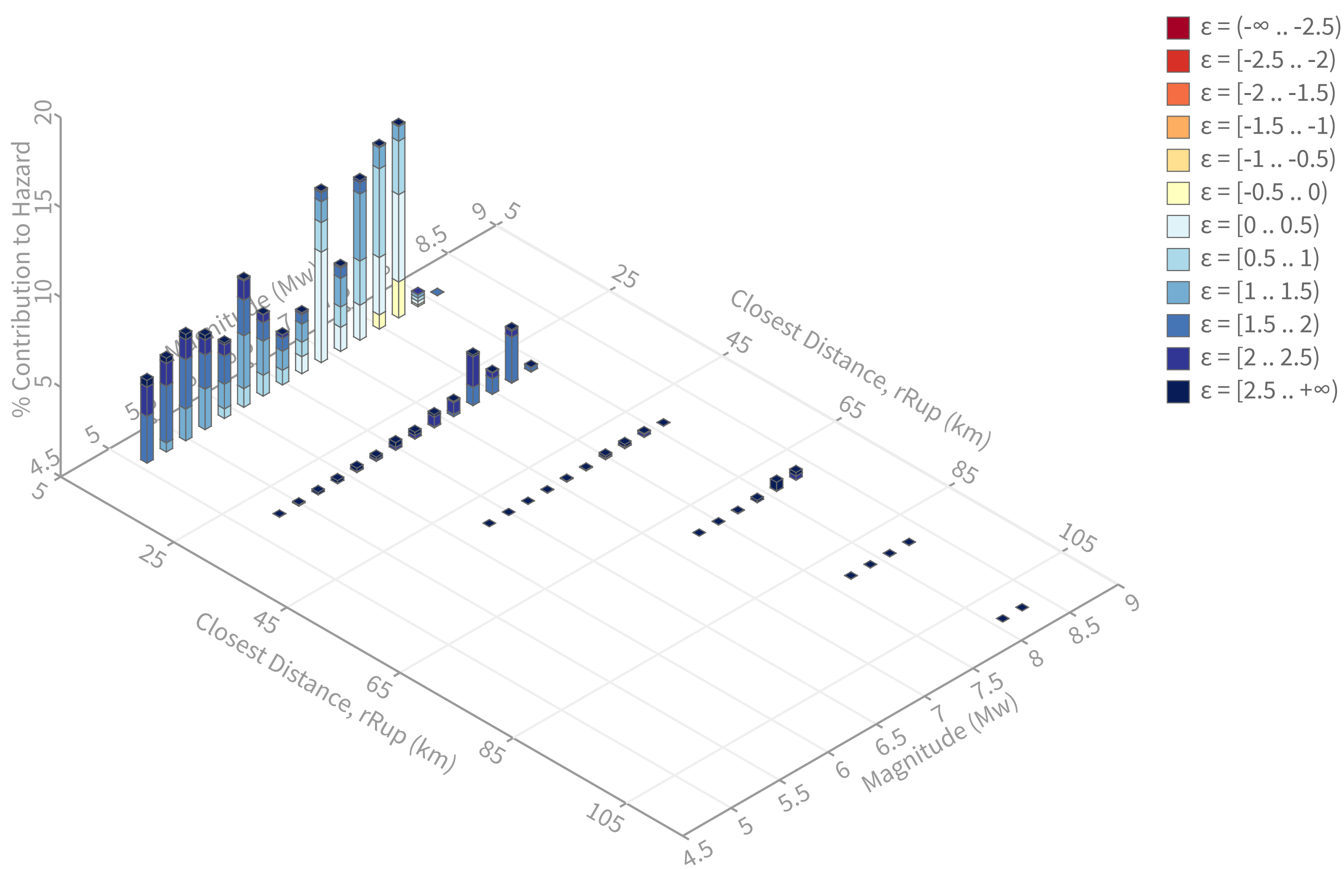


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.65084062 g

Recovered targets

Return period: 2949.8301 yrs
Exceedance rate: 0.00033900258 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.1 %

Mean (over all sources)

m: 6.7
r: 10.93 km
ε_0: 1.24 σ

Mode (largest m-r bin)

m: 7.69
r: 5.67 km
ε_0: 0.44 σ
Contribution: 10.71 %

Mode (largest m-r-ε_0 bin)

m: 6.89
r: 3.35 km
ε_0: 0.29 σ
Contribution: 6.15 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM32	System							32.30
San Joaquin Hills [0]		3.35	7.13	0.34	117.885°W	33.671°N	351.83	12.81
Newport-Inglewood alt 2 [0]		6.89	7.48	0.77	117.937°W	33.619°N	228.64	6.48
Compton [0]		16.72	7.35	1.27	118.043°W	33.702°N	288.18	2.70
Palos Verdes [6]		25.33	7.46	1.98	118.119°W	33.544°N	239.84	1.87
Newport-Inglewood (Offshore) [0]		8.15	6.55	1.37	117.915°W	33.591°N	201.47	1.83
San Joaquin Hills [1]		4.61	6.93	0.52	117.845°W	33.669°N	72.20	1.21
UC33brAvg_FM31	System							27.76
San Joaquin Hills [0]		3.35	7.52	0.29	117.885°W	33.671°N	351.83	8.25
Newport-Inglewood alt 1 [0]		7.02	7.45	0.77	117.940°W	33.619°N	230.44	7.15
Compton [0]		16.72	7.28	1.31	118.043°W	33.702°N	288.18	2.55
Newport-Inglewood (Offshore) [0]		8.15	6.46	1.41	117.915°W	33.591°N	201.47	2.01
Palos Verdes [6]		25.33	7.29	2.08	118.119°W	33.544°N	239.84	1.74
Whittier alt 1 [2]		28.76	7.61	1.98	117.731°W	33.884°N	29.17	1.08
UC33brAvg_FM31 (opt)	Grid							20.02
PointSourceFinite: -117.883, 33.699		6.78	5.66	1.34	117.883°W	33.699°N	0.00	3.30
PointSourceFinite: -117.883, 33.699		6.78	5.66	1.34	117.883°W	33.699°N	0.00	3.30
PointSourceFinite: -117.883, 33.717		8.09	5.68	1.53	117.883°W	33.717°N	0.00	2.09
PointSourceFinite: -117.883, 33.717		8.09	5.68	1.53	117.883°W	33.717°N	0.00	2.09
PointSourceFinite: -117.883, 33.735		8.95	5.94	1.54	117.883°W	33.735°N	0.00	1.55
PointSourceFinite: -117.883, 33.735		8.95	5.94	1.54	117.883°W	33.735°N	0.00	1.55
UC33brAvg_FM32 (opt)	Grid							19.93
PointSourceFinite: -117.883, 33.699		6.80	5.64	1.35	117.883°W	33.699°N	0.00	3.18
PointSourceFinite: -117.883, 33.699		6.80	5.64	1.35	117.883°W	33.699°N	0.00	3.18
PointSourceFinite: -117.883, 33.717		8.09	5.68	1.54	117.883°W	33.717°N	0.00	2.18
PointSourceFinite: -117.883, 33.717		8.09	5.68	1.54	117.883°W	33.717°N	0.00	2.18
PointSourceFinite: -117.883, 33.735		8.97	5.93	1.55	117.883°W	33.735°N	0.00	1.56
PointSourceFinite: -117.883, 33.735		8.97	5.93	1.55	117.883°W	33.735°N	0.00	1.56

