GEOTECHNICAL EXPLORATION
PROPOSED SELF-STORAGE FACILITY
3701 NORTH PACIFIC PLACE
LONG BEACH, CALIFORNIA

Prepared For:

InSite Property Group
811 North Catalina Avenue, Suite 1306
Redondo Beach, California 90277

Project No. PWAS_20190823b

November 14, 2019

CARL KIM GEOTECHNICAL, INC.
945 Baileyana Road
Hillsborough, CA 94010
949-441-8143
carlkimgeo@gmail.com

November 14, 2019

Project No. PWAS_20190823b

Insite Property Group
811 North Catalina Avenue, Suite 1306
Redondo Beach, California 90277

Attention: Mr. CJ Rogers

Subject: **Geotechnical Exploration**
Proposed Self-Storage Facility
3701 North Pacific Place
Long Beach, California 90806

In response to your request, Carl Kim Geotechnical, Inc. (Carl Kim Geo) has performed geotechnical exploration for the subject project. The purpose of this study was to characterize engineering properties of onsite soils, identify geologic and seismic hazards that may impact the site, and develop foundation and earthwork recommendations.

InSite Property Group proposes to redevelop the 13.94-acre property into a self-storage facility with a 151,000 square foot 3-story building, and roughly 585 recreational vehicle (RV) parking spaces (the "Project"). Retaining walls up to 12 feet tall are proposed along much of the site perimeter.

Carl Kim Geo understands that the project site was used for oil and gas operations as a sump facility from about 1926 into the 1960's to contain drilling mud, produced water, and associated hydrocarbons. Most recently, the project site was operated as a golf school and driving range, but appears to have sat fallow for a number of years as only paved parking areas, concrete slabs, and a shade structure remain in the southern part of the site. The project site is a Brownfield development regulated by the California Department of Toxic Substances Control (DTSC); as such, Carl Kim Geo understands that environmental considerations (soil vapor and potential impacts to groundwater and soil) are being addressed by others.

Fill, sump materials, alluvium, and Lakewood Formation were encountered during prior and recent explorations at the site. Where measured, groundwater was encountered at an average depth of about 52 feet or at Elevation of -3.9 feet mean sea level. The historic high groundwater level reported by the California Geological Survey is on the order of 20 feet below the ground surface below the lower portions of the site.

Existing uncertified fill and sump materials will continue to settle due to their consistency and high moisture content. Because of the anticipated settlement, the cover fill soils and underlying sump materials in their current state are not suitable for the support of foundations of proposed habitable structures. Carl Kim Geo

recommends that proposed habitable buildings be supported on driven pile foundations extending through the existing fill and sump materials into the underlying natural soil. Building floor slabs should also be structurally supported on pile foundations. Foundations for light ancillary structures (trash enclosures, etc.) can be supported on spread footings if settlement-induced damage and the corresponding required repair are deemed acceptable.

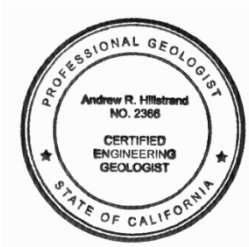
As an alternative to pile foundations, ground improvement may be performed to support the proposed building on a mat foundation.

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.

Carl C. Kim
Senior Principal Engineer



Andrew Hillstrand
Consulting Engineering Geologist

ARH/CCK

Distribution: (4) Addressee

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

1.0 INTRODUCTION

1.1 SITE LOCATION AND PROJECT DESCRIPTION

The project site is located at 3701 North Pacific Place, Long Beach, California. The site location and immediate vicinity are shown on Figure 1, *Site Location*. The Site is located at latitude N33.82660° and longitude W118.20306°.

The proposed 13.86-acre development site is located in the City of Long Beach, Los Angeles County, California (Figure 1). As of the date of this report the site is vacant with remnants of parking areas, foundations of buildings, and landscaping in the southern portion of the site while the remainder of the site is open land with abundant weeds, scattered concrete and organic debris, and tall wooden poles that presumably held up perimeter netting for prior golf school and driving range operations. Site terrain is somewhat hummocky presumably from grading of the golf school.

The project site is bordered by "Government Owned Parcels" on the west and south that abut the Los Angeles River levee and the 710/405 freeway interchange, respectively. The northeast portion of the site is contiguous with a Pacific Railroad easement while the southeastern edge of the project site borders mostly vacant industrial zoned parcels (Los Angeles County, 2019[1]) (*Figure 1, Site Location Map*). Land uses around the site are mixed with residential and a school to the east of the Pacific Railroad with open space and freeways to the north, west, and south.

The project site is a Brownfield development regulated by the California Department of Toxic Substances Control (DTSC); as such, Carl Kim Geo understands that environmental considerations (soil vapor and potential impacts to groundwater and soil) are being addressed by others. The Site is part of the "Long Beach Industrial Park (A.K.A. Former Oil Operators)" facility. In brief, the site supported oil and gas operations as a sump facility. The sumps served as a central brine water treatment facility where oil brine (drilling mud and other waste materials) were treated or contained onsite from roughly 1926 to the 1960's (LFR, 2009) (Appendix A, References). Comprehensive site history is covered in referenced reports, specifically LFR (2009 and 2007a), which can be found on the Envirostore website along with other environmental-focused regulatory and investigation data (Envirostor ID: 70000161)[2]. For context refer to Figure 1A which shows the planned improvement concept and property boundaries over a September 10, 1944 aerial photo of the site.

[1] Parcel viewer available at https://portal.assessor.lacounty.gov/mapsearch?c=-118.2021714803091,33.8266981224895,18

[2] Envirostore link at https://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=70000161

According to a topographic survey and grading plans for the site (Joseph A. Truxaw and Associates, 2019) (Truxaw), existing ground elevations within proposed development areas vary from about Elevation +72 to +36 feet mean sea level (msl). Existing slopes roughly 15 to 20 feet tall descend toward and beyond the site boundaries along the west edge of the site and along portions of the east edge of the property while slopes ascend toward the south up to the 405/710 onramps and interchange, which are elevated a few tens of feet above the southern edge of the property. Plate 1, Geotechnical Map depicts these features.

InSite Property Group (Insite) proposes to redevelop the site into a self-storage facility that will include includes building a three-story, 151,200-square-foot storage building, roughly 585 recreational vehicle (RV) parking spaces, and a 10-foot-tall exterior security fence. Roughly 85 RV parking spaces may be covered with photo voltaic canopies. Access from the site will be from the northwest terminus and extension of North Pacific Place along what is presumed and existing easement.

The proposed self-storage building will be three stories tall, and no basement levels are planned. The lowest level will have a finished floor elevation of about +56 feet msl. The current grading concept reflects roughly 41,000 cubic yards of cut and 74,000 cubic yards of fill with a resulting 33,000 cubic yards of import. Most of the cut will occur in the northern portion of the site with a maximum of about 15 vertical feet. The majority of the fill will be placed in the southern part of the site and will be on the order of ten feet. Grading plans by Truxaw (2019) also depict retaining walls surrounding the site with typical heights on the order of 5 to 10 feet and isolated areas where walls will be up to 14 feet tall. About 50,000 cubic yards of material are expected to be placed as engineered fill. Existing and proposed project features are shown Plate 1.

An existing storm drain traverses the proposed building site from northeast to southwest (Plate 1). We understand that the invert of the storm drain is about 15 to 20 feet below the planned finished floor of the proposed building.

Typical dead plus live column loads are anticipated to range from about 400 to 800 kips. Maximum dead plus live column loads are not expected to exceed 1,200 kips.

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 AND PLANNING

As part of our study, we reviewed several geotechnical documents and maps pertinent to the subject site. The documents reviewed are referenced in Appendix A.

Because the site is regulated by California State Department of Toxic Substances Control (DTSC), Carl Kim Geotechnical, Inc. prepared an exploration plan (provided to the DTSC for review and approval) and comprehensive Health and Safety Plan describing proposed means and methods for obtaining the necessary subsurface information for geotechnical design of the Project. Other tasks included site reconnaissance, marking of boring locations, contacting Underground Services Alert, and obtaining boring permits from the City of Long Beach.

TASK 2 – SUBSURFACE EXPLORATION AND LABORATORY TESTING

Seven (7) hollow-stem auger borings and 7 cone penetrometer test (CPT) soundings were advanced to obtain representative subsurface data for grading and foundation design. Exploration locations are shown on Plate 1. In general, explorations were advanced to a target depth of 50 to 75 feet below the existing ground surface (bgs) or deeper than 20 feet below the bottom of undocumented fill and sump materials unless refusal was encountered.

Because of the proximity of the zoned active Cherry Hill Fault to the proposed development Carl Kim Geo performed a limited fault investigation consisting of a transect of eight (8) CPT soundings and three soil core borings to assess portions of the development for the presence of active fault traces.

In total fifteen (15) CPT soundings and ten (10) hollow-stem auger borings were drilled to investigate the site. Logs of borings and soundings are attached in Appendix B, Field Exploration Appendix.

Geotechnical laboratory testing was performed as part of the current study. Results are attached in Appendix C, Laboratory Test Results. The program consisted of testing selected representative specimens, prepared from representative samples, of the earth materials to obtain the following properties and characteristics:

- Soil classification (ASTM D2488);
- Moisture and density (ASTM D 2216 and D 2937);

- Particle size distribution (ASTM D 422);
- Plasticity Index (ASTM D 4318);
- Expansion Index (ASTM D 4829);
- Direct Shear (ASTM D3080);
- Consolidation (ASTM D 2435);
- Compaction (ASTM D 1557);
- R-value (CTM 301); and
- Corrosivity (CTM 643, 417, 422).

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 project site is located near the east edge of West Coast Hydrologic Basin, within the southwestern block of the Los Angeles Basin. The block is roughly rectangular in shape, is 28 miles long from northwest to southeast and is approximately 5 to 12 miles wide. Most of the block is a low plain extending from Santa Monica in the northwest to Long Beach in the southeast. The southwest portion of the block is marked by the Palos Verdes Hills, which rise to an elevation of approximately 1,300 feet msl. The Palos Verdes Hills are the most prominent topographic feature of this block and is separated from the nearly flat plain to the north and northeast by the northwest trending Palos Verdes fault (Yerkes and Campbell, 2005). The West Coast Basin is bounded on the northeast by the Newport-Inglewood Structural Zone, which is marked by series of northwest-trending faults and folds that form a chain of low eroded scarps and elongated hills and terraces that extend from Newport Bay to Beverley Hills.

The site borders the Los Angeles River drainage which drains southward toward the San Pedro Bay and Pacific Ocean. Portions of the site are located only a few tens of feet west of the Cherry Hill Fault while proposed habitable structures are located about 465 feet or greater from the mapped fault trace. The proposed 3-story storage building appears to be just outside of the associated Alquist-Priolo Earthquake Fault Zone. The Cherry Hill Fault is associated with the Newport-Inglewood Structural Zone (NISZ) and trends north-northwest and has a right-lateral sense of movement with an oblique component of west wall down. The fault trace is marked by a topographic lineament somewhat coincident with toe of the slope immediately east and near the Pacific Electric rail line east of the site. The documented regional geologic conditions of the site and vicinity are shown on Figure 3, *Geology*.

2.2 SITE GEOLOGY

Generally, earth materials at the site consist of undocumented fill over varying amounts of sump materials over Holocene to Pleistocene alluvium and Pleistocene Lakewood formation. The geotechnical map for the site is shown on Plate 1. The materials underlying the Site are described below.

Artificial Fill (map symbol Afu): Approximately 3 to 20 feet of material that appeared to be uncertified cover fill was encountered over sump materials in most locations investigated. Encountered materials consisted of admixtures of silt, clay, and sand. Some areas of the site had liberal amounts of concrete rubble of various sizes. CKG-5, CKG-4, and CPT-13 through 15 encountered concrete, brick, or refusal at varying depths indicating the possible presence of buried coarse material. Fill depths are expected to be greater along the edges of the sumps, but may be variable.

Sump Material (AFs): Sump materials encountered were highly variable, but generally clayey, very soft in zones with varying amounts of petroleum hydrocarbon content, and moisture content. Soil consistencies encountered varied from stiff to very soft.

Thicknesses of sump materials encountered during the current investigations varied from 0 to about 20 feet at (CPT-8 and CKG-4. The average thickness of sump materials based on the current borings and CPT's is about 10 feet. According to referenced reports wastes were placed within basins with exterior earthen berms. Reportedly during the 1970's, "land farming" activities yielded some processed (dried and recompacted) soils, however zones of sludge or clayey soils near the liquid limit exist in zones (LFR, 2009) (LFR, 2007a, b).

Quaternary Alluvium (Map Symbol - Qal): Quaternary alluvium, consists generally of silt and clay with silty sand, sand, and clayey sand interbeds/ facies typical of fluvial and estuarine sequences. Thicknesses encountered varied from zero in boring CKG-10 to about 21 feet at CKG-1.

Lakewood Formation (QL): The Lakewood Formation is locally interpreted to be comprised of Upper Pleistocene age older alluvium consisting of weakly-cemented to semi-consolidated older alluvium consisting of interbedded claystone, sandy claystone, sandstone and silty sandstone. The material is stiff and dense relative to the overlying alluvium materials.

Estimated/measured depths for the bottom of sump materials are interpreted primarily from borings and CPT soundings from the current investigation. Select prior exploration points were also considered in this study to inform design and construction planning; however, much of the prior subsurface data was gathered a decade or more in the past, and for purposes other than geotechnical design[3].

The estimated lateral limits and vertical thickness of sump material shown on Plate 1 are reproduced from prior work presented in LFR (2009). LFR's produced an isopach map that contoured the base of the sump materials, which is reproduced on Plate 1. On Plate 1 we have tabulated the interpreted depths of material contacts for our explorations. Note that significant localized variations in depth and lateral limits of materials may be present because of prior land uses and numerous grading events at and around the site.

2.3 GROUNDWATER

According to the California Geological Survey (1998b), the historic high groundwater level at the site is anticipated to be about 20 feet bgs near the Los Angeles River Levee (about Elevation +15 to +20 feet msl).

[3] Select files containing investigation data from prior work at the site can be found at the following link: https://1drv.ms/u/s!AjsyFTgBQau1hYcRaCIHLqAfFDHLSw?e=vR0AxK

Groundwater was encountered at depths of about 45 to 57½ feet bgs during the current investigation. The highest groundwater depth/elevation was measured at boring CPT-12 (Elevation -3.2 feet). In general groundwater water was encountered near the bottom contact of alluvium near a depth of 50 feet bgs (Elevation -3 feet msl).

Carl Kim Geo understands that the project environmental consultant, Roux Associates, Inc. (Roux) gauged found and gauged select existing monitoring wells during early September 2019. Reportedly, MW-3 was obstructed above groundwater while groundwater at MW-7 was at a depth of 49.65 feet below datum (Elevation -0.49 feet msl) (Roux Associates, 2019a).

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 citing of habitable structures across traces of "active" faults.

Based on our review, an EFZ[4] encroaches onto the proposed development (Bryant, 1985) (CGS, 1999); therefore, Carl Kim Geo performed a fault investigation for the planned development. A planned habitable structure (3-story self-storage building) will be located approximately 465 feet west of the mapped trace of the Cherry Hill fault. The proposed building appears to be a few tens of feet outside of the EFZ. Regional faults are shown on Figure 4 while the EFZ and mapped location of the Cherry Hill Fault are shown on Figure 6 and Plate 1.

3.1.1 FAULT INVESTIGATION AND SURFACE RUPTURE HAZARD

Carl Kim Geo performed a limited fault investigation that focused on the site for the planned 3-story self-storage building. The tasks performed included, but was not limited to review of literature for the site and region, and review of available aerial photos. Because of the depth of man-made and potentially impacted soils Carl Kim Geo investigated the critical portion of the building envelope

[4] https://maps.conservation.ca.gov/cgs/EQZApp/app/

and greater than 50 feet beyond for the presence of active fault traces via a transect of eight (8) CPT and three (3) near-continuously cored hollow-stem-auger borings. Each exploration was advanced to about 75 feet below ground surface. After excavations were completed the boring locations were surveyed by Truxaw and provided to Carl Kim Geo. Plate 1 depicts the locations of the explorations in plan view while Plate 2, Cross-Section A-A' depicts the subsurface data gathered along with geologic interpretations. Man-made fills, alluvium, and Lakewood Formation were encountered.

Strata of the Lakewood Formation correlate well across the site. Lakewood strata have a relatively consistent gentle apparent dip of about 1 degree along transect toward the east-northeast.

Groundwater depths encountered at the time of drilling (ATD) are plotted on Plate 2. Presumably because of the clay content of soils under the site, pore dissipation testing in the CPT soundings and select borings did not always yield a groundwater depth result. Groundwater elevations were relatively consistent at -3 to about -4 feet msl across the 320-foot transect.

Based on these data from our fault investigation, Carl Kim Geo did not find evidence of faulting within the proposed building footprint.

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, 59 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 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.

A PGA_M of 0.63g was selected for the Maximum Considered Earthquake (2% probability of exceedance in 50 years) based on published acceleration parameters per Article 1613 of the 2016 California Building Code (CBC). 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 and dynamic settlement of soils can be caused by strong ground motion due to earthquakes. Research and historical data indicate that loose, saturated granular soils are most susceptible to liquefaction. According to CGS (1998), large portions of the site, including the planned building site, are in areas deemed susceptible to liquefaction and requiring additional study (Figure 6).

The results of our site-specific liquefaction analysis indicate that liquefaction potential is generally limited to isolated, non-continuous zones (CPT-2 and CPT-11). The overall liquefaction potential for the site is deemed low.

3.2.2 SEISMICALLY-INDUCED SETTLEMENT

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

The potential seismically-induced settlement is estimated to be up to about 2 inches.

3.2.3 LATERAL SPREADING OR FLOW FAILURE

For lateral spreading or flow failure to occur, a continuous, laterally unconstrained liquefiable zone must be free to move along gently sloping ground toward an unconfined area. Due to the presence of low-lying areas west and east of the Site, the potential for lateral spreading flow failure is considered significant. The magnitude of lateral displacement will have to be verified once grading details are finalized and we are provided with topographic information for the subject low-lying areas immediately adjacent to the site.

3.2.4 SEISMICALLY-INDUCED LANDSLIDES

According to the State of California Seismic Hazards Zones Map for the Long Beach Quadrangle (CGS, 1998), the site is located in an area potentially susceptible to earthquake induced landsliding (Figure 7). The area appears to be confined to small area where a slope that ascends southward off-site toward the 710/405 interchange. Based on our professional experience and the relatively gentle topography of the site and surrounding areas, the potential for seismically-induced slope instability is considered low provided slopes are not over-steepened.

3.2.5 SEICHES AND TSUNAMIS

Tsunamis are long wavelength seismic sea waves (long compared to the ocean depth) generated by sudden movements of the ocean bottom during submarine earthquakes, landslides, or volcanic activity. A seiche is an oscillation (wave) of a body of water in an enclosed or semi-enclosed basin or tank that varies in period, depending on the physical dimensions of the structure, from a few

minutes to several hours, and in height from several inches to several feet. A seiche is caused chiefly by local changes in atmospheric pressure, aided by winds, tidal currents, and occasionally earthquakes.

The project site is not located within a tsunami inundation zone (Figure 7). Accordingly, the potential for damage due to either a tsunami or seiche is deemed low.

3.2.6 GROUND LURCHING

Ground lurching is defined as movement of low density soil materials on a bluff, steep slope, or embankment due to earthquake shaking. Because of the presence of sump materials that are saturated to super-saturated (sludges) and walls up to 14-feet tall and minor slopes exist along the west and east edge of the site the re proposed Since there are no significant slopes at the site, it is our opinion that the potential for ground lurching as a result of nearby or distant seismic events is moderate.

3.3 FLOODING HAZARDS

According to a Federal Emergency Management Agency (FEMA) flood insurance rate map data (FEMA, 2019), the Site appears to be in an “Area of Undetermined Flood Hazard”. Flood zones for the site and vicinity are shown on Figure 9, *Flood Hazard*.

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.

Laboratory testing of selected samples from the current investigation indicate that near-surface onsite soils have a range of expansion potentials from low to high expansion potential. Many soils encountered at shallow depths contain significant clay content such that when processed engineered fills may have medium to high expansion potential.

Expansion Index test results are attached in Appendix C.

3.5 CORROSIVE SOILS

Most of the Site is underlain by sump materials. Accordingly, subsurface materials at the site are classified as corrosive to severely corrosive to metals, and deleterious to concrete and steel reinforcing in concrete. Corrosivity test results are tabulated and attached in Appendix C.

3.6 SUBSURFACE GASES

Most of the Site is underlain by sump materials. Accordingly, hazardous soil gases are anticipated and will require mitigation.

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.

The sludges and wet, uncompacted sump materials at the site will continue to densify over time and induce localized subsidence and settlement. Based on the proposed grading of the site, which includes up to 10 feet of additional fill over some areas, over 12 inches of ground surface settlement may occur.

3.8 MISCELLANEOUS

Existing subsurface utilities including a petroleum pipeline and storm drains are shown on Plate 1 and came from Truxaw (2019a, b). One storm drain appears to pass under the proposed building footprint.

Based on review of referenced aerial photos and referenced reports several portions of the site and periphery were developed previously. The site and surrounding areas have been altered from multiple phases of grading and development. Buried construction debris may be present/buried in uncertified fill and sump areas that were not specifically investigated. Notable conditions that appear on aerial photos reviewed and on Figure 1A include:

- Within the north eastern portion of the proposed storage building it appears that a dry dock was in constructed and in use presumably to drill two oil wells in that area. No records were found documenting the construction or destruction of the dry dock.
- About 130 feet west of CKG-7 above ground storage tanks and oil well derricks appear in aerial photos. Presently scattered concrete fragments can be found on ground in the area and in areas north and east of CKG-7.
- During investigations coarse materials (concrete fragments and other items) have also been observed in areas near CKG-4, CKG-5, and CPT-14 and CPT-15.
- Remnants of the golf school infrastructure including building foundations, landscape and hardscape, etc.

4.0 CONCLUSIONS

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

- We encountered fill, sump materials, alluvium, and older alluvium (Lakewood Formation) in our explorations at the site.
- Our review of the geologic literature (Appendix A) and results of our limited fault study indicate there are no known active faults within the footprint of the proposed building.
- The main seismic hazards that may affect the site are strong ground shaking, liquefaction, and lateral spreading.
- Groundwater was encountered at a depth of about 45 to 57½ feet bgs. The historic high groundwater level reported by the California Geological Survey is 20 feet below the ground surface along the lower potions of the site. In our opinion, the design groundwater level should be assumed at Elevation +20 feet msl.
- Localized perched water can be expected in zones above the alluvium surface.
- Because of the nature of the former use of the site as a disposal facility, the sludge and sump materials zone is expected to be heterogeneous. Depths and thicknesses may vary significantly laterally.
- The expansion potential of near-surface onsite soils range from low to high.
- The onsite soils are deemed corrosive to buried ferrous metals and concrete.
- The sump materials are anticipated to be corrosive to concrete and ferrous metals.
- The undocumented fill and sump materials will likely continue to settle due to their consistency.
- Because of the anticipated settlement, the undocumented fill soils and sump materials are not suitable for support of the proposed foundations and floor slabs.
- The proposed building should be supported on pile foundations extending through the existing fill and/or sump materials into the underlying natural soil. Building floor slabs should also be structurally supported on pile foundations.
- Alternatively, the materials below the building area may be improved to accommodate support of the building on a mat foundation.
- Foundations for light ancillary structures (trash enclosures, etc.) can be supported on spread footings.

5.0 RECOMMENDATIONS

The existing undocumented fill and sump materials will continue to settle due to their consistency. The planned grading and any surcharging should be implemented several months before installation of foundations or utilities. In general, we recommend that the utility spine be located around the perimeter of the site where the depth of undocumented fill and sump materials is shallower. Buried utilities crossing the middle of the site will traverse boundaries (side walls) and saddles of disposal pits, which will maximize differential settlement along the utility line.

If deemed acceptable to ownership and utility operators, planned underground utilities may be supported over undocumented fill and sump materials if the utility alignment is surcharged with a temporary fill thickness equivalent to twice the anticipated dead plus live loading imposed by the planned use of the facility. The width of the fill stockpile surface should extend from both sides of the utility line a horizontal distance equal to the distance from the top of the stockpile to the utility invert.

Because of the anticipated settlement, the existing fill soils and sump materials are not suitable for support of foundations and floor slab for the proposed building. Ideally, the proposed building would be supported on driven pile foundations extending through the refuse and into the underlying natural soil. Building floor slabs would then also be structurally supported on pile foundations.

As a result of the anticipated settlement, the refuse will cause downdrag loads on the foundations. Also, the exterior grade will settle differentially from pile-supported structures and entrances to pile-supported structures will require maintenance. Any utilities supported over undocumented fill or sump materials should be expected to settle. Utility connections to pile supported elements, including the proposed building (if pile supported), should be able to accommodate up to 12 inches of differential settlement.

Due to the presence of the existing storm drain across the site and the relatively shallow depth to the bottom of sump materials below the building footprint, we recommend that a ground improvement alternative be explored. Regardless of the foundation option selected, the ownership and serviceability of the existing storm drain needs to be verified, including a formal survey of its alignment and elevation. This information is necessary to avoid damaging the storm drain if it is to remain in service or to design and construct a replacement.

Ground improvement may be performed to enhance subsurface materials below the building footprint, which would enable the use of a mat foundation. Preliminary discussions with specialty contractors indicate that ground improvement is feasible. A cost-effective approach to mitigate the settlement of sump materials may consist of surcharging the building pad with a fill stockpile imposing a bearing pressure equivalent to the design bearing pressure of a mat foundation for the building. The undocumented fill, which extends

roughly 15 feet below existing grade, may be improved with surface densification techniques. The performance target for ground improvement would be to mitigate the total combined static and seismic settlement to less than 1½ inches. A pilot test will be required to verify the effectiveness of the ground improvement program.

Potential hazardous soil gas generation and collection beneath the buildings are being addressed by others and should be accounted for in the foundation design.

Carl Kim Geo should review the grading plans, shoring plans, foundation plans, and specifications when they are available to verify that the recommendations presented in this report have been properly interpreted and incorporated.

5.1 EARTHWORK AND GRADING

All earthwork and grading should be performed in accordance with the following recommendations and *Earthwork and Grading Guide Specifications* presented in Appendix E.

5.1.1 SITE PREPARATION

Prior to construction, the area of proposed new structures should be cleared of any vegetation and demolition trash and debris. These materials should be removed from the site. Any underground obstructions onsite should be removed. Efforts should be made to locate any existing utility lines to be removed or rerouted where interfering with the proposed construction. Any resulting cavities should be properly backfilled and compacted. After the site is cleared, the soils should be carefully observed for the removal of all unsuitable deposits. All undocumented fill should be excavated from below proposed improvements not supported on pile foundations.

5.1.2 GENERAL GRADING RECOMMENDATIONS

Overexcavation and recompaction should extend a minimum horizontal distance equal to the vertical distance between the proposed footing bottom (if any structures are not to be pile supported) and depth of overexcavation. After completion of the overexcavation and prior to fill placement, the exposed soils should be scarified to a minimum depth of 12 inches, moisture conditioned and compacted to at least 90 percent relative compaction based on ASTM Test Method D 1557.

In areas where the subgrade consists of clayey soils, additional measures are recommended. Clay soils should be overexcavated as necessary to permit the placing of at least 2 feet of relatively non-expansive soils beneath all concrete slabs and walks. After excavating as recommended, the moisture content of the soils should be determined, and the soils slowly and uniformly moistened (or dried) as necessary to bring the soils to a uniformly moist condition. Any surface soils that may have dried out too much should be slowly and uniformly moistened as necessary to bring the soils to a uniformly moist condition. The moisture content of the clay soils should be brought to about 4% over optimum moisture content to a depth of 12 inches. The moisture content of the relatively

non-expansive and predominantly granular soils should be brought to 2 to 3 percent above optimum moisture content to a depth of 6 inches. The moisture content of the subgrade should be checked and approved prior to placing the required fill.

The onsite soils, less any deleterious material or organic matter, can be used in required fills. Cobbles larger than 6 inches in largest diameter should not be used in the fill. Any required import material should consist of relatively non-expansive soils with an Expansion Index (EI) less than 35. The imported materials should contain sufficient fines (binder material) so as to be relatively impermeable and result in a stable subgrade when compacted. All proposed import materials should be approved by Carl Kim Geo prior to being placed at the site.

5.1.3 PIPE BEDDING

Any proposed pipe should be placed on properly placed bedding materials. Pipe bedding should extend to a depth in accordance to the pipe manufacturer's specification. The pipe bedding should extend to at least 12 inches over the top of the pipeline. The bedding material may consist of compacted free-draining sand, gravel, or crushed rock. Pipe bedding material should have a Sand Equivalent (SE) of at least 30.

5.1.4 TRENCH BACKFILL

Trench excavations above pipe bedding may be backfilled with onsite soils under the observation of the geotechnical consultant. All fill soils should be placed in loose lifts, moisture conditioned as required and compacted to a minimum of 90 percent relative compaction based on ASTM Test Method D 1557. Lift thickness will be dependent on the equipment used as suggested in the latest edition of the *Standard Specifications for Public Works Construction* (Greenbook). The fill soils should extend to the bottom of the aggregate base for new pavement, or to finished grade.

5.2 PILE FOUNDATIONS

We have evaluated various pile foundation systems and have determined that driven pre-cast, pre-stressed square concrete piles are the most cost-effective foundation alternative.

5.2.1 PILE CAPACITIES

The downward and uplift capacities of square driven pre-stressed concrete piles are presented in the following table. We have assumed that piles will extend through existing fill and sump materials. Based on the currently available information, the maximum depth of fill or sump materials is not anticipated to exceed 30 feet bgs within the proposed building footprints (Plate 2).

Driven Precast Concrete Pile Capacities (in Kips)

Pile Length	14-inch-square	16-inch-square
50	250	300
60	300	400

The top of the pile is anticipated to be about 5 feet bgs. Accordingly, the table above assumes a minimum embedment of 10 feet in alluvium underlying refuse. 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 skin friction developed in the natural soils and the reduced skin friction anticipated in the refuse was used to develop the allowable uplift capacities of the piles. 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. The downdrag loads caused by the settlement of the refuse should be added to the structural loads in determining pile lengths.

In general, the refuse will be in direct contact with the piles, preventing buckling within the piles; however, localized voids may develop within the refuse. We recommend that the piles be designed for an unsupported length of 5 feet.

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

5.2.2 DOWNDRAG LOADS

In addition to the building loads on the piles, the settlement of the undocumented fill and sump materials in contact with the pile will create downward loading on the piles. The magnitude of the load will depend on the thickness of settling zone and the developed friction between the piles and the settling zone. The downdrag loads can be reduced by pre-drilling the pile location prior to installing the production pile. If pre-drilling is selected, a displacement-type drill will be required to prevent generation of cuttings contaminated with sump materials.

We estimate that the required cross-sectional area of the pre-drilling will be about 80 to 100 percent of the cross-sectional area of the pile. The optimal area will be determined during the indicator pile program. Based on data from prior pile load tests at the nearby sites, a 14-inch-square pile driven 30 feet directly through the undocumented fill and sump materials will develop about 120 kips of downdrag load if it is installed after pre-drilling. A 16-inch-square pile driven 30 feet directly through

the refuse will develop about 140 kips of downdrag load if it is installed after pre-drilling. The optimum size will be verified during the indicator pile program.

5.2.3 SETTLEMENT

The settlement of the proposed buildings, supported on driven piling in the manner recommended, will be less than 1 inch. Differential settlement will be about ½ inch or less.

5.2.4 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 *14- and 16-inch-square, pre-stressed, precast concrete piles* using the computer program LPILE by ENSOFT, Inc. Based anticipated structural pile details, we used a concrete compressive strength value (f_c') of 6 kips per square inch (ksi) and a yield stress (f_y) of 270 ksi for the steel reinforcing.

To account for the reduction in bending stiffness due to concrete cracking, a subroutine in the program LPILE that computes the bending stiffness as a function of applied bending moment and axial loading was incorporated into the analyses. We have assumed that the minimum steel reinforcing consists of six and eight ½-inch-diameter low relaxation Grade 1860 tendons, for 14- and 16-inch-square piles respectively, with clear concrete cover thickness of 3 inches.

Our computations were performed for pile head deflections of ¼ inch and ½ inch. The results are summarized in the tables below.

Lateral Load Design Data
14-inch Square Driven Pile

	Pile Head Deflection (inches)			
	¼		½	
Pile Head Condition	**Free**	**Fixed**	**Free**	**Fixed**
Lateral Load (kips)	15	28	20	40
Maximum Moment (inch-kips)	480	900	680	1240
Depth to Maximum Moment (ft)	5	0	5	0
Depth to Zero Moment (ft)	16	18	16	18

Lateral Load Design Data
16-inch Square Driven Pile

	Pile Head Deflection (inches)			
	¼		½	
Pile Head Condition	**Free**	**Fixed**	**Free**	**Fixed**
Lateral Load (kips)	20	36	28	52
Maximum Moment (inch-kips)	680	1300	960	1800
Depth to Maximum Moment (ft)	5½	0	5½	0
Depth to Zero Moment (ft)	18	22	18	22

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.

The capacities reflect the anticipated subsidence. The capacities are based on loosened and displaced cover fill and refuse adjacent to the pile due to the anticipated pre-drilling.

For piles in groups spaced at least 3 pile widths 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 8 pile widths on centers will have a reduction in lateral capacity due to group effects. The lateral capacity of piles in groups spaced at 3 pile widths 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 8 pile widths on centers and the reduction for piles spaced at 3 pile widths 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. The future settlement of the refuse will cause disturbance of the soils adjacent to poured in place structure and the soils settle. The passive resistance of properly compacted fill may be assumed to be equal to the pressure developed by a fluid with a density of 200 pounds per cubic foot (pcf). It will require about ¾ inch of displacement to mobilize the full passive resistance of 4 feet of compacted backfill. For ¼ inch and ½ inch displacement, the passive resistance from the same 4 feet of compacted backfill would decrease to 150 pcf and 175 pcf, respectively.

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.

Friction between structurally supported slabs and the subgrade soils should not be considered due to the anticipated refuse settlement.

5.2.5 PILE INSTALLATION

The specification of pile driving criteria for termination of pile driving will depend on the pile hammer used and the characteristics of the pile selected for construction. Once the pile driving system is selected, wave equation analysis should be performed to evaluate drivability and to develop driving criteria. The final driving criteria should be developed using wave equation analysis incorporating the results of the indicator pile program recommended below.

Unless refusal is encountered, driving should not be terminated until blowcounts in excess of the number required to develop the allowable pile load are achieved. Refusal may be defined as driving resistance corresponding to 3 times the required blowcounts.

We recommend that 2 indicator piles be driven at the site of each proposed structure to verify the required pile lengths and to evaluate the efficiency of driving systems before production piles are cast or ordered. The indicator piles should be ordered 10 feet longer than the design length to allow for instrumentation and possible variations in the subsurface materials. We will provide proposed locations of indicator piles after the pile foundation plan is finalized. Dynamic measurements during the indicator pile program using a Pile Driving Analyzer (PDA) is recommended on all indicator piles to develop blowcount and refusal criteria required to develop design capacities as well as to evaluate the induced stresses on the piles and the depth of pre-drilling, if required.

If pre-drilling is required to maintain induced stresses on piles below acceptable levels, the auger for pre-drilling should have a cross-sectional area no larger than 80% of the cross-sectional area of the pile and pre-drilling should be limited to the cover fill unless displacement-type augers that do not generate spoils are used.

5.2.6 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.

5.3 SLABS-ON-GRADE

As previously mentioned, because of the potential for settlement of the subgrade, all floors slabs and other “slabs-on-grade” should be structurally supported to maintain grade uniformity within each building. However, due to the anticipated subsidence, there may be difficulties in maintaining access between the pile-supported structure and the exterior grades. One method in providing access would be diligence maintenance of transition areas between the pile-supported building and slabs and non-pile supported adjacent areas (mostly pavement). We understand that the currently preferred method is to add pavement overlays as necessary to future depressed areas that will restore design grades. This method is deemed feasible considering the gradual nature of the anticipated settlement and cost-effective considering that

mobilization for pavement overlays will be required to address pavement settlement-induced distress.

Another method in providing access would be in the use of transition slabs between the building and the exterior slabs. Such transition slabs could be about 20 feet in length, hinged at the building and supported on grade at the other end and reinforced to span its 20-foot length. The slab would thereby be able to maintain building access while experiencing the anticipated movement and could be periodically releveled. The requirements of the ADA Act should be met for all grade changes.

Concrete slabs not underlain by refuse may be designed using a modulus of subgrade reaction of 150 pci provided the subgrade is prepared as described in Section 6.1. From a geotechnical standpoint, we recommend slab-on-grade be a minimum 5 inches thick with No. 3 rebars placed at the center of the slab at 24 inches on center in each direction. The structural engineer should design the actual thickness and reinforcement based on anticipated loading conditions. Where moisture-sensitive floor coverings or equipment is planned, the slabs should be protected by a minimum 10-mil-thick vapor barrier between the slab and subgrade.

Minor cracking of concrete after curing due to drying and shrinkage is normal and should be expected; however, concrete is often aggravated by a high water/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 cracking. Additionally, our experience indicates that the use of reinforcement in slabs and foundations can generally reduce the potential for concrete cracking.

To reduce the potential for excessive cracking, concrete slabs-on-grade should be provided with construction or weakened plane joints at frequent intervals. Joints should be laid out to form approximately square panels.

5.4 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	35
At-Rest	55
Passive*	300
Coefficient of Friction	0.35

**See Section 6.2.4 for discussion of reduced passive resistance for areas underlain by refuse*

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 (equivalent fluid pressure of 62.4 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 0.35 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.

5.5 SEISMIC DESIGN PARAMETERS

The following values may be used for the seismic design method based on the 2016 CBC (based on ASCE 7-10). Seismic response spectra are presented in Appendix B.

Categorization/Coefficient	Design Value
Site Class	D
Seismic Design Category	D
Adjusted spectral response acceleration parameter at short period, S_{MS}	1.650 g
Adjusted spectral response acceleration parameter at a period of 1 sec, S_{M1}	0.922 g
Design spectral response acceleration parameter at short period, S_{DS}	1.100 g
Design spectral response acceleration parameter at a period of 1 sec, S_{D1}	0.615 g
Peak Ground Acceleration for Maximum Considered Earthquake (MCE_G), PGA_M	0.630 g

5.6 PAVEMENT DESIGN

To provide support for paving, the subgrade soils should be prepared as recommended in Section 5.1. Settlement of the undocumented fill and sump materials in paving areas will occur and maintenance will be required. Compaction of the subgrade, including trench backfills, to at least 95%, and achieving a firm, hard, and unyielding surface will be important for paving support. The preparation of the paving area subgrade should be performed immediately prior to placement of the base course. Proper drainage of the paved areas should be provided since this will reduce moisture infiltration into the subgrade and increase the life of the paving. The preliminary paving thicknesses presented in the table below are based on our observations of the on-site soil conditions and construction considerations.

5.6.1 ASPHALT CONCRETE PAVING

The required paving and base thicknesses will depend on the expected wheel loads and volume of traffic (Traffic Index or TI). The R-values of existing near surface fill ranged from 5 to 20. Assuming that the paving subgrade will consist of the on-site or comparable soils (minimum R-value of 10) 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.

Asphalt Concrete (AC) Paving Thickness

Area	Traffic Index	AC Paving (inches)	Base Course (inches)
Automobile Parking	4	3	6
Heavy Truck	6	3	13

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.

5.6.2 PORTLAND CEMENT CONCRETE PAVING

Portland cement concrete (PCC) 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.

PCC Paving Thickness

Traffic Index	PCC Paving (inches)	Base Course (inches)
4	6	4
7	7	6

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.

5.6.3 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.

5.7 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 5 feet or deeper should be laid back or shored in accordance with OSHA requirements before personnel are allowed to enter.

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.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should 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.

5.8 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 COUNTY OF LOS ANGELES BUILDING CODE SECTION 111 STATEMENT

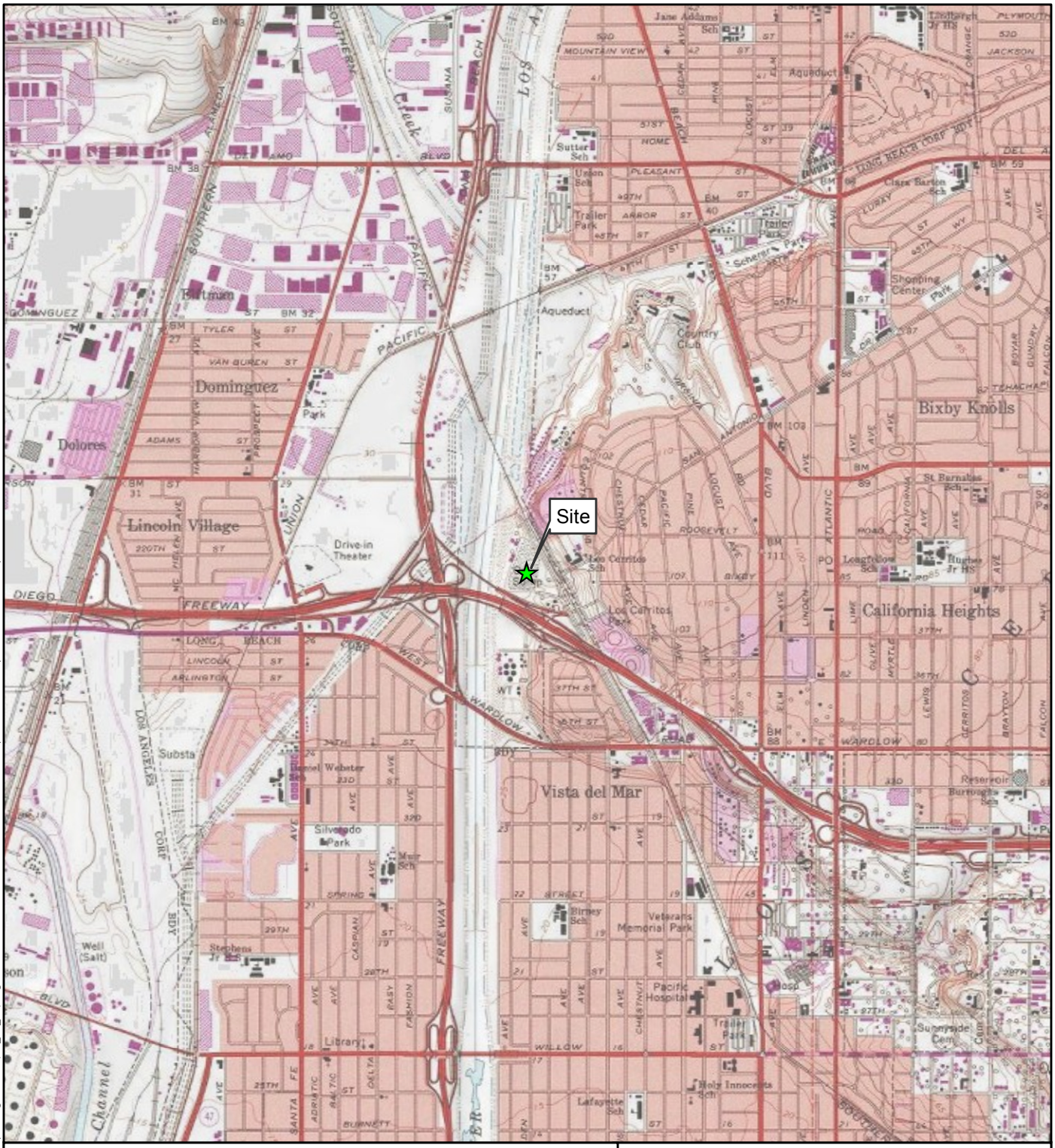
Provided that the recommendations in this report are implemented, it is Carl Kim Geo's opinion that the proposed project will be safe from the hazards of landslide, settlement, or slippage, and that the proposed project will not adversely affect the stability of adjacent properties.

7.0 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



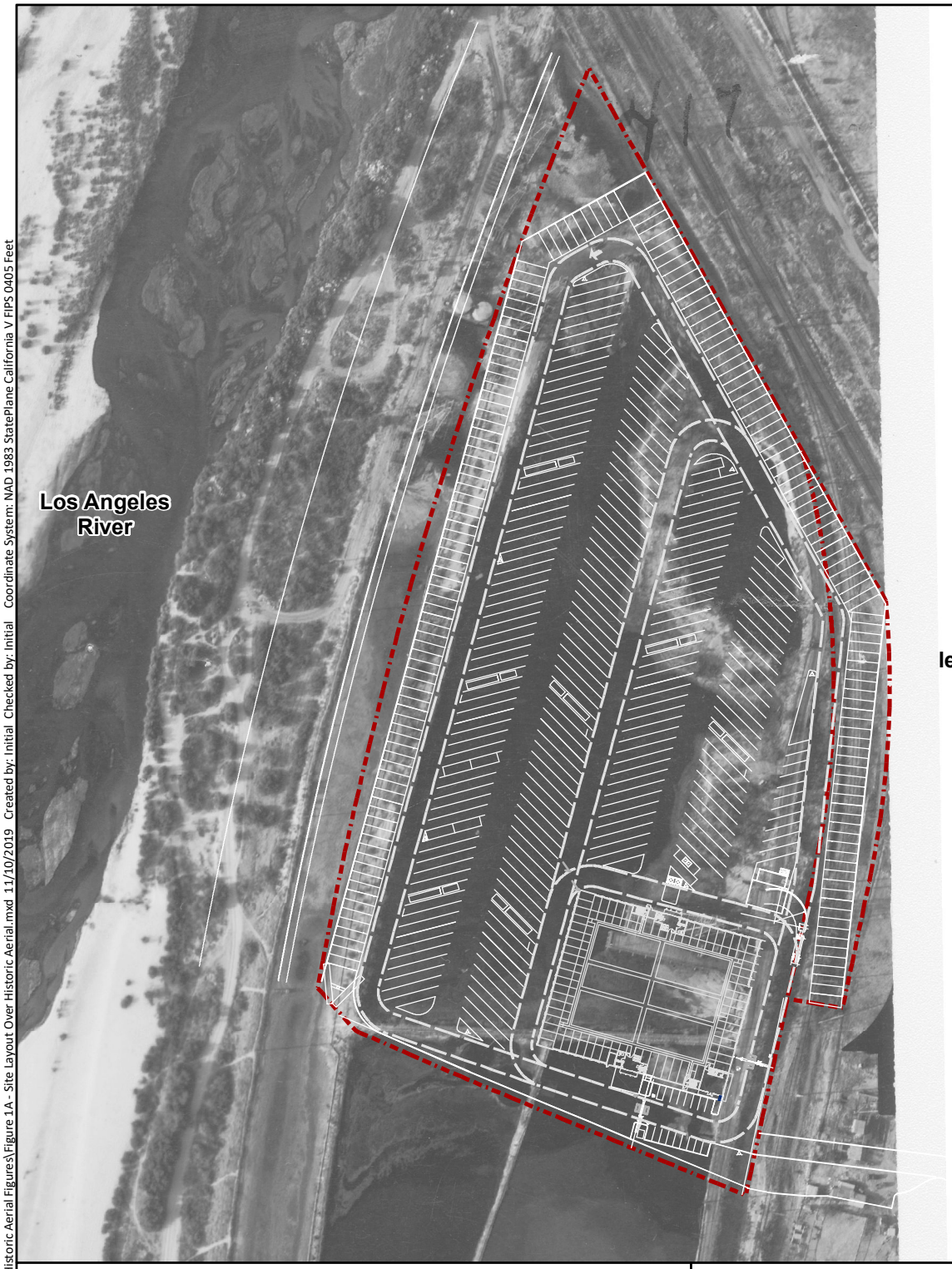
Legend

Site Location

Base Map: USGS 7.5 Minute Quadrangle for Long Beach, CA.

October 2019	CLIENT: Insite Property Group	**Site Location**
Carl Kim Geotechnical, INC 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *CARLKIMGEO@GMAIL.COM*	PROJECT: Proposed Self-Storage Facility 3701 North Pacific Place, Long Beach, CA	
	PROJECT NUMBER: S050.002.002	**FIGURE 1**

File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 1 - Site Location.mxd 10/16/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



Aerial photo data terminates. Area left blank intentionally

0 200 400 Feet

1 inch = 200 feet

N

Legend

Site Property Line

Concept Plan

Note:
Design concept from Truxaw (2019) (references).
Aerial photo base from Flight C-9114, frame 417, dated 9-10-44.