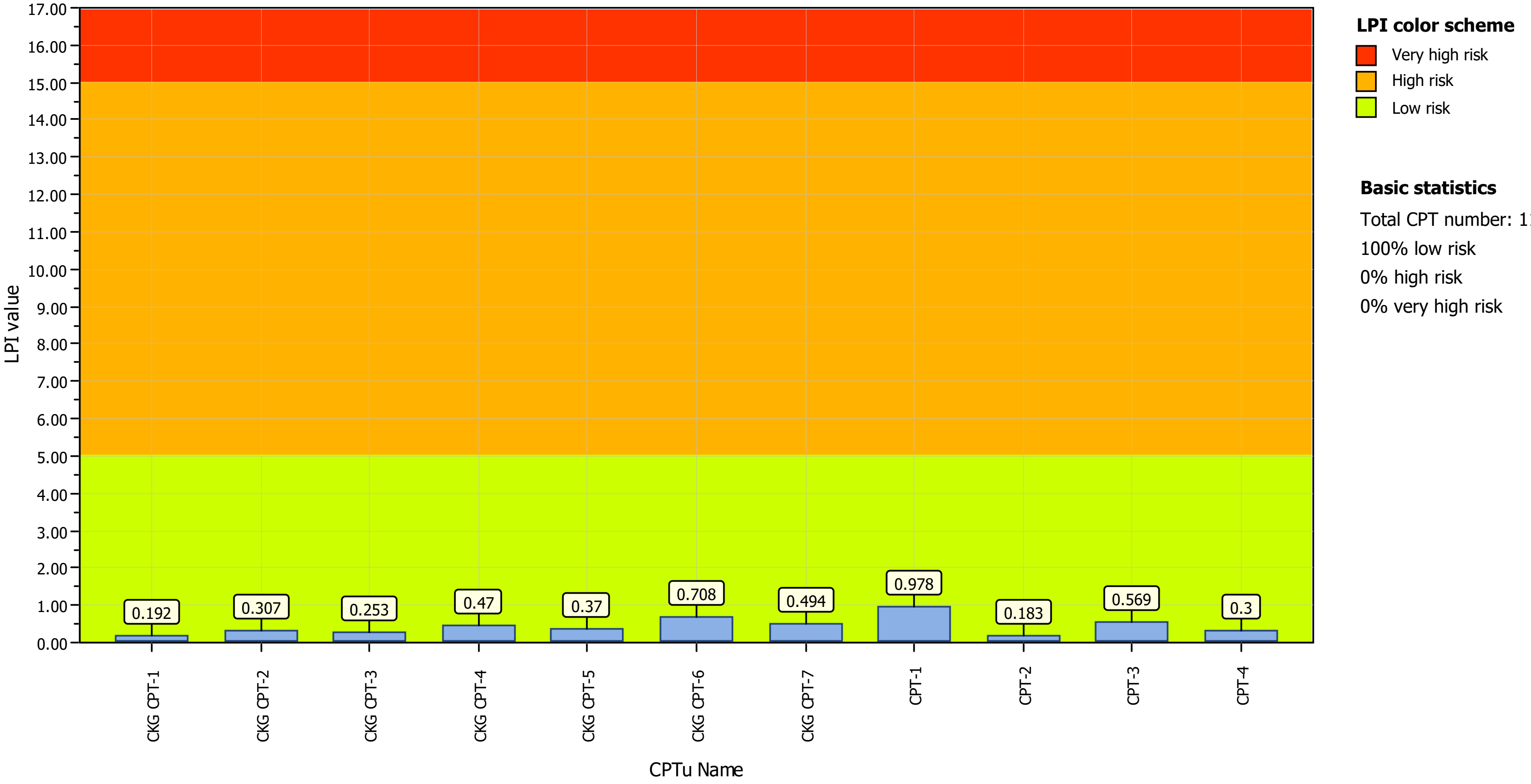
APPENDIX E

LIQUEFACTION ANALYSIS

Project title : Carl Kim Geotechnical

Location : 3100 Irvine Ave, Newport Beach, CA

Overall Liquefaction Potential Index report



Basic statistics

Total CPT number: 11

100% low risk

0% high risk

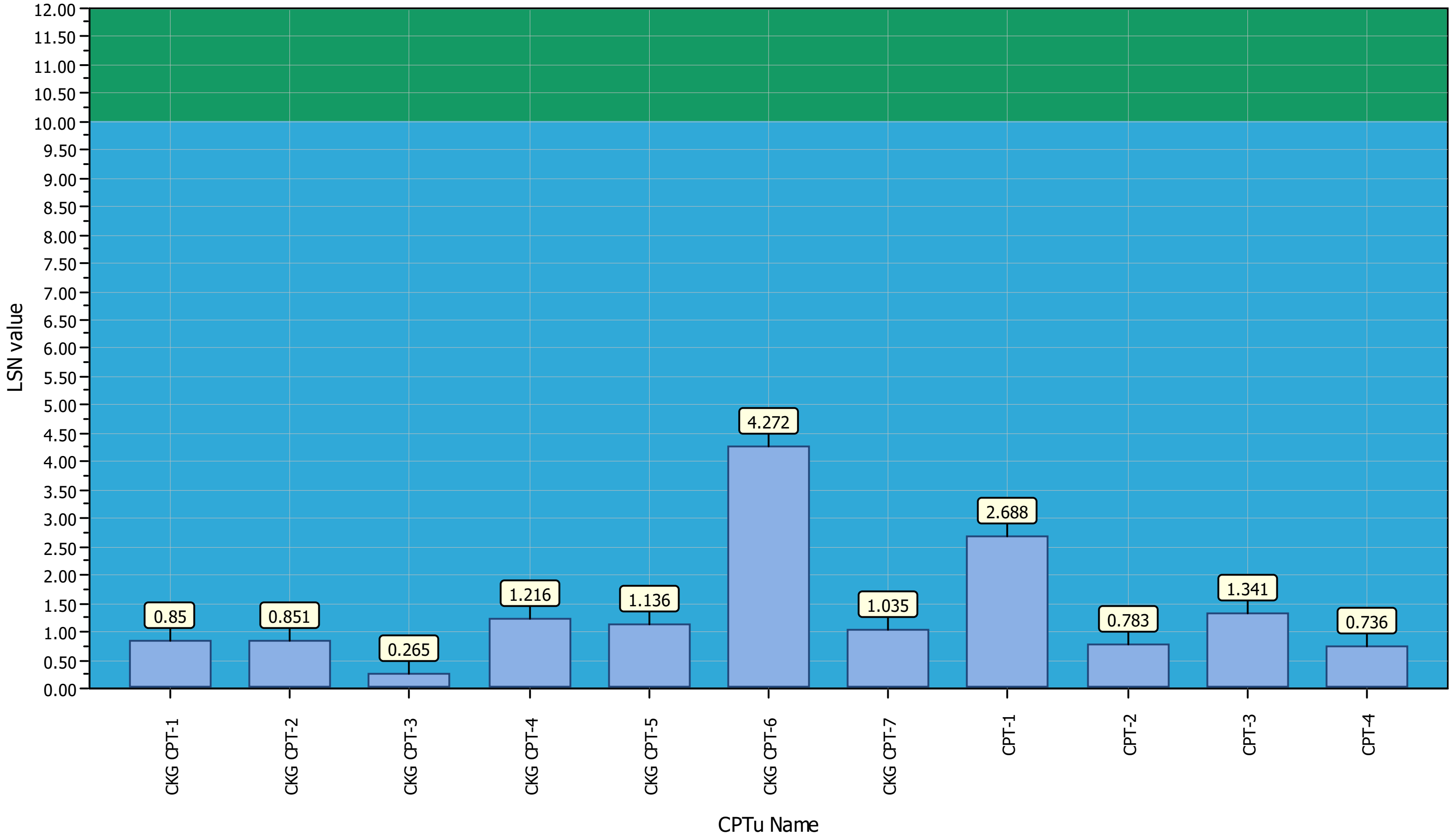
0% very high risk

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
carlkimgeo@gmail.com

Project title : Carl Kim Geotechnical

Location : 3100 Irvine Ave, Newport Beach, CA

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 11

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

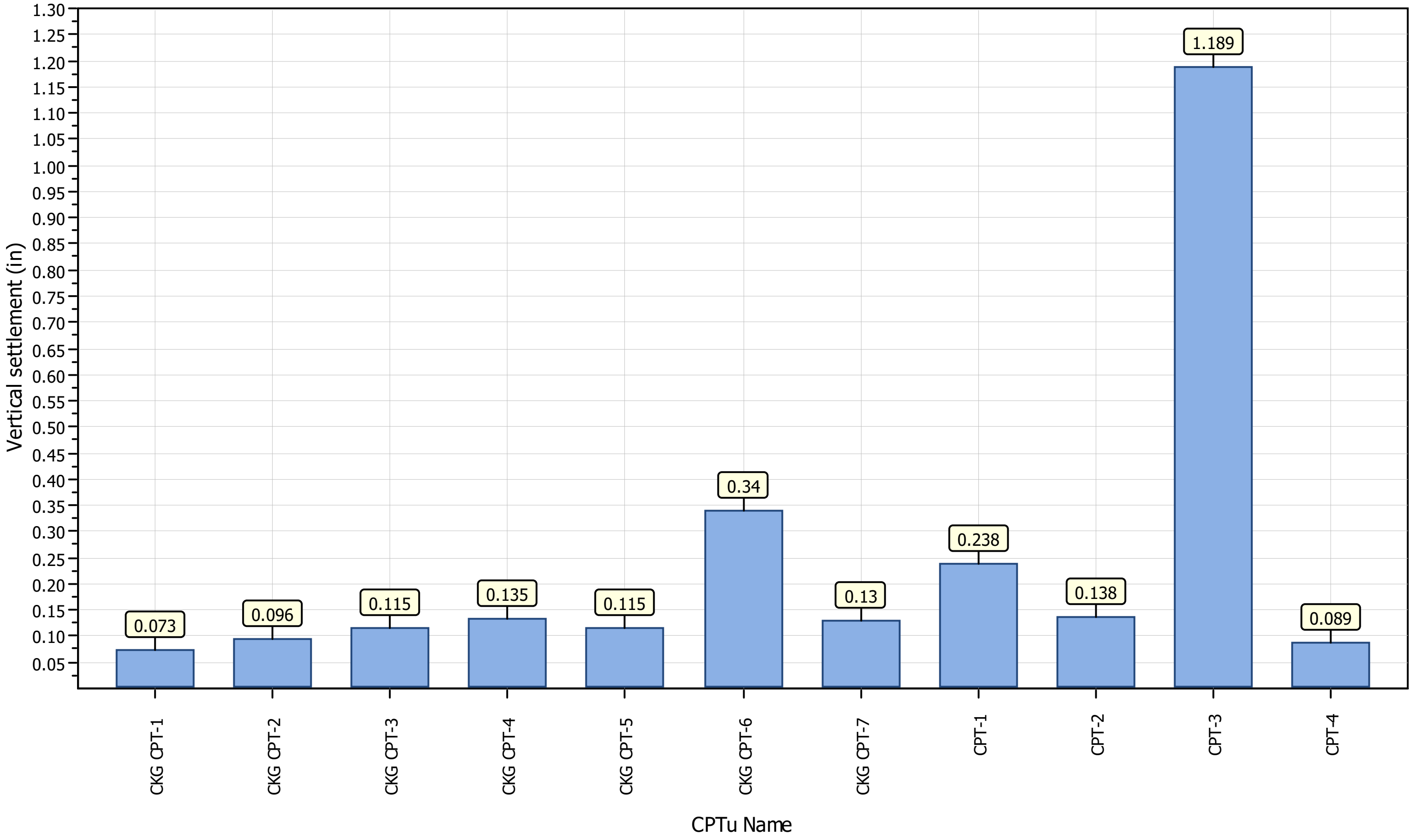
0% severe liquefaction

Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
carlkimgeo@gmail.com

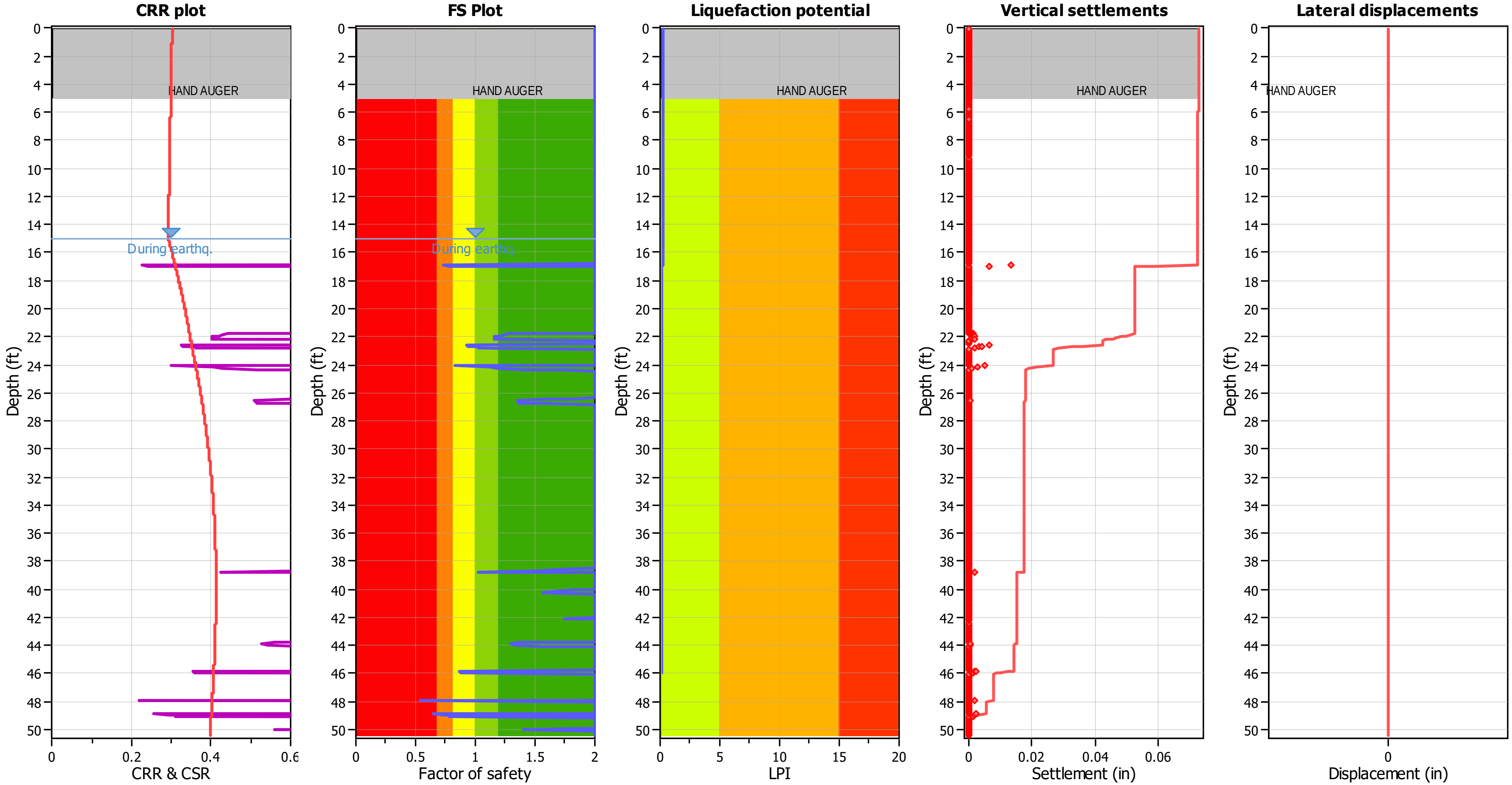
Project title : Carl Kim Geotechnical