SAFETY FIRST

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

CLIENT: Insite Property Group

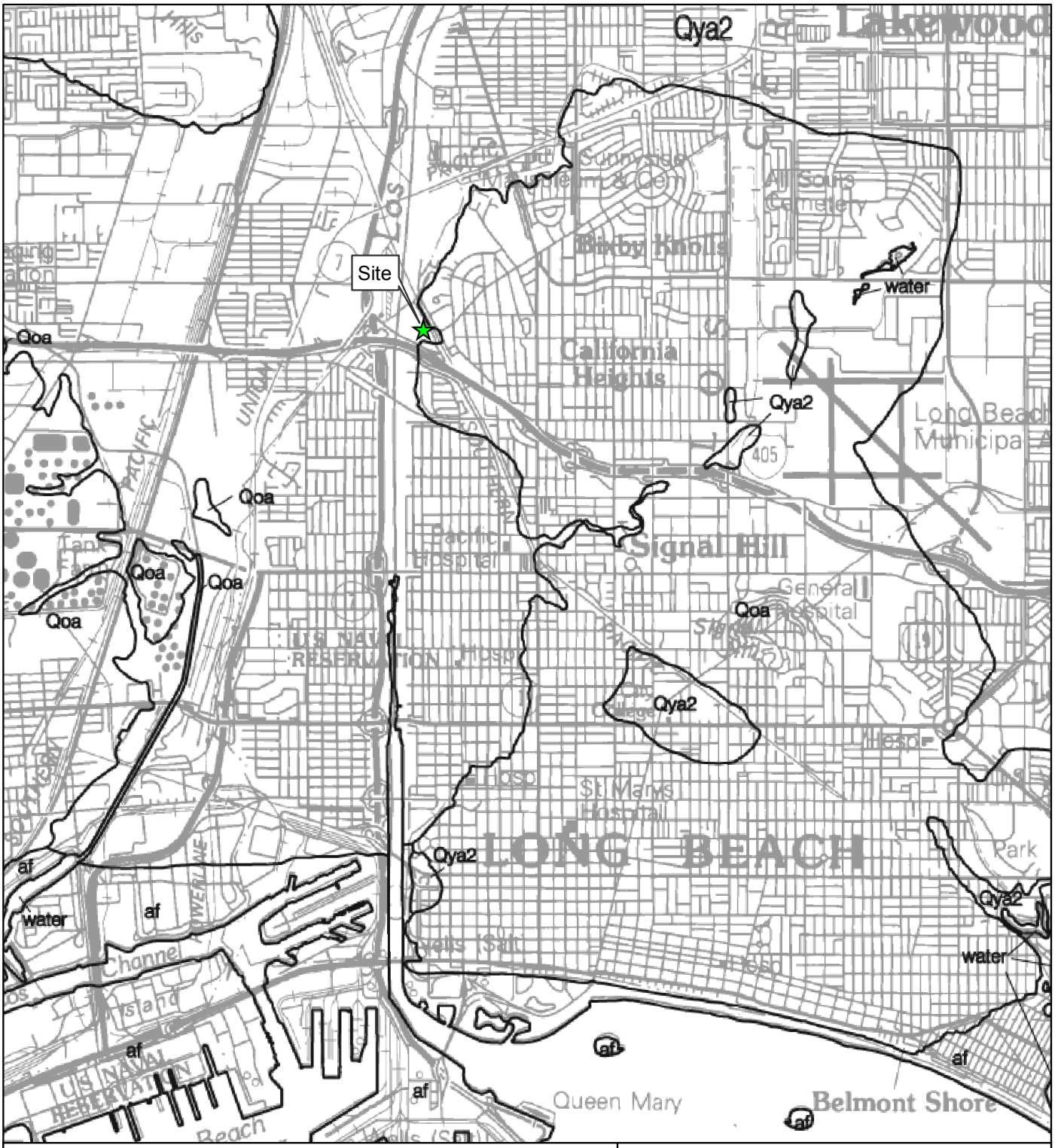
PROJECT: Proposed Self-Storage Facility
3701 North Pacific Place, Long Beach, CA

PROJECT NUMBER: S050.002.002

Site Layout Over Historic Aerial

FIGURE 1A

File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Historic Aerial Figures\Figure 1A - Site Layout Over Historic Aerial.mxd 11/10/2019 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 2 - Geologic Map.mxd 11/6/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

0 5,000 10,000 Feet

1 inch = 5,000 feet

N

Legend

Site Location

Base Map: Seismic Hazard Zone Report for Long Beach 7.5 Quadrangle 1998, Plate 1.1 Quaternary Geologic Map

October 2019

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

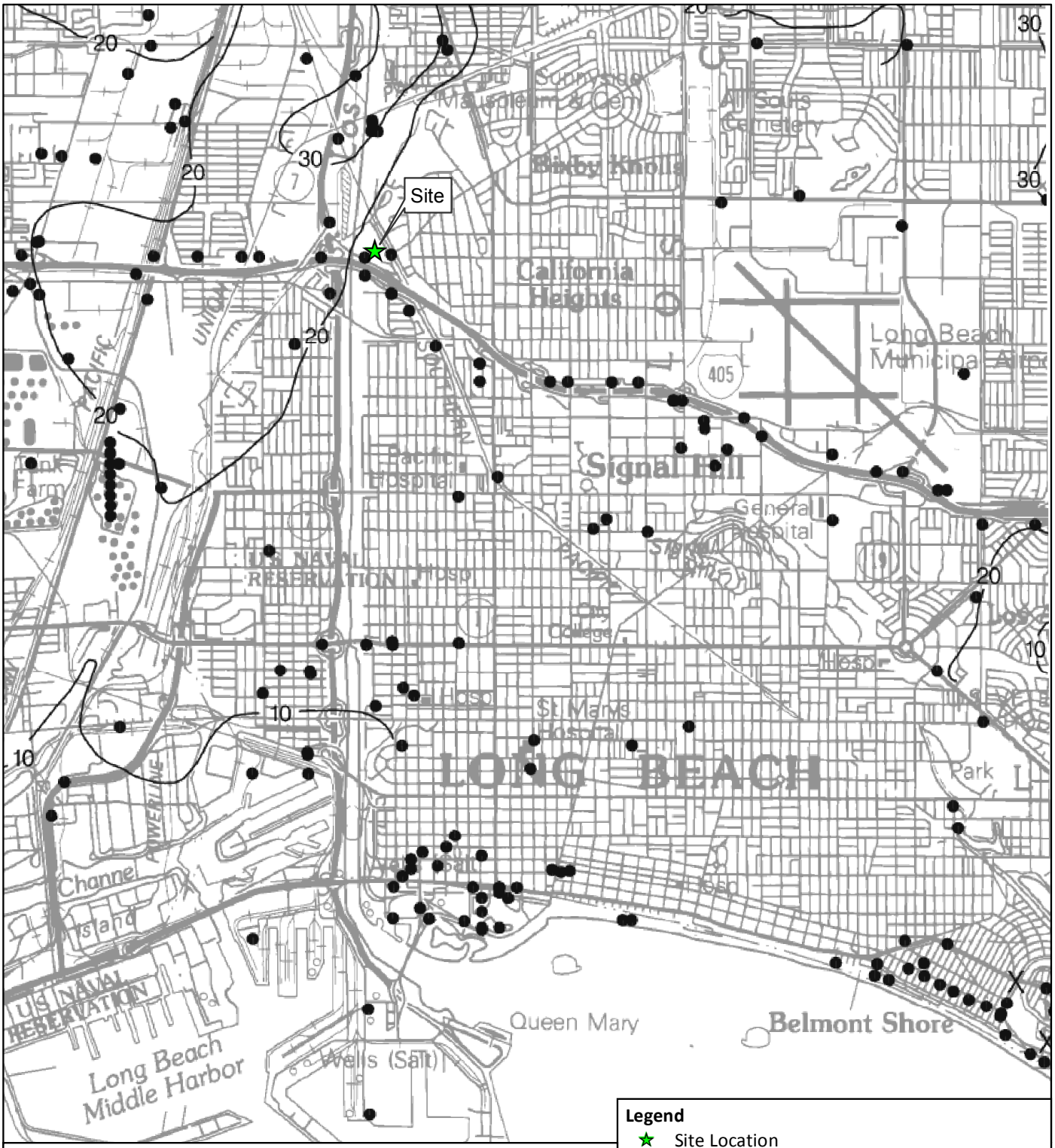
CLIENT: Insite Property Group

PROJECT: Proposed Self-Storage Facility
3701 North Pacific Place, Long Beach, CA

PROJECT NUMBER: S050.002.002

Geologic Map

FIGURE 2



0 5,000 10,000 Feet

1 inch = 5,000 feet

N

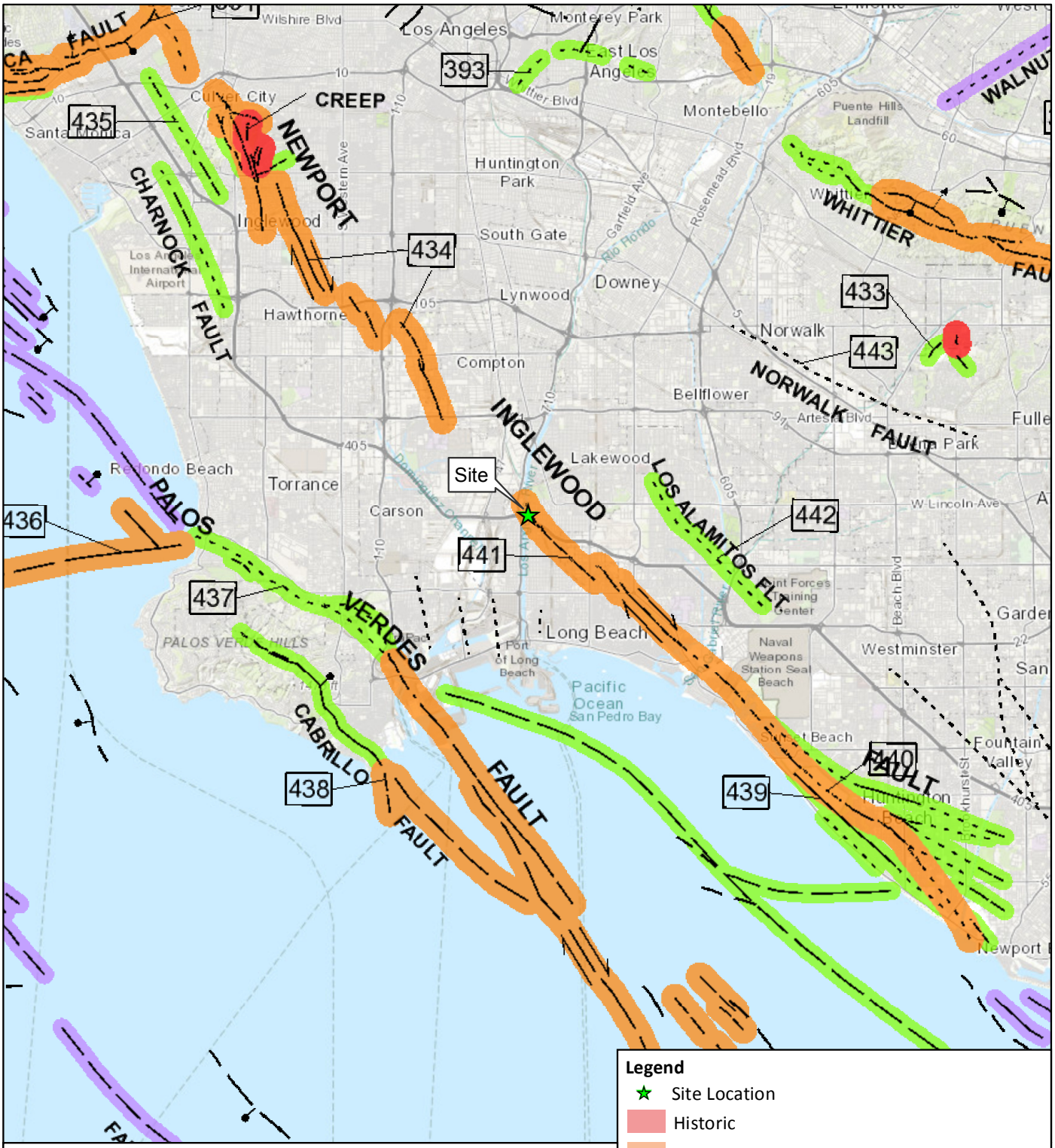
Legend

- ★ Site Location
- • Borehole Site
- ~10~ Estimated depth to historic high groundwater level in feet

Base Map: Seismic Hazard Zone Report for Long Beach 7.5 Quadrangle 1998, Plate 1.1 Quaternary Geologic Map

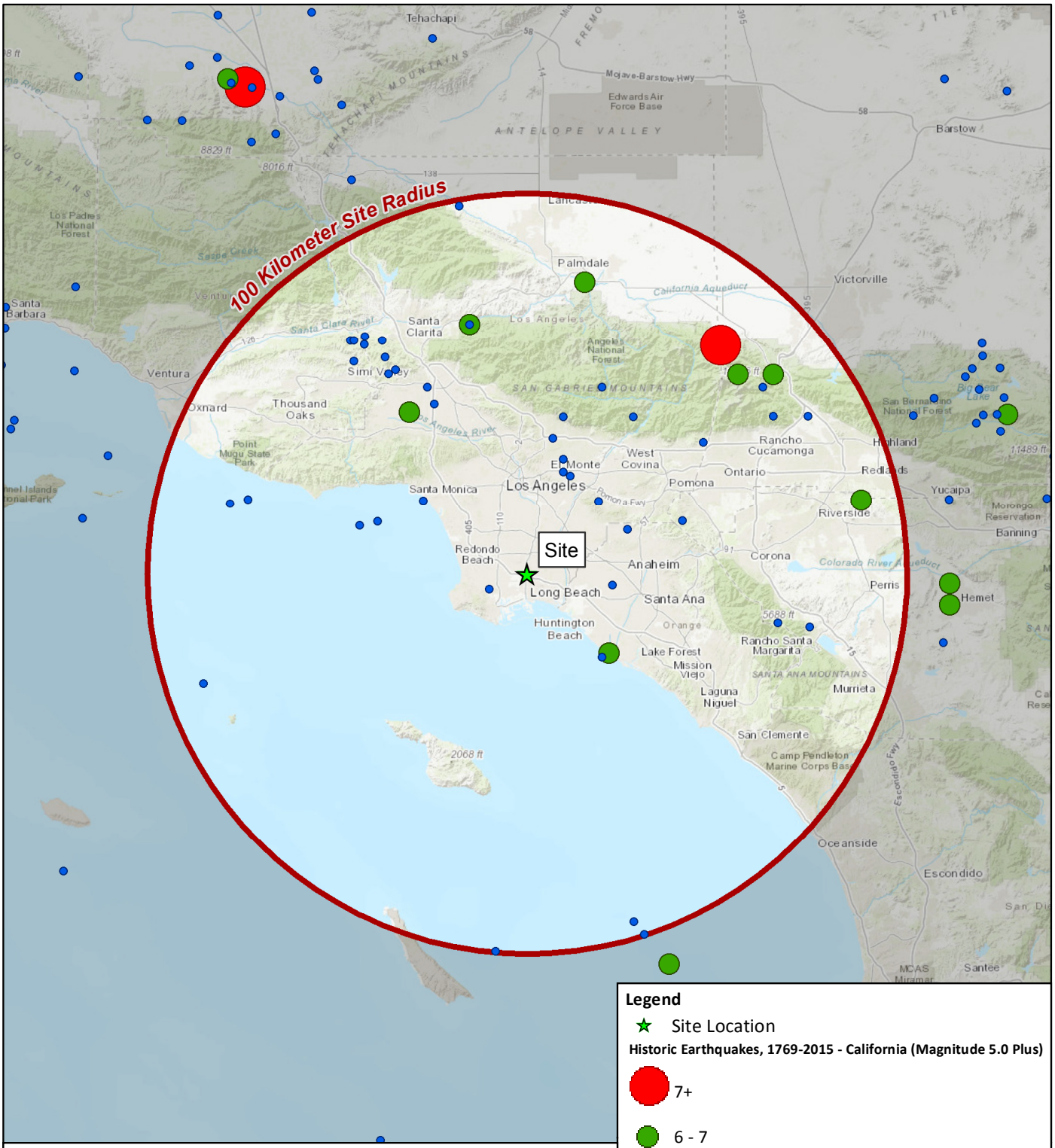
October 2019	CLIENT: Insite Property Group	**Groundwater**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *INFO@CARLKIMGEO.COM*	PROJECT: Proposed Self-Storage Facility 3701 North Pacific Place, Long Beach, CA	
	PROJECT NUMBER: S050.002.002	**FIGURE 3**

File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 3 - Groundwater Table Map.mxd 11/6/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



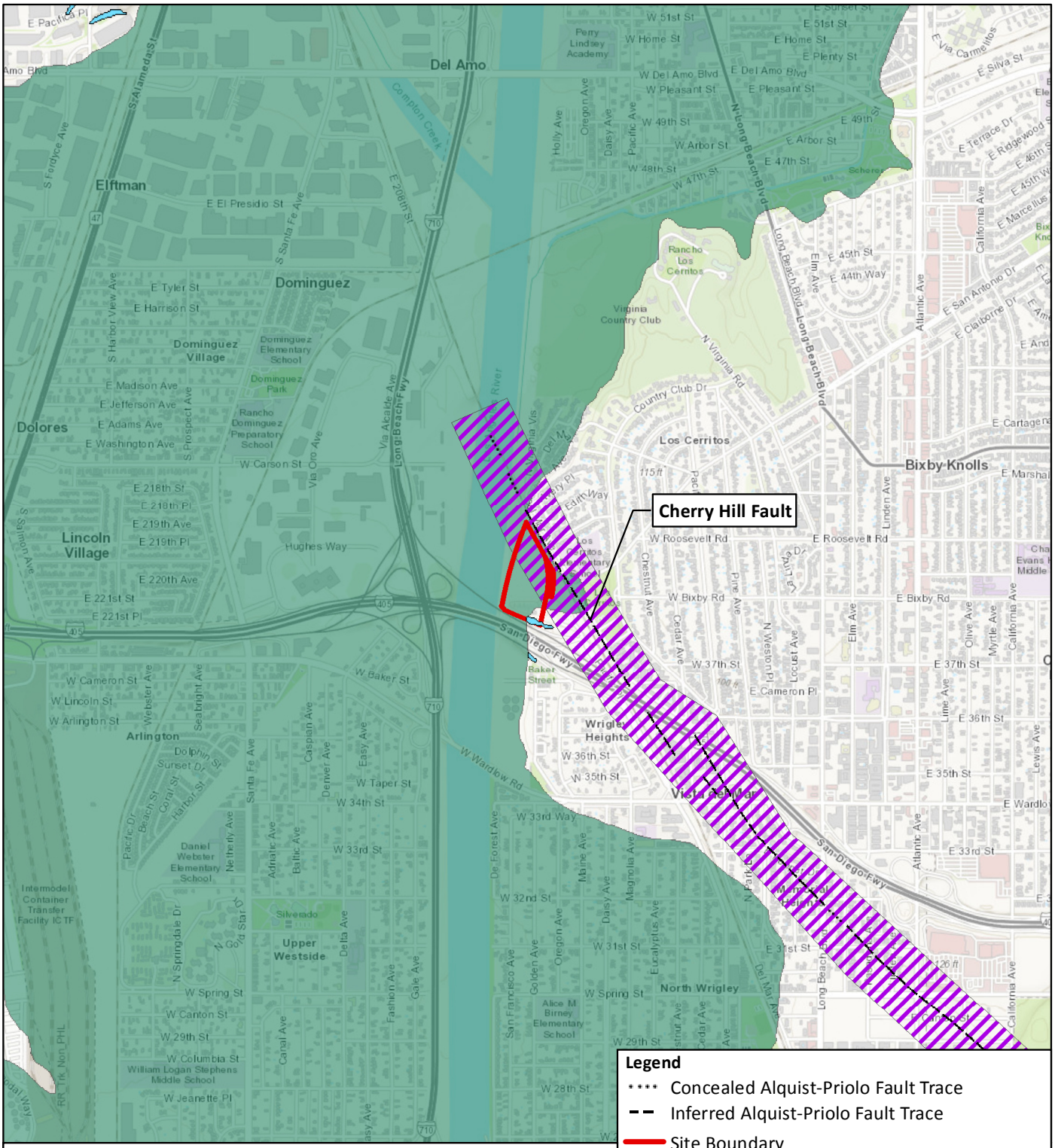
October 2019	CLIENT: Insite Property Group	**Regional Faults**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *INFO@CARLKIMGEO.COM*	PROJECT: Proposed Self-Storage Facility 3701 North Pacific Place, Long Beach, CA	
	PROJECT NUMBER: S050.002.002	**FIGURE 4**

File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 4 - Regional Faults.mxd 11/6/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 5 - Historic Seismicity.mxd 11/6/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

October 2019	CLIENT: Insite Property Group	**Historic Seismicity**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *INFO@CARLKIMGEO.COM*	PROJECT: Proposed Self-Storage Facility 3701 North Pacific Place, Long Beach, CA	
	PROJECT NUMBER: S050.002.002	**FIGURE 5**



File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 6 - Seismic Hazards Map.mxd 11/6/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

October 2019

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

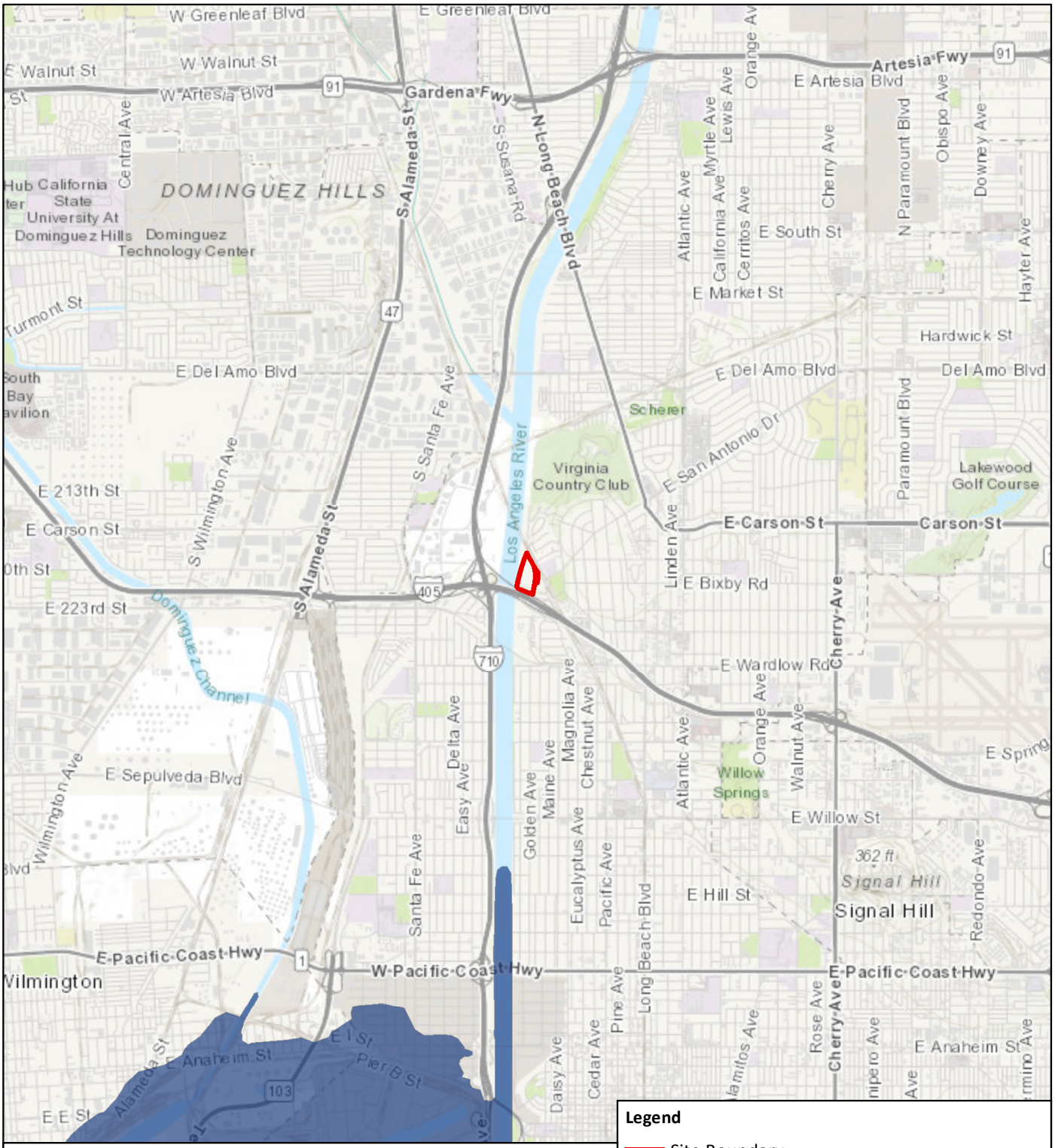
CLIENT: Insite Property Group

PROJECT: Proposed Self-Storage Facility
3701 North Pacific Place, Long Beach, CA

PROJECT NUMBER: S050.002.002

Seismic Hazards

FIGURE 6



0 5,000 10,000 Feet

1 inch = 5,000 feet

N

Legend

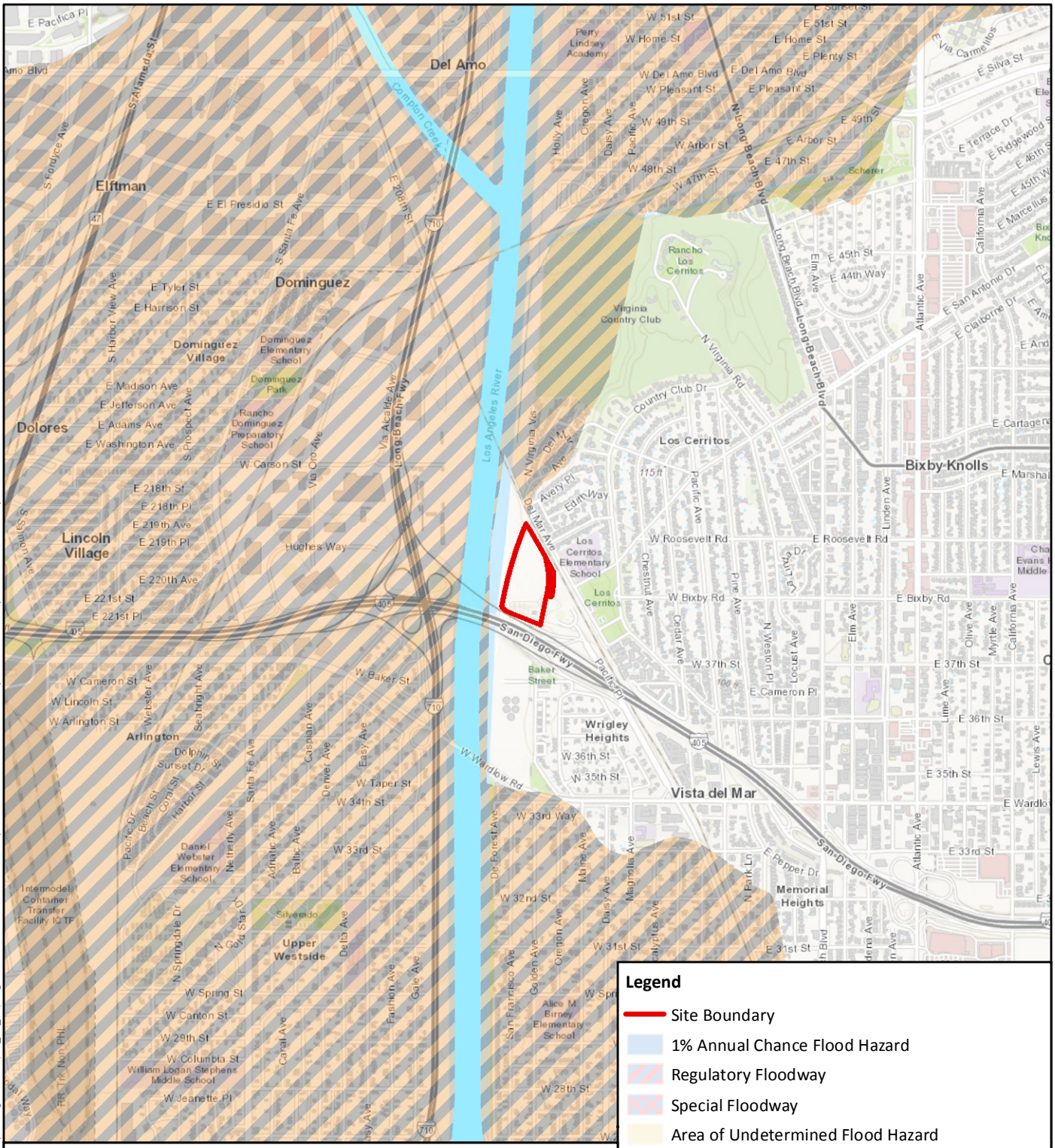
Site Boundary

Tsunami Inundation Zones

Base Map: Tsunami Inundation Map for Emergency Planning, produced by CA Emergency Management Agency, CA Geological Survey, and USC-Tsunami Research Center

October 2019	CLIENT: Insite Property Group	**Tsunami Inundation**
Carl Kim Geotechnical, Inc. 945 Baileyana Road Hillsborough, CA 94010 949-441-8143 *INFO@CARLKIMGEO.COM*	PROJECT: Proposed Self-Storage Facility 3701 North Pacific Place, Long Beach, CA	
	PROJECT NUMBER: S050.002.002	**FIGURE 7**

File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 7 - Tsunami Inundation Map.mxd 11/6/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



File: K:\GIS\Prj\S050.002 - CKG - 3701 N. Pacific Place\MXDs\Report Figures 1-8 (10_16_19)\Figure 8 - Flood Hazard Zones Map.mxd 10/18/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

October 2019

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

CLIENT: Insite Property Group

PROJECT: Proposed Self-Storage Facility
3701 North Pacific Place, Long Beach, CA

PROJECT NUMBER: S050.002.002

Flood Hazard Zones

FIGURE 8

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

Bryant, William A., (Bryant) 1985, California Division of Mines and Geology, Fault Evaluation Report FER-173, Northern Newport-Inglewood Fault Zone, Los Angeles County, California, dated November 15, 1985

California Department of Water Resources, 1961, Planned utilization of the ground water basins of the coastal plain of Los Angeles County: Bulletin 104, Appendix A, dated June 1961.

California Geological Survey (CGS), 1998, Seismic Hazard Zone Report for the 7.5 Minute Long Beach Quadrangle, Los Angeles County, California, SHZR 028, dated 1998 (updated 1/13/06)

CGS, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special publication 117A, (revised and re-adopted) dated September 11, 2008.

CGS, 2009, Tsunami Inundation Hazard Map for Emergency Planning, Long Beach Quadrangle, Scale of 1:24,000, Dated March 1, 2009

CGS, 1999, Earthquake Fault Zones of Required Investigation, Long Beach Quadrangle, Official Map, signed by State Geologist James Davis, EFZ's released July 1, 1986 and SHZ's released March 25, 1999, scale of 1 to 24,000 (updated 2016).

CGS, 2016, Geologic Map of the Long Beach 30 x 60 Quadrangle, California, Version 2.0, Scale of 1:1,000,000, contour interval of 10 meters, dated 2016

CGS, 2018, Special Publication 42, Earthquake Fault Zones, A Guide for Government Agencies, Property owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zone Maps, Revised 2018

Federal Emergency Management Agency (FEMA), 2009, FEMA Flood Map Service Center, web interface for flood hazard mapping. https://msc.fema.gov/portal/home

InSite, 2019, Conceptual Masterplan [package, ten pages], undated

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas; California Division of Mines and Geology, Geologic Data Map 6, Scale 1:750,000.

KSP Studio (KSP), 2019, Conceptual Site Plan, 3701 North Pacific Place, Long Beach, CA, Option 3, KSP Project No. 20492 , Sheet 2, Scale of 1" to 60', dated 9.30.19

LFR, 2007a, Historical Review of CRG Properties Former Oil Operators' North Site, Long Beach, California, LFR Project No. 002-10231-01, dated March 7, 2007.

LFR, 2007b, Revised Characterization Data Report, Former Oil Operators North Site, 3701 Pacific Place, Long Beach, California, LFR Project No. 002-10231-01, dated March 12, 2007.

LFR, 2009, Final Remedial Investigation Report, Former Oil Operators North Site, 3701 Pacific Place, Long Beach, California, LFR project No. 002-10231-06, dated May 27, 2009.

[City of] Long Beach, 1988, City of Long Beach General Plan, Seismic Safety Element, dated October 1988

Long Beach, 2017, Hazard Mitigation Plan, dated February 28, 2017.

Roux Associates, Inc. (Roux), 2019a, E-mail and Personal Communication with Jaydeep Purandare and Peter Shimer, September/October 2019.

Roux Associates (Roux), 2019b, Former Oil Operators, Inc., 3701 Pacific Place, Long Beach, California [presentation by Jaydeep Purandare and Mauricio H. Escobar to DTSC representatives.], June 29, 2019.

Joseph C. Truxaw and Associates, Inc. (Truxaw), 2019a, ALTA/NSPS Land Title Survey, 3701 North Pacific Place, In the City of Long Beach, County of Los Angeles, California, Project Number IPG 19058, 4 sheets, Scale of 1" to 30', dated 8-28-19.

Truxaw, 2019b, [Preliminary] Earthwork Exhibit, InSite Pacific Self Storage, 3701 N. Pacific Place, Long Beach, CA, scale of 1" to 100', dated 9/17/2019

Yerkes, R.F., and Campbell, R.H., 2005, Preliminary Geologic Map of the Los Angeles 30' x 60' Quadrangle, Southern California, United States Geological Survey (U.S.G.S.) Open-File Report 2005-1019, Version 1.0, Map Scale 1:100,000.

Yerkes, R.F., McCulloh, T.H., Schoellhamer, J.E., and Vedder, J.G., 1965, Geology of the Los Angeles basin, California--an introduction: U.S. Geological Survey Professional Paper 420-A

DIGITAL AERIAL PHOTOS

Fairchild Aerial Surveys (Fairchild), Flight C-300, Frame 142-143 and 155-156, Scale 1:18,000, flight begin date December 31, 1927.

Fairchild Aerial Surveys (Fairchild), Flight C-9114, Frame 416-418 and 155-156, Scale 1:3,600, flight begin date September 8-10, 1944.[5]

Pacific Air Industries (PAI), Flight PAI-LA-Basin-62_151V, frames 115 and 116, Scale 1:18,000, start date January 28, 1962.[5]

Teledyne Geotronics, Flight TG-7600, frame 4-10, Scale 1:24,000, frame dated 3-22-76.[5]

United States Department of Agriculture (USDA), Flight AXJ-13K, frame 216 and 217, Scale ~1:18,000, flight dated 10-19-53. [5]

[5]University of California Santa Barbara (UCSB) digital collection, http://mil.library.ucsb.edu/ap_indexes/FrameFinder/

APPENDIX B

FIELD EXPLORATIONS

APPENDIX B

FIELD EXPLORATIONS

Subsurface explorations during the current geotechnical investigation consisted of drilling and sampling using hollow-stem-auger drilling and cone penetration test (CPT) soundings. Explorations were supervised and logged by qualified representatives. Earth materials encountered were visually classified in accordance with the Unified Soil Classification System (USCS), as practicable. Stratigraphic boundaries are indicated on the logs. Some soil/material types transition gradually. The logs of the borings and the report presenting the results of the CPT soundings are presented in this appendix.

Work was performed in accordance with means and methods disclosed to approved by Department of Toxic Substances Control representatives and per the requirements of the City of Long Beach Environmental Health [Boring] Permit No. 2681.

Carl Kim Geotechnical prepared and implemented a site-specific Health and Safety Plan (Plans) for all staff and subcontractor site work.

RECONNAISSANCE AND LOGISTICS

Locations of the borings and CPT soundings 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.

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

A total of 10 hollow stem auger borings, designated CKG-1 through CKG-10 were drilled October 2, 2019 through October 8, 2019 by ABC Liovan Drilling of Signal Hill, California. Drilling was performed using a truck mounted CME 75 drill rig operated by a driller and two driller's assistants. Borings ranged in depth of from 20 feet to 75 feet below ground surface.

Cone Penetrometer Test (CPT) soundings were performed at 15 different locations October 1, 2, and 4, 2019. CPT soundings are designated CPT-1 through CKCPT-15. Shear wave measurements were obtained at CPT-11 on 5-foot increments.

CPT interpretations are included in this appendix.

BOREHOLE SEALING

Each borehole was abandoned using positive displacement methods (tremie pipe) with neat cement grout. As noted in the logs some borings presumably encountered subsurface voids that cause the neat cement grout to settle below ground surface. In these locations borings were partially backfilled with hydrated bentonite chips to bridge the voids.

SAMPLING

Representative relatively undisturbed and bulk (bag) samples were obtained from the borings. Samples were logged, labeled, and retained for laboratory testing. Sample depths are indicated on the logs.

Relatively undisturbed samples were obtained by driving a Modified California Split-Spoon Sampler, with a 3.0-inch outside diameter, into the bottom of the boring at desired depths. The barrel of the sampler was lined with 1-inch-tall by 2.41-inch inside diameter geotechnical sampling rings. The rings containing the undisturbed samples were placed in plastic cans, labeled, and transported to Smith-Emery Labs of Los Angeles via courier.

The number of blows to achieve a 6-inch penetration of the sampler was recorded and is shown on the logs. The blow counts provide an indication of the density or consistency of the in-situ earth materials.

In addition to obtaining undisturbed and large bulk samples, Standard Penetration Tests (SPT) were performed in each of the hollow-stem auger borings. The SPTs were performed in accordance with the ASTM D1586 Test Method. The results of the tests are indicated on the boring logs, where blow counts or N-values are given for each 6 inches of driving. Samples of the materials obtained from the SPT sampler were placed in plastic bags for transport to the laboratory.

For the fault investigation, near continuous core sample was obtained from CKG-1, CKG-2, and CKG-9 using hollow-stem auger drilling and a CME soil coring system. Core runs varied from 3 to 5 feet in length. Core sample was placed in wooden core boxes, logged, and photographed. Core boxes were retained onsite. As of the date of this document Carl Kim Geotechnical understands that the samples were vandalized. Therefore, the core samples will be disposed of.

Each split spoon sample was screened for organic vapors using a Minirae 3000 photoionization detector (PID).

EXPLORATION LOGS

CKG-1 through CKG-10

CPT-1 through 10

Project: **INSITE, LONG BEACH** Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA** Project Number: **PWAS_20190823B**	Log of Boring CKG-1 **Sheet 1 of 3**

Date(s) Drilled **10-2-19 and 10-3-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **75 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **49.92 FEET BGS**
Groundwater Level and Date Measured **53.2 FEET BGS ATD ON 10-3-19**	Sampling Method(s) **Bulk, CME**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **CO-LOCATED WITH CPT-2**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Recovered (in) / Total (in)	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
49.92	0					SP		FILL - SAND (SP) - dark brown, dry, fine, poorly graded, roots			
		BULK-1 0-3		36/60	2.0	CL		CLAY-SANDY CLAY (CL) - dark olive gray, damp, soft-firm, low plasticity, sand is fine, some gravel, black staining, petroleum-like odor, some dark oily residue, trace asphalt chunks			
44.92	5			60/60	10	SP		SAND (SP) - black, damp, fine, poorly graded, strong petroleum-like odor, oily residue/staining			
						CL		CLAY (CL) - black, damp, soft, low plasticity, sand is fine, some gravel, petroleum-like odor, trace black staining/oily residue			
39.92	10					SP-SM		SAND-SILTY SAND (SP-SM) - black, damp, loose to dense (?), fine, poorly graded, silty interbeds, dark oily staining, strong petroleum-like odor, scattered concrete pieces			
				36/60	15.0	SP		SAND (SP) - black, damp, fine, poorly graded, strong petroleum-like odor, oily residue/staining, varying clay content			
34.92	15					CL		SUMP MATERIAL(?): - CLAY (CL) - black, damp, very soft, low plasticity, sand is fine, some gravel, petroleum-like odor, trace black oily staining			
					8.9	SP		SAND (SP) - black, damp, fine, poorly graded, strong petroleum-like odor, black oily staining, varying clay content, piece of paper in sample at 16 feet bgs			
				30/60		CL-ML		ALLUVIUM: - SILTY CLAY - CLAYEY SILT (CL-ML) - black, moist, soft, no to low plasticity, rootlets, laminar silt beds, moderate petroleum-like odor, sand content increases with depth, grades into a CLAYEY SAND			
29.92	20										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - CME, Recovery, El, Sample, NO Blows, PID, Moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-1

Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Recovered (in) / Total (in)	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
29.92	20			24/24		CL-ML		ALLUVIUM: - SILTY CLAY - CLAYEY SILT (CL-ML) - black, moist, soft, no to low plasticity, rootlets, laminar silt beds, moderate petroleum-like odor, sand content increases with depth, grades into a CLAYEY SAND			
				36/36	4.6	SC		CLAYEY SAND (SC) - black, moist, fine, poorly graded, some clay with no to low plasticity, decreasing fine content with depth, moderate petroleum-like odor, grades into a SILTY SAND			
24.92	25					SM		SILTY SAND (SM) - black, damp, fine, poorly graded, moderate petroleum-like odor, decreasing fine content, grades into a SAND			
				54/60	1.1						
19.92	30					SP		SAND (SP) - dark olive gray, damp, fine to medium grain, poorly graded, massively bedded, faint petroleum-like odor, rare fines, beach sand			
				48/60	0.5	SP		Becomes gray, dry to damp, driller notes harder drilling conditions from 32 to 35 feet bgs			
14.92	35			30/30	0.0						
9.92	40			60/60	0.0	CL-ML		LAKEWOOD FORMATION: SILTY CLAY-CLAYEY SILT (CL-ML) (MUDSTONE) - gray mottled with dark yellowish brown, damp, firm, up to 15% fine sand, low plasticity, laminar beds, remnant rootlets			
4.92	45			42/60	0.0	SM		SILTY SAND (SM) - dark green, damp, predominantly fine grain with some medium, poorly graded, laminar beds, fissile along faint laminar beds			
-0.08	50					SM		Becomes dark greeninsh gray, decreasing fine content, grades into SAND			
				30/60	0.0	SP		SAND (SP) - dark greeninsh gray, moist to wet, fine to medium grain, poorly graded, laminar beds			
-5.08	55										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - CME, Recovery, El, Sample, NO Blows, PID, Moist, weight.tp]

terraphase engineering

Project: **INSITE, LONG BEACH**

Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**

Project Number: **PWAS_20190823B**

Log of Boring CKG-1

Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Recovered (in) / Total (in)	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
-5.08	55			30/30	0.0	SP		SAND (SP) - dark greeninsh gray, moist to wet, fine to medium grain, poorly graded, laminar beds			
				30/30		SP		Becomes gray and greenish gray mottled with dark yellowish brown along bed planes, fine to medium, beach sand, weakly cemented, relatively hard drilling until 60 feet bgs			
-10.08	60			36/36	0.0	SP		Increased clay content, grades into CLAYEY SAND			
				36/36		SC		CLAYEY SAND (SC) - olive mottled with gray, wet, soft to firm, fine, poorly graded, clay content varies, low plasticity			
-15.08	65			36/36	0.0						
				24/24	0.0	SC-CL		CLAYEY SAND - SANDY CLAY (SC-CL) - strong brown mottled with gray, damp, firm, low plasticity, sand is fine, poorly graded			
-20.08	70			24/24							
				24/24	0.0						
-25.08	75							DRILLED AND SAMPLED WITH CME SOIL CORING SYSTEM TOTAL DEPTH = 75 FEET GROUNDWATER MEASURED AT 53.2 FEET BGS ATD BACKFILLED WITH NEAT CEMENT ON 10/03/19			
-30.08	80										
-35.08	85										
-40.08	90										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - CME, Recovery, El, Sample, NO Blows, PID, Moist, weight.tp]

terraphase engineering

Project: **INSITE, LONG BEACH** Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA** Project Number: **PWAS_20190823B**	Log of Boring CKG-2 **Sheet 1 of 3**

Date(s) Drilled **10-3-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **75 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **47.84 FEET AMSL**
Groundwater Level and Date Measured **51.39 FEET BGS ATD ON 10-03-19**	Sampling Method(s) **Bulk, CME**	Hammer Data **N/A**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **CO-LOCATED WITH CPT-4**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Recovered (in) / Total (in)	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
47.84	0	BULK-1 0-3				SM-ML		FILL: SILTY SAND - SANDY SILT (SM-ML) - dark yellowish brown, dry, fine, poorly graded, rootlets			
						CL		SUMP MATERIAL: SANDY CLAY (CL) - black, damp, soft, sand is fine, low plasticity, varying fine content with alternating sandy and clayey layers, oily residue, strong petroleum-like odor			
42.84	5			36/60	8.5						
						SM		SILTY SAND (SM) - olive gray mottled with yellowish spots, damp, fine to medium, poorly graded, mild petroleum-like odor			
37.84	10					SP		SAND (SP) - dark gray, damp, fine to medium, poorly graded, silt and clay intermixed			
				36/60	1.0						
32.84	15					SP		ALLUVIUM (?): SAND (SP) - dark gray, fine to medium, poorly graded, some clays and fines, faint laminations, root hairs			
				42/60	0.8						
27.84	20					SC		SANDY CLAY (SC) - black, damp, fine, poorly graded, no to low plasticity, roots, root hairs, oily residue, mild petroleum like odor,			

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-2

Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Recovered (in) / Total (in)	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
27.84	20					SC		SANDY CLAY (SC) - black, damp, fine, poorly graded, no to low plasticity, roots, root hairs, oily residue, mild petroleum like odor, gradually fining upwards			
				36/36	0.4						
				24/24	0.1	SC		Grades into a SILTY SAND (SM)			
22.84	25					SM		SILTY SAND (SM) - black, damp, fine, poorly graded, roots, mild petroleum-like odor			
				36/36	0.0						
						SM		Becomes very dark gray			
				24/24							
17.84	30										
				60/60	0.0						
						SM		Decreasing fine content, grades into SAND (SP)			
12.84	35					SP		SAND (SP) - dark olive gray mottled with orange, damp, fine to medium, poorly graded, some silty interbeds			
				36/60	0.0	SP		Becomes dark greenish gray, mostly massive with scattered beds			
7.84	40										
				30/30	0.0						
				30/30	0.0						
2.84	45					ML		CLAYEY SILT (ML) (MUDSTONE) - light gray mottled with orange, dry to damp, soft to firm, trace fine sand, low plasticity, laminar, fissile along bed planes, sand and fine content varies			
				48/60	0.0						
						ML		Becomes firm, fewer laminar beds			
-2.16	50										
						SP		SAND (SP) - olive gray mottled with orange, damp, wet, fine to medium, poorly graded, massively bedded with scattered laminations beach sand			
				36/36	0.0						
				24/24	0.0						
-7.16	55										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - CME, Recovery, El, Sample, NO Blows, PID, Moist, weight.tp]

terraphase engineering

Project: **INSITE, LONG BEACH**

Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**

Project Number: **PWAS_20190823B**

Log of Boring CKG-2

Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Recovered (in) / Total (in)	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
-7.16	55			36/36	0.0	SP		SAND (SP) - olive gray mottled with orange, damp, wet, fine to medium, poorly graded, massively bedded with scattered laminations, beach sand			
						SP		Becomes gray with mottled with orange, damp, weakly to moderately cemented, massively bedded			
				0/24		SC		CLAYEY SAND (SC) - gray mottled with orange, moist, fine to medium, poorly graded, low plasticity			
-12.16	60			36/36	0.0						
						SP		SAND (SP) - gray mottled with orange, moist, fine to medium, poorly graded, scattered white mineralization			
				24/24	0.0						
-17.16	65										
				30/36							
						SP		Becomes fine to coarse grain			
				24/24	0.0	SC		CLAYEY SAND (SC) - dark brown mottled with orange and gray, damp, increased density relative to above SAND unit, fine, poorly graded, no to low plasticity, massively bedded,			
-22.16	70										
				30/36	0.0						
						SC-CL		Clay content increases, becomes CLAYEY SAND - SANDY CLAY (SC-CL), low plasticity			
				24/24	0.0						
-27.16	75							DRILLED AND SAMPLED WITH CME CORING MACHINE TOTAL DEPTH DRILLED = 75 FEET GROUNDWATER ENCOUNTERED AT 51.39 FEET BGS ATD BACKFILLED WITH NEAT CEMENT 10-03-19			
-32.16	80										
-37.16	85										
-42.16	90										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - CME, Recovery, El, Sample, NO Blows, PID, Moist, weight.tp]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-3
Sheet 1 of 2

Date(s) Drilled **10-4-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **50 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **49.18 FEET AMSL**
Groundwater Level and Date Measured **NOT ENCOUNTERED**	Sampling Method(s) **Bulk, California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **SOUTHEAST CORNER OF PROPOSED BUILDING**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
49.18	0	BULK-1 0-3				SM		FILL: SILTY SAND (SM) - dark yellowish brown, dry, fine to medium, poorly graded, roots, trace gravels			EI: 47 MAX: 128 pcf @10% R: 31 CHEM
						SM		Becomes black, stained, fine, petroleum-like odor			
44.18	5	R-1		5 16 7	20.3	SM		Medium dense	8	102	
						SP-SM		SUMP MATERIAL (?): SAND - SILTY SAND (SP-SM) - dark gray to black, damp-moist, very loose, fine to medium, poorly graded, petroleum-like odor, scattered areas with visible laminar beds, some clays with low plasticity, pinhole voids			
39.18	10	SPT-1		P 2 2	428				17		
						SC		ALLUVIUM (?): CLAYEY SAND (SC) - reddish brown mottled with dark gray, damp, medium dense, fine to medium, poorly graded, low plasticity, scattered faint laminations, rootlets, faint petroleum-like odor			
34.18	15	R-2		6 13 21	16.6				14	122	CONS
29.18	20	SPT-2		6 12 18	0.2	SC		Becomes dark reddish brown, some pinhole voids	13		
						SM		SILTY SAND (SM) - dark olive brown mottled with gray and orange, damp, medium dense, fine, poorly graded, faint laminar beds			
24.18	25										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-3

Sheet 2 of 2

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
24.18	25	R-3		7 11 17	0.0	SM			18	111	CONS DS
						SP		SAND (SP) - gray, mottled with orange and white, damp, medium dense, fine to medium, poorly graded, visible beds, scattered white mineralization, beach sand			
19.18	30	SPT-3		4 7 11	2.6						
14.18	35	R-4		9 20 50-5"	0.0	SP		LAKEWOOD FORMATION: SAND (SP) - olive and light yellowish brown, dry to damp, very dense, fine, poorly graded, weakly cemented	6	104	
9.18	40	SPT-4		13 19 19	0.0			Becomes olive gray, dense, beach sand	5		
						ML		CLAYEY SILT (ML) (MUDSTONE) - light olive brown mottled with orange, gray and red, damp, hard, low plasticity, trace fine sands, laminar			
4.18	45	R-5		9 14 39	0.0						
						SM		SILTY SAND (SM) - light olive brown mottled with gray and orange, moist, dense, fine, poorly graded, estimated 10% to 20% fines			
-0.82	50	SPT-5		10 16 25	0.0			TOTAL DEPTH DRILLED = 50 FEET TOTAL DEPTH SAMPLED = 51.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT 10/04/19	20		
-5.82	55										
-10.82	60										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH** Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA** Project Number: **PWAS_20190823B**	Log of Boring CKG-4 **Sheet 1 of 2**

Date(s) Drilled **10-4-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **50 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **48.03 FEET AMSL**
Groundwater Level and Date Measured **NOT ENCOUNTERED**	Sampling Method(s) **Bulk, California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **SOUTHWEST CORNER OF PROPOSED BUILDING**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
48.03	0	BULK-1 0-5				SM		FILL: SILTY SAND (SM) - dark yellowish brown, dry, fine, poorly graded, roots			
43.03	5	SPT-1		7 10 8	25.4	SC		CLAYEY SAND (SC) - black with gray, damp, fine, poorly graded, low plasticity, oily residue, strong petroleum-like odor, scattered concrete and rubber pieces	11		
						SC		SUMP MATERIAL: CLAYEY SAND (SC) - black with gray, damp, fine, poorly graded, low plasticity, black and gray laminations visible in some areas, petroleum-like odor			
38.03	10	R-1		3 4 7	39.2				20	98	
						SC-CL		CLAYEY SAND - SANDY CLAY (SC-CL) - black, moist, loose-firm, sand is fine, poorly graded, rootlets, remnant woody vegetation, petroleum-like odor			
33.03	15	SPT-2		3 3 6	119				17		
						SM		SILTY SAND (SM) - dark olive gray mottled with olive brown, damp to moist, loose, fine, non plastic to low plasticity, strong petroleum-like odor			
28.03	20	R-2		8 7 10	387				19	99	
						ML		SILT - SANDY SILT (ML) - very dark gray, damp to moist, stiff, sand is fine to medium grain, low plasticity, laminar beds, roots, strong petroleum-like odor			
23.03	25										

terraphase engineering

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

Project: **INSITE, LONG BEACH**

Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**

Project Number: **PWAS_20190823B**

Log of Boring CKG-4

Sheet 2 of 2

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
23.03	25	SPT-3		2 4 7	678	ML			29		
						CL		ALLUVIUM/WEATHERED LAKEWOOD FORMATION: SILTY CLAY (CL) - dark gray, damp, stiff, trace fine sand, low to medium plasticity, laminar beds, rounded gray nodules, root hairs, possible shell fragments, petroleum-like odor			
18.03	30	R-3		4 7 8	1.4				36	86	
						SC-CL		LAKEWOOD FORMATION: CLAYEY SAND - SANDY CLAY (SC-CL) - dark gray, damp,very dense-very hard , sand is fine, poorly graded, low plasticity, massively bedded, trace pinhole voids, petroleum-like odor			
13.03	35	SPT-4		9 26 35	1.4				17		
						SM		SILTY SAND (SM) - dark olive gray mottled with dark brown and white mineralizations, damp, loose, fine, poorly graded, non-plastic, trace clays, up to 30% fines, sand casts, petroleum like odor			
8.03	40	R-4		6 6 12	0.6				18	109	
3.03	45	SPT-5		6 15 30	1.3	SM		Becomes greenish black mottled with olive, moist, dense, fine to medium, poorly graded, massively bedded, trace white mineralizations, micaceous, fine beach sand	24		
						SM		SILTY SAND (SP) - greenish gray mottled with trace red discoloration, moist, medium dense, fine, poorly graded, massivley bedded			
-1.97	50	R-5		6 12 12	0.1			TOTAL DEPTH DRILLED = 50 FEET TOTAL DEPTH SAMPLED = 51.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT 10/04/19	18	109	
-6.97	55										
-11.97	60										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-5
Sheet 1 of 2

Date(s) Drilled **10-4-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **55 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **45.33 FEET AMSL**
Groundwater Level and Date Measured **50.79 FEET BGS ATD ON 10-4-19**	Sampling Method(s) **Bulk, California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **NORTHWEST CORNER OF PROPOSED BUILDING**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
45.33	0	BULK-1 0-3				ML		FILL: SANDY SILT (ML) - pale brown, dry to damp, sand is fine, low plasticity			EI: 56 MAX: 121 pcf@8.5% R: 20 CHEM
40.33	5	R-1		22 16 12	157.7	CL CL		CLAY (CL) - black, damp, soft, trace fine sand, low plasticity, oily residue/staining, concrete rubble, strong petroleum-like odor Increased gravel, massively bedded, suspected brick flakes, rootlets, strong petroleum-like odor	13	101	
35.33	10	SPT-1		2 2 1	240.6	CL		Some gravels, suspected brick flakes, rootlets, massively bedded, strong petroleum-like odor SUMP MATERIAL (?): CLAY (CL) - black with dark gray layering, damp, firm, trace fine sand, poorly graded, low plasticity, scattered faint laminations, root hairs, strong petroleum-like odor	17		LL: 37 PL: 16 PI: 21
30.33	15	R-2		2 3 4	491.7	CL			23	87	CONS
25.33	20	SPT-2		P P P	699.1	CL		Becomes dark olive gray, trace fine sands, massively bedded, liquid black oily residue, strong petroleum-like odor, pinhole voids, cracks	56		LL: 51 PL: 23 PI: 28
20.33	25					CL		ALLUVIUM (?): SANDY CLAY (CL) - dark olive gray mottled with black, moist, very soft, sand is fine, low plasticity, massively bedded, root hairs, strong petroleum like-odor			

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-5

Sheet 2 of 2

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
20.33	25	R-3		P P 2	592.6	CL			21	93	CONS
						SC		CLAYEY SAND (SC) (ALLUVIUM) - dark greenish gray, moist, fine, poorly graded, mostly massive with some fine laminations, low plasticity, moderate petroleum-like odor			
						SC		Hard drilling from 29 to 30 feet bgs			
15.33	30	SPT-3		4 7 8	2.3.1	SM		SILTY SAND (SM) - dark greenish gray, mottled with dark brown, moist, medium dense, fine, poorly graded, mostly massive with scattered fine laminations, scattered white mineralization and nodules, no plastic, moderate petroleum-like odor	18		LL: 27 PL: 21 PI: 6
10.33	35	R-4		6 11 19	5.1				17	114	
						SP		SAND (SP) - gray, dry to damp, dense, fine to medium, poorly graded, mostly massive with scattered beds, beach sand			
5.33	40	SPT-4		7 17 20	2.2				8		LL: PL: PI:
						ML		CLAYEY SILT (ML) (MUDSTONE) - greenish gray mottled with orange and white, damp, hard, low plasticity, trace fine sands, laminar			
0.33	45	R-5		10 25 40	1.0				31	91	CONS
						ML		Increasing sand content, grades into a SILTY SAND			
-4.67	50	SPT-5		10 15 31	18.1	SM		SILTY SAND (SM) - greenish gray mottled with orange, moist to wet, dense, fine to medium, poorly graded, laminar, weakly cemented ▽	22.5		
						SP		SAND (SP) - gray mottled with orange, wet, very dense, fine to medium, poorly graded, scattered white mineralization, massively bedded, beach sand			
-9.67	55	R-6		15 42 50-5"	1.2			ENCOUNTERED DRILLING REFUSAL AT 5 FEET BGS, RELOCATED CKG-5 ~5 FEET SOUTH AND REDRILLED TOTAL DEPTH DRILLED = 55 FEET TOTAL DEPTH SAMPLED = 56.5 FEET GROUNDWATER ENCOUNTERED AT 50.79 FEET BGS ATD BACKFILLED WITH NEAT CEMENT 10/04/19	24	100	
-14.67	60										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-6
Sheet 1 of 2

Date(s) Drilled **10-7-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **50 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **46.26 FEET AMSL**
Groundwater Level and Date Measured **NOT ENCOUNTERED**	Sampling Method(s) **Bulk, California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **NORTHEAST CORNER OF PROPOSED BUILDING**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
46.26	0	BULK-1 0-3				ML		FILL: SILT (ML) - pale brown, dry, firm, sand is fine to medium, low plasticity, roots			
						SM		SILTY SAND (SM) - dark greenish gray, dry to damp, very loose, fine to medium grain with occasional coarse, poorly graded, no to low plasticity, scattered white mineralization, faint petroleum-like odor			
41.26	5	SPT-1		2 2 2	0.6				13		
						SC		ALLUVIUM (?): CLAYEY SAND (SC) - dark olive gray, damp, loose, fine, poorly graded, low plasticity, predominantly massively bedded with some scattered faint laminations, faint petroleum-like odor			
36.26	10	R-1		5 5 9	0.3				9	93	
						SC		Becomes black, rare roots and root hairs, varying fine content, massively bedded			
31.26	15	SPT-2		3 2 4	54				17		
26.26	20	R-2		8 12 16	4.2	SC		Becomes very dark gray, massively bedded, sand content increases	12	121	
						SM		SILTY SAND (SM) - dark grayish brown, damp, fine to medium grain with occasional coarse, poorly graded, no to low plasticity, trace clays, massively bedded, slight petroleum-like odor			
21.26	25										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-6

Sheet 2 of 2

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
21.26	25	SPT-3		4 6 6	1.7	SM			14		
						SM		LAKEWOOD FORMATION (?): SILTY SAND (SM) - dark olive brown, damp, fine to medium with occational coarse grain, poorly graded, predominantly massively bedded with scattered faint laminations, varying fine content			
16.26	30	R-3		8 15 17	0.8				14	119	
						SP		SAND (SP) - olive brown mottled with gray and orange, dry to damp, fine, poorly graded, fine beach sand			
11.26	35	SPT-4		10 14 20	5.2				4		
6.26	40	R-4		12 32 46	0.6	SP		Some laminar beds, no odor	8	97	
						ML		CLAYEY SILT (ML) (MUDSTONE) - olive gray mottled with orange, damp, firm to hard, low plasticity, laminar			
1.26	45	SPT-5		15 32 34	1.6	SP		SAND (SP) - gray mottled with orange, damp to moist, very dense, fine, poorly graded, massively bedded, weakly cemented, no odor	18		
						SP		Becomes dark greenish gray mottled with orange and olive			
-3.74	50	R-5		6 16 50-5"	0.3			TOTAL DEPTH DRILLED = 50 FEET TOTAL DEPTH SAMPLED = 51.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT 10/07/19	19	111	
-8.74	55										
-13.74	60										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH** Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA** Project Number: **PWAS_20190823B**	Log of Boring CKG-7 **Sheet 1 of 1**

Date(s) Drilled **10-07-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **25 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **70.11 FEET AMSL**
Groundwater Level and Date Measured **NOT ENCOUNTERED**	Sampling Method(s) **Bulk, California, Modified California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **NORTHERN PORTION OF SITE**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
70.11	0	BULK-1 0-3				SM		FILL: SILTY SAND (SM) - grayish brown, dry, fine to medium, poorly graded, roots, no odor			
65.11	5	R-1		8 14 16	0.1	SM		Increase in gravels up to 3-inch diameter	13	93	
		CKG-7-7.5		8 13 21		SC		CLAYEY SAND (SC) - dark yellowish brown, dry to damp, medium dense, fine, poorly graded, sand and fine content varies, some areas have low plasticity			
60.11	10	SPT-1		6 7 12	0.3				12		
						CL		SANDY CLAY (CL) - dark brown and dark yellowish brown, dry to damp, very stiff, sand is fine, low plasticity, 1-inch gravels			
55.11	15	R-2		9 11 12	0.3				15	108	
		CKG-7-17.5		6 9 16		SC		CLAYEY SAND (SC) - dark brown and dark yellowish brown, dry to damp, medium dense, fine, low plasticity, scattered asphalt pieces			
50.11	20	SPT-2		6 12 12	0.3				15		
						CL		SANDY CLAY (CL) - very dark grayish brown, dry to damp, very stiff, sand is fine, low plasticity, clasts of sand and silty material			
45.11	25							TOTAL DEPTH DRILLED = 25 FEET			

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-8
Sheet 1 of 1

Date(s) Drilled **10-7-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **20 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **63.67 FEET AMSL**
Groundwater Level and Date Measured **NOT ENCOUNTERED**	Sampling Method(s) **Bulk, California, Modified California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **NORTHWEST PORTION OF THE SITE**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
63.67	0	BULK-1 0-3				SC		FILL: CLAYEY SAND (SC) - very dark greyish brown, dry, very fine to fine, poorly graded, low plasticity, scattered gravel, no odor			
						CL		SANDY CLAY (CL) - dark yellowish brown, dry, sand is fine, low plasticity, scattered gravels, some silt			
58.67	5	SPT-1		4 8 10	0.0				12		
		CKG-8-6.5		8 7 15							
						SC		CLAYEY SAND (SC) - very dark grayish brown, dry to damp, sand is fine, low plasticity, some silt, clay, and gravel			
53.67	10	R-1			0.1				15	111	
		CKG-8-11.5		7 8 12							
						CL		SANDY CLAY (CL) - very gark grayish brown with gray and yellow, damp, sand is fine, low to medium plasticity			
48.67	15	SPT-2		4 7 11	0.1				37		
						SM		SILTY SAND (SM) - dark gray, damp, fine, poorly graded, common gravel, peices of tile, petroleum-like odor			
43.67	20	R-2		20 38 39	1.1			TOTAL DEPTH DRILLED = 20 FEET TOTAL DEPTH SAMPLED = 21.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT 10/07/19	6	114	
38.67	25										

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-9

Sheet 1 of 1

Date(s) Drilled **10-07-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **20 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **64.89 FEET AMSL**
Groundwater Level and Date Measured **NOT ENCOUNTERED**	Sampling Method(s) **Bulk, California, Modified California, SPT**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **NORTEASTERN PORTION OF SITE**	

Elevation (feet)	Depth (feet)	Sample Number	Sample Type	Sampling Resistance, blows/ft	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
64.89	0	BULK-1 0-3				CL		FILL: SILTY CLAY (CL) - dark brown, dry, sand is fine, low plasticity, roots			
59.89	5	R-1		13 13 15	0.0	SM		SILTY SAND (SM) - light yellowish brown, dry, medium dense, fine, poorly graded, no to low plasticity, scattered gravel	4	91	
		CKG-9-6.5		8 10 14							
54.89	10	R-2		50-6	0.1	CL		SANDY CLAY (CL) - dark grayish brown with pale yellow and gray, damp, hard, sand is fine, low plasticity, gravels	12	105	
						SC		CLAYEY SAND (SC) - dark reddish brown, damp, loose to medium dense, fine, poorly graded, low plasticity, scattered gravels			
49.89	15	SPT-1		2 2 4	0.2				12		
		CKG-9-16.5		4 6 8							
44.89	20	SPT-2		4 4 8	19.0	CL		SUMP MATERIAL: SANDY CLAY (CL) - black, damp, stiff, sand is fine, low plasticity, oily residue/staining, strong petroleum like odor	14		
39.89	25							TOTAL DEPTH DRILLED = 20 FEET TOTAL DEPTH SAMPLED = 21.5 FEET NO GROUNDWATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT 10/07/19			

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CK Geotech - Shallow, HSA, No rec, el, sample, blows, pid, moist, weight.tpl]

terraphase engineering

Project: **INSITE, LONG BEACH** Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA** Project Number: **PWAS_20190823B**	Log of Boring CKG-10 **Sheet 1 of 3**

Date(s) Drilled **10-8-19**	Logged By **DANIEL PHELPS**	Checked By **ANDREW HILLSTRAND**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **8" HOLLOW STEM AUGER**	Total Depth of Borehole **75 FEET BGS**
Drill Rig Type **CME 85**	Drilling Contractor **ABC LIOVIN**	Approximate Surface Elevation **41.61 FEET AMSL**
Groundwater Level and Date Measured **45.51 FEET BGS ATD ON 10-08-19**	Sampling Method(s) **Bulk, California, CME**	Hammer Data **140 LB AUTO, 30" DROP**
Borehole Backfill **NEAT CEMENT 5% BENTONITE GROUT**	Location **CO-LOCATED WITH CPT-7**	

Elevation (feet)	Depth (feet)	Sample Number	Sampling Resistance, blows/ft	Sample Type	Recovered (in) /	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
41.61	0	BULK-1 0-3				0.1	SM-SC		TOP SOIL/ALLUVIUM: SILTY SAND - CLAYEY SAND (SM-SC) - light brown, dry, fine, poorly graded, some clayey layers with low plasticity, roots, no odor			
36.61	5				30/60	0.1	SM-SC		ALLUVIUM: SILTY SAND - CLAYEY SAND (SM-SC) - dark brown mottled with gray, dry, fine, poorly graded, some clay, low plasticity, roots, no odor			
31.61	10		8 10 16		18/18	0.1	SM-SC		Becomes damp, medium dense			
26.61	15				0/42 30/30	0.1	SM-SC		LAKEWOOD FORMATION: SILTY SAND - CLAYEY SAND (SM-SC) - yellowish brown mottled with dark brown and gray, dry to damp, fine, poorly graded, fine and sand content varies, some clay. low plasticity			
21.61	20				30/30		SM-SC		Becomes mottled with white and gray, dense, increased white mineralization			

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Log of Boring CKG-10

Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Number	Sampling Resistance, blows/ft	Sample Type	Recovered (in) /	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
21.61	20		19 30 46		18/18 12/12 30/30	0.1	SM-SC		Becomes mottled with white and gray, dense, increased white mineralization			
16.61	25		19 30 46		18/18 12/12 30/30	0.1	ML SP		CLAYEY SILT (ML) (MUDSTONE) - yellowish brown mottled with gray and orange with trace white mineral stringers, damp, very stiff, trace fine sand, low plasticity, clay content varies, laminar, some moderately indurated pieces SAND (SP) - yellowish brown mottled with gray and orange, moist, fine to medium, poorly graded, massively bedded with scattered faint laminar beds			
11.61	30		18 24 24		18/18 12/12 30/30	0.1	SM SP		SILTY SAND (SM) - greenish black, moist, dense, fine, poorly graded, laminar, weakly cemented, micaceous SAND (SP) - dark greenish gray, mottled with orange and brown, damp, medium dense, fine to medium, poorly graded, massive with occasional beds, weakly cemented			
6.61	35				30/30 30/30	0.1 0.1	SP SP		Increase in mottled orange and brown coloration between 35-36 feet bgs 4-inch thick stringer of black silty sand			
1.61	40		15 16 14		18/18 12/12 30/30	0.1	CL CL SC		SILTY CLAY (CL) - yellowish brown mottled with gray and dark brown, damp, very stiff, trace fine sand, medium plasticity, laminar Becomes fissile on bed planes, increase in sand content, 2-inch high flame structure at contact with CLAYEY SAND CLAYEY SAND (SC) - olive gray mottled with gray and dark brown, fine, poorly graded, low plasticity ▽			
-3.39	45				30/30	0.1	CL SM-SC		SANDY CLAY (CL) - olive gray mottled with gray and dark brown, damp, firm, sand is fine, low plasticity SAND (SP) - olive gray mottled with orange, damp, moist, fine, poorly graded, massively bedded, fine content decreases with depth			
-8.39	50		14 24 36		18/18 12/12 30/30	0.1	SP SP SP		Becomes wet, decreased fine content Becomes gray mottled with orange, fine, dense Fine content varies with alternating clayey and sandy layers			Add H2O down augers for heaving sands
-13.39	55											

R:\Projects\S050 - Carl Kim Geotechnical\002 - 3701 N. Pacific Place, Long Beach, CA\Technical\Boring Logs\InSITE LONG BEACH.bg4[CKGeotech - El, Sample, Blows, PID, Moist, weight.tp]

Project: **INSITE, LONG BEACH**

Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**

Project Number: **PWAS_20190823B**

Log of Boring CKG-10

Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Number	Sampling Resistance, blows/ft	Sample Type	Recovered (in) /	PID Reading, ppm	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
-13.39	55				30/30		SP		Fine content varies with alternating clayey and sandy layers			
					30/30		SP		Becomes olive brown, massively bedded			
-18.39	60		6 5 6		18/18	0.1	SP		Becomes loose			
					0/12							
					12/30		SC		CLAYEY SAND (SC) - dark yellowish brown mottled with orange, damp, relative increase in density, fine, poorly graded, areas of low plasticity, massive, sand and fine content varies			
-23.39	65				30/30							
					30/30							
-28.39	70				30/30	0.0						
							SP		SAND (SP) - olive brown, wet, medium, poorly graded, massive			
					26/30		ML		SILT - SANDY SILT (ML) - olive brown, wet, sand is very fine, non plastic, laminar			
							CL		SILTY CLAY (CL) (MUDSTONE) - light brownish gray mottled with orange and dark gray, dry to damp, firm, some fine sand, laminar.			
-33.39	75								DRILLED AND SAMPLED WITH CME SOIL CORING SYSTEM TOTAL DEPTH DRILLED = 75 FEET GROUNDWATER ENCOUNTERED AT 45.51 FEET BGS ATD BACKFILLED WITH NEAT CEMENT 10-08-19			
-38.39	80											
-43.39	85											
-48.39	90											

Project: **INSITE, LONG BEACH**
Project Location: **3701 N. PACIFIC PLACE, LONG BEACH, CA**
Project Number: **PWAS_20190823B**

Key to Log of Boring
Sheet 1 of 1

Elevation (feet) [1]	Depth (feet) [2]	Sample Number [3]	Sample Type [4]	Recovered (in) / Total (in) [5]	PID Reading, ppm [6]	USCS Symbol [7]	Graphic Log [8]	MATERIAL DESCRIPTION [9]	Water Content, % [10]	Dry Unit Weight, pcf [11]	REMARKS AND OTHER TESTS [12]

COLUMN DESCRIPTIONS

1 Elevation (feet): Elevation (MSL, feet).
2 Depth (feet): Depth in feet below the ground surface.
3 Sample Number: Sample identification number.
4 Sample Type: Type of soil sample collected at the depth interval shown.
5 Recovered (in) / Total (in): Inches of recovery / total inches of boring tubing.
6 PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
7 USCS Symbol: USCS symbol of the subsurface material.
8 Graphic Log: Graphic depiction of the subsurface material encountered.
9 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
10 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
11 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
12 REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS


Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)


SILTY CLAY (CL-ML)


Clayey SAND (SC)


Clayey SAND to Sandy CLAY (SC-CL)


Silty SAND (SM)


Poorly graded SAND (SP)


Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS


Bulk Sample


CME Sampler

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

SUMMARY

OF

CONE PENETRATION TEST DATA

Project:

Insite, Long Beach Storage
3701 N. Pacific Place
Long Beach, CA
October 1, 2 & 4, 2019

Prepared for:

Mr. Andy Hillstrand
Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
Office (650) 627-4410

Prepared by:

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

TABLE OF CONTENTS

SUMMARY

OF

CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the Insite, Long Beach Storage project located at 3701 N. Pacific Place in Long Beach, California. The work was performed by Kehoe Testing & Engineering (KTE) on October 1, 2 & 4, 2019. The scope of work was performed as directed by Carl Kim Geotechnical, Inc. personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at fifteen locations to determine the soil lithology. A summary is provided in **TABLE 2.1**.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
CPT-1	75	
CPT-2	75	
CPT-3	75	
CPT-4	75	
CPT-5	75	
CPT-6	75	
CPT-7	75	
CPT-8	50	
CPT-9	50	
CPT-10	50	
CPT-11	75	
CPT-12	75	
CPT-13	30	Refusal
CPT-14	39	Refusal
CPT-15	41	Refusal

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm^2 cone and recorded the following parameters at approximately 2.5 cm depth intervals:

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

At location CPT-11, shear wave measurements were obtained at approximately 5-foot intervals. The shear wave is generated using an air-actuated hammer, which is located inside the front jack of the CPT rig. The cone has a triaxial geophone, which recorded the shear wave signal generated by the air hammer.

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for up to 2 years for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

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

The CPT data files have also been provided. These files can be imported in CPeT-IT (software by GeoLogismiki) and other programs to calculate various geotechnical parameters.

It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and u. In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

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

Sincerely,

KEHOE TESTING & ENGINEERING

Steven P. Kehoe
President

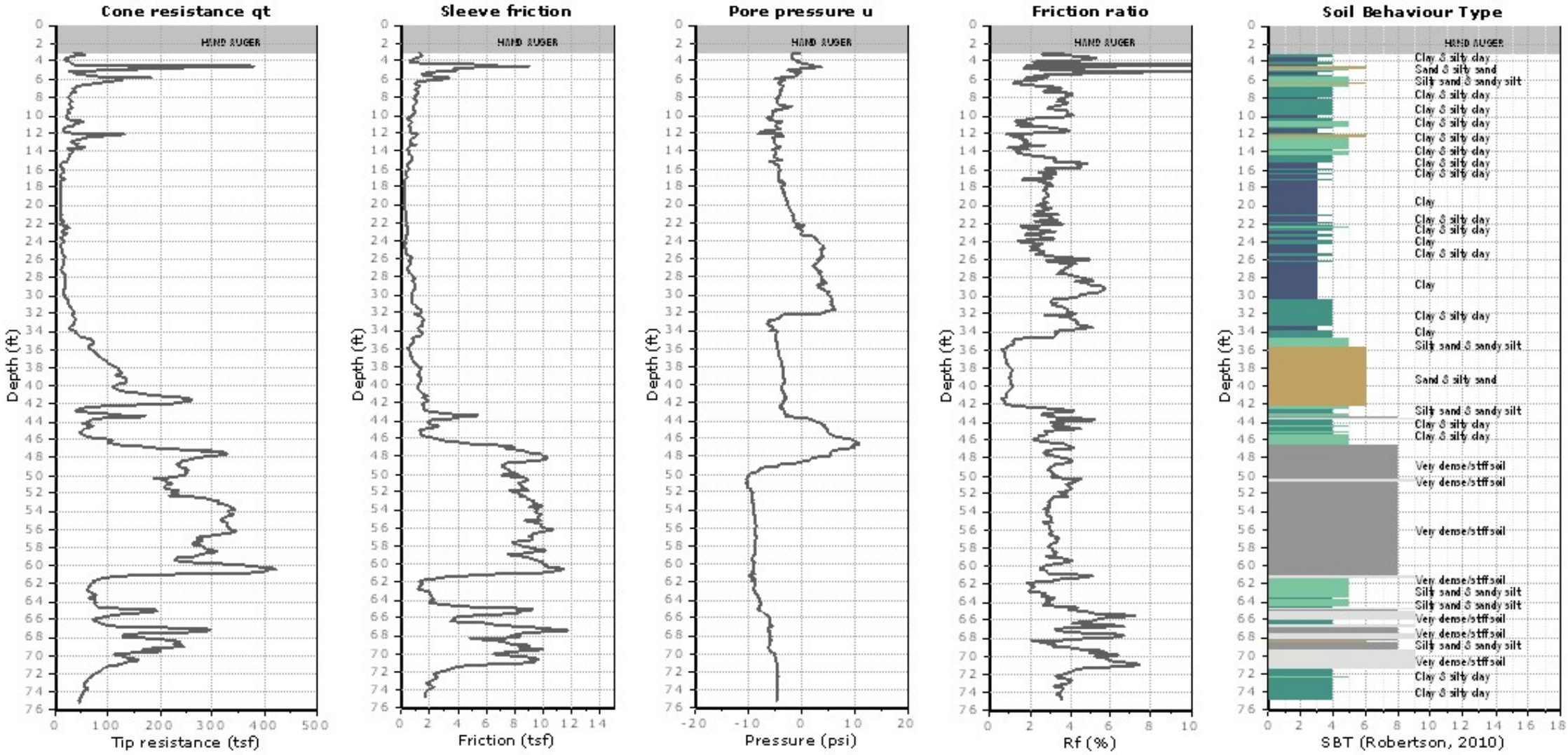
10/09/19-mc-1000

APPENDIX

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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

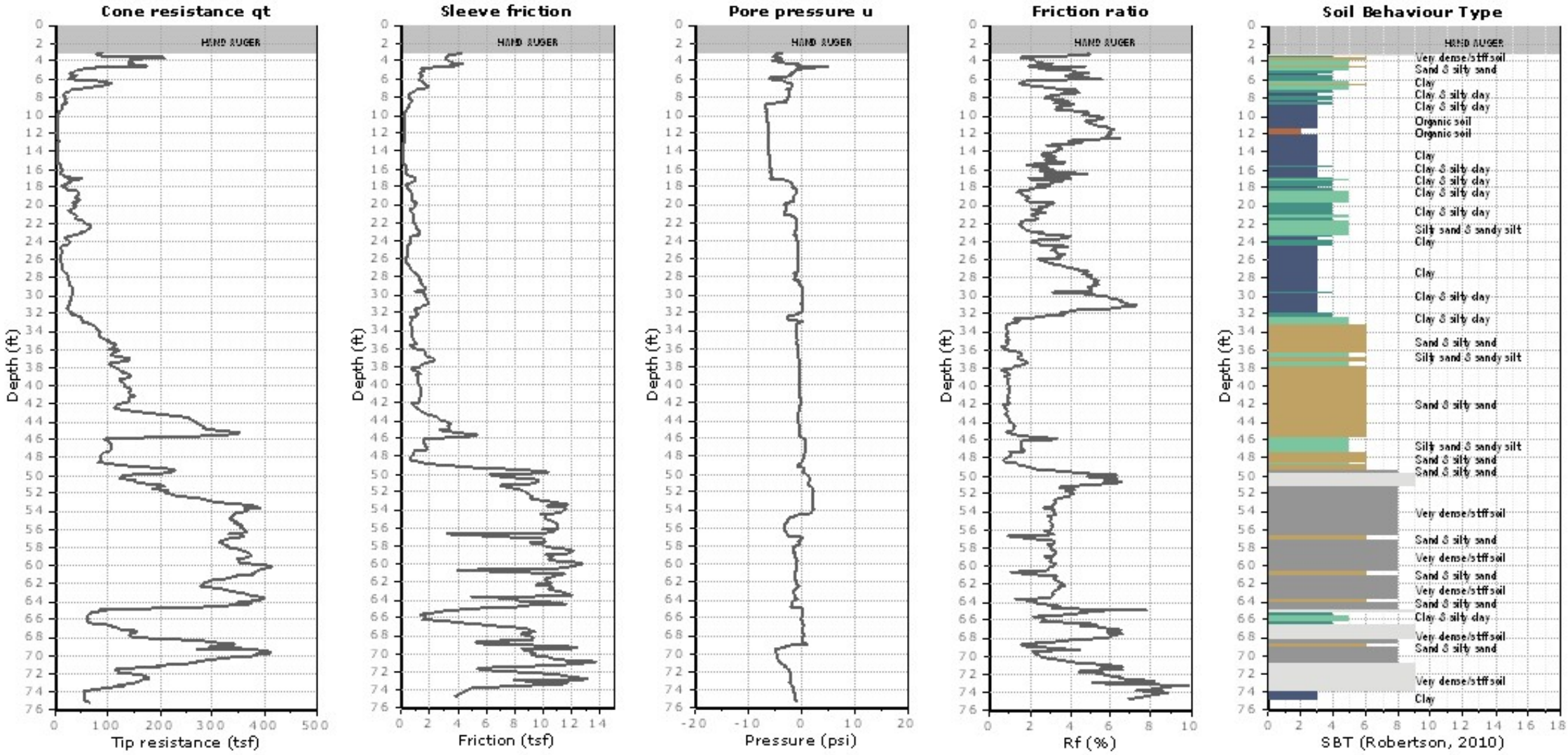
CPT-1
Total depth: 75.26 ft, Date: 10/1/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

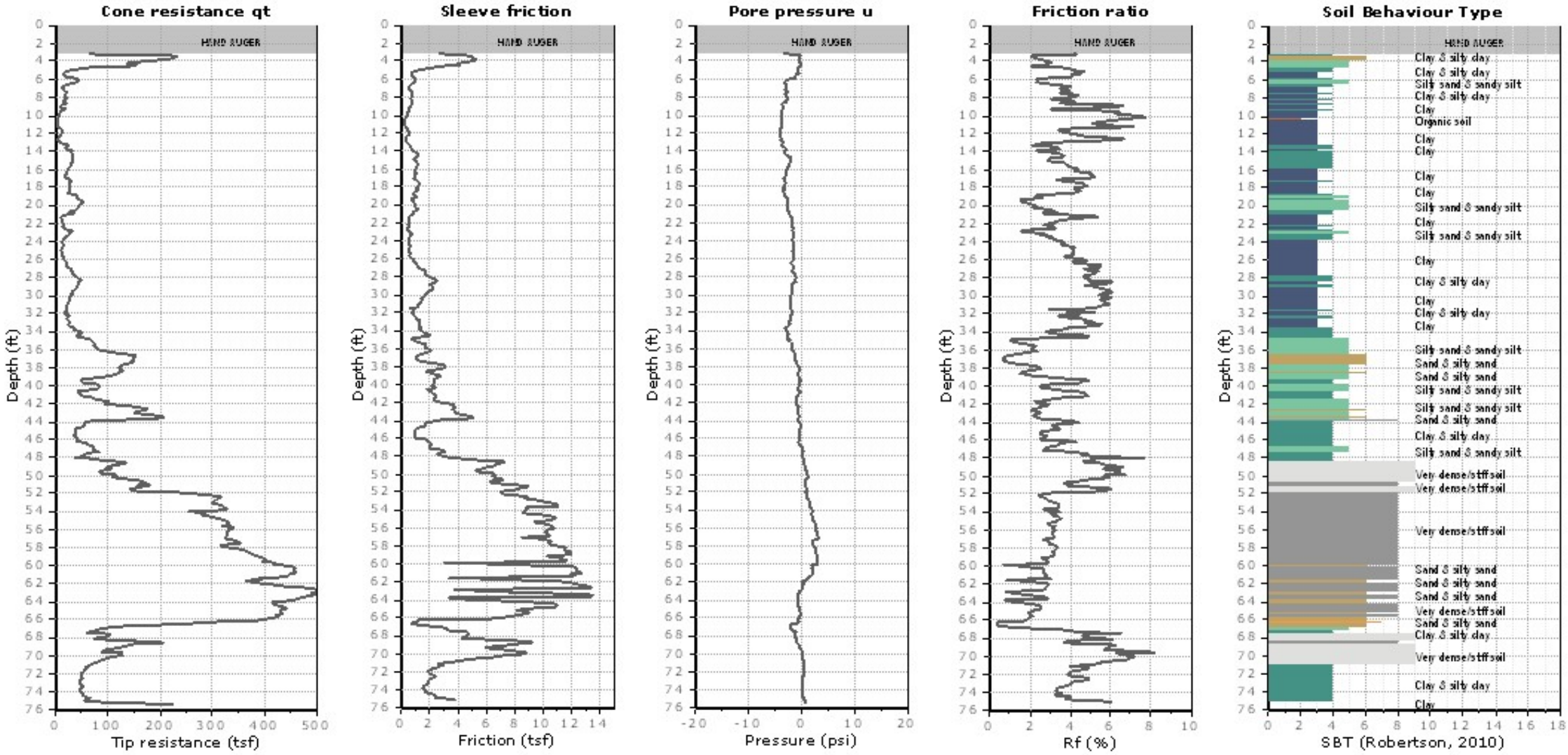
CPT-2
Total depth: 75.20 ft, Date: 10/1/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

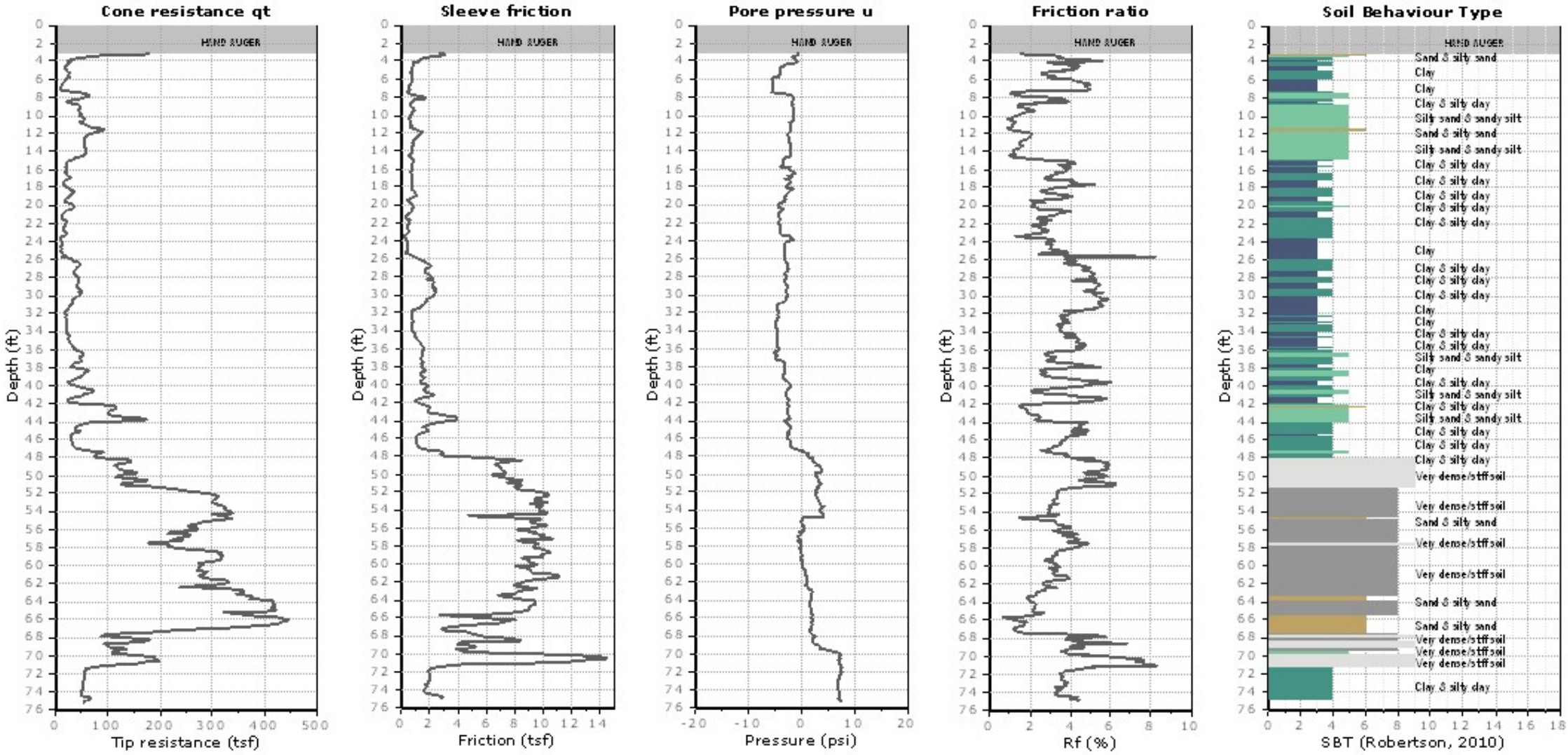
CPT-3
Total depth: 75.48 ft, Date: 10/1/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

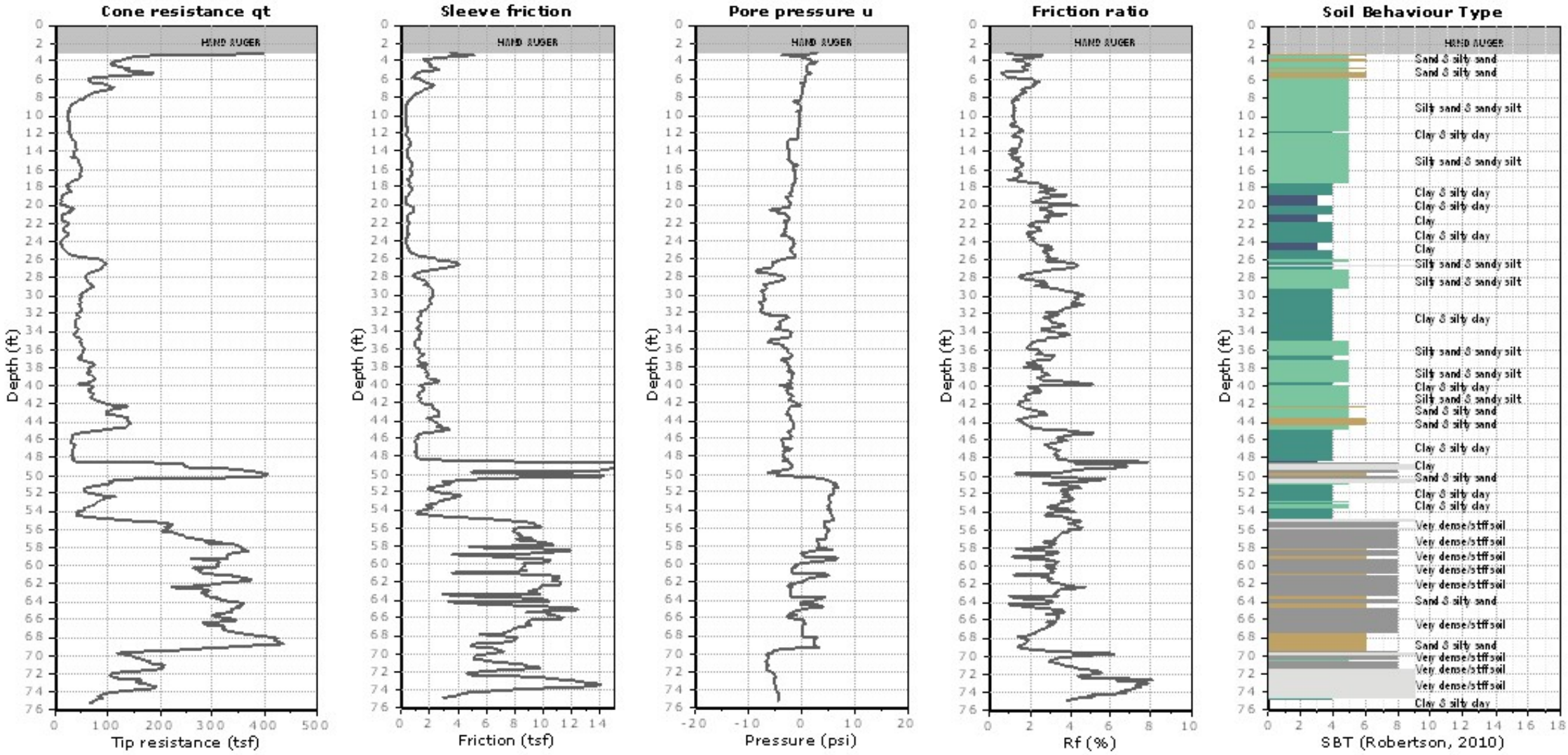
CPT-4
Total depth: 75.27 ft, Date: 10/1/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

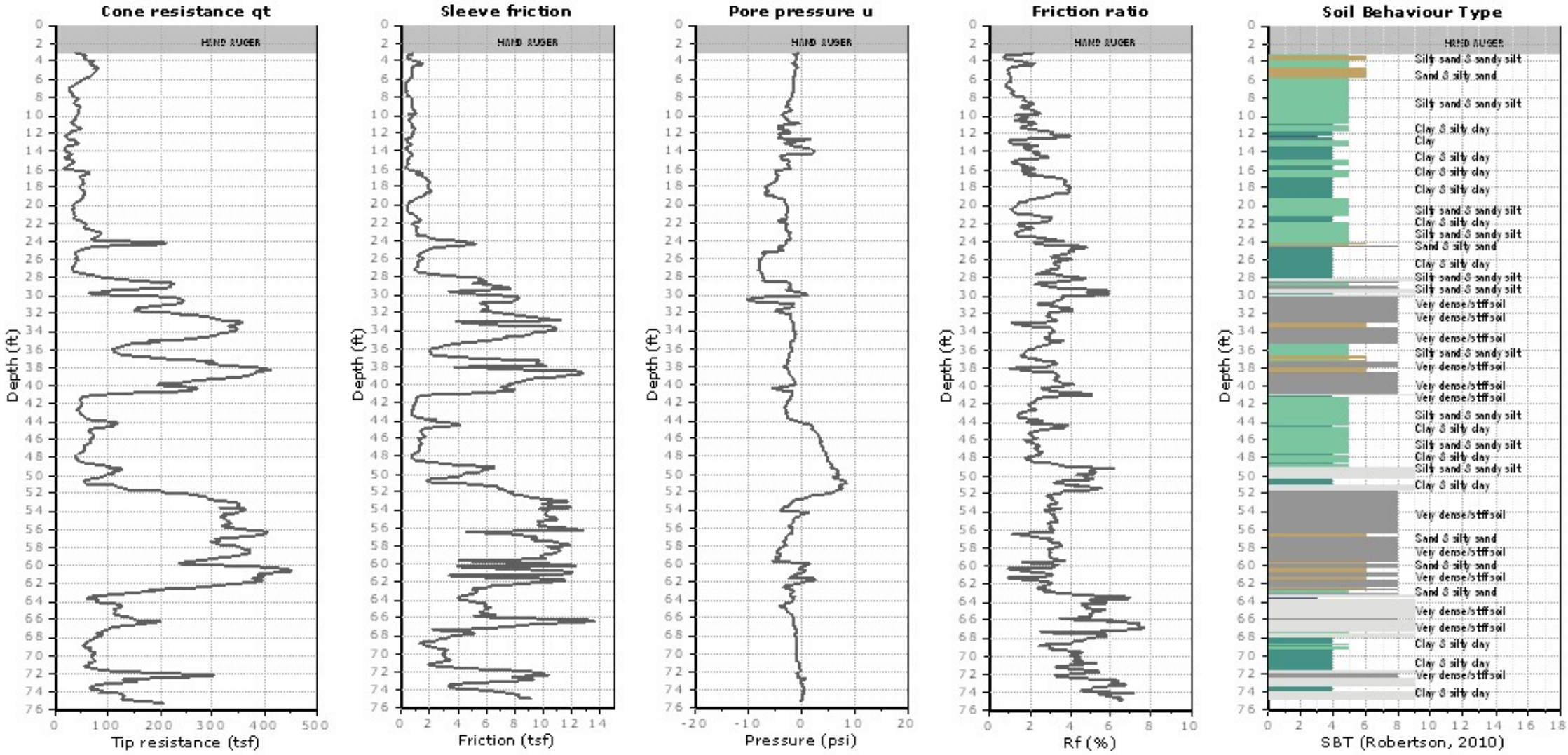
CPT-5
Total depth: 75.27 ft, Date: 10/1/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

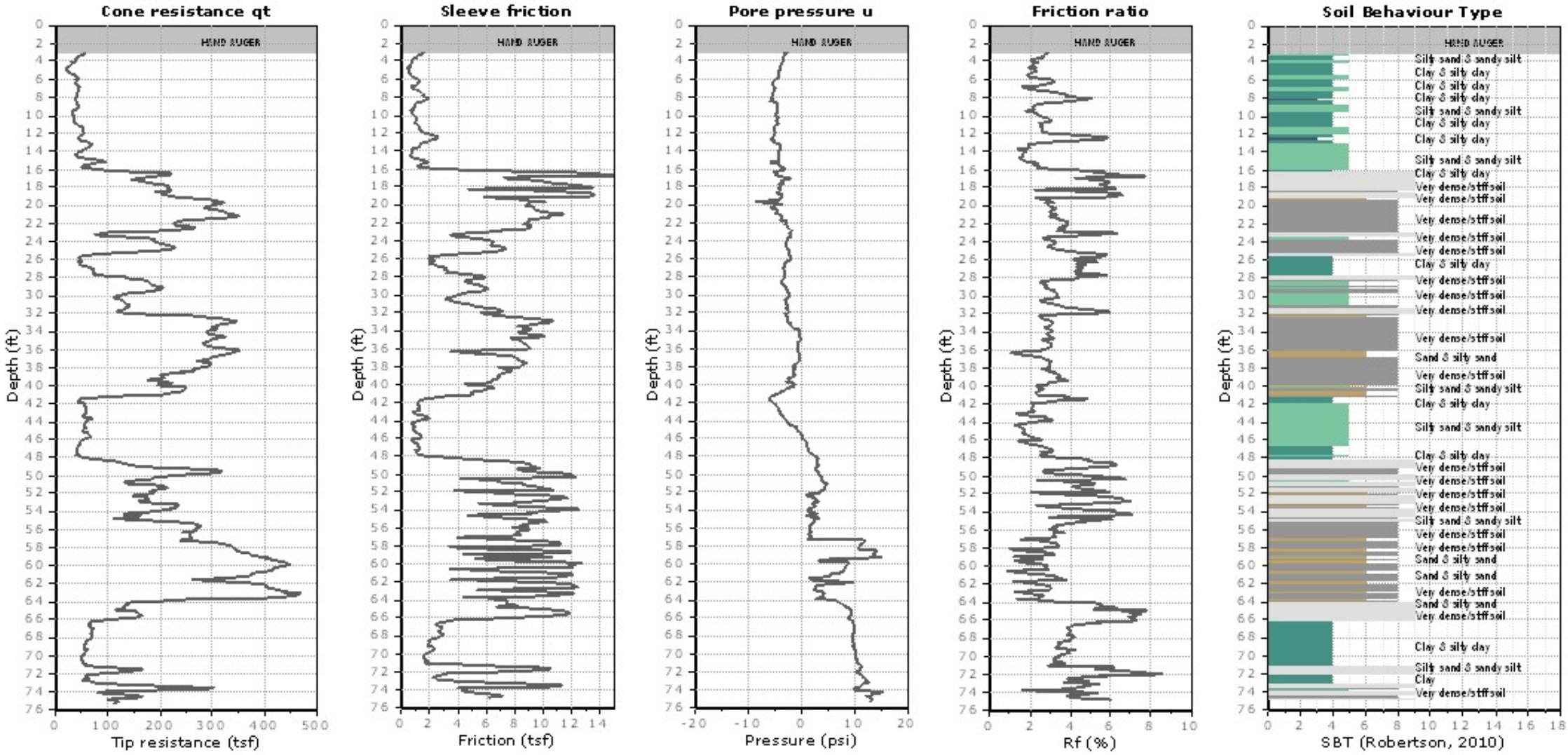
CPT-6
Total depth: 75.34 ft, Date: 10/2/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

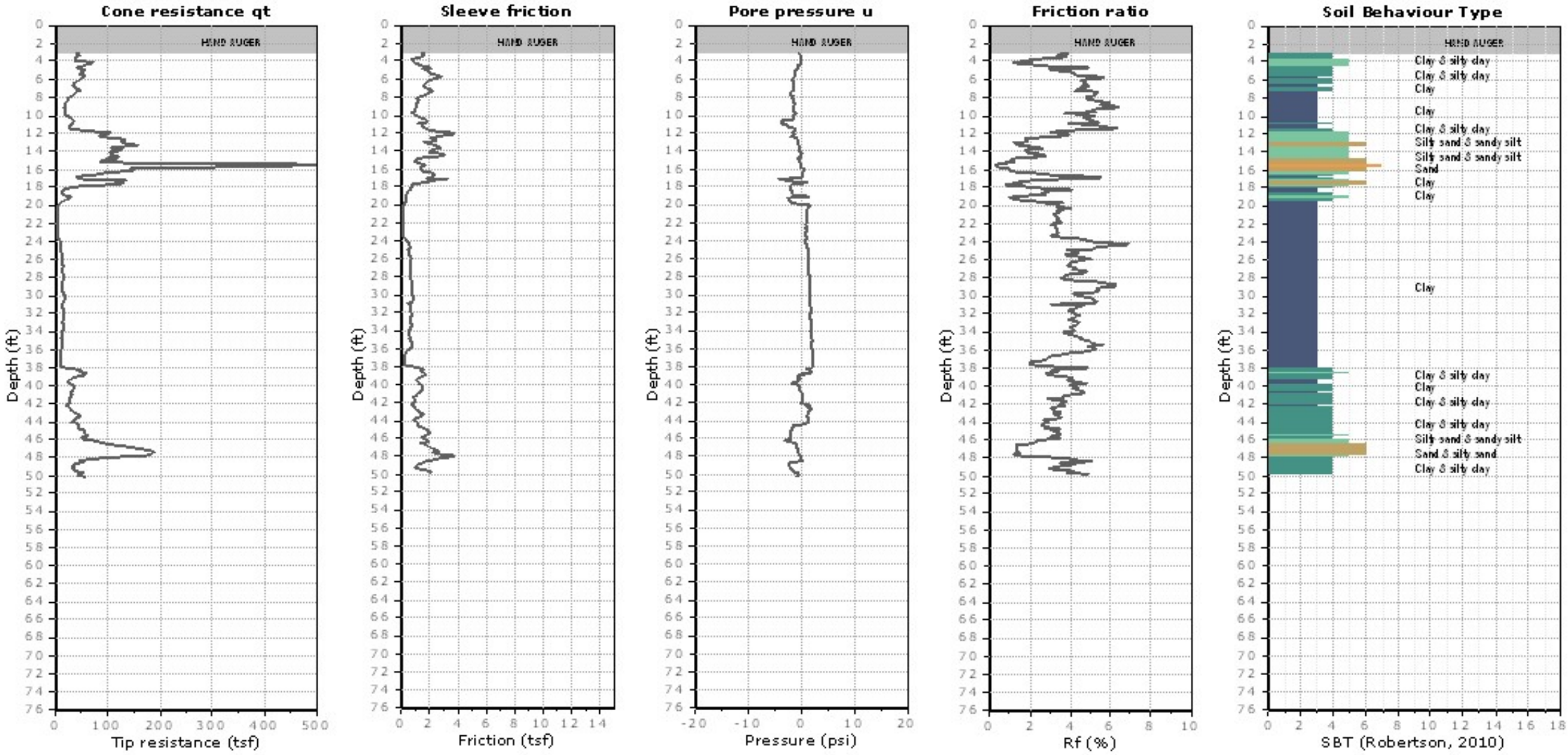
CPT-7
Total depth: 75.20 ft, Date: 10/2/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

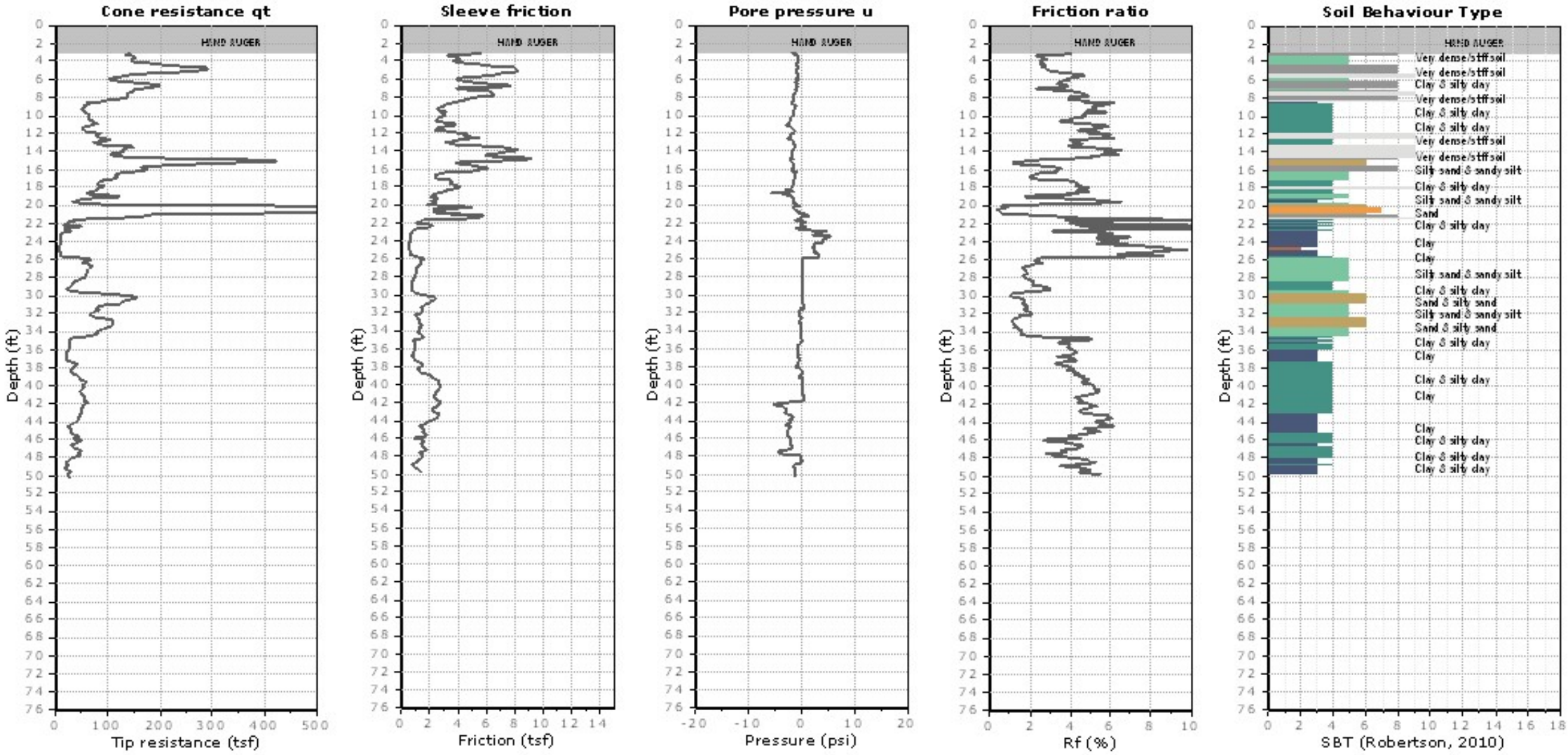
CPT-8
Total depth: 50.21 ft, Date: 10/2/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

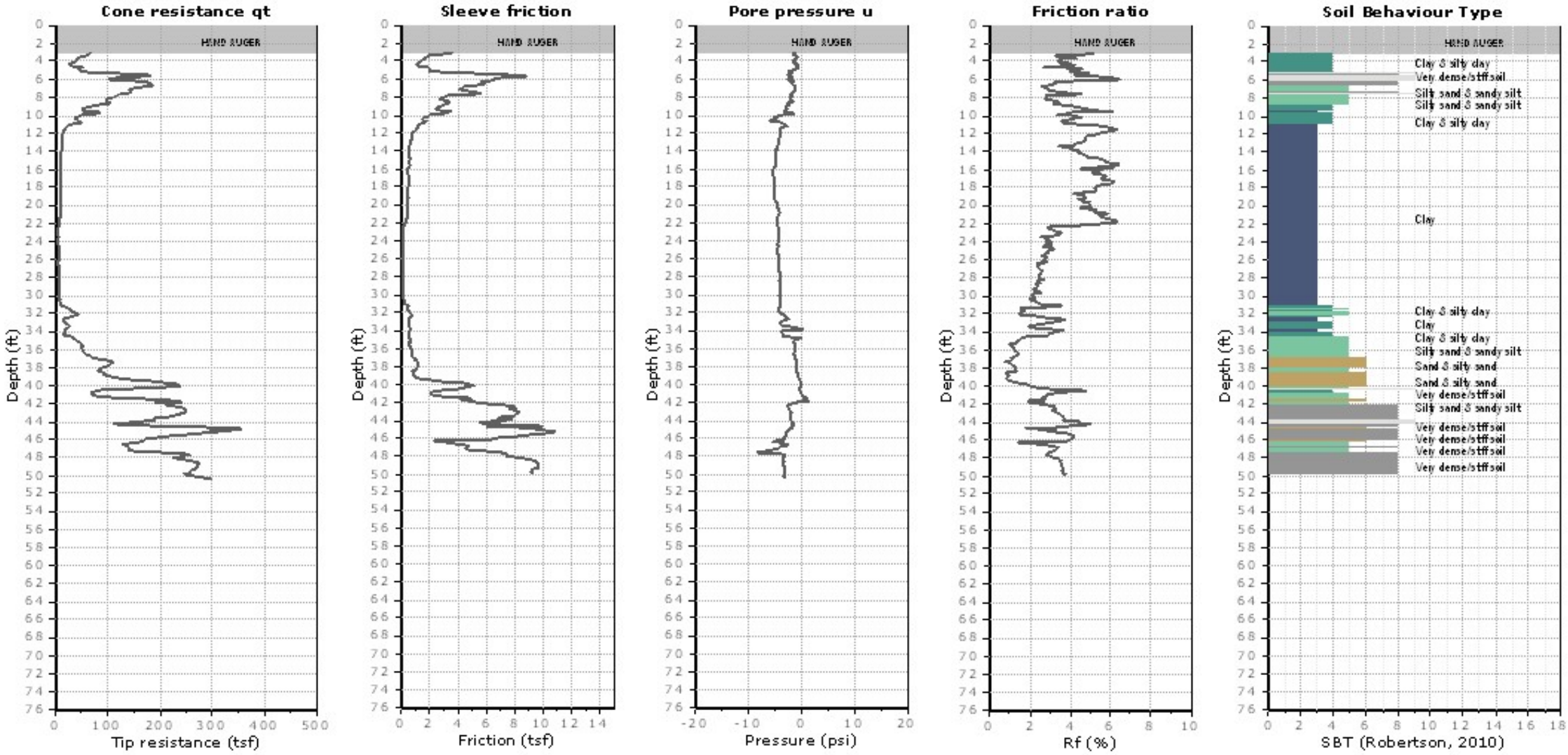
CPT-9
Total depth: 50.22 ft, Date: 10/2/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

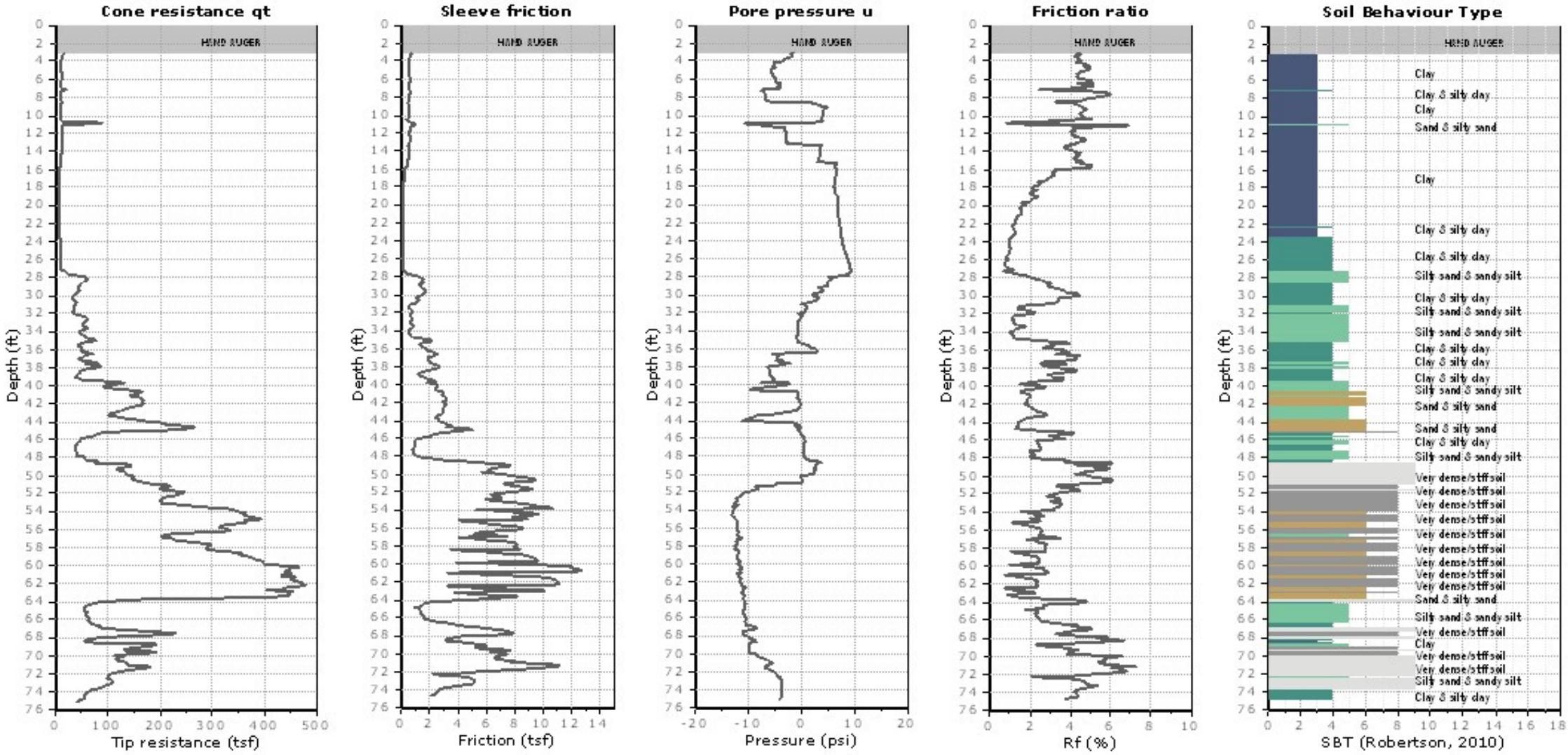
CPT-10
Total depth: 50.36 ft, Date: 10/2/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