Location : 3100 Irvine Ave, Newport Beach, CA

Overall vertical settlements report



Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

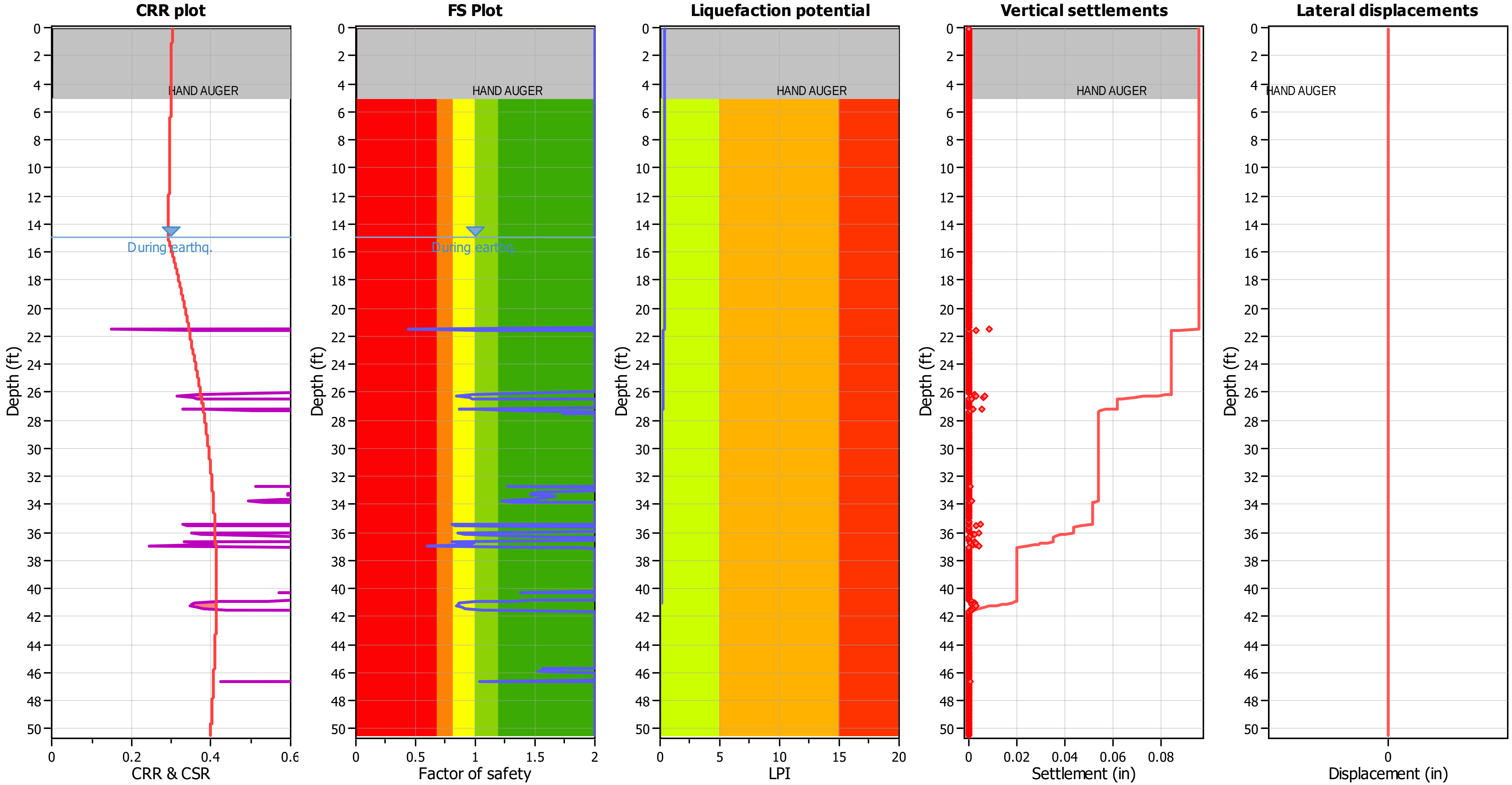
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis overall plots



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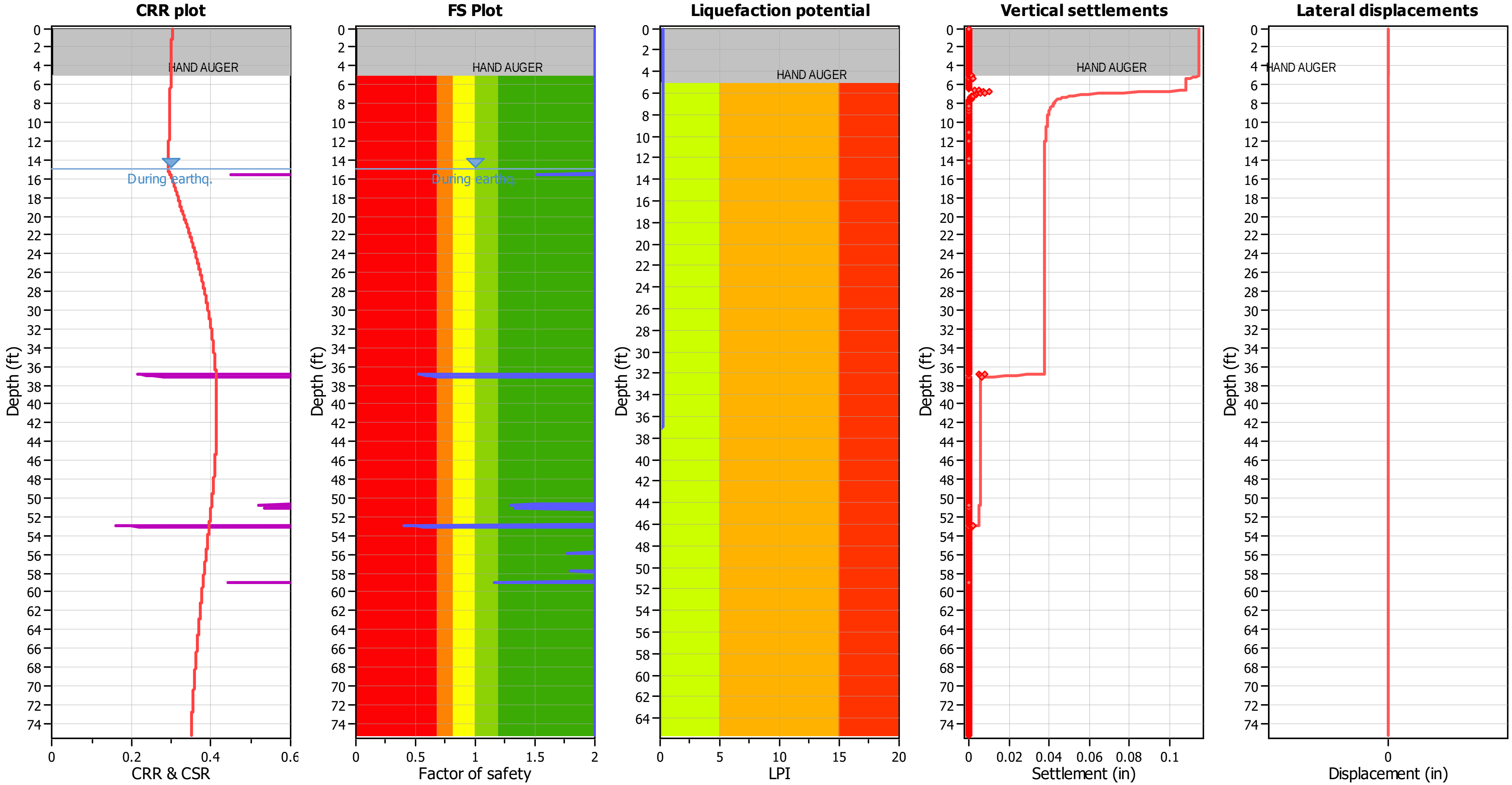
Liquefaction analysis overall plots