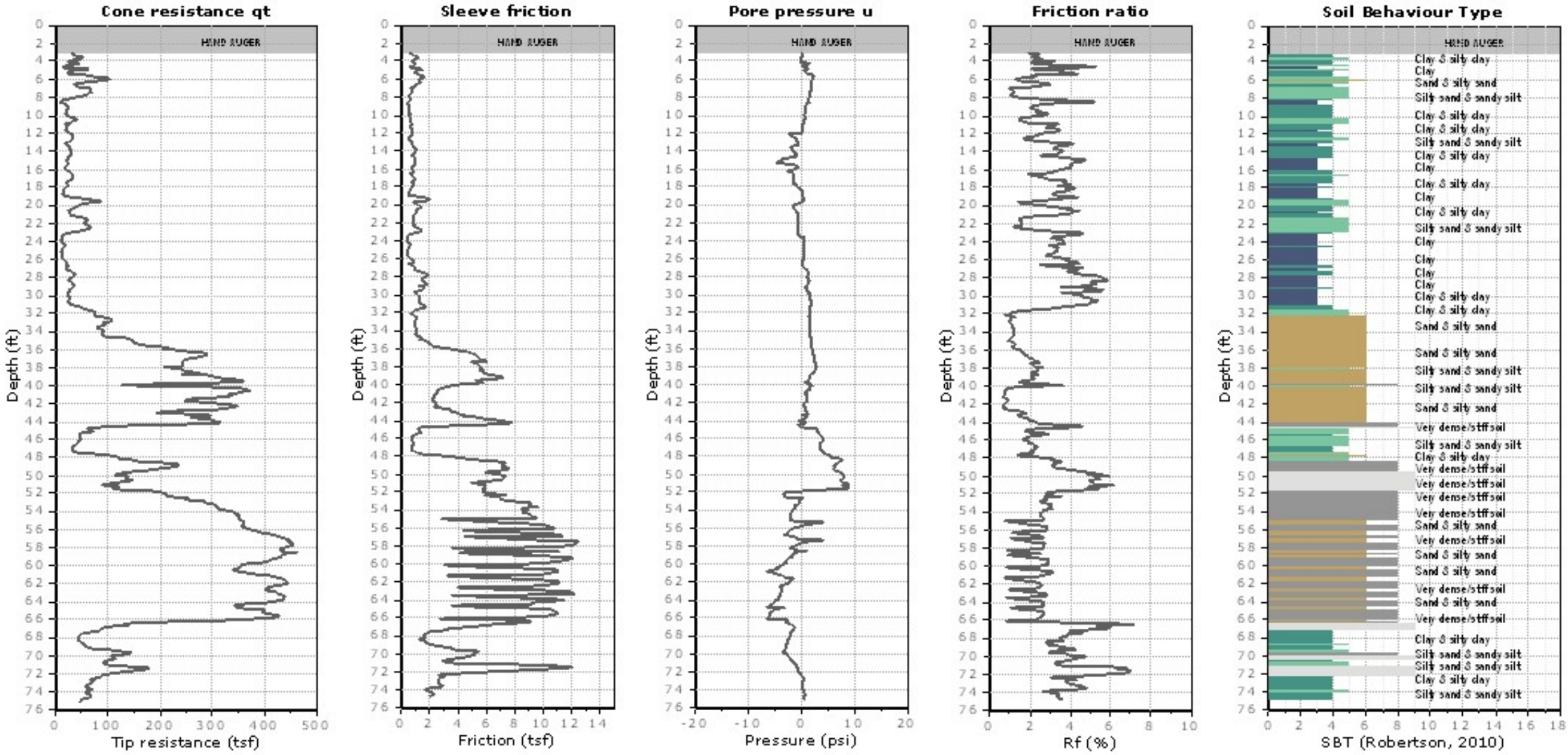
CPT-11
Total depth: 75.15 ft, Date: 10/4/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

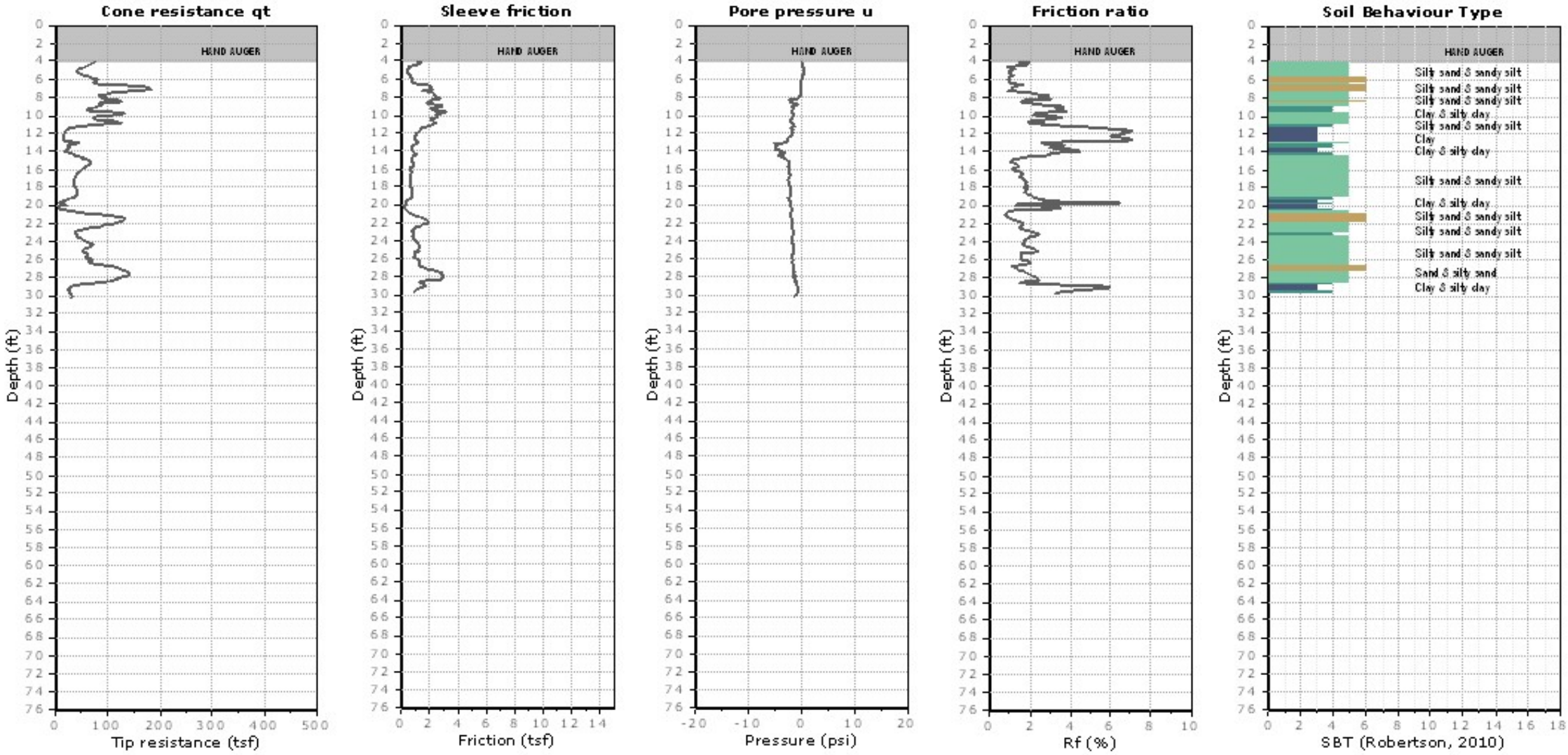
CPT-12
Total depth: 75.15 ft, Date: 10/4/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

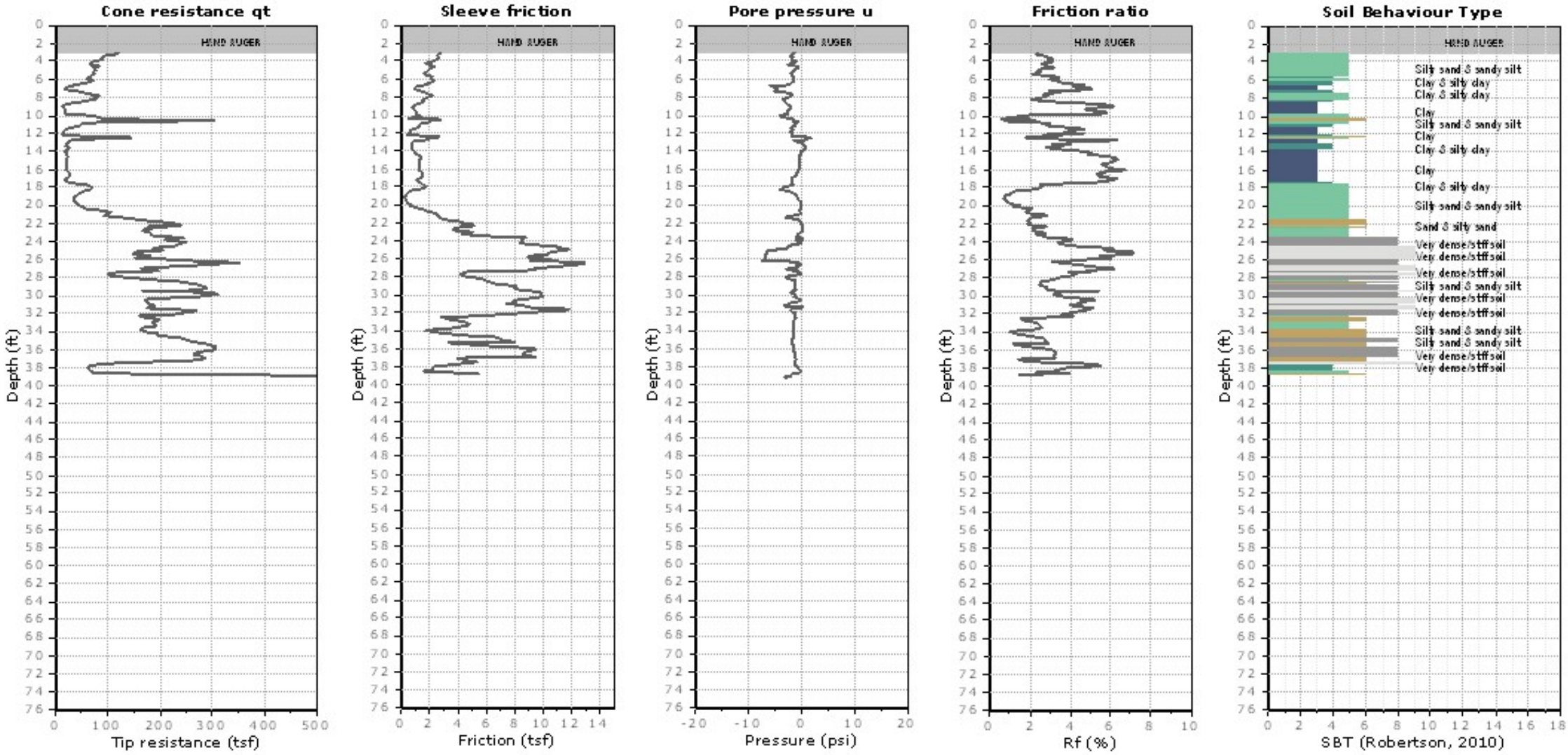
CPT-13
Total depth: 30.12 ft, Date: 10/4/2019



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

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

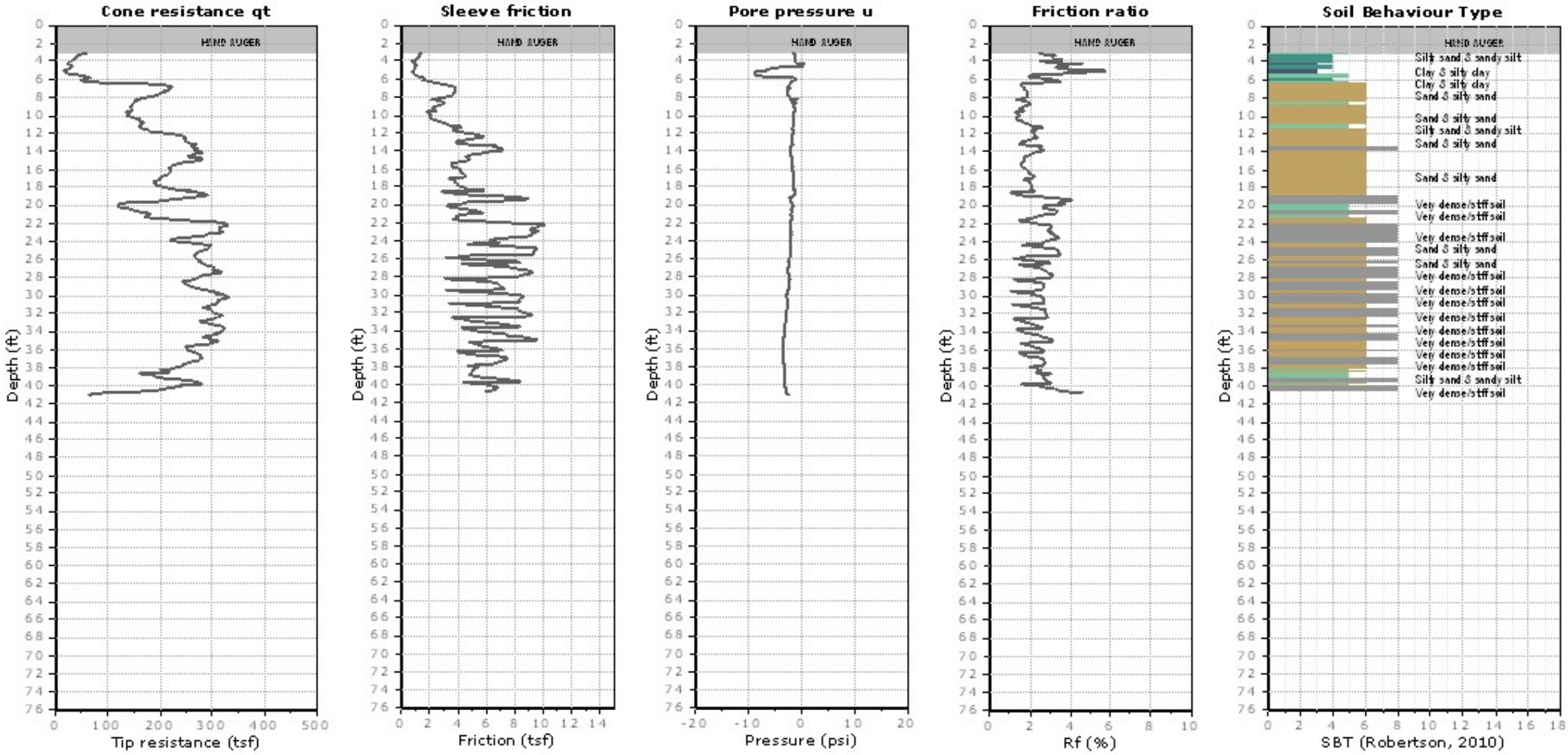
CPT-14
Total depth: 39.25 ft, Date: 10/4/2019



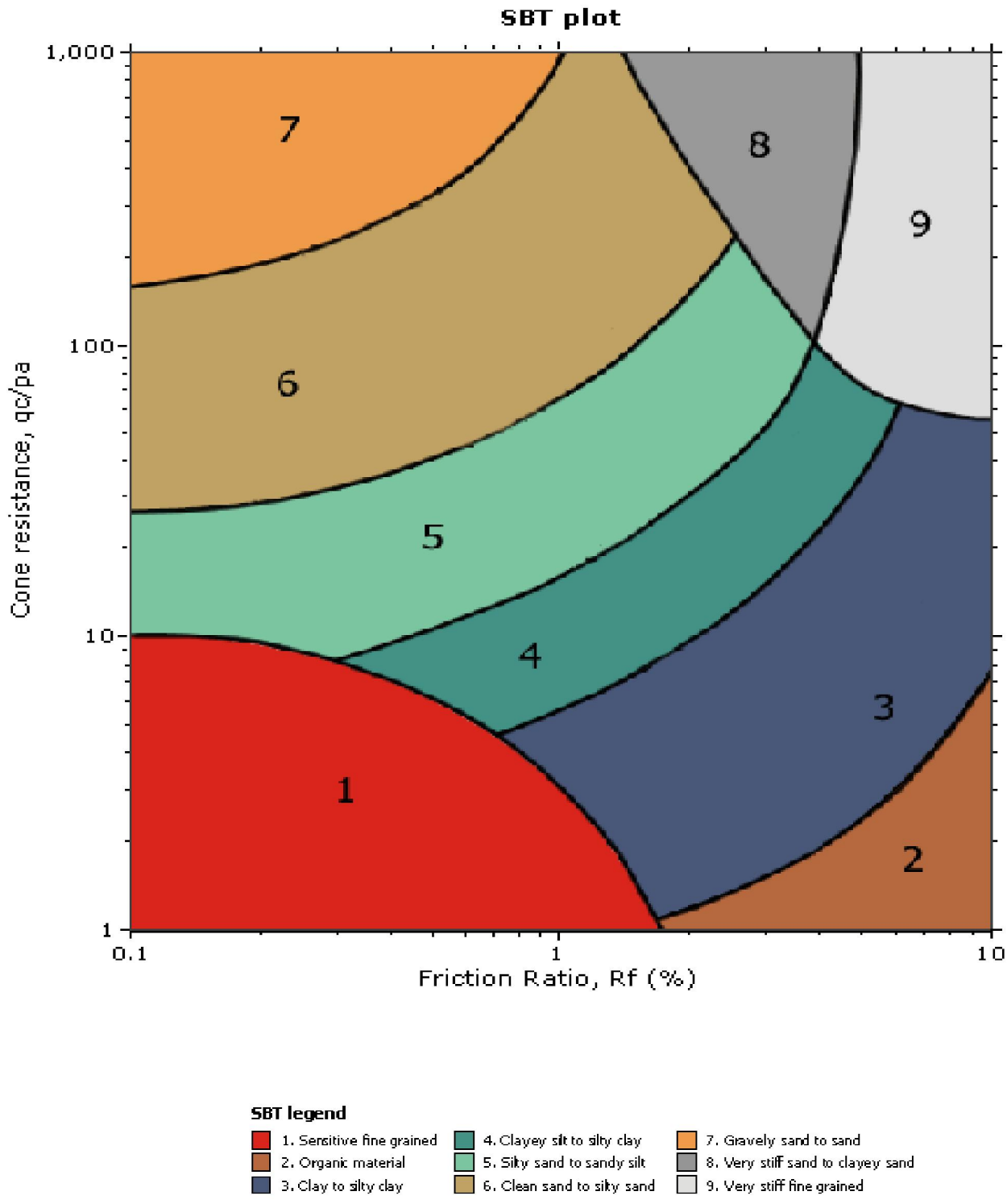
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: **Carl Kim Geotechnical / InSite, Long Beach Storage**
Location: **Long Beach, CA**

CPT-15
Total depth: 41.08 ft, Date: 10/4/2019



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



Carl Kim Geotechnical
InSite, Long Beach Storage
Long Beach, CA

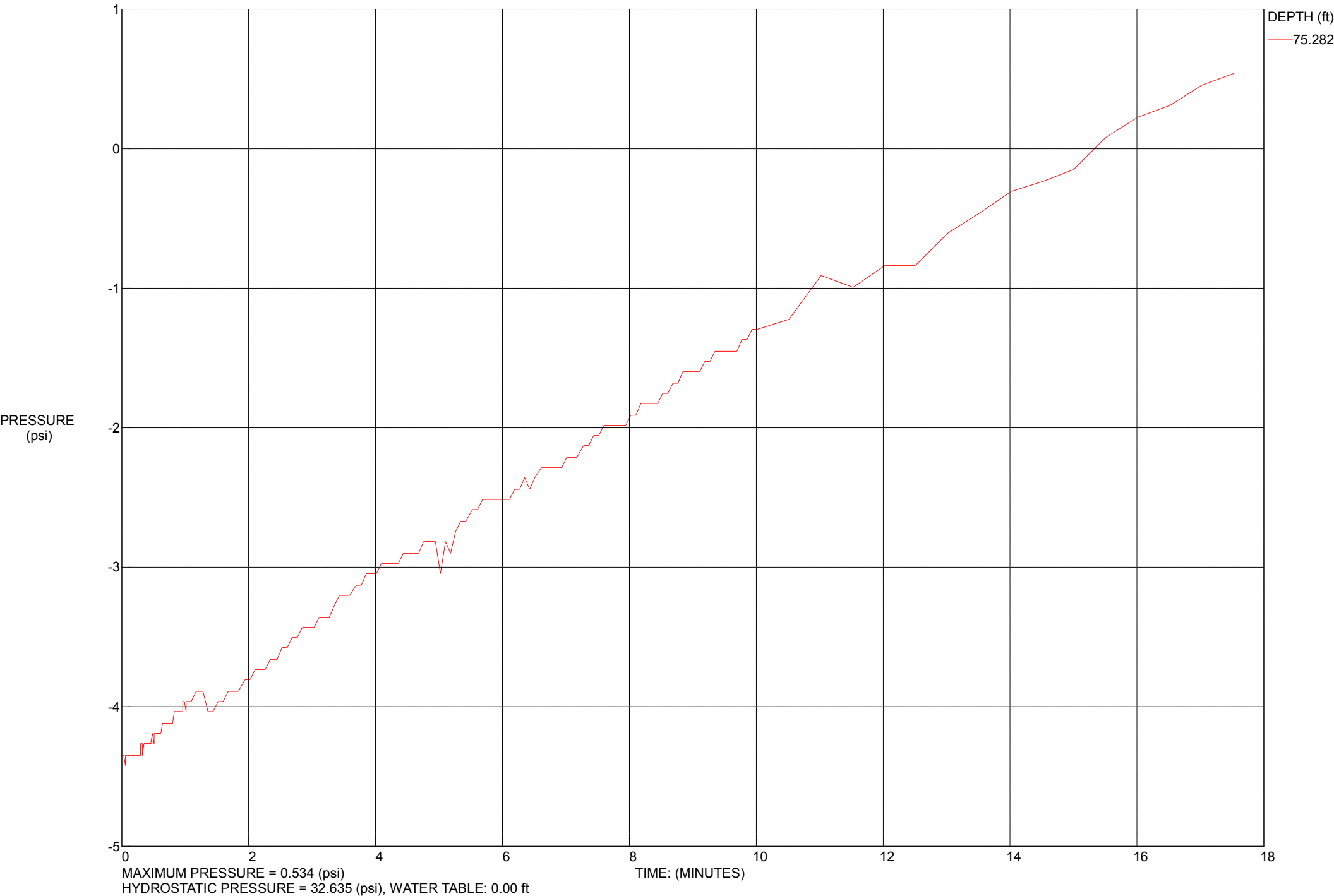
CPT Shear Wave Measurements

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)
CPT-11	5.09	4.09	5.72	10.92	523.89	
	10.04	9.04	9.89	17.44	566.82	638.74
	15.09	14.09	14.65	25.48	574.83	592.21
	20.11	19.11	19.52	33.48	583.16	609.67
	25.00	24.00	24.33	39.60	614.42	785.44
	30.02	29.02	29.29	45.28	646.96	873.82
	35.01	34.01	34.24	52.44	653.02	691.35
	40.06	39.06	39.26	59.52	659.68	709.02
	45.08	44.08	44.26	65.32	677.60	861.52
	50.03	49.03	49.19	70.64	696.39	927.03
	54.99	53.99	54.14	75.60	716.11	996.99
	60.01	59.01	59.15	79.24	746.41	1375.67
	65.06	64.06	64.18	82.64	776.68	1482.16
	70.05	69.05	69.17	86.52	799.42	1283.76
	75.16	74.16	74.27	89.38	830.92	1783.93

Shear Wave Source Offset - 4 ft

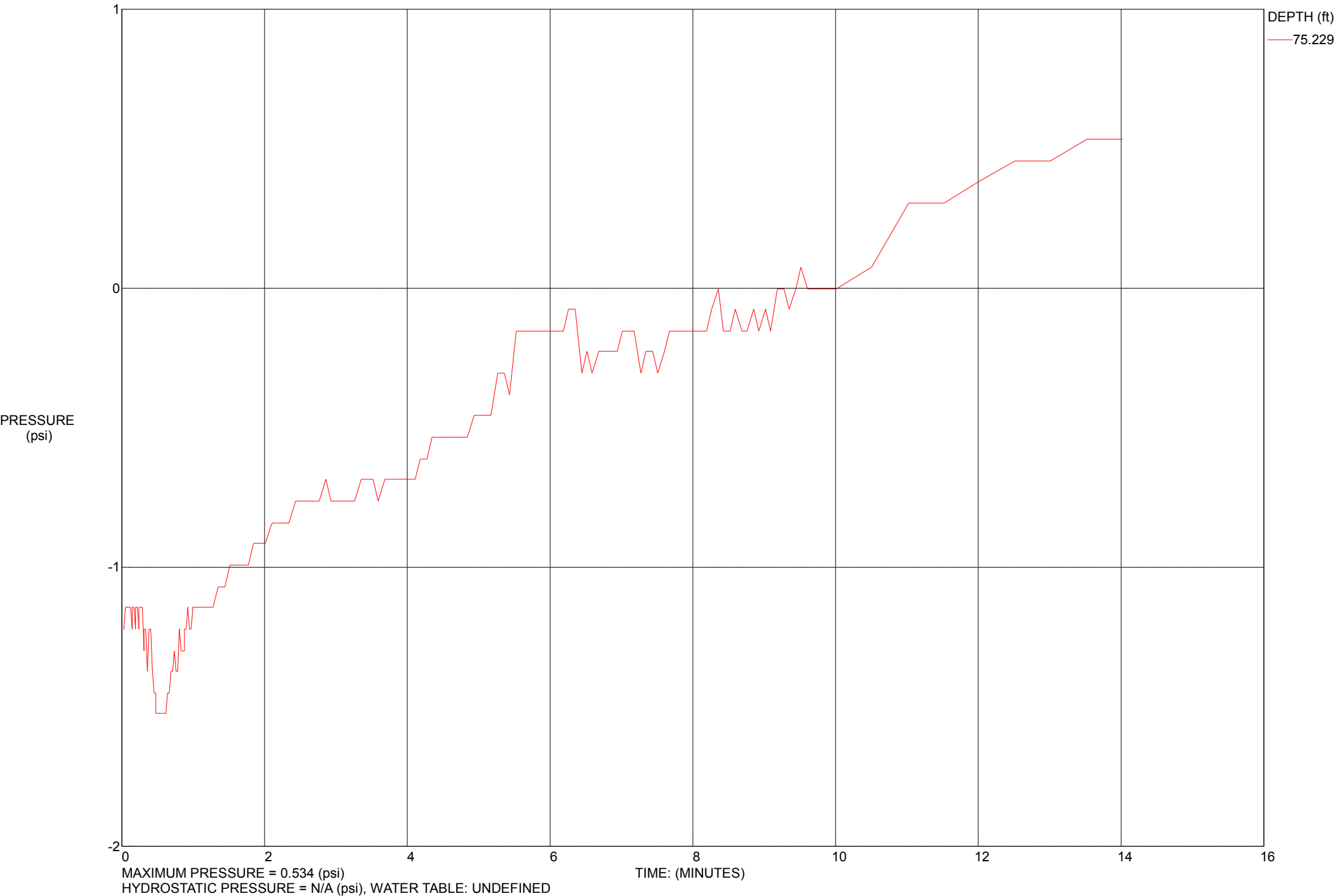
S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

TEST ID: CPT-1

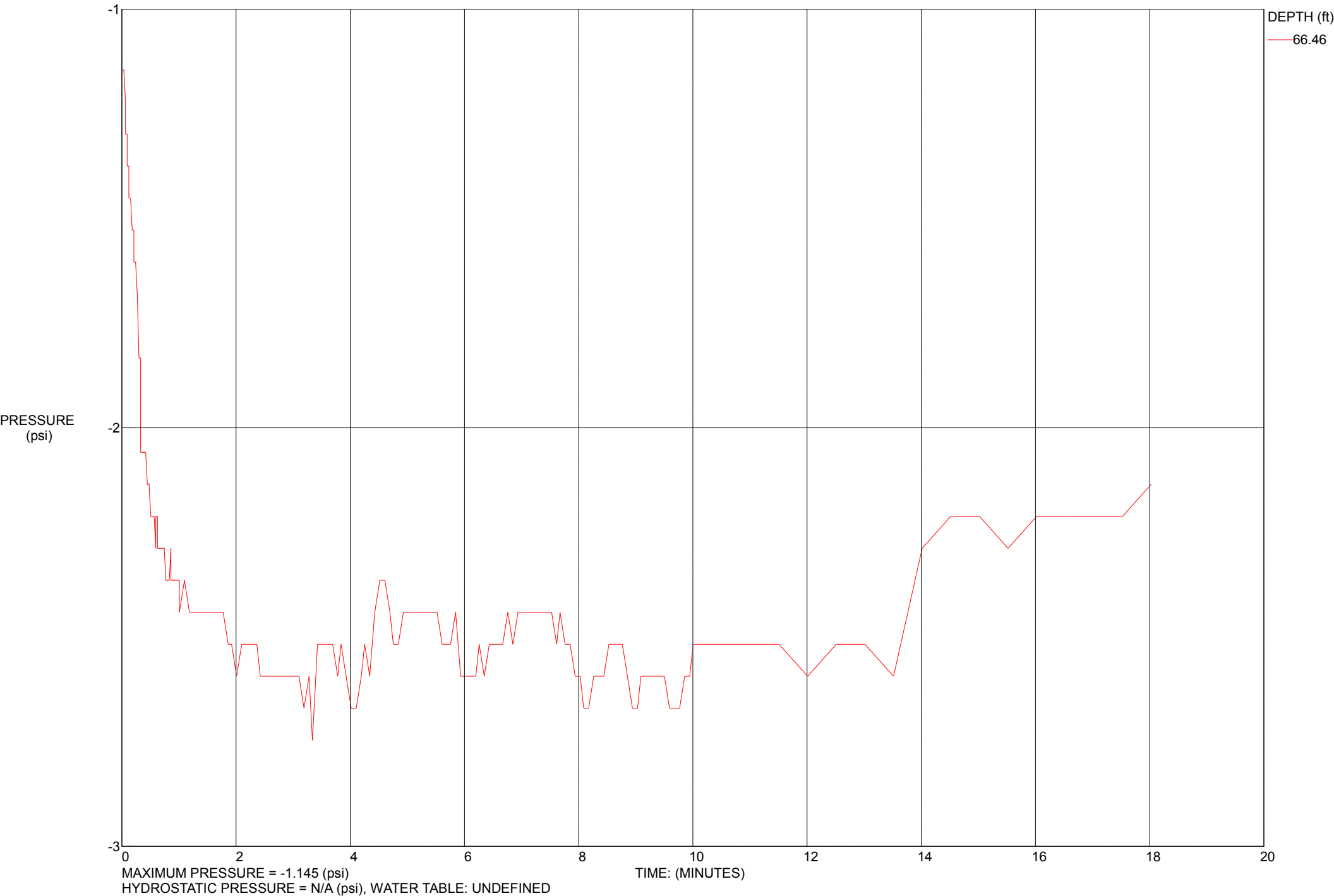


MAXIMUM PRESSURE = 0.534 (psi)
HYDROSTATIC PRESSURE = 32.635 (psi), WATER TABLE: 0.00 ft

TEST ID: CPT-2

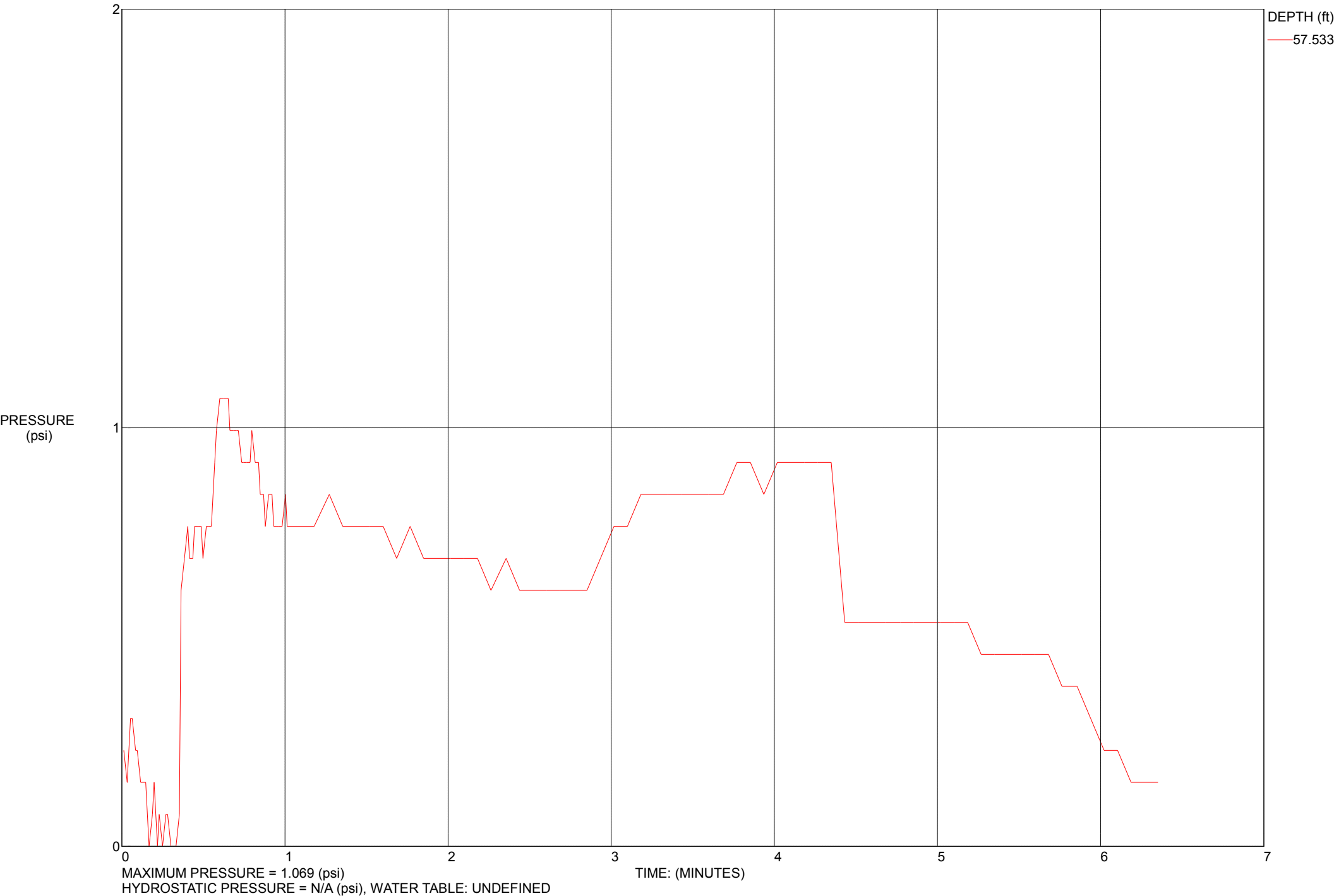

1
0
-1
-2
0
2
4
6
8
10
12
14
16
PRESSURE
(psi)
DEPTH (ft)
75.229
MAXIMUM PRESSURE = 0.534 (psi)
HYDROSTATIC PRESSURE = N/A (psi), WATER TABLE: UNDEFINED
TIME: (MINUTES)

TEST ID: CPT-3



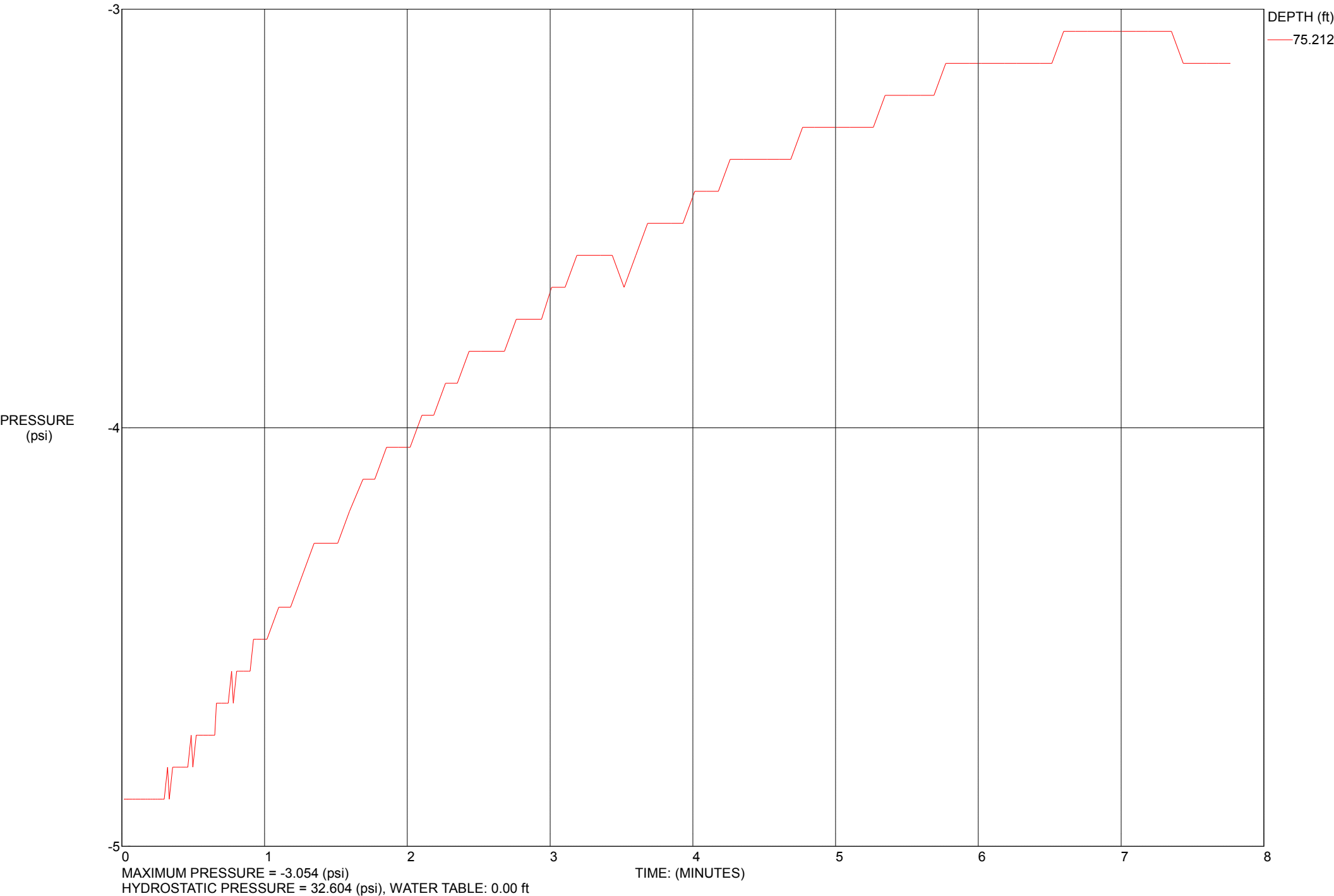
MAXIMUM PRESSURE = -1.145 (psi)
HYDROSTATIC PRESSURE = N/A (psi), WATER TABLE: UNDEFINED

TEST ID: CPT-4



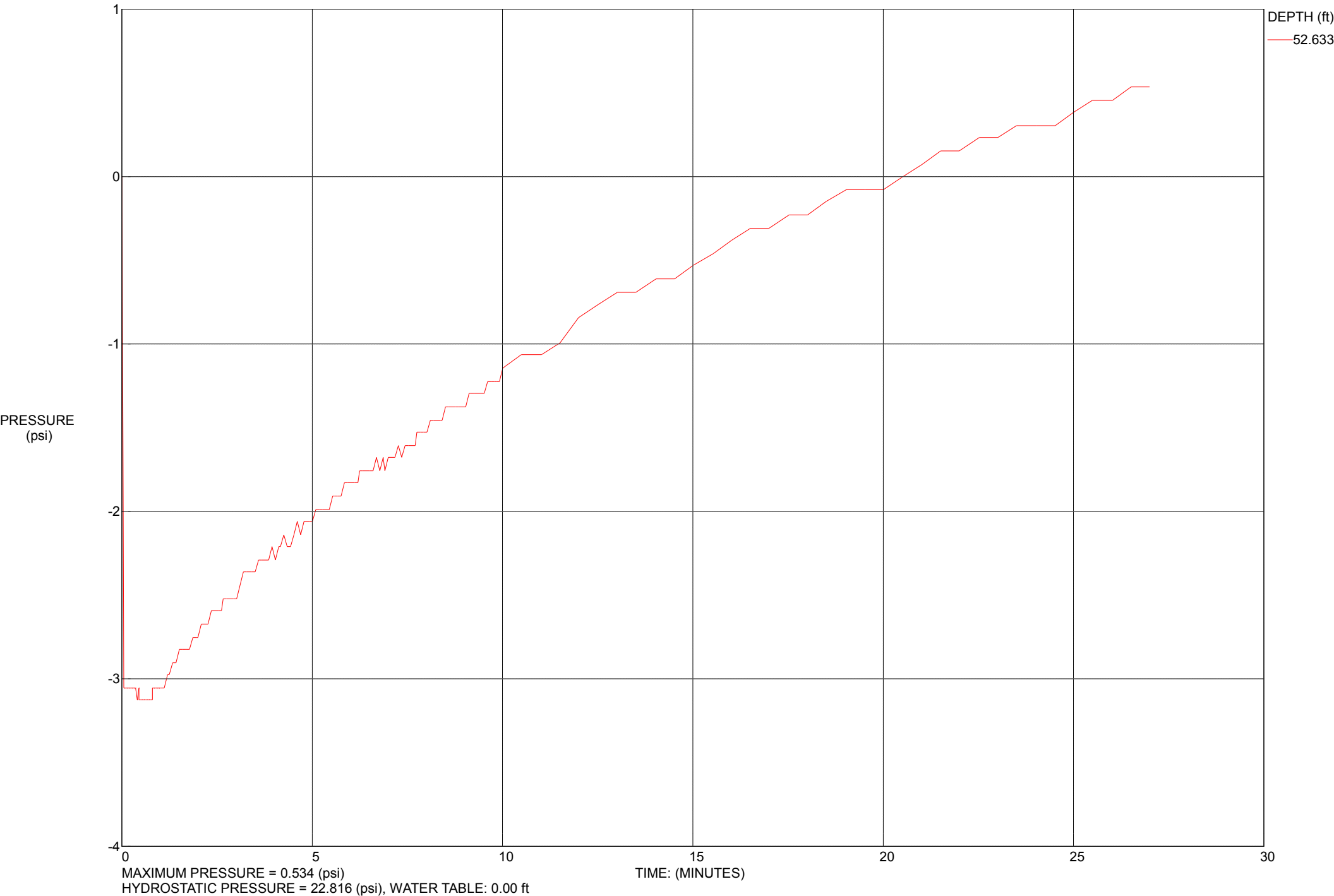
MAXIMUM PRESSURE = 1.069 (psi)
HYDROSTATIC PRESSURE = N/A (psi), WATER TABLE: UNDEFINED

TEST ID: CPT-5



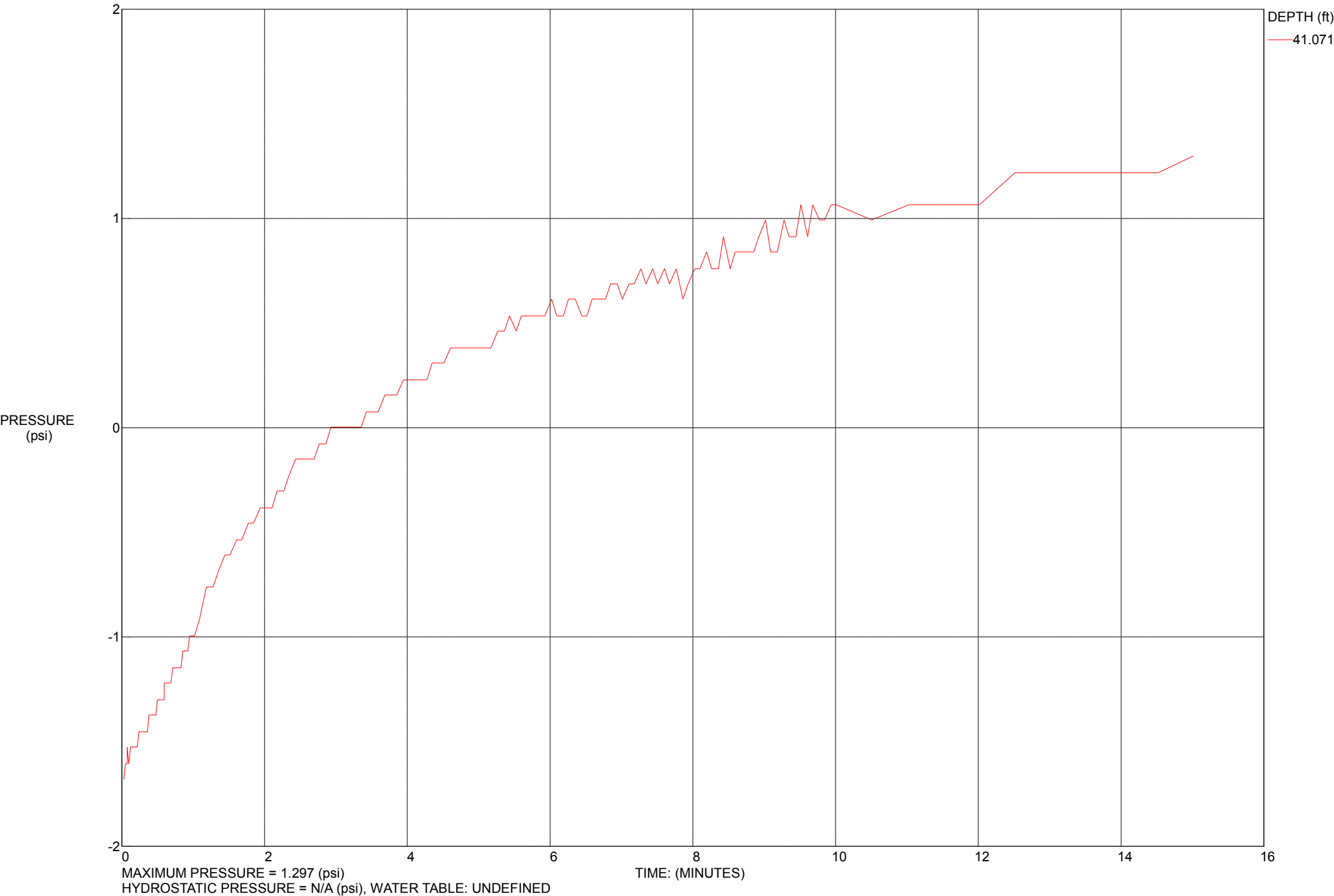
MAXIMUM PRESSURE = -3.054 (psi)
HYDROSTATIC PRESSURE = 32.604 (psi), WATER TABLE: 0.00 ft

TEST ID: CPT-12



MAXIMUM PRESSURE = 0.534 (psi)
HYDROSTATIC PRESSURE = 22.816 (psi), WATER TABLE: 0.00 ft

TEST ID: CPT-15



MAXIMUM PRESSURE = 1.297 (psi)
HYDROSTATIC PRESSURE = N/A (psi), WATER TABLE: UNDEFINED

APPENDIX C

LABORATORY TESTS

SMITH-EMERY Laboratories

MOISTURE CONTENT AND IN SITU DENSITY DETERMINATIONS AND DEGREE OF SATURATION

791/781 East Washington Blvd., Los Angeles, CA

Tel. No.: (213) 745-5333; Fax No.: (213) 741-8621

ASTM D2166/1587

Client: Carl Kim Geotechnical/Smith-Emery Anaheim
Lab. Ref. No.: 877,879 &880

Project Name: Long beach Storage PWAS_20190823
SEG File No.: CKG LB

Location: 3701 N. Pacific Pace, Long Beach City, CA
Date Sampled: 10/4/19

Date Received: 10/8/19

BH No.: **CKG-3 to CKG-5** Sp.gr. 2.650
Ring dia: 2.416 Area in^2 4.584
Date Tested: 10/16/19

Sampled by: DP

DENSITY OF SAMPLE **MOISTURE CONTENT**

Boring No.	Sample No.	Sample Depth (ft)	Soil Description	Sample Ht (in)	Wt. of soil & Rings (g)	Wt. of Rings (g)	wet Density pcf	Dry Density Pcf	wet wt (g)	dry wt (g)	can wt (g)	can no	moist. cont. (%)	initial Void e	% Saturation
CGK-3	R-1	5	Fill Matl base & asph/ SM	6	1022.7	222.0	110.8	101.7	650.8	612.3	179.4	P1	8.9	0.63	37.7
	SPT-1	10-11.5	Drk Brw SM	SPT					270.9	239.1	49.4	8	16.8		
	SPT-2	20-21.5	Brw SC	SPT					261.4	237.0	49.9	13	13.0		
	SPT-3	30-31.5	Olv Brw SP-SM/SM	SPT					217.3	202.6	49.4	85	9.6		
	R-4	35-36.5	Olv brw SP-SM	6	1052.1	259.0	109.7	104.0	187.9	180.8	53.4	57	5.6	0.59	25.0
	SPT-4	40-41.5	Olv SP-SM	SPT					200.7	194.2	50.2	99	4.5		
	SPT-5	50-51.5	Olv brw SM	SPT					209.0	182.0	49.7	49	20.4		
CKG-4	SPT-1	5-6.5	Fill Matl Vry Dk Brw SC/SM	SPT					288.6	264.5	49.8	107	11.2		
	R-1	10-11.5	Blk SM (petroluem odor)	6	1114.3	269.4	116.9	97.7	180.2	158.8	50.0	170	19.7	0.69	75.3
	SPT-2	15-16.5	vry Drk Brw CL/SC	SPT					263.1	232.2	54.0	81	17.3		
	R-2	20-21.5	Dk Olv Brw SC	6	1125.0	272.9	117.9	99.1	192.3	169.9	51.7	46	19.0	0.67	75.2
	SPT-3	25-26.5	Blk ML (petroluem odor)	SPT					239.1	196.5	49.9	10	29.1		
	R-3	30-31.5	Dk Olv Gry CL	5	928.5	224.4	116.9	85.8	178.8	144.6	50.4	106	36.3	0.93	103.7
	SPT-4	35-36.5	Dk Olv Gry CL/SC	SPT					250.5	222.0	54.3	40	17.0		
	R-4	40-41.5	Olv Brw SM	5	1000.5	222.2	129.2	109.4	186.5	165.8	51.5	32	18.1	0.51	93.9
	SPT-5	45-46.5	Lt Greensh Gry SM	SPT					271.6	228.8	48.8	177	23.8		
	R-5	50-51.5	Lt Greensh Gry SM	5	1000.5	222.2	129.2	109.4	186.5	165.8	51.5	32	18.1	0.51	93.9
CKG-5	R-1	5-6.5	Fill Matl Blk SM/GP-GM	6	1089.0	263.7	114.2	101.2	287.7	260.8	50.7	101	12.8	0.63	53.6
	SPT-1	10-11.5	BLK CL/CK (w/ Odor)	SPT					240.2	212.5	50.1	92	17.1		
	SPT-2	20-21.5	Vrk Drk Brw/BLK CL/SC	SPT					208.9	151.4	49.4	136	56.4		
	SPT-3	30-31.5	Lt Greensh Gry SC/SM	SPT					255.4	224.4	49.7	168	17.7		
	SPT-4	40-41.5	Lt Gry SP-SM	SPT					224.0	211.4	51.0	64	7.9		
	SPT-5	50-51.5	Lt Gry SM	SPT					264.9	225.4	49.7	174	22.5		
	R-6	55-56.5	Gry SP-SM	5	970.8	223.5	124.1	100.0	189.6	162.6	50.4	112	24.1	0.65	97.6

Tested By: E.Saucedo
Date Tested: 10/16/19

Checked By: A.Cabanilla
Date Checked: 10/17/19

SMITH-EMERY Laboratories

MOISTURE CONTENT AND IN SITU DENSITY DETERMINATIONS AND DEGREE OF SATURATION

791/781 East Washington Blvd., Los Angeles, CA

Tel. No.: (213) 745-5333; Fax No.: (213) 741-8621

ASTM D2166/1587

Client: Carl Kim Geotechnical/Smith-Emery Anaheim

Project Name: Long beach Storage PWAS_20190823

Location: 3701 N. Pacific Pace, Long Beach City, CA

Lab. Ref. No.: 883,885,887 &889

SEG File No.: CKG LB

Date Sampled: 10/7/19

Date Received: 10/8/19

Date Tested: 10/16/19

Sampled by: DP

BH No.: CKG-6 to CKG-9 Sp.gr. 2.650

Ring dia: 2.416 Area in^2 4.584

					DENSITY OF SAMPLE				MOISTURE CONTENT						
Boring No.	Sample No.	Sample Depth (ft)	Soil Description	Sample Ht (in)	Wt. of soil & Rings (g)	Wt. of Rings (g)	wet Density pcf	Dry Density Pcf	wet wt (g)	dry wt (g)	can wt (g)	can no	moist. cont. (%)	initial Void e	% Saturation
CGK-6	SPT-1	5-6.5	Brw SM	SPT					253.3	230.2	49.5	29	12.8		
	R-1	10-11.5	Lt Greenh Gry SP trace of lump	5	831.1	219.6	101.5	93.0	266.4	248.1	49.2	167	9.2	0.78	31.3
	SPT-2	15-16.5	Dk Olv Bw SM/SC-SM	SPT					254.6	225.8	55.5	14	16.9		
	R-2	20-21.5	BLK/Brw CL/SC	6	1246.9	269.1	135.3	121.2	216.2	198.8	49.6	131	11.7	0.36	84.7
	SPT-3	25-26.5	Brw SM	SPT					266.6	240.3	49.6	173	13.8		
	R-3	30-31.5	Brw SM	6	1239.7	268.1	134.4	118.5	220.5	200.5	52.0	33	13.5	0.40	90.2
	SPT-4	35-36.5	Olv Brw SP	SPT					218.9	212.9	50.1	179	3.7		
	R-4	40-41.5	Olv Brw SP/SP-SM	6	1025.6	266.6	105.0	96.9	172.4	162.9	50.0	27	8.4	0.71	31.5
	SPT-5	45-46.5	Olv Brw ML	SPT					233.9	206.1	53.5	73	18.2		
	R-5	50-51.5	Gry SM/SP-SM	6	1215.8	263.5	131.8	111.0	210.1	184.9	50.5	12	18.8	0.49	101.4
CKG-7	R-1	5-6.5	Olv Brw SM/Fill Matl	5	857.4	222.2	105.5	93.4	282.7	256.2	51.5	23	12.9	0.77	44.5
	SPT-1	10-11.5	Olv Brw SM/ML	SPT					243.2	222.9	54.3	83	12.0		
	R-2	15-16.5	Olv Brw SM	6	1149.3	255.6	123.7	107.8	309.8	276.8	52.1	80	14.7	0.53	72.9
	SPT-2	20-21.5	Brw SC/CL	SPT					265.8	238.2	50.0	89	14.7		
	R-3	25-26.5	Brw SM	6	1166.5	258.8	125.6	111.9	239.5	218.8	49.6	175	12.2	0.48	67.9
CKG-8	SPT-1	5-6.5	Brw SC/CL	SPT					235.7	215.6	49.6	142	12.1		
	R-1	10-11.5	Brw SC	5	995.4	224.4	128.0	111.3	178.7	161.8	49.6	145	15.1	0.49	82.1
	SPT-2	15-16.5	Dk Brw CL	SPT					287.7	223.4	49.5	162	37.0		
	R-2	20-21.5	Dk Brw/BLK SM	5	951.4	222.2	121.1	113.9	333.1	316.5	51.4	12	6.3	0.45	36.8
CKG-9	R-1	5-6.5	Brw SM/ML	5	790.6	224.4	94.0	90.5	273.6	265.1	49.4	104	3.9	0.83	12.6
	R-2	10-11.5	Olv Gry CL/SC	5	928.2	223.3	117.0	104.8	306.8	279.9	50.0	54	11.7	0.58	53.6
	SPT-1	15-16.5	Brw SC	SPT					244.8	224.5	49.5	59	11.6		
	SPT-2	20-21.5	Drk Brw SC	SPT					259.4	234.0	49.5	178	13.8		

Tested By: E.Saucedo

Checked By: A.Cabanilla

Date Tested: 10/16/19

Date Checked: 10/17/19

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Very Dark Grayish Brown Lean CLAY w/ Sand
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 10/24/19
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-1 Depth (ft): 10'
Sample Preparation: wet ☐ dry ☒ Mass of Test Specimen (g): 152.00

PLASTIC LIMIT TEST

	Trials			Ave.
	1	2	3	
Dish Number	4	8		
a) wt. of dish + wet soil (g)	45.38	45.17		
b) wt. of dish + dry soil (g)	44.20	44.03		
c) wt. of moisture (g)=[a-b]	1.18	1.14		
d)wt. of dish (g)	36.93	36.99		
e) wt. of dry soil (g) =[b-d]	7.27	7.04		
f) moisture content %=[e/c]*100	16.2	16.2		**16**

LIQUID LIMIT TEST

	Trials			
	1	2	3	4
Dish Number	6	13	37	
Number of Blows	35	28	22	
g) wt. of dish + wet soil (g)	48.42	46.86	48.22	
h) wt. of dish + dry soil (g)	45.44	44.19	45.13	
i) wt. of moisture (g)=[g-h]	2.98	2.67	3.09	
j)wt. of dish (g)	36.99	36.85	36.93	
k) wt. of dry soil (g)=[h-j]	8.45	7.34	8.2	
l) moisture content %=[i/k]*100	35.3	36.4	37.7	

Liquid Limit	Plastic Limit	Plasticity Index	Classification
37	**16**	**21**	**CL**

Tested by: A.Cabanilla Checked by: Angelito Cabanilla

PLATE NO.: B-6A1

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

		Lab. Ref. No.:	881
Client:	Carl Kim Geotechnical	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage	SEG File No.:	CKGLB
Location:	371 N. Pacific Place, Long Beach City, CA	Date Sampled:	10/4/19
Material Description:	Very Dark Grayish Brown Lean CLAY w/ Sand	Date Received:	10/8/19
Liquid Limit App.:	I4645	Grooving Tool: # 10	Date Tested: 10/24/19
Balance:	15612017	Oven: SQ-2	Sampled by: DP
Bore Hole No.:	CKG-5	Sample No.: SPT-1	Depth (ft): 10'

LIQUID LIMIT WET: 37

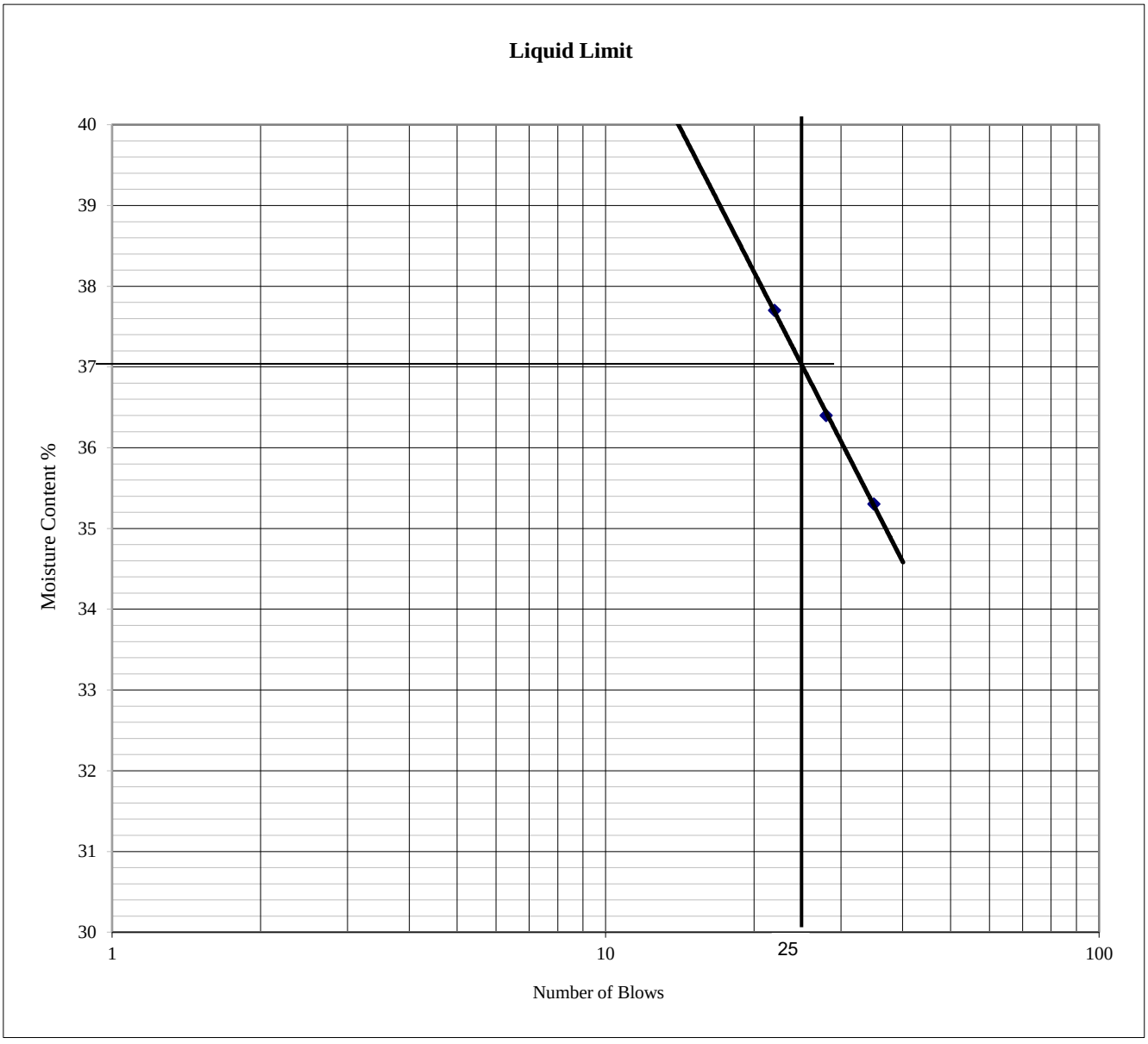


PLATE NO.: B-

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

		Lab. Ref. No.:	881
Client:	Carl Kim Geotechnical	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage	SEG File No.:	CKGLB
Location:	371 N. Pacific Place, Long Beach City, CA	Date Sampled:	10/4/19
Material Description:	Very Dark Grayish Brown Lean CLAY w/ Sand	Date Received:	10/8/19
Liquid Limit App.:	I4645	Grooving Tool: # 10	Date Tested: 0:00
Balance:	15612017	Oven: SQ-2	Sampled by: DP
Bore Hole No.:	CKG-5	Sample No.: SPT-1	Depth (ft): 10'

	Liquid Limit	Plastic Limit	Plasticity Index	Classification
Wet	**37**	**16**	**21**	**CL**
Oven Dried		LL Oven / LL	**0.00**	
	ORGANIC when	LL dried/LLwet	**≤0.75**	**Inorganic**

PLASTICITY CHART

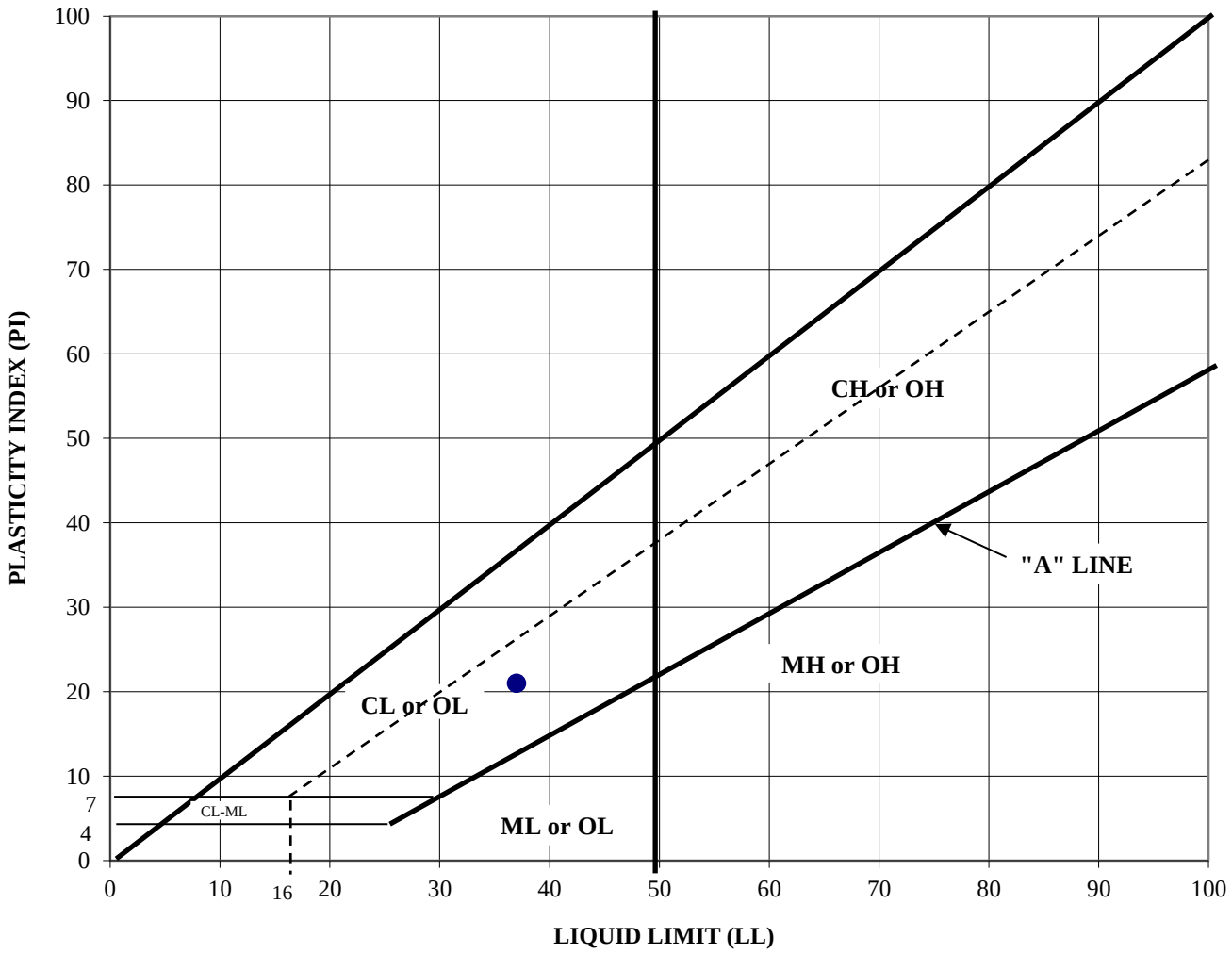


PLATE NO.: B-6A

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Very Dark Grayish Brown Fat CLAY
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 10/24/19
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-2 Depth (ft): 20'
Sample Preparation: wet ☐ dry ☒ Mass of Test Specimen (g): 155.93

PLASTIC LIMIT TEST

	Trials			Ave.
	1	2	3	
Dish Number	15	28		
a) wt. of dish + wet soil (g)	44.14	44.14		
b) wt. of dish + dry soil (g)	42.76	42.80		
c) wt. of moisture (g)=[a-b]	1.38	1.34		
d)wt. of dish (g)	36.80	37.01		
e) wt. of dry soil (g) =[b-d]	5.96	5.79		
f) moisture content %=[e/c]*100	23.2	23.1		**23**

LIQUID LIMIT TEST

	Trials			
	1	2	3	4
Dish Number	2	8	31	
Number of Blows	34	22	18	
g) wt. of dish + wet soil (g)	47.87	45.77	47.02	
h) wt. of dish + dry soil (g)	44.38	42.65	43.42	
i) wt. of moisture (g)=[g-h]	3.49	3.12	3.60	
j)wt. of dish (g)	36.99	36.74	36.85	
k) wt. of dry soil (g)=[h-j]	7.39	5.91	6.57	
l) moisture content %=[i/k]*100	47.2	52.8	54.8	

Liquid Limit	Plastic Limit	Plasticity Index	Classification
51	**23**	**28**	**CH**

Tested by: A.Cabanilla Checked by: Angelito Cabanilla

PLATE NO.: B-6A1

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

		Lab. Ref. No.:	881
Client:	Carl Kim Geotechnical	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage	SEG File No.:	CKGLB
Location:	371 N. Pacific Place, Long Beach City, CA	Date Sampled:	10/4/19
Material Description:	Very Dark Grayish Brown Fat CLAY	Date Received:	10/8/19
Liquid Limit App.:	I4645	Grooving Tool: # 10	Date Tested: 10/24/19
Balance:	15612017	Oven: SQ-2	Sampled by: DP
Bore Hole No.:	CKG-5	Sample No.: SPT-2	Depth (ft): 20'

LIQUID LIMIT WET: 51

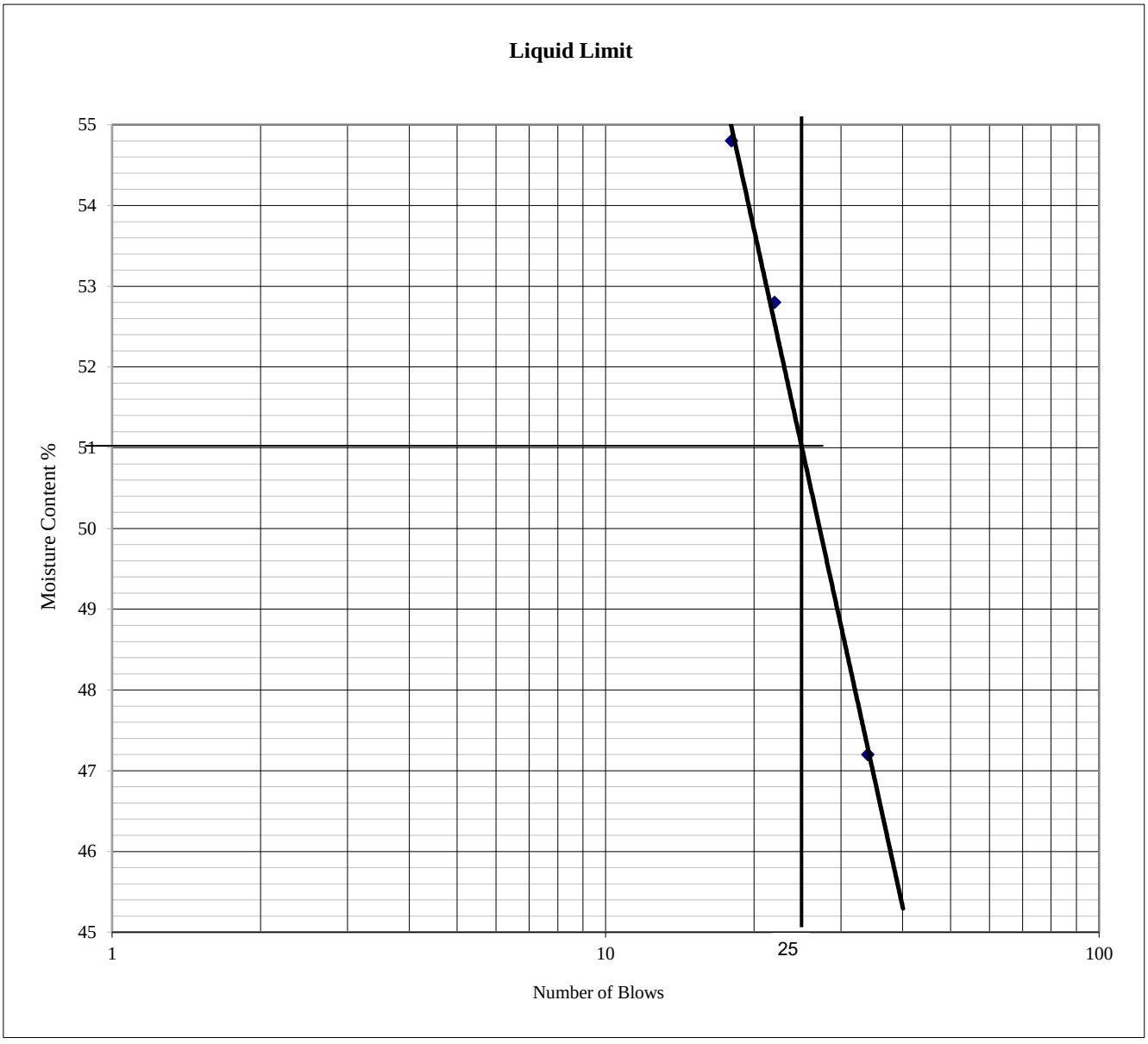


PLATE NO.: B-

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Very Dark Grayish Brown Fat CLAY
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 0:00
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-2 Depth (ft): 20'

	Liquid Limit	Plastic Limit	Plasticity Index	Classification
Wet	**51**	**23**	**28**	**CH**
Oven Dried		LL Oven / LL	**0.00**	
	ORGANIC when	LL dried/LLwet	**≤0.75**	**Inorganic**

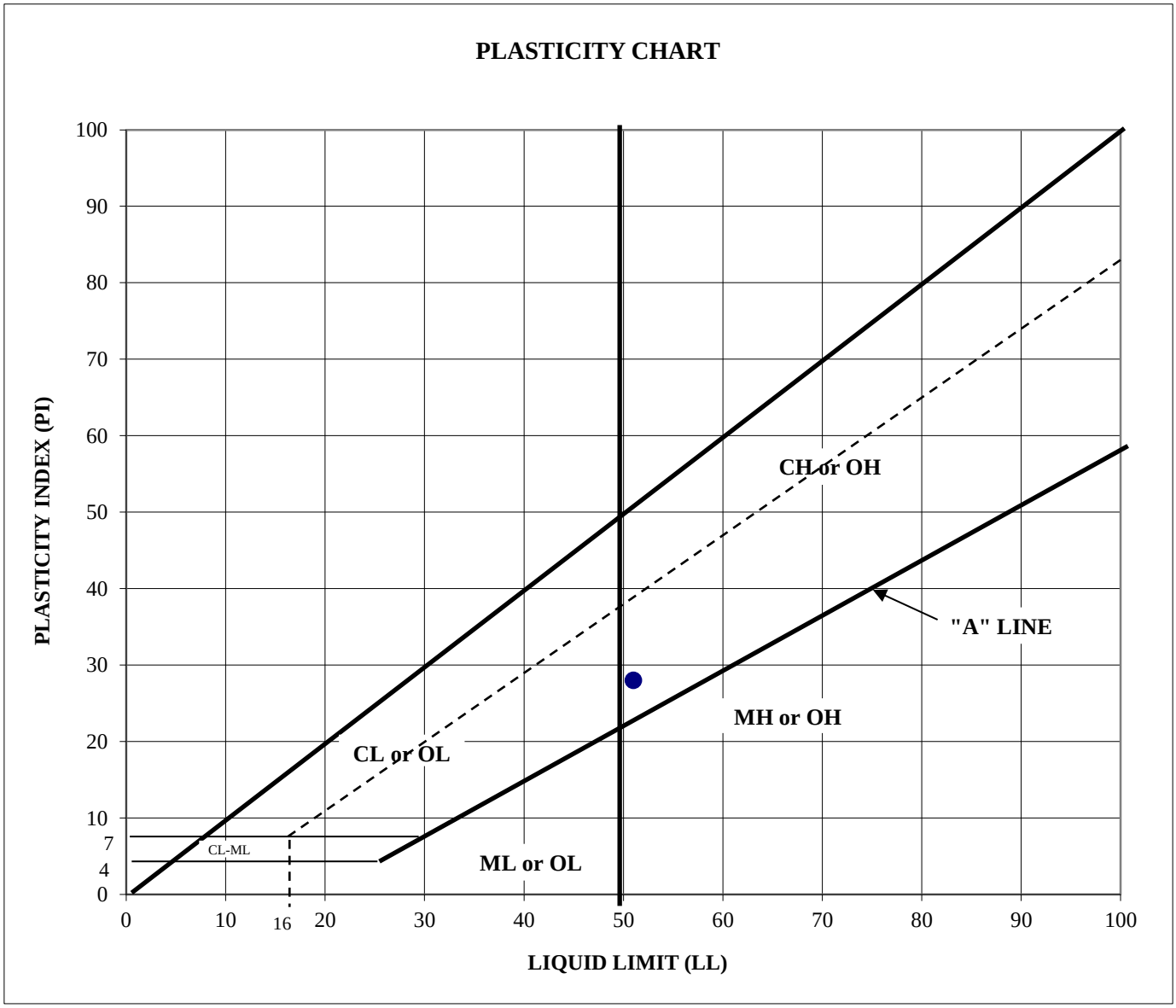


PLATE NO.: B-6A

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Olive Silty Clayey SAND
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 10/25/19
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-3 Depth (ft): 30'
Sample Preparation: wet ☐ dry ☒ Mass of Test Specimen (g): 155.93

PLASTIC LIMIT TEST

	Trials			Ave.
	1	2	3	
Dish Number	20	17		
a) wt. of dish + wet soil (g)	46.32	45.41		
b) wt. of dish + dry soil (g)	44.72	43.91		
c) wt. of moisture (g)=[a-b]	1.6	1.5		
d)wt. of dish (g)	36.94	36.72		
e) wt. of dry soil (g) =[b-d]	7.78	7.19		
f) moisture content %=[e/c]*100	20.6	20.9		**21**

LIQUID LIMIT TEST

	Trials			
	1	2	3	4
Dish Number	9	12	25	
Number of Blows	34	29	23	
g) wt. of dish + wet soil (g)	47.22	47.11	45.99	
h) wt. of dish + dry soil (g)	45.13	44.92	44.01	
i) wt. of moisture (g)=[g-h]	2.09	2.19	1.98	
j)wt. of dish (g)	37.11	36.7	36.90	
k) wt. of dry soil (g)=[h-j]	8.02	8.22	7.11	
l) moisture content %=[i/k]*100	26.1	26.6	27.8	

Liquid Limit	Plastic Limit	Plasticity Index	Classification
27	**21**	**6**	**CL-ML**

Tested by: A.Cabanilla Checked by: Angelito Cabanilla

PLATE NO.: B-6A1

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

		Lab. Ref. No.:	881
Client:	Carl Kim Geotechnical	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage	SEG File No.:	CKGLB
Location:	371 N. Pacific Place, Long Beach City, CA	Date Sampled:	10/4/19
Material Description:	Olive Silty Clayey SAND	Date Received:	10/8/19
Liquid Limit App.:	I4645	Grooving Tool: # 10	Date Tested: 10/25/19
Balance:	15612017	Oven: SQ-2	Sampled by: DP
Bore Hole No.:	CKG-5	Sample No.: SPT-3	Depth (ft): 30'

LIQUID LIMIT WET: 27

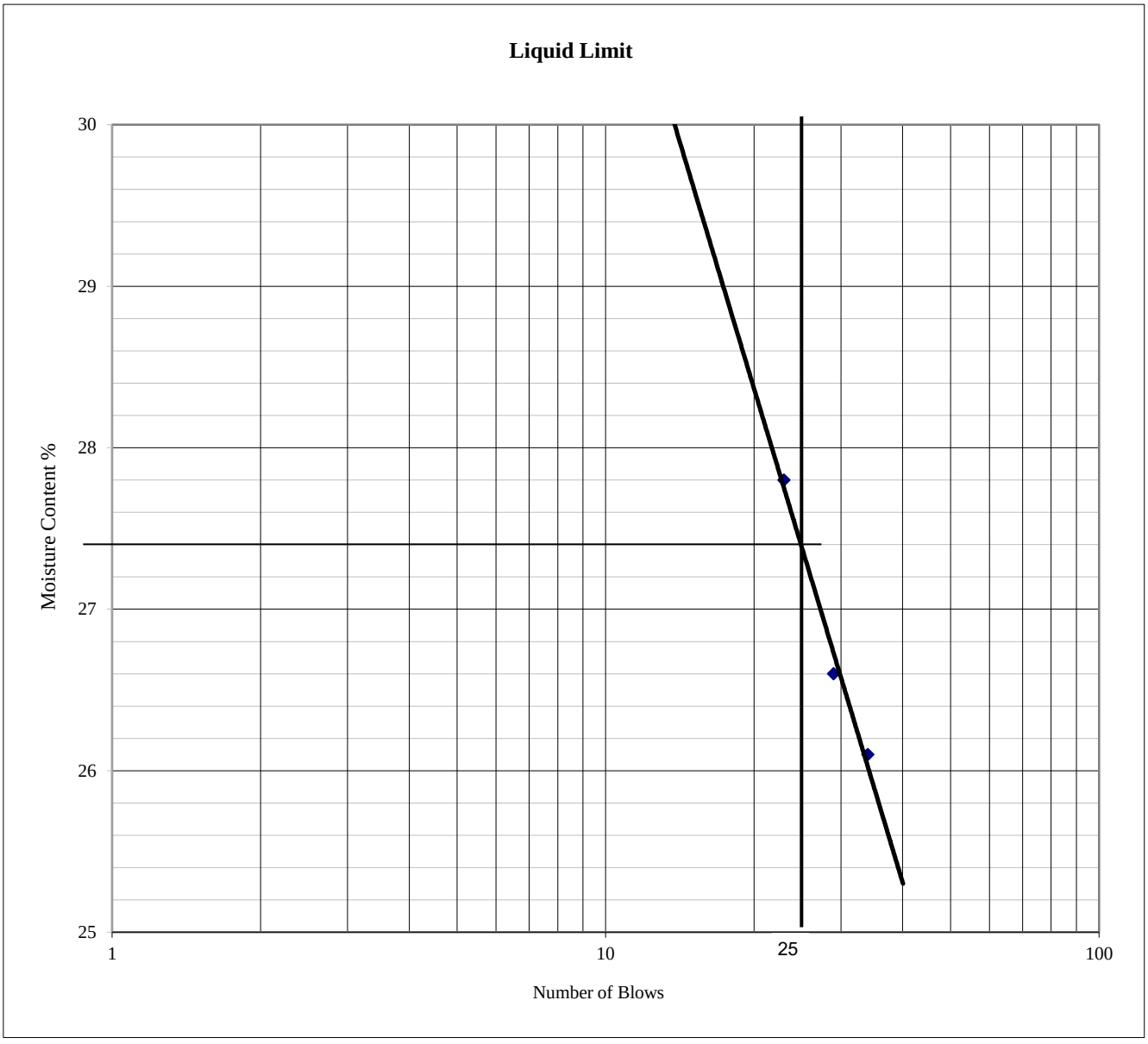


PLATE NO.: B-

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Olive Silty Clayey SAND
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 0:00
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-3 Depth (ft): 30'

	Liquid Limit	Plastic Limit	Plasticity Index	Classification
Wet	**27**	**21**	**6**	**CL-ML**
Oven Dried	**0**	LL Oven / LL	**0.00**	
	ORGANIC when	LL dried/LLwet	**≤0.75**	**Inorganic**

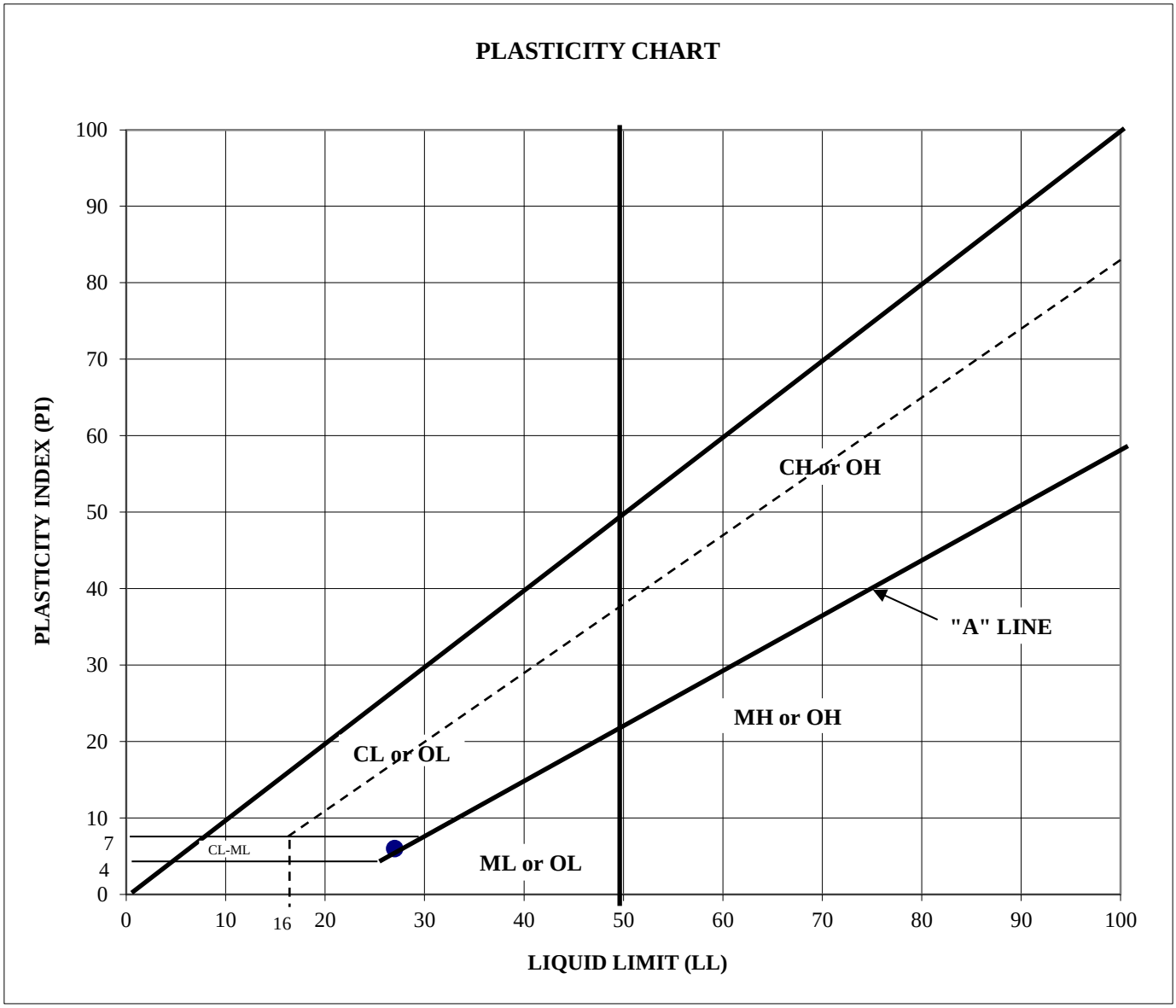


PLATE NO.: B-6A

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Greenish Gray Poorly Graded SAND with Silty/SM
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 10/24/19
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-4 Depth (ft): 40'
Sample Preparation: wet ☐ dry ☒ Mass of Test Specimen (g): 152.00

PLASTIC LIMIT TEST	Trials			Ave.
	1	2	3	
Dish Number	15	28		
a) wt. of dish + wet soil (g)				
b) wt. of dish + dry soil (g)				
c) wt. of moisture (g)=[a-b]				
d)wt. of dish (g)	36.80	37.01		
e) wt. of dry soil (g) =[b-d]				
f) moisture content %=[e/c]*100				

LIQUID LIMIT TEST	Trials			
	1	2	3	4
Dish Number				
Number of Blows				
g) wt. of dish + wet soil (g)	**SAMPLE TEST NO LIQUID LIMIT**			
h) wt. of dish + dry soil (g)				
i) wt. of moisture (g)=[g-h]				
j)wt. of dish (g)				
k) wt. of dry soil (g)=[h-j]				
l) moisture content %=[i/k]*100				

Liquid Limit	Plastic Limit	Plasticity Index	Classification
NP	**NP**	**NP**	**SP-SM/SM**

Tested by: A.Cabanilla Checked by: Angelito Cabanilla

PLATE NO.: B-6A1

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

		Lab. Ref. No.:	881
Client:	Carl Kim Geotechnical	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage	SEG File No.:	CKGLB
Location:	371 N. Pacific Place, Long Beach City, CA	Date Sampled:	10/4/19
Material Description:	Greenish Gray Poorly Graded SAND with Silty/SM	Date Received:	10/8/19
Liquid Limit App.:	I4645	Grooving Tool: # 10	Date Tested: 10/24/19
Balance:	15612017	Oven: SQ-2	Sampled by: DP
Bore Hole No.:	CKG-5	Sample No.: SPT-4	Depth (ft): 40'

LIQUID LIMIT WET: NP

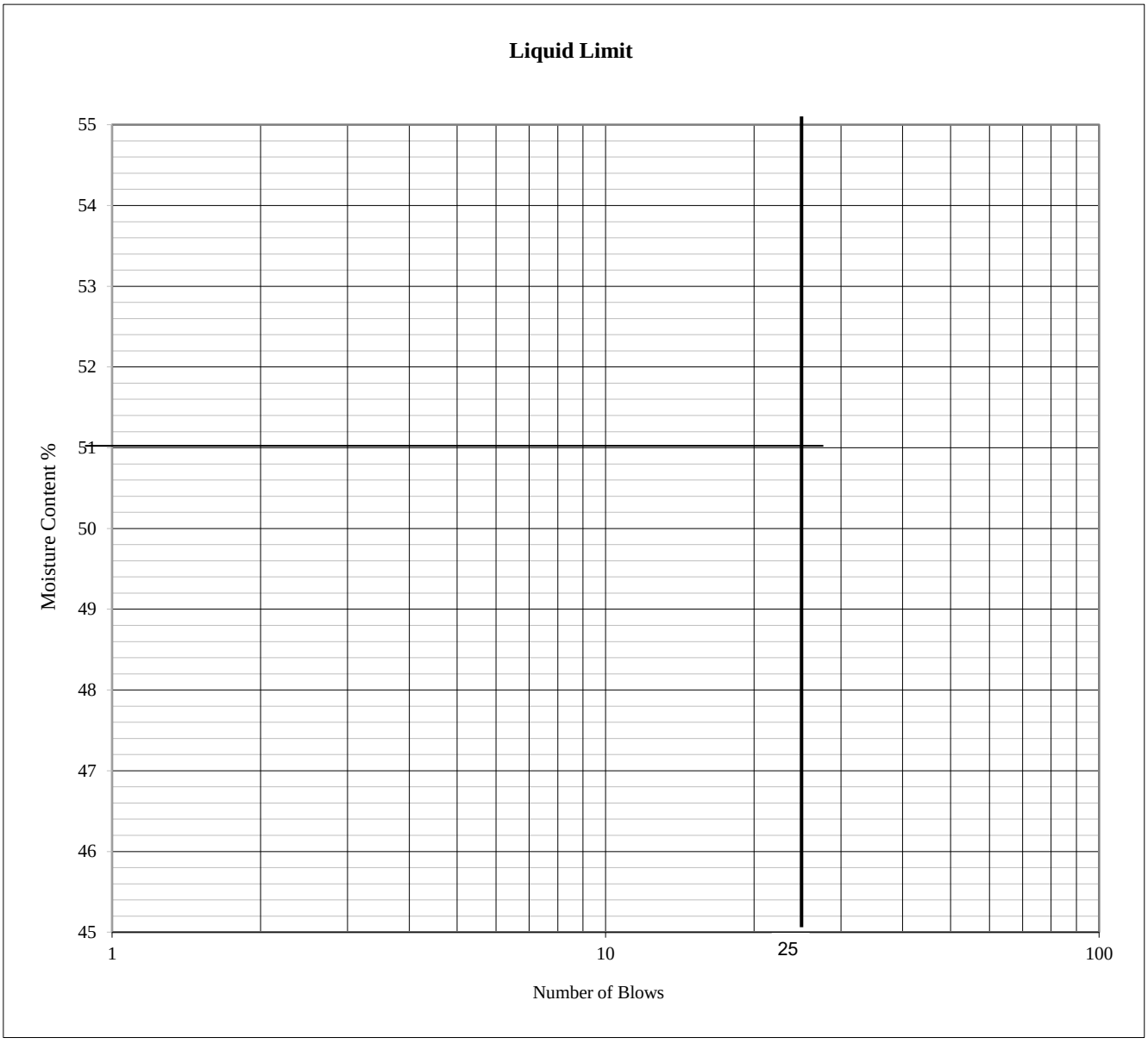


PLATE NO.: B-

SMITH-EMERY Laboratories

Liquid Limit, Plastic Limit, and Plasticity Index
ASTM D4318

Lab. Ref. No.: 881

Client: Carl Kim Geotechnical
SEG Report No.: G-19-18xx
Project: Long Beach Storage
SEG File No.: CKGLB
Location: 371 N. Pacific Place, Long Beach City, CA
Date Sampled: 10/4/19
Material Description: Greenish Gray Poorly Graded SAND with Silty/SM
Date Received: 10/8/19
Liquid Limit App.: I4645 Grooving Tool: # 10
Date Tested: 0:00
Balance: 15612017 Oven: SQ-2
Sampled by: DP
Bore Hole No.: CKG-5 Sample No.: SPT-4 Depth (ft): 40'

	Liquid Limit	Plastic Limit	Plasticity Index	Classification
Wet	**NP**	**NP**	**NP**	**SP-SM/SM**
Oven Dried		LL Oven / LL	**NP**	
	ORGANIC when	LL dried/LLwet	**≤0.75**	**Inorganic**

PLASTICITY CHART

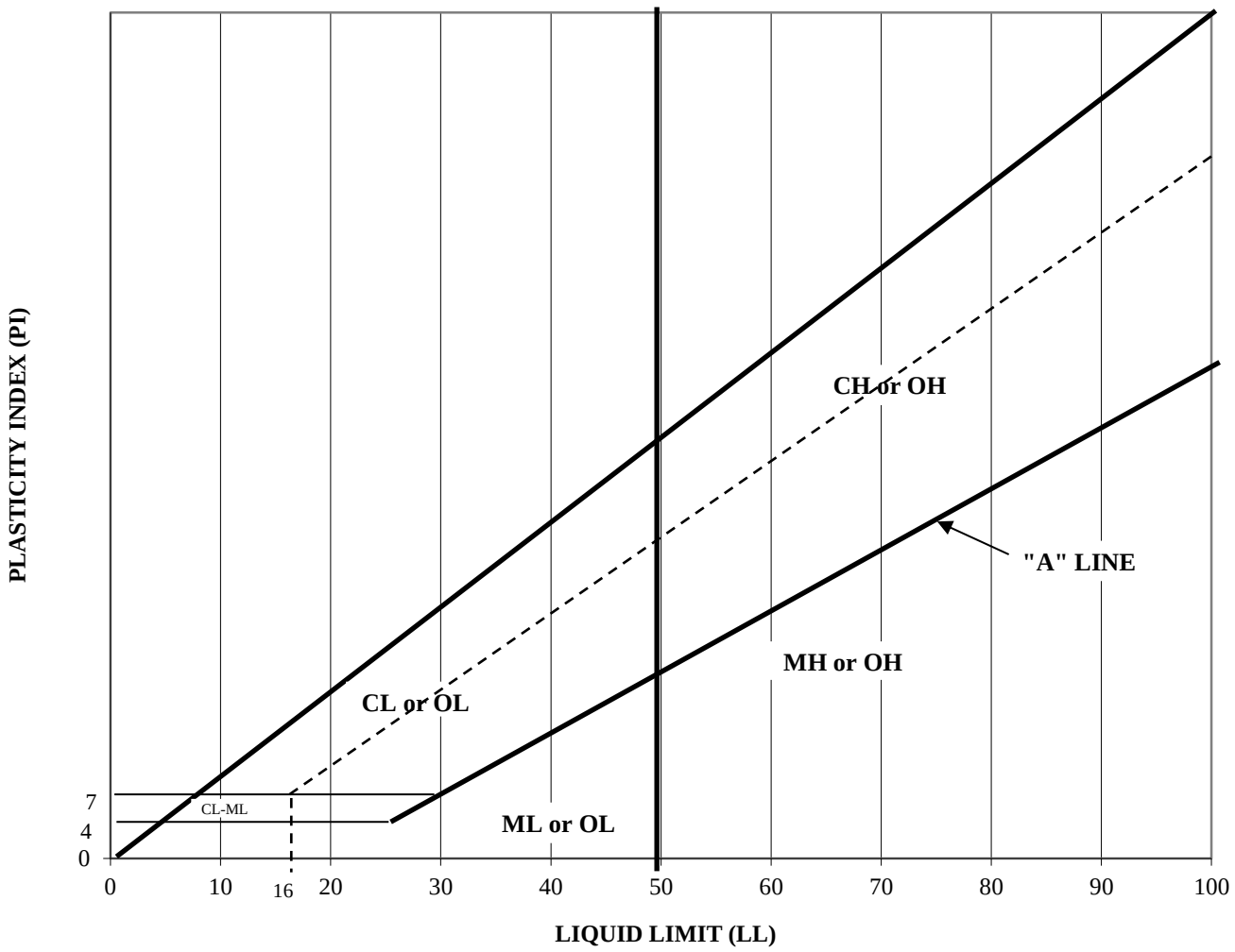


PLATE NO.: B-6A

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

DIRECT SHEAR TEST
ASTM D3080

Lab. Ref. No.: 876

Client: **Carl Kim Geotechnical/Smith-Emery Anaheim**
Project: Long Beach Storage /PN PWAS_20190823
Location: 3701 N. Pacific Place, Long Beach, CA
Remark: **intact sample**

SEG Report No.: G-19-18xx
SEG File No.: SKGLB
Date Sampled: 10/4/19
Date Received: 10/8/19
Date Tested: 10/18/19

Boring No.: **CKG-3** Sample No.: **R-3** Depth(ft): **25-26.5**

Normal Stress (psf)	Moisture Content (%)	Dry Density (psf)	Peak Stress (psf)	Deflection (in)	Degree Saturation
1000	18.1	110.9	960	0.04	94.0
3000	20.4	107.2	1920	0.09	96.4
6000	16.4	112.3	3528	0.08	88.4

.

Soil Classification:	Sample #1	Sample #2	Sample #3
	Brown Sandy CLAY	Brown Sandy CLAY	Brown Sandy CLAY

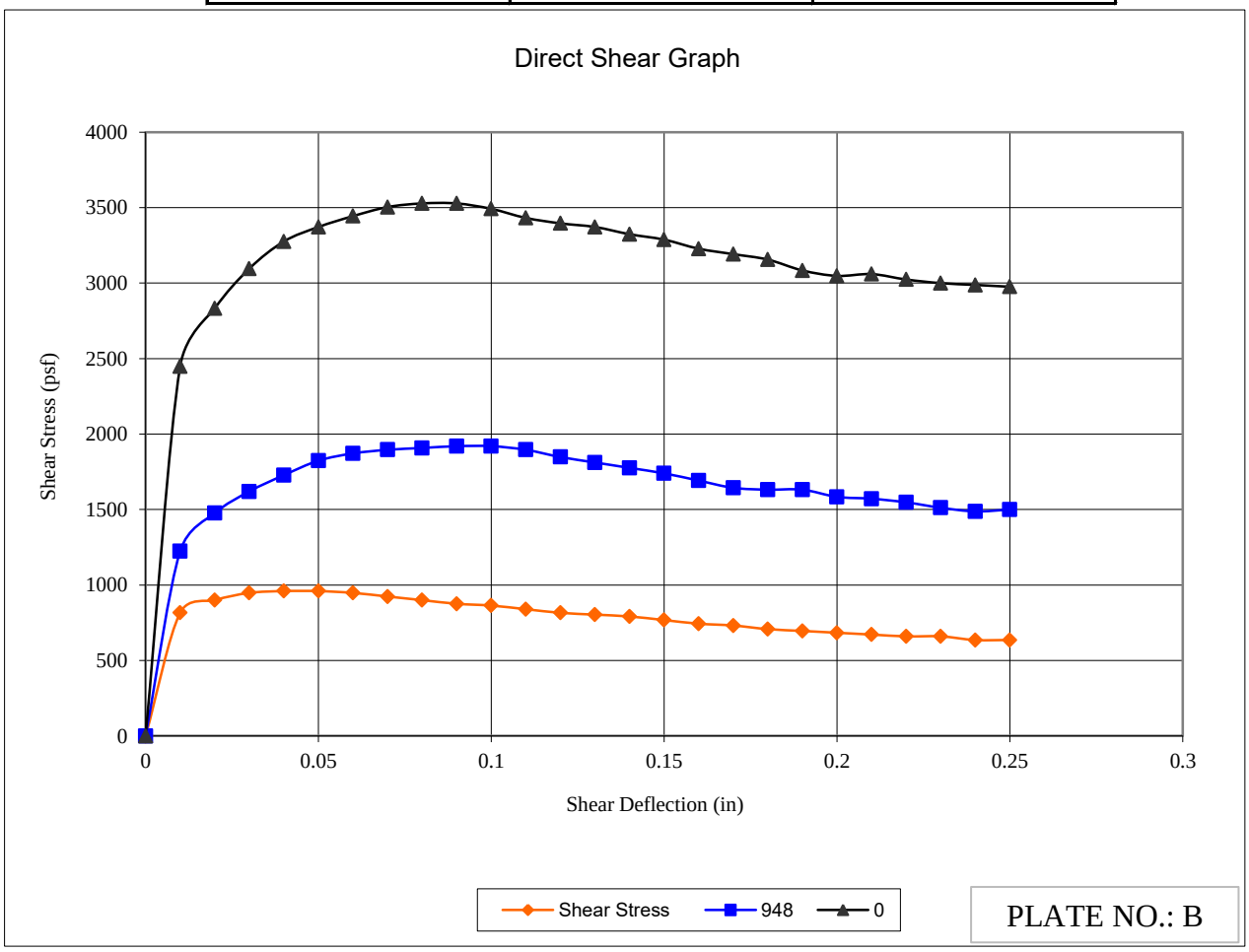


PLATE NO.: B

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

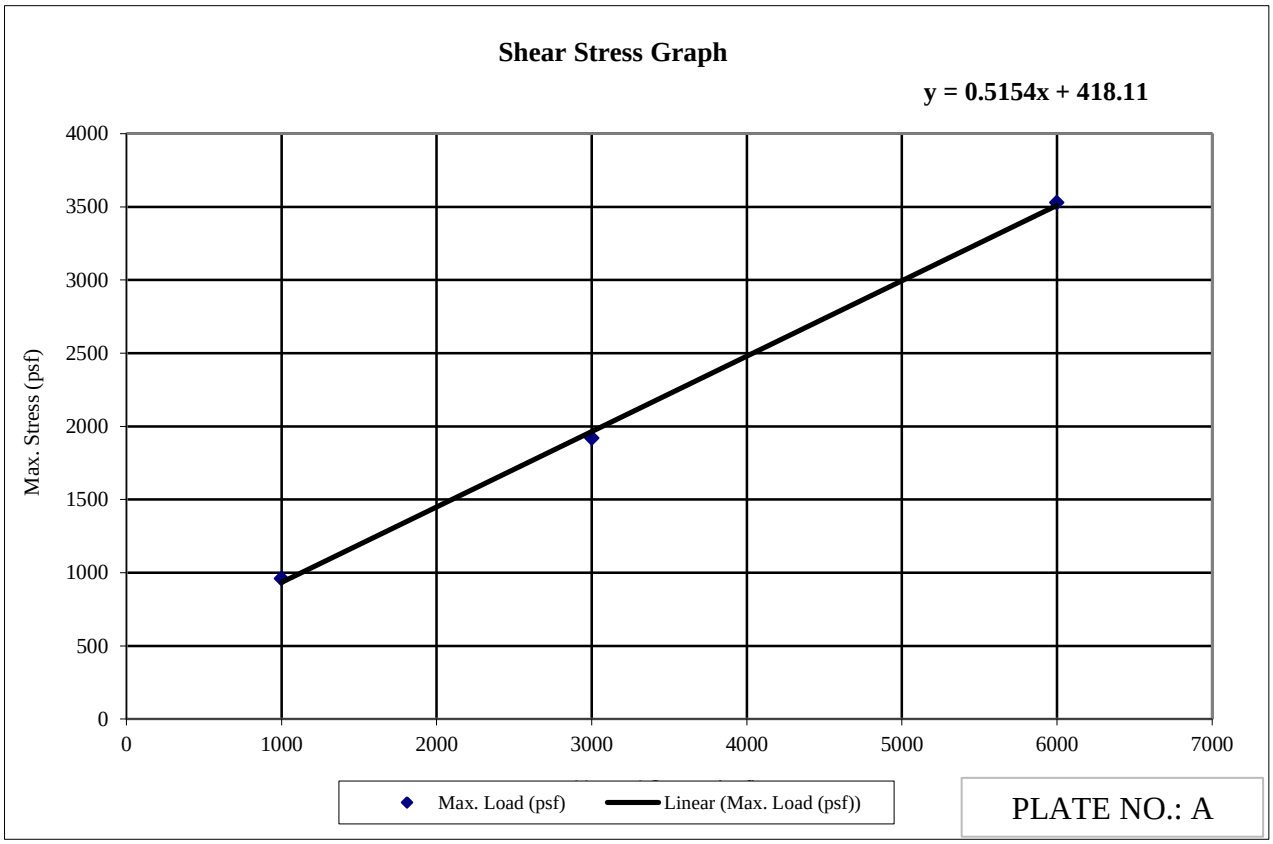
DIRECT SHEAR TEST
ASTM D3080

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage /PN PWAS_20190823	SEG File No.:	SKGLB
Location:	3701 N. Pacific Place, Long Beach, CA	Date Sampled:	10/4/19
Remark:	**intact sample**	Date Received:	10/8/19
		Date Tested:	10/18/19

Boring No.: CKG-3 Sample No.: R-3 Depth(ft): 25-26.5

Soil Classification:	Sample #1	Sample #2	Sample #3
	Brown Sandy CLAY	Brown Sandy CLAY	Brown Sandy CLAY

PEAK STRENGTH



STRENGTH INTERCEPT (KSF)= **0.418**
FRICTION ANGLE (θ) PHI in ° = **27.3**
Ave. Degree of saturation: **92.9**
Ave. Initial Voids: **0.53**

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

DIRECT SHEAR TEST
ASTM D3080

Lab. Ref. No.: 876

Client: **Carl Kim Geotechnical/Smith-Emery Anaheim**
Project: Long Beach Storage /PN PWAS_20190823
Location: 3701 N. Pacific Place, Long Beach, CA
Remark: **intact sample**

SEG Report No.: G-19-18xx
SEG File No.: SKGLB
Date Sampled: 10/4/19
Date Received: 10/8/19
Date Tested: 10/21/19

Boring No.: **CKG-3** Sample No.: **R-5** Depth(ft): **45-46.5**

Normal Stress (psf)	Moisture Content (%)	Dry Density (psf)	Peak Stress (psf)	Deflection (in)	Degree Saturation
1000	28.5	95.0	1416	0.04	99.5
3000	28.2	94.9	2568	0.03	98.2
6000	28.1	95.3	4740	0.05	99.0

Soil Classification:

Sample #1	Sample #2	Sample #3
Brown Lean CLAY W/ Sand	Brown Lean CLAY W/ Sand	Brown Lean CLAY W/ Sand