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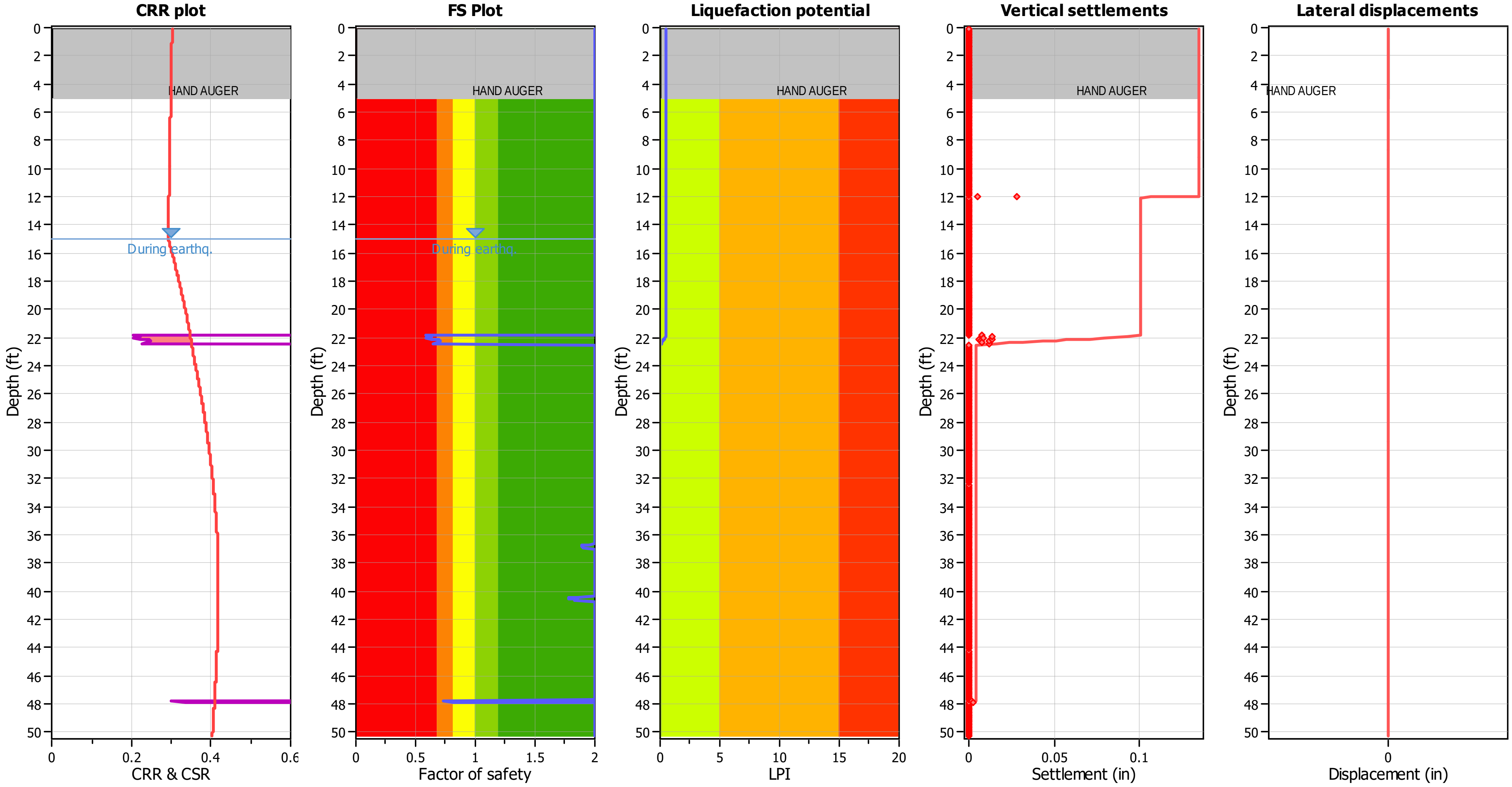

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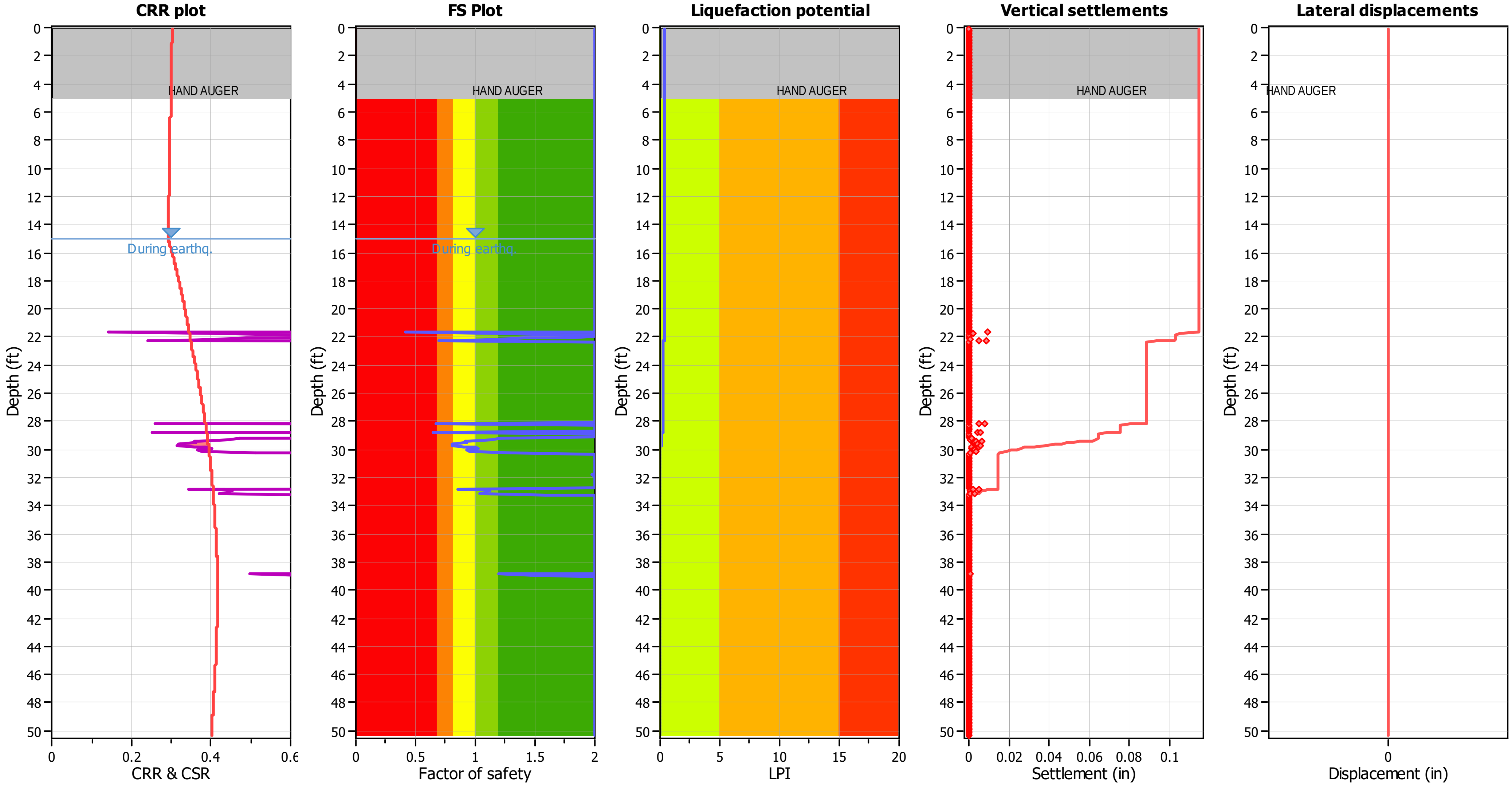

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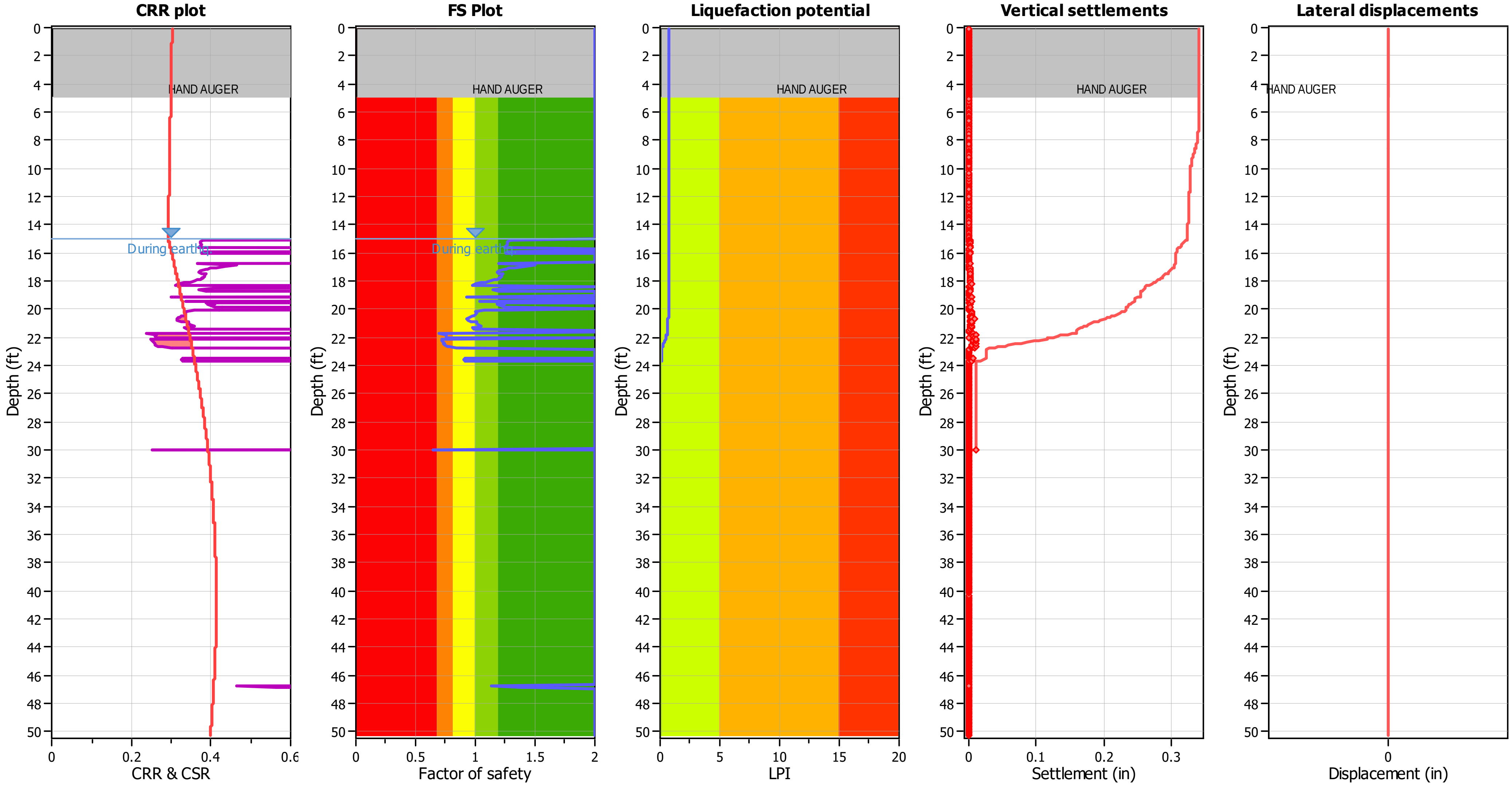
Liquefaction analysis overall plots



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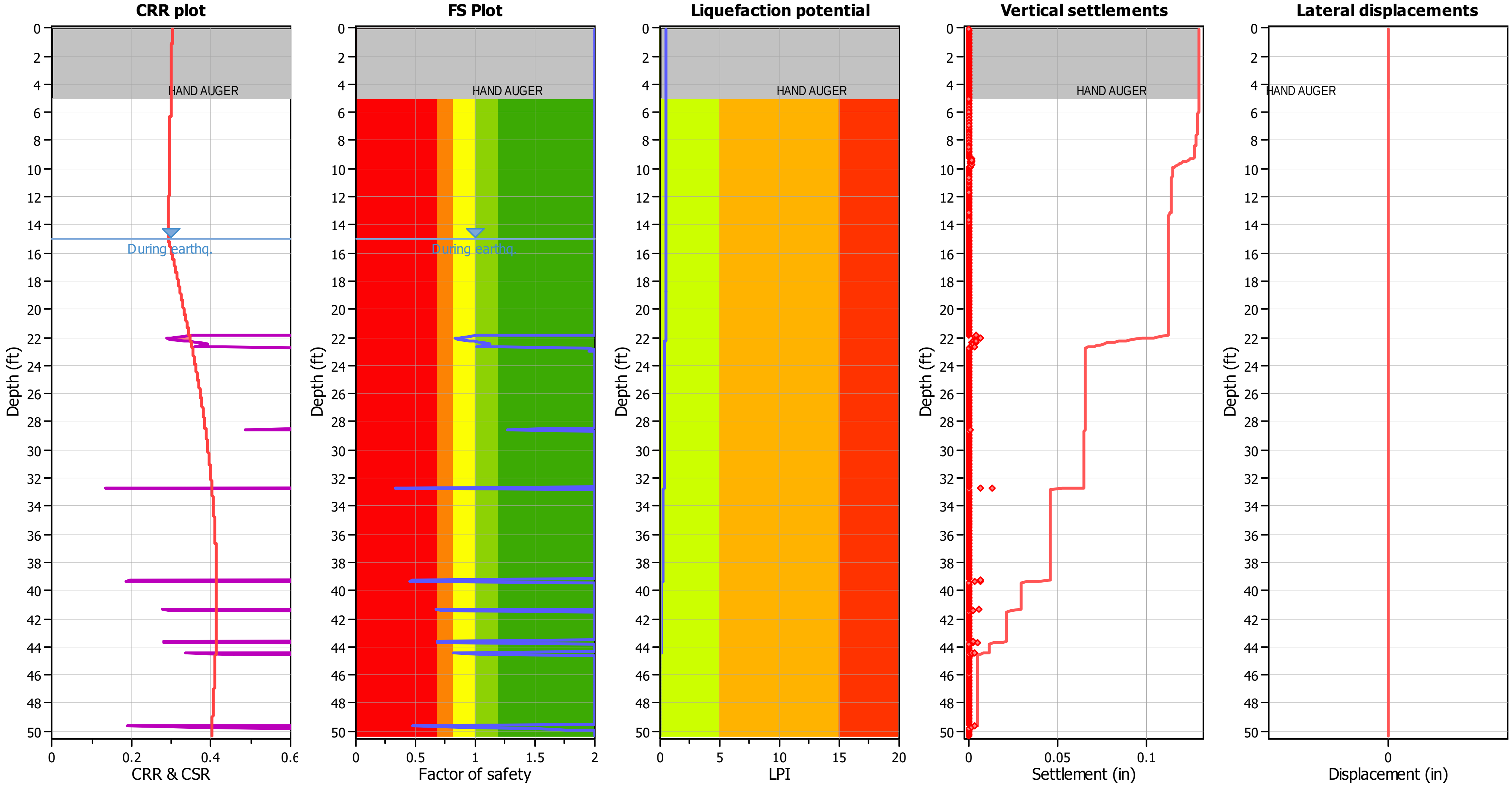
Liquefaction analysis overall plots



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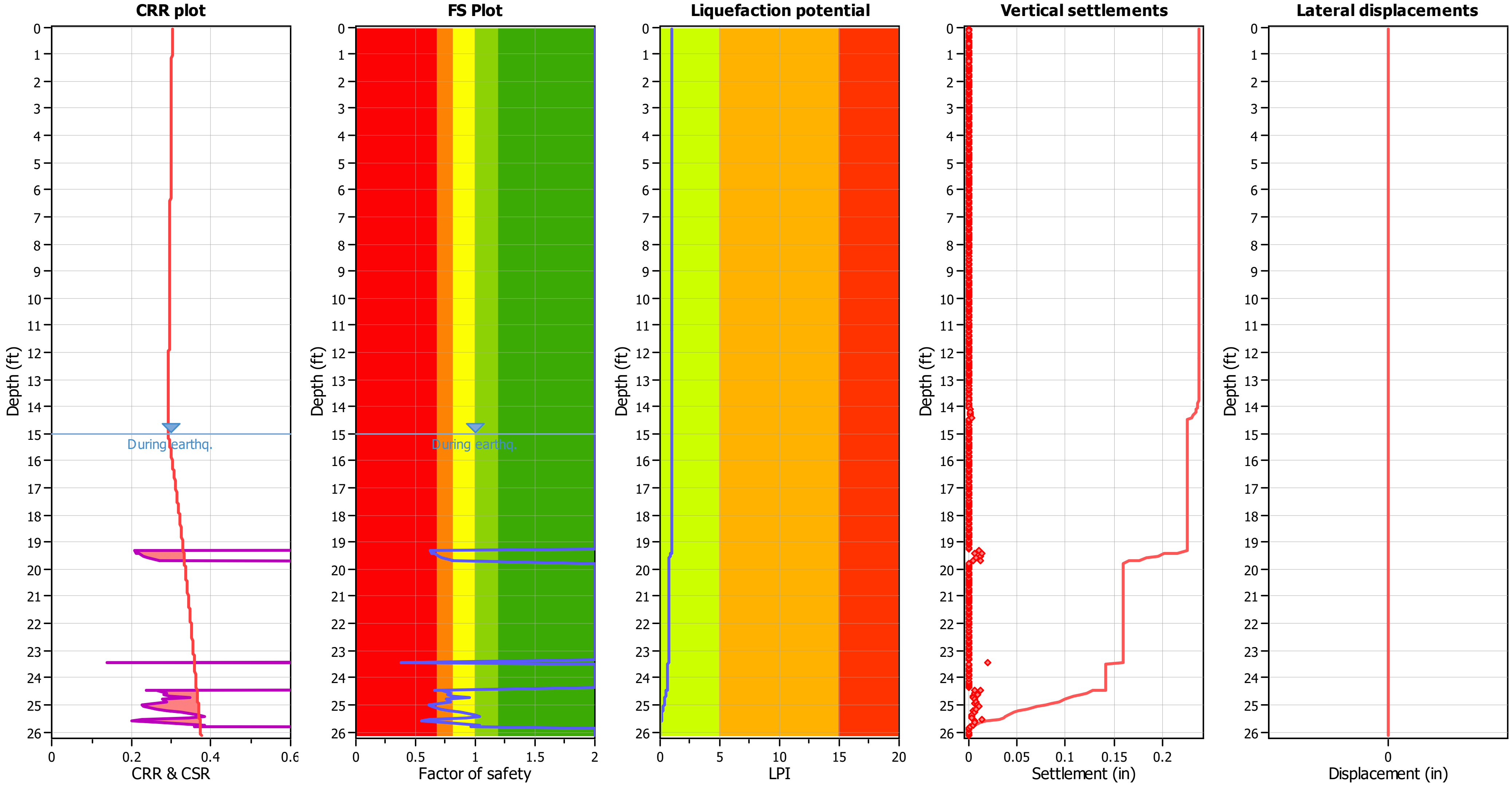
Liquefaction analysis overall plots



Input parameters and analysis data

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Fines correction method:	NCEER (1998)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.70	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	60.00 ft

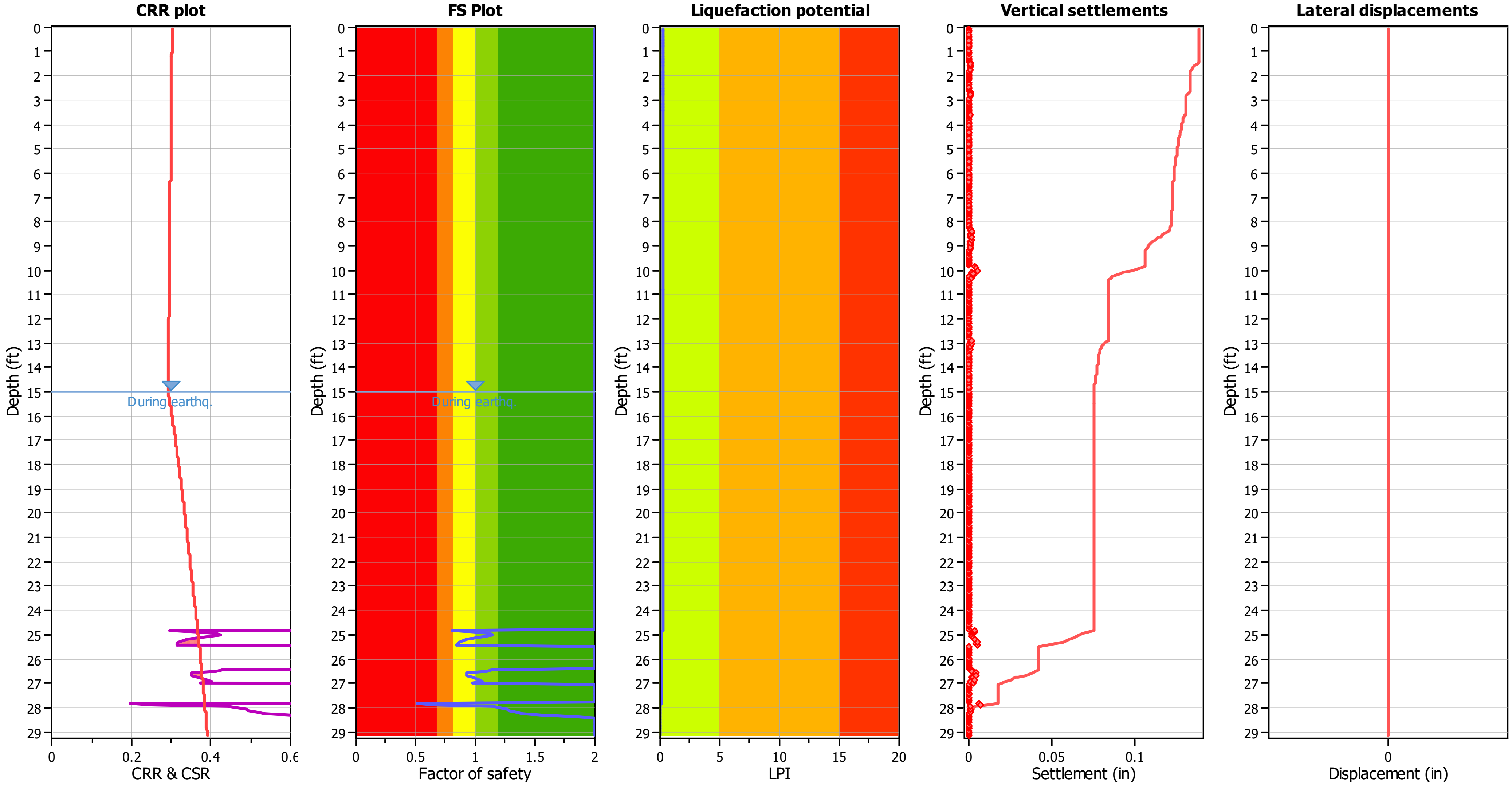
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	15.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	1	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
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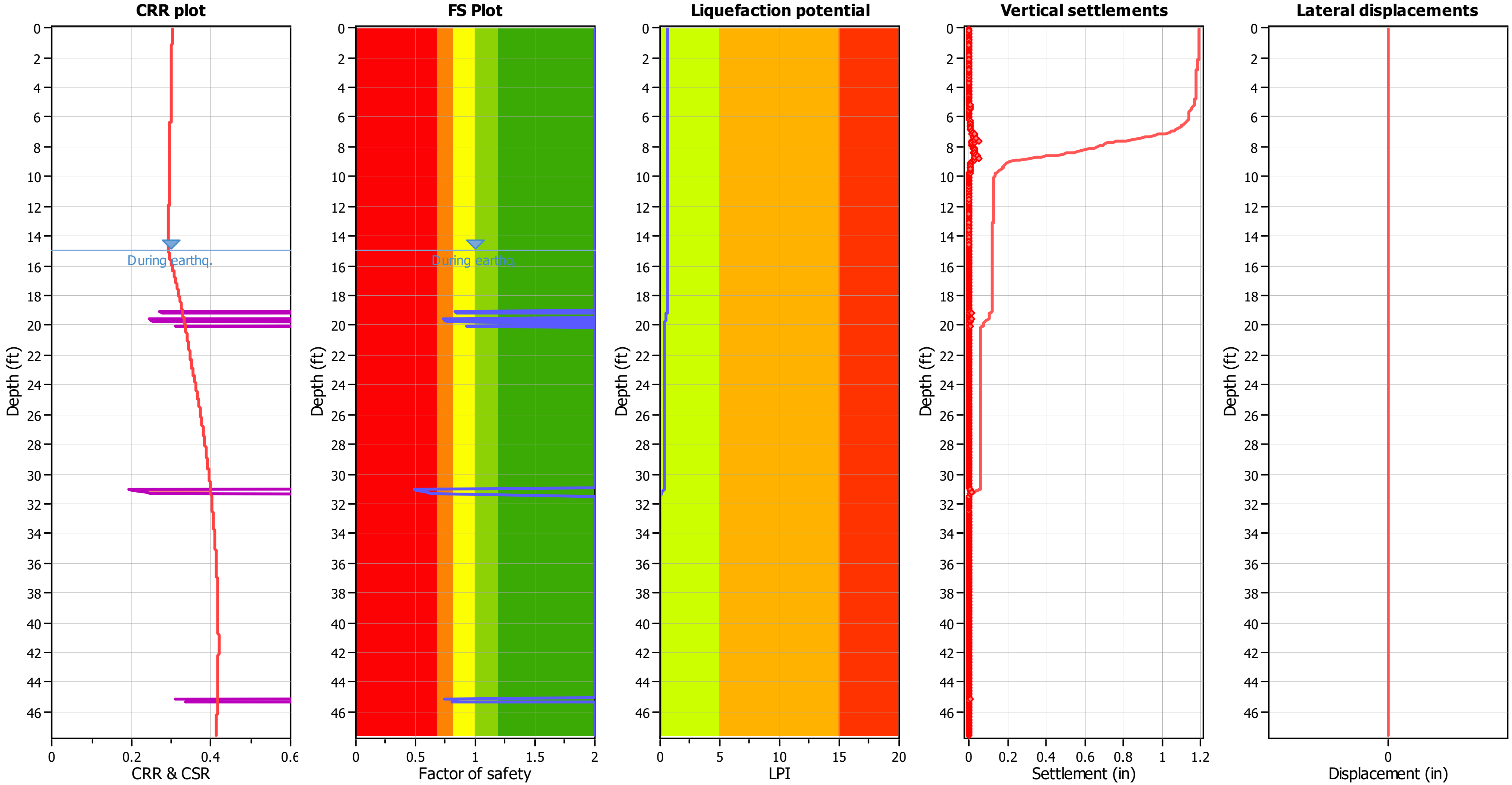

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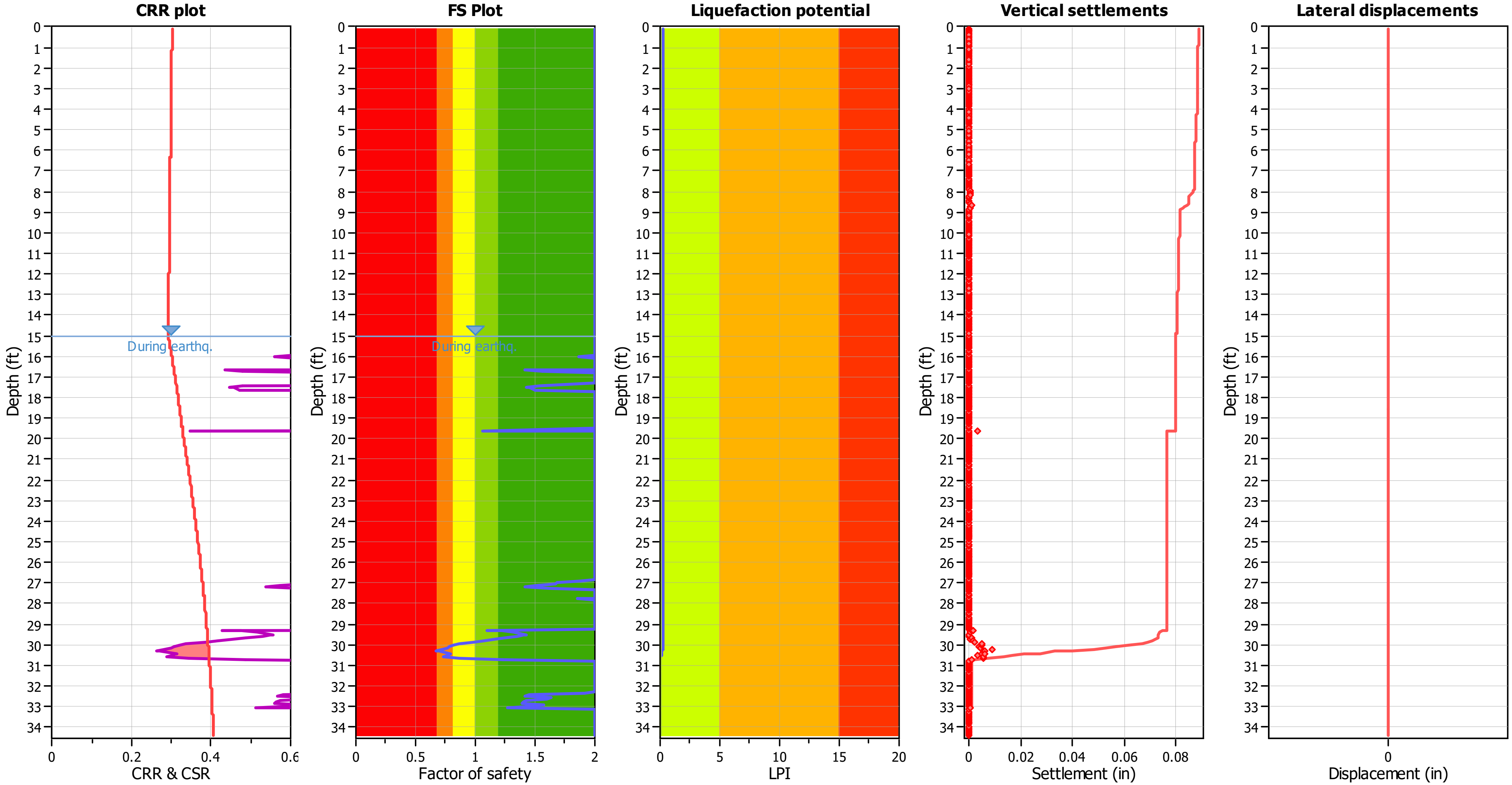

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APPENDIX F

EARTHWORK AND GRADING GUIDE SPECIFICATIONS

APPENDIX F

CARL KIM GEOTECHNICAL, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

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F-1.0 GENERAL

F-1.1 <u>Intent</u>

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Carl Kim Geotechnical, Inc. (Carl Kim Geo) geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Carl Kim Geo shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Carl Kim Geo may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

F-1.2 <u>Role of Carl Kim Geotechnical, Inc.</u>

Prior to commencement of earthwork and grading, Carl Kim Geo shall meet with the earthwork contractor to review the earthwork contractor's work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Carl Kim Geo shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Carl Kim Geo shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Carl Kim Geo shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Carl Kim Geo shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

F-1.3 <u>The Earthwork Contractor</u>

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The

Contractor shall review and accept the plans, geotechnical report(s), and these Guide Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Carl Kim Geo of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Carl Kim Geo is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Carl Kim Geo, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Carl Kim Geo shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

F-2.0 PREPARATION OF AREAS TO BE FILLED

F-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Carl Kim Geo. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Carl Kim Geo shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

F-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Carl Kim Geo, shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be over-excavated as specified in the following Section F-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

F-2.3 Overexcavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by Carl Kim Geo during grading. All undocumented fill soils under proposed structure footprints should be excavated

F-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Carl Kim Geo. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Carl Kim Geo. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

F-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Carl Kim Geo as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Carl Kim Geo prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

F-3.0 FILL MATERIAL

F-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Carl Kim Geo prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Carl Kim Geo or mixed with other soils to achieve satisfactory fill material.

F-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Carl Kim Geo. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

F-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section F-3.1, and be free of hazardous materials ("contaminants") and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than (≤) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Carl Kim Geo at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

F-4.0 FILL PLACEMENT AND COMPACTION

F-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section 0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Carl Kim Geo may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

F-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

F-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 95 percent of the maximum dry density as determined by ASTM Test Method D 1557. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

F-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Carl Kim Geo. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

F-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Carl Kim Geo. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

F-4.6 Compaction Test Locations

Carl Kim Geo shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Carl Kim Geo can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

F-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Carl Kim Geo during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Carl Kim Geo based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, then observed and reviewed by Carl Kim Geo prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Carl Kim Geo.

F-6.0 TRENCH BACKFILLS

F-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2003 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

F-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the current edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise, the pipe-bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the current edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 95 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Carl Kim Geo and backfill above the pipe zone (bedding) shall be observed and tested by Carl Kim Geo.

F-6.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Carl Kim Geo that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.