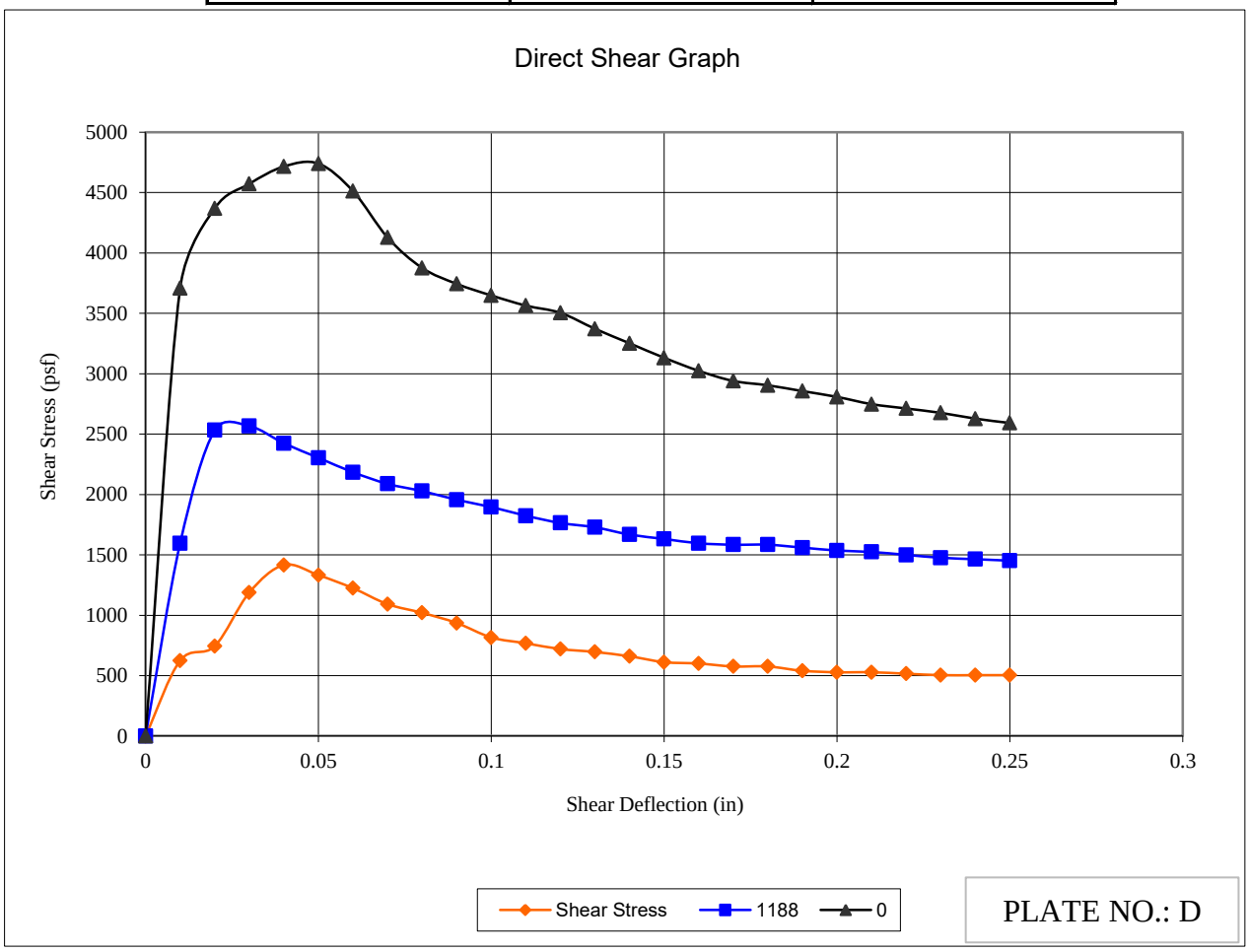


PLATE NO.: D

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

DIRECT SHEAR TEST
ASTM D3080

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim	SEG Report No.:	G-19-18xx
Project:	Long Beach Storage /PN PWAS_20190823	SEG File No.:	SKGLB
Location:	3701 N. Pacific Place, Long Beach, CA	Date Sampled:	10/4/19
Remark:	**intact sample**	Date Received:	10/8/19
		Date Tested:	10/21/19

Boring No.: CKG-3 Sample No.: R-5 Depth(ft): 45-46.5

Soil Classification:	Sample #1	Sample #2	Sample #3
	Brown Lean CLAY W/ Sand	Brown Lean CLAY W/ Sand	Brown Lean CLAY W/ Sand

PEAK STRENGTH

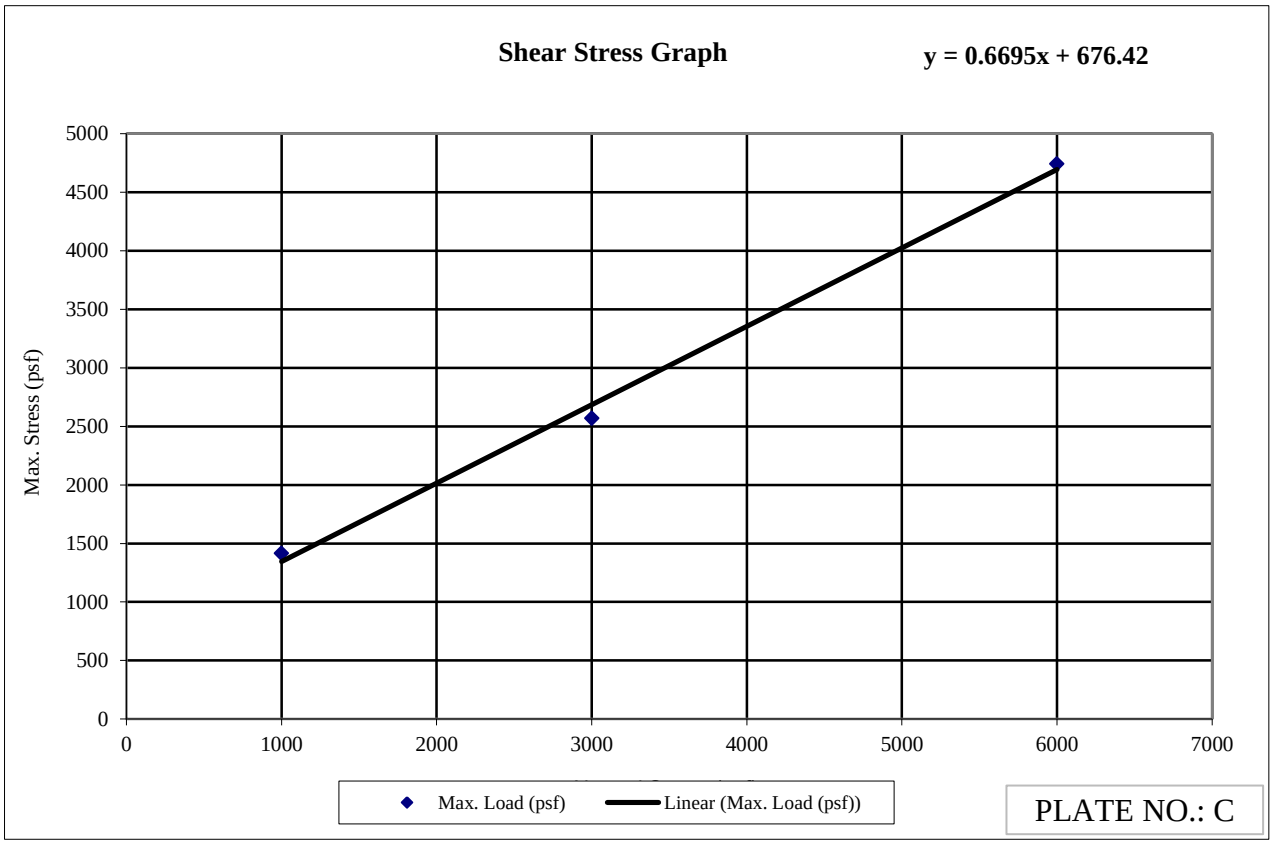


PLATE NO.: C

STRENGTH INTERCEPT (KSF)= **0.676**
FRICTION ANGLE (θ) PHI in ° = **33.9**
Ave. Degree of saturation: **98.9**
Ave. Initial Voids: **0.77**

SMITH-EMERY-LABORATORIES
791/781 East Washington Boulevard, Los Angeles, CA 90021
Tel.: (213) 745-5333; Fax (213)741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

Client: **Carl Kim Geotechnical/Smith-Emery Anaheim** | SEL File No.: CKGLB
Project: Long Beach Storage/ PWAS_20190823 | SEL Report No.: G-19-1xxx
Location: 3701 N. Pacific Place, Long Beach, CA | Date Sampled : 10/4/19
Date Received: 10/8/19
BORING NO.: CKG-3 SAMPLE NO.: R-2 DEPTH (FT.): 15-16.5' Date Tested : 10/17/19

SOIL DESCRIPTION: Brown Sandy Lean CLAY/Lean CLAY w/ Sand

CONSOL NO. 1

NORMAL PRESSURE (KSF)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	NORMAL PRESSURE (KSF)	CORRECTED DEFLECTION (%)	Graph
0	0.24715	0.00000	0.00000	0	0.00	0
0.1	0.24125	0.00590	0.00070	0.1	0.520	0.260
0.2	0.23990	0.00725	0.00120	0.2	0.605	0.303
0.4	0.23770	0.00945	0.00190	0.4	0.755	0.378
0.8	0.23230	0.01485	0.00310	0.8	1.175	0.588
1.6	0.22610	0.02105	0.00520	1.6	1.585	0.793
1.6	0.22820	0.01895	0.00520	1.6	1.375	0.688
3.2	0.22395	0.02320	0.00760	3.2	1.560	0.780
6.4	0.21560	0.03155	0.01050	6.4	2.105	1.053
12.8	0.20595	0.04120	0.01380	12.8	2.740	1.370
3.201	0.21185	0.03530	0.01050	3.201	2.480	1.240
0.801	0.22055	0.02660	0.00830	0.801	1.830	0.915
0.101	0.24540	0.00175	0.00660	0.101	-0.485	-0.243

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	0.998	1.012	0.998	1.000

Height of sample (in) 1.002
Final Height of sample (in) 0.961
Diameter of sample (in) 2.416
Volume of sample (ft^3) 0.002658 ***75.27*** (cm^3)
Final volume of sample (ft3) 0.002549 ***72.17*** (cm^3)
Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	212.0	214.5
2) wt. of dry soil + Ring	192.1	192.1
3) wt. of Ring (g)	44.8	44.8
4) wt of moisture (g)	19.9	22.4
5) % moisture content	13.5	15.2
6) wt. of dry soil Ws (g)	147.3	147.3
7) Wet density (pcf)	138.6	140.6
8) dry density (pcf)	122.1	122.1
9) Vs=Ws/GS	54.6	54.6
10) Voids Ratio (V-Vs)/(Vs)	0.38	0.38
Degree of Saturation	95.9	108.0

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.:	CKGLB
SEL Report No.:	G-19-1xxx
Date:	10/28/19
BH No.:	CKG-3
Depth:	15-16.5'
Sample No.:	R-2
Moisture Content:	13.5
Saturation:	95.9
Voids Ratio	0.38
Dry Density:	122.1

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim
Project :	Long Beach Storage/ PWAS_20190823
Location:	3701 N. Pacific Place, Long Beach, CA
Description:	Brown Sandy Lean CLAY/Lean CLAY w/ Sand

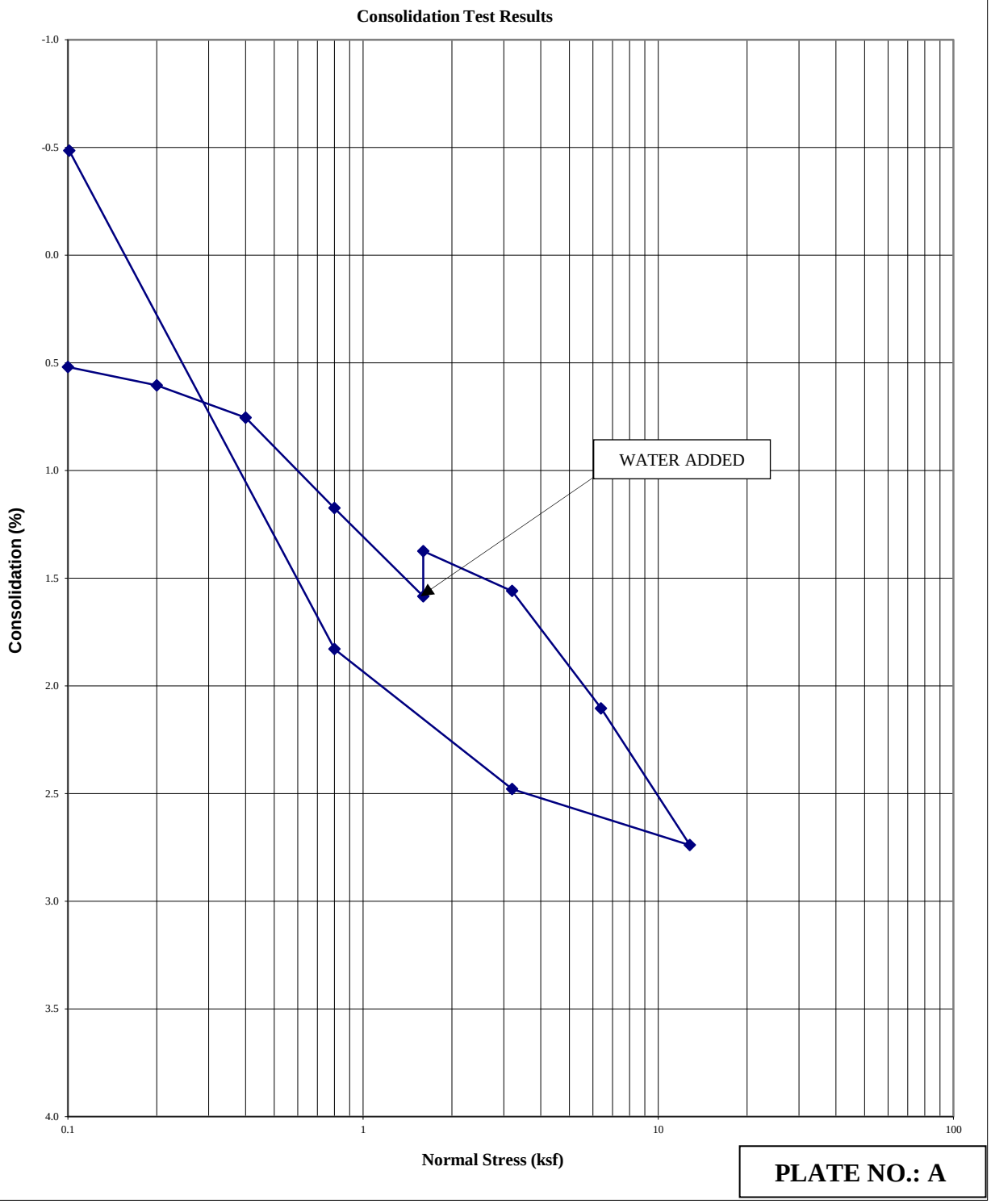


PLATE NO.: A

SMITH-EMERY-LABORATORIES
791/781 East Washington Boulevard, Los Angeles, CA 90021
Tel.: (213) 745-5333; Fax (213)741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

Client: Carl Kim Geotechnical/Smith-Emery Anaheim
Project: Long Beach Storage/ PWAS_20190823
Location: 3701 N. Pacific Place, Long Beach, CA

SEL File No.: CKGLB
SEL Report No.: G-19-1xxx
Date Sampled : 10/4/19
Date Received: 10/8/19
Date Tested : 10/17/19

BORING NO.: CKG-3 SAMPLE NO.: R-3 DEPTH (FT.): 25-26.5

SOIL DESCRIPTION: Brown Sandy CLAY/Clay w/ SAND

CONSOL NO. 2

NORMAL PRESSURE (KSF)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	NORMAL PRESSURE (KSF)	CORRECTED DEFLECTION (%)	Graph
0.0	0.25675	0.00000	0.00000	0	0.0000	0
0.1	0.25210	0.00465	0.00080	0.1	0.38	0.1925
0.2	0.24970	0.00705	0.00130	0.2	0.57	0.2875
0.4	0.24435	0.01240	0.00230	0.4	1.01	0.5050
0.8	0.23715	0.01960	0.00360	0.8	1.60	0.8000
1.6	0.23050	0.02625	0.00530	1.6	2.10	1.0475
1.6	0.23135	0.02540	0.00530	1.6	2.01	1.0050
3.2	0.22730	0.02945	0.00700	3.2	2.25	1.1225
6.4	0.21815	0.03860	0.00900	6.4	2.96	1.4800
12.8	0.20435	0.05240	0.01140	12.8	4.10	2.0500
3.201	0.21125	0.04550	0.00900	3.201	3.65	1.8250
0.801	0.22225	0.03450	0.00710	0.801	2.74	1.3700
0.101	0.24280	0.01395	0.00600	0.101	0.79	0.3975

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	0.9985	1.0060	1.0050	0.9960

Height of sample (in) 1.001
Final Height of sample (in) 0.949
Diameter of sample (in) 2.416
Volume of sample (ft^3) 0.002657 ***75.23*** (cm^3)
Final volume of sample (ft3) 0.002518 ***71.29*** (cm^3)
Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	199.2	204.7
2) wt. of dry soil + Ring	174.6	174.6
3) wt. of Ring (g)	46.2	46.2
4) wt of moisture (g)	24.6	30.1
5) % moisture content	19.2	23.4
6) wt. of dry soil Ws (g)	128.4	128.4
7) Wet density (pcf)	126.9	131.4
8) dry density (pcf)	106.5	106.5
9) Vs=Ws/GS	47.6	47.6
10) Voids Ratio (V-Vs)/(Vs)	0.58	0.58
Degree of Saturation	88.8	108.6

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.:	CKGLB
SEL Report No.:	G-19-1xxx
Date:	10/28/19
BH No.:	CKG-3
Depth:	25-26.5
Sample No.:	R-3
Moisture Content:	19.2
Saturation:	88.8
Voids Ratio	0.58
Dry Density:	106.5

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim
Project :	Long Beach Storage/ PWAS_20190823
Location:	3701 N. Pacific Place, Long Beach, CA
Description:	Brown Sandy CLAY/Clay w/ SAND

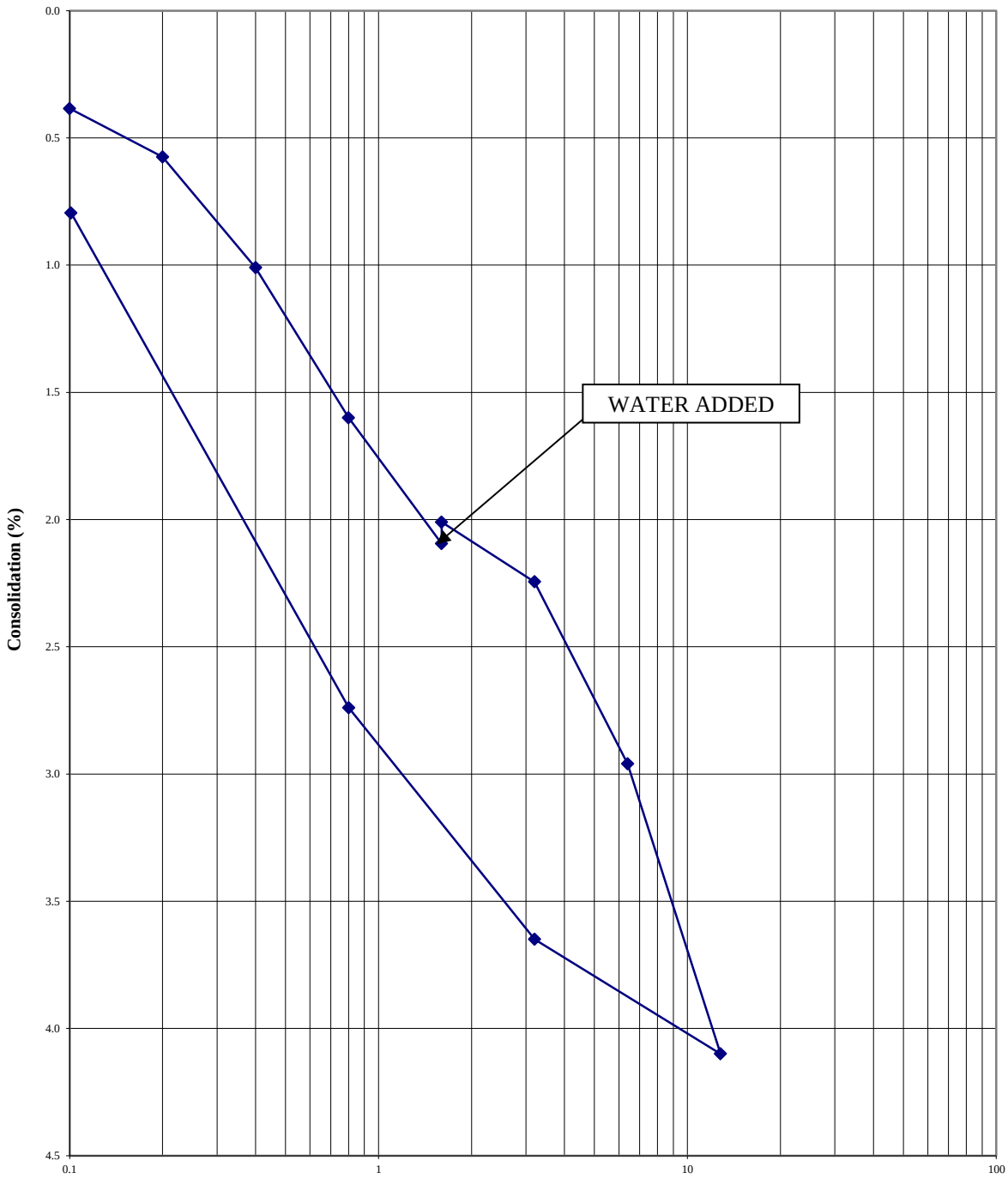


PLATE NO.: B

SEG FILE NO.: CKGLB
JOB NAME: Long Beach Storage /PN PWAS_20190823

BORING NO.: CKG-3 SAMPLE NO.: R2 DEPTH (FT.): 15-16.5

SOIL DESCRIPTION: Brown Sandy Lean CLAY/Lean CLAY w/ Sand

		CONSOL NO. 1				
		Loading (Kips)	**3.2 ksf**			
LOG of TIME (HR)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	LOG of TIME (Min.)	DEFORMATION (in)	Graph
0.000	0.22820	0.0000	0.0000	0	0.00	0
0.00167	0.22565	0.00255	0.00760	0.10	-0.51	-0.25
0.00417	0.22550	0.00270	0.00760	0.25	-0.49	-0.25
0.00833	0.22540	0.00280	0.00760	0.50	-0.48	-0.24
0.01666	0.22535	0.00285	0.00760	1	-0.48	-0.24
0.03333	0.22515	0.00305	0.00760	2	-0.46	-0.23
0.06666	0.22490	0.00330	0.00760	4	-0.43	-0.22
0.13333	0.22470	0.00350	0.00760	8	-0.41	-0.21
0.25000	0.22455	0.00365	0.00760	15	-0.40	-0.20
0.50000	0.22430	0.00390	0.00760	30	-0.37	-0.19
1	0.22405	0.00415	0.00760	60	-0.35	-0.17
2	0.22385	0.00435	0.00760	120	-0.33	-0.16
4	0.22360	0.00460	0.00760	240	-0.30	-0.15
8	0.22345	0.00475	0.00760	480	-0.29	-0.14

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	1.0125	1.0115	1.0165	1.0100

Height of sample (in) 1.013

Final Height of sample (in) 1.001

Diameter of sample (in) 2.416

Volume of sample (ft^3) 0.002687 ***76.07*** (cm^3)

Final volume of sample (ft3) 0.002657 ***75.23*** (cm^3)

Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	212.0	214.5
2) wt. of dry soil + Ring	192.1	192.1
3) wt. of Ring (g)	44.8	44.8
4) wt of moisture (g)	19.9	22.4
5) % moisture content	13.5	15.2
6) wt. of dry soil Ws (g)	147.3	147.3
7) Wet density (pcf)	137.1	139.1
8) dry density (pcf)	120.8	122.1
9) Vs=Ws/GS	54.6	54.6
10) Voids Ratio (V-Vs)/(Vs)	0.39	0.38
Degree of Saturation	92.3	108.2

SMITH-EMERY-LABORATORIES
791/781 East Washington Boulevard, Los Angeles, CA 90021
Tel.: (213) 745-5333; Fax (213)741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

Client: Carl Kim Geotechnical/Smith-Emery Anaheim
Project: Long Beach Storage/ PWAS_20190823
Location: 3701 N. Pacific Place, Long Beach, CA

SEL File No.: CKGLB
SEL Report No.: G-19-1xxx
Date Sampled : 10/4/19
Date Received: 10/8/19
Date Tested : 10/17/19

BORING NO.: CKG-5 SAMPLE NO.: R-2 DEPTH (FT.): 15-16.5

SOIL DESCRIPTION: Black SILT/ Lean CLAY (Petroleum Odor)

CONSOL NO. 3

NORMAL PRESSURE (KSF)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	NORMAL PRESSURE (KSF)	CORRECTED DEFLECTION (%)	Graph
0	0.27140	0.00000	0.00000	0	0.000	0
0.1	0.26220	0.00920	0.00060	0.1	0.860	0.430
0.2	0.25950	0.01190	0.00110	0.2	1.080	0.540
0.4	0.25545	0.01595	0.00190	0.4	1.405	0.702
0.8	0.24570	0.02570	0.00320	0.8	2.250	1.125
1.6	0.23065	0.04075	0.00480	1.6	3.595	1.7975
1.6	0.22925	0.04215	0.00480	1.6	3.735	1.868
3.2	0.21610	0.05530	0.00690	3.2	4.840	2.420
6.4	0.18925	0.08215	0.00930	6.4	7.285	3.643
12.8	0.14970	0.12170	0.01180	12.8	10.990	5.495
3.201	0.15970	0.11170	0.00890	3.201	10.280	5.140
0.801	0.17220	0.09920	0.00640	0.801	9.280	4.64
0.101	0.19645	0.07495	0.00440	0.101	7.055	3.528

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	1.0350	1.0350	1.0020	1.0005

Height of sample (in) 1.018
Final Height of sample (in) 0.896
Diameter of sample (in) 2.416
Volume of sample (ft^3) 0.002701 ***76.49*** (cm^3)
Final volume of sample (ft3) 0.002378 ***67.34*** (cm^3)
Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	174.5	171.6
2) wt. of dry soil + Ring	150.3	150.3
3) wt. of Ring (g)	43.5	43.5
4) wt of moisture (g)	24.2	21.3
5) % moisture content	22.7	19.9
6) wt. of dry soil Ws (g)	106.8	106.8
7) Wet density (pcf)	106.8	104.5
8) dry density (pcf)	87.1	87.1
9) Vs=Ws/GS	39.6	39.6
10) Voids Ratio (V-Vs)/(Vs)	0.93	0.93
Degree of Saturation	65.5	57.6

SMITH-EMERY LABORATORIES
791 E. Washington Boulevard, Los Angeles, CA 90021

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

SEL File No.:	CKGLB
SEL Report No.:	G-19-1xxx
Date:	10/28/19
BH No.:	CKG-5
Depth:	15-16.5
Sample No.:	R-2
Moisture Content:	22.7
Saturation:	65.5
Voids Ratio	0.93
Dry Density:	87.1

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim
Project :	Long Beach Storage/ PWAS_20190823
Location:	3701 N. Pacific Place, Long Beach, CA
Description:	Black SILT/ Lean CLAY (Petroleum Odor)

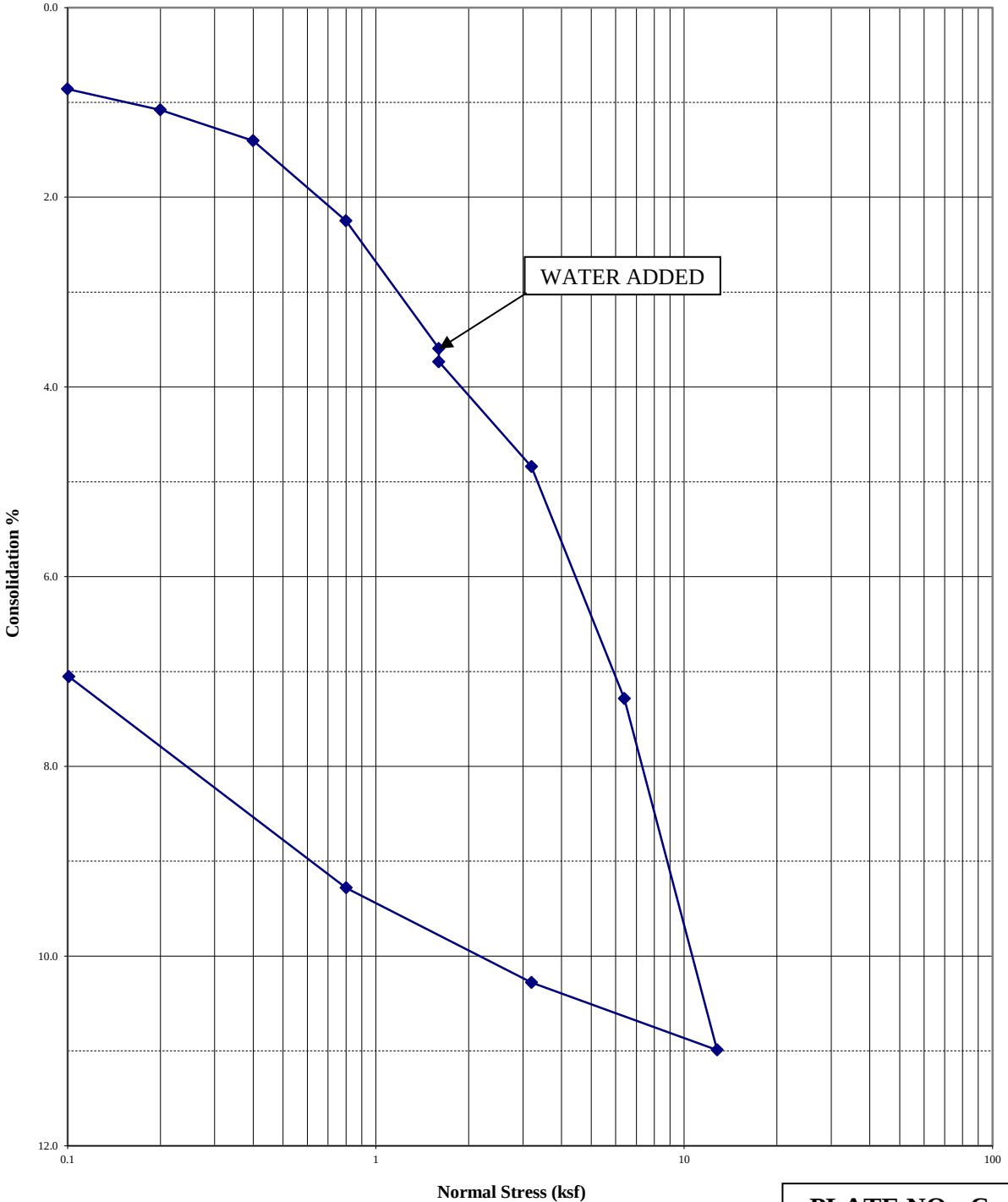


PLATE NO.: C

SEG FILE NO.: CKGLB
JOB NAME: Long Beach Storage /PN PWAS_20190823

BORING NO.: CKG-5 SAMPLE NO.: R-2 DEPTH (FT.): 15-16.5

SOIL DESCRIPTION: Black SILT/ Lean CLAY (Petroleum Odor)

CONSOL NO. 3

Loading (Kips) **3.2**

LOG of TIME (hr)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	LOG of TIME (Min.)	DEFORMATION (in)	Graph
0	0.22925	0.0000	0.00000	0	0.0000	0
0.002	0.22490	0.0044	0.00690	0.10	-0.2550	-0.1275
0.004	0.22440	0.0049	0.00690	0.25	-0.2050	-0.1025
0.008	0.22400	0.0053	0.00690	0.50	-0.1650	-0.0825
0.017	0.22380	0.0055	0.00690	1	-0.1450	-0.072
0.033	0.22305	0.0062	0.00690	2	-0.0700	-0.035
0.067	0.22230	0.0070	0.00690	4	0.0050	0.0025
0.133	0.22140	0.0079	0.00690	8	0.0950	0.047
0.25	0.22065	0.0086	0.00690	15	0.1700	0.085
0.50	0.21975	0.0095	0.00690	30	0.2600	0.13
1	0.21880	0.0105	0.00690	60	0.3550	0.178
2	0.21790	0.0114	0.00690	120	0.4450	0.2225
4	0.21695	0.0123	0.00690	240	0.5400	0.27
8	0.21610	0.0132	0.00690	480	0.6250	0.3125

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	1.0350	1.0350	1.0020	1.0005

Height of sample (in) 1.018

Final Height of sample (in) 1.008

Diameter of sample (in) 2.416

Volume of sample (ft^3) 0.002701 ***76.49*** (cm^3)

Final volume of sample (ft3) 0.002674 ***75.71*** (cm^3)

Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	174.5	171.6
2) wt. of dry soil + Ring	150.3	150.3
3) wt. of Ring (g)	43.5	43.5
4) wt of moisture (g)	24.2	21.3
5) % moisture content	22.7	19.9
6) wt. of dry soil Ws (g)	106.8	106.8
7) Wet density (pcf)	106.8	104.5
8) dry density (pcf)	87.1	88.0
9) Vs=Ws/GS	39.6	39.6
10) Voids Ratio (V-Vs)/(Vs)	0.93	0.91
Degree of Saturation	65.5	58.9

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

SEG FILE NO.: CKGLB
JOB NAME: Storage /PN PWAS_20190823

Date Received: 10/8/19
DateTested: 10/22/19

BORING NO.: CKG-5 SAMPLE NO.: R-2 DEPTH (FT.): 15-16.5

SOIL DESCRIPTION: Black SILT/ Lean CLAY (Petroleum Odor)

% moisture content	**22.7**
dry density (pcf)	**87.1**
Degree of Saturation	65.5
Voids Ratio (V-Vs)/(Vs)	0.9

CONSOL NO. 3	
Loading (Kips)	**3.2**

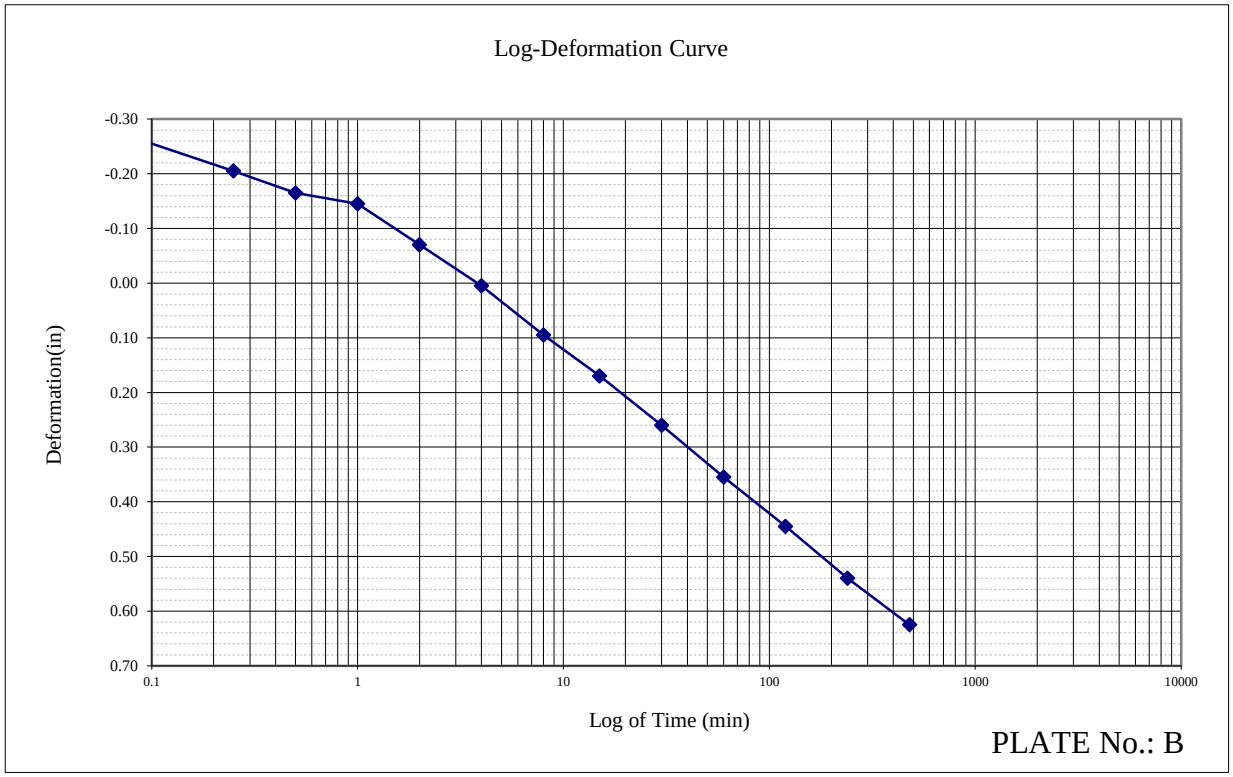


PLATE No.: B

SMITH-EMERY-LABORATORIES
791/781 East Washington Boulevard, Los Angeles, CA 90021
Tel.: (213) 745-5333; Fax (213)741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim	SEL File No.:	CKGLB
Project:	Long Beach Storage/ PWAS_20190823	SEL Report No.:	G-19-1xxx
Location:	3701 N. Pacific Place, Long Beach, CA	Date Sampled :	10/4/19
		Date Received:	10/8/19

BORING NO.: CKG5 SAMPLE NO.: R3 DEPTH (FT.): 25-26.5 Date Tested : 10/17/19

SOIL DESCRIPTION: Black Sandy SILT (Petroleum Odor)

CONSOL NO. 4

NORMAL PRESSURE (KSF)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	NORMAL PRESSURE (KSF)	CORRECTED DEFLECTION (%)	Graph
0	0.27075	0.00000	0.00000	0	0.0000	0
0.1	0.25955	0.01120	0.00080	0.1	1.0400	0.5200
0.2	0.25185	0.01890	0.00130	0.2	1.7600	0.8800
0.4	0.23800	0.03275	0.00220	0.4	3.0550	1.5275
0.8	0.22915	0.04160	0.00380	0.8	3.7800	1.8900
1.6	0.21950	0.05125	0.00530	1.6	4.5950	2.2975
1.6	0.21880	0.05195	0.00530	1.6	4.6650	2.3325
3.2	0.20470	0.06605	0.00720	3.2	5.8850	2.9425
6.4	0.18145	0.08930	0.00930	6.4	8.0000	4.0000
12.8	0.15450	0.11625	0.01150	12.8	10.4750	5.2375
3.201	0.15845	0.11230	0.00950	3.201	10.2800	5.1400
0.801	0.16380	0.10695	0.00770	0.801	9.9250	4.9625
0.101	0.17640	0.09435	0.00580	0.101	8.8550	4.4275

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	0.9985	0.9945	0.9950	0.9945

Height of sample (in) 0.996

Final Height of sample (in) 0.879

Diameter of sample (in) 2.416

Volume of sample (ft3) 0.002641 ***74.80*** (cm^3)

Final volume of sample (ft3) 0.002333 ***66.06*** (cm^3)

Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	180.1	176.5
2) wt. of dry soil + Ring	157.1	157.1
3) wt. of Ring (g)	45.4	45.4
4) wt of moisture (g)	23.0	19.4
5) % moisture content	20.6	17.4
6) wt. of dry soil Ws (g)	111.7	111.7
7) Wet density (pcf)	112.3	109.3
8) dry density (pcf)	93.1	93.1
9) Vs=Ws/GS	41.4	41.4
10) Voids Ratio (V-Vs)/(Vs)	0.81	0.81
Degree of Saturation	68.7	58.0

SMITH-EMERY LABORATORIES
791 E. Washington Boulevard, Los Angeles, CA 90021

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

SEL File No.:	CKGLB
SEL Report No.:	G-19-1xxx
Date:	10/28/19
BH No.:	CKG5
Depth:	25-26.5
Sample No.:	R3
Moisture Content:	20.6
Saturation:	68.7
Voids Ratio	0.81
Dry Density:	93.1

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim
Project :	Long Beach Storage/ PWAS_20190823
Location:	3701 N. Pacific Place, Long Beach, CA
Description:	Black Sandy SILT (Petroleum Odor)

Consolidation Test Results

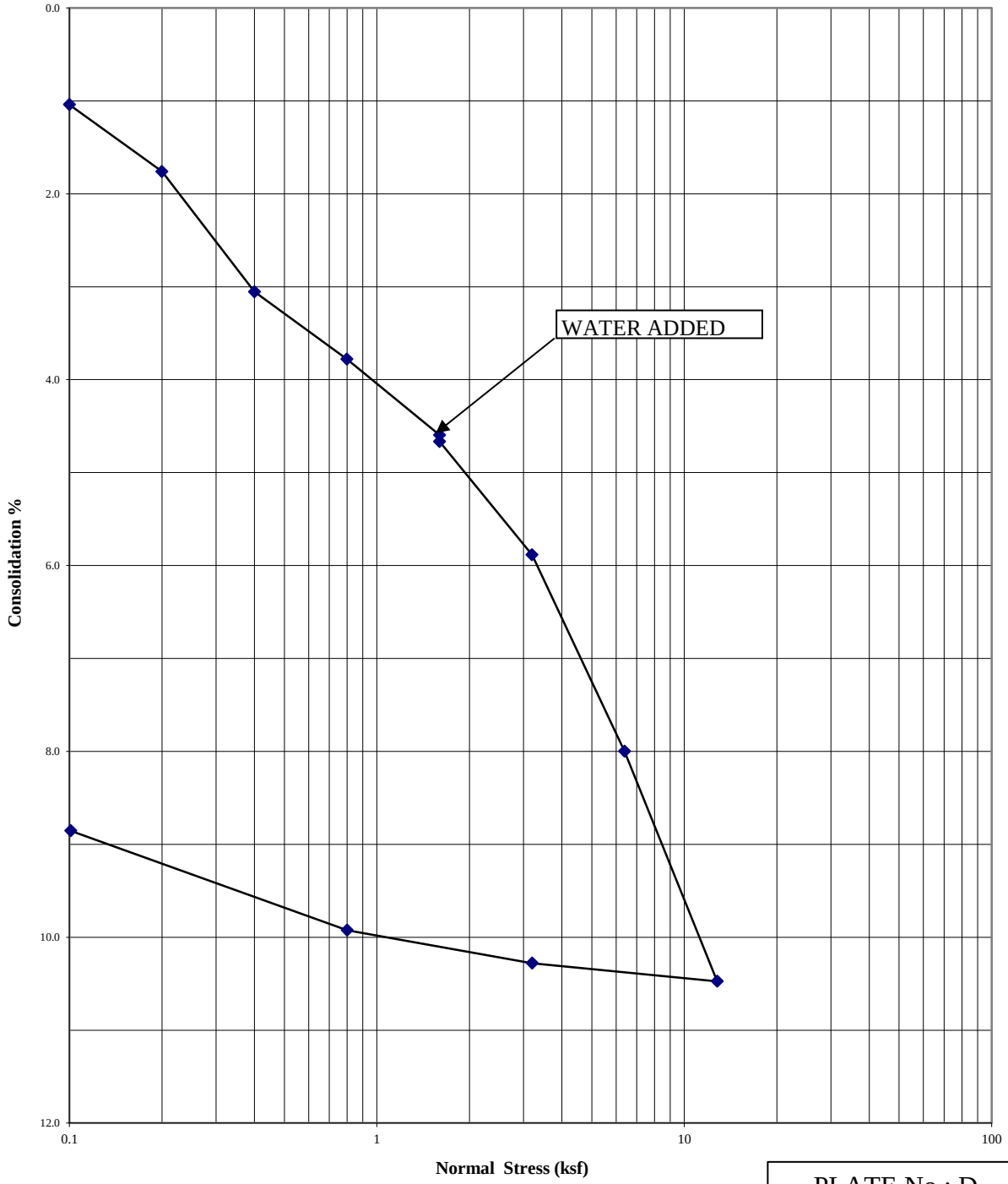


PLATE No.: D

SEG FILE NO.: CKGLB
JOB NAME: Long Beach Storage /PN PWAS_20190823

BORING NO.: CKG5 SAMPLE NO.: R3 DEPTH (FT.): 25-26.5

SOIL DESCRIPTION: Black Sandy SILT (Petroleum Odor)

CONSOL NO. 4

Loading (Kips) **3.2**

LOG of TIME (hr)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	LOG of TIME (Min.)	DEFORMATION (in)	Graph
0	0.21880	0.00000	0.00000	0	0.0000	0
0.002	0.21170	0.00710	0.00720	0.10	-0.0100	-0.0050
0.004	0.21085	0.00795	0.00720	0.25	0.0750	0.0375
0.008	0.21040	0.00840	0.00720	0.50	0.1200	0.0600
0.017	0.21010	0.00870	0.00720	1	0.1500	0.0750
0.033	0.20920	0.00960	0.00720	2	0.2400	0.1200
0.067	0.20845	0.01035	0.00720	4	0.3150	0.1575
0.133	0.20770	0.01110	0.00720	8	0.3900	0.1950
0.25	0.20725	0.01155	0.00720	15	0.4350	0.2175
0.50	0.20675	0.01205	0.00720	30	0.4850	0.2425
1	0.20620	0.01260	0.00720	60	0.5400	0.2700
2	0.20565	0.01315	0.00720	120	0.5950	0.2975
4	0.20520	0.01360	0.00720	240	0.6400	0.3200
8	0.20470	0.01410	0.00720	480	0.6900	0.3450

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	0.9985	0.9945	0.9950	0.9945

Height of sample (in) 0.996

Final Height of sample (in) 0.990

Diameter of sample (in) 2.416

Volume of sample (ft3) 0.002641 ***74.80*** (cm^3)

Final volume of sample (ft3) 0.002628 ***74.41*** (cm^3)

Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	180.1	176.5
2) wt. of dry soil + Ring	157.1	157.1
3) wt. of Ring (g)	45.4	45.4
4) wt of moisture (g)	23.0	19.4
5) % moisture content	20.6	17.4
6) wt. of dry soil Ws (g)	111.7	111.7
7) Wet density (pcf)	112.3	109.9
8) dry density (pcf)	93.1	93.6
9) Vs=Ws/GS	41.4	41.4
10) Voids Ratio (V-Vs)/(Vs)	0.81	0.80
Degree of Saturation	68.7	58.7

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

SEG FILE NO.: CKGLB
JOB NAME: Long Beach Storage /PN PWAS_20190823

Date Received: 10/8/19
DateTested: 10/22/19

BORING NO.: CKG5 SAMPLE NO.: R3 DEPTH (FT.): 25-26.5

SOIL DESCRIPTION: Black Sandy SILT (Petroleum Odor)

% moisture content	**20.6**
dry density (pcf)	**93.1**
Degree of Saturation	68.7
Voids Ratio (V-Vs)/(Vs)	68.7

CONSOL NO. 4	
Loading (Kips)	**3.2**

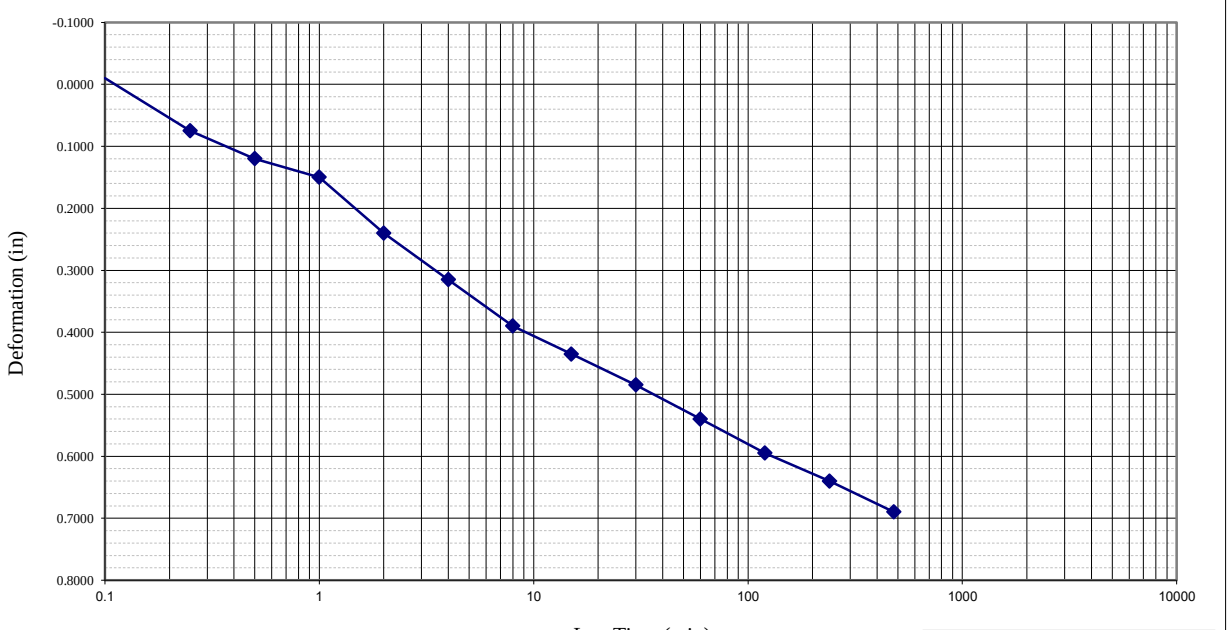


PLATE No.: C

SMITH-EMERY-LABORATORIES
791/781 East Washington Boulevard, Los Angeles, CA 90021
Tel.: (213) 745-5333; Fax (213)741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

Client: **Carl Kim Geotechnical/Smith-Emery Anaheim** SEL File No.: CKGLB
Project: Long Beach Storage/ PWAS_20190823 SEL Report No.: G-19-1xxx
Location: 3701 N. Pacific Place, Long Beach, CA Date Sampled : 10/4/19
Date Received: 10/8/19
BORING NO.: CKG-5 SAMPLE NO.: R-4 DEPTH (FT.): 35-36.5' Date Tested : 10/28/19

SOIL DESCRIPTION: Gray SILT

CONSOL NO. 1

NORMAL PRESSURE (KSF)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	NORMAL PRESSURE (KSF)	CORRECTED DEFLECTION (%)	Graph
0	0.25655	0.00000	0.00000	0	0.00	0
0.1	0.25380	0.00275	0.00070	0.1	0.205	0.102
0.2	0.25155	0.00500	0.00120	0.2	0.380	0.190
0.4	0.24935	0.00720	0.00190	0.4	0.530	0.265
0.8	0.24611	0.01044	0.00310	0.8	0.734	0.367
1.6	0.24055	0.01600	0.00520	1.6	1.080	0.540
3.2	0.23430	0.02225	0.00760	3.2	1.465	0.733
3.2	0.23345	0.02310	0.00760	3.2	1.550	0.775
6.4	0.22410	0.03245	0.01050	6.4	2.195	1.098
12.8	0.20905	0.04750	0.01380	12.8	3.370	1.685
3.201	0.21555	0.04100	0.01050	3.201	3.050	1.525
0.801	0.22395	0.03260	0.00830	0.801	2.430	1.215
0.101	0.24005	0.01650	0.00660	0.101	0.990	0.495

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	1.007	1.013	1.005	1.007

Height of sample (in) 1.008
Final Height of sample (in) 0.961
Diameter of sample (in) 2.416
Volume of sample (ft^3) 0.002674 ***75.73*** (cm^3)
Final volume of sample (ft3) 0.002548 ***72.16*** (cm^3)
Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	205.9	207.2
2) wt. of dry soil + Ring	182.6	182.6
3) wt. of Ring (g)	44.5	44.5
4) wt of moisture (g)	23.3	24.6
5) % moisture content	16.9	17.8
6) wt. of dry soil Ws (g)	138.1	138.1
7) Wet density (pcf)	132.9	134.0
8) dry density (pcf)	113.7	113.7
9) Vs=Ws/GS	51.1	51.1
10) Voids Ratio (V-Vs)/(Vs)	0.48	0.48
Degree of Saturation	94.7	100.0

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.:	CKGLB
SEL Report No.:	G-19-1xxx
Date:	10/28/19
BH No.:	CKG-5
Depth:	35-36.5'
Sample No.:	R-4
Moisture Content:	16.9
Saturation:	94.7
Voids Ratio	0.48
Dry Density:	113.7

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim
Project :	Long Beach Storage/ PWAS_20190823
Location:	3701 N. Pacific Place, Long Beach, CA
Description:	Gray SILT

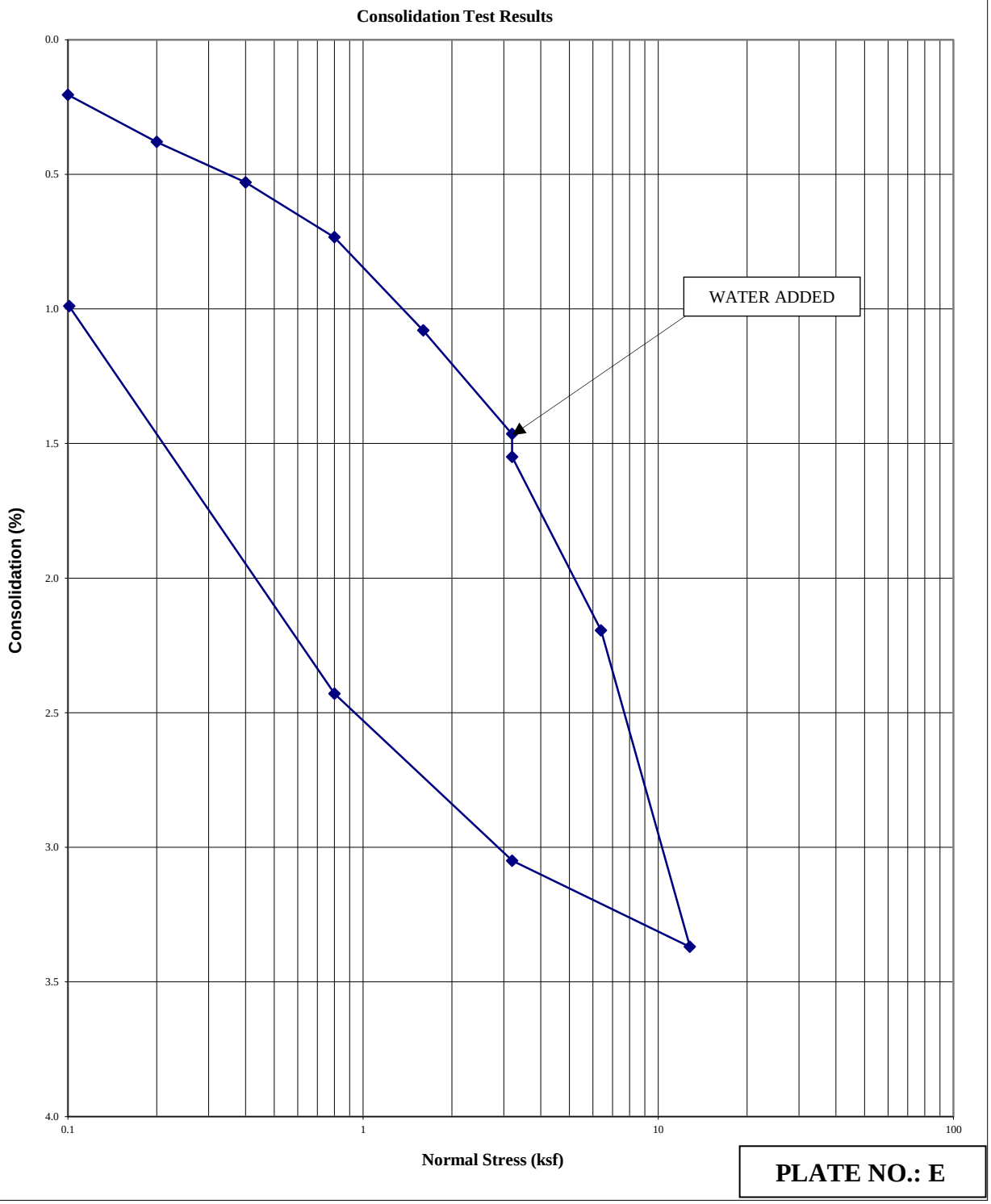


PLATE NO.: E

SMITH-EMERY-LABORATORIES
791/781 East Washington Boulevard, Los Angeles, CA 90021
Tel.: (213) 745-5333; Fax (213)741-8621

ASTM D2435-11

One-Dimensional Consolidation Properties of Soils Using Incremental Loading

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim	SEL File No.:	CKGLB
Project:	Long Beach Storage/ PWAS_20190823	SEL Report No.:	G-19-1xxx
Location:	3701 N. Pacific Place, Long Beach, CA	Date Sampled :	10/4/19
		Date Received:	10/8/19

BORING NO.: CKG-5 SAMPLE NO.: R-5 DEPTH (FT.): 45-46.5 Date Tested : 10/28/19

SOIL DESCRIPTION: Gray Lean CLAY

CONSOL NO. 2

NORMAL PRESSURE (KSF)	DIAL READING (INCH)	TOTAL DEFLECTION (INCH)	DEVICE CORRECTION (INCH)	NORMAL PRESSURE (KSF)	CORRECTED DEFLECTION (%)	Graph
0.0	0.25490	0.00000	0.00000	0	0.0000	0
0.1	0.25085	0.00405	0.00080	0.1	0.33	0.1625
0.2	0.24635	0.00855	0.00130	0.2	0.73	0.3625
0.4	0.24075	0.01415	0.00230	0.4	1.19	0.5925
0.8	0.23595	0.01895	0.00360	0.8	1.54	0.7675
1.6	0.22905	0.02585	0.00530	1.6	2.06	1.0275
3.2	0.22380	0.03110	0.00700	3.2	2.41	1.2050
3.2	0.23915	0.01575	0.00700	3.2	0.88	0.4375
6.4	0.23120	0.02370	0.00900	6.4	1.47	0.7350
12.8	0.21715	0.03775	0.01140	12.8	2.64	1.3175
3.201	0.23415	0.02075	0.00900	3.201	1.18	0.5875
0.801	0.25260	0.00230	0.00710	0.801	-0.48	-0.2400
0.101	0.28455	-0.02965	0.00600	0.101	-3.57	-1.7825

SAMPLE MOISTURE CONTENT/DRY DENSITY

Measure Sample Ht. (in)	1.0050	1.0050	1.0020	1.0030

Height of sample (in) 1.004

Final Height of sample (in) 0.966

Diameter of sample (in) 2.416

Volume of sample (ft^3) 0.002663 ***75.41*** (cm^3)

Final volume of sample (ft3) 0.002563 ***72.57*** (cm^3)

Assumed Sp. Gr. (SG) 2.700 Unit of Water (pcf): 62.4

	Before	After
1) wt. of wet soil + Ring (g)	188.5	193.2
2) wt. of dry soil + Ring	154.1	154.1
3) wt. of Ring (g)	44.0	44.0
4) wt of moisture (g)	34.4	39.1
5) % moisture content	31.2	35.5
6) wt. of dry soil Ws (g)	110.1	110.1
7) Wet density (pcf)	119.5	123.4
8) dry density (pcf)	91.1	91.1
9) Vs=Ws/GS	40.8	40.8
10) Voids Ratio (V-Vs)/(Vs)	0.85	0.85
Degree of Saturation	99.2	112.8

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.:	CKGLB
SEL Report No.:	G-19-1xxx
Date:	10/28/19
BH No.:	CKG-5
Depth:	45-46.5
Sample No.:	R-5
Moisture Content:	31.2
Saturation:	99.2
Voids Ratio	0.85
Dry Density:	91.1

Client:	Carl Kim Geotechnical/Smith-Emery Anaheim
Project :	Long Beach Storage/ PWAS_20190823
Location:	3701 N. Pacific Place, Long Beach, CA
Description:	Gray Lean CLAY

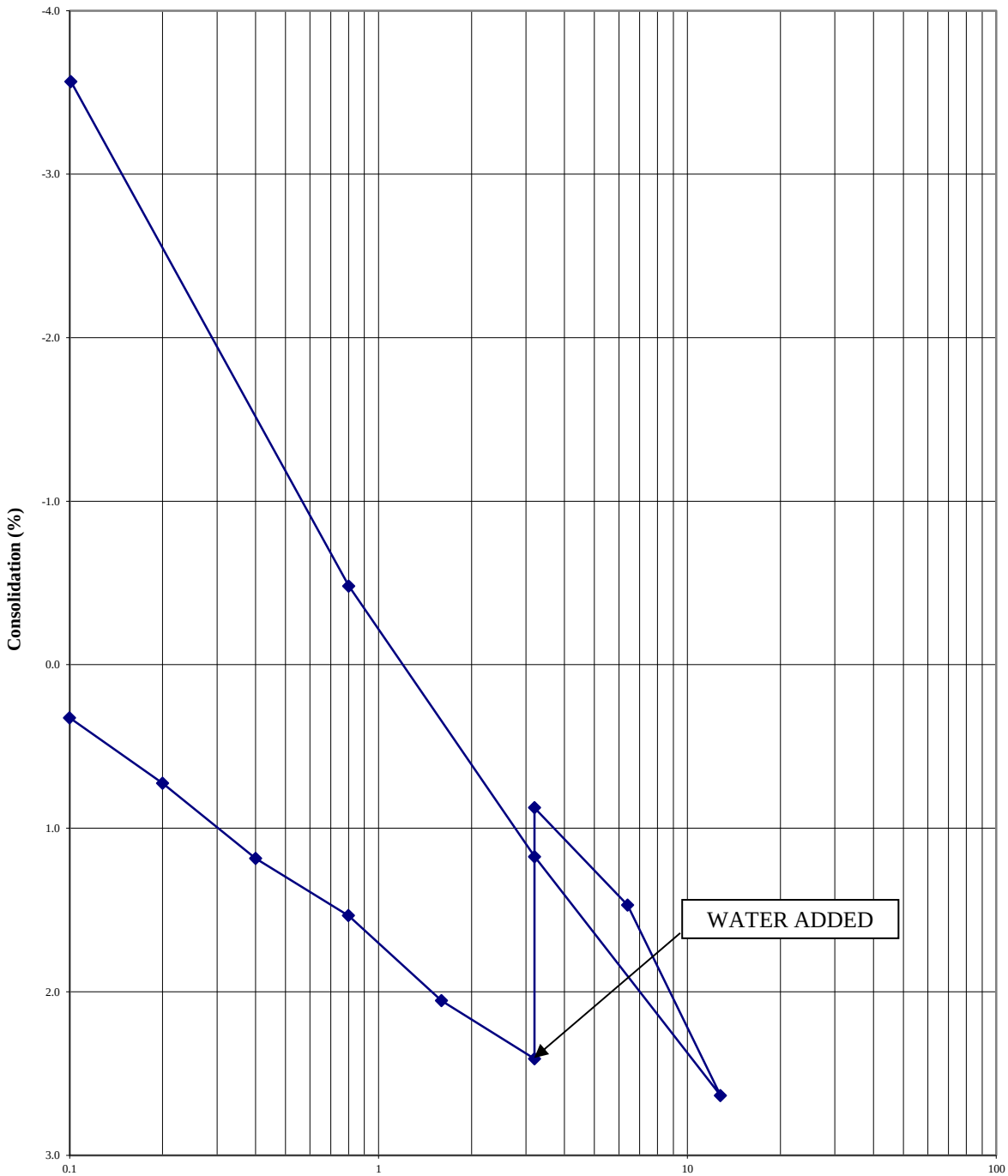


PLATE NO.: F

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/ Smith-Emery Anaheim — Lab. Ref. No.: 876
Project: Long Beach Storage PWAS_20190823 — SEL File No.: CKGLB
Location: 371 N. Long Beach, CA — Date Sampled: 10/4/19
Material Description: Olive Brown Clayey SAND — Date Received: 10/8/19
Boring No.: CKG-3 — Sample No. Blk-1 — Depth (ft.) 0-3.0' — Date Tested: 10/21/19
Equipment: Used: — Ring I.D.: B — Oven: SE SQ-1 — Chamber No.: 1
Balance: B846769478 — 5 #Rammer: SE SH-1

						Height Measurement
Area of specimen (in^2)	12.57	Initial Ht. (in)	1.0000	Final Ht. (in)	1.0432	1.0000
Ring Diameter (in)	4.00	Initial Vol. ft^3	0.00727	Final Vol. ft^3	0.00759	1.0000
Undisturbed Sample		Assumed sp. gr. of soil =		2.700		1.0000
Remolded Sample	X	% Saturation: (%mc*x* sp.gr*x* Dd)/(sp.gr*x* 62.4-Dd)				1.0000

Initial Moisture content

wt.wet soil + tare	275.2
wt. of dry soil + tare	263.2
wt. of tare	130.8
Moisture content %	9.1

REMARKS

Sampled by Dan Phelps

Moisture and Density Data

	Initial	Final
Wt. of wet soil + Ring	777.5	815.3
Wt. of dry soil+ Ring	743.4	743.4
Wt. of Moisture	34.1	71.9
Wt. of Ring	367.5	367.5
Wt of dry soil	375.9	375.9
Moisture Content %	9.1	19.1
Wet Density (pcf)	124.2	130.0
Dry Density (pcf)	113.9	109.1
% Saturation	51	95

Date	Time	Time Lapsed	Load (kPa)/(psi)	Dial Reading	deflection (in.)
10/21/19	13:20		0	0.0000	0.0000
			6.9 kPa/ 1 psi	0.0000	0.0000
	13:30	10 min		0.0033	0.0033
		6sec	Saturated	0.0036	
10/21/19		15sec		0.0042	-0.0009
		30sec		0.0049	-0.0016
		1min		0.0040	-0.0007
		2min		0.0013	0.0020
		4min		-0.0022	0.0055
		8min		-0.0078	0.0111
		15min		-0.0151	0.0184
		30min		-0.0255	0.0288
	14:30	1hr		-0.0369	0.0402
	15:30	2hrs		-0.0409	0.0442
10/22/19	7:30	18hrs		-0.0432	0.0465
				EI $_{50}$	**47**

*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 (-).*

TABLE 18-1-B

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

Tested By: A. Cabanilla — 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/ Smith-Emery Anaheim — Lab. Ref. No.: 880
Project: Long Beach Storage PWAS_20190823 — SEL File No.: CKGLB
Location: 371 N. Long Beach, CA — Date Sampled: 10/4/19
Material Description: Very Dark Brown Sandy Silty CLAY (petrol odor) — Date Received: 10/8/19
Boring No.: CKG-5 — Sample No. Blk-1 — Depth (ft.) 0-3.0' — Date Tested: 10/22/19
Equipment: Used: — Ring I.D.: C — Oven: SE SQ-1 — Chamber No.: 1
Balance: B846769478 — 5 #Rammer: SE SH-1

Area of specimen (in^2) 12.57 — Initial Ht. (in) 1.0000 — Final Ht. (in) 1.0501
Ring Diameter (in) 4.00 — Initial Vol. ft^3 0.00727 — Final Vol. ft^3 0.00764
Undisturbed Sample [ ] — Assumed sp. gr. of soil = 2.700
Remolded Sample [X] — % Saturation: (%mc*x* sp.gr*x* Dd)/(sp.gr*x* 62.4-Dd)

Height Measurement

1.0000
1.0000
1.0000
1.0000

Initial Moisture content

wt.wet soil + tare	254.7
wt. of dry soil + tare	243.9
wt. of tare	130.9
Moisture content %	9.6

REMARKS
Sampled by Dan Phelps

Moisture and Density Data

	Initial	Final
Wt. of wet soil + Ring	767.5	801.6
Wt. of dry soil+ Ring	733.7	733.7
Wt. of Moisture	33.8	67.9
Wt. of Ring	366.5	366.5
Wt of dry soil	367.2	367.2
Moisture Content %	9.2	18.5
Wet Density (pcf)	121.5	125.5
Dry Density (pcf)	111.2	105.9
% Saturation	48	85

Date	Time	Time Lapsed	Load (kPa)/(psi)	Dial Reading	deflection (in.)
10/22/19	12:56		0	0.0000	0.0000
			6.9 kPa/ 1 psi	0.0000	0.0000
	13:06	10 min		0.0059	0.0059
		6sec	Saturated	0.0060	
10/22/19		15sec		0.0061	-0.0002
		30sec		0.0062	-0.0003
		1min		0.0060	-0.0001
		2min		0.0055	0.0004
		4min		0.0040	0.0019
		8min		0.0011	0.0048
		15min		-0.0030	0.0089
		30min		-0.0094	0.0153
	14:06	1hr		-0.0169	0.0228
	15:06	2hrs		-0.0261	0.0320
10/23/19	8:06	19hrs		-0.0501	0.0560
				EI $_{50}$	**56**

*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 (-).*

TABLE 18-1-B

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

Tested By: A. Cabanilla — Checked By: A.Cabanilla

SMITH-EMERY LABORATORIES

An Independent Commercial Testing Laboratory, Established 1904

1195 N. Tustin Anahiem, California 92807 ◆ Tel. (714) 238-6133 ◆ Fax (714) 238-6144

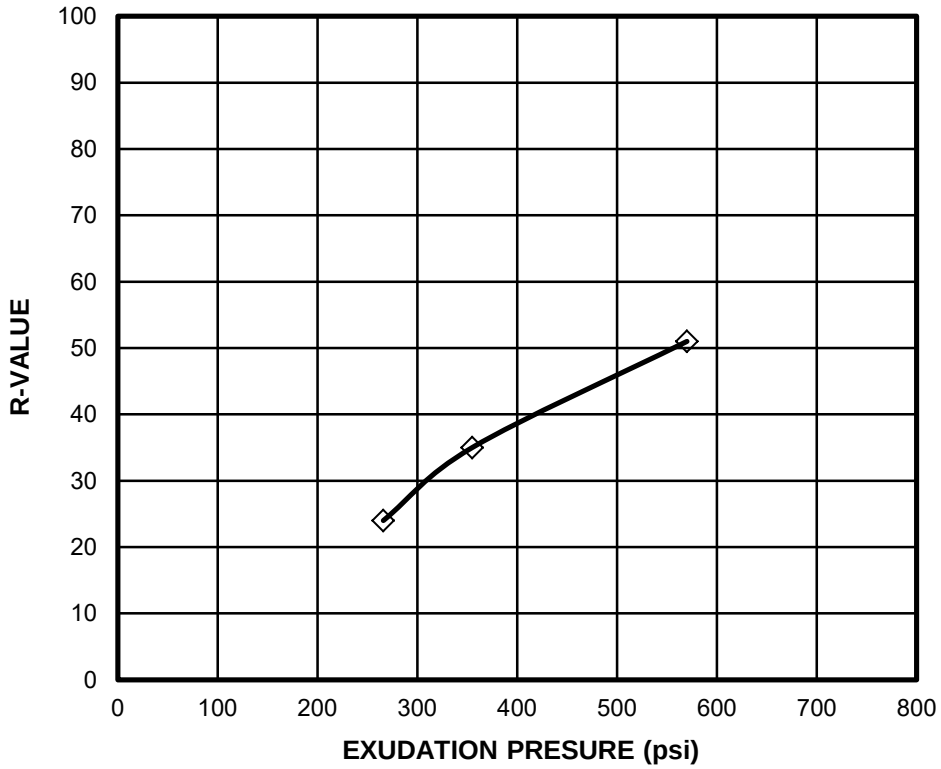
(CAL TEST 301) Report No.: A19-245

SEL JOB #: New
Date Sample: 10/16/2019
Project: Long Beach Storage PWAS_20190823
Source: Native/On Site Material
SOIL TYPE: Brown Clayey SAND
Sample # 1
BH No. CKG-3

SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	570	355	266
PREPARED WEIGHT (g)	1100	1100	1100
FINAL WATER ADDED (g)	30	40	50
WEIGHT, SOIL & MOLD (g	3106	3127	3125
WEIGHT, MOLD (g)	2095	2094	2100
HEIGHT (in)	2.22	2.3	2.42
EXPANSION DIAL	0	0	0
STABILOMETER @ 1000 lb	0	0	0
STABILOMETER @ 2000 lb	60	84	106
TURNS DISPLACEMENT	3.25	3.34	3.82
(2.5/d)*((Pv/Ph)-1)+1	2.28	1.68	1.33
100/Above	44	60	75
R-VALUE TEST	51	35	24

VALUE AT 300 PSI
EXUDATION PRESSURE:

R-VALUE:
Corrected: **31**



Moisture:	**R-VALUE TEST**
	Smith-Emery Laboratory

SMITH-EMERY LABORATORIES

An Independent Commercial Testing Laboratory, Established 1904

1195 N. Tustin Anahiem, California 92807 ◆ Tel. (714) 238-6133 ◆ Fax (714) 238-6144

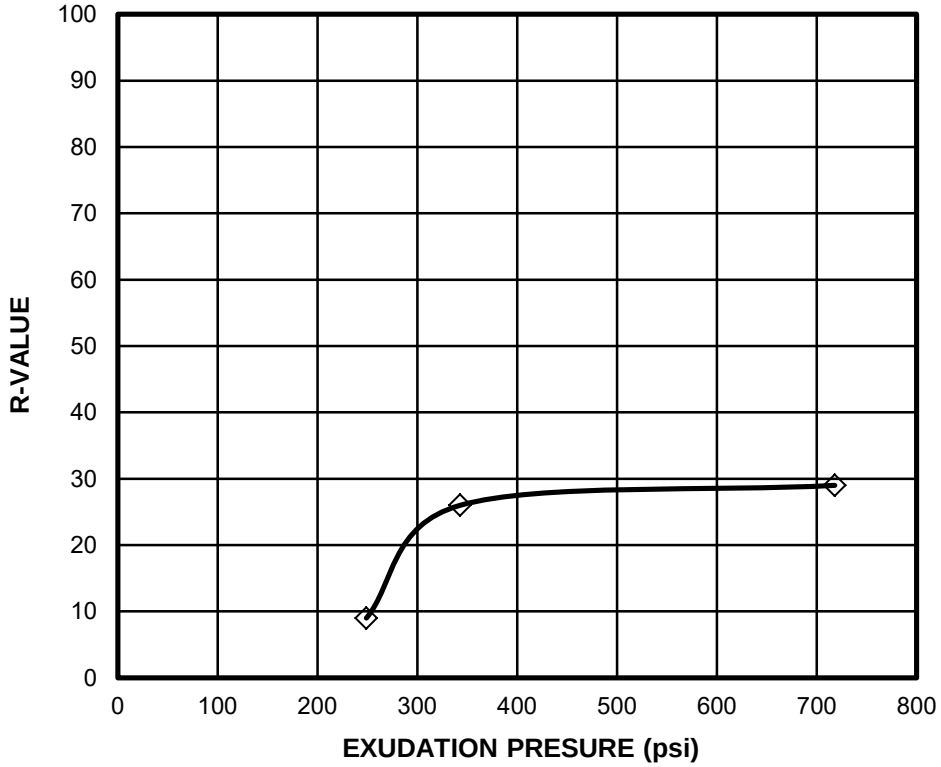
(CAL TEST 301) Report No.: A19-245

SEL JOB #: New
Date Sample: 10/16/2019
Project: Long Beach Storage PWAS_20190823
Source: Native/On Site Material
SOIL TYPE: Vry Dark Grayish Brown Sandy Silty CLAY
Sample # 2
BH No. CKG-5

SPECIMEN	A	B	C
EXUDATION PRESSURE (psi)	718	343	249
PREPARED WEIGHT (g)	1100	1100	1100
FINAL WATER ADDED (g)	20	40	50
WEIGHT, SOIL & MOLD (g	3064	3116	3009
WEIGHT, MOLD (g)	2090	2098	2094
HEIGHT (in)	2.47	2.72	2.55
EXPANSION DIAL	0	0	0
STABILOMETER @ 1000 lb	0	0	0
STABILOMETER @ 2000 lb	104	114	140
TURNS DISPLACEMENT	3.25	3.34	3.82
(2.5/d)*((Pv/Ph)-1)+1	1.41	1.30	1.09
100/Above	71	77	91
R-VALUE TEST	29	26	9

VALUE AT 300 PSI
EXUDATION PRESSURE:

R-VALUE:
Corrected: **20**



Moisture: 7.10%	**R-VALUE TEST**
	Smith-Emery Laboratory

POSITIVE LAB SERVICE

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

October 23, 2019

Mr. Robert Greeley
Smith Emery Company [Anaheim]
1195 N. Tustin Avenue
Anaheim, CA 92807

Report No.: 1910178
Project Name: Long Beach Storage PWAS_20190823 - 3701 N. Pacific Place, Long Beach, CA

Dear Mr. Robert Greeley,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on October 16, 2019.

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

POSITIVE LAB SERVICE

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

Certificate of Analysis

Smith Emery Company [Anaheim]
1195 N. Tustin Avenue
Anaheim, CA 92807

Attn: Mr. Robert Greeley Phone: (714) 238-6133 FAX:(714) 238-6144

File #:73901
Report Date: 10/23/19
Submitted: 10/16/19
PLS Report No.: 1910178

Project: Long Beach Storage PWAS_20190823 - 3701 N. Pacific Place, Long Beach, CA

Sample ID: BULK-1 CKG-3 0-3 Silty Sand (1910178-01) Sampled: 10/04/19 00:00 Received: 10/16/19 08:33

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method		Prepared	Analyzed	By	Batch
Soluble Chloride	**102**		1	mg/kg	5.00	DI-Leach	EPA 300.0 M	10/17/19	10/18/19	cg	BJ91811
Soluble Sulfate	**367**		1	mg/kg	5.00	DI-Leach	EPA 300.0 M	10/17/19	10/18/19	cg	BJ91811
Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method		Prepared	Analyzed	By	Batch
pH	**8.2**		1	pH Units	0.1	EPA 9045C	EPA 9045C	10/17/19	10/17/19	dd	BJ91804
Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method		Prepared	Analyzed	By	Batch
Resistivity, Minimum	**1130**		1	ohm-cm	1.00	-	CTM 643-2007	10/18/19	10/18/19	vc	BJ91824

Sample ID: BULK-1 CKG-5 0-3 Silty Sand (1910178-02) Sampled: 10/04/19 00:00 Received: 10/16/19 08:33

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method		Prepared	Analyzed	By	Batch
Soluble Chloride	**3290**		10	mg/kg	50.0	DI-Leach	EPA 300.0 M	10/17/19	10/18/19	cg	BJ91811
Soluble Sulfate	**608**		1	mg/kg	5.00	DI-Leach	EPA 300.0 M	10/17/19	10/18/19	cg	BJ91811
Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method		Prepared	Analyzed	By	Batch
pH	**7.8**		1	pH Units	0.1	EPA 9045C	EPA 9045C	10/17/19	10/17/19	dd	BJ91804
Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method		Prepared	Analyzed	By	Batch
Resistivity, Minimum	**178**		1	ohm-cm	1.00	-	CTM 643-2007	10/18/19	10/18/19	vc	BJ91824

Quality Control Data

Analyte		Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BJ91811 - DI-Leach											
Blank		**Prepared: 10/17/19 Analyzed: 10/18/19**									
Soluble Chloride		ND	5.00	mg/kg							
Soluble Sulfate		ND	5.00	mg/kg							
LCS		**Prepared: 10/17/19 Analyzed: 10/18/19**									
Soluble Chloride		50.4	5.00	mg/kg	50.00		101	70-130			
Soluble Sulfate		49.4	5.00	mg/kg	50.00		98.8	70-130			
Matrix Spike	**Source: 1910178-01**	**Prepared: 10/17/19 Analyzed: 10/18/19**									
Soluble Chloride		153	5.00	mg/kg	50.00	102	101	70-130			
Soluble Sulfate		425	5.00	mg/kg	50.00	367	115	70-130			
Matrix Spike Dup	**Source: 1910178-01**	**Prepared: 10/17/19 Analyzed: 10/18/19**									
Soluble Chloride		149	5.00	mg/kg	50.00	102	94.5	70-130	6.38	30	
Soluble Sulfate		443	5.00	mg/kg	50.00	367	152	70-130	27.5	30	V-2
Batch BJ91804 - EPA 9045C											
Duplicate	**Source: 1910180-01**	**Prepared & Analyzed: 10/17/19**									
pH		9.4	0.1	pH Units		9.4			0.00	5	

POSITIVE LAB SERVICE

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

Certificate of Analysis

Smith Emery Company [Anaheim]
1195 N. Tustin Avenue
Anaheim, CA 92807

Attn: Mr. Robert Greeley Phone: (714) 238-6133 FAX:(714) 238-6144

File #:73901
Report Date: 10/23/19
Submitted: 10/16/19
PLS Report No.: 1910178

Project: Long Beach Storage PWAS_20190823 - 3701 N. Pacific Place, Long Beach, CA

Notes and Definitions

V-2	Out-of-Range recovery was due to sample Heterogeneity.
NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
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

Authorized Signature(s)

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

Chain of Custody

1910178

Client: SMITH-EMERY ANAHEIM / CKG Date: OCT. 16, 2019 Page 1 of 1

Project Name: LONG BEACH STORAGE PWAS_20190823 Project No.: NEW

Location: 3701 N. PACIFIC PLACE, LONG BEACH, CA Source: ON SITE Sampled By: CLIENT / CKG

Sample Number	Boring No. / Depth in Ft.	Description	Date Sampled	Time	Container Type	No.	Test Requested and Standard
BULK-1 CKG-3	CKG-3 0-3	SILTY SAND	10.4.19 *	-	ZIPLOC	1	MIN. RESISTIVITY, PH VALUE, SOL CHLORIDE & SOL SULFATE
BULK-1 CKG-5	CKG-5 0-3	"	10.4.19 *	-	ZIPLOC	1	

Turnaround Time: Same Day 24hr 5 day Other: REGULAR

Results Attn: ROB GREELEY & CC ANGELITO Phone / Fax #: /

CHAIN OF CUSTODY:

1.	Signature	LAB MANAGER Title	10/16/19 Inclusive Dates
2.	Signature	Lines Manager Title	10/16/19 8:33 am 26.3°C Inclusive Dates
3.	Signature	Title	Inclusive Dates

* 10.16.19 @ 8:38
Sampling date Confirmed per Angelito (email)

APPENDIX D

SEISMIC DESIGN PARAMETERS

AND LIQUEFACTION ANALYSIS

InSite LB Self-Storage

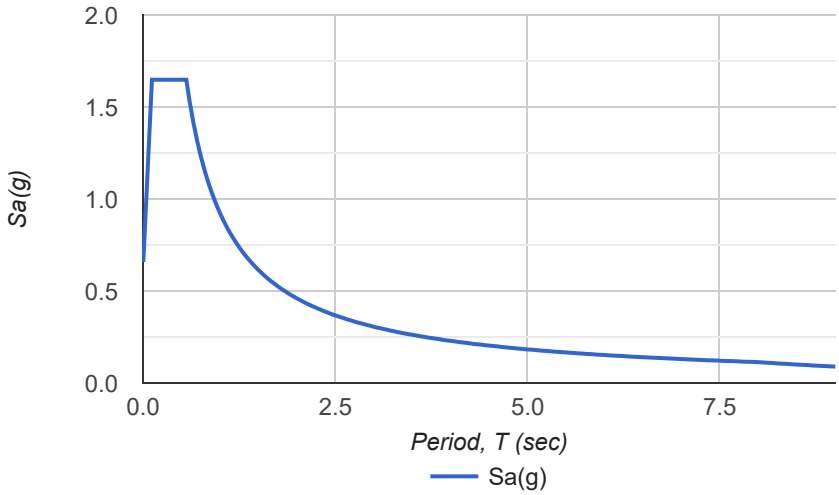
Latitude, Longitude: 33.826368, -118.202516

Date	10/22/2019, 11:09:30 AM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

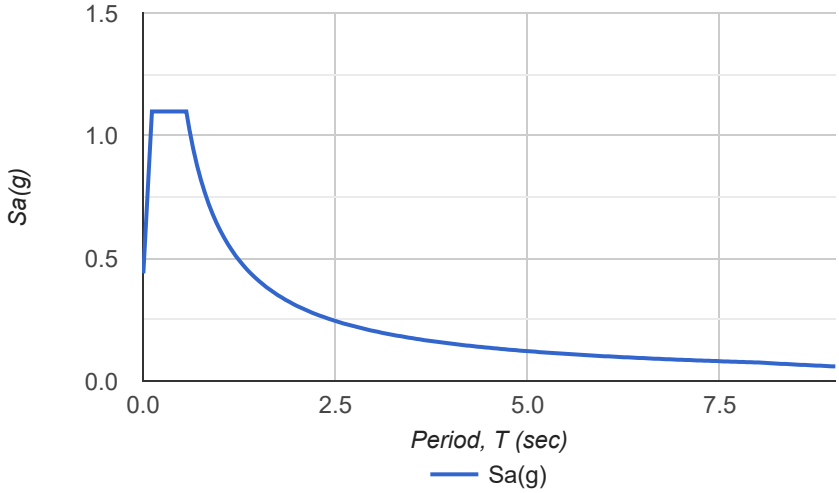
Type	Value	Description
S_S	1.65	MCE_R ground motion. (for 0.2 second period)
S_1	0.615	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.65	Site-modified spectral acceleration value
S_{M1}	0.922	Site-modified spectral acceleration value
S_{DS}	1.1	Numeric seismic design value at 0.2 second SA
S_{D1}	0.615	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.63	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.63	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.65	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.72	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.537	Factored deterministic acceleration value. (0.2 second)
S1RT	0.615	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.632	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.107	Factored deterministic acceleration value. (1.0 second)
PGAd	0.979	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.959	Mapped value of the risk coefficient at short periods
C_{R1}	0.973	Mapped value of the risk coefficient at a period of 1 s

MCER Response Spectrum



Design Response Spectrum



DISCLAIMER

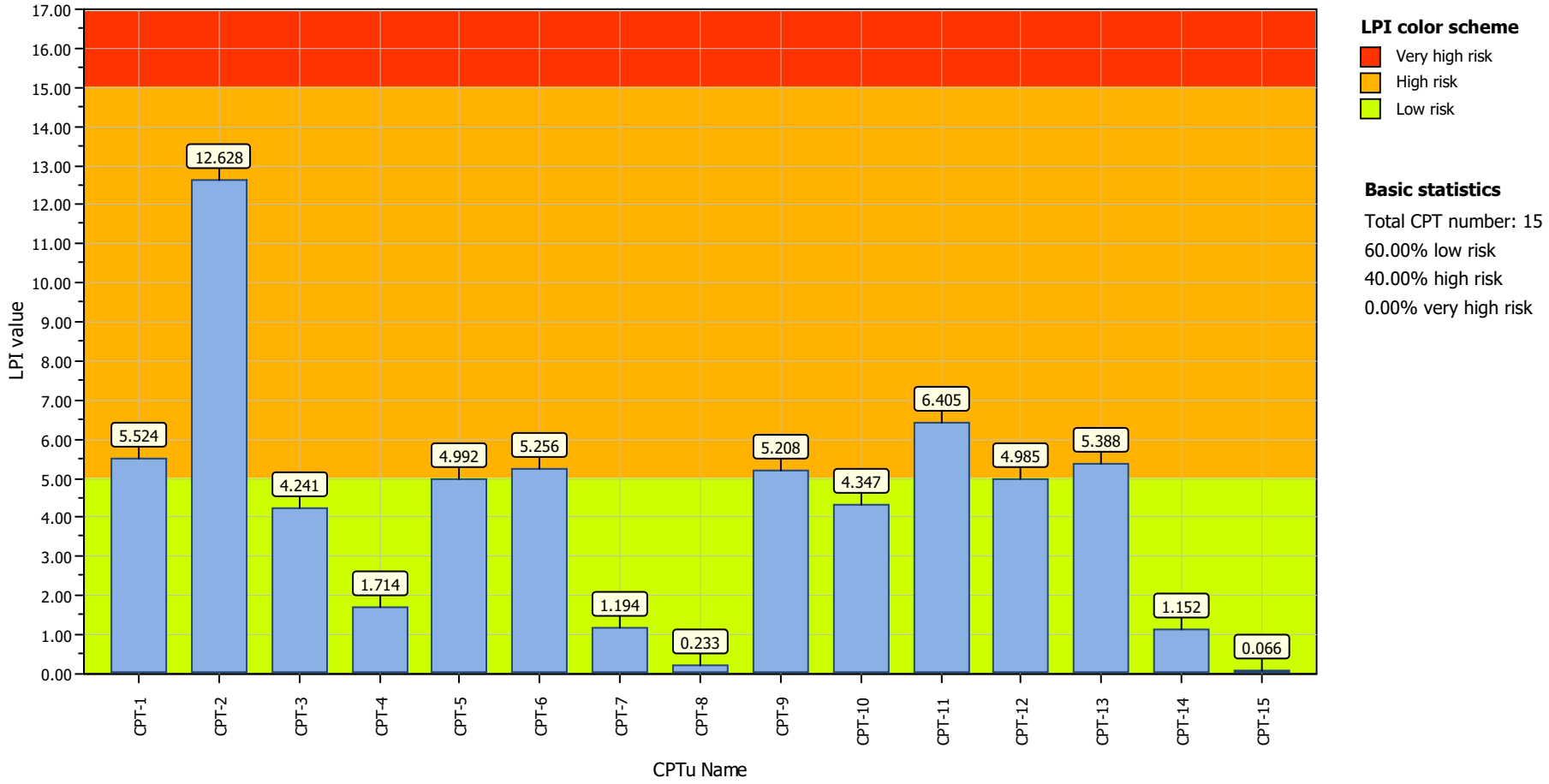
While the information presented on this website is believed to be correct, SEAOC /OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this webstie.

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

Project title : InSite LB self storage

Location :

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

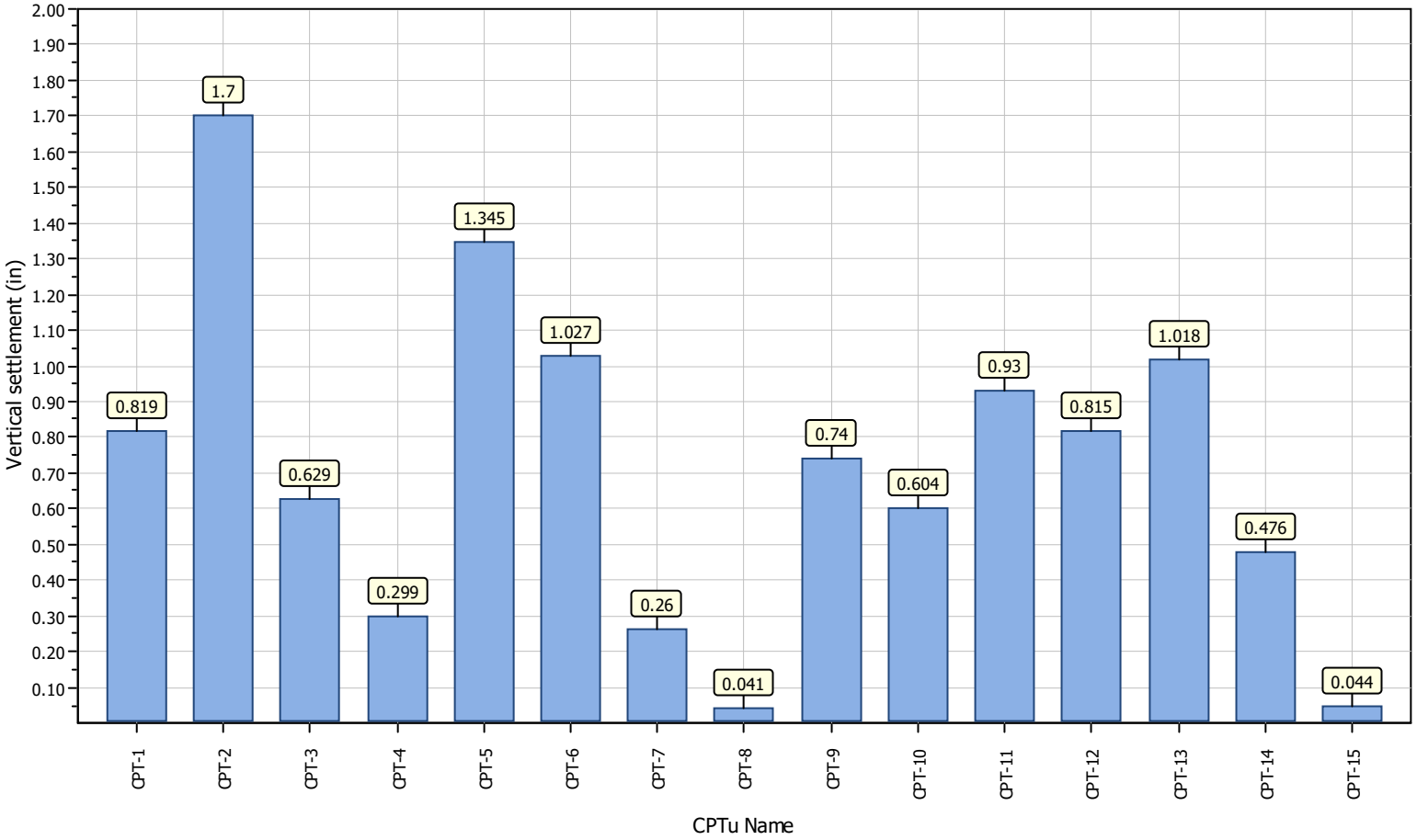
Total CPT number: 15
60.00% low risk
40.00% high risk
0.00% very high risk

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

Project title : InSite LB self storage

Location :

Overall vertical settlements report

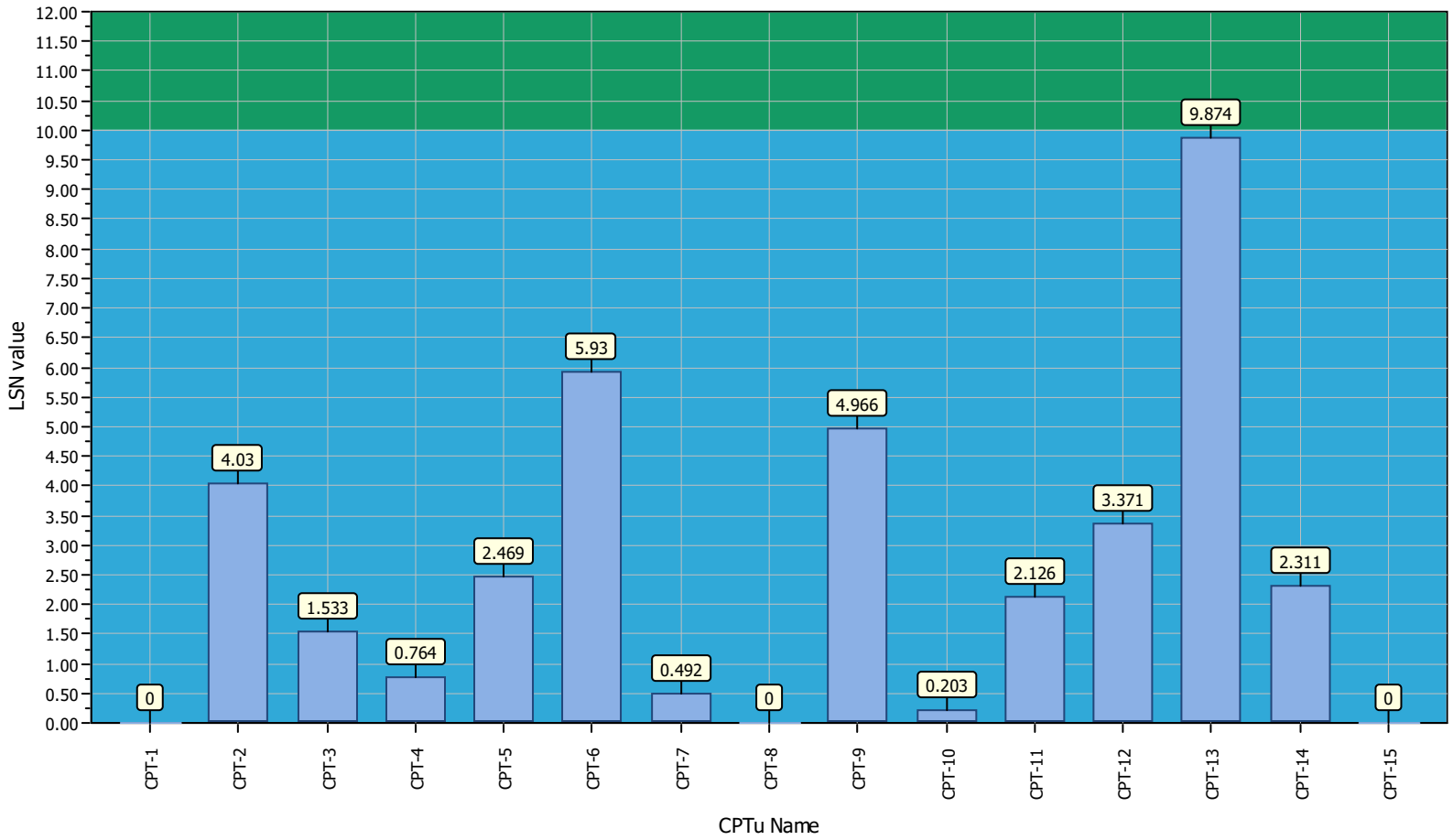


Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010

Project title : InSite LB self storage

Location :

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: 15

100.00% little liquefaction

0.00% minnor liquefaction

0.00% moderate liquefaction

0.00% moderate to major liquefaction

0.00% major liquefaction

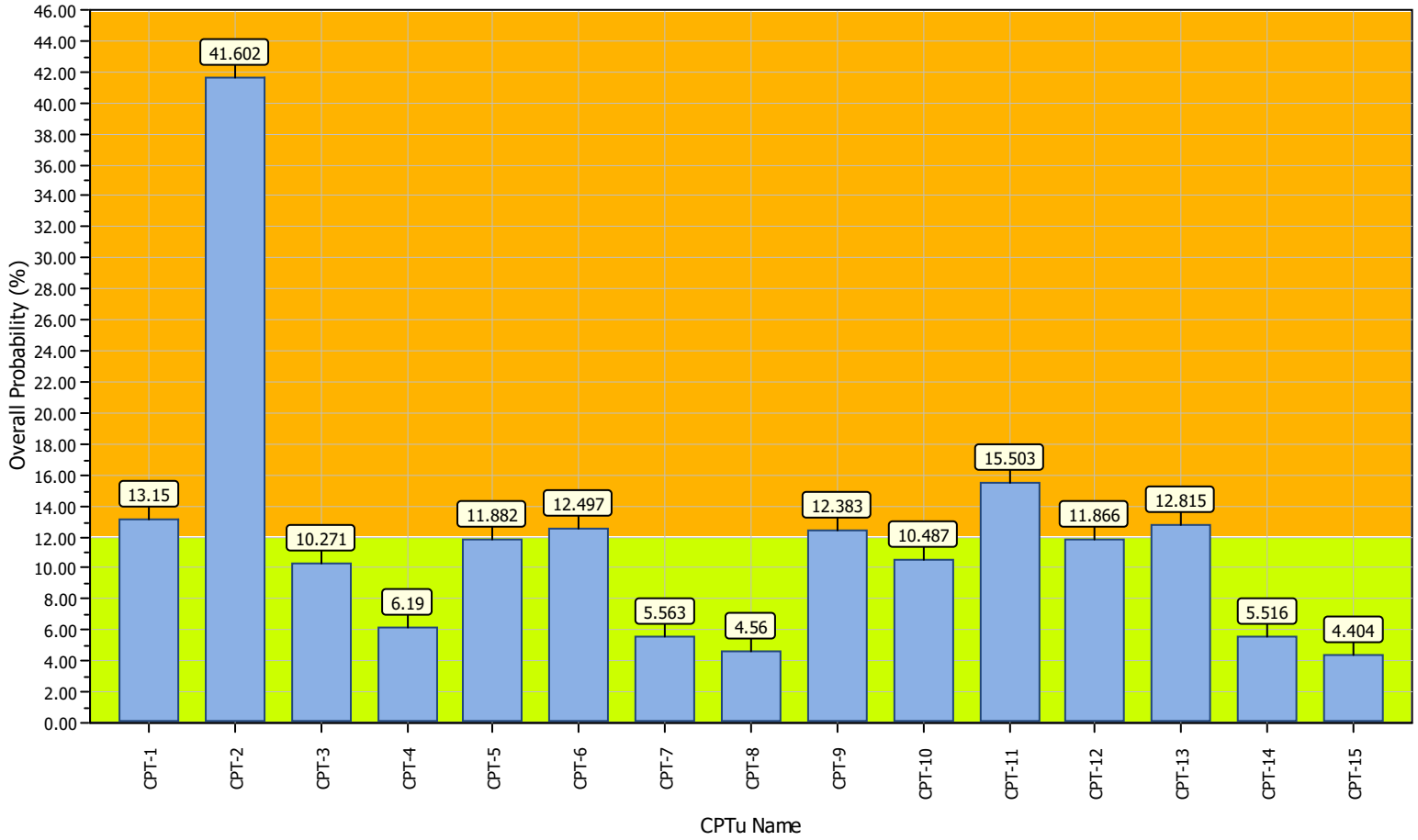
0.00% severe liquefaction

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

Project title : InSite LB self storage

Location :

Overall Probability for Liquefaction report



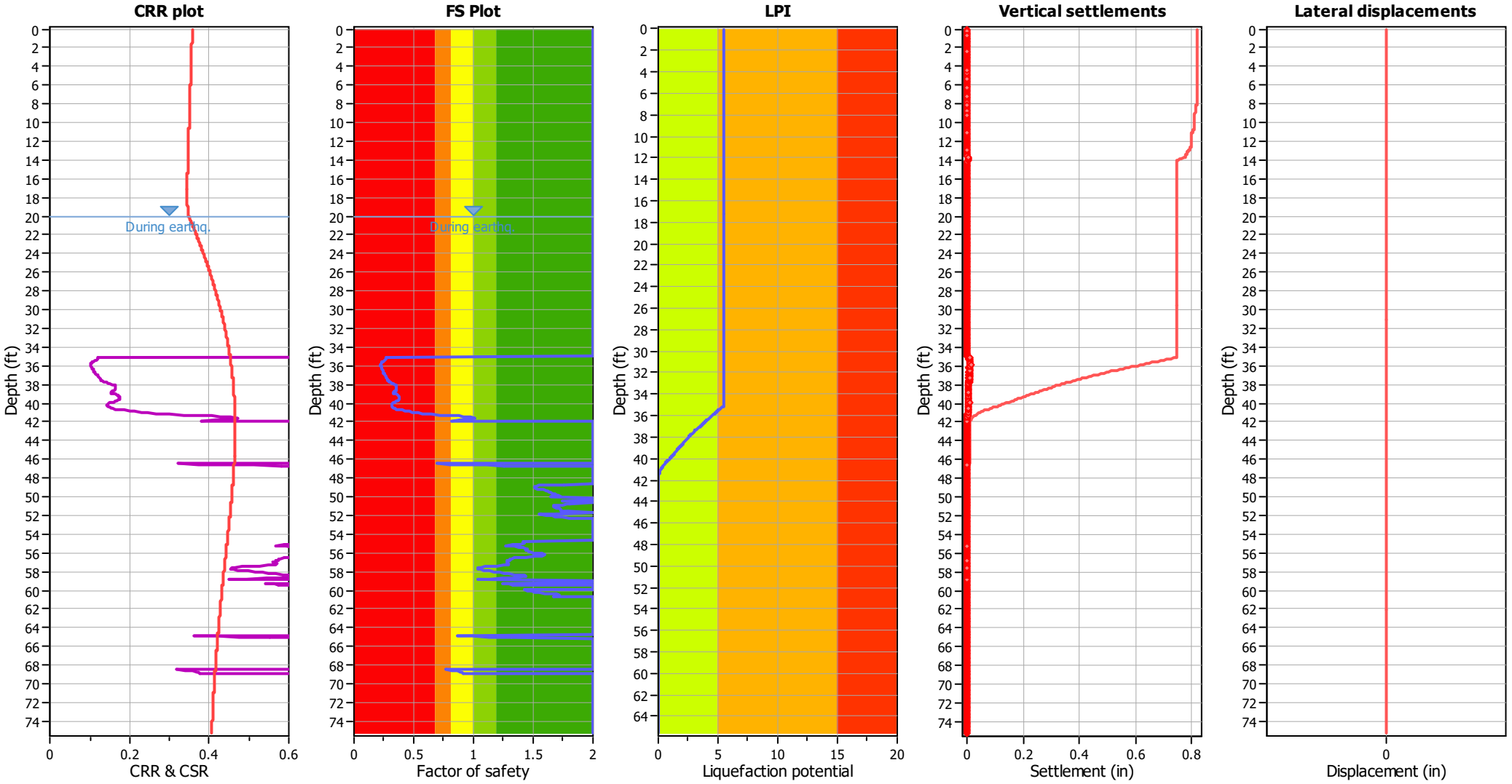
Probability color scheme

- Very High Probability
- High Probability
- Low Probability

Basic statistics

Total CPT number: 15
60.00% low probability
40.00% high probability
0.00% very high probability

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

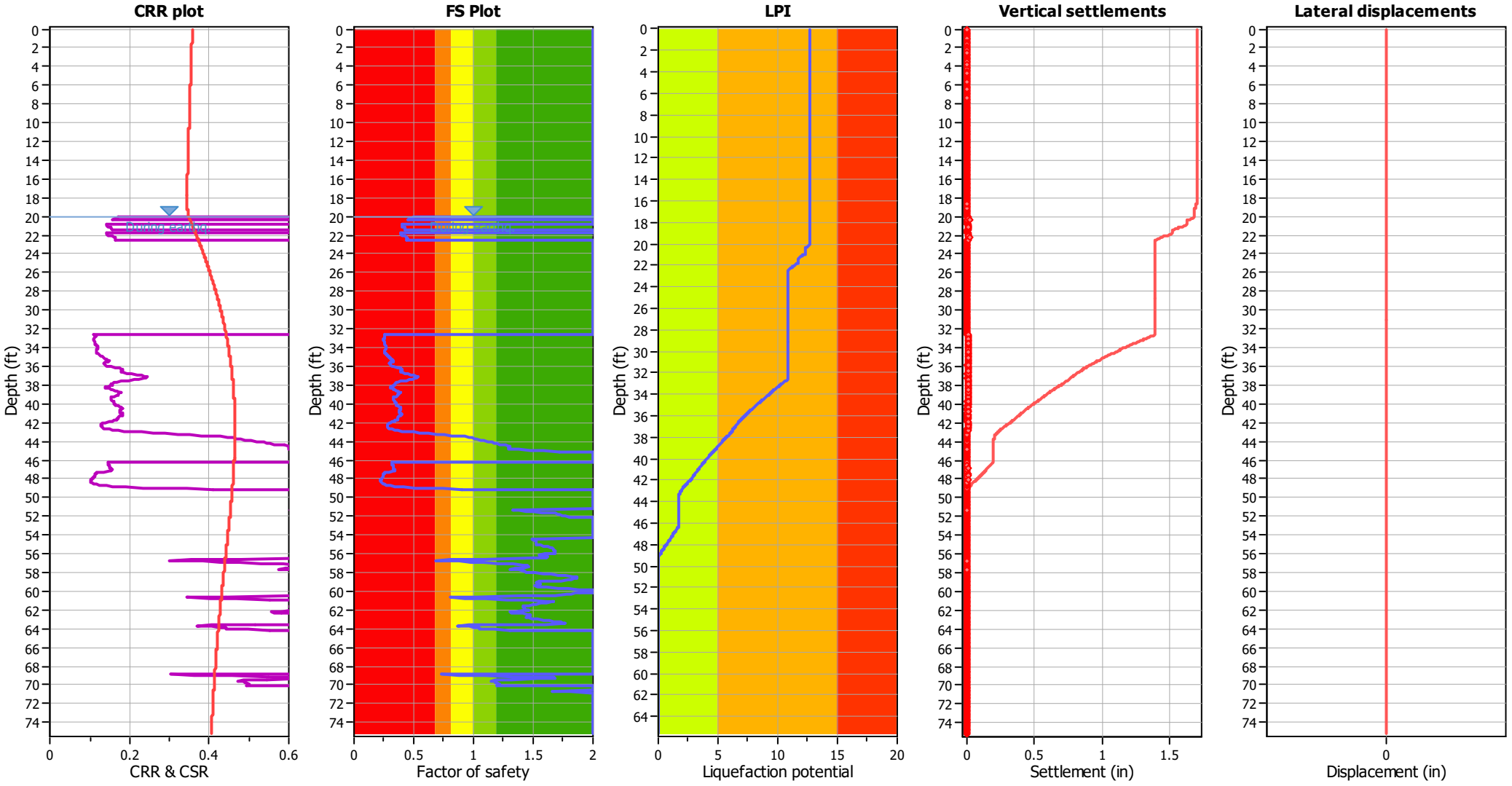
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

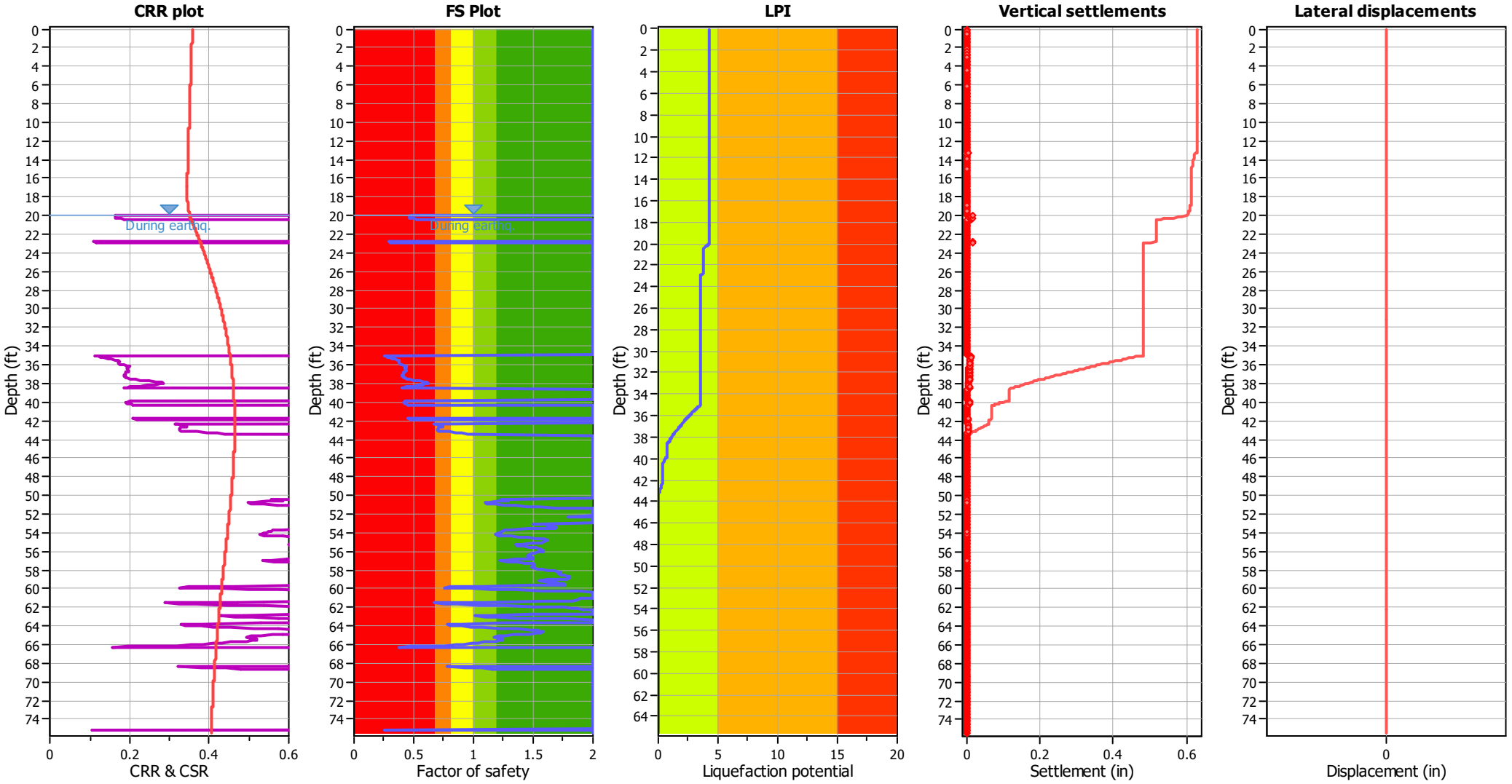
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

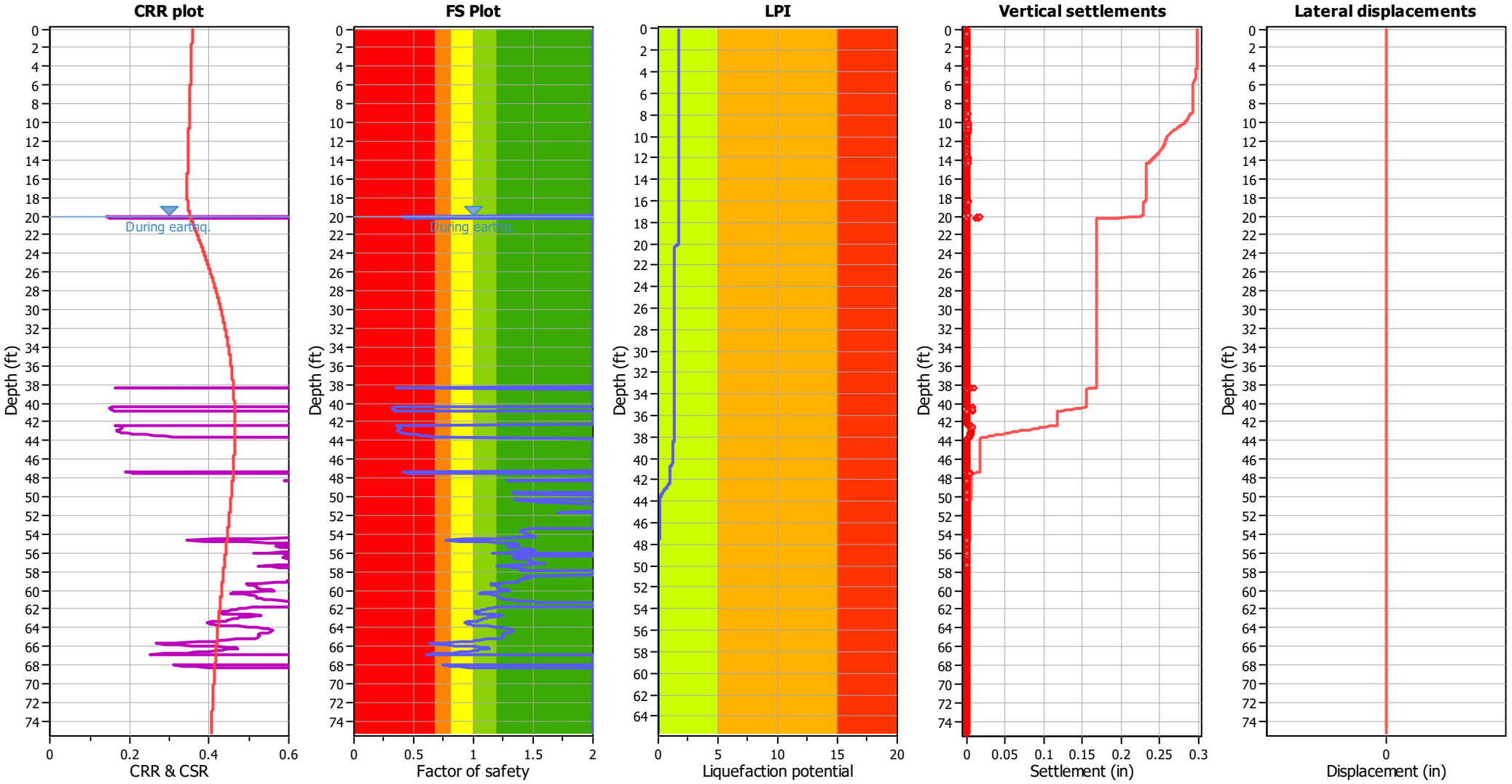
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

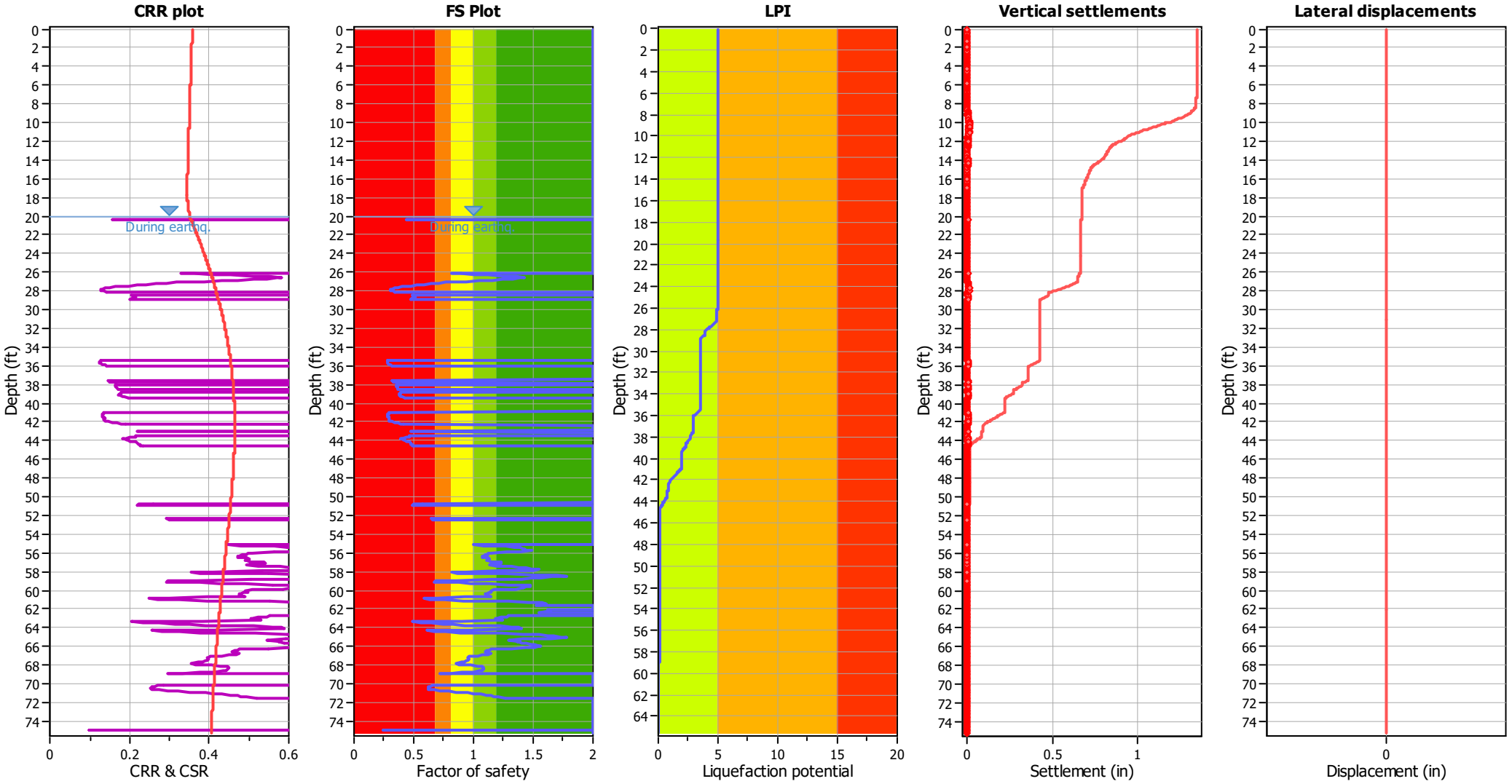
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

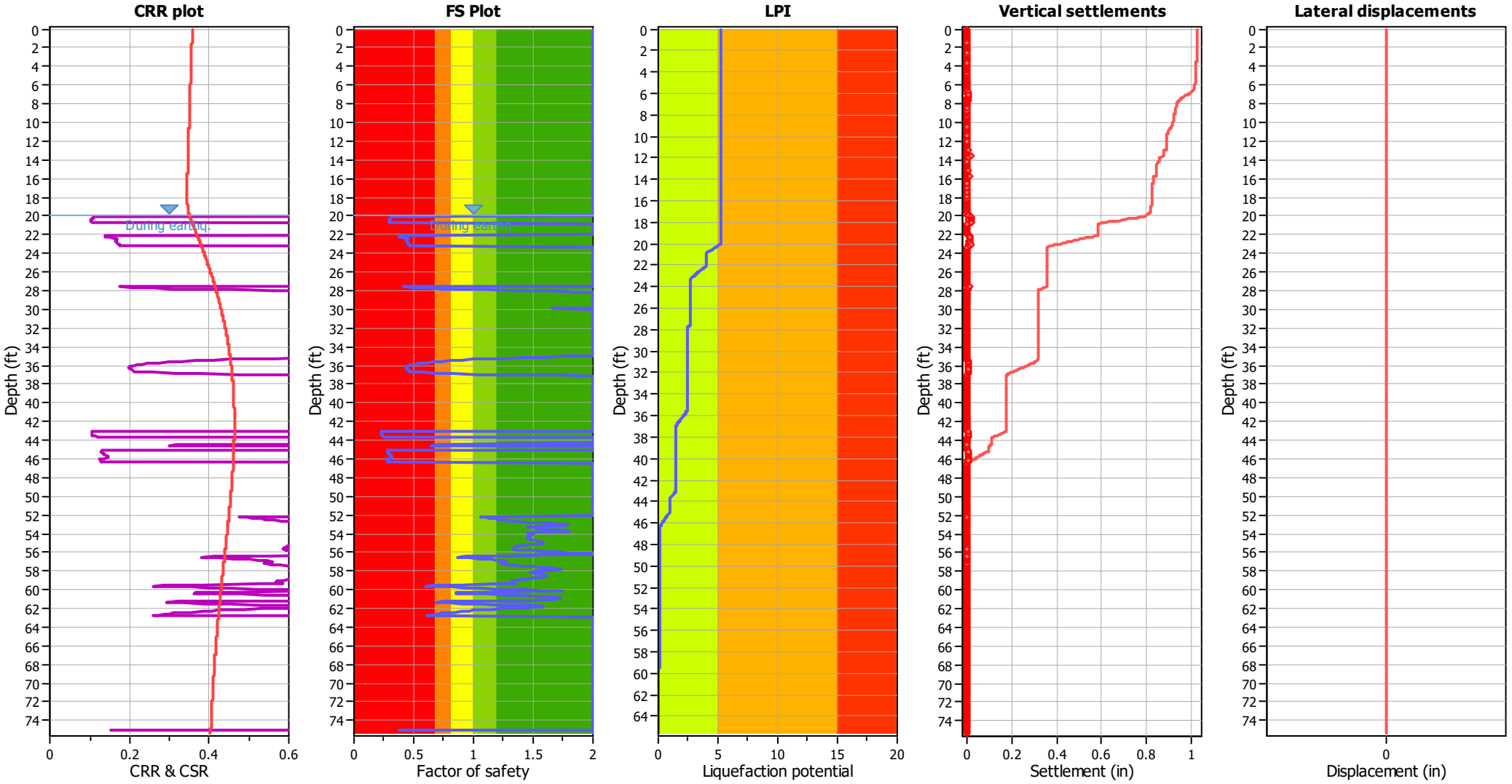
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

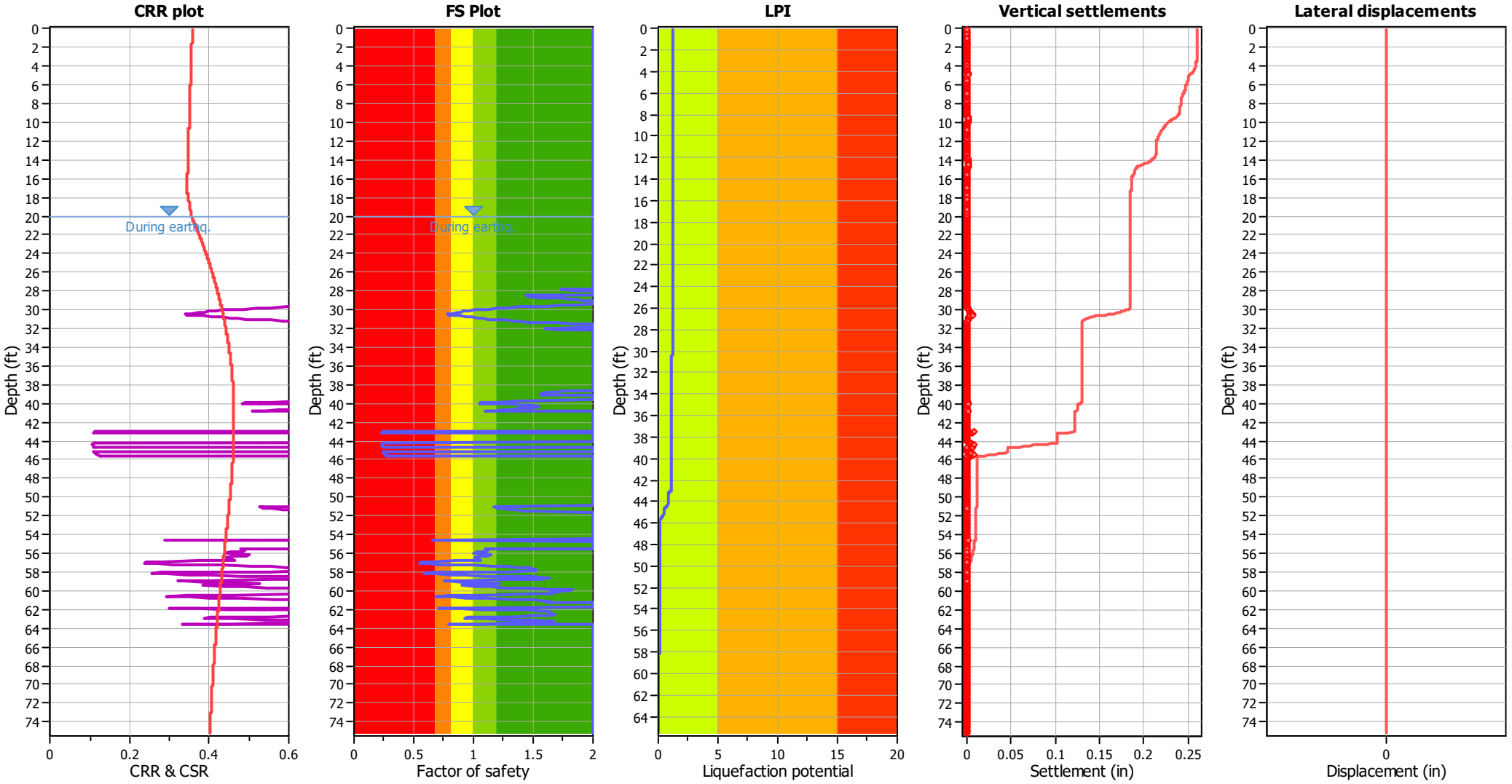
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

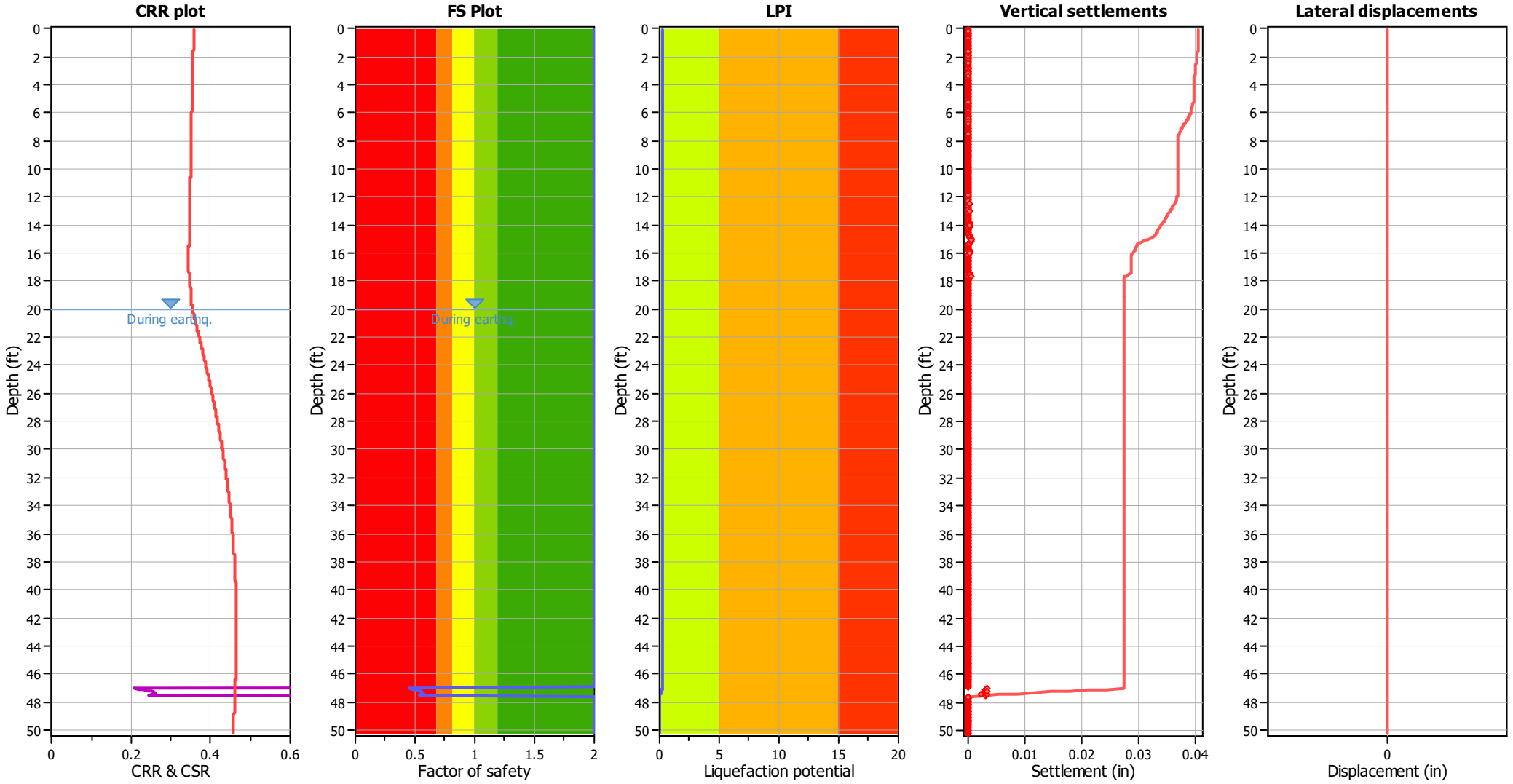
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

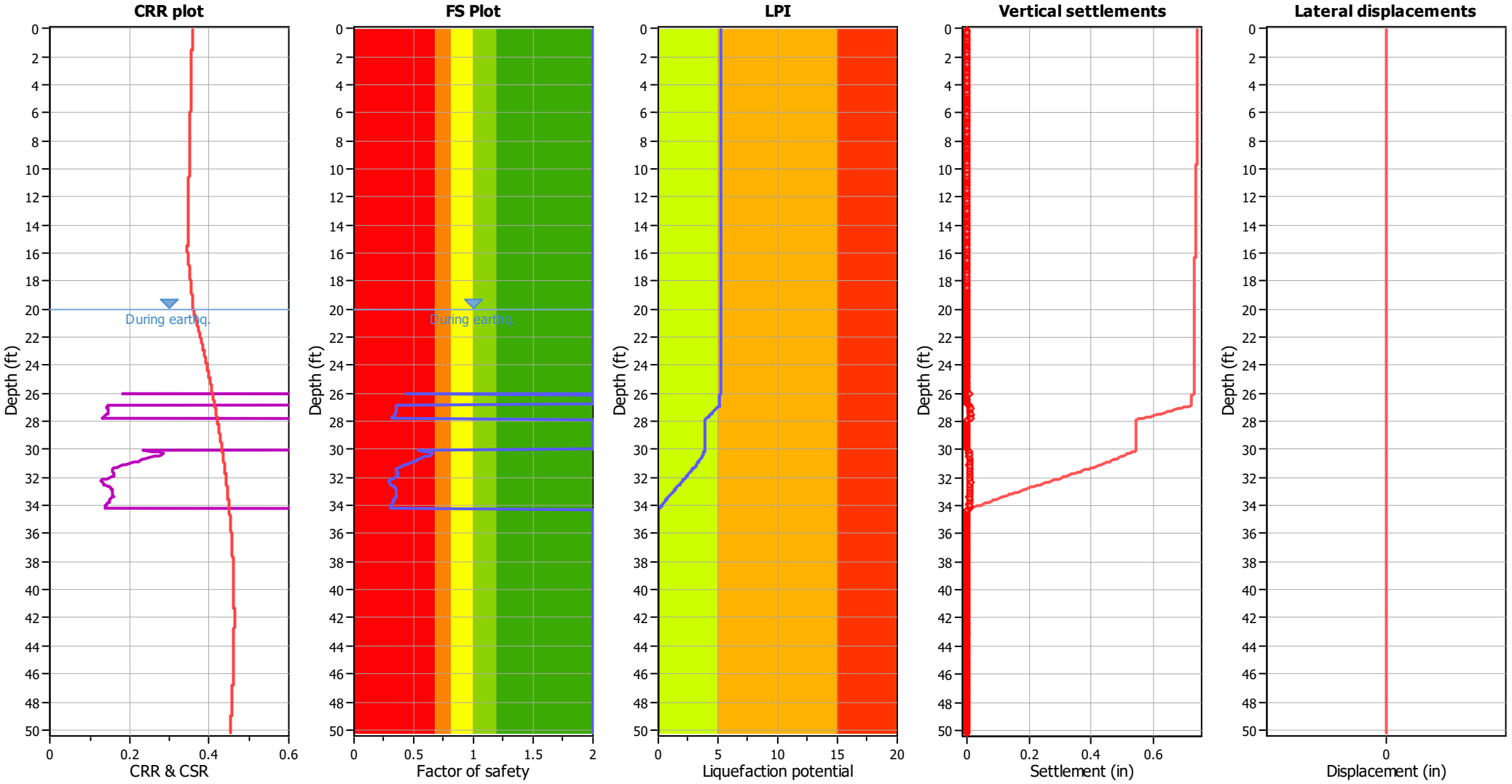
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

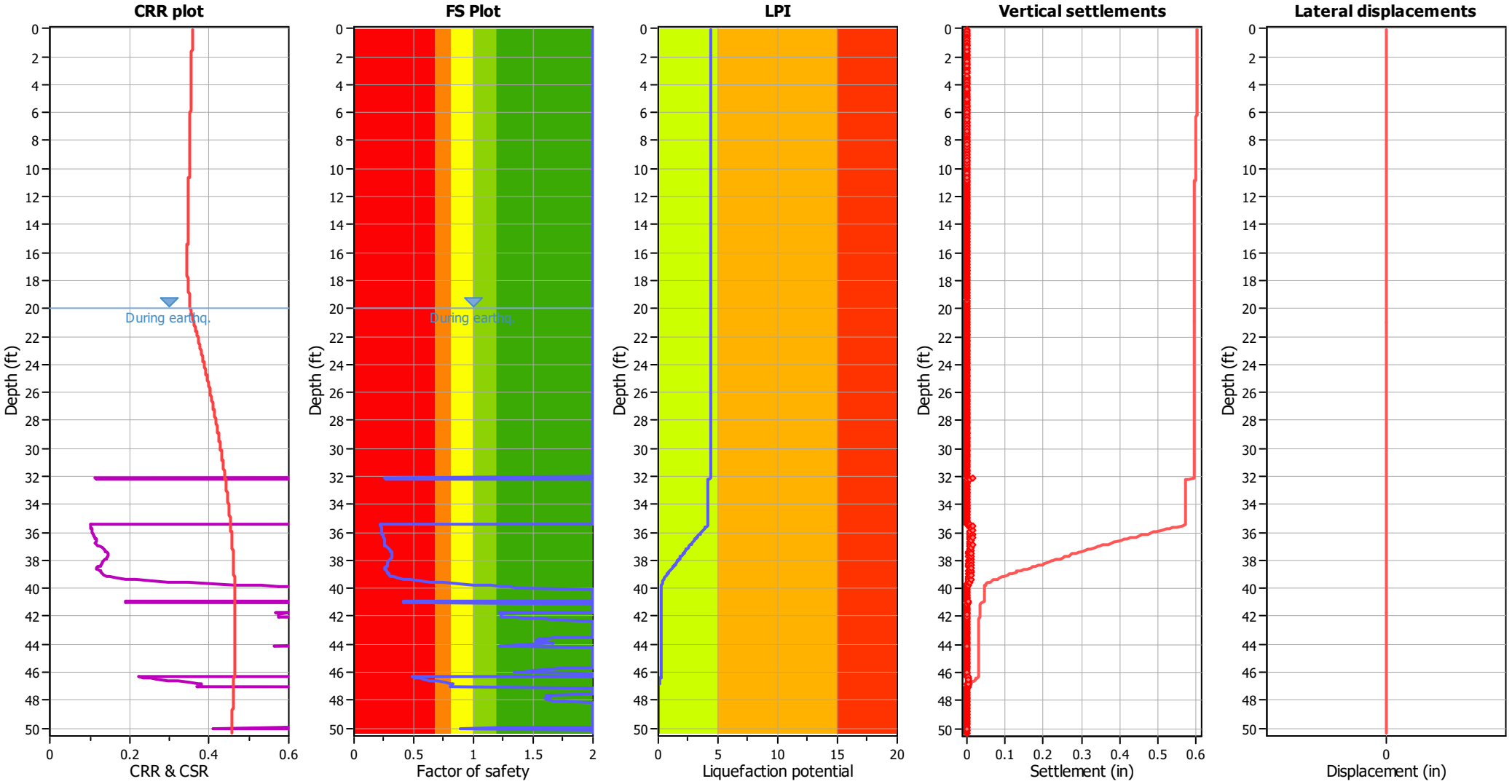
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

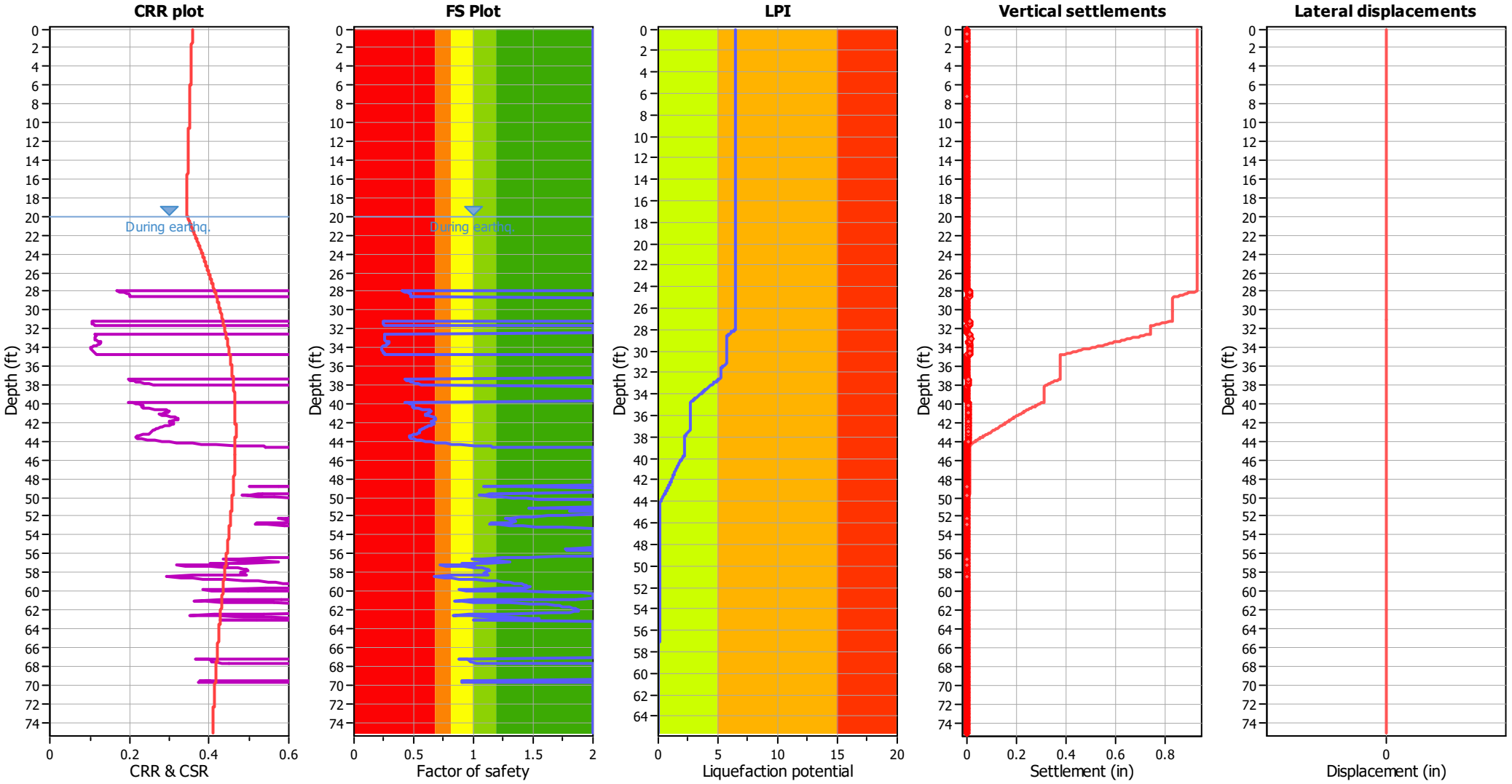
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

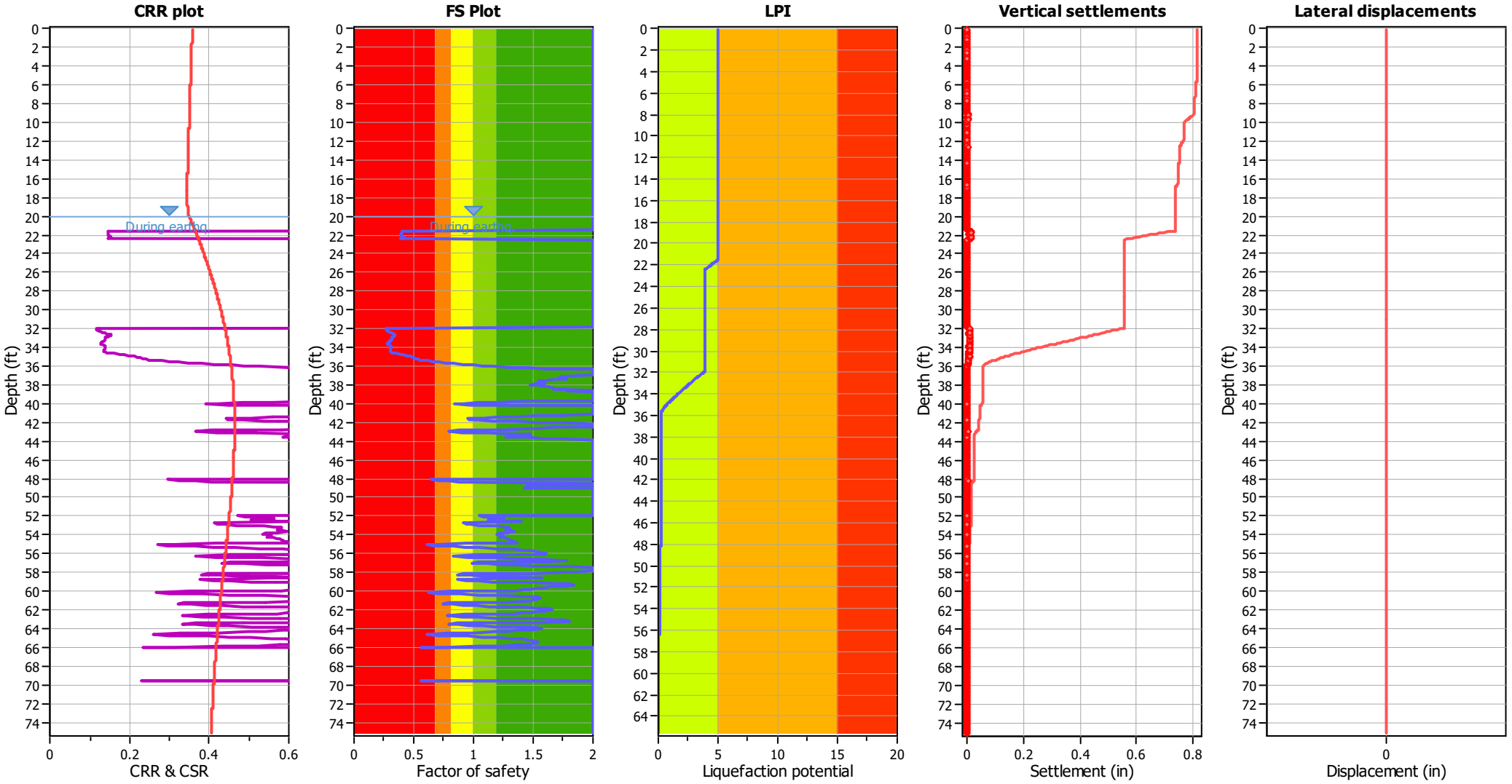
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

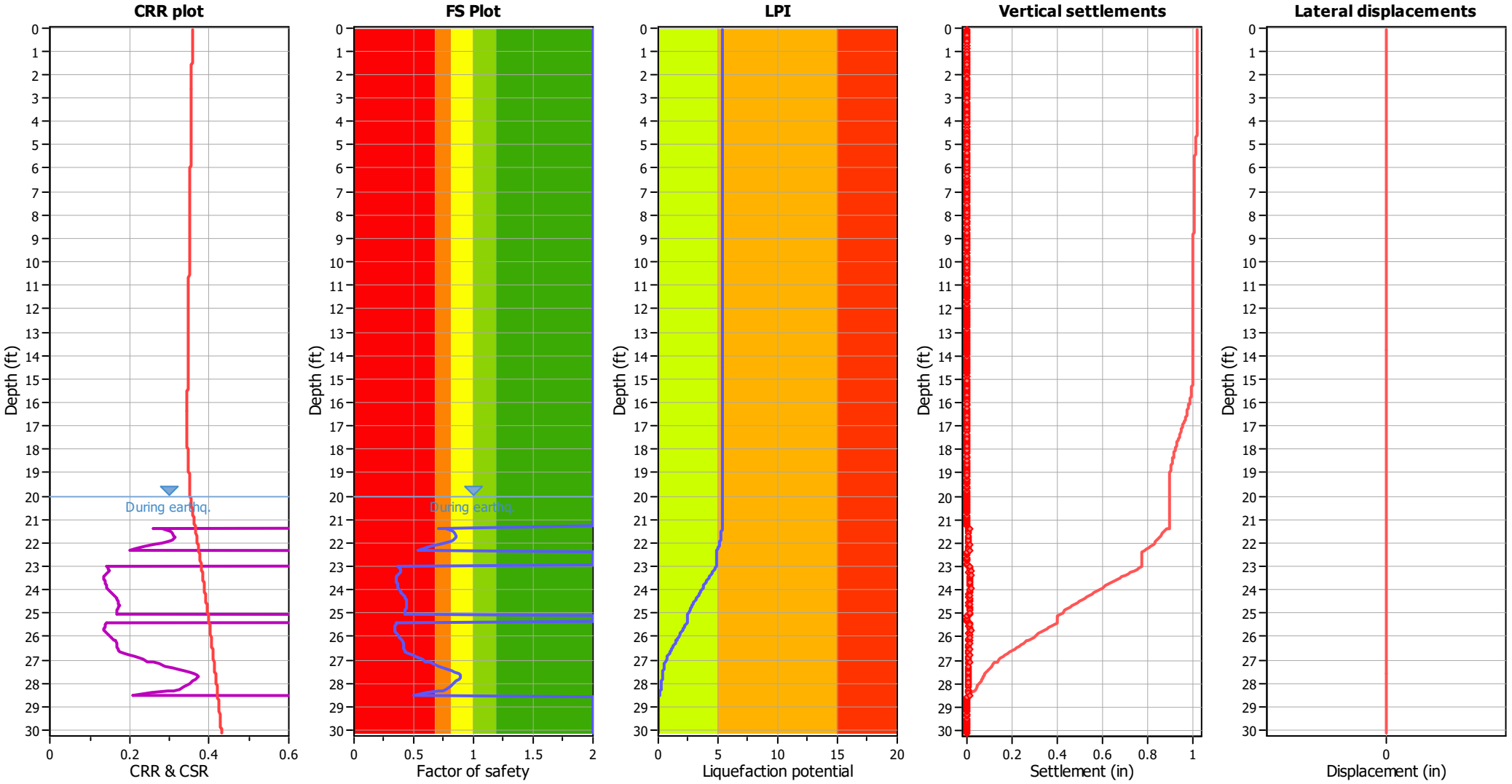
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

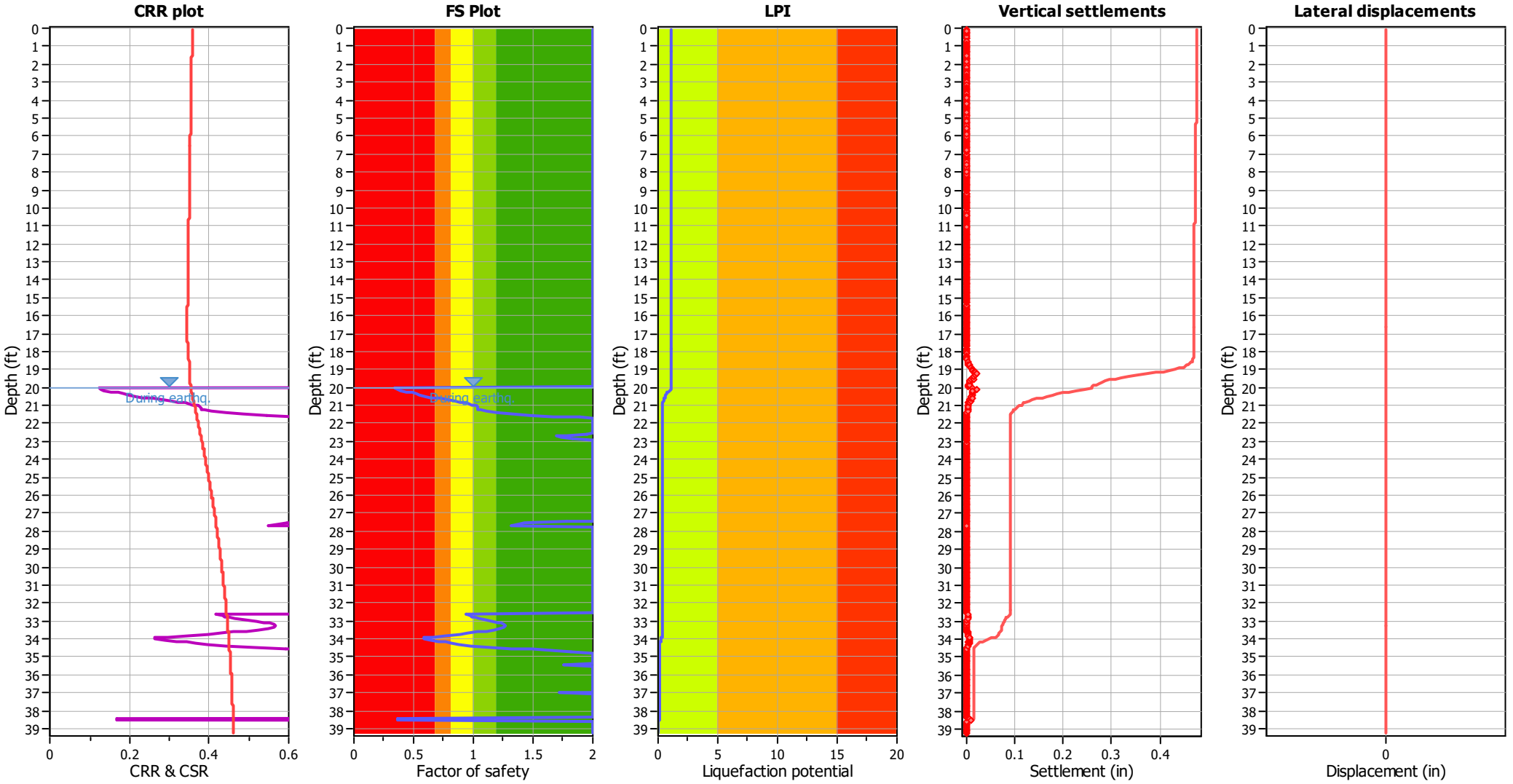
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

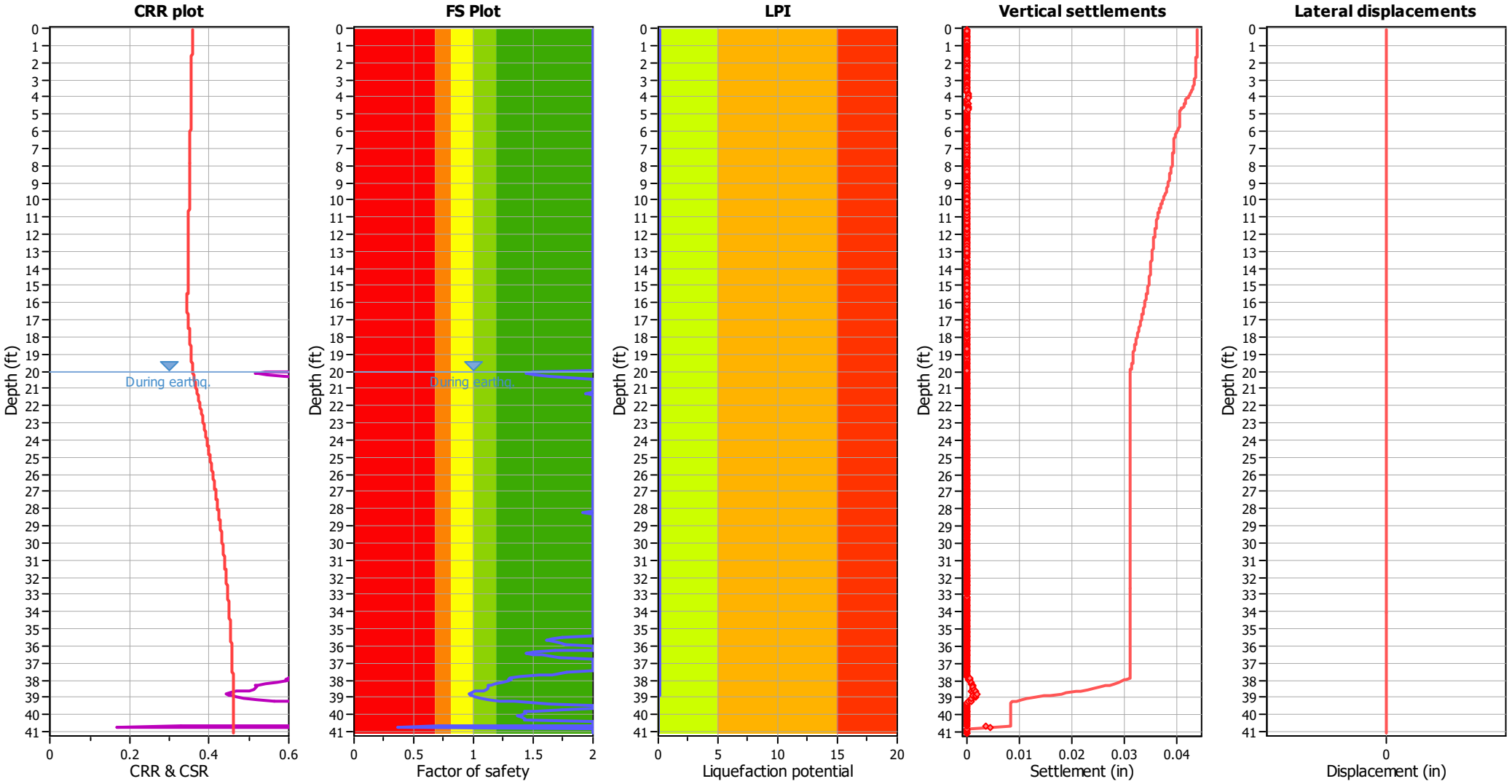
F.S. color scheme

- 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.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	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:	7.11	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.63	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	50.00 ft	Fill height:	N/A	Limit depth:	N/A

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

APPENDIX E

EARTHWORK AND GRADING GUIDE SPECIFICATIONS

APPENDIX E

CARL KIM GEOTECHNICAL, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

TABLE OF CONTENTS

E-1.0 GENERAL

E-1.1 Intent

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).

E-1.2 Role of Carl Kim Geotechnical, Inc.

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.

E-1.3 The Earthwork Contractor

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.

E-2.0 PREPARATION OF AREAS TO BE FILLED

E-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 2974-00). 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.

E-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 E-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.

E-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

E-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.

E-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.

E-3.0 FILL MATERIAL

E-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.

E-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.

E-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section E-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.

E-4.0 FILL PLACEMENT AND COMPACTION

E-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section E-2.0, 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.

E-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 1557-09.

E-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 (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557-09. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557-09 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557-09 laboratory maximum density. 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.

E-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 1557-09 laboratory maximum density.

E-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).

E-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.

E-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.

E-6.0 TRENCH BACKFILLS

E-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).

E-6.2 Bedding and Backfill

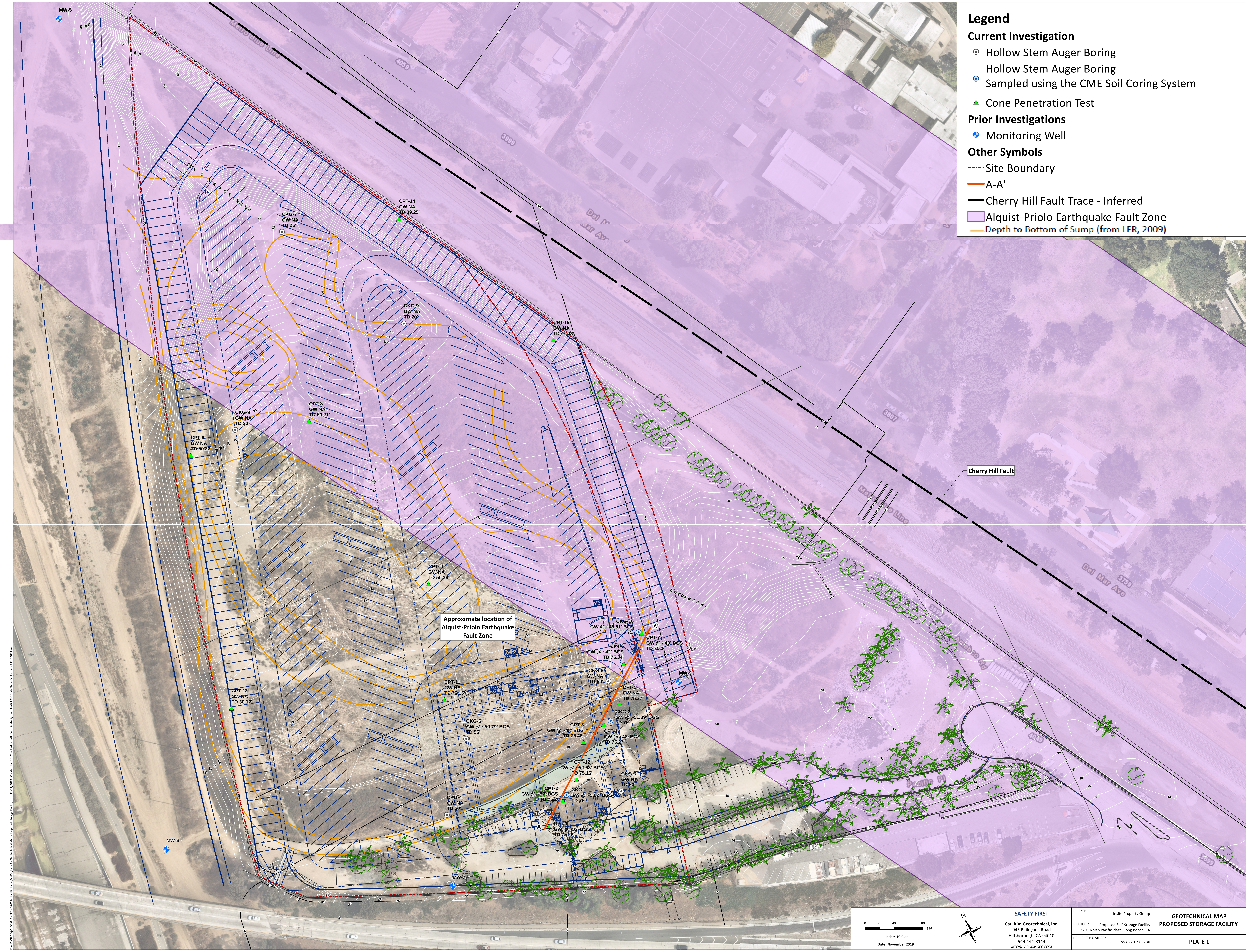
All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2012 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (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 2012 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 90 percent of relative compaction (ASTM D 1557-09) 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.

E-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.

PLATES


Legend
Current Investigation
Hollow Stem Auger Boring
Hollow Stem Auger Boring Sampled using the CME Soil Coring System
Cone Penetration Test
Prior Investigations
Monitoring Well
Other Symbols
Site Boundary
A-A'
Cherry Hill Fault Trace - Inferred
Alquist-Priolo Earthquake Fault Zone
Depth to Bottom of Sump (from LFR, 2009)
Cherry Hill Fault
Approximate location of Alquist-Priolo Earthquake Fault Zone
MW-5
MW-6
MW-7
CPT-14 GW NA TD 39.25'
CKG-7 GW NA TD 25'
CKG-9 GW NA TD 20'
CPT-15
CPT-8 GW NA TD 50.21'
CKG-8 GW NA TD 20'
CPT-9 GW NA TD 50.2'
CPT-10 GW NA TD 50.36'
CPT-13 GW NA TD 30.12'
CPT-11 GW NA TD 75.15'
CKG-5 GW @ ~50.79' BGS TD 55'
CKG-4 GW NA TD 50'
Del Mar Ave
0 20 40 80 Feet
1 inch = 40 feet
Date: November 2019
N
SAFETY FIRST
Carl Kim Geotechnical, Inc.
945 Baileyana Road
Hillsborough, CA 94010
949-441-8143
INFO@CARLKIMGEO.COM
CLIENT: Insite Property Group
PROJECT: Proposed Self-Storage Facility
3701 North Pacific Place, Long Beach, CA
PROJECT NUMBER: PWAS 20190323b
GEOTECHNICAL MAP
PROPOSED STORAGE FACILITY
PLATE 1

A

A'

Proposed 3-Story Building Envelope

Existing Grade

Proposed Grade

Finished Floor - 56'

CPT-1 CPT-2 CKG-1 CPT-12 CPT-3 CPT-4 CKG-2 CPT-5 CPT-6 CPT-7 CKG-10

Historic Berm

Historic Berm

Af

Afs

Qal

Qt

QL

Feet MSL

60 55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50

0 50 100 150 200 250 300

CL SP CL SP-SM SP SP CL-ML SC SM SP SP CL-ML SM SP SC SP SC-CL

SM-ML CL SM SP SC SM SP ML SP SC SP SC SC-CL

SM SM-SC SM-SC ML SP SM SP CL SC CL SM-SC SP SC SP ML CL

Explanation

Cone Resistance qt (0-500 tsf)

Sleeve Friction (0-14.5 tsf)

Af Uncertain Fill

Afs Sump Material

Qal Quaternary Alluvium

QL Lakewood Formation (Pleistocene)

Geologic Contact (Dashed where approximate, queried where uncertain)

Marker Bed / Strata

Groundwater Level; Measured at Time of Drilling (ATD)

0 20 40 Feet

1 inch = 20 feet Vertical Exaggeration = 1X

Date: November 2019

SAFETY FIRST

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

CLIENT: Insite Property Group

PROJECT: Proposed Self-Storage Facility
3701 North Pacific Place, Long Beach, CA

PROJECT NUMBER: PWAS 20190323b

Cross Section A - A'

PLATE 2

File: K:\GIS\Prj\050.002 - CKG - 3701 N. Pacific Place\MXDs\Crossview\Cross Section A-A' V3.mxd 11/11/2019 Created by: BO Checked by: AH Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet