Compton Community College District
Geotechnical and Soils Investigation Report
For
Instructional Building #2

1. **Original Report Prepared by United-Heider Inspection Group dated February 21, 2018**
2. **CGS First review letter dated April 25, 2018**
3. **United-Heider Response to CGS first review letter dated May 8, 2018**
4. **CGS Second review letter dated May 21, 2018**
5. **United-Heider Response to CGS second review letter dated June 15, 2018**
6. **CGS Third review letter & approval dated July 30, 2018**

PCM3, Inc. Site Office
Compton Community College District
1111 E. Artesia Ave., Bond Trailer, Compton, CA 90221

UNITED-HEIDER
INSPECTION GROUP
An ETS Company

PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT
PROPOSED NEW INSTRUCTIONAL BUILDING #2
EL CAMINO COLLEGE COMPTON CENTER CAMPUS
1111 E. ARTESIA BLVD.
COMPTON, CA 90221

UNITED - HEIDER INSPECTION GROUP

PROJECT NO.: 10-18020PW

PREPARED For:

FACILITIES SERVICES
COMPTON COMMUNITY COLLEGE DISTRICT
1111 EAST ARTESIA BLVD.
COMPTON, CA 90221

PREPARED By:

UNITED - HEIDER INSPECTION GROUP

22620 GOLDENCREST DRIVE, SUITE 114
MORENO VALLEY, CA 92553

UNITED-HEIDER INSPECTION GROUP
An ETS Company

February 21, 2018

To: Ms. Linda Owens
Director of Facilities
Compton Community College District
1111 East Artesia Blvd.
Compton, CA 90221

Subject: Preliminary Geotechnical Investigation Report
Proposed New Instructional Building #2
El Camino College Compton Center Campus
1111 E. Artesia Boulevard
Compton, CA 90221

United - Heider Inspection Group Project No. 10-18020PW

Dear Ms. Owens:

In accordance with our proposal, United - Heider Inspection Group has prepared this preliminary geotechnical investigation report for the proposed New Instructional Building #2 located within the El Camino College Compton Center Campus located at 1111 East Artesia Boulevard in the City of Compton, California.

The purpose of our investigation was to explore the subsurface conditions with respect to the planned improvements, to evaluate the general soil characteristics, and to provide geotechnical recommendations for design and construction. This investigation is based on a Site Plan provided by the tPB/Architecture and our correspondence with architects/designers.

Based upon our investigation, the proposed development is feasible from a geotechnical viewpoint, provided our recommendations are incorporated in the design and construction of the project. The most significant design considerations for this project are moderately compressible and hydro-collapsible potential soil at the near surface, liquefaction and seismic settlement, and seismic shaking. We have evaluated the appropriate foundation systems to support the proposed building and other improvements. This report presents our findings, conclusions, and geotechnical recommendations for the project.

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,

UNITED - HEIDER INSPECTION GROUP

Param Piratheepan, PE, GE	Dennis Heider, RCE
Geotechnical Engineer	Principal Engineer

Stephen E. Jacobs, PG, CEG

Principal Engineering Geologist

Distribution: (4) Addressee

UNITED-HEIDER INSPECTION GROUP
An ETS Company

TABLE OF CONTENTS

FIGURES AND APPENDICES

Figures

Appendices

1.0 INTRODUCTION

1.1 Site Location and Description

The subject building site is located within the northern portion of the El Camino College Compton Center Campus in the City of Compton, California. The subject building site is surrounded by Classroom buildings on the north, Transfer/Career Center Outreach Building on the south, Child Development Center on the west, and Classroom buildings on the east. The site location, relative to existing adjacent streets, landmarks and topographic features, is shown on the Site Location Map, Figure 1. The project location, measured on a Google Earth map, has a latitude reading of North 33.87889° and longitude reading of West 118.21043°. These coordinate readings should be considered accurate only to within an approximately 50-foot radius as implied by the method used. The New Instructional Building #2 site is currently partially occupied with the Classroom - Financial Aid-Welcome Center Building and is predominantly covered with grass and mature trees.

1.2 Proposed Development

Based on the Preliminary Site Plans by tPB/Architecture, Compton Community College District plans to build a two-story New Instructional Building #2 at the subject site. We understand that the footprint of the building will be approximately 17,000 square feet. As this project is in the design phase, there are no foundation plans available at this time. We anticipate the building will be supported on mat foundation system/shallow footings. We anticipate that the new building will be designed and constructed under the 2016 California Building Code.

1.3 Purpose and Scope

The purpose of our investigation has been to evaluate general engineering characteristics of the earth materials with respect to the planned improvements for the New Instructional Building #2 and provide geotechnical recommendations for design and construction of the proposed project.

This investigation is based on the Site Plan provided by tPB/Architecture, showing the site boundary and proposed preliminary improvements. This plan serves as the basis for our Boring Location Map, Figure 2 (Appendix A).

Our scope of work included the following tasks:

- Background Review - A background review of readily available, relevant, local and regional geology maps, geohazard maps, geotechnical reports, and literature pertinent to the proposed improvements was performed.

- Pre-Field Investigation Activities - Prior to our drilling activities, we conducted a site reconnaissance to locate proposed boring locations for access and for coordination with Underground Service Alert (USA).

- Field Investigation - Our field investigation consisted of excavation, logging and sampling of 4 hollow-stem auger borings to depths ranging from 26.5 feet to 51.5 feet below the ground surface within the building footprint. Each boring was logged by a qualified member of our technical staff. Relatively undisturbed soil samples were obtained at selected intervals within the borings using a California Ring Sampler. Standard Penetration Tests (SPT) were also conducted at selected depths within the borings, and soil samples were obtained. Bulk samples of representative soil types were also obtained from the borings. The borings were loosely backfilled with soil cuttings obtained from the borings. Logs of the geotechnical borings are presented in Appendix B. Boring locations are shown on the accompanying Boring Location Map, Figure 2 (Appendix A).

- Laboratory Tests - Laboratory tests were performed on selected soil samples obtained during our field investigation. The laboratory-testing program was designed to evaluate the physical and engineering characteristics of the onsite soils. Tests performed during this investigation include:

    - In situ moisture content and dry density of existing soils.
    - Particle Size Analysis to characterize the soil type according to USCS, and to assist in the evaluation of liquefaction susceptibility of granular soil.
    - Atterberg limit tests to classify and characterize of the engineering properties of soils.
    - Direct shear to evaluate the strength characteristics of the onsite materials.

- Expansion Index test to evaluate the expansion potential of the onsite material.
- Water-soluble sulfate concentration in the soil for sulfate exposure and cement type recommendations.
- Resistivity and pH to evaluate corrosion potential of the onsite soils.
- Maximum Density and optimum moisture content test to evaluate compaction characteristics.

All laboratory tests were performed in general conformance with ASTM Standard Methods and California Test Methods.

The results of the in-situ moisture and density tests are shown on the boring logs (Appendix B). Results of the other laboratory tests are provided in Appendix C.

- Engineering Analysis - The data obtained from our background review, field exploration, and laboratory testing program were evaluated and analyzed in order to develop the conclusions and recommendations for the site.

- Report Preparation - The results of this investigation have been summarized in this report, presenting our findings, conclusions and recommendations for the proposed project.

2.0 GEOLOGIC AND GEOTECHNICAL FINDINGS

2.1 Regional Geology

The site is located within the South Gate Quadrangle within the Los Angeles metropolitan region, which is located at the convergence of two major physiographic/geomorphic provinces, the Transverse Ranges and the Peninsular Ranges, and includes rugged mountains, hills, valleys, and alluvial plains. The east-west–trending Transverse Ranges are irregular to the main northwest structural grain of California. The Transverse Ranges were uplifted along east- to west–trending thrust faults and folds (Crowell, 1976; Wright, 1991; and Ingersoll and Rumelhart, 1999). The central Los Angeles basin is divided by a mountain range, the Santa Monica Mountains. The leading structure in the area is the north-dipping Santa Monica–Hollywood–Raymond fault system, located at the southern boundary of the Transverse Ranges. The Los Angeles basin itself is part of the northern Peninsular Ranges Geomorphic Province, which extends southeastward into Baja California, Mexico. The Transverse Ranges are formed by mildly metamorphosed sedimentary and volcanic rocks of Jurassic age that have been infringed by mid- Cretaceous plutonic rocks of the southern California batholith and rimmed by Cenozoic sedimentary rocks (Gastil et al., 1981; Schoellhamer et al., 1981). The Los Angeles greater basin is also part of the onshore portion of the California continental borderland, characterized by northwest-trending offshore ridges and basins, formed primarily during early and middle Miocene time (Legg, 1991; Wright, 1991; and Crouch and Suppe, 1993). The thickness of the predominantly Neogene-age sedimentary fill in the central depression of the Los Angeles basin, a structural low between the Whittier and Newport–Inglewood faults, is estimated to be about 30,000 feet (Yerkes et al., 1965).

Major northwest-trending strike-slip faults such as the Whittier, Verdugo, Northridge, Sierra Madre, Newport–Inglewood, and Palos Verdes faults dominate the great basin. In addition to these surface faults, significant buried thrust faults in the general site vicinity in the Los Angeles basin include the lower and upper Elysian Park thrust faults, the Compton thrust, and the Puente Hills thrust (Shaw, et al., 2002; Bilodeau, et. al., 2007).

The youngest surficial deposits are Holocene sediments of modern alluvial fans, stream channels (i.e., Los Angeles and San Gabriel Rivers), and their flood plains. These debris-flow, sheet flood, and fluvial deposits consist of boulder, cobble, and pebble gravel lenses and sheets, interbedded with sand, silt, and clay derived from the surrounding highlands. Although the thickness of these sediments is usually less than 100 feet (30 m), they are locally as thick as 200 feet (60 m), and the fluvial sediments are roughly graded, with the lower parts containing coarser material. A narrow zone of well-sorted, fine- to medium-grained, dune sand, as thick as 70 feet (21 m), is located near the coast between Santa Monica and the Palos Verdes Hills (California Department of Water Resources, 1961; Yerkes et al., 1965). Since about 6 thousand years ago, when postglacial sea level had risen to near its present level, coastal estuaries and tidal marshes formed and became filled with organic-rich, fine-grained sediment that extended as far as 4 miles (6.4 km) inland from the mouths of the streams (Yerkes et al., 1965). Real estate development has now transformed most of these estuaries and marshes into marinas and residential areas (Bilodeau, et al., 2007).

Based on a review of the California Geologic Survey geologic maps of the Long Beach 30' x 60' Quadrangle (CGS, 2010; 2016), the site area is mapped as being underlain by younger alluvial fan deposits (or Young Alluvium, Unit 2), as shown on Figure 3, Regional Geology Map. As shown on the geologic map (Figure 3 - Appendix A), the project site and much of the project vicinity are underlain by Holocene to Late Pleistocene age Younger Alluvial Fan Deposits (Qyf), described by the California Geological Survey (2010) as "unconsolidated to slightly consolidated, unvisited to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon" as "Young alluvium, Unit 2" by the California Geological Survey (2016).

2.2 Subsurface Conditions

The site is underlain by about 0.5 foot of grass/top soil/surficial fill and young alluvial fan deposits of Holocene to late Pleistocene age (Qyf) as shown on the geologic cross sections (Figures 7 and 8 in Appendix A). The young alluvial fan deposits encountered at the site are predominantly comprised of inter-layered Silty SAND, Sandy SILT, Clayey Sandy SILT, Clayey SILT, Silty CLAY, and Sandy Silty CLAY, with lesser amounts of Sandy Clayey SILT and Silty Fat CLAY. In general, the near-surface sandy soils layers are mostly loose to medium dense, and sandy soils layers at depth are medium dense to dense in relative density. The near-surface fine-grained soil layers are mostly firm to stiff and stiff to very stiff at depth in consistency.

Important geotechnical characteristics of the subsurface soils that are relevant for the proposed developments are discussed briefly in the following subsections:

2.2.1 Expansion Potential

A representative sample of the most expansive sub-surface soils within the building site that was tested for expansion index had an expansion index of 85, indicating a medium expansion potential. The Geotechnical Engineering and Geologic Hazards Study Report (Heider Inspection Group, 2015) for the adjacent building project (Instructional Building #1) reported a low expansion potential for the site. Based on this finding and our experience with similar type of materials, the onsite soils are anticipated to contain a low to medium expansion potential (per ASTM D4829).

2.2.2 Corrosivity Potential

In general, soil environments that are detrimental to concrete have high concentrations of soluble sulfates and/or pH values of less than 5.5. Section 4.3 of ACI 318 (ACI, 2005), as referred in the 2013 CBC, provides specific guidelines for the concrete mix-design when the soluble sulfate content of the soil exceeds 0.1 percent by weight or 1,000 parts per million (ppm). The County of Los Angeles (2013) recommends implementing mitigation measures to protect any concrete structures when soluble sulfate concentrations are equal to or greater than 2,000 ppm in soil and 1,000 ppm in groundwater.

A representative sample of the subsurface soil within the building that was tested for water-soluble sulfates during the investigation had a soluble sulfate content of 36 ppm, i.e., less than 0.1 percent by weight (1000 ppm), indicating negligible sulfate exposure. Therefore, no cement type restriction/concrete class restriction is necessary per ACI Table 4.3.1 for the consideration of soluble sulfate exposure, as well as no soil mitigation necessary for the site.

The minimum amount of chloride ions in the soil environment that are corrosive to steel, either in the form of reinforcement protected by concrete cover or plain steel substructures (such as steel pipes or piles) is 500 ppm per California Test 532. Soil corrosivity to ferrous metals can be estimated by the soil's pH level, electrical resistivity, and chloride content (County of Los Angeles, 2013). In general, soils are considered corrosive to foundation elements when the minimum resistivity is less than 1,000 ohm-centimeters. Soil with a chloride content of 500 ppm or more is considered corrosive.

As a screening for potentially corrosive soil, a representative sample of the subsurface soil within the building site was tested to determine its minimum resistivity, chloride content, and pH level. The chloride content of the sample was non-detectable (less than 10 ppm). The minimum resistivity of the samples was 2,700 ohm-cm. The pH value of the sample was 7.3. Based on these results, the onsite soil is considered to be non-corrosive to foundation elements. This information should be provided to the underground utility subcontractors. Consideration should be given to retaining a corrosion consultant to obtain recommendations for the protection of metal components embedded in the site soil.

The Geotechnical Engineering and Geologic Hazards Study Report (Heider Inspection Group, 2015) for the adjacent building project (Instructional Building #1) reported the following substantially conforming corrosion suite results as listed in the following table.

Table 1: Corrosion Results (Heider Inspection Group, 2015)

Boring (Heider Inspection 2015)	**Sample Depth (feet)**	**Sulfate (mg/kg)**	**Chloride (mg/kg)**	**Resistivity (ohm-cm)**	**pH**
B-2H	0-5	45	16	3,120	6.9

2.2.3 Excavatability

Based on our investigation findings, subsurface soils within the anticipated maximum depth of excavation are expected to be readily excavatable by conventional heavy earthmoving equipment in good condition.

2.3 Groundwater

Groundwater was encountered in our soil boring B-1 at a depth of 45 feet below the existing ground surface. Groundwater was encountered in Borings B-1H and B-3H during the Heider Inspection Group's investigation in 2015. The depths of groundwater encountered in the previous borings, as well as estimated from the CPTs, ranged from 46 to 48.5 feet below existing ground surface.

According to the California Geological Survey (CGS, 1998) seismic hazard zone report for the South Gate quadrangle, historically shallowest groundwater level is estimated to be on the order of eight feet below existing grade. According to the Department of Water Resources (DWR), available groundwater level data for Well 338872N1182432W001, the nearest well located approximately two miles northwest of the project site, a single measurement made on September 14, 1995 indicated the groundwater on that date to be at 122.45 feet below the existing local ground surface, corresponding to El. -32.5 feet (mean sea level datum). The DWR groundwater level data are presented in Appendix B.

Groundwater levels generally fluctuate between different locations, years, and seasons. Therefore, variations from our observations may occur in the future; historically, these appear to be on the order of a few feet. Given the extensive use of groundwater resources and urbanization, it is unlikely groundwater levels will rise to a level that may adversely impact the design and/or during construction of this project. As such, groundwater is not expected to be a constraint to the design or construction of the proposed development.

3.0 FAULTING, SEISMICITY AND SEISMIC HAZARDS

3.1 Faulting and Primary Seismic Hazards

Our review of available in-house literature indicates that there are no known active or potentially active faults that traverse the site, and the site is not located within an Alquist-Priolo Earthquake Fault Zone, although such faults are in general proximity to the subject site (Hart and Bryant, 1999). The nearest mapped Alquist-Priolo Earthquake Fault Zone is the Newport-Inglewood Fault Zone, approximately 2 miles west of the site. In addition to this surface fault zone, two buried thrust faults, the Lower Elysian Park and Compton, are inferred to be located about 2.5 miles north and 8 miles south, respectively, from the site. (Shaw, et al., 2002; Bilodeau, et. al., 2007)

The principal seismic hazard that could affect the site is ground shaking resulting from an earthquake occurring along nearby several major active or potentially active faults in southern California as shown in Figure 4 (Regional Fault Map). The known regional active and potentially active faults that could produce the most significant ground shaking and closer to the site include those faults listed (in order of increasing distance from the site) in following table:

Table 2: Characteristics and Estimated Earthquakes for Regional Faults

Fault Name	Approximate Distance to Site (miles)[1]	Maximum Credible Earthquake (MCE) Magnitude[2]
Newport-Inglewood	2	7.1
Lower Elysian Park Thrust	2.5[3]	6.7

[1] Fault distances estimated from measurements using the Fault Activity Map of California by C.W. Jennings and W.A. Bryant, California Geological Survey, Geologic Data Map No. 6, 2010.

[2] Maximum moment magnitude calculated from relationships (rupture area) derived from Wells and Coppersmith (1994; values listed in Appendix A of Cao, T., Bryant, W.A., Rowshandel, B., Branum, D., and Wills, C.J., 2003, The revised 2002 California probabilistic seismic hazard maps, June 2003: California Geological Survey, 12 p., Appendix A.

Fault Name	Approximate Distance to Site (miles)[1]	Maximum Credible Earthquake (MCE) Magnitude[2]
Compton Thrust	8[3]	6.8
Puente Hills Blind Thrust	7[3]	7.1
Palos Verdes	9	7.3
Upper Elysian Park Thrust	10[3]	6.4
Whittier	13	6.8
Hollywood	16	6.4
Raymond	17	6.5
Verdugo	17	6.9
Santa Monica	18	6.6
Malibu Coast	21	6.7
Sierra Madre	22	7.2
Newport-Inglewood (offshore)	26	7.1
San Fernando	28	6.7
Anacapa-Dume	29	7.5
Chino-Central Avenue	29	6.7
Northridge	29	7.0
San Gabriel	31	7.2
Santa Susana	34	6.7

---

[3] Fault distances estimated from measurements using Puente Hills Blind-Thrust System, Los Angeles, California by Shaw and others (2002): Bulletin of the Seismological Society of America, vol. 92, no. 8, pp. 2946-2960 and Bilodeau, W.L., Bilodeau, S.W., Gath, E.M. Oborne, M., and Proctor, R.J., 2007, Geology of Los Angeles, California, United States of America: Environmental & Engineering Geoscience, Vol. XIII, No. 2, May 2007, pp. 99–160.

.

Fault Name	Approximate Distance to Site (miles)[1]	Maximum Credible Earthquake (MCE) Magnitude[2]
Elsinore (Glen Ivey)	36	6.8
Simi-Santa Rosa	40	7.0
San Andreas (Mojave)	44	7.4
Oak Ridge	48	7.1
San Clemente	50	7.25[4]
San Cayetano	50	7.0
North Frontal Thrust (Western)	63	7.2
Pinto Mountain	86	7.2

3.1.1 Regional Seismicity

Evaluation of the historic seismicity related to the New Instructional Building #2 site was performed to show the significant past earthquakes. Figure 5 (Regional Seismicity Map) and the associated table show the recent regional seismicity with respect to the site. Significant past earthquakes from 1900 to 2018 with magnitudes 5 or greater were estimated using the USGS Earthquake database. This historical seismicity evaluation was performed within the 100-kilometer radius search from the project site, and the seismic events are listed in Appendix A.

The chance of earthquake damage in Compton is near the California average and is much higher than the national average due to active earthquake faults in the region. Based on the online reports at the http://www.city-data.com, it appears no property damage and human losses were reported in the City of Compton area during the previous historic earthquakes. Summary of the major earthquakes and reported damages at the epicenter are summarized below:

[4] Legg, M.R., Luyendyk, B.P., Mammerickx, J., and Tyce, R.C., 1989, Sea Beam Survey of an Active Strike-Slip Fault: The San Clemente Fault in the California Continental Borderland: Journal of Geophysical Research, v. 94, pp. 1727-1744.

On 7/21/1952 at 11:52:14, a magnitude 7.7 (7.7 UK, Class: Major, Intensity: VIII - XII) earthquake occurred 88.2 miles away from the city center, causing $50,000,000 total damage

On 6/28/1992 at 11:57:34, a magnitude 7.6 (6.2 MB, 7.6 MS, 7.3 MW, Depth: 0.7 mi) earthquake occurred 99.1 miles away from Compton center, causing 3 deaths (1 shaking deaths, 2 other deaths) and 400 injuries, causing $100,000,000 total damage and $40,000,000 insured losses

On 10/16/1999 at 09:46:44, a magnitude 7.4 (6.3 MB, 7.4 MS, 7.2 MW, 7.3 ML) earthquake occurred 111.0 miles away from the city center

On 11/4/1927 at 13:51:53, a magnitude 7.5 (7.5 UK) earthquake occurred 174.9 miles away from the city center

On 1/17/1994 at 12:30:55, a magnitude 6.8 (6.4 MB, 6.8 MS, 6.7 MW, Depth: 11.4 mi, Class: Strong, Intensity: VII - IX) earthquake occurred 26.9 miles away from Compton center, causing 60 deaths (60 shaking deaths) and 7000 injuries

On 4/21/1918 at 22:32:30, a magnitude 6.8 (6.8 UK) earthquake occurred 45.5 miles away from the city center.

** Magnitude types: body-wave magnitude (MB), local magnitude (ML), surface-wave magnitude (MS), moment magnitude (MW).

3.2 Secondary Seismic Hazards

Secondary seismic hazards for this site, generally associated with severe ground shaking, include liquefaction, seismic settlement, landslide, tsunamis, and seiches.

3.2.1 Liquefaction

Liquefaction is the loss of soil strength or stiffness due to a buildup of pore-water pressure during severe ground shaking. Liquefaction is associated primarily with loose (low density), saturated, fine- to medium-grained cohesionless soil. As the shaking action of an earthquake progresses, the soil grains are rearranged and the soil densifies within a short period of time. Rapid densification of the soil results in a buildup of pore-water pressure. When the pore-water pressure approaches the total overburden pressure, the soil reduces greatly in strength and temporarily behaves similarly to a fluid.

The site is mapped within an area shown as potentially susceptible to liquefaction on the California Geological Survey (CGS, 2016) seismic hazard zones for the South Gate Quadrangle as shown on Figure 6 (Appendix A).

A site-specific liquefaction analysis was performed in accordance with the method of NCEER (Youd et al., 2001) and Boulanger and Idriss (2006) using LiquefyPro Version 5 computer program developed by Civiltech Software. Seismically-induced settlement analyses were performed based on the sub-surface conditions encountered in the deep boring B-1 and peak ground acceleration values PGA corresponding to adjusted Peak Ground Acceleration PGA_M. For this analysis, we considered a historic high groundwater level at eight feet below ground surface as indicated on the CGS Seismic Hazards Report. The predominant earthquake magnitude was obtained from the USGS Interactive Deaggregation website for a 2% probability of exceedence in 50 years (2475 return period) hazard. The seismic parameters, using peak ground acceleration values PGA corresponding to adjusted Peak Ground Acceleration PGAM and modal magnitude of 7.3 Mw, were used for the liquefaction analysis. Seismically-induced settlement calculated for the soil layers has the factor of safety of less than 1.3.

Based on our calculations, potential for liquefaction at the site to occur within various loose to medium dense sandy silt/silty sand layers occurring primarily between depths of 10 and 45 feet below existing ground surface. Therefore the liquefaction susceptibility of the site is very high.

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 moderately dense sandy soil due to reduction in volume during and shortly after an earthquake event. Seismically-induced settlement analyses were performed using the methods set forth by Tokimatsu and Seed (1987).

The maximum potential liquefaction settlement at the site was estimated to be on the order of 1 inch. This potential settlement is primarily due to liquefaction settlement. The Geotechnical Engineering and Geologic Hazards Study Report (Heider Inspection Group, 2015) for the adjacent building project (Instructional Building #1) reported post-earthquake settlements at the two 55-foot deep CPTs (CPT-1H and CPT-3H) approximately 1.7 and 1.4 inches, respectively.

The maximum differential settlement is estimated to be on the order of 1/3 to 2/3 of the vertical settlement, corresponding to 0.6 to 1.2 inches. A summary of our liquefaction analyses is presented in Appendix D.

The major impact of potential liquefaction would be post-earthquake settlement which could potentially damage a structure due to excessive vertical and differential settlements. These settlements should be taken into account by the Structural Engineer during the design of the structure foundations. If the settlements are judged to be excessive, special remediation for ground improvement may be considered to reduce post liquefaction settlement.

3.2.3 Earthquake-Induced Lateral Displacement

In general, relatively severe and shallow liquefaction could cause lateral ground displacements. Since no vertical free–face or sloping ground is close to the site, the potential for lateral displacement is considered low.

3.2.4 Surface Manifestations of Liquefaction

Since much of the calculated liquefaction occurring relatively deep layers, the potential for surface manifestation of liquefaction is considered low to moderate.

3.2.5 Seismically-Induced Landslide

There are no significant slopes that exist near the site. As the site is relatively flat and no slopes are proposed, the possibility for earthquake-induced landslides is considered negligible.

3.2.6 Hydro-Collapsible Soils

Collapsible soils are fine sandy and silty soils that have been laid down by the action of flowing water, usually in alluvial fan deposits. Terrace deposits and fluvial deposits can also contain collapsible soil deposits. The soil particles are usually bound together with a mineral precipitate. The loose structure is maintained in the soil until a load is imposed on the soil and water is introduced. The water breaks down the inter-particle bonds, and the newly imposed loading densifies the soil.

The Geotechnical Engineering and Geologic Hazards Study Report (Heider Inspection Group, 2015) for the adjacent building project (Instructional Building #1) reported potential hydro-collapsible soils onsite. Based on a laboratory collapse test performed on a representative onsite soil sample collected from B-2H at a depth of 4.5 feet, a collapse potential index of about one percent was observed at an applied overburden pressure of 2,200 pounds per square foot (psf). We anticipate up to about an eight-foot thickness of the surficial onsite soils may be susceptible to collapse under saturation, corresponding to approximately one inch of collapse settlement. This calculated settlement should also be considered in designing the proposed structure foundation.

3.2.7 Other Hazards

Flood hazards generally consist of shallow sheet flooding caused by surface water runoff during large rain storms. According to the Federal Emergency Management Agency Flood Insurance Map (FIRM, 2008), the site is within a zone designated as "Other Flood Areas-Zone X: Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

Subsidence of the land surface, as a result of the activities of man, has been occurring in California for many years. Subsidence can be divided, on the basis of causative mechanisms, into four types: groundwater withdrawal subsidence, hydrocompaction subsidence, oil and gas withdrawal subsidence, and peat oxidation subsidence (CDMG, 1973). According to CDMG (1973), the site lies either within, or near, an area potential land subsidence due to withdrawal of oil and gas from nearby oil and gas fields.

Tsunamis, often incorrectly called tidal waves, are long period waves of water usually caused by underwater seismic disturbances, volcanic eruptions, or submerged landslides. The site is not within a potential tsunamis hazard zone according to the Tsunami Inundation Maps for the Long Beach and Venice Quadrangles (California Emergency Management Agency, 2009). Therefore, tsunamis are not a potential hazard at the site.

A seiche is an oscillation of a body of water in an enclosed or semi-enclosed basin that varies in period. Seiches are often caused by tidal currents, landslides, earthquakes, and wind. There are no bodies of water adjacent or near to the site. Therefore, a seiche is not a potential inundation hazard.

Earthquake-Induced Flooding is a flooding caused by failure of dams or other water-retaining structures as a result of earthquakes. The site is mapped within an area shown as Potential Dam Inundation Areas on the Los Angeles County General Plan Dam and Reservoir Inundation Routes Map (General Plan 2035 Figure 9.4). Since the site is located in the inundation area of the Whittier Narrows Dam (11 miles upstream from Compton), the Hansen Dam (30 miles upstream from Compton), and the Sepulveda Dam (29 miles upstream from Compton), the potential of earthquake-induced flooding exists at the site, if one of these dams fails during a strong earthquake.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our geotechnical investigation findings, it is our opinion that the site is suitable for the proposed building and associated improvements provided the recommendations in this report are taken into account during design and construction of the project. We did not encounter any geotechnical constraints, geological hazards within the subject site that cannot be mitigated by proper planning, design, and sound construction practices.

The most significant design considerations for this project are moderately compressible and hydro-collapsible potential soil at the near surface, liquefaction & seismic settlement, and seismic shaking. Presented herein are our recommendations for site grading, seismic parameters, foundation design parameters, lateral earth pressures, and construction considerations for the project.

4.1 Earthwork

All earthwork should be performed in accordance with the latest edition of the *Standard Specifications for Public Works Construction* (Greenbook), unless specifically revised or amended below or by future review of project plans.

All site grading operations should conform to the local building and safety codes and rules and regulations of the governing governmental agencies having jurisdiction over the subject construction.

Earthwork is expected to consist of excavation/overexcavation of loose and/or disturbed soils and placement of fill soils for the proposed site improvements. Recommendations for site earthwork are provided in the following paragraphs.

4.1.1 Site Preparation

The site should be cleared of all debris and unsuitable materials. All undocumented fill soils should be removed from the site. Prior to construction, it will be necessary to demolish the existing classroom building including utilities, remove all existing concrete slabs within the limits of planned grading. Structure removal should include foundations and flatwork. Concrete fragments and debris from the demolition operation should be disposed off-site. The existing near surface soils that are disturbed during demolition of the existing improvements should be recompacted or removed as needed to make it firm stable subgrade soils. The need for and extent of removal of soils disturbed by site demolition should be determined by the Geotechnical Engineer at the time of grading.

Any existing vegetation and organic contaminated soil should be stripped and disposed off-site. Removal of trees and shrubs should also include root balls and attendant root system.

Any existing utility lines should be removed and/or rerouted if they interfere with the proposed construction. The cavities resulting from removal of utility lines and any buried obstructions should be properly backfilled and compacted as recommended in Section 4.1.3 of this report. In addition, if any uncontrolled artificial fill is encountered, it should be removed.

Excavations located along property lines and/or adjacent to existing structures (i.e. buildings, walls, fences, etc.) should not be permitted within two (2) feet of existing foundations.

4.1.2 Excavation/Overexcavation

Existing fill soils within the proposed building area should be over-excavated to a depth of 1 foot below existing grade or to a sufficient depth to remove all of the undocumented fill materials in their entirety from within the proposed building area. Deeper undocumented fill layers may be present locally at the site and the depth and extent of the fill should be verified during the grading operation.

In order to remove the upper compressible and hydro-collapsible soil and to reduce the potential for adverse differential settlement of the proposed structures, the underlying subgrade soil must be prepared in such a manner that a uniform response to the applied loads is achieved. For the proposed building, we recommend that a minimum of 5 feet of engineered fill be provided under mat foundation/footings at a minimum overexcavation depth of 5 feet from existing grade, whichever provides the deeper overexcavation. The excavated removal bottoms of structural footings should be evaluated by a geotechnical engineer to confirm competent native soil materials are encountered. In general native soils with at least 85 percent relative compaction of maximum dry density (ASTD D1557) is considered suitable. If unsuitable soil conditions are encountered deeper excavation may be recommended. The overexcavation should extend below any underground obstructions to be removed. The overexcavation and recompaction should extend a minimum of 5 feet laterally from the edges of the footings, where feasible.

The soil below slabs-on-grade should be overexcavated and recompacted a minimum of 12 inches below the bottom of the proposed slab or 12 inches below the existing ground surface, whichever is deeper.

Areas outside the overexcavation limits of the proposed building planned for asphalt or concrete pavement and flatwork and areas to receive fill should be overexcavated to a minimum depth of 12 inches below the existing ground surface or 12 inches below the proposed finish grade, whichever is deeper.

Local conditions may require that deeper overexcavation be performed. If encountered, such areas should be evaluated by the geotechnical consultant of record during grading.

In addition to the above recommendations, all uncontrolled fill, if encountered, should be removed from structural areas prior to fill placement.

After completion of the overexcavation, and prior to fill placement, the exposed surfaces should be scarified to a minimum depth of 6 inches, moisture-conditioned to optimum to plus 3-percent above optimum, and recompacted to a minimum 90 percent relative compaction.

4.1.3 Fill Placement and Compaction

Upon excavation/overexcavation to the recommended depths, subgrade soils at the removal bottoms should be moisture-conditioned as needed and recompacted to a minimum of 90 percent relative compaction (per ASTM D1557). No scarification at the removal bottom would be necessary.

Any fill soil should be placed in loose lifts of 6 to 8 inches in thickness, moisture-conditioned to above the optimum moisture content, and compacted to a minimum of 90 percent relative compaction (per ASTM D1557).

4.1.4 Fill Materials

Onsite soils that are free of organics, debris and oversize particles (e.g., cobbles, rubble, etc. that are greater than 3 inches in the largest dimension) and an Expansion Index less than 50 can be reused as fill as approved by the Geotechnical Engineer. Import soils, if used, should be free of organics, corrosion impacts, and should have an Expansion Index less than 21 (per ASTM D4829). Import soils should be evaluated and tested by our firm to confirm the quality of the material. If base materials are imported to be placed instead of soil backfill, these may be either crushed aggregate base or crushed miscellaneous base in conformance with the Sections 200-2.2 and 200-2.4 of the *Standard Specifications for Public Works Construction* (Green Book), 2006 Edition, respectively.

Soil engineer should be notified at least 48 hours prior to borrow materials in order to sample and test materials from proposed borrow sites.

4.2 CBC Seismic Design Parameters

A seismic cone penetration test (SCPT) at the site to measure shear wave velocities was performed by Heider Inspection Group during their 2015 investigation. Measurements were performed up to 55 feet below the existing surface. The average shear wave velocity was measured to be 779 feet per second (ft/sec; see Appendix B).

In order to provide the preliminary seismic design parameters, based on the field data we have assumed that site's soil profile may be characterized within the category of 'Stiff Soil Profile' with Site Class D according to Section 1613.3.2 of the 2016 California Building Code (CBC) accordance with Chapter 20 of ASCE 7. Although liquefiable soils and potential liquefaction settlement have been identified at the site, Site Class "F" was judged to not apply since, per ASCE 7-10, Section 20.3.1, the proposed building is anticipated to have a fundamental period of vibration less than 0.5 second. Therefore, based on the subsurface conditions and geology of the site, site's soil profile can be characterized within the category of 'Stiff Soil Profile' with Site Class D.

Corresponding **CBC seismic design parameters** for this soil profile and the site location (Latitude: 33.87889 °N; Longitude: - 118.21043 °W) are determined based on general ground motion analysis in accordance with Section 1613.3 of the 2016 CBC. These parameters are summarized in Table. Proposed development at the site should be designed for the seismic parameters presented in the following Table.

Table 3 – CBC Seismic Design Parameters

Categorization/Coefficient	Design Value
Site Class	D
Mapped MCE Spectral Acceleration for Short (0.2 Second) Period, S_S	1.674
Mapped MCE Spectral Acceleration for a 1-Second Period, S_1	0.611
Short Period (0.2 Second) Site Coefficient, F_a	1.0
Long Period (1 Second) Site Coefficient, F_v	1.5
Adjusted Spectral Response Acceleration at 0.2-Second Period, S_{MS}	1.674
Adjusted Spectral Response Acceleration at 1-Second Period, S_{M1}	0.916
Design (5% damped) Spectral Response Acceleration for Short (0.2 Second) Period, S_{DS}	1.116
Design (5% damped) Spectral Response Acceleration for a 1-Second Period, S_{D1}	0.611
Peak ground acceleration value, PGA_M	0.623
Seismic Design Category	D

As the reported long period spectral response acceleration (S_1) was less than 0.75g (S_1<0.75), the project is assigned to a ***Seismic Design Category*** **"D"** based on Section 1613A.3.5 of CBC 2016.

As the site is assigned a Seismic Design Category D, a site-specific ground motion analysis is not required per CGS Note 48. As such, the above CBC Seismic Design Parameters following this USGS general procedure presented in Table 1 above should be used in design. The USGS summary reports will be included in our geotechnical report.

4.3 Foundation Design Parameters

The proposed building should be supported on foundations designed to accommodate the anticipated static and calculated seismic total and differential settlements without undue distress occurring to the building. As discussed in previous Sections, the project site is susceptible to potential settlement due to collapse settlement of the surficial silty soils, as well as liquefaction settlement induced by the design earthquake. Based on our liquefaction analyses, we calculated post-seismic liquefaction settlement on the order of 1 inch. Geotechnical Engineering and Geologic Hazards Study Report (Heider Inspection Group 2015) for the adjacent building project (Instructional Building #1) reported a seismic settlement ranging from 1.4 to 1.7 inches. Potential settlement due to collapse within the surficial silty soils was also reported to be on the order of one inch.

Hydro-collapse settlement and static settlement can be reduced or controlled by remedial grading i.e., reworking the surficial, collapse- susceptible soils as engineered fill. However, deep liquefiable layers will not be mitigated by shallow remedial grading. Therefore, due to high settlement, shallow pad and strip footing system is not recommended for this project.

We recommend using either a structural mat foundation supported on a layer of engineered fill or a conventional shallow spread footing foundation system in combination with a ground improvement method such as Geopiers or drilled displacement columns to transfer structural building loads to deeper, dense supporting strata below the bulk of the collapse and liquefaction-susceptible layers onsite.

4.3.1 Structural Mat Foundation

A mat foundation can be used to distribute foundation loads to span local irregularities in the supporting capacity of the foundation soil, and to reduce the magnitude of differential settlement. The mat foundation may be designed for any practical bearing pressure up to a maximum of 1,200 psf. Total settlement of mat foundations designed to the maximum bearing pressure are estimated to be on the order of 2½ inches or less (including seismic settlement) and differential settlement between adjacent columns should not exceed ¾ inch provided that the mat extends to a minimum two feet below lowest adjacent grade.

For the design of structural mat foundation, an average modulus of subgrade reaction, K_S of 150 pci (pounds per cubic inch) may be used. In addition, we recommend that the mat foundation be designed to tolerate a static and seismically-induced differential settlement. The magnitude of total and differential static settlement of the mat foundation will be a function of the structural design and stiffness of the mat.

Resistance to lateral loads can be provided by friction acting at the base of the foundation and by passive earth pressure. A coefficient of friction of 0.3 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 200 pounds per square foot (psf) per foot of depth up to a maximum of 2,000 psf may be used for sides of the foundation poured against properly compacted fill. This allowable passive pressure is applicable for level ground conditions only (slope equal to or flatter than 5H:1V).

The bearing values indicated above are for total dead-load and frequently applied live-loads. The above vertical and lateral bearing values may be increased by 33 percent for short durations of loading, including the effects of wind or seismic forces. Adjacent utilities or foundations should be avoided within the zone of an imaginary plane extending downward at a 1½H:1V (horizontal: vertical) inclination from the bottom edge of the mat foundation.

If a structural mat foundation is selected for building support, the soils underlying the building pad should be over-excavated to construct the recommended five-foot thick engineered fill layer, and backfilled with engineered fill in order to remove the upper compressible & hydro-collapsible soil. Subgrade soil should be prepared as described in the earthwork section of this report (Section 4.1)

4.3.2 Shallow Foundations with Ground Improvement

Shallow spread footing foundations supported by a ground improvement method such as Drilled Displacement Columns (DDC), a ground improvement technique, can be used as an alternate for building foundation support. DDC is a method where a large diameter auger is advanced to the design depth, and as the auger is withdrawn, low strength concrete (CLSM) is injected under pressure as the auger is slowly withdrawn, providing soil compaction in loose and soft soil zones as well as providing a column. The method is similar to the installation of auger-cast piles except that minimal spoils are generated, and the columns serve to also transfer load of shallow Proposed Instructional Building # 2 foundations to deeper, more competent supporting strata rather than serving as a deep foundation with internal steel reinforcement.

If used, drilled displacement columns should be extended to a bearing depth 45 feet below the existing ground surface. We estimate that columns extended to a depth 30 feet will reduce potential liquefaction settlement to less than approximately ½ inch. Multiple columns may be needed at footing locations based on footing loads and dimensions, and additional columns may be required and spaced at wider intervals below slab-on-grade floors in order to minimize the potential for differential settlement of floor slabs and adjacent building columns.

DDC sizing and spacing would be determined by the design-build contractor once structural loading and foundation plans become available. The DDC work should be designed and installed by a qualified specialty contractor. The DDC work scope should include a DDC design-build submittal stamped by a California Registered Engineer, equipment and personnel mobilization, DDC load testing, and construction of DDCs. The design package should be submitted to United-Heider Inspection Group for review at least two weeks prior to mobilization for construction. Installation of DDC elements should be observed by United-Heider Inspection Group on a full-time basis.

Conventional continuous and/or isolated spread footings bearing on the improved onsite soils should be founded a minimum of 24 inches below lowest adjacent finished grade. Continuous footings should have a minimum width of at least 24 inches, and isolated column footings should have a minimum width of at least 30 inches. In addition, footings located adjacent to other footings or utility trenches should bear below an imaginary 1.5:1 (horizontal to vertical) plane projected upward from the bottom edge of the adjacent footings or utility trench. Footing reinforcement should be determined by the project Structural Engineer. Footings supported on DDC-reinforced soils can be initially designed for an allowable bearing capacity of 5,000 pounds per square foot (psf). The bearing capacity should be verified by a full-scale load test. An aggregate "cushion" layer at least eight inches thick should be placed between the DDC elements and footing. The aggregate "cushion" is typically placed and constructed by the grading contractor and is not a part of the DDC work.

Footings can be designed to resist lateral loads using an allowable coefficient of friction of 0.35. Lateral sliding resistance is derived at the concrete/aggregate interface below the footing. In addition, an ultimate passive resistance equal to an equivalent fluid weighing 200 pounds per cubic foot (pcf) acting against the foundation may be used for lateral load resistance against the sides of footings perpendicular to the direction of loading where the footing is poured neat against undisturbed material (i.e., native soils or engineered fills). The top foot of passive resistance at foundations not adjacent to and confined by pavement, interior floor slab, or hardscape should be neglected. In order to fully mobilize this passive resistance, a lateral footing deflection on the order of one to two percent of the embedment of the footing is required. If it is desired to limit the amount of lateral deflection to mobilize the passive resistance, a proportional safety factor should be applied. A one-third increase to the allowable bearing capacity and frictional resistance is permitted for short-term seismic and wind loads. The estimated long-term total and differential settlements of the DDC-supported footings should be less than one inch and ½ inch, respectively. Heider personnel should be retained to observe and confirm that foundation excavations prior to backfill or formwork and reinforcing steel placement bear in the anticipated soils suitable for the recommended maximum design bearing pressure.

4.4 Slab-On-Grade

Slabs-on-grade should be placed on properly prepared subgrade soil as described in the earthwork section of this report (Section 4.1). Prior to concrete placement, the exposed subgrade should be scarified to at least 6 inches, moisture-conditioned to moisture content of optimum moisture to plus 3% over optimum. The subgrade should not be allowed to dry prior to concrete placement.

The structural engineer should design the actual slab thickness and reinforcement based on structural load requirements. We recommend a minimum slab thickness of 4 inches. Frequent continuous joints should be provided to help control slab cracking.

Care should be taken to avoid slab curling if slabs are poured in hot weather. Slabs should be designed and constructed as promulgated by the Portland Cement Association. Prior to the slab pour, all utility trenches should be properly backfilled and compacted.

In areas where a moisture-sensitive floor covering (such as vinyl, tile, or carpet) is used, a moisture/vapor barrier should be placed per our recommendation in Section 4.9.

4.4.1 Exterior Concrete

To reduce the potential for excessive cracking of concrete flatwork (such as walkways, etc.), concrete should be a minimum of 4 inches thick and provided with construction or weakened plane joints at frequent intervals.

4.5 Moisture/Vapor Mitigation for Concrete Floor Slab-on-Grade

In order to reduce the potential for moisture/water vapor migration up through the slab and possibly affecting floor covering, a moisture/vapor retarder is recommended under concrete floor slab-on-grade. The moisture barrier should be properly installed, lapped and sealed in accordance with the manufacturer's specifications. Punctures and rips should be repaired prior to placement of sand.

United-Heider Inspection Group does not specialize in the field of slab design, concrete mix design and/or moisture vapor transmission. A qualified waterproofing consultant should be retained in order to recommend a product or method which would provide protection for the concrete slabs-on-grade in your project based on the project needs. Please refer to the latest version of the "ACI Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials" for your design.

The moisture/water vapor protection for concrete slab-on-grade should be selected based on cost and construction considerations, and considering potential future problems resulting from improper and uncontrolled landscape irrigation practices. Regardless of the moisture/water vapor retarder option selected, it should be emphasized that proper control of irrigation and landscape water adjacent to the structure is of paramount importance.

4.6 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations and other excavations should be performed in accordance with project plans, specifications and all Occupational Safety and Health Administration (OSHA) requirements.

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 slope, 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 structures.

Excavations located along property lines and adjacent to existing structures (i.e. buildings, walls, fences, etc.) should not be permitted within two (2) feet from existing foundations.

4.7 Surface Drainage

All pad and roof drainage should be collected and transferred to an approved area in non-erosive drainage devices. Drainage should not be allowed to descend any slope in a concentrated manner, pond on the pad or against any foundation.

The California Building Code recommends a minimum 5-percent slope away from the perpendicular face of the building wall for a minimum horizontal distance of 10-feet (where space permits). We recommend a minimum 5-percent slope away from the building foundations for a horizontal distance of 3 feet be established for any landscape areas immediately adjacent to the building foundations. In addition, we recommend a minimum 2-percent slope away from the building foundations be established for any impervious surfaces immediately adjacent to the building foundations for a minimum horizontal distance of 10 feet (where space permits). Lastly, we recommend the installation of roof gutters and downspouts which deposit water into a buried drain system be installed instead of discharging surface water into planter areas adjacent to structures.

It is the responsibility of the contractor and ultimately the developer and/or property owner to insure that all drainage devices are installed and maintained in accordance with the approved plans, our recommendations, and the requirements of all applicable municipal agencies. This includes installation and maintenance of all subdrain outlets and surface drainage devices. It is recommended that watering be limited or stopped altogether during the rainy season when little irrigation is required. Over-saturation of the ground can cause major subsurface damage. Maintaining a proper drainage system will minimize the hydro-collapse potential of sub-soils.

Drainage swales should not be constructed within 5 feet of building structure. Irrigation adjacent to buildings should be avoided wherever possible.

As an option, sealed-bottom planter boxes and/or drought resistant vegetation may be used within 5 feet of buildings.

4.8 Trench Backfill

Utility trenches should be backfilled with compacted fill in accordance with Sections 306-1.2 and 306-1.3 of the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2006 Edition.

Utility trenches can be backfilled with onsite soils free of debris, organic and oversized material (maximum size not exceeding 3 inches). However, prior to backfilling utility trenches, pipes should be bedded in and covered with import granular material that has a Sand Equivalent (SE) value greater than 30. Bedding sands may be placed by mechanical compaction (rolling sheepsfoot wheel attached to backhoe) or by jetting. Native soil backfill over the pipe bedding zone should be placed in thin lifts - loose lift thickness not exceeding 8 inches - moisture conditioned as necessary, and mechanically compacted to a minimum of 90 percent relative compaction (per ASTM D1557) in paved and any structural areas.

4.9 Construction Observation and Testing

All excavation and grading during construction should be performed under the observation and testing of the geotechnical consultant at the following stages:

- Upon removal of the upper soils to the proposed excavation/overexcavation bottoms;
- During preparation of the removal bottoms, any fill placement, and grading for the proposed improvements;
- During preparation of the footing subgrades;
- When any unusual or unexpected geotechnical conditions are encountered.

4.10 Limitations

The conclusions and recommendations in this report are based in part upon data that were obtained from a limited number of soil samples and laboratory test results. Such information is by necessity limited. Subsurface conditions may vary across the site. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if United - Heider Inspection Group has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our findings are representative for the site.

This report is not authorized for use by, and is not to be relied upon by any party except, **Compton Community College District**, their successors and assignees as the owner of the property. Use of or reliance on this report by any other party is at that party's risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify United - Heider Inspection Group from and against liability, which may arise as a result of such use or reliance.

Geotechnical investigation and relevant engineering evaluations for this project were performed in substantial conformance with the general practices of geotechnical engineering in southern California at the time of this report. No other warranty is expressed or implied.

5.0 REFERENCES

American Concrete Institute (ACI), 2005, ACI 318-05, Building Code Requirements for Structural Concrete and Commentary, published in 2005.

Bedrossian, T.L., Roffers, P.D., Hayhurst, C.A Lancaster, J.T., and Short, W.R., and., compilers, December 2012, Geologic Compilation of Quaternary Surficial Deposits in Southern California: California Geological Survey, Special Report 217 (Revised), Plate 8-Long Beach 30' x 60' Quadrangle, scale 1:100,000, dated July 2010.

Bilodeau, W.L., Bilodeau, S.W., Gath, E.M. Oborne, M., and Proctor, R.J., 2007, Geology of Los Angeles, California, United States of America: Environmental & Engineering Geoscience, Vol. XIII, No. 2, May 2007, pp. 99–160.

Boulanger, R. W., and Idriss, I. M. (2006). "Liquefaction susceptibility criteria for silts and clays." Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 132(11), 1413-1426.

California Department of Water Resources, 1961, Ground water geology, Appendix A of Planned utilization of the ground water basins of the coastal plain of Los Angeles County: California Dept. Water Resources Bull. 104, 181 p.

California Division of Mines and Geology (CDMG), 1973, Urban Geology Master Plan for California, Bulletin 198, p. 43-48.

California Emergency Management Agency, California Geological Survey and University of Southern California, 2009, Tsunami Inundation Map for Emergency Planning, Long Beach Quadrangle: from Tsunami Inundation Maps website; http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/LosAngeles/Documents/Tsunami_Inundation_LongBeach_Quad_LosAngeles.pdf.

California Emergency Management Agency, California Geological Survey and University of Southern California, 2009, Tsunami Inundation Map for Emergency Planning, Venice Quadrangle: from Tsunami Inundation Maps website; http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/LosAngeles/Documents/Tsunami_Inundation_Venice_Quad_LosAngeles.pdf.

California Geological Survey, 1998, Seismic Hazard Zone Report for the South Gate 7.5-Minute Quadrangle, Los Angeles County, California: Department of Conservation (formerly Division of Mines and Geology), Seismic Hazard Zone Report 034.

California Geological Survey, 2005, Earthquake Zones of Required Investigation

South Gate 7.5-Minute Quadrangle, Los Angeles County, California, March 25, 1999.

California Geologic Survey, 2007, Fault-Rupture Hazard Zones in California: Special Publication 42.

California Geologic Survey, 2010, Geologic Compilation of Quaternary Surficial Deposits In Southern California Onshore Portion Of The Long Beach 30' X 60' Quadrangle; CGS Special Report 217, Plate 8 (July 2010).

California Geologic Survey, 2013, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings, October 2013: CGS Note 48.

California Geological Survey, 2016, Earthquake Zones of Required Investigation, Inglewood 7.5-Minute Quadrangle, Los Angeles County, California, March 25, 1999.

California Geological Survey, 2016, Earthquake Zones of Required Investigation, South Gate 7.5-Minute Quadrangle, Los Angeles County, California, March 25, 1999.

California Geological Survey, 2016, Geologic Map of the Long Beach 30’ x 60’ quadrangle, California: A digital database: California Geological Survey Preliminary Geologic Map, scale 1:100,000.

Cao, T., Bryant, W.A., Rowshandel, B., Branum, D., and Wills, C.J., 2003, The revised 2002 California probabilistic seismic hazard maps, June 2003: California Geologic Survey, 12 p., Appendix A.

County of Los Angeles, 2013, Manual for Preparation Geotechnical Reports, July 1, 2013.

Crouch, J. K. and Suppe, J., 1993, Late Cenozoic tectonic evolution of the Los Angeles basin and inner California borderland: A model for core complex-like crustal extension: Geological Society America Bulletin, Vol. 105, pp. 1415–1434.

Crowell, J. C., 1976, Implications of crustal stretching and shortening of coastal Ventura Basin, California. In Howell, D. G. (Editor), Aspects of the Geologic History of the California Continental Borderland: American Association of Petroleum Geologists, Pacific Section, Miscellaneous Publication 24, pp. 365–382.

Das, Braja M., 1983, Advanced Soil Mechanics, John Benjamins Publishing Co., January 1983.

Das, Braja M., 2000, Principles of Foundation Engineering.

Federal Emergency Management Agency Flood Insurance Rate Map (FIRM), 2008, Panel 1815 of 2350, Map Number 06037C1815F, Effective September 26, 2008.

Gastil, G.; Morgan, G.; and Krummenacher, D., 1981, "The tectonic history of peninsular California and adjacent Mexico", In Ernst, W. G. (Editor), "The Geotectonic Development of California", Rubey Vol. I: Prentice-Hall, Inc., Englewood Cliffs, NJ, pp. 285–306.

Hart, E.W. and Bryant, W.A., 1999, Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Maps, California Division of Mines and Geology, Special Publication 42.

Heider Inspection Group, 2015, Geotechnical Engineering and Geologic Hazards Study Report, Proposed Instructional Building 1, El Camino College Compton Center, 1111 E. Artesia Boulevard, Compton, California 90221, Heider Inspection Group Project # HE15281-2, dated December 21, 2015.

Hsai-Yang Fang, 1997, Foundation Engineering Handbook, Second Edition.

Ingersoll, R. V. and Rumelhart, P. E., 1999, Three-stage evolution of the Los Angeles basin, Southern California: Geology, Vol. 27, pp. 593–596.

International Code Council (ICC), 2016, California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, 2016 Edition.

Jennings, C.W., and Bryant, W.A, 2010, Fault Activity Map of California, Scale 1:750,000, California Geological Survey, Geologic Data Map No. 6.

Legg, M. R., 1991, Developments in understanding the tectonic evolution of the California Continental borderland. In Osborne, R. H. (Editor), From Shoreline to Abyss: Contributions in Marine Geology in Honor of Francis Parker Shepard: SEPM (Society for Sedimentary Geology) Special Publication 46, pp. 291–312.

Legg, M.R., Luyendyk, B.P., Mammerickx, J., and Tyce, R.C., 1989, Sea Beam Survey of an Active Strike-Slip Fault: The San Clemente Fault in the California Continental Borderland: Journal of Geophysical Research, v. 94, pp. 1727-1744.

Martin, G. R., and Lew, M., ed., 1999, "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California," Southern California Earthquake Center, dated March 1999.

Naval Facilities Engineering Command (NAVFAC), 1986, Foundation and Earth Structures, Design Manual 7.02.

NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils," Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127(10), 817-833.

Schoellhamer, J. E.; Woodford, A. O.; Vedder, J. G.; Yerkes, R. F.; and Kinney, D. M., 1981, Geology of the Northern Santa Ana Mountains, California: U.S. Geological Survey Professional Paper 420-D, U.S. Geological Survey, Denver, CO, 109 p.

Seed, H. B. and Whitman, R. V., 1970, Design of earth retaining structures for dynamic loads, Proc. ASCE Specialty Conference on Lateral Stresses in the Ground and Design of Earth Retaining Structures, pp. 103-147.

Shaw, J.H., Plesch, A., Dolan, J.F., Pratt, T.L., and Fiore, P., 2002, Puente Hills Blind-Thrust System, Los Angeles, California: Bulletin of the Seismological Society of America, vol. 92, no. 8, pp. 2946-2960.

Soils and Foundations, U.S. Department of Transportation, Federal Highway Administration, Publication No. FHWA HI-88-009, Revised July 1993.

Tokimatsu, K., Seed, H. B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," Journal of the Geotechnical Engineering, American Society of Civil Engineers, Vol. 113, No. 8, pp. 861-878.

Yoshimi, Y., K. Tokimatsu, and Y. Hosaka., 1989, "Evaluation of Liquefaction Resistance of Clean Sands Based on High-Quality Undisturbed Samples", Soils and Foundation, 29(1), 3-104. Tokyo, Japan.

Youd, T. L., and Idriss, I. M. (Editors), 1997, Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils, National Center for Earthquake Engineering Research, State University of New York at Buffalo, New York.

Youd, T. L. et al., 2001, "Liquefaction Resistance of Soils: Summary Report from the 1996.

United States Geological Survey, Earthquake Ground Motion Parameter Calculator for 2016 CBC Seismic Design Parameters.
https://earthquake.usgs.gov/designmaps/us/application.php

http://earthquake.usgs.gov/research/hazmaps/design/index.php

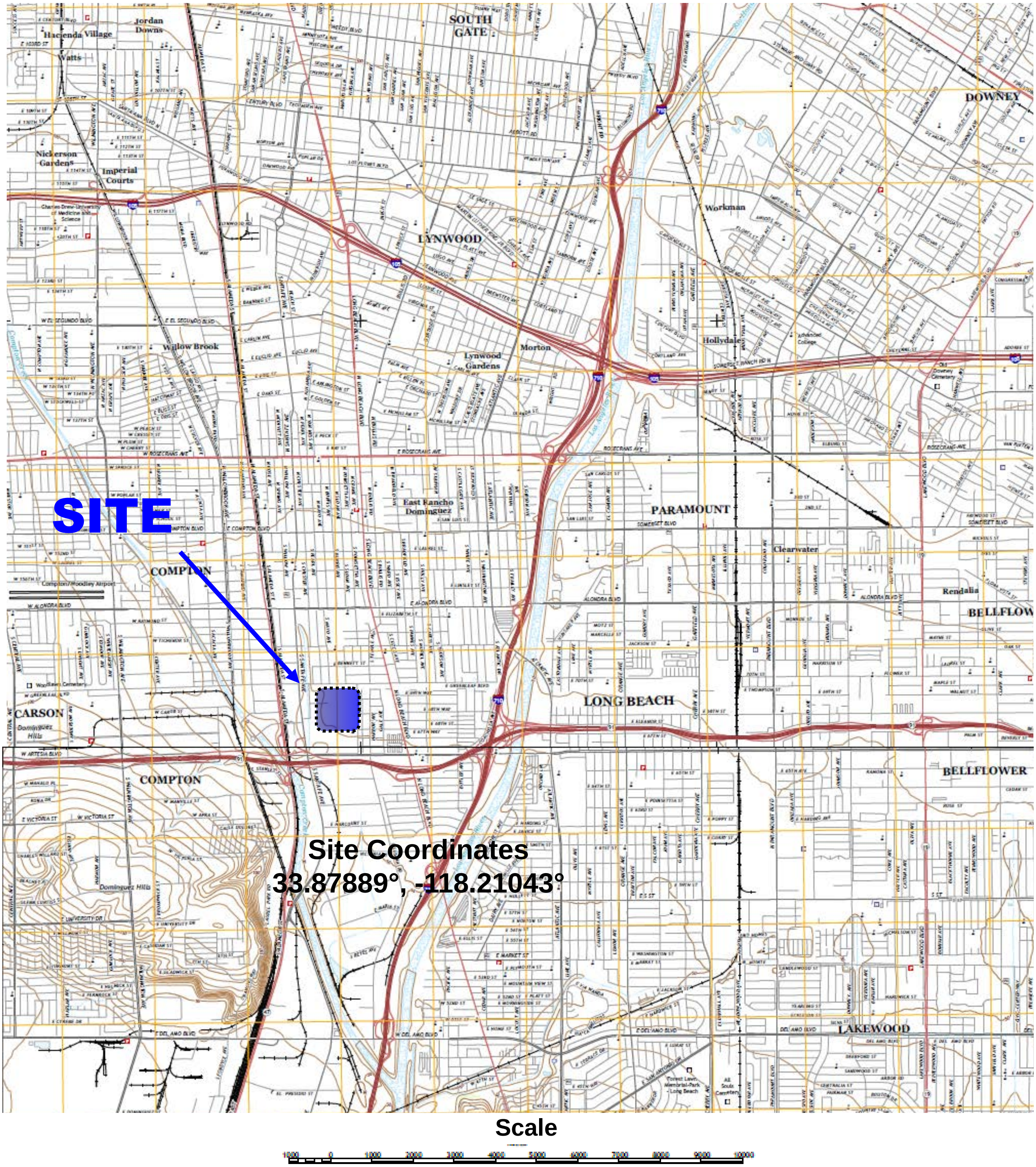
https://earthquake.usgs.gov/hazards/interactive/

Wright, T. L., 1991, Structural geology and tectonic evolution of the Los Angeles basin, California; In Biddle, K. T. (Editor), Active Margin Basins: American Association of Petroleum Geologists Memoir 52, American Association of Petroleum Geologists, Tulsa, OK, pp. 35–134.

Yerkes, R. F.; McCulloch, 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, U.S. Geological Survey, Denver, CO, 57 p.

APPENDIX A

Figures



REFERENCE: USGS 7.5 Minute Topographic Maps, South Gate and Long Beach Quadrangles, Los Angeles County, California (2015).

UNITED-HEIDER
INSPECTION GROUP

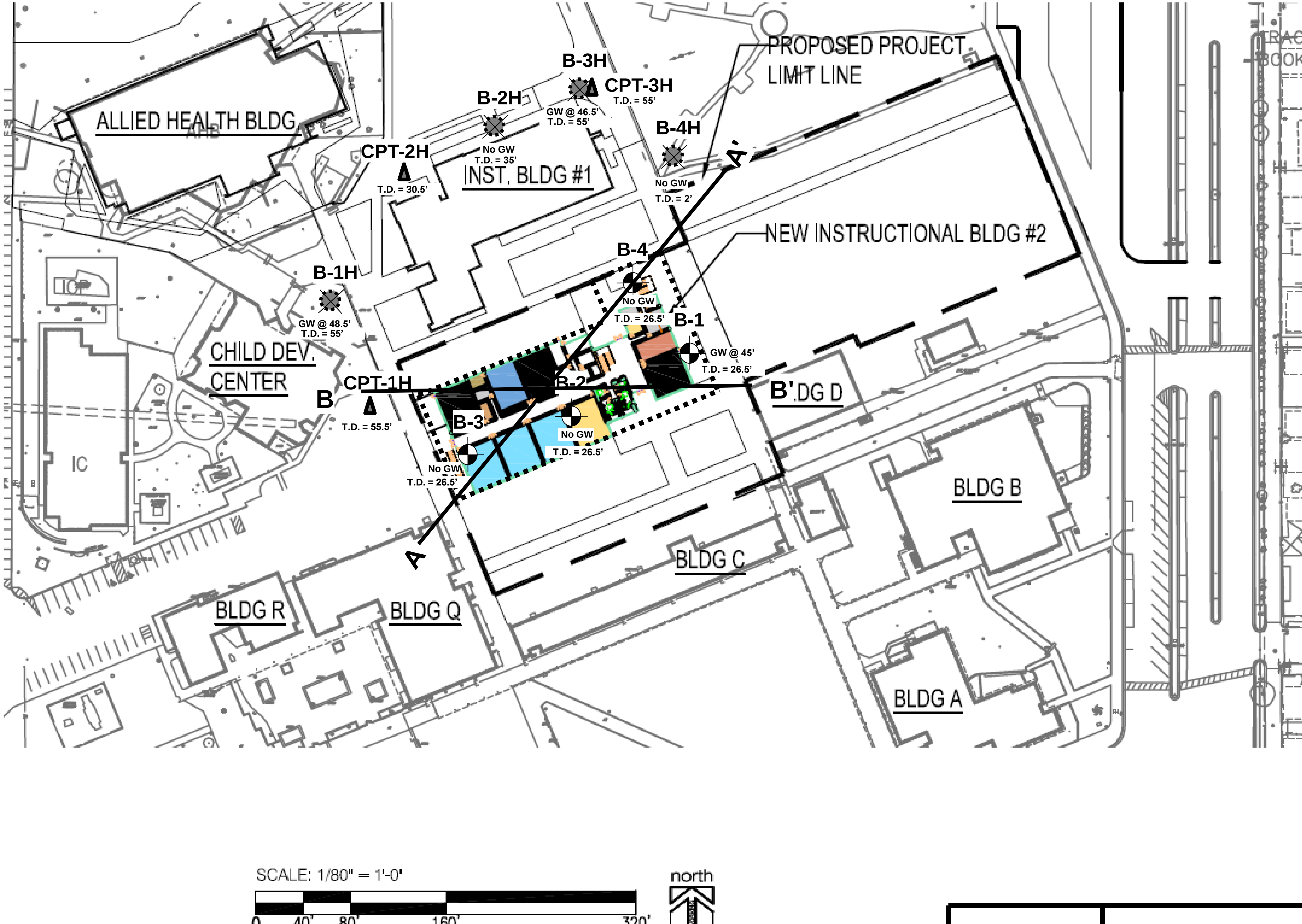
Figure 1 – Site Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd.
Compton, CA 90221

N

Project No. 10-18020PW

Date: Feb. 2018



EXPLANATION

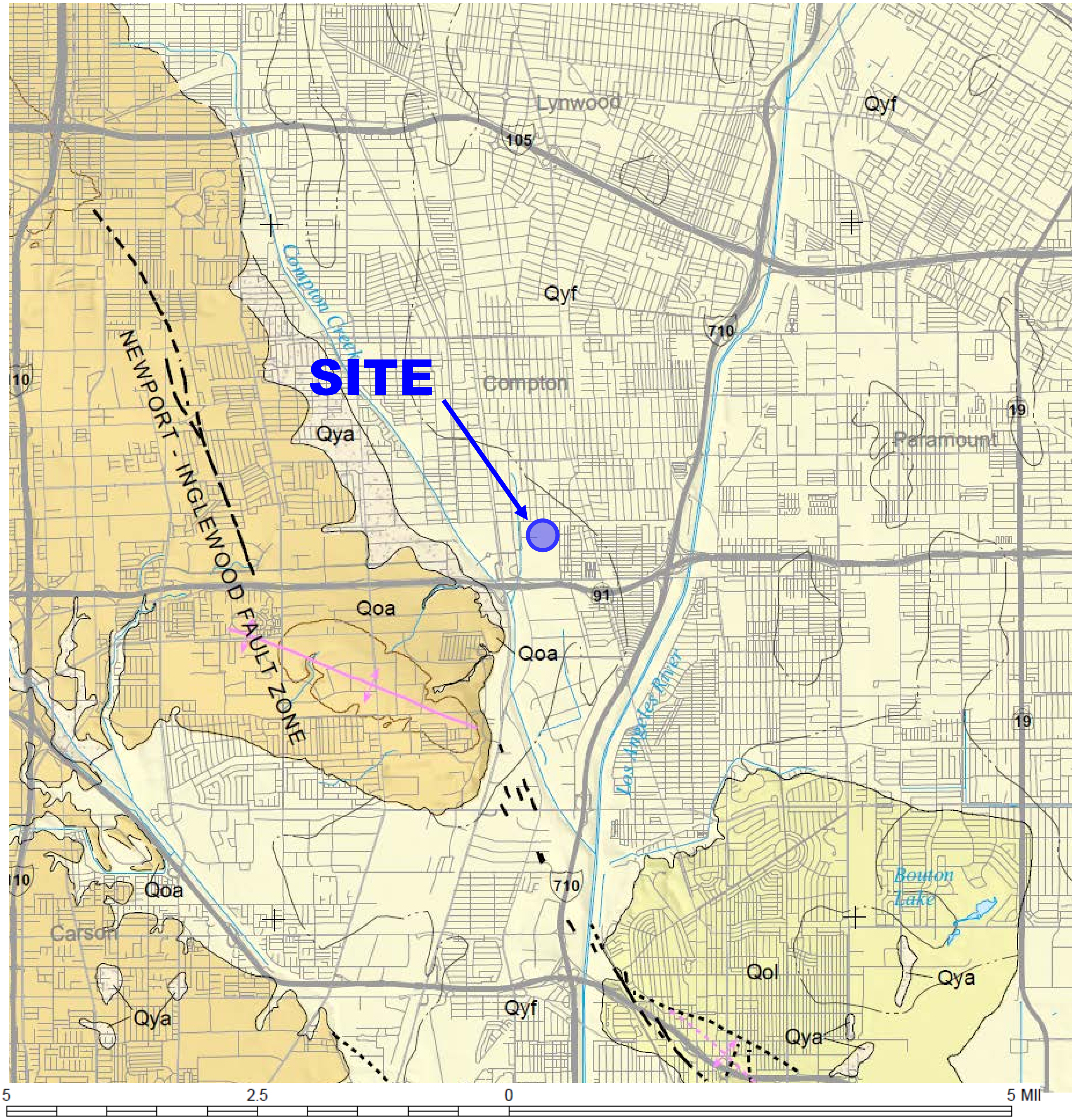
B-4	⊕	Boring Location and Designation
B-4H	⊗	Boring Location and Designation by Heider Inspection Group (2015).
CPT-3H	▲	Cone Penetration Test (CPT) Location and Designation by Heider Inspection Group (2015).
T.D. = 51.5'		Total Depth of Exploration
No GW		No Groundwater Encountered
GW @ 45'		Depth of Groundwater

UNITED-HEIDER INSPECTION GROUP

Figure 2 – Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd.
Compton, CA 90221

Project No. 10-18020PW
Date: Feb. 2018



Qyf	**Young Alluvial Fan Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

REFERENCE: CGS (2010) Geologic Compilation of Quaternary Surficial Deposits In Southern California Onshore Portion Of The Long Beach 30' X 60' Quadrangle; CGS Special Report 217, Plate 8.

UNITED-HEIDER
INSPECTION GROUP

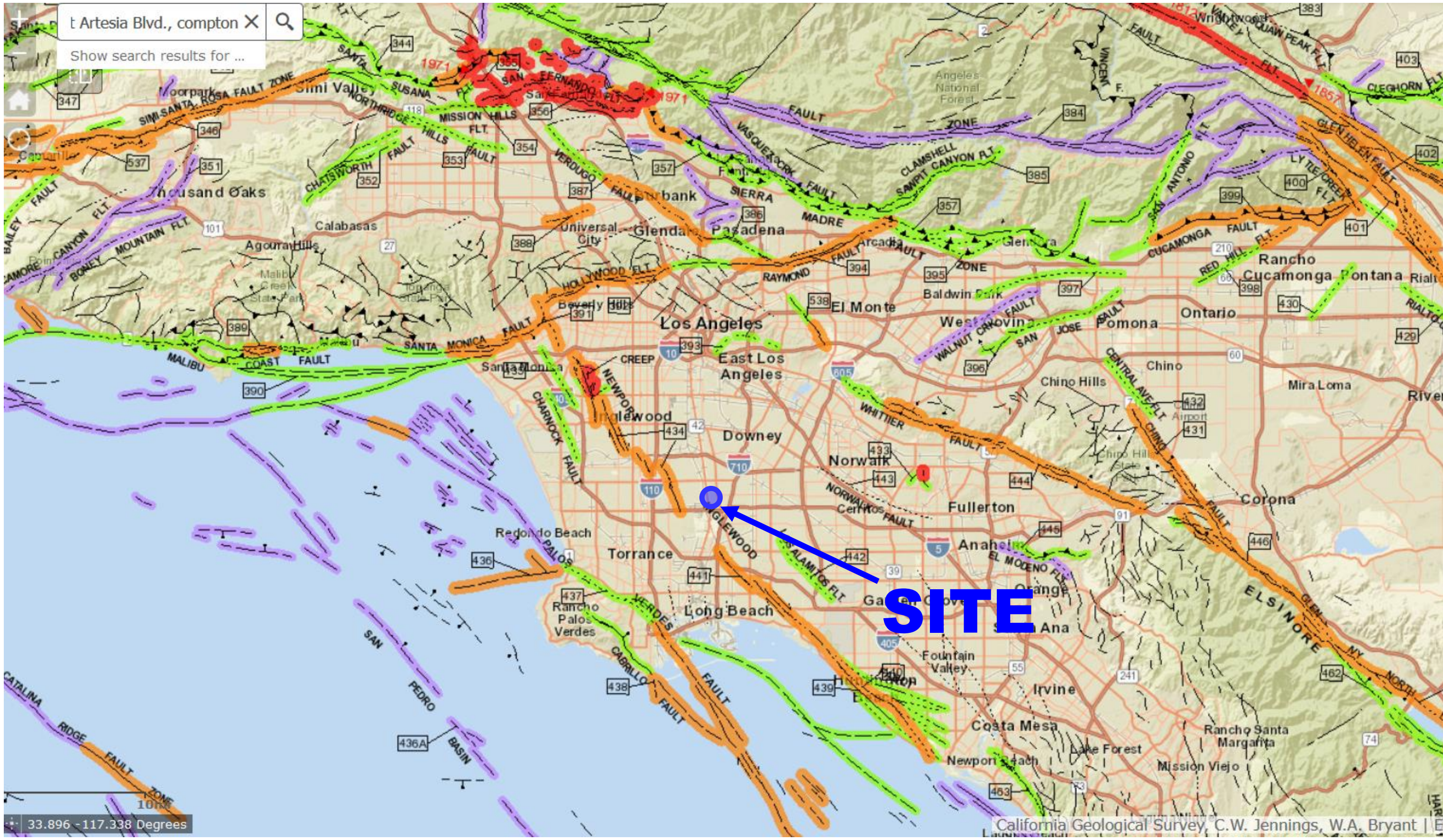
Figure 3 - Regional Geology Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd.
Compton, CA 90221

N

Project No. 10-18020PW

Date: Feb. 2018



SYMBOL EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred.

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

Date bracketed by triangles indicates local fault break.

No triangle by date indicates an intermediate point along faultbreak.

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

REFERENCE: California Geological Survey, Fault Activity Map of California (2010).

http://maps.conservation.ca.gov/cgs/fam/App/index.html

UNITED-HEIDER
INSPECTION GROUP

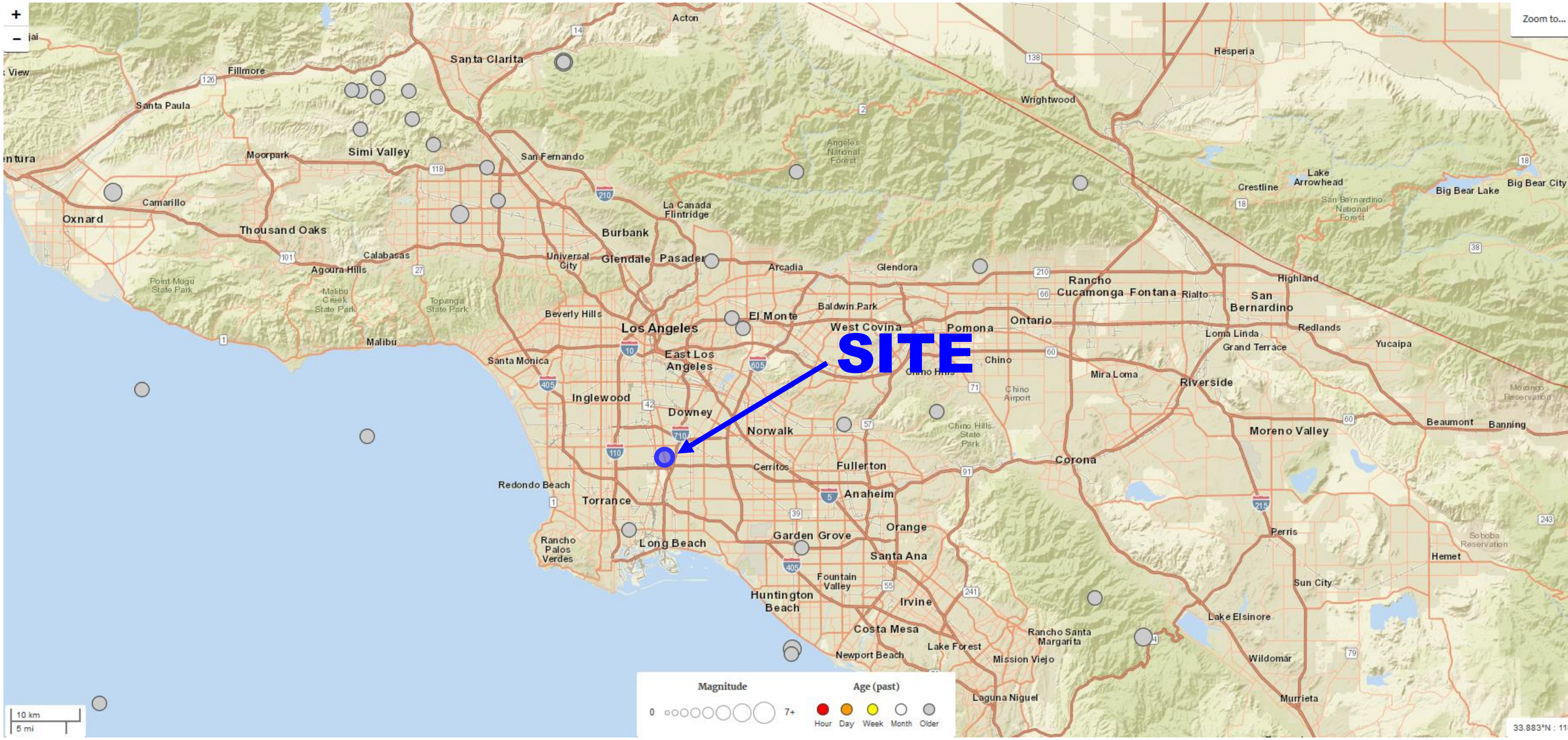
Figure 4 - Regional Fault Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd.
Compton, CA 90221

N

Project No. 10-18020PW

Date: Feb. 2018



REFERENCE: http://earthquake.usgs.gov/earthquakes

Location of Historic Earthquake Epicenter (M_W > 5)

UNITED-HEIDER
INSPECTION GROUP

Figure 5 - Regional Seismicity Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd.
Compton, CA 90221

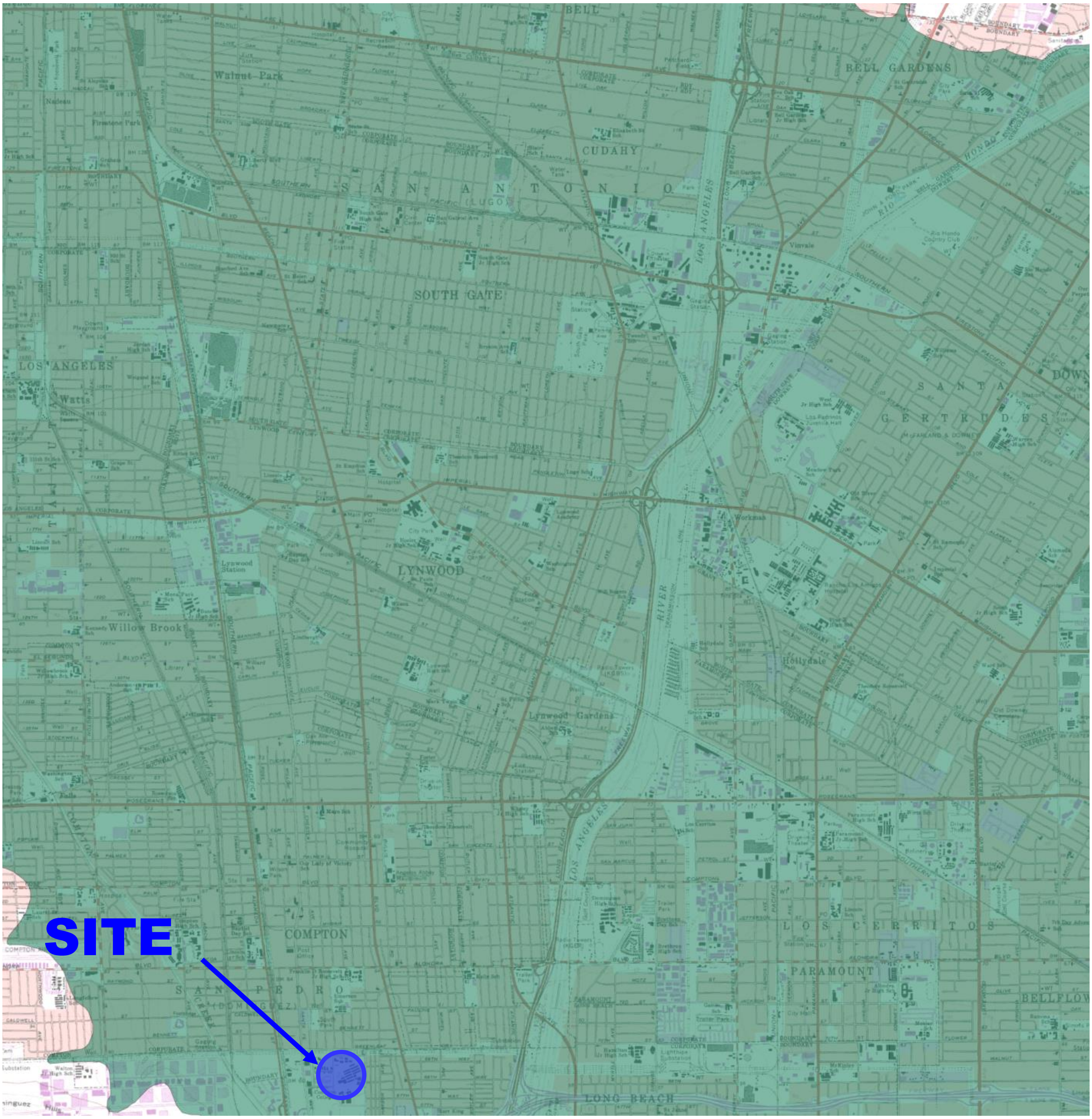
N

Project No. 10-18020PW

Date: Feb. 2018

Historic Seismicity (1900 to 2018)
Within 100 km Search Radius and $M_W > 5.0$
Proposed Instructional Building #2, El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221

Local System Date and Time (UTC-08:00)	Latitude	Longitude	Depth (km)	Magnitude (M_W)	Place
2014-03-29T04:09:42.170Z	33.9325	-117.9158	5.1	5.1	2km NW of Brea, CA
2008-07-29T18:42:15.670Z	33.9485	-117.7663	15.5	5.4	5km S of Chino Hills, CA
1997-04-26T10:37:30.670Z	34.3690	-118.6700	15.9	5.1	12km ESE of Piru, California
1995-06-26T08:40:28.940Z	34.3940	-118.6690	12.8	5.0	11km SW of Valencia, California
1994-03-20T21:20:12.260Z	34.2310	-118.4750	12.4	5.2	3km WNW of Panorama City, California
1994-01-29T11:20:35.970Z	34.3060	-118.5790	0.6	5.1	6km NNE of Chatsworth, California
1994-01-19T21:11:44.900Z	34.3780	-118.6190	10.8	5.1	10km SSW of Valencia, California
1994-01-19T21:09:28.610Z	34.3790	-118.7120	13.8	5.1	8km ESE of Piru, California
1994-01-18T00:43:08.890Z	34.3770	-118.6980	10.7	5.2	10km ESE of Piru, California
1994-01-17T23:33:30.690Z	34.3260	-118.6980	9.1	5.6	7km NNE of Simi Valley, California
1994-01-17T12:40:36.120Z	34.3400	-118.6140	5.4	5.2	9km N of Chatsworth, California
1994-01-17T12:31:58.120Z	34.2750	-118.4930	5.3	5.9	1km ENE of Granada Hills, California
1994-01-17T12:30:55.390Z	34.2130	-118.5370	18.2	6.7	1km NNW of Reseda, CA
1991-06-28T14:43:54.660Z	34.2700	-117.9930	8.0	5.8	13km NNE of Sierra Madre, CA
1990-02-28T23:43:36.750Z	34.1440	-117.6970	3.3	5.5	6km NNE of Claremont, CA
1988-12-03T11:38:26.450Z	34.1510	-118.1300	13.7	5.0	1km SSE of Pasadena, CA
1987-10-04T10:59:38.190Z	34.0740	-118.0980	7.7	5.3	2km WSW of Rosemead, CA
1987-10-01T14:42:20.020Z	34.0610	-118.0790	8.9	5.9	2km SSW of Rosemead, CA
1981-09-04T15:50:48.700Z	33.5575	-119.1195	5.5	5.5	11km NNW of Santa Barbara Is., CA
1979-01-01T23:14:38.620Z	33.9165	-118.6872	13.3	5.2	13km S of Malibu Beach, CA
1973-02-21T14:45:56.140Z	33.9790	-119.0502	10.0	5.3	22km W of Malibu, CA
1971-02-09T14:10:29.040Z	34.4160	-118.3700	6.0	5.3	10km SSW of Agua Dulce, CA
1971-02-09T14:02:45.740Z	34.4160	-118.3700	6.0	5.8	10km SSW of Agua Dulce, CA
1971-02-09T14:01:12.450Z	34.4160	-118.3700	6.0	5.8	10km SSW of Agua Dulce, CA
1971-02-09T14:00:41.920Z	34.4160	-118.3700	9.0	6.6	10km SSW of Agua Dulce, CA
1970-09-12T14:30:53.000Z	34.2548	-117.5343	10.8	5.2	3km W of Lytle Creek, CA
1941-11-14T08:41:38.350Z	33.7907	-118.2637	6.0	5.1	5km E of Lomita, CA
1938-05-31T08:34:56.580Z	33.6993	-117.5112	10.2	5.2	8km ENE of Trabuco Canyon, CA
1933-03-11T06:58:45.610Z	33.6238	-118.0012	6.0	5.3	7km W of Newport Beach, CA
1933-03-11T05:18:48.490Z	33.7667	-117.9850	6.0	5.0	2km ENE of Westminster, CA
1933-03-11T01:54:10.660Z	33.6308	-117.9995	6.0	6.4	7km WNW of Newport Beach, CA
1922-03-10T11:21:04.000Z	34.2430	-119.0970	10.0	6.5	Greater Los Angeles area, California
1918-04-21T22:32:29.000Z	33.6470	-117.4330	10.0	6.7	Southern California



LIQUEFACTION

Liquefaction
Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

REFERENCE: California Geologic Survey, 2016, Earthquake Zones of Required Investigation, South Gate Quadrangle, Los Angeles County, California;.

UNITED-HEIDER
INSPECTION GROUP

Figure 6 – Liquefaction Susceptibility Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd.
Compton, CA 90221

N

Project No. 10-18020PW

Date: Feb. 2018

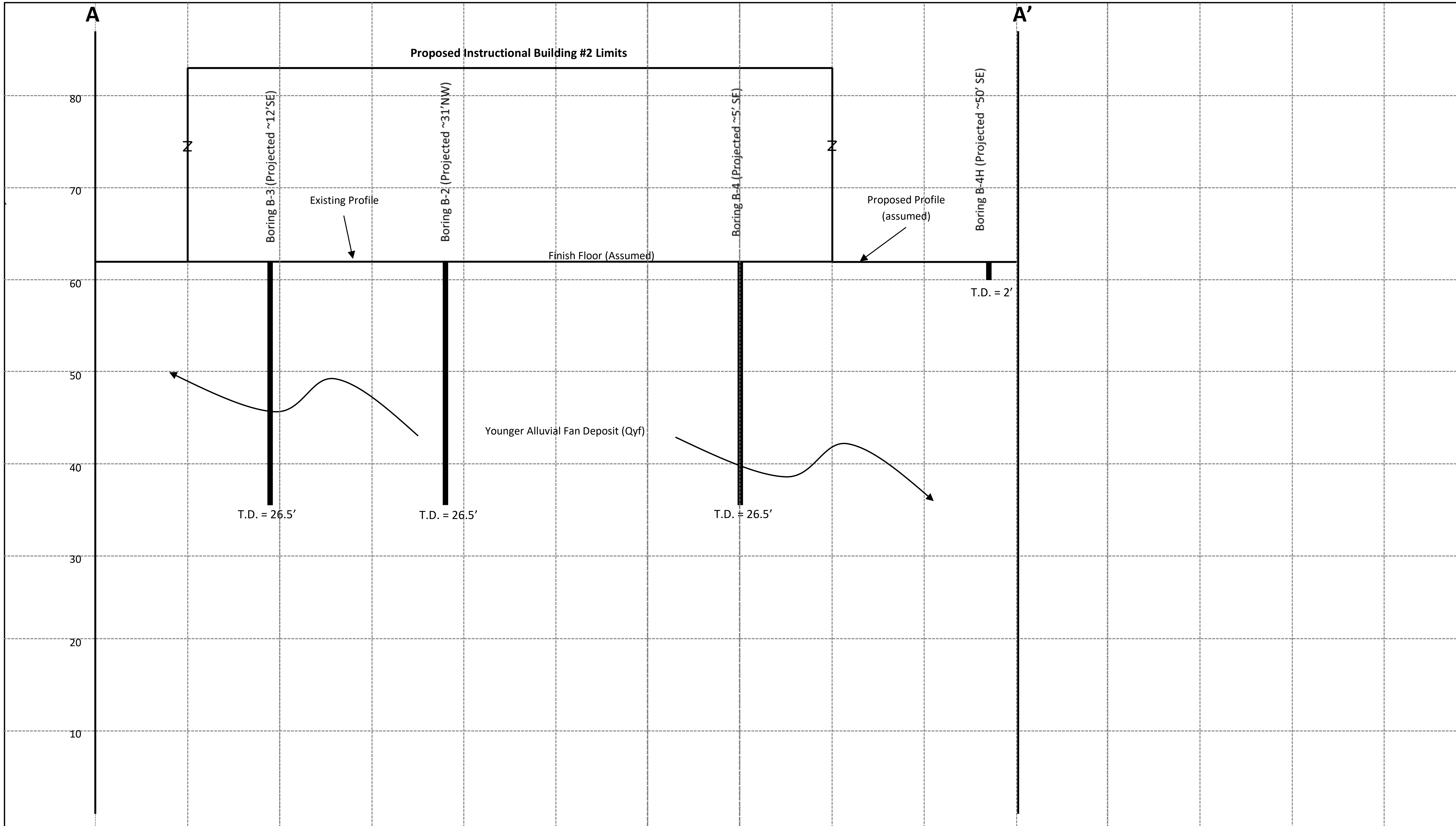


Figure 7 - Geotechnical Cross Section A-A’

Proposed Instructional Building #2

El Camino College Compton Center Campus, 1111 East Artesia Blvd., Compton, CA

UNITED-HEIDER INSPECTION GROUP

Project No: 10-18020PW
Date: February, 2018

Vertical Scale: 1: 10
Horizontal Scale: 1: 40

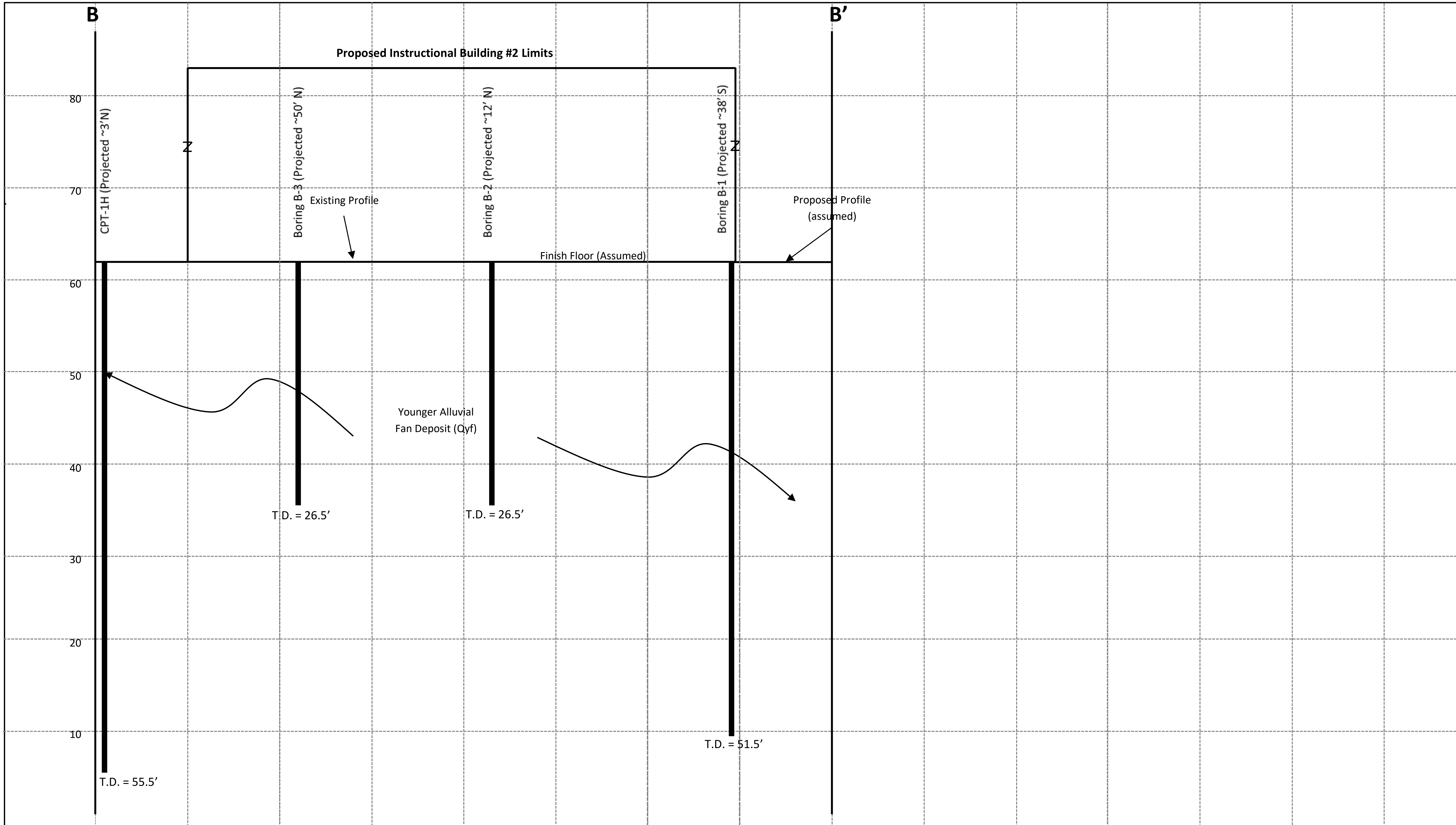


Figure 7 - Geotechnical Cross Section B-B'

Proposed Instructional Building #2

El Camino College Compton Center Campus, 1111 East Artesia Blvd., Compton, CA

UNITED-HEIDER INSPECTION GROUP

Project No: 10-18020PW
Date: February, 2018

Vertical Scale: 1: 10
Horizontal Scale: 1: 40

APPENDIX B

Field Exploration

FIELD EXPLORATION

The field investigation was performed on January 29, 2018 under the supervision of a United - Heider Inspection Groups' technical representative. A staff engineer performed a site reconnaissance to identify exploratory locations. The exploratory boring locations for the project were marked in the field by our staff engineer from existing site features. United - Heider Inspection Group notified Underground Service Alert (USA) to identify the locations of subsurface utilities that may be in potential conflict with the boring locations.

Subsurface exploration included drilling and sampling of four hollow-stem auger borings (B-1 to B-4) to depths ranging from 26.5 feet to 51.5 feet. The borings were drilled using a CME - 75 drilling rig. Relatively undisturbed soils samples and Standard Penetration Tests (SPTs) samples were collected at regular intervals. The relatively undisturbed samples were obtained using California samplers. Standard Penetration Tests were also performed in general accordance with ASTM D 1586. The sampler was driven 18 inches into the subsurface soils using a 140-lb hammer with a 30-inch drop. The number of blows (blow count) to drive the sampler into the subsurface soils were recorded at 6-inch intervals, and the blow counts required to drive the sampler the final 12 inches are recorded on the boring logs. The borings were loosely backfilled with soil cuttings. The boring records are presented in this Appendix.

United-Heider Inspection Group
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-1**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
					X				**Surficial Fill - 4" Grass and Top soil**	
1					X				**Young Alluvial Fan Deposits (Qyf)**	
2					X					
3	S-1	13		X	X	11.5		81	@ 2.5': Sandy Silty CLAY (CL), stiff, moist, gray brown some porosity	LL=34, PL=23 PI =11
4					X					
5										
	S-2	8		X		3.9		25	@ 5': Silty SAND (SM), loose, moist, brown	
6										
7										
8	S-3	16		X		5.6		46	@ 7.5': grades medium dense	
10										
	S-4	8		X		20.3		84	@ 10': Clayey SILT (ML), firm to stiff, moist, gray brown some sand	LL=34, PL=23 PI =11
11										
12										
13	S-4	17		X		14.2		58	@ 15': Sandy SILT (ML), medium dense, moist, gray brown non-plastic fines	Non-Plastic
14										
15										
	S-5	15		X		9.5		45	@ 15': Silty SAND (SM), medium dense, moist, brown, mostly fine sand	Non-Plastic
16										
17										
18										
19										
20										

JOB NO.: 10-17664PW | **BORING RECORD** |

UNITED-HEIDER INSPECTION GROUP

An ETS Company

United-Heider Inspection Group

22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553

Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-1**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
20	S-6	9		X		28.9		90	@ 20': Silty fat CLAY (CH), stiff, most, brown	LL=60, PL=33 PI =27
25	S-7	8		X		36.7		97	@ 25': grades firm	
30	S-8	12		X		35.5		99	@ 30': grades stiff, gray	LL=60, PL=33 PI =27
35	S-9	20		X		18.7		89	@ 35': grades very stiff	
40										

JOB NO.: 10-17664PW | **BORING RECORD** |

UNITED-HEIDER INSPECTION GROUP
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-1**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
41	S-10	18		X		12		52	@ 40': Sandy SILT (ML), medium dense, moist, gray non-plastic fines	Non Plastic
45	S-11	20	▼ (groundwater)	X		36.9		100	@ 45': Silty CLAY (CL), very stiff, very moist, gray	LL=39, PL=27 PI =12
50	S-12	34		X		22.2		8	@ 50': Poorly graded SAND with Silt (SP-SM), dense, moist, gray, mostly fine to medium sand	
55									- Total Depth of boring approx. 51.5 feet. - Groundwater encoutered at 45 ft bgs. - Borehole was loosely backfilled with the soil cuttings.	
60										

UNITED-HEIDER INSPECTION GROUP
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-2**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
									Surficial Fill - 6" Grass and Top soil	
1					X				**Young Alluvial Fan Deposits (Qyf)**	
2					X					
3	R-1	21	X		X	7.1	97.9		@ 2.5': Sandy Silty CLAY (CL), stiff, moist, grey brown some porosity	
4					X					
5	R-2	16	X			3.5	92.9		@ 5': Silty SAND (SM), loose to medium dense, moist, brown mostly fine sand	
6										
7										
8	R-3	36	X			9.2	97.5		@ 7.5': grades medium dense	
9										
10	R-4	23	X			16.2	107.8		@ 10': grades same	
11										
12										
13	S-4	11		X		9.5			@ 12.5': Sandy SILT (ML), medium dense, brown, moist trace clay	
14										
15	S-5	13		X		4.2			@ 15': Silty SAND (SM), medium dense, moist, tan brown mostly fine sand	
16										
17										
18										
19										
20										

UNITED-HEIDER INSPECTION GROUP
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-2**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
21	S-6	7		X		25			@ 20': Silty Clay (ML to CL), firm, moist	
25	S-7	13		X		22.5			@ 25': grades stiff	
30									- Total Depth of boring approx. 26.5 feet. - Groundwater was not encountered. - Borehole was loosely backfilled with the soil cuttings.	
35										
40										

JOB NO.: 10-17664PW **BORING RECORD**

United-Heider Inspection Group
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-3**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
0–1					X				**Surficial Fill - 4" Grass and Top soil**	
1					X				**Young Alluvial Fan Deposits (Qyf)**	
5	R-1	15	X			5.5	94.7		@ 5': Sandy Silty CLAY (CL), stiff, moist, gray brown some porosity	
7.5	R-2	18	X			12	111.3		@ 7.5': grades same	
10	R-3	24	X						@ 10': Silty SAND (SM), medium dense, moist, brown mostly fine sand	
12									Sandy Clayey SILT, stiff, moist, brown	
15	S-4	13		X		9			@ 15': Silty SAND (SM), medium dense, moist, brown mostly fine sand	
20										

JOB NO.: 10-17664PW | **BORING RECORD** |

UNITED-HEIDER INSPECTION GROUP
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-3**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
	S-5	9		X		28.5			@ 20': Clayey Sandy SILT (ML), stiff, moist, grey brown	
21										
25	S-6	16		X		16.0			@ 25': grades same	
									Silty SAND (SM), medium dense, moist brown	
									- Total Depth of boring approx. 26.5 feet. - Groundwater was not encountered. - Borehole was loosely backfilled with the soil cuttings.	
30										
35										
40										

JOB NO.: 10-17664PW **BORING RECORD**

UNITED-HEIDER INSPECTION GROUP
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-4**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
									Surficial Fill - 4" Grass and Top soil	
1					X				**Young Alluvial Fan Deposits (Qyf)**	
2					X					
3	R-1	23	X		X	14.8	93.9		@ 2.5': Sandy Silty CLAY (CL), stiff, moist, gray brown some porosity	
4					X					
5	R-2	16	X			5.8	89.9		@ 5': Silty SAND (SM), medium dense, moist, brown mostly fine sand	
6										
7										
8	R-3	22	X			6.9	94.0		@ 7.5': grades same	
9										
10	R-4	13	X			8.6			@ 10': grades same	
11										
12										
13										
14										
15	S-5	12		X		9.5			@ 15': Clayey Sandy SILT (ML), stiff, moist, brown	
16										
17										
18										
19										
20										

UNITED-HEIDER INSPECTION GROUP
An ETS Company

United-Heider Inspection Group
22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553
Main: (951) 697-4777 | Fax: (951) 697-4770

DATE OF DRILLING: 01/29/18 METHOD OF DRILLING: CME-75, Auto hammer; 8" Dia. Hollow Stem Auger

LOGGED BY: LM GROUND ELEVATION: NA LOCATION: See Fig. 2, Boring Location Map

Proposed Instructional Building #2
El Camino College Compton Center Campus
1111 East Artesia Blvd., Compton, CA 90221
BORING NO. **B-4**

DEPTH (FEET)	SAMPLE NUMBER	BLOWS/FOOT	RING SAMPLE	SPT SAMPLE	BULK SAMPLE	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	- # 200 (%)	SOIL DESCRIPTION	SOIL TEST
21	S-6	8		X		30.7			@ 20': Silty CLAY (CL), firm to stiff, moist, brown	
25	S-7	17		X		8.0			@ 25': Silty SAND (SM), medium dense, moist, light brown mostly fine sand	
30									- Total Depth of boring approx. 26.5 feet. - Groundwater was not encountered. - Borehole was loosely backfilled with the soil cuttings.	
35										
40										

JOB NO.: 10-17664PW **BORING RECORD**

Boring Logs and CPTs
Heider Inspection Group (2015)

APPENDIX A

Key to Boring Log Symbols
Boring Logs and CPTs

UNIFIED SOIL CLASSIFICATION (ASTM D-2487)						
Material Types	**Criteria for Assigning Soil Group Names**			**Group Symbol**	**Soil Group Names**	**Legend**
Coarse Grained Soils >50% Retained on No. 200 Sieve	Gravels >50% of Coarse Fraction Retained on No 4 Sieve	Clean Gravels <5% Fines	Cu≥4 and 1≤Cc≤3	GW	Well-Graded Gravel	
			Cu<4 and/or [Cc<1 or Cc>3]	GP	Poorly-Graded Gravel	
		Gravels with Fines >12% Fines	Fines Classify as ML or MH	GM	Silty Gravel	
			Fines Classify as CL or CH	GC	Clayey Gravel	
	Sands ≥50% of Coarse Fraction Passes on No. 4 Sieve	Clean Sands <5% Fines	Cu≥6 and 1≤Cc≤3	SW	Well-Graded Sand	
			Cu<6 and/or [Cc<1 or Cc>3]	SP	Poorly-Graded Sand	
		Sands and Fines >12% Fines	Fines Classify as ML or MH	SM	Silty Sand	
			Fines Classify as CL or CH	SC	Clayey Sand	
Fine Grained Soils ≥50% Passes No. 200 Sieve	Silts and Clays Liquid Limits<50	Inorganic	PI>7 and Plots≥"A" Line	CL	Lean Clay	
			PI<4 and Plots<"A" Line	ML	Silt	
		Organic	LL (Oven Dried)/LL(Not Dried <0.75)	OL	Organic Silt	
	Silts and Clays Liquid Limits≥50	Inorganic	PI Plots≥"A" Line	CH	Fat Clay	
			PI Plots<"A" Line	MH	Elastic Silt	
		Organic	LL (Oven Dried)/LL(Not Dried <0.75)	OH	Organic Clay	
Highly Organic Soils		Primarily Organic Matter, Dark in Color and Organic Odor		PT	Peat	

PENETRATION RESISTANCE (RECORDED AS BLOWS/0.5 FEET)				
SAND AND GRAVEL		SILT AND CLAY		
RELATIVE DENSITY	N-VALUE (BLOWS/FOOT)*	CONSISTENCY	N-VALUE (BLOWS/FOOT)*	COMPRESSIVE STRENGTH
Very Loose	0 - 3	Very Soft	0 - 1	0 - 0.25
Loose	4 - 10	Soft	2 - 4	0.25 - 0.50
Medium Dense	11 - 29	Medium Stiff	5 - 7	0.50 - 1.0
Dense	30 - 49	Stiff	8 - 14	1.0 - 2.0
Very Dense	50 +	Very Stiff	15 - 29	2.0 - 4.0
		Hard	30 +	Over 4.0

SOIL MOISTURE	
DESCRIPTOR	**DESCRIPTION**
Dry	Dry of Standard Proctor Optimum
Damp	Sand Dry
Moist	Near Standard Proctor Optimum
Wet	Wet of Satandard Proctor Optimum
Saturated	Free Water in Sample

PARTICLES SIZES		
COMPONENTS		**SIZE OR SIEVE NUMBER**
Boulders		Over 12 Inches
Cobbles		3 to 12 Inches
Gravels	-Coarse	3/4 to 3 Inches
	-Fine	Number 4 to 3/4 Inch
Sand	-Coarse	Number 10 to Number 4
	-Medium	Number 40 to Number 10
	-Fine	Number 200 to Number 40
Fines (Silt and Clay)		Below Number 200

Grab Bulk Sample

Standard Penetration Test

2.5 Inch Modified California

Shelby Tube

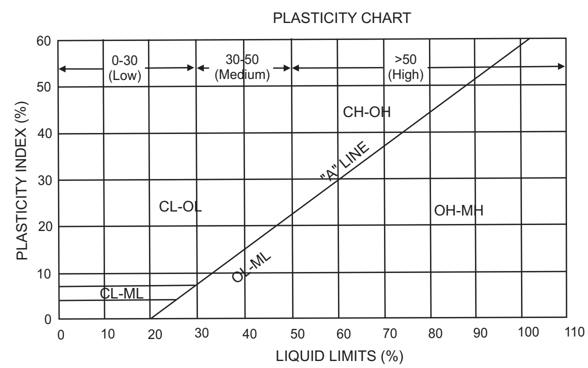
No Recovery

Initial Water Level Reading

Final Water Level Reading

Blow Count
The number of blows of the sampling hammer required to drive the sampler through each of three 6-inch increments. Less than three increments may be reported if more than 50 blows are counted for any increment. The notation 50/5" indicates 50 blows recorded for 5 inches of penetration.

N-Value
Number of blows 140 LB hammer falling 30 inches to drive a 2 inch outside diameter (1-3/8 inch I.D) split barrel sampler the last 12 inches of an 18 inch drive (ASTM-1586 Standard Penetration Test)



CU -Consolidated Undrained triaxial test completed. Refer to laboratory results
DS - Results of Direct Shear test in terms of total cohesion (C, KSF) or effective cohesion and friction angles (C', KSF and degrees)
LL - Liquid Limit
PI - Plasticity Index
PP - Pocket Penetrometer test
TV - Torvane Shear Test results in terms of undrained shear strength (KSF)
UC - Unconfined Compression test results in terms of undrained shear strength (KSF)
#200 - Percent passing number 200 sieve
Cu - Coefficient of Uniformity
Cc - Coefficient of Concavity

General Notes

1. The boring locations were determined by pacing, sighting and/or measuring from site features. Locations are approximate. Elevations of borings (if included) were determined by interpolation between plan contours or from another source that will be identified in the report or on the project site plan. The location and elevation of borings should be considered accurate only to the degree implied by the method used.

2. The stratification lines represent the approximate boundary between soil types. The transition may be gradual.

3. Water level readings in the drill holes were recorded at time and under conditions stated on the boring logs. This data has been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tides, temperature and other factors at the time measurements were made.

4. The boring logs and attached data should only be used in accordance with the report.

HEIDER INSPECTION GROUP
An ETS Company

KEY TO EXPLORATORY BORING LOGS

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-1

CLIENT El Camino College Compton Center
PROJECT NAME Proposed Instructional Building I
PROJECT NUMBER HE15281-2
PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221
DATE STARTED 11/3/15 **COMPLETED** 11/3/15
GROUND ELEVATION 62 ft **HOLE SIZE** 8"
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD HSA
▽ **AT TIME OF DRILLING** 48.50 ft / Elev 13.50 ft
LOGGED BY Steve Runyan **CHECKED BY** RS
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) **SILTY SAND:** Light brown, med. dense.										
			SPT 1-1		6-6-8 (14)			7				
		becomes white brown, fine grained.										
5			MC 1-2		7-11-10 (21)		96	5				
		(ML) **SILT:** Light brown, stiff w/ clay and fine sand.										
		increased sand content.	SPT 1-3		6-7-7 (14)			6				
10		becomes dark brown, very stiff w/ clay.	MC 1-4		8-13-14 (27)		112	7				
15		becomes stiff.	SPT 1-5		6-8-6 (14)							
20		(SM) **SILTY SAND:** Light brown, med. dense, fine grained.	SPT 1-6		3-6-6 (12)			29				
		(CL) **CLAY:** Green brown, stiff, w/ silt.										
25			SPT 1-7		7-8-10 (18)			8				
30		w/ silt and sand.	SPT 1-8		5-6-7 (13)			29				

(Continued Next Page)

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-1

CLIENT El Camino College Compton Center

PROJECT NAME Proposed Instructional Building I

PROJECT NUMBER HE15281-2

PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
30		(CL) **CLAY:** Green brown, stiff, w/ silt. *(continued)*										
35		w/ silt.	SPT 1-9		5-5-7 (12)			30				
		(ML) **SANDY SILT:** Dark brown, very stiff, w/ trace amount of clay										
40			SPT 1-10		8-9-11 (20)			25				
45		becomes green brown.	SPT 1-11		7-8-9 (17)			39				
		▽ (SP) **SAND:** Tan, very dense, wet, med-coarse.										
50			SPT 1-12		10-19-29 (48)			18				
55		becomes gray.	SPT 1-13		10-16-17 (33)							

Bottom of borehole at 55.0 feet.

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-2

CLIENT El Camino College Compton Center
PROJECT NAME Proposed Instructional Building I
PROJECT NUMBER HE15281-2
PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221
DATE STARTED 11/3/15 **COMPLETED** 11/3/15
GROUND ELEVATION 62 ft **HOLE SIZE** 8"
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD HSA
AT TIME OF DRILLING --- NGWE
LOGGED BY Steve Runyan **CHECKED BY** RS
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) **SILTY SAND:** Brown.										
			GB Bulk					8				
5		becomes grey and medium dense.	MC 1-1		7-8-8 (16)		95	3				44
		becomes dark brown and loose.	SPT 1-2		3-3-5 (8)			22				
10			MC 1-3		6-8-10 (18)		103	14				
15		becomes grey brown, med.dense and fine-grained.	SPT 1-4		6-10-14 (24)			5				
		(CL) **CLAY:** Green brown, stiff.										
20			SPT 1-5		3-5-5 (10)		69	52	48	33	15	94
		(SC) **CLAYEY SAND:** Black, stiff.										
25			SPT 1-6		4-4-6 (10)			25				

(Continued Next Page)

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-2

CLIENT El Camino College Compton Center
PROJECT NAME Proposed Instructional Building I
PROJECT NUMBER HE15281-2
PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
25		(SC) **CLAYEY SAND:** Black, stiff. *(continued)*										
		(CL-ML) **CLAYEY SILT:** Green brown, stiff.										
30			SPT 1-7		3-5-6 (11)			30				
35		becomes very stiff.	SPT 1-8		5-6-7 (13)			27				

Bottom of borehole at 35.0 feet.

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-3

CLIENT El Camino College Compton Center
PROJECT NAME Proposed Instructional Building I
PROJECT NUMBER HE15281-2
PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221
DATE STARTED 11/3/15 **COMPLETED** 11/3/15
GROUND ELEVATION 63 ft **HOLE SIZE** 8"
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD HSA
▽ **AT TIME OF DRILLING** 46.50 ft / Elev 16.50 ft
LOGGED BY Steve Runyan **CHECKED BY** RS
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) **SILTY SAND:** Light brown, loose.										
5			SPT 1-1		4-4-3 (7)			11				32
		(ML) **SANDY SILT:** Dark brown, stiff.										
10			SPT 1-2		2-4-4 (8)			22				
15		becomes green brown, w/ clay and trace sand.	SPT 1-3		3-4-3 (7)			41				92
20		becomes brown, w/ sand.	SPT 1-4		3-5-8 (13)			11				
25		becomes green brown, w/ trace clay.	SPT 1-5		5-3-4 (7)			30				
		(CL) **CLAY:** Green brown, stiff w/ silt.										
30			SPT 1-6		2-3-4 (7)			38				

(Continued Next Page)

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-3

CLIENT El Camino College Compton Center

PROJECT NAME Proposed Instructional Building I

PROJECT NUMBER HE15281-2

PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
30		(CL) **CLAY:** Green brown, stiff w/ silt. *(continued)*										
		(CL-ML) **SILTY CLAY:** Green brown, stiff.										
35			SPT 1-7		5-6-8 (14)			29				
		(ML) **SILT:** Green brown, stiff, w/ fine grained sand.										
40			SPT 1-8		4-6-8 (14)			27				80
		(SP) **POORLY GRADED SAND:** Grey brown, med. dense, medium to fine grained.										
45			SPT 1-9		9-12-15 (27)			20				
	∇											
50		becomes brown, wet.	SPT 1-10		7-7-12 (19)			22				
55		becomes grey brown.	SPT 1-11		8-19-35 (54)			20				

Bottom of borehole at 55.0 feet.

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

BORING NUMBER B-4

CLIENT El Camino College Compton Center
PROJECT NAME Proposed Instructional Building I
PROJECT NUMBER HE15281-2
PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221
DATE STARTED 11/3/15 **COMPLETED** 11/3/15
GROUND ELEVATION 63 ft **HOLE SIZE** 8"
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD HSA
AT TIME OF DRILLING ---
LOGGED BY Steve Runyan **CHECKED BY** RS
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) **SILTY SAND:** Light brown, med. dense.										

Refusal at 2' due to concrete. Attempted to redrill in another location 10' away and encountered concrete again.

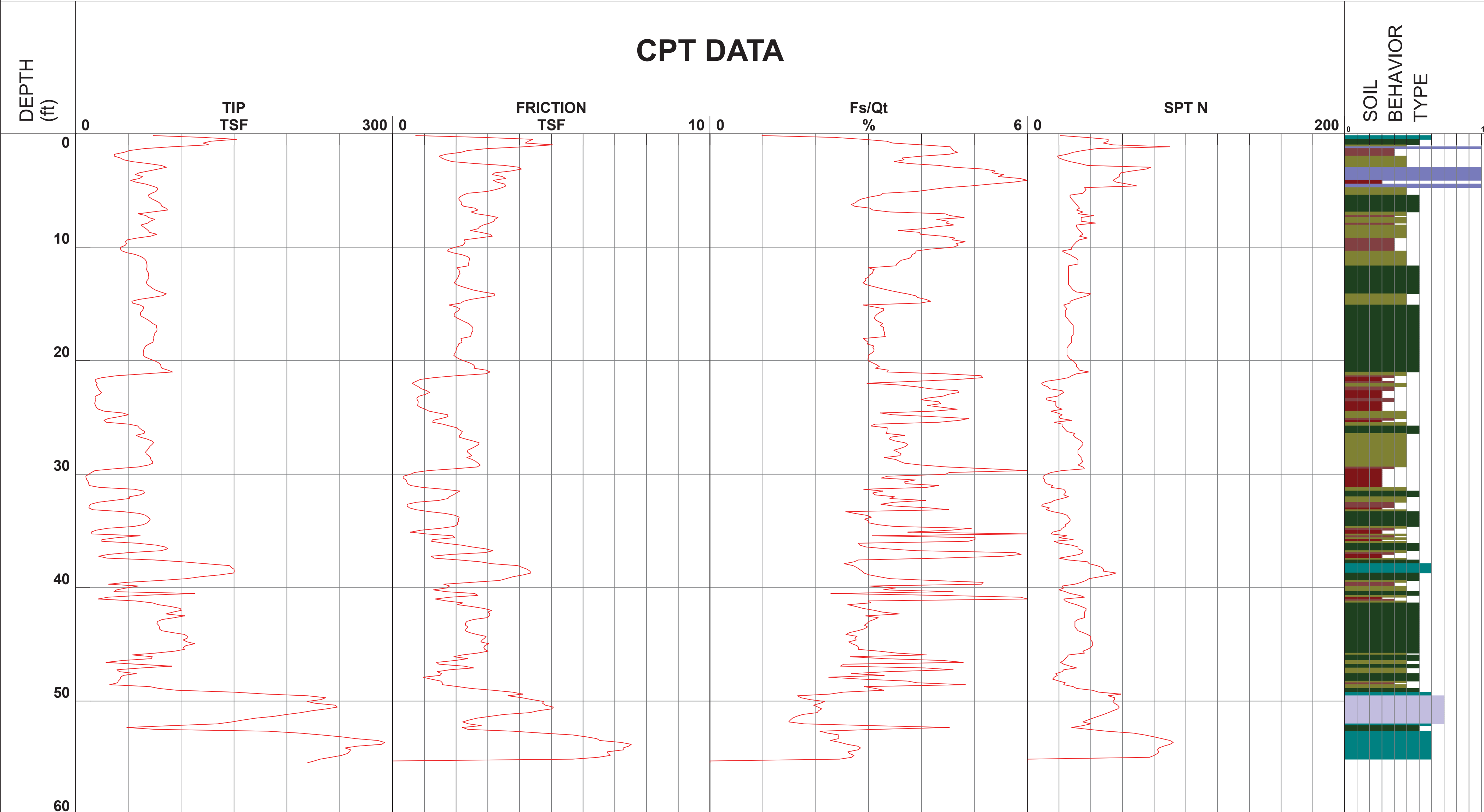
Bottom of borehole at 2.0 feet.

Heider Inspections

Proje Instructional Bldg I El Camino College Compton		Operator	RC-DG	Filename	SDF(349).cpt
Job Number	150249	Cone Number	DDG1333	GPS	
Hole Number	CPT-01	Date and Time	11/2/2015 11:45:02 AM	Maximum Depth	55.45 ft
EST GW Depth During Test		47.30 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Instructional Bldg I El Camino College Compton Center

Project ID: Heider Inspections
Data File: SDF(349).cpt
CPT Date: 11/2/2015 11:45:02 AM
GW During Test: 47 ft

Sounding ID: CPT-01
Project No: 150249
Cone/Rig: DDG1333

Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
0.33	120.8	247.5	120.8	2.8	-0.8	2.3	5	silty SAND to sandy SILT	120	4.0	30	48	89	48	-	-	12	1.98	16	N/A	N/A
0.49	152.4	317.8	152.4	4.4	-0.9	2.9	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	10.1	9.9	13	2.00	16	N/A	N/A
0.66	128.1	296.3	128.1	4.3	-1.0	3.3	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	8.5	9.9	16	2.09	16	N/A	N/A
0.82	121.0	289.3	121.0	4.2	-0.8	3.5	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	8.0	9.9	16	2.12	16	N/A	N/A
0.98	125.9	319.2	125.9	5.0	-1.0	4.0	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	8.3	9.9	18	2.16	16	N/A	N/A
1.15	91.3	279.1	91.3	4.1	-0.8	4.5	9	very stiff fine SOIL	120	2.0	46	73	80	48	-	-	22	2.29	30	N/A	N/A
1.31	65.2	231.5	65.1	3.0	-0.7	4.6	9	very stiff fine SOIL	120	2.0	33	52	68	48	-	-	25	2.38	30	N/A	N/A
1.48	51.3	205.3	51.3	2.4	-1.0	4.6	4	clayy SILT to silty CLAY	115	2.0	26	41	-	-	3.6	9.9	28	2.44	15	N/A	N/A
1.64	46.1	196.9	46.1	2.2	-1.0	4.7	4	clayy SILT to silty CLAY	115	2.0	23	37	-	-	3.3	9.9	30	2.48	15	N/A	N/A
1.80	37.1	174.2	37.1	1.7	-1.0	4.5	4	clayy SILT to silty CLAY	115	2.0	19	30	-	-	2.6	9.9	32	2.53	15	N/A	N/A
1.97	36.5	161.3	36.5	1.5	-1.0	4.0	4	clayy SILT to silty CLAY	115	2.0	18	29	-	-	2.6	9.9	31	2.50	15	N/A	N/A
2.13	42.5	163.2	42.5	1.5	-1.1	3.6	4	clayy SILT to silty CLAY	115	2.0	21	34	-	-	3.0	9.9	27	2.42	15	N/A	N/A
2.30	45.7	170.0	45.6	1.7	-1.1	3.7	4	clayy SILT to silty CLAY	115	2.0	23	37	-	-	3.2	9.9	27	2.40	15	N/A	N/A
2.46	53.8	179.1	53.8	1.9	-1.2	3.5	5	silty SAND to sandy SILT	120	4.0	13	22	62	47	-	-	24	2.34	16	N/A	N/A
2.62	68.8	213.2	68.8	2.6	-1.3	3.8	5	silty SAND to sandy SILT	120	4.0	17	28	70	48	-	-	22	2.29	16	N/A	N/A
2.79	81.3	254.0	81.3	3.5	-1.4	4.3	9	very stiff fine SOIL	120	2.0	41	65	76	48	-	-	23	2.30	30	N/A	N/A
2.95	86.1	272.6	86.0	4.0	-1.4	4.6	9	very stiff fine SOIL	120	2.0	43	69	78	48	-	-	23	2.31	30	N/A	N/A
3.12	78.3	276.9	78.2	4.1	-1.4	5.2	9	very stiff fine SOIL	120	2.0	39	63	74	47	-	-	25	2.37	30	N/A	N/A
3.28	69.2	265.0	69.1	3.7	-1.4	5.4	9	very stiff fine SOIL	120	2.0	35	55	70	47	-	-	27	2.42	30	N/A	N/A
3.45	60.4	245.0	60.4	3.2	-1.4	5.4	9	very stiff fine SOIL	120	2.0	30	48	66	46	-	-	28	2.45	30	N/A	N/A
3.61	56.6	243.0	56.6	3.1	-1.4	5.6	9	very stiff fine SOIL	120	2.0	28	45	64	45	-	-	30	2.48	30	N/A	N/A
3.77	63.5	254.8	63.4	3.5	-1.5	5.5	9	very stiff fine SOIL	120	2.0	32	51	68	46	-	-	28	2.44	30	N/A	N/A
3.94	60.7	260.8	60.7	3.6	-1.5	5.9	9	very stiff fine SOIL	120	2.0	30	49	66	45	-	-	30	2.48	30	N/A	N/A
4.10	52.3	247.0	52.3	3.2	-1.5	6.1	9	very stiff fine SOIL	120	2.0	26	42	61	44	-	-	32	2.53	30	N/A	N/A
4.27	57.1	249.6	57.1	3.3	-1.5	5.8	9	very stiff fine SOIL	120	2.0	29	46	64	45	-	-	30	2.49	30	N/A	N/A
4.43	66.3	257.2	66.3	3.5	-1.6	5.3	9	very stiff fine SOIL	120	2.0	33	53	69	45	-	-	27	2.43	30	N/A	N/A
4.59	72.5	257.5	72.5	3.6	-1.7	4.9	9	very stiff fine SOIL	120	2.0	36	58	72	45	-	-	25	2.38	30	N/A	N/A
4.76	77.2	251.5	77.2	3.5	-1.7	4.5	9	very stiff fine SOIL	120	2.0	39	62	74	46	-	-	23	2.32	30	N/A	N/A
4.92	77.8	243.0	77.7	3.3	-1.8	4.2	9	very stiff fine SOIL	120	2.0	39	62	74	45	-	-	23	2.30	30	N/A	N/A
5.09	76.3	231.1	76.2	3.0	-1.8	3.9	8	stiff SAND to clayy SAND	115	1.0	76	100	-	-	5.0	9.9	22	2.28	16	N/A	N/A
5.25	72.1	203.5	72.0	2.4	-1.8	3.3	5	silty SAND to sandy SILT	120	4.0	18	29	72	45	-	-	20	2.24	16	N/A	N/A
5.41	68.9	196.8	68.9	2.2	-1.9	3.2	5	silty SAND to sandy SILT	120	4.0	17	28	70	44	-	-	20	2.24	16	N/A	N/A
5.58	69.8	191.9	69.7	2.1	-1.9	3.0	5	silty SAND to sandy SILT	120	4.0	17	28	71	44	-	-	20	2.22	16	N/A	N/A
5.74	72.5	191.3	72.5	2.1	-1.9	2.9	5	silty SAND to sandy SILT	120	4.0	18	29	72	44	-	-	19	2.19	16	N/A	N/A
5.91	76.0	194.4	76.0	2.1	-2.0	2.8	5	silty SAND to sandy SILT	120	4.0	19	30	74	44	-	-	18	2.17	16	N/A	N/A
6.07	79.3	198.1	79.3	2.2	-2.0	2.8	5	silty SAND to sandy SILT	120	4.0	20	32	75	44	-	-	17	2.15	16	N/A	N/A
6.23	81.1	197.7	81.0	2.2	-2.1	2.7	5	silty SAND to sandy SILT	120	4.0	20	32	76	44	-	-	17	2.14	16	N/A	N/A
6.40	81.8	199.5	81.8	2.2	-2.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	32	75	44	-	-	17	2.15	16	N/A	N/A
6.56	85.6	213.0	85.5	2.6	-2.1	3.0	5	silty SAND to sandy SILT	120	4.0	21	33	76	44	-	-	18	2.17	16	N/A	N/A
6.73	87.2	215.9	87.2	2.7	-2.2	3.1	5	silty SAND to sandy SILT	120	4.0	22	34	77	44	-	-	18	2.18	16	N/A	N/A
6.89	72.7	202.9	72.7	2.5	-2.1	3.4	5	silty SAND to sandy SILT	120	4.0	18	28	70	43	-	-	21	2.26	16	N/A	N/A
7.05	59.4	210.9	59.4	2.6	-2.1	4.5	4	clayy SILT to silty CLAY	115	2.0	30	45	-	-	4.2	9.9	27	2.41	15	N/A	N/A
7.22	66.8	225.4	66.7	3.0	-2.2	4.6	9	very stiff fine SOIL	120	2.0	33	50	67	43	-	-	26	2.39	30	N/A	N/A
7.38	69.1	236.2	69.1	3.3	-2.3	4.8	9	very stiff fine SOIL	120	2.0	35	51	67	43	-	-	27	2.40	30	N/A	N/A
7.55	75.1	229.2	75.1	3.2	-2.3	4.3	9	very stiff fine SOIL	120	2.0	38	55	70	43	-	-	24	2.34	30	N/A	N/A
7.71	70.9	227.6	70.8	3.2	-2.3	4.5	9	very stiff fine SOIL	120	2.0	35	51	68	43	-	-	26	2.38	30	N/A	N/A
7.87	68.6	221.3	68.5	3.1	-2.6	4.5	9	very stiff fine SOIL	120	2.0	34	49	66	43	-	-	26	2.39	30	N/A	N/A
8.04	62.0	213.2	61.9	2.9	-2.4	4.6	4	clayy SILT to silty CLAY	115	2.0	31	44	-	-	4.3	9.9	28	2.43	15	N/A	N/A
8.20	64.2	206.1	64.1	2.7	-2.3	4.3	4	clayy SILT to silty CLAY	115	2.0	32	45	-	-	4.5	9.9	26	2.40	15	N/A	N/A
8.37	66.9	202.4	66.9	2.7	-2.4	4.1	4	clayy SILT to silty CLAY	115	2.0	33	46	-	-	4.7	9.9	25	2.37	15	N/A	N/A
8.53	68.9	190.9	68.9	2.5	-2.4	3.6	5	silty SAND to sandy SILT	120	4.0	17	24	65	42	-	-	23	2.32	16	N/A	N/A
8.69	70.1	203.3	70.0	2.8	-2.4	4.0	4	clayy SILT to silty CLAY	115	2.0	35	47	-	-	4.9	9.9	25	2.36	15	N/A	N/A
8.86	77.0	213.4	77.0	3.1	-2.5	4.0	9	very stiff fine SOIL	120	2.0	39	52	68	43	-	-	24	2.33	30	N/A	N/A
9.02	71.3	216.4	71.2	3.1	-2.4	4.4	9	very stiff fine SOIL	120	2.0	36	47	65	42	-	-	26	2.39	30	N/A	N/A
9.19	58.7	201.5	58.6	2.7	-2.4	4.7	4	clayy SILT to silty CLAY	115	2.0	29	39	-	-	4.1	9.9	29	2.47	15	N/A	N/A
9.35	49.3	183.6	49.3	2.3	-2.4	4.6	4	clayy SILT to silty CLAY	115	2.0	25	32	-	-	3.4	9.9	31	2.52	15	N/A	N/A
9.51	47.4	185.2	47.3	2.3	-2.5	4.9	4	clayy SILT to silty CLAY	115	2.0	24	31	-	-	3.3	9.9	33	2.55	15	N/A	N/A
9.68	48.5	182.7	48.5	2.3	-2.4	4.7	4	clayy SILT to silty CLAY	115	2.0	24	31	-	-	3.4	9.9	32	2.53	15	N/A	N/A
9.84	47.1	180.4	47.0	2.2	-2.4	4.8	4	clayy SILT to silty CLAY	115	2.0	24	30	-	-	3.3	9.9	33	2.55	15	N/A	N/A
10.01	42.8	170.2	42.8	2.0	-2.4	4.7	4	clayy SILT to silty CLAY	115	2.0	21	27	-	-	3.0	9.9	34	2.57	15	N/A	N/A
10.17	42.8	159.6	42.7	1.8	-2.8	4.2	4	clayy SILT to silty CLAY	115	2.0	21	27	-	-	3.0	9.9	33	2.54	15	N/A	N/A
10.34	44.4	156.0	44.3	1.7	-2.8	4.0	4	clayy SILT to silty CLAY	115	2.0	22	28	-	-	3.1	9.9	31	2.51	15	N/A	N/A
10.50	48.9	162.2	48.9	1.9	-2.7	3.9	4	clayy SILT to silty CLAY	115	2.0	24	30	-	-	3.4	9.9	30	2.48	15	N/A	N/A
10.66	57.2	171.9	57.2	2.2	-2.5	3.9	4	clayy SILT to silty CLAY	115	2.0	29	35	-	-	4.0	9.9	28	2.43	15	N/A	N/A
10.83	62.2	177.7	62.1	2.4	-2.5	3.8	4	clayy SILT to silty CLAY	115	2.0	31	38	-	-	4.3	9.9	27	2.41	15	N/A	N/A
10.99	64.5	179.2	64.5	2.4	-2.5	3.8	4	clayy SILT to silty CLAY	115	2.0	32	39	-	-	4.5	9.9	26	2.40	15	N/A	N/A
11.16	66.7	177.3	66.6	2.4	-2.5	3.7	4	clayy SILT to silty CLAY	115	2.0	33	40	-	-	4.7	9.9	25	2.38	15	N/A	N/A
11.32	67.3	176.1	67.2	2.4	-2.5	3.6	4	clayy SILT to silty CLAY	115	2.0	34	40	-	-	4.7	9.9	25	2.37	15	N/A	N/A
11.48	67.6	174.9	67.5	2.4	-2.5	3.6	4	clayy SILT to silty CLAY	115	2.0	34	40	-	-	4.7	9.9	25	2.37	15	N/A	N/A
11.65	67.8	174.1	67.8	2.4	-2.5	3.6	4	clayy SILT to silty CLAY	115	2.0	34	40	-	-	4.7	9.9	25	2.37	15	N/A	N/A
11.81	67.7	158.9	67.6	2.0	-2.4	3.0	5	silty SAND to sandy SILT	120	4.0	17	20	59	40	-	-	23	2.32	16	N/A	N/A
11.98	67.3	161.0	67.2	2.1	-2.4	3.1	5	silty SAND to sandy SILT	120	4.0	17	19	59	40	-	-	24	2.34	16	N/A	N/A
12.14	68.3	160.8	68.2	2.1	-2.3	3.1	5	silty SAND to sandy SILT	120	4.0	17	20	59	40	-	-	24	2.33	16	N/A	N/A
12.30	69.3	161.1	69.2	2.1	-2.3	3.1	5	silty SAND to sandy SILT	120	4.0	17	20	59	40	-	-	24	2.33	16	N/A	N/A
12.47	69.2	158.9	69.1	2.1	-2.3	3.0	5	silty SAND to sandy SILT	120	4.0	17	20	59	40	-	-	23	2.32	16	N/A	N/A
12.63	68.9	157.8	68.8	2.1	-2.2	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	59	40	-	-	23	2.33	16	N/A	N/A
12.80	69.1	155.6	69.0	2.0	-2.2	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	58	40	-	-	23	2.32	16	N/A	N/A
12.96	67.6	153.7	67.5	2.0	-2.2	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	58	40	-	-	24	2.33	16	N/A	N/A
13.12	67.2	151.5	67.2	1.9	-2.2	2.9	5	silty SAND to sandy SILT	120	4.0	17	19	57	40	-	-	24	2.33	16	N/A	N/A
13.29	68.0	153.3	67.9	2.0	-2.2	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	57	40	-	-	24	2.33	16	N/A	N/A
13.45	70.4	158.8	70.4	2.2	-2.2	3.1	5	silty SAND to sandy SILT	120	4.0	18	19	58	40	-	-	24	2.34	16	N/A	N/A
13.62	72.8	165.8	72.8	2.4	-2.2	3.3	5	silty SAND to sandy SILT	120	4.0	18	20	59	40	-	-	24	2.34	16	N/A	N/A
13.78	75.8	172.0	75.7	2.5	-2.2	3.4	5	silty SAND to sandy SILT	120	4.0	19	20	60	40	-	-	24	2.35	16	N/A	N/A
13.94	80.7	182.2	80.6	2.9	-2.2	3.6	4	clayy SILT to silty CLAY	115	2.0	40	43	-	-	5.6	9.9	24	2.35	15	N/A	N/A
14.11	86.0	193.2	85.9	3.2	-2.2	3.8	4	clayy SILT to silty CLAY	115	2.0	43	46	-	-	6.0	9.9	24	2.35	15	N/A	N/A
14.27	82.5	193.2	82.4	3.2	-2.2	3.9	4	clayy SILT to silty CLAY	115	2.0	41	44	-	-	5.8	9.9	25	2.38	15	N/A	N/A
14.44	72.4	181.9	72.3	2.8	-2.2	4.0	4	clayy SILT to silty CLAY	115	2.0	36	38	-	-	5.1	9.9	27	2.42	15	N/A	N/A
14.60	60.0	170.3	59.9	2.5	-2.2	4.1	4	clayy SILT to silty CLAY	115	2.0	30	31	-	-	4.2	9.9	30	2.49	15	N/A	N/A
14.76	53.4	163.4	53.4	2.2	-2.6	4.2	4	clayy SILT to silty CLAY	115	2.0	27	28	-	-	3.7	9.9	32	2.53	15	N/A	N/A
14.93	54.0	159.3	54.0	2.1	-2.9	4.0	4	clayy SILT to silty CLAY	115	2.0	27	28	-	-	3.8	9.9	31	2.52	15	N/A	N/A
15.09	61.1	140.7	61.1	1.8	-2.6	2.9	5	silty SAND to sandy SILT	120	4.0	15	16	52	38	-	-	26	2.38	16	N/A	N/A
15.26	64.5	149.2	64.5	2.0	-2.3	3.1	4	clayy SILT to silty CLAY	115	2.0	32	33	-	-	4.5	9.9	26	2.39	15	N/A	N/A
15.42	64.3	153.3	64.2	2.1	-2.3	3.3	4	clayy SILT to silty CLAY	115	2.0	32	33	-	-	4.5	9.9	27	2.41	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Heider Inspections
Data File: SDF(349).cpt
CPT Date: 11/2/2015 11:45:02 AM
GW During Test: 47 ft

Sounding ID: CPT-01
Project No: 150249
Cone/Rig: DDG1333

Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
15.58	63.3	151.8	63.3	2.1	-2.3	3.3	4	clayy SILT to silty CLAY	115	2.0	32	32	-	-	4.4	9.9	27	2.41	15	N/A	N/A
15.75	61.7	147.9	61.6	2.0	-2.3	3.3	4	clayy SILT to silty CLAY	115	2.0	31	31	-	-	4.3	9.9	27	2.42	15	N/A	N/A
15.91	61.5	146.1	61.4	1.9	-2.4	3.2	4	clayy SILT to silty CLAY	115	2.0	31	31	-	-	4.3	9.9	27	2.41	15	N/A	N/A
16.08	62.1	145.5	62.0	1.9	-2.2	3.2	4	clayy SILT to silty CLAY	115	2.0	31	31	-	-	4.3	9.9	27	2.41	15	N/A	N/A
16.24	65.4	148.2	65.4	2.0	-2.2	3.2	4	clayy SILT to silty CLAY	115	2.0	33	33	-	-	4.6	9.9	26	2.39	15	N/A	N/A
16.40	68.7	151.8	68.6	2.2	-2.2	3.2	4	clayy SILT to silty CLAY	115	2.0	34	34	-	-	4.8	9.9	26	2.38	15	N/A	N/A
16.57	71.1	155.6	71.0	2.3	-2.1	3.2	4	clayy SILT to silty CLAY	115	2.0	36	35	-	-	5.0	9.9	26	2.38	15	N/A	N/A
16.73	73.2	159.5	73.2	2.4	-2.1	3.3	4	clayy SILT to silty CLAY	115	2.0	37	36	-	-	5.1	9.9	26	2.38	15	N/A	N/A
16.90	76.7	161.2	76.7	2.5	-2.1	3.3	5	silty SAND to sandy SILT	120	4.0	19	19	57	39	-	-	25	2.36	16	N/A	N/A
17.06	76.9	162.9	76.9	2.5	-2.1	3.3	4	clayy SILT to silty CLAY	115	2.0	38	37	-	-	5.4	9.9	25	2.37	15	N/A	N/A
17.23	77.2	162.7	77.2	2.5	-2.0	3.3	4	clayy SILT to silty CLAY	115	2.0	39	37	-	-	5.4	9.9	25	2.37	15	N/A	N/A
17.39	76.9	162.4	76.9	2.5	-2.0	3.3	4	clayy SILT to silty CLAY	115	2.0	38	37	-	-	5.4	9.9	25	2.37	15	N/A	N/A
17.55	75.2	160.7	75.1	2.5	-1.9	3.3	4	clayy SILT to silty CLAY	115	2.0	38	36	-	-	5.2	9.9	26	2.38	15	N/A	N/A
17.72	75.0	160.0	74.9	2.5	-1.9	3.3	4	clayy SILT to silty CLAY	115	2.0	37	36	-	-	5.2	9.9	26	2.38	15	N/A	N/A
17.88	74.0	159.2	74.0	2.5	-1.9	3.4	4	clayy SILT to silty CLAY	115	2.0	37	35	-	-	5.2	9.9	26	2.39	15	N/A	N/A
18.05	74.2	147.8	74.2	2.2	-1.9	2.9	5	silty SAND to sandy SILT	120	4.0	19	18	55	39	-	-	24	2.35	16	N/A	N/A
18.37	73.3	148.8	73.3	2.2	-1.9	3.0	5	silty SAND to sandy SILT	120	4.0	18	17	55	38	-	-	25	2.36	16	N/A	N/A
18.54	69.7	144.8	69.6	2.1	-1.8	3.0	5	silty SAND to sandy SILT	120	4.0	17	16	53	38	-	-	26	2.38	16	N/A	N/A
18.70	66.6	144.7	66.5	2.1	-1.8	3.2	4	clayy SILT to silty CLAY	115	2.0	33	31	-	-	4.6	9.9	27	2.41	15	N/A	N/A
18.87	65.5	142.9	65.5	2.0	-1.7	3.1	4	clayy SILT to silty CLAY	115	2.0	33	30	-	-	4.5	9.9	27	2.41	15	N/A	N/A
19.03	64.6	142.5	64.6	2.0	-1.7	3.2	4	clayy SILT to silty CLAY	115	2.0	32	30	-	-	4.5	9.9	27	2.42	15	N/A	N/A
19.19	64.4	141.8	64.4	2.0	-1.7	3.2	4	clayy SILT to silty CLAY	115	2.0	32	29	-	-	4.5	9.9	27	2.42	15	N/A	N/A
19.36	64.2	140.1	64.2	2.0	-1.6	3.1	4	clayy SILT to silty CLAY	115	2.0	32	29	-	-	4.5	9.9	27	2.42	15	N/A	N/A
19.52	64.3	138.7	64.3	1.9	-1.6	3.1	4	clayy SILT to silty CLAY	115	2.0	32	29	-	-	4.5	9.9	27	2.42	15	N/A	N/A
19.69	66.2	140.5	66.1	2.0	-1.6	3.1	4	clayy SILT to silty CLAY	115	2.0	33	30	-	-	4.6	9.9	27	2.41	15	N/A	N/A
19.85	70.2	143.4	70.2	2.1	-1.6	3.0	4	clayy SILT to silty CLAY	115	2.0	35	32	-	-	4.9	9.9	26	2.39	15	N/A	N/A
20.01	74.9	147.6	74.8	2.2	-1.6	3.0	5	silty SAND to sandy SILT	120	4.0	19	17	54	38	-	-	25	2.37	16	N/A	N/A
20.18	78.6	152.8	78.6	2.4	-1.6	3.1	5	silty SAND to sandy SILT	120	4.0	20	18	55	38	-	-	25	2.37	16	N/A	N/A
20.34	80.6	156.3	80.6	2.5	-1.7	3.2	5	silty SAND to sandy SILT	120	4.0	20	18	56	38	-	-	25	2.37	16	N/A	N/A
20.51	80.9	157.8	80.9	2.6	-1.6	3.2	4	clayy SILT to silty CLAY	115	2.0	40	36	-	-	5.6	9.9	25	2.37	15	N/A	N/A
20.67	81.9	156.5	81.9	2.6	-1.6	3.2	5	silty SAND to sandy SILT	120	4.0	20	18	56	38	-	-	25	2.36	16	N/A	N/A
20.83	87.7	168.2	87.6	3.0	-1.6	3.4	4	clayy SILT to silty CLAY	115	2.0	44	38	-	-	6.1	9.9	25	2.37	15	N/A	N/A
21.00	91.8	170.8	91.8	3.1	-1.6	3.4	5	silty SAND to sandy SILT	120	4.0	23	20	60	39	-	-	24	2.35	16	N/A	N/A
21.16	66.1	172.6	66.1	2.9	-1.6	4.5	4	clayy SILT to silty CLAY	115	2.0	33	29	-	-	4.6	9.9	33	2.54	15	N/A	N/A
21.33	39.0	-	39.0	2.0	-1.4	5.3	3	silty CLAY to CLAY	115	1.5	26	21	-	-	2.7	9.9	45	2.78	15	N/A	N/A
21.49	25.1	-	25.1	1.3	-1.5	5.4	3	silty CLAY to CLAY	115	1.5	17	13	-	-	1.7	6.2	54	2.94	15	N/A	N/A
21.65	18.6	-	18.6	0.9	-0.8	5.0	3	silty CLAY to CLAY	115	1.5	12	10	-	-	1.2	4.5	60	3.02	15	N/A	N/A
21.82	19.1	-	19.1	0.7	-0.8	4.2	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	4.6	56	2.97	15	N/A	N/A
21.98	20.7	-	20.7	0.6	-0.3	3.2	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	5.0	50	2.87	15	N/A	N/A
22.15	19.8	-	19.8	0.7	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	4.7	54	2.94	15	N/A	N/A
22.31	20.8	-	20.8	0.8	0.2	4.2	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	4.9	55	2.94	15	N/A	N/A
22.47	21.7	-	21.8	0.9	0.4	4.4	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	5.1	55	2.95	15	N/A	N/A
22.64	23.0	-	23.0	1.1	0.6	5.0	3	silty CLAY to CLAY	115	1.5	15	12	-	-	1.5	5.4	56	2.96	15	N/A	N/A
22.80	24.7	-	24.7	1.2	0.3	5.0	3	silty CLAY to CLAY	115	1.5	16	12	-	-	1.6	5.8	54	2.94	15	N/A	N/A
22.97	23.0	-	23.0	1.0	0.5	4.8	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	5.3	56	2.96	15	N/A	N/A
23.13	18.9	-	18.9	0.8	0.6	4.7	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.2	4.3	60	3.03	15	N/A	N/A
23.30	18.6	-	18.6	0.8	0.8	4.4	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	4.2	60	3.02	15	N/A	N/A
23.46	19.4	-	19.5	0.8	0.9	4.3	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	4.3	58	2.99	15	N/A	N/A
23.62	18.7	-	18.7	0.8	1.1	4.7	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	4.1	61	3.03	15	N/A	N/A
23.79	18.3	-	18.3	0.8	1.1	4.7	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	4.0	62	3.05	15	N/A	N/A
23.95	19.1	-	19.1	0.8	1.2	4.4	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	4.2	60	3.02	15	N/A	N/A
24.12	19.8	-	19.8	0.9	1.3	4.7	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	4.3	60	3.02	15	N/A	N/A
24.28	21.9	-	21.9	1.0	1.4	5.0	3	silty CLAY to CLAY	115	1.5	15	10	-	-	1.4	4.8	59	3.00	15	N/A	N/A
24.44	27.1	-	27.2	1.1	1.4	4.5	3	silty CLAY to CLAY	115	1.5	18	13	-	-	1.8	5.9	52	2.90	15	N/A	N/A
24.61	44.6	-	44.6	1.4	0.6	3.3	4	clayy SILT to silty CLAY	115	2.0	22	15	-	-	3.1	9.9	38	2.65	15	N/A	N/A
24.77	50.1	-	50.1	1.7	-1.7	3.6	4	clayy SILT to silty CLAY	115	2.0	25	17	-	-	3.4	9.9	37	2.63	15	N/A	N/A
24.94	41.2	-	41.2	1.7	-2.0	4.4	3	silty CLAY to CLAY	115	1.5	27	19	-	-	2.8	9.0	44	2.76	15	N/A	N/A
25.10	31.2	-	31.2	1.5	-1.9	5.1	3	silty CLAY to CLAY	115	1.5	21	14	-	-	2.1	6.7	52	2.90	15	N/A	N/A
25.26	27.0	-	27.0	1.3	-2.0	5.0	3	silty CLAY to CLAY	115	1.5	18	12	-	-	1.8	5.7	55	2.94	15	N/A	N/A
25.43	29.1	-	29.1	1.3	-1.9	4.6	3	silty CLAY to CLAY	115	1.5	19	13	-	-	2.0	6.1	52	2.89	15	N/A	N/A
25.59	50.7	-	50.7	1.6	-2.3	3.2	4	clayy SILT to silty CLAY	115	2.0	25	17	-	-	3.5	9.9	36	2.61	15	N/A	N/A
25.76	59.0	128.0	59.0	1.8	-1.3	3.1	4	clayy SILT to silty CLAY	115	2.0	29	23	-	-	4.1	9.9	30	2.49	15	N/A	N/A
25.92	60.4	136.1	60.4	2.0	-1.4	3.4	4	clayy SILT to silty CLAY	115	2.0	30	24	-	-	4.2	9.9	31	2.52	15	N/A	N/A
26.08	62.5	137.8	62.5	2.1	-1.7	3.4	4	clayy SILT to silty CLAY	115	2.0	31	25	-	-	4.3	9.9	31	2.51	15	N/A	N/A
26.25	65.7	140.3	65.6	2.2	-0.9	3.4	4	clayy SILT to silty CLAY	115	2.0	33	26	-	-	4.5	9.9	30	2.49	15	N/A	N/A
26.41	65.0	139.1	65.0	2.2	-1.0	3.4	4	clayy SILT to silty CLAY	115	2.0	32	25	-	-	4.5	9.9	30	2.49	15	N/A	N/A
26.58	57.4	-	57.3	2.1	-1.4	3.8	4	clayy SILT to silty CLAY	115	2.0	29	18	-	-	3.9	9.9	37	2.63	15	N/A	N/A
26.74	61.3	137.6	61.3	2.1	-1.6	3.5	4	clayy SILT to silty CLAY	115	2.0	31	24	-	-	4.2	9.9	32	2.52	15	N/A	N/A
26.90	67.6	142.5	67.6	2.3	-0.9	3.5	4	clayy SILT to silty CLAY	115	2.0	34	26	-	-	4.7	9.9	30	2.49	15	N/A	N/A
27.07	72.3	148.8	72.2	2.5	-0.9	3.6	4	clayy SILT to silty CLAY	115	2.0	36	28	-	-	5.0	9.9	30	2.48	15	N/A	N/A
27.23	73.9	154.6	73.9	2.7	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	37	28	-	-	5.1	9.9	30	2.49	15	N/A	N/A
27.40	72.4	154.5	72.4	2.7	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	36	28	-	-	5.0	9.9	31	2.50	15	N/A	N/A
27.56	70.5	151.4	70.5	2.6	-0.8	3.8	4	clayy SILT to silty CLAY	115	2.0	35	27	-	-	4.9	9.9	31	2.51	15	N/A	N/A
27.72	69.1	147.8	69.1	2.5	-0.8	3.7	4	clayy SILT to silty CLAY	115	2.0	35	26	-	-	4.8	9.9	31	2.51	15	N/A	N/A
27.89	68.0	143.8	68.0	2.4	-0.9	3.6	4	clayy SILT to silty CLAY	115	2.0	34	26	-	-	4.7	9.9	31	2.50	15	N/A	N/A
28.05	66.3	143.9	66.3	2.4	-0.9	3.6	4	clayy SILT to silty CLAY	115	2.0	33	25	-	-	4.6	9.9	31	2.52	15	N/A	N/A
28.22	67.1	145.9	67.1	2.4	-1.0	3.7	4	clayy SILT to silty CLAY	115	2.0	34	25	-	-	4.6	9.9	32	2.52	15	N/A	N/A
28.38	69.5	147.3	69.5	2.5	-0.8	3.7	4	clayy SILT to silty CLAY	115	2.0	35	26	-	-	4.8	9.9	31	2.51	15	N/A	N/A
28.54	71.0	141.4	71.0	2.3	-0.9	3.4	4	clayy SILT to silty CLAY	115	2.0	36	27	-	-	4.9	9.9	30	2.48	15	N/A	N/A
28.71	71.3	146.7	71.3	2.5	-0.9	3.6	4	clayy SILT to silty CLAY	115	2.0	36	27	-	-	4.9	9.9	30	2.49	15	N/A	N/A
28.87	73.0	149.8	73.0	2.6	-1.1	3.7	4	clayy SILT to silty CLAY	115	2.0	37	27	-	-	5.0	9.9	30	2.49	15	N/A	N/A
29.04	73.1	151.9	73.1	2.7	-1.1	3.8	4	clayy SILT to silty CLAY	115	2.0	37	27	-	-	5.0	9.9	31	2.50	15	N/A	N/A
29.20	69.3	-	69.3	2.8	-1.0	4.1	4	clayy SILT to silty CLAY	115	2.0	35	20	-	-	4.8	9.9	36	2.62	15	N/A	N/A
29.36	59.5	-	59.5	2.7	-0.9	4.6	3	silty CLAY to CLAY	115	1.5	40	23	-	-	4.1	9.9	41	2.71	15	N/A	N/A
29.53	36.1	-	36.1	1.9	-0.9	5.6	3	silty CLAY to CLAY	115	1.5	24	14	-	-	2.4	6.6	54	2.93	15	N/A	N/A
29.69	18.6	-	18.6	1.1	-0.8	6.7	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	3.2	74	3.22	15	N/A	N/A
29.86	15.2	-	15.2	0.7	-0.1	5.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.6	75	3.22	15	N/A	N/A
30.02	12.4	-	12.4	0.6	0.5	5.2	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.0	82	3.31	15	N/A	N/A
30.19	9.9	-	9.9	0.3	0.6	4.1	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.5	85	3.35	15	N/A	N/A
30.35	10.1	-	10.1	0.3	0.7	3.9	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.6	84	3.33	15	N/A	N/A
30.51	10.9	-	10.9	0.4	0.8	4.6	3	silty CLAY to CLAY	115	1.5	7	4	-	-	0.6	1.7	85	3.34	15	N/A	N/A
30.68	12.2	-	12.3	0.4	0.9	4.3	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	1.9	79	3.28	15	N/A	N/A
30.84	12.7	-	12.7	0.5	1.0	4.3	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.0	78	3.27	15	N/A	N/A
31.01	13.1	-	13.2	0.6	1.1	5.0	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	80	3.29	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Heider Inspections
Data File: SDF(349).cpt
CPT Date: 11/2/2015 11:45:02 AM
GW During Test: 47 ft

Sounding ID: CPT-01
Project No: 150249
Cone/Rig: DDG1333

Depth ft	qc PS tsf	* q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
31.17	22.9	-	22.9	0.9	1.2	4.4	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	3.8	62	3.05	15	N/A	N/A
31.33	55.6	-	55.6	1.6	-1.2	3.0	4	clayy SILT to silty CLAY	115	2.0	28	15	-	-	3.8	9.7	37	2.62	15	N/A	N/A
31.50	64.7	-	64.6	2.1	-1.2	3.4	4	clayy SILT to silty CLAY	115	2.0	32	18	-	-	4.4	9.9	36	2.61	15	N/A	N/A
31.66	65.4	129.2	65.3	2.0	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	33	23	-	-	4.5	9.9	31	2.50	15	N/A	N/A
31.83	61.1	-	61.1	1.9	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	31	16	-	-	4.2	9.9	36	2.62	15	N/A	N/A
31.99	51.3	-	51.3	1.8	-1.7	3.6	4	clayy SILT to silty CLAY	115	2.0	26	14	-	-	3.5	8.7	41	2.71	15	N/A	N/A
32.15	51.1	-	51.1	1.7	-2.3	3.5	4	clayy SILT to silty CLAY	115	2.0	26	14	-	-	3.5	8.7	41	2.71	15	N/A	N/A
32.32	35.6	-	35.6	1.5	-2.0	4.3	3	silty CLAY to CLAY	115	1.5	24	13	-	-	2.4	5.9	51	2.89	15	N/A	N/A
32.48	21.6	-	21.6	0.8	-1.0	3.8	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	3.4	61	3.04	15	N/A	N/A
32.65	14.6	-	14.6	0.5	-0.8	3.7	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.2	72	3.19	15	N/A	N/A
32.81	13.0	-	13.0	0.5	-0.6	4.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	78	3.27	15	N/A	N/A
32.97	12.9	-	12.9	0.5	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	9	4	-	-	0.8	1.9	83	3.32	15	N/A	N/A
33.14	16.4	-	16.4	0.7	-0.3	5.1	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.5	76	3.23	15	N/A	N/A
33.30	44.9	-	44.9	1.2	-0.6	2.7	4	clayy SILT to silty CLAY	115	2.0	22	12	-	-	3.0	7.3	40	2.69	15	N/A	N/A
33.47	60.7	-	60.7	1.7	-1.2	2.8	4	clayy SILT to silty CLAY	115	2.0	30	16	-	-	4.2	9.9	35	2.60	15	N/A	N/A
33.63	66.3	125.9	66.3	2.0	-1.2	3.0	4	clayy SILT to silty CLAY	115	2.0	33	23	-	-	4.5	9.9	30	2.49	15	N/A	N/A
33.79	68.7	129.7	68.7	2.1	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	34	24	-	-	4.7	9.9	30	2.49	15	N/A	N/A
33.96	70.8	128.1	70.8	2.1	-0.7	3.0	4	clayy SILT to silty CLAY	115	2.0	35	24	-	-	4.9	9.9	29	2.47	15	N/A	N/A
34.12	69.7	128.9	69.6	2.1	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	35	24	-	-	4.8	9.9	30	2.48	15	N/A	N/A
34.29	68.3	127.7	68.2	2.0	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	34	23	-	-	4.7	9.9	30	2.49	15	N/A	N/A
34.45	64.2	-	64.2	2.0	-0.9	3.3	4	clayy SILT to silty CLAY	115	2.0	32	16	-	-	4.4	9.9	37	2.63	15	N/A	N/A
34.61	55.3	-	55.3	1.9	-0.7	3.6	4	clayy SILT to silty CLAY	115	2.0	28	14	-	-	3.8	8.7	41	2.71	15	N/A	N/A
34.78	30.5	-	30.5	1.5	0.1	5.3	3	silty CLAY to CLAY	115	1.5	20	10	-	-	2.0	4.6	60	3.03	15	N/A	N/A
34.94	19.6	-	19.7	0.9	1.5	5.1	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.2	2.9	72	3.18	15	N/A	N/A
35.11	14.9	-	15.0	0.6	1.8	4.3	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	77	3.25	15	N/A	N/A
35.27	15.7	-	15.8	1.1	2.0	7.8	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	2.2	88	3.39	15	N/A	N/A
35.43	61.4	-	61.3	1.9	-2.5	3.2	4	clayy SILT to silty CLAY	115	2.0	31	15	-	-	4.2	9.5	38	2.65	15	N/A	N/A
35.60	39.2	-	39.2	2.0	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	26	13	-	-	2.6	5.9	55	2.95	15	N/A	N/A
35.76	25.1	-	25.1	1.3	-0.2	5.5	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.6	3.7	67	3.12	15	N/A	N/A
35.93	25.0	-	25.0	1.2	0.1	5.3	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.6	3.6	67	3.11	15	N/A	N/A
36.09	58.6	-	58.5	1.6	-0.7	2.9	4	clayy SILT to silty CLAY	115	2.0	29	14	-	-	4.0	8.9	38	2.65	15	N/A	N/A
36.26	76.5	128.4	76.5	2.2	-1.8	2.9	4	clayy SILT to silty CLAY	115	2.0	38	26	-	-	5.3	9.9	28	2.45	15	N/A	N/A
36.42	84.9	136.7	84.9	2.5	-0.7	3.0	4	clayy SILT to silty CLAY	115	2.0	42	28	-	-	5.8	9.9	27	2.42	15	N/A	N/A
36.58	87.5	148.1	87.5	2.9	-0.7	3.4	4	clayy SILT to silty CLAY	115	2.0	44	29	-	-	6.0	9.9	29	2.45	15	N/A	N/A
36.75	81.2	-	81.2	3.2	-0.7	4.0	4	clayy SILT to silty CLAY	115	2.0	41	19	-	-	5.6	9.9	37	2.63	15	N/A	N/A
36.91	50.6	-	50.5	2.9	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	34	16	-	-	3.4	7.4	53	2.91	15	N/A	N/A
37.08	31.3	-	31.2	1.8	-0.5	6.3	3	silty CLAY to CLAY	115	1.5	21	10	-	-	2.1	4.5	65	3.09	15	N/A	N/A
37.24	22.0	-	22.0	1.2	-0.3	6.1	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.4	3.0	74	3.21	15	N/A	N/A
37.40	30.1	-	30.1	1.3	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	4.2	60	3.03	15	N/A	N/A
37.57	74.8	125.7	74.8	2.1	-1.0	2.9	4	clayy SILT to silty CLAY	115	2.0	37	25	-	-	5.1	9.9	29	2.46	15	N/A	N/A
37.73	100.9	140.4	100.8	2.8	-5.5	2.8	5	silty SAND to sandy SILT	120	4.0	25	17	53	36	-	-	24	2.35	16	N/A	N/A
37.90	123.3	148.6	123.2	3.1	-2.8	2.6	5	silty SAND to sandy SILT	120	4.0	31	20	60	37	-	-	21	2.27	16	N/A	N/A
38.06	145.8	167.2	145.7	3.9	-1.3	2.7	5	silty SAND to sandy SILT	120	4.0	36	24	65	38	-	-	20	2.24	16	N/A	N/A
38.22	147.4	170.2	147.3	4.1	-1.3	2.8	5	silty SAND to sandy SILT	120	4.0	37	24	66	38	-	-	20	2.24	16	N/A	N/A
38.39	150.1	173.2	150.1	4.2	-1.2	2.9	5	silty SAND to sandy SILT	120	4.0	38	24	66	38	-	-	20	2.24	16	N/A	N/A
38.55	150.3	174.8	150.3	4.3	-1.2	2.9	5	silty SAND to sandy SILT	120	4.0	38	24	66	38	-	-	21	2.25	16	N/A	N/A
38.72	149.8	175.3	149.8	4.4	-1.4	3.0	5	silty SAND to sandy SILT	120	4.0	37	24	66	38	-	-	21	2.25	16	N/A	N/A
38.88	136.5	169.8	136.4	4.1	-1.8	3.1	5	silty SAND to sandy SILT	120	4.0	34	22	63	38	-	-	22	2.29	16	N/A	N/A
39.04	118.7	163.5	118.7	3.8	-2.2	3.3	5	silty SAND to sandy SILT	120	4.0	30	19	58	37	-	-	25	2.36	16	N/A	N/A
39.21	105.1	160.0	105.1	3.6	-1.8	3.5	4	clayy SILT to silty CLAY	115	2.0	53	34	-	-	7.3	9.9	27	2.41	15	N/A	N/A
39.37	80.3	-	80.2	3.4	-1.4	4.3	4	clayy SILT to silty CLAY	115	2.0	40	17	-	-	5.5	9.9	40	2.68	15	N/A	N/A
39.54	48.0	-	48.0	2.5	-1.9	5.4	3	silty CLAY to CLAY	115	1.5	32	14	-	-	3.2	6.6	53	2.92	15	N/A	N/A
39.70	31.4	-	31.3	1.6	-2.9	5.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	4.1	64	3.08	15	N/A	N/A
39.86	59.6	-	59.5	1.8	-2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	30	13	-	-	4.0	8.1	40	2.69	15	N/A	N/A
40.03	48.6	-	48.4	1.7	-6.9	3.7	3	silty CLAY to CLAY	115	1.5	32	14	-	-	3.3	6.5	47	2.81	15	N/A	N/A
40.19	39.1	-	38.9	1.3	-6.5	3.5	3	silty CLAY to CLAY	115	1.5	26	11	-	-	2.6	5.2	51	2.88	15	N/A	N/A
40.36	36.5	-	36.3	1.7	-6.3	4.9	3	silty CLAY to CLAY	115	1.5	24	10	-	-	2.4	4.8	58	3.00	15	N/A	N/A
40.52	113.0	133.1	112.9	2.6	-6.9	2.3	5	silty SAND to sandy SILT	120	4.0	28	18	56	36	-	-	22	2.27	16	N/A	N/A
40.68	61.8	-	61.8	2.7	-1.3	4.5	3	silty CLAY to CLAY	115	1.5	41	17	-	-	4.2	8.3	46	2.79	15	N/A	N/A
40.85	30.9	-	30.9	1.8	-1.1	6.4	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.0	4.0	68	3.13	15	N/A	N/A
41.01	21.5	-	21.5	1.3	-0.9	7.0	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.3	2.6	81	3.30	15	N/A	N/A
41.18	56.8	-	56.8	1.7	-0.7	3.1	4	clayy SILT to silty CLAY	115	2.0	28	12	-	-	3.8	7.5	42	2.72	15	N/A	N/A
41.34	72.9	-	72.9	2.2	-2.1	3.1	4	clayy SILT to silty CLAY	115	2.0	36	15	-	-	5.0	9.7	37	2.64	15	N/A	N/A
41.50	78.5	121.0	78.4	2.0	-2.3	2.7	5	silty SAND to sandy SILT	120	4.0	20	12	43	34	-	-	28	2.44	16	N/A	N/A
41.67	90.1	131.8	90.1	2.5	-2.0	2.8	5	silty SAND to sandy SILT	120	4.0	23	14	48	35	-	-	27	2.41	16	N/A	N/A
41.83	99.0	140.6	99.0	2.9	-1.5	3.0	5	silty SAND to sandy SILT	120	4.0	25	15	51	35	-	-	26	2.39	16	N/A	N/A
42.00	100.3	146.9	100.3	3.1	-1.6	3.2	4	clayy SILT to silty CLAY	115	2.0	50	31	-	-	6.9	9.9	27	2.41	15	N/A	N/A
42.16	92.5	145.4	92.5	3.0	-1.0	3.3	4	clayy SILT to silty CLAY	115	2.0	46	29	-	-	6.4	9.9	29	2.45	15	N/A	N/A
42.32	85.5	-	85.5	3.1	-0.5	3.7	4	clayy SILT to silty CLAY	115	2.0	43	17	-	-	5.9	9.9	37	2.64	15	N/A	N/A
42.49	103.4	144.2	103.3	3.0	-3.6	3.0	5	silty SAND to sandy SILT	120	4.0	26	16	52	35	-	-	26	2.39	16	N/A	N/A
42.65	93.6	144.0	93.6	3.0	-2.3	3.3	4	clayy SILT to silty CLAY	115	2.0	47	29	-	-	6.4	9.9	28	2.44	15	N/A	N/A
42.82	82.1	-	82.0	2.5	-1.3	3.2	4	clayy SILT to silty CLAY	115	2.0	41	16	-	-	5.6	9.9	36	2.62	15	N/A	N/A
42.98	77.9	-	77.9	2.3	-1.5	3.1	4	clayy SILT to silty CLAY	115	2.0	39	16	-	-	5.3	9.9	37	2.63	15	N/A	N/A
43.15	77.0	-	77.0	2.3	-1.5	3.1	4	clayy SILT to silty CLAY	115	2.0	39	15	-	-	5.3	9.8	37	2.63	15	N/A	N/A
43.31	78.6	-	78.6	2.3	-0.8	3.0	4	clayy SILT to silty CLAY	115	2.0	39	16	-	-	5.4	9.9	36	2.62	15	N/A	N/A
43.47	79.6	-	79.6	2.4	-0.6	3.1	4	clayy SILT to silty CLAY	115	2.0	40	16	-	-	5.4	9.9	36	2.62	15	N/A	N/A
43.64	79.4	-	79.4	2.3	-3.1	3.0	4	clayy SILT to silty CLAY	115	2.0	40	16	-	-	5.4	9.9	36	2.62	15	N/A	N/A
43.80	81.7	126.4	81.6	2.3	-5.3	2.9	4	clayy SILT to silty CLAY	115	2.0	41	25	-	-	5.6	9.9	29	2.45	15	N/A	N/A
43.97	91.4	128.3	91.2	2.4	-7.1	2.7	5	silty SAND to sandy SILT	120	4.0	23	14	48	35	-	-	26	2.40	16	N/A	N/A
44.13	103.1	132.9	103.0	2.7	-9.2	2.6	5	silty SAND to sandy SILT	120	4.0	26	16	51	35	-	-	24	2.35	16	N/A	N/A
44.29	105.9	140.1	105.8	2.9	-6.5	2.9	5	silty SAND to sandy SILT	120	4.0	26	16	52	35	-	-	25	2.37	16	N/A	N/A
44.46	105.7	138.8	105.6	2.9	-5.5	2.8	5	silty SAND to sandy SILT	120	4.0	26	16	52	35	-	-	25	2.36	16	N/A	N/A
44.62	102.1	137.2	101.9	2.8	-6.2	2.8	5	silty SAND to sandy SILT	120	4.0	26	15	51	35	-	-	26	2.38	16	N/A	N/A
44.79	105.9	135.5	105.7	2.8	-7.0	2.7	5	silty SAND to sandy SILT	120	4.0	26	16	52	35	-	-	25	2.35	16	N/A	N/A
44.95	112.9	141.1	112.8	3.0	-7.7	2.7	5	silty SAND to sandy SILT	120	4.0	28	17	54	36	-	-	24	2.34	16	N/A	N/A
45.11	104.6	138.7	104.5	2.9	-6.3	2.8	5	silty SAND to sandy SILT	120	4.0	26	16	52	35	-	-	25	2.37	16	N/A	N/A
45.28	102.1	138.1	102.0	2.9	-6.3	2.9	5	silty SAND to sandy SILT	120	4.0	26	15	51	35	-	-	26	2.39	16	N/A	N/A
45.44	103.2	138.5	103.1	2.9	-7.2	2.9	5	silty SAND to sandy SILT	120	4.0	26	15	51	35	-	-	26	2.38	16	N/A	N/A
45.61	93.9	142.9	93.7	3.0	-8.2	3.3	4	clayy SILT to silty CLAY	115	2.0	47	28	-	-	6.4	9.9	29	2.46	15	N/A	N/A
45.77	75.5	-	75.4	2.7	-8.7	3.7	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.1	9.0	41	2.70	15	N/A	N/A
45.93	53.6	-	53.4	2.2	-8.6	4.3	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.6	6.3	50	2.87	15	N/A	N/A
46.10	72.7	-	72.6	1.9	-8.6	2.8	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	8.6	37	2.64	15	N/A	N/A
46.26	71.7	-	71.5	2.4	-9.2	3.4	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	4.9	8.4	41	2.70	15	N/A	N/A
46.43	44.8	-	44.6	2.0	-9.3	4.7	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	5.1	55	2.95	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Instructional Bldg I El Camino College Compton Center

Project ID: Heider Inspections
Data File: SDF(349).cpt
CPT Date: 11/2/2015 11:45:02 AM
GW During Test: 47 ft

Sounding ID: CPT-01
Project No: 150249
Cone/Rig: DDG1333

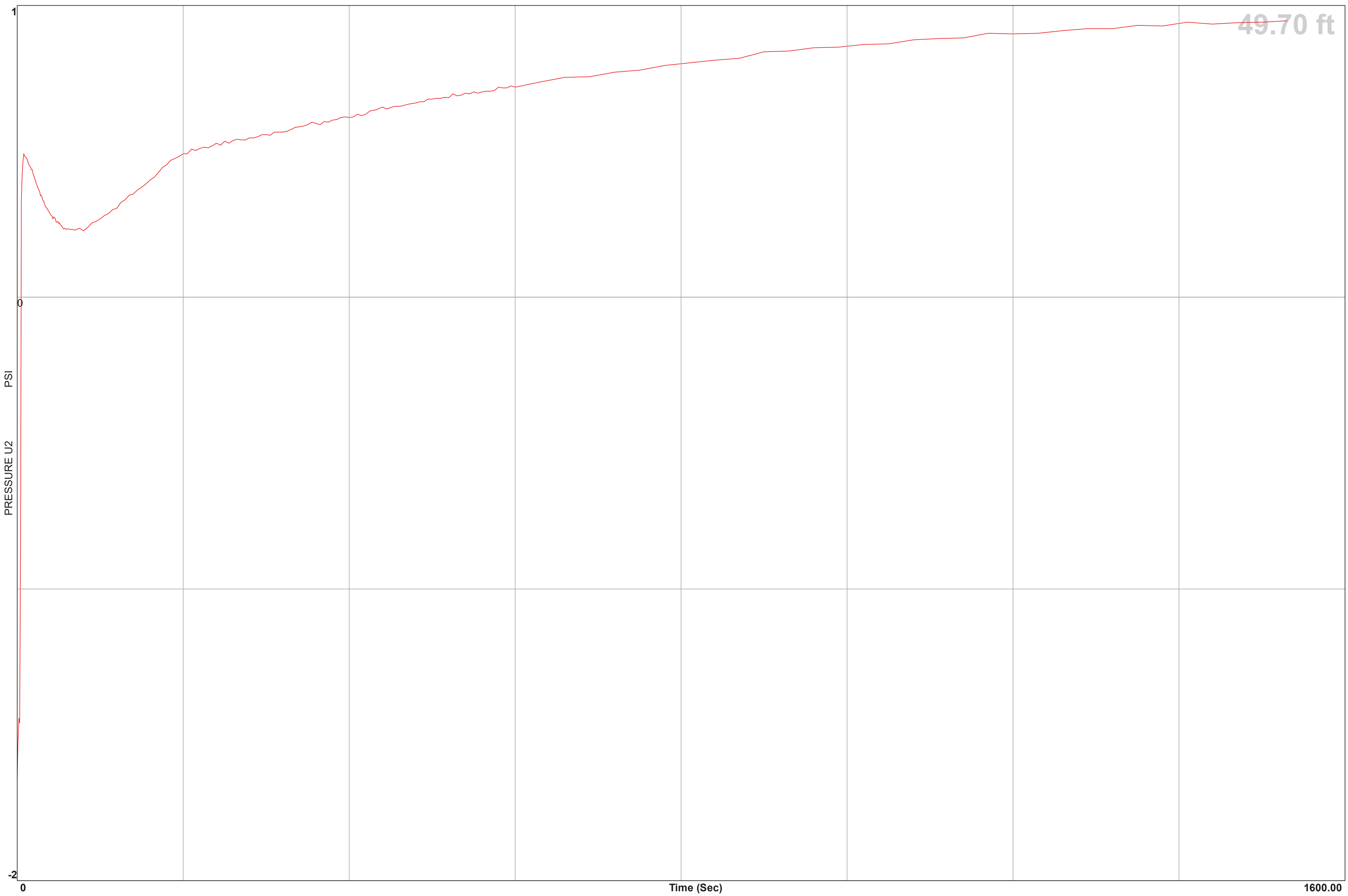
Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
46.59	28.9	-	28.7	1.4	-9.1	5.3	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.8	3.2	69	3.15	15	N/A	N/A
46.75	57.7	-	57.5	1.5	-9.0	2.7	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	3.9	6.7	41	2.71	15	N/A	N/A
46.92	91.1	122.0	90.9	2.2	-9.7	2.5	5	silty SAND to sandy SILT	120	4.0	23	13	46	34	-	-	26	2.39	16	N/A	N/A
47.08	62.8	-	62.6	2.6	-10.0	4.3	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.2	7.2	47	2.81	15	-	-
47.25	39.2	-	39.0	1.8	-9.8	4.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	4.4	60	3.02	15	-	-
47.41	41.7	-	41.5	1.4	-9.7	3.6	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	4.7	52	2.91	15	-	-
47.57	57.7	-	57.5	1.5	-9.7	2.8	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	3.9	6.6	42	2.72	15	-	-
47.74	45.4	-	45.2	1.5	-9.6	3.5	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	5.1	50	2.87	15	-	-
47.90	42.7	-	42.5	1.0	-9.6	2.4	4	clayy SILT to silty CLAY	115	2.0	21	8	-	-	2.8	4.8	46	2.80	15	-	-
48.07	42.3	-	42.2	1.2	-9.6	3.1	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.8	4.7	50	2.86	15	-	-
48.23	40.6	-	40.4	1.5	-9.6	4.0	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	4.5	55	2.95	15	-	-
48.39	39.9	-	39.7	1.6	-9.2	4.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.6	4.4	56	2.97	15	-	-
48.56	32.5	-	32.3	1.6	-9.1	5.3	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.1	3.5	66	3.10	15	-	-
48.72	70.4	-	70.2	2.1	-9.3	3.0	4	clayy SILT to silty CLAY	115	2.0	35	13	-	-	4.8	8.0	39	2.68	15	-	-
48.89	78.9	-	78.7	2.5	-9.4	3.2	4	clayy SILT to silty CLAY	115	2.0	39	15	-	-	5.4	9.0	38	2.65	15	-	-
49.05	95.7	-	95.5	3.1	-9.4	3.4	4	clayy SILT to silty CLAY	115	2.0	48	18	-	-	6.6	9.9	35	2.60	15	-	-
49.22	149.8	154.5	149.6	3.8	-9.8	2.6	5	silty SAND to sandy SILT	120	4.0	37	22	62	37	-	-	20	2.24	16	0.15	0.7
49.38	181.2	163.2	181.0	4.1	-10.0	2.3	5	silty SAND to sandy SILT	120	4.0	45	26	69	38	-	-	17	2.15	16	0.00	0.0
49.54	219.4	164.1	219.2	3.6	-9.9	1.7	6	clean SAND to silty SAND	125	5.0	44	25	75	39	-	-	13	1.99	16	0.00	0.0
49.71	236.9	175.0	236.8	4.1	-1.6	1.7	6	clean SAND to silty SAND	125	5.0	47	27	77	40	-	-	12	1.98	16	0.00	0.0
49.87	232.2	178.0	232.2	4.4	-0.1	1.9	5	silty SAND to sandy SILT	120	4.0	58	34	77	39	-	-	13	2.02	16	0.00	0.0
50.04	218.9	179.9	218.9	4.8	-0.6	2.2	5	silty SAND to sandy SILT	120	4.0	55	32	75	39	-	-	15	2.08	16	0.00	0.0
50.20	226.6	181.0	226.5	4.7	-1.1	2.1	5	silty SAND to sandy SILT	120	4.0	57	33	76	39	-	-	15	2.06	16	0.00	0.0
50.36	245.7	187.0	245.6	4.8	-3.4	2.0	5	silty SAND to sandy SILT	120	4.0	61	35	79	40	-	-	13	2.01	16	0.00	0.0
50.53	247.8	190.8	247.7	5.1	-4.2	2.1	5	silty SAND to sandy SILT	120	4.0	62	36	79	40	-	-	14	2.03	16	0.00	0.0
50.69	237.4	187.3	237.3	5.0	-3.0	2.1	5	silty SAND to sandy SILT	120	4.0	59	34	77	40	-	-	14	2.05	16	0.00	0.0
50.86	223.9	178.2	223.8	4.6	-3.0	2.1	5	silty SAND to sandy SILT	120	4.0	56	32	75	39	-	-	15	2.06	16	0.00	0.0
51.02	213.2	171.6	213.1	4.3	-2.9	2.1	5	silty SAND to sandy SILT	120	4.0	53	31	74	39	-	-	15	2.07	16	0.00	0.0
51.18	199.9	156.2	199.8	3.5	-3.0	1.8	5	silty SAND to sandy SILT	120	4.0	50	29	72	39	-	-	14	2.04	16	0.16	1.1
51.35	187.6	146.2	187.6	3.1	-3.1	1.7	5	silty SAND to sandy SILT	120	4.0	47	27	69	38	-	-	14	2.04	16	0.24	1.6
51.51	170.1	135.0	170.1	2.7	-2.4	1.6	5	silty SAND to sandy SILT	120	4.0	43	24	66	38	-	-	15	2.06	16	0.50	2.6
51.68	158.0	127.8	158.0	2.4	-1.0	1.5	5	silty SAND to sandy SILT	120	4.0	39	23	64	37	-	-	15	2.07	16	0.83	3.9
51.84	148.2	122.0	148.2	2.2	0.1	1.5	5	silty SAND to sandy SILT	120	4.0	37	21	62	37	-	-	16	2.09	16	1.21	5.8
52.00	134.4	123.7	134.4	2.4	0.1	1.8	5	silty SAND to sandy SILT	120	4.0	34	19	58	36	-	-	18	2.18	16	1.02	5.2
52.17	91.0	-	91.0	2.8	0.3	3.2	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.2	9.9	35	2.60	15	-	-
52.33	48.6	-	48.6	2.2	1.2	4.8	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.2	5.2	54	2.94	15	-	-
52.50	75.9	-	75.9	2.4	1.3	3.3	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.2	8.3	39	2.67	15	-	-
52.66	182.1	156.3	182.1	3.8	0.6	2.1	5	silty SAND to sandy SILT	120	4.0	46	26	68	38	-	-	17	2.13	16	0.15	0.9
52.82	212.4	176.5	212.4	4.7	-0.1	2.3	5	silty SAND to sandy SILT	120	4.0	53	30	73	39	-	-	16	2.10	16	0.00	0.0
52.99	232.6	194.2	232.5	5.7	-2.0	2.5	5	silty SAND to sandy SILT	120	4.0	58	33	76	39	-	-	16	2.11	16	0.00	0.0
53.15	251.8	203.9	251.8	6.1	-2.2	2.5	5	silty SAND to sandy SILT	120	4.0	63	36	79	40	-	-	15	2.08	16	0.00	0.0
53.32	265.4	211.1	265.4	6.4	-2.0	2.5	5	silty SAND to sandy SILT	120	4.0	66	38	81	40	-	-	15	2.07	16	0.00	0.0
53.48	286.1	217.1	286.1	6.5	-1.3	2.3	5	silty SAND to sandy SILT	120	4.0	72	41	83	40	-	-	14	2.03	16	0.00	0.0
53.64	292.3	226.6	292.3	7.2	-1.1	2.5	5	silty SAND to sandy SILT	120	4.0	73	42	84	41	-	-	14	2.05	16	0.00	0.0
53.81	289.7	229.9	289.7	7.5	-1.5	2.6	5	silty SAND to sandy SILT	120	4.0	72	41	83	40	-	-	15	2.07	16	0.00	0.0
53.97	266.7	224.0	266.6	7.4	-2.3	2.8	5	silty SAND to sandy SILT	120	4.0	67	38	81	40	-	-	16	2.11	16	0.00	0.0
54.14	255.0	219.6	254.9	7.3	-2.6	2.9	5	silty SAND to sandy SILT	120	4.0	64	36	79	40	-	-	17	2.13	16	0.00	0.0
54.30	260.3	220.5	260.2	7.3	-3.6	2.8	5	silty SAND to sandy SILT	120	4.0	65	37	80	40	-	-	16	2.12	16	0.00	0.0
54.46	259.3	213.4	259.1	6.8	-5.8	2.6	5	silty SAND to sandy SILT	120	4.0	65	37	80	40	-	-	16	2.10	16	0.00	0.0
54.63	257.3	213.2	257.1	6.8	-6.4	2.7	5	silty SAND to sandy SILT	120	4.0	64	36	79	40	-	-	16	2.11	16	0.00	0.0
54.79	251.8	213.1	251.6	6.9	-7.1	2.8	5	silty SAND to sandy SILT	120	4.0	63	36	79	40	-	-	17	2.12	16	0.00	0.0
54.96	241.6	205.9	241.4	6.5	-7.6	2.7	5	silty SAND to sandy SILT	120	4.0	60	34	77	39	-	-	17	2.13	16	0.00	0.0
55.12	231.5	192.8	231.4	5.7	-7.6	2.5	5	silty SAND to sandy SILT	120	4.0	58	33	76	39	-	-	16	2.11	16	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Heider Inspections

Local	Instructional Bldg I El Camino College Comptor	Operator	RC-DG	GPS	
Job Number	150249	Cone Number	DDG1333		
Hole Number	CPT-01	Date and Time	11/2/2015 11:45:02 AM		
Equilized Pressure	.9	EST GW Depth During Test	47.3		

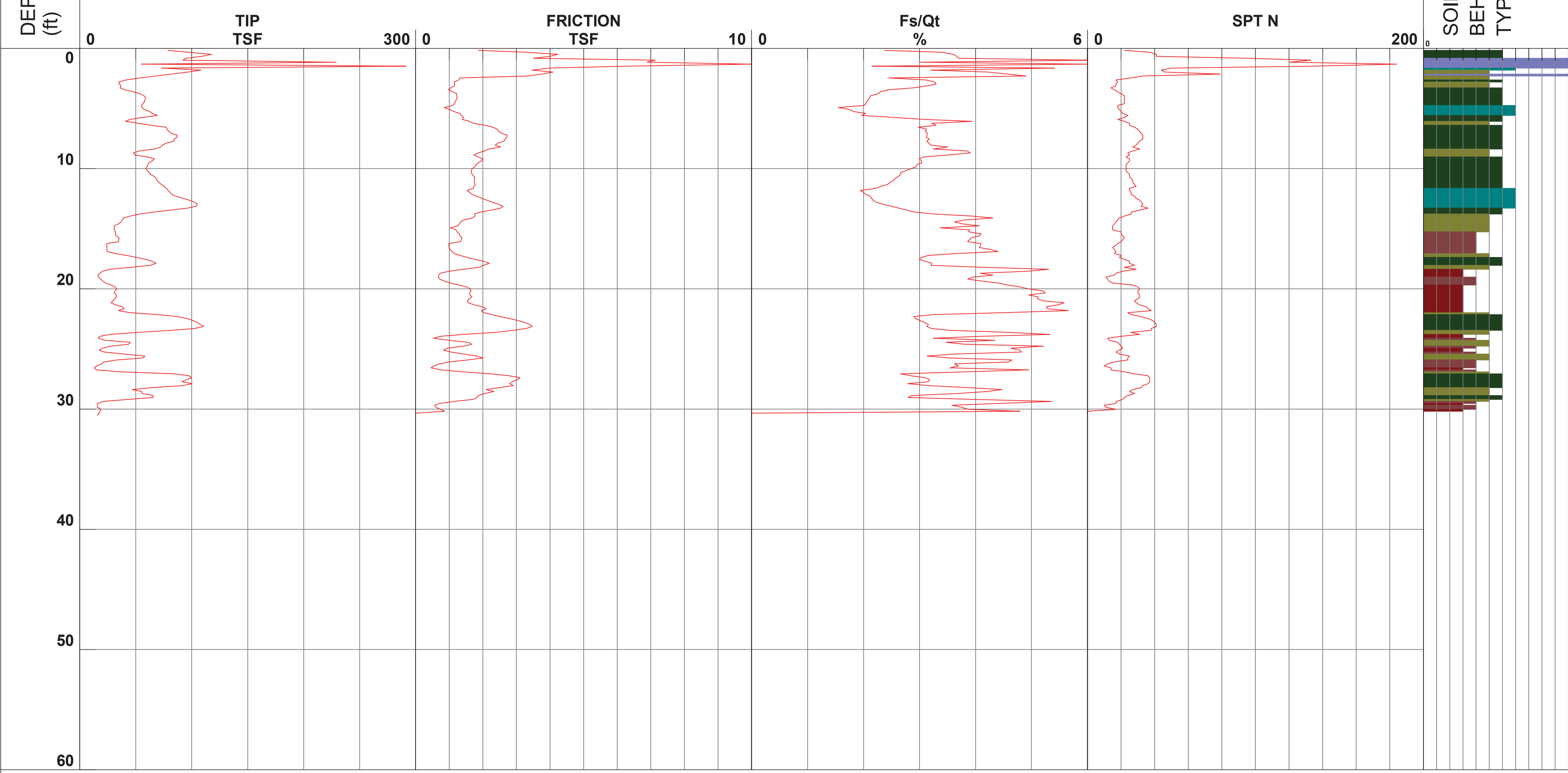


Heider Inspections

ProjeclInstructional Bldg I El Camino College Comptor		Operator	RC-DG	Filename	SDF(350).cpt
Job Number	150249	Cone Number	DDG1333	GPS	
Hole Number	CPT-02	Date and Time	11/2/2015 12:53:31 PM	Maximum Depth	30.51 ft
EST GW Depth During Test		46.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Instructional Bldg I El Camino College Compton Center

Project ID: Heider Inspections
Data File: SDF(350).cpt
CPT Date: 11/2/2015 12:53:31 PM
GW During Test: 46 ft

Sounding ID: CPT-02
Project No: 150249
Cone/Rig: DDG1333

Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
0.33	97.1	247.8	97.1	3.3	-0.4	3.4	8	stiff SAND to clayy SAND	115	1.0	97	100	-	-	6.4	9.9	18	2.17	16	N/A	N/A
0.49	117.7	289.4	117.6	4.2	-0.6	3.6	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.8	9.9	17	2.14	16	N/A	N/A
0.66	109.1	277.5	109.1	4.0	-0.6	3.7	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.2	9.9	18	2.17	16	N/A	N/A
0.82	95.1	255.1	95.0	3.5	-0.5	3.7	8	stiff SAND to clayy SAND	115	1.0	95	100	-	-	6.3	9.9	19	2.20	16	N/A	N/A
0.98	92.1	392.9	92.1	7.1	-0.4	7.8	9	very stiff fine SOIL	120	2.0	46	74	80	48	-	-	30	2.48	30	N/A	N/A
1.15	228.9	445.3	228.9	6.9	-0.4	3.0	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	15.2	9.9	11	1.92	16	N/A	N/A
1.31	55.0	-	55.0	11.8	-0.3	9.9	9	very stiff fine SOIL	120	2.0	28	44	63	48	-	-	40	2.69	30	N/A	N/A
1.48	291.4	499.9	291.4	6.3	-1.7	2.2	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	19.3	9.9	7	1.75	16	N/A	N/A
1.64	73.1	273.3	73.1	4.0	-0.6	5.4	9	very stiff fine SOIL	120	2.0	37	59	72	48	-	-	27	2.40	30	N/A	N/A
1.80	108.4	259.0	108.3	3.5	-1.0	3.2	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.2	9.9	16	2.12	16	N/A	N/A
1.97	96.8	277.4	96.7	4.1	-1.2	4.2	9	very stiff fine SOIL	120	2.0	48	78	82	48	-	-	21	2.25	30	N/A	N/A
2.13	82.0	263.7	82.0	3.8	-1.2	4.6	9	very stiff fine SOIL	120	2.0	41	66	76	48	-	-	23	2.32	30	N/A	N/A
2.30	68.0	247.3	68.0	3.3	-1.3	4.9	9	very stiff fine SOIL	120	2.0	34	55	70	48	-	-	26	2.39	30	N/A	N/A
2.46	53.8	149.1	53.7	1.3	-1.2	2.5	5	silty SAND to sandy SILT	120	4.0	13	22	62	47	-	-	20	2.22	16	N/A	N/A
2.62	41.3	147.8	41.3	1.3	-1.2	3.1	4	clayy SILT to silty CLAY	115	2.0	21	33	-	-	2.9	9.9	26	2.38	15	N/A	N/A
2.79	35.1	141.0	35.0	1.1	-1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	18	28	-	-	2.5	9.9	28	2.45	15	N/A	N/A
2.95	35.2	141.9	35.1	1.2	-1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	18	28	-	-	2.5	9.9	28	2.45	15	N/A	N/A
3.12	36.8	141.0	36.8	1.2	-1.2	3.2	4	clayy SILT to silty CLAY	115	2.0	18	30	-	-	2.6	9.9	27	2.42	15	N/A	N/A
3.28	36.0	133.5	36.0	1.0	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	9	14	49	44	-	-	26	2.40	16	N/A	N/A
3.45	39.8	128.1	39.8	1.0	-1.3	2.5	5	silty SAND to sandy SILT	120	4.0	10	16	52	44	-	-	23	2.32	16	N/A	N/A
3.61	47.6	136.0	47.5	1.1	-1.3	2.3	5	silty SAND to sandy SILT	120	4.0	12	19	58	45	-	-	21	2.24	16	N/A	N/A
3.77	54.3	144.7	54.3	1.2	-1.3	2.3	5	silty SAND to sandy SILT	120	4.0	14	22	62	45	-	-	19	2.20	16	N/A	N/A
3.94	57.4	145.3	57.3	1.2	-1.4	2.1	5	silty SAND to sandy SILT	120	4.0	14	23	64	45	-	-	18	2.16	16	N/A	N/A
4.10	58.8	146.8	58.8	1.2	-1.4	2.1	5	silty SAND to sandy SILT	120	4.0	15	24	65	45	-	-	17	2.15	16	N/A	N/A
4.27	58.2	145.4	58.2	1.2	-1.3	2.1	5	silty SAND to sandy SILT	120	4.0	15	23	65	45	-	-	17	2.15	16	N/A	N/A
4.43	57.7	143.6	57.6	1.2	-1.3	2.1	5	silty SAND to sandy SILT	120	4.0	14	23	64	45	-	-	17	2.15	16	N/A	N/A
4.59	56.4	141.4	56.4	1.2	-1.3	2.1	5	silty SAND to sandy SILT	120	4.0	14	23	64	44	-	-	18	2.15	16	N/A	N/A
4.76	55.1	138.6	55.1	1.1	-1.3	2.0	5	silty SAND to sandy SILT	120	4.0	14	22	63	44	-	-	18	2.16	16	N/A	N/A
4.92	55.5	125.8	55.5	0.9	-1.3	1.6	5	silty SAND to sandy SILT	120	4.0	14	22	63	44	-	-	15	2.08	16	N/A	N/A
5.09	57.7	135.1	57.6	1.0	-1.3	1.8	5	silty SAND to sandy SILT	120	4.0	14	23	64	44	-	-	16	2.10	16	N/A	N/A
5.25	62.5	143.6	62.5	1.1	-1.3	1.8	5	silty SAND to sandy SILT	120	4.0	16	25	67	44	-	-	15	2.09	16	N/A	N/A
5.41	64.4	153.1	64.4	1.3	-1.3	2.0	5	silty SAND to sandy SILT	120	4.0	16	26	68	44	-	-	16	2.11	16	N/A	N/A
5.58	69.4	158.1	69.4	1.4	-1.3	2.0	5	silty SAND to sandy SILT	120	4.0	17	28	71	44	-	-	15	2.08	16	N/A	N/A
5.74	55.8	156.1	55.8	1.4	-1.3	2.6	5	silty SAND to sandy SILT	120	4.0	14	22	63	43	-	-	20	2.23	16	N/A	N/A
5.91	45.0	154.0	45.0	1.4	-1.2	3.1	5	silty SAND to sandy SILT	120	4.0	11	18	56	42	-	-	25	2.35	16	N/A	N/A
6.07	40.8	168.8	40.8	1.6	-1.2	4.0	4	clayy SILT to silty CLAY	115	2.0	20	33	-	-	2.9	9.9	29	2.46	15	N/A	N/A
6.23	53.4	171.5	53.4	1.7	-1.2	3.2	5	silty SAND to sandy SILT	120	4.0	13	21	62	42	-	-	23	2.32	16	N/A	N/A
6.40	63.4	188.6	63.4	2.1	-1.2	3.3	5	silty SAND to sandy SILT	120	4.0	16	25	67	43	-	-	22	2.28	16	N/A	N/A
6.56	77.1	198.8	77.1	2.3	-1.3	3.0	5	silty SAND to sandy SILT	120	4.0	19	30	73	44	-	-	19	2.19	16	N/A	N/A
6.73	78.0	203.5	78.0	2.4	-1.3	3.1	5	silty SAND to sandy SILT	120	4.0	20	30	73	44	-	-	19	2.21	16	N/A	N/A
6.89	79.4	203.3	79.4	2.5	-1.4	3.1	5	silty SAND to sandy SILT	120	4.0	20	30	73	44	-	-	19	2.21	16	N/A	N/A
7.05	81.5	206.4	81.5	2.6	-1.4	3.2	5	silty SAND to sandy SILT	120	4.0	20	31	74	44	-	-	19	2.21	16	N/A	N/A
7.22	87.0	212.8	87.0	2.7	-1.4	3.1	5	silty SAND to sandy SILT	120	4.0	22	32	75	44	-	-	19	2.19	16	N/A	N/A
7.38	86.8	210.8	86.8	2.7	-1.4	3.1	5	silty SAND to sandy SILT	120	4.0	22	32	75	44	-	-	19	2.19	16	N/A	N/A
7.55	84.2	207.3	84.2	2.7	-1.3	3.2	5	silty SAND to sandy SILT	120	4.0	21	31	74	44	-	-	19	2.21	16	N/A	N/A
7.71	84.1	204.3	84.1	2.6	-1.3	3.1	5	silty SAND to sandy SILT	120	4.0	21	30	73	44	-	-	19	2.21	16	N/A	N/A
7.87	77.5	195.0	77.5	2.5	-1.3	3.2	5	silty SAND to sandy SILT	120	4.0	19	28	70	43	-	-	20	2.24	16	N/A	N/A
8.04	73.9	189.8	73.9	2.4	-1.3	3.2	5	silty SAND to sandy SILT	120	4.0	18	26	68	43	-	-	21	2.26	16	N/A	N/A
8.20	72.1	195.4	72.0	2.5	-1.3	3.5	5	silty SAND to sandy SILT	120	4.0	18	25	67	43	-	-	23	2.30	16	N/A	N/A
8.37	67.0	179.7	67.0	2.2	-1.3	3.3	5	silty SAND to sandy SILT	120	4.0	17	23	64	42	-	-	22	2.30	16	N/A	N/A
8.53	53.3	175.4	53.3	2.1	-1.3	3.9	4	clayy SILT to silty CLAY	115	2.0	27	36	-	-	3.7	9.9	27	2.42	15	N/A	N/A
8.69	47.9	167.6	47.8	1.9	-1.5	4.0	4	clayy SILT to silty CLAY	115	2.0	24	32	-	-	3.3	9.9	29	2.46	15	N/A	N/A
8.86	49.0	159.5	49.0	1.7	-1.5	3.6	4	clayy SILT to silty CLAY	115	2.0	25	33	-	-	3.4	9.9	28	2.43	15	N/A	N/A
9.02	60.6	162.5	60.6	1.9	-1.6	3.1	5	silty SAND to sandy SILT	120	4.0	15	20	60	41	-	-	23	2.32	16	N/A	N/A
9.19	66.6	167.4	66.6	2.0	-1.6	3.0	5	silty SAND to sandy SILT	120	4.0	17	22	63	42	-	-	22	2.29	16	N/A	N/A
9.35	64.7	165.4	64.7	2.0	-1.6	3.1	5	silty SAND to sandy SILT	120	4.0	16	21	61	41	-	-	23	2.30	16	N/A	N/A
9.51	61.5	160.7	61.5	1.9	-1.6	3.1	5	silty SAND to sandy SILT	120	4.0	15	20	59	41	-	-	23	2.32	16	N/A	N/A
9.68	60.9	156.7	60.8	1.8	-1.6	3.0	5	silty SAND to sandy SILT	120	4.0	15	20	59	41	-	-	23	2.32	16	N/A	N/A
9.84	60.1	154.8	60.1	1.8	-1.6	3.0	5	silty SAND to sandy SILT	120	4.0	15	19	58	41	-	-	23	2.32	16	N/A	N/A
10.01	59.0	150.1	59.0	1.7	-1.6	2.9	5	silty SAND to sandy SILT	120	4.0	15	19	57	40	-	-	23	2.32	16	N/A	N/A
10.17	60.4	148.4	60.3	1.7	-1.6	2.8	5	silty SAND to sandy SILT	120	4.0	15	19	58	41	-	-	23	2.31	16	N/A	N/A
10.34	62.1	147.6	62.1	1.7	-1.6	2.7	5	silty SAND to sandy SILT	120	4.0	16	19	58	41	-	-	22	2.29	16	N/A	N/A
10.50	63.5	148.6	63.5	1.7	-1.6	2.7	5	silty SAND to sandy SILT	120	4.0	16	20	59	41	-	-	22	2.28	16	N/A	N/A
10.66	66.7	150.4	66.6	1.7	-1.6	2.6	5	silty SAND to sandy SILT	120	4.0	17	20	60	41	-	-	21	2.27	16	N/A	N/A
10.83	68.5	150.3	68.5	1.8	-1.6	2.6	5	silty SAND to sandy SILT	120	4.0	17	21	61	41	-	-	21	2.25	16	N/A	N/A
10.99	69.0	149.6	68.9	1.7	-1.6	2.6	5	silty SAND to sandy SILT	120	4.0	17	21	61	41	-	-	21	2.25	16	N/A	N/A
11.16	70.7	148.9	70.6	1.7	-1.6	2.5	5	silty SAND to sandy SILT	120	4.0	18	21	61	41	-	-	20	2.24	16	N/A	N/A
11.32	73.0	149.8	73.0	1.8	-1.6	2.5	5	silty SAND to sandy SILT	120	4.0	18	22	62	41	-	-	20	2.23	16	N/A	N/A
11.48	75.4	148.1	75.3	1.7	-1.6	2.3	5	silty SAND to sandy SILT	120	4.0	19	22	63	41	-	-	19	2.20	16	N/A	N/A
11.65	77.4	147.1	77.4	1.7	-1.6	2.2	5	silty SAND to sandy SILT	120	4.0	19	23	64	41	-	-	18	2.18	16	N/A	N/A
11.81	78.9	139.9	78.8	1.5	-1.6	2.0	5	silty SAND to sandy SILT	120	4.0	20	23	64	41	-	-	17	2.14	16	N/A	N/A
11.98	80.7	142.9	80.7	1.6	-1.6	2.0	5	silty SAND to sandy SILT	120	4.0	20	23	65	41	-	-	17	2.14	16	N/A	N/A
12.14	82.0	144.8	82.0	1.7	-1.5	2.1	5	silty SAND to sandy SILT	120	4.0	21	23	65	41	-	-	17	2.15	16	N/A	N/A
12.30	85.9	150.8	85.8	1.8	-1.6	2.1	5	silty SAND to sandy SILT	120	4.0	21	24	66	41	-	-	17	2.15	16	N/A	N/A
12.47	92.3	157.3	92.3	2.0	-1.6	2.2	5	silty SAND to sandy SILT	120	4.0	23	26	68	42	-	-	17	2.13	16	N/A	N/A
12.63	97.8	163.4	97.8	2.1	-1.6	2.2	5	silty SAND to sandy SILT	120	4.0	24	27	70	42	-	-	16	2.12	16	N/A	N/A
12.80	102.2	168.8	102.2	2.3	-1.6	2.2	5	silty SAND to sandy SILT	120	4.0	26	28	71	42	-	-	16	2.12	16	N/A	N/A
12.96	105.2	174.9	105.1	2.5	-1.6	2.4	5	silty SAND to sandy SILT	120	4.0	26	29	72	42	-	-	17	2.13	16	N/A	N/A
13.12	104.1	177.9	104.0	2.6	-1.6	2.5	5	silty SAND to sandy SILT	120	4.0	26	29	71	42	-	-	17	2.15	16	N/A	N/A
13.29	96.2	173.4	96.2	2.5	-1.5	2.7	5	silty SAND to sandy SILT	120	4.0	24	26	69	42	-	-	19	2.19	16	N/A	N/A
13.45	81.5	161.7	81.4	2.3	-1.5	2.8	5	silty SAND to sandy SILT	120	4.0	20	22	63	41	-	-	21	2.26	16	N/A	N/A
13.62	65.9	149.1	65.9	1.9	-1.4	2.9	5	silty SAND to sandy SILT	120	4.0	16	18	56	39	-	-	24	2.34	16	N/A	N/A
13.78	53.6	144.2	53.6	1.8	-1.4	3.3	4	clayy SILT to silty CLAY	115	2.0	27	29	-	-	3.7	9.9	28	2.45	15	N/A	N/A
13.94	45.1	148.3	45.1	1.8	-1.4	4.0	4	clayy SILT to silty CLAY	115	2.0	23	24	-	-	3.1	9.9	33	2.56	15	N/A	N/A
14.11	39.1	-	39.1	1.7	-1.5	4.4	4	clayy SILT to silty CLAY	115	2.0	20	22	-	-	2.7	9.9	36	2.62	15	N/A	N/A
14.27	37.9	137.4	37.8	1.4	-1.7	3.9	4	clayy SILT to silty CLAY	115	2.0	19	21	-	-	2.6	9.9	35	2.59	15	N/A	N/A
14.44	36.9	132.2	36.8	1.3	-2.0	3.7	4	clayy SILT to silty CLAY	115	2.0	18	20	-	-	2.5	9.9	35	2.59	15	N/A	N/A
14.60	34.4	-	34.4	1.3	-3.1	3.9	4	clayy SILT to silty CLAY	115	2.0	17	20	-	-	2.4	9.9	36	2.61	15	N/A	N/A
14.76	30.9	-	30.9	1.3	-2.4	4.2	4	clayy SILT to silty CLAY	115	2.0	15	18	-	-	2.1	9.9	39	2.67	15	N/A	N/A
14.93	30.6	-	30.5	1.0	-1.8	3.5	4	clayy SILT to silty CLAY	115	2.0	15	17	-	-	2.1	9.9	37	2.62	15	N/A	N/A
15.09	31.0	-	30.9	1.2	-1.9	4.0	4	clayy SILT to silty CLAY	115	2.0	15	17	-	-	2.1	9.9	39	2.66	15	N/A	N/A
15.26	31.8	-	31.7	1.2	-1.9	4.0	4	clayy SILT to silty CLAY	115	2.0	16	18	-	-	2.2	9.9	38	2.66	15	N/A	N/A
15.42	31.7	-	31.6	1.3	-2.1	4.2	4	clayy SILT to silty CLAY	115	2.0	16	17	-	-	2.2	9.9	39	2.68	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Heider Inspections
Data File: SDF(350).cpt
CPT Date: 11/2/2015 12:53:31 PM
GW During Test: 46 ft

Sounding ID: CPT-02
Project No: 150249
Cone/Rig: DDG1333

. Depth ft	. qc PS tsf	. q1ncs PS -	* qt PS tsf	. Slv Stss tsf	. pore prss (psi)	. Frct Rato %	* Mat Typ Zon	* Material Behavior Description	. Unit Wght pcf	. Qc to N	. SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	. Und Shr tsf	. OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
15.58	32.2	-	32.1	1.3	-1.8	4.2	4	clayy SILT to silty CLAY	115	2.0	16	17	-	-	2.2	9.9	39	2.68	15	N/A	N/A
15.75	35.0	-	35.0	1.4	-1.8	4.0	4	clayy SILT to silty CLAY	115	2.0	18	19	-	-	2.4	9.9	37	2.64	15	N/A	N/A
16.08	34.7	-	34.6	1.3	-2.1	4.0	4	clayy SILT to silty CLAY	115	2.0	17	18	-	-	2.4	9.9	38	2.64	15	N/A	N/A
16.24	24.0	-	24.0	1.0	-3.4	4.3	3	silty CLAY to CLAY	115	1.5	16	17	-	-	1.6	7.9	46	2.79	15	N/A	N/A
16.57	24.4	-	24.3	1.0	-3.3	4.2	3	silty CLAY to CLAY	115	1.5	16	17	-	-	1.7	7.9	45	2.79	15	N/A	N/A
16.73	24.2	-	24.1	1.0	-2.5	4.4	3	silty CLAY to CLAY	115	1.5	16	16	-	-	1.6	7.7	47	2.81	15	N/A	N/A
16.90	24.5	-	24.5	1.1	-2.5	4.6	3	silty CLAY to CLAY	115	1.5	16	16	-	-	1.7	7.8	47	2.82	15	N/A	N/A
17.06	31.5	-	31.5	1.2	-2.4	3.8	4	clayy SILT to silty CLAY	115	2.0	16	16	-	-	2.2	9.9	39	2.68	15	N/A	N/A
17.23	41.8	122.6	41.7	1.3	-2.9	3.2	4	clayy SILT to silty CLAY	115	2.0	21	20	-	-	2.9	9.9	33	2.55	15	N/A	N/A
17.39	50.4	128.9	50.4	1.5	-2.6	3.1	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	30	2.48	15	N/A	N/A
17.55	59.3	136.7	59.3	1.8	-1.1	3.0	4	clayy SILT to silty CLAY	115	2.0	30	28	-	-	4.1	9.9	27	2.42	15	N/A	N/A
17.72	65.0	145.1	65.0	2.0	-1.0	3.2	4	clayy SILT to silty CLAY	115	2.0	32	31	-	-	4.5	9.9	27	2.41	15	N/A	N/A
17.88	68.1	150.6	68.1	2.2	-1.0	3.3	4	clayy SILT to silty CLAY	115	2.0	34	32	-	-	4.7	9.9	27	2.41	15	N/A	N/A
18.05	63.0	144.8	63.0	2.0	-1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	31	30	-	-	4.4	9.9	28	2.43	15	N/A	N/A
18.21	45.0	-	45.0	1.9	-1.4	4.3	4	clayy SILT to silty CLAY	115	2.0	23	21	-	-	3.1	9.9	36	2.62	15	N/A	N/A
18.37	26.8	-	26.8	1.4	-1.1	5.5	3	silty CLAY to CLAY	115	1.5	18	16	-	-	1.8	7.8	50	2.87	15	N/A	N/A
18.54	20.3	-	20.3	1.0	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.4	5.8	55	2.95	15	N/A	N/A
18.70	17.9	-	17.9	0.7	-0.6	4.4	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	5.0	55	2.95	15	N/A	N/A
18.87	16.2	-	16.1	0.7	-1.4	4.6	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.1	4.5	59	3.00	15	N/A	N/A
19.03	16.9	-	16.9	0.7	-1.3	4.2	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.1	4.7	56	2.97	15	N/A	N/A
19.19	18.7	-	18.7	0.7	-1.2	4.1	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	5.1	54	2.92	15	N/A	N/A
19.36	20.7	-	20.7	0.9	-1.2	4.4	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.4	5.7	52	2.91	15	N/A	N/A
19.52	23.3	-	23.2	1.0	-1.1	4.6	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	6.3	51	2.89	15	N/A	N/A
19.69	28.1	-	28.1	1.3	-1.1	4.8	3	silty CLAY to CLAY	115	1.5	19	16	-	-	1.9	7.7	48	2.83	15	N/A	N/A
19.85	31.7	-	31.7	1.5	-1.0	5.0	3	silty CLAY to CLAY	115	1.5	21	18	-	-	2.2	8.6	47	2.81	15	N/A	N/A
20.01	33.0	-	33.0	1.6	-1.0	5.1	3	silty CLAY to CLAY	115	1.5	22	19	-	-	2.2	8.9	46	2.81	15	N/A	N/A
20.18	31.6	-	31.6	1.6	-1.3	5.4	3	silty CLAY to CLAY	115	1.5	21	18	-	-	2.1	8.4	48	2.84	15	N/A	N/A
20.34	30.6	-	30.6	1.6	-1.0	5.5	3	silty CLAY to CLAY	115	1.5	20	17	-	-	2.1	8.1	49	2.86	15	N/A	N/A
20.51	32.6	-	32.6	1.6	0.0	5.1	3	silty CLAY to CLAY	115	1.5	22	18	-	-	2.2	8.6	47	2.82	15	N/A	N/A
20.67	32.6	-	32.6	1.7	0.3	5.3	3	silty CLAY to CLAY	115	1.5	22	18	-	-	2.2	8.5	48	2.83	15	N/A	N/A
20.83	31.2	-	31.2	1.6	0.6	5.3	3	silty CLAY to CLAY	115	1.5	21	17	-	-	2.1	8.1	49	2.85	15	N/A	N/A
21.00	29.6	-	29.6	1.5	1.0	5.4	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	7.6	51	2.88	15	N/A	N/A
21.16	27.9	-	27.9	1.6	0.5	5.8	3	silty CLAY to CLAY	115	1.5	19	15	-	-	1.9	7.1	53	2.92	15	N/A	N/A
21.33	31.8	-	31.8	1.7	1.0	5.7	3	silty CLAY to CLAY	115	1.5	21	17	-	-	2.2	8.0	50	2.87	15	N/A	N/A
21.49	37.8	-	37.8	2.0	0.6	5.4	3	silty CLAY to CLAY	115	1.5	25	20	-	-	2.6	9.5	46	2.80	15	N/A	N/A
21.65	39.7	-	39.7	2.1	0.2	5.5	3	silty CLAY to CLAY	115	1.5	26	21	-	-	2.7	9.9	46	2.79	15	N/A	N/A
21.82	34.5	-	34.5	2.0	0.1	5.9	3	silty CLAY to CLAY	115	1.5	23	18	-	-	2.4	8.6	50	2.86	15	N/A	N/A
21.98	45.3	-	45.3	2.0	0.4	4.6	3	silty CLAY to CLAY	115	1.5	30	23	-	-	3.1	9.9	41	2.70	15	N/A	N/A
22.15	69.8	146.6	69.8	2.3	-1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	35	30	-	-	4.8	9.9	28	2.44	15	N/A	N/A
22.31	86.3	151.2	86.3	2.5	-0.4	2.9	5	silty SAND to sandy SILT	120	4.0	22	18	57	38	-	-	24	2.33	16	N/A	N/A
22.47	95.7	159.5	95.7	2.8	-0.4	3.0	5	silty SAND to sandy SILT	120	4.0	24	20	60	39	-	-	23	2.31	16	N/A	N/A
22.64	101.5	166.5	101.5	3.1	-0.4	3.1	5	silty SAND to sandy SILT	120	4.0	25	21	62	39	-	-	23	2.30	16	N/A	N/A
22.80	104.8	171.2	104.8	3.2	-0.4	3.1	5	silty SAND to sandy SILT	120	4.0	26	22	63	39	-	-	23	2.30	16	N/A	N/A
22.97	107.6	175.4	107.6	3.4	-0.4	3.2	5	silty SAND to sandy SILT	120	4.0	27	22	64	39	-	-	23	2.30	16	N/A	N/A
23.13	110.7	176.8	110.7	3.5	-0.5	3.2	5	silty SAND to sandy SILT	120	4.0	28	23	64	39	-	-	22	2.29	16	N/A	N/A
23.30	102.3	171.9	102.3	3.3	-0.4	3.3	5	silty SAND to sandy SILT	120	4.0	26	21	62	39	-	-	23	2.32	16	N/A	N/A
23.46	82.2	163.1	82.2	2.9	-0.3	3.6	4	clayy SILT to silty CLAY	115	2.0	41	34	-	-	5.7	9.9	27	2.42	15	N/A	N/A
23.62	51.9	-	51.9	2.4	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	35	25	-	-	3.6	9.9	40	2.69	15	N/A	N/A
23.79	26.9	-	26.9	1.4	0.0	5.6	3	silty CLAY to CLAY	115	1.5	18	13	-	-	1.8	6.0	56	2.96	15	N/A	N/A
23.95	17.8	-	17.8	0.7	0.1	4.5	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	3.8	62	3.04	15	N/A	N/A
24.12	16.5	-	16.5	0.5	0.6	3.5	3	silty CLAY to CLAY	115	1.5	11	8	-	-	1.1	3.5	60	3.02	15	N/A	N/A
24.28	22.4	-	22.5	1.0	1.1	4.6	3	silty CLAY to CLAY	115	1.5	15	10	-	-	1.5	4.9	57	2.98	15	N/A	N/A
24.44	45.2	-	45.2	1.6	2.8	3.6	4	clayy SILT to silty CLAY	115	2.0	23	16	-	-	3.1	9.9	39	2.66	15	N/A	N/A
24.61	43.7	-	43.8	1.7	2.4	3.9	4	clayy SILT to silty CLAY	115	2.0	22	15	-	-	3.0	9.7	41	2.70	15	N/A	N/A
24.77	27.8	-	27.8	1.4	1.3	5.5	3	silty CLAY to CLAY	115	1.5	19	13	-	-	1.9	6.0	56	2.96	15	N/A	N/A
24.94	20.3	-	20.3	0.9	2.1	5.0	3	silty CLAY to CLAY	115	1.5	14	9	-	-	1.3	4.2	61	3.04	15	N/A	N/A
25.10	17.3	-	17.3	0.8	2.5	5.2	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.1	3.5	67	3.12	15	N/A	N/A
25.26	21.9	-	21.9	1.1	2.6	5.2	3	silty CLAY to CLAY	115	1.5	15	10	-	-	1.4	4.5	60	3.03	15	N/A	N/A
25.43	39.6	-	39.7	1.4	2.5	3.8	4	clayy SILT to silty CLAY	115	2.0	20	13	-	-	2.7	8.4	42	2.73	15	N/A	N/A
25.59	58.0	129.3	58.0	1.8	0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	29	23	-	-	4.0	9.9	31	2.51	15	N/A	N/A
25.76	56.6	-	56.5	2.0	-0.8	3.6	4	clayy SILT to silty CLAY	115	2.0	28	19	-	-	3.9	9.9	36	2.61	15	N/A	N/A
25.92	33.4	-	33.4	1.6	0.1	4.9	3	silty CLAY to CLAY	115	1.5	22	15	-	-	2.2	6.9	50	2.87	15	N/A	N/A
26.08	21.4	-	21.4	1.0	0.3	4.9	3	silty CLAY to CLAY	115	1.5	14	9	-	-	1.4	4.3	61	3.04	15	N/A	N/A
26.25	19.6	-	19.6	0.7	0.5	3.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	3.9	59	3.01	15	N/A	N/A
26.41	15.0	-	15.0	0.6	0.4	4.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.9	67	3.13	15	N/A	N/A
26.58	13.0	-	13.0	0.5	0.8	4.0	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.8	2.4	72	3.18	15	N/A	N/A
26.74	15.1	-	15.1	0.7	0.8	5.5	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.8	73	3.20	15	N/A	N/A
26.90	36.1	-	36.1	1.4	0.7	4.0	3	silty CLAY to CLAY	115	1.5	24	15	-	-	2.4	7.2	46	2.80	15	N/A	N/A
27.07	84.4	137.0	84.3	2.2	-0.5	2.7	5	silty SAND to sandy SILT	120	4.0	21	16	53	37	-	-	24	2.35	16	N/A	N/A
27.23	97.7	151.8	97.7	2.8	-0.6	2.9	5	silty SAND to sandy SILT	120	4.0	24	19	58	38	-	-	23	2.32	16	N/A	N/A
27.40	100.0	160.6	100.0	3.1	-0.6	3.2	5	silty SAND to sandy SILT	120	4.0	25	19	58	38	-	-	24	2.34	16	N/A	N/A
27.56	95.2	158.9	95.2	3.0	-0.5	3.2	5	silty SAND to sandy SILT	120	4.0	24	18	57	38	-	-	25	2.37	16	N/A	N/A
27.72	91.3	154.8	91.3	2.9	-0.5	3.2	4	clayy SILT to silty CLAY	115	2.0	46	35	-	-	6.3	9.9	26	2.38	15	N/A	N/A
27.89	100.4	151.4	100.4	2.8	-0.5	2.8	5	silty SAND to sandy SILT	120	4.0	25	19	58	38	-	-	23	2.31	16	N/A	N/A
28.05	92.2	155.1	92.2	2.9	-0.4	3.2	4	clayy SILT to silty CLAY	115	2.0	46	35	-	-	6.4	9.9	26	2.38	15	N/A	N/A
28.22	64.6	-	64.6	2.5	-0.3	4.0	4	clayy SILT to silty CLAY	115	2.0	32	20	-	-	4.4	9.9	36	2.62	15	N/A	N/A
28.38	46.8	-	46.8	2.1	-0.3	4.6	3	silty CLAY to CLAY	115	1.5	31	19	-	-	3.2	8.9	45	2.78	15	N/A	N/A
28.54	55.4	-	55.3	2.3	-0.9	4.3	4	clayy SILT to silty CLAY	115	2.0	28	17	-	-	3.8	9.9	41	2.70	15	N/A	N/A
28.71	55.7	-	55.7	2.1	-1.2	3.8	4	clayy SILT to silty CLAY	115	2.0	28	17	-	-	3.8	9.9	39	2.66	15	N/A	N/A
28.87	65.4	126.2	65.4	1.9	-0.6	2.9	4	clayy SILT to silty CLAY	115	2.0	33	24	-	-	4.5	9.9	29	2.46	15	N/A	N/A
29.04	65.5	124.6	65.5	1.8	-0.2	2.9	4	clayy SILT to silty CLAY	115	2.0	33	24	-	-	4.5	9.9	29	2.46	15	N/A	N/A
29.20	43.4	-	43.4	1.7	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	29	17	-	-	2.9	8.0	45	2.78	15	N/A	N/A
29.36	21.2	-	21.2	1.1	-0.1	5.8	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	3.7	67	3.13	15	N/A	N/A
29.53	15.9	-	15.9	0.7	0.0	5.0	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.7	73	3.20	15	N/A	N/A
29.69	15.8	-	15.8	0.6	0.3	4.0	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.7	69	3.15	15	N/A	N/A
29.86	16.0	-	16.0	0.6	0.4	4.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.7	70	3.16	15	N/A	N/A
30.02	19.0	-	19.0	0.7	-0.1	4.3	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.2	3.2	65	3.09	15	N/A	N/A
30.19	18.0	-	18.0	0.9	-0.8	5.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.1	3.0	71	3.17	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

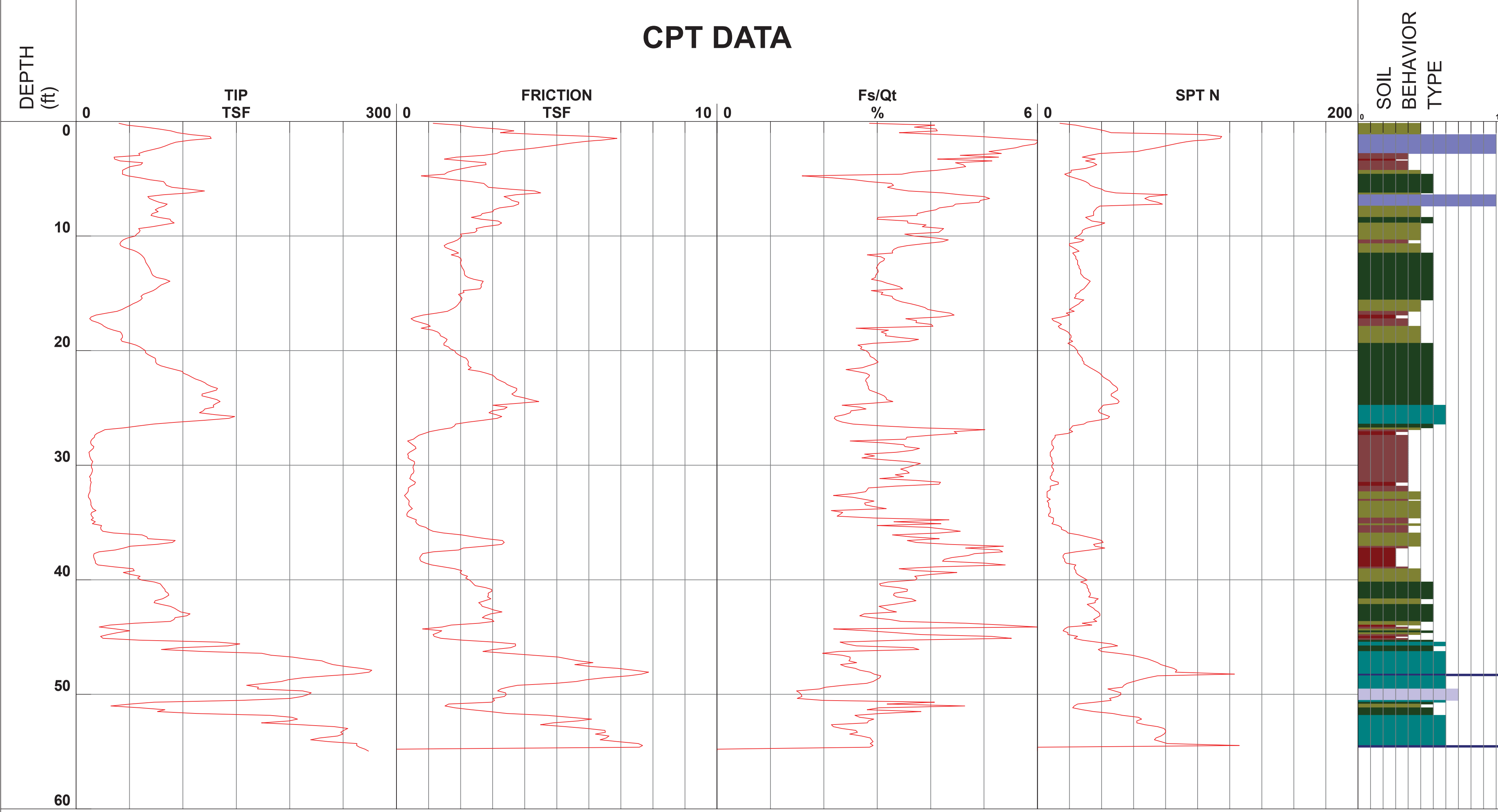
Middle Earth Geo Testing

Heider Inspections

ProjecInstructional Bldg I El Camino College Comptor		Operator	RC-DG	Filename	SDF(351).cpt
Job Number	150249	Cone Number	DDG1333	GPS	
Hole Number	CPT-03	Date and Time	11/2/2015 1:33:51 PM	Maximum Depth	54.95 ft
EST GW Depth During Test		46.40 ft			

Net Area Ratio .8

CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

Cone Size 10cm squared

S*Soil behavior type and SPT based on data from UBC-1983

Instructional Bldg I El Camino College Compton Center

Project ID: Heider Inspections
Data File: SDF(351).cpt
CPT Date: 11/2/2015 1:33:51 PM
GW During Test: 46 ft

Sounding ID: CPT-03
Project No: 150249
Cone/Rig: DDG1333

Depth ft	qc PS tsf	q1ncs PS -	* qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
0.33	47.6	183.9	47.6	1.9	-0.3	4.1	4	clayy SILT to silty CLAY	115	2.0	24	38	-	-	3.4	9.9	27	2.42	15	N/A	N/A
0.49	64.6	203.5	64.6	2.4	-0.4	3.7	5	silty SAND to sandy SILT	120	4.0	16	26	68	48	-	-	23	2.31	16	N/A	N/A
0.66	77.9	239.7	77.9	3.2	-0.4	4.1	9	very stiff fine SOIL	120	2.0	39	62	74	48	-	-	22	2.29	30	N/A	N/A
0.82	88.7	259.7	88.7	3.7	-0.5	4.1	9	very stiff fine SOIL	120	2.0	44	71	79	48	-	-	21	2.26	30	N/A	N/A
0.98	94.9	244.9	94.9	3.2	-0.5	3.4	8	stiff SAND to clayy SAND	115	1.0	95	100	-	-	6.3	9.9	18	2.18	16	N/A	N/A
1.15	107.6	297.2	107.6	4.6	-0.6	4.2	9	very stiff fine SOIL	120	2.0	54	86	85	48	-	-	20	2.22	30	N/A	N/A
1.31	125.3	355.7	125.2	6.2	-0.7	4.9	9	very stiff fine SOIL	120	2.0	63	100	90	48	-	-	20	2.24	30	N/A	N/A
1.48	126.5	379.9	126.4	6.9	-0.9	5.4	9	very stiff fine SOIL	120	2.0	63	100	90	48	-	-	22	2.28	30	N/A	N/A
1.64	106.5	362.3	106.4	6.4	-0.9	6.0	9	very stiff fine SOIL	120	2.0	53	85	85	48	-	-	24	2.35	30	N/A	N/A
1.80	93.4	338.5	93.4	5.7	-0.8	6.1	9	very stiff fine SOIL	120	2.0	47	75	80	48	-	-	26	2.39	30	N/A	N/A
1.97	88.1	322.8	88.1	5.3	-0.8	6.0	9	very stiff fine SOIL	120	2.0	44	71	78	48	-	-	26	2.39	30	N/A	N/A
2.13	83.6	305.2	83.5	4.8	-0.8	5.7	9	very stiff fine SOIL	120	2.0	42	67	77	48	-	-	26	2.39	30	N/A	N/A
2.30	78.6	290.8	78.6	4.4	-0.9	5.6	9	very stiff fine SOIL	120	2.0	39	63	75	48	-	-	26	2.40	30	N/A	N/A
2.46	71.6	268.8	71.6	3.8	-0.9	5.4	9	very stiff fine SOIL	120	2.0	36	57	72	48	-	-	27	2.41	30	N/A	N/A
2.62	63.8	244.9	63.8	3.3	-0.9	5.1	9	very stiff fine SOIL	120	2.0	32	51	68	47	-	-	27	2.42	30	N/A	N/A
2.79	58.7	240.9	58.7	3.1	-1.0	5.3	9	very stiff fine SOIL	120	2.0	29	47	65	47	-	-	29	2.46	30	N/A	N/A
2.95	59.8	221.0	59.7	2.7	-1.0	4.6	9	very stiff fine SOIL	120	2.0	30	48	66	46	-	-	26	2.40	30	N/A	N/A
3.12	35.6	187.4	35.6	1.9	-1.2	5.3	4	clayy SILT to silty CLAY	115	2.0	18	29	-	-	2.5	9.9	35	2.59	15	N/A	N/A
3.28	36.1	163.4	36.1	1.5	-1.1	4.2	4	clayy SILT to silty CLAY	115	2.0	18	29	-	-	2.5	9.9	31	2.51	15	N/A	N/A
3.45	41.2	198.0	41.1	2.1	-1.2	5.2	4	clayy SILT to silty CLAY	115	2.0	21	33	-	-	2.9	9.9	33	2.54	15	N/A	N/A
3.61	62.3	223.4	62.2	2.8	-1.3	4.5	9	very stiff fine SOIL	120	2.0	31	50	67	46	-	-	26	2.38	30	N/A	N/A
3.77	60.7	224.6	60.7	2.8	-1.3	4.6	9	very stiff fine SOIL	120	2.0	30	49	66	45	-	-	26	2.40	30	N/A	N/A
3.94	50.7	206.2	50.6	2.4	-1.3	4.7	4	clayy SILT to silty CLAY	115	2.0	25	41	-	-	3.6	9.9	29	2.45	15	N/A	N/A
4.10	46.8	192.4	46.8	2.1	-1.3	4.4	4	clayy SILT to silty CLAY	115	2.0	23	38	-	-	3.3	9.9	29	2.46	15	N/A	N/A
4.27	43.5	178.1	43.4	1.8	-1.4	4.1	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.1	9.9	29	2.46	15	N/A	N/A
4.43	43.6	166.4	43.6	1.6	-1.4	3.7	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.1	9.9	27	2.42	15	N/A	N/A
4.59	43.4	161.0	43.4	1.5	-1.4	3.5	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.0	9.9	26	2.40	15	N/A	N/A
4.76	48.6	117.5	48.5	0.8	-1.5	1.6	5	silty SAND to sandy SILT	120	4.0	12	19	59	43	-	-	17	2.13	16	N/A	N/A
4.92	59.9	150.0	59.9	1.3	-1.6	2.2	5	silty SAND to sandy SILT	120	4.0	15	24	66	44	-	-	17	2.15	16	N/A	N/A
5.09	69.2	176.7	69.2	1.8	-1.8	2.6	5	silty SAND to sandy SILT	120	4.0	17	28	70	45	-	-	18	2.17	16	N/A	N/A
5.25	81.8	204.9	81.8	2.3	-1.8	2.9	5	silty SAND to sandy SILT	120	4.0	20	33	76	45	-	-	17	2.15	16	N/A	N/A
5.41	83.4	221.7	83.4	2.7	-1.8	3.3	5	silty SAND to sandy SILT	120	4.0	21	33	77	45	-	-	19	2.20	16	N/A	N/A
5.58	84.6	225.0	84.5	2.8	-1.8	3.3	5	silty SAND to sandy SILT	120	4.0	21	34	77	45	-	-	19	2.20	16	N/A	N/A
5.74	89.8	229.5	89.8	2.9	-1.9	3.2	5	silty SAND to sandy SILT	120	4.0	22	36	79	45	-	-	18	2.17	16	N/A	N/A
5.91	105.5	260.5	105.4	3.5	-1.9	3.4	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.0	9.9	17	2.14	16	N/A	N/A
6.07	120.2	293.6	120.2	4.3	-2.0	3.6	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.9	9.9	17	2.14	16	N/A	N/A
6.23	106.2	294.8	106.1	4.5	-2.0	4.3	9	very stiff fine SOIL	120	2.0	53	85	85	46	-	-	20	2.23	30	N/A	N/A
6.40	81.8	260.8	81.8	3.7	-1.9	4.6	9	very stiff fine SOIL	120	2.0	41	65	75	44	-	-	23	2.32	30	N/A	N/A
6.56	67.1	245.9	67.1	3.4	-1.9	5.0	9	very stiff fine SOIL	120	2.0	34	52	69	43	-	-	27	2.41	30	N/A	N/A
6.73	68.8	250.8	68.8	3.5	-2.0	5.1	9	very stiff fine SOIL	120	2.0	34	53	69	43	-	-	27	2.41	30	N/A	N/A
6.89	73.1	251.8	73.1	3.6	-2.1	5.0	9	very stiff fine SOIL	120	2.0	37	56	71	44	-	-	26	2.39	30	N/A	N/A
7.05	77.7	257.9	77.7	3.8	-2.1	4.9	9	very stiff fine SOIL	120	2.0	39	58	72	44	-	-	25	2.37	30	N/A	N/A
7.22	85.3	255.0	85.2	3.8	-2.2	4.5	9	very stiff fine SOIL	120	2.0	43	63	75	44	-	-	23	2.32	30	N/A	N/A
7.38	82.5	247.2	82.4	3.6	-2.1	4.4	9	very stiff fine SOIL	120	2.0	41	61	73	44	-	-	24	2.33	30	N/A	N/A
7.55	77.2	228.8	77.2	3.2	-2.2	4.2	9	very stiff fine SOIL	120	2.0	39	56	71	43	-	-	24	2.33	30	N/A	N/A
7.71	74.1	220.4	74.1	3.0	-2.2	4.1	9	very stiff fine SOIL	120	2.0	37	53	69	43	-	-	24	2.34	30	N/A	N/A
7.87	76.9	217.5	76.8	3.0	-2.2	3.9	8	stiff SAND to clayy SAND	115	1.0	77	100	-	-	5.1	9.9	23	2.31	16	N/A	N/A
8.04	71.4	203.0	71.3	2.7	-2.2	3.8	5	silty SAND to sandy SILT	120	4.0	18	25	67	43	-	-	23	2.32	16	N/A	N/A
8.20	70.1	200.0	70.1	2.6	-2.3	3.8	5	silty SAND to sandy SILT	120	4.0	18	24	66	42	-	-	24	2.33	16	N/A	N/A
8.37	77.3	186.9	77.3	2.3	-2.4	3.0	5	silty SAND to sandy SILT	120	4.0	19	27	69	43	-	-	20	2.23	16	N/A	N/A
8.53	88.0	199.4	87.9	2.6	-2.4	3.0	5	silty SAND to sandy SILT	120	4.0	22	30	73	43	-	-	19	2.20	16	N/A	N/A
8.69	88.8	218.2	88.8	3.2	-2.6	3.6	5	silty SAND to sandy SILT	120	4.0	22	30	73	43	-	-	21	2.26	16	N/A	N/A
8.86	91.9	221.4	91.8	3.3	-2.6	3.6	5	silty SAND to sandy SILT	120	4.0	23	31	74	43	-	-	21	2.25	16	N/A	N/A
9.02	81.2	216.3	81.2	3.2	-2.6	3.9	8	stiff SAND to clayy SAND	115	1.0	81	100	-	-	5.3	9.9	23	2.32	16	N/A	N/A
9.19	71.3	198.8	71.2	2.7	-2.6	3.9	4	clayy SILT to silty CLAY	115	2.0	36	47	-	-	5.0	9.9	24	2.35	15	N/A	N/A
9.35	58.5	190.1	58.5	2.5	-2.5	4.3	4	clayy SILT to silty CLAY	115	2.0	29	38	-	-	4.1	9.9	28	2.44	15	N/A	N/A
9.51	59.9	190.3	59.9	2.5	-2.6	4.2	4	clayy SILT to silty CLAY	115	2.0	30	39	-	-	4.2	9.9	28	2.43	15	N/A	N/A
9.68	58.9	186.9	58.9	2.4	-2.6	4.2	4	clayy SILT to silty CLAY	115	2.0	29	38	-	-	4.1	9.9	28	2.44	15	N/A	N/A
9.84	56.7	166.0	56.6	2.0	-2.6	3.6	4	clayy SILT to silty CLAY	115	2.0	28	36	-	-	4.0	9.9	26	2.40	15	N/A	N/A
10.01	55.1	168.0	55.1	2.0	-2.6	3.7	4	clayy SILT to silty CLAY	115	2.0	28	35	-	-	3.9	9.9	27	2.42	15	N/A	N/A
10.17	48.0	167.1	47.9	2.0	-2.5	4.2	4	clayy SILT to silty CLAY	115	2.0	24	30	-	-	3.3	9.9	31	2.50	15	N/A	N/A
10.34	44.1	165.3	44.0	1.9	-2.5	4.4	4	clayy SILT to silty CLAY	115	2.0	22	27	-	-	3.1	9.9	33	2.55	15	N/A	N/A
10.50	42.1	159.2	42.0	1.8	-2.7	4.3	4	clayy SILT to silty CLAY	115	2.0	21	26	-	-	2.9	9.9	33	2.56	15	N/A	N/A
10.66	41.0	149.5	41.0	1.6	-2.8	3.9	4	clayy SILT to silty CLAY	115	2.0	21	25	-	-	2.9	9.9	32	2.54	15	N/A	N/A
10.83	41.7	143.1	41.6	1.5	-3.1	3.6	4	clayy SILT to silty CLAY	115	2.0	21	25	-	-	2.9	9.9	31	2.51	15	N/A	N/A
10.99	44.8	143.0	44.8	1.5	-2.7	3.4	4	clayy SILT to silty CLAY	115	2.0	22	27	-	-	3.1	9.9	30	2.47	15	N/A	N/A
11.16	50.2	147.8	50.1	1.7	-2.5	3.4	4	clayy SILT to silty CLAY	115	2.0	25	30	-	-	3.5	9.9	28	2.43	15	N/A	N/A
11.32	55.6	153.4	55.6	1.8	-2.5	3.3	4	clayy SILT to silty CLAY	115	2.0	28	33	-	-	3.9	9.9	26	2.40	15	N/A	N/A
11.48	58.8	157.2	58.7	1.9	-2.5	3.3	4	clayy SILT to silty CLAY	115	2.0	29	35	-	-	4.1	9.9	26	2.39	15	N/A	N/A
11.65	60.7	146.1	60.6	1.7	-2.5	2.8	5	silty SAND to sandy SILT	120	4.0	15	18	56	40	-	-	24	2.33	16	N/A	N/A
11.81	63.0	155.3	62.9	1.9	-2.5	3.1	5	silty SAND to sandy SILT	120	4.0	16	18	57	40	-	-	24	2.35	16	N/A	N/A
11.98	64.1	158.1	64.0	2.0	-2.3	3.2	5	silty SAND to sandy SILT	120	4.0	16	19	57	40	-	-	25	2.35	16	N/A	N/A
12.14	64.7	157.8	64.7	2.0	-2.2	3.2	5	silty SAND to sandy SILT	120	4.0	16	19	57	40	-	-	24	2.35	16	N/A	N/A
12.30	65.3	156.1	65.2	2.0	-2.2	3.1	5	silty SAND to sandy SILT	120	4.0	16	19	57	40	-	-	24	2.34	16	N/A	N/A
12.47	66.3	155.9	66.3	2.0	-2.2	3.1	5	silty SAND to sandy SILT	120	4.0	17	19	58	40	-	-	24	2.34	16	N/A	N/A
12.63	67.6	156.3	67.5	2.0	-2.2	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	58	40	-	-	24	2.33	16	N/A	N/A
12.80	68.8	156.7	68.8	2.1	-2.2	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	58	40	-	-	24	2.33	16	N/A	N/A
12.96	69.6	157.8	69.5	2.1	-2.1	3.0	5	silty SAND to sandy SILT	120	4.0	17	19	58	40	-	-	24	2.33	16	N/A	N/A
13.12	70.1	158.1	70.0	2.1	-2.1	3.1	5	silty SAND to sandy SILT	120	4.0	18	19	59	40	-	-	24	2.33	16	N/A	N/A
13.29	70.8	157.6	70.7	2.1	-2.1	3.0	5	silty SAND to sandy SILT	120	4.0	18	19	59	40	-	-	23	2.32	16	N/A	N/A
13.45	72.0	157.8	72.0	2.1	-2.1	3.0	5	silty SAND to sandy SILT	120	4.0	18	20	59	40	-	-	23	2.32	16	N/A	N/A
13.62	75.4	160.9	75.4	2.2	-2.1	3.0	5	silty SAND to sandy SILT	120	4.0	19	20	60	40	-	-	23	2.31	16	N/A	N/A
13.78	83.4	166.7	83.4	2.4	-2.1	2.9	5	silty SAND to sandy SILT	120	4.0	21	22	63	41	-	-	21	2.27	16	N/A	N/A
13.94	87.9	176.5	87.8	2.7	-2.1	3.1	5	silty SAND to sandy SILT	120	4.0	22	24	65	41	-	-	22	2.28	16	N/A	N/A
14.11	84.0	174.7	84.0	2.7	-2.1	3.2	5	silty SAND to sandy SILT	120	4.0	21	22	63	41	-	-	23	2.30	16	N/A	N/A
14.27	79.6	173.4	79.6	2.6	-2.1	3.3	5	silty SAND to sandy SILT	120	4.0	20	21	61	40	-	-	24	2.33	16	N/A	N/A
14.44	77.3	173.7	77.3	2.6	-2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	39	41	-	-	5.4	9.9	25	2.35	15	N/A	N/A
14.60	75.0	172.1	74.9	2.6	-2.1	3.5	4	clayy SILT to silty CLAY	115	2.0	37	39	-	-	5.2	9.9	25	2.37	15	N/A	N/A
14.76	72.1	152.3	72.1	2.1	-2.0	2.9	5	silty SAND to sandy SILT	120	4.0	18	19	58	39	-	-	23	2.32	16	N/A	N/A
14.93	67.8	153.4	67.8	2.1	-2.0	3.1	5	silty SAND to sandy SILT	120	4.0	17	18	55	39	-	-	25	2.37	16	N/A	N/A
15.09	62.9	146.9	62.9	1.9	-1.9	3.1	4	clayy SILT to silty CLAY	115	2.0	31	32	-	-	4.4	9.9	26	2.39	15	N/A	N/A
15.26	60.7	149.5	60.7	2.0	-1.9	3.3	4	clayy SILT to silty CLAY	115	2.0	30	31	-	-	4.2	9.9	27	2.42	15	N/A	N/A
15.42	62.0	150.9	62.0	2.0	-1.8	3.3	4	clayy SILT to silty CLAY	115	2.0	31	32	-	-	4.3	9.9	27	2.42	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Heider Inspections
Data File: SDF(351).cpt
CPT Date: 11/2/2015 1:33:51 PM
GW During Test: 46 ft

Sounding ID: CPT-03
Project No: 150249
Cone/Rig: DDG1333

. Depth ft	. qc PS tsf	. q1ncs PS -	* qt PS tsf	. Slv Stss tsf	. pore prss (psi)	. Frct Rato %	* Mat Typ Zon	* Material Behavior Description	. Unit Wght pcf	. Qc to N	. SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	. Und Shr tsf	. OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
15.58	60.4	150.3	60.4	2.0	-1.8	3.4	4	clayy SILT to silty CLAY	115	2.0	30	31	-	-	4.2	9.9	28	2.43	15	N/A	N/A
15.75	57.2	149.2	57.2	2.0	-1.8	3.5	4	clayy SILT to silty CLAY	115	2.0	29	29	-	-	4.0	9.9	29	2.46	15	N/A	N/A
15.91	53.3	148.2	53.3	1.9	-1.8	3.7	4	clayy SILT to silty CLAY	115	2.0	27	27	-	-	3.7	9.9	31	2.50	15	N/A	N/A
16.08	50.3	147.5	50.2	1.9	-1.7	3.8	4	clayy SILT to silty CLAY	115	2.0	25	25	-	-	3.5	9.9	32	2.53	15	N/A	N/A
16.24	46.5	145.1	46.5	1.8	-1.7	4.0	4	clayy SILT to silty CLAY	115	2.0	23	23	-	-	3.2	9.9	34	2.57	15	N/A	N/A
16.40	43.1	142.7	43.0	1.7	-1.7	4.0	4	clayy SILT to silty CLAY	115	2.0	22	22	-	-	3.0	9.9	35	2.59	15	N/A	N/A
16.57	38.5	-	38.4	1.6	-1.9	4.2	4	clayy SILT to silty CLAY	115	2.0	19	20	-	-	2.6	9.9	37	2.64	15	N/A	N/A
16.73	28.6	-	28.5	1.2	-2.1	4.5	3	silty CLAY to CLAY	115	1.5	19	19	-	-	1.9	9.2	44	2.76	15	N/A	N/A
16.90	18.7	-	18.6	0.8	-0.9	4.7	3	silty CLAY to CLAY	115	1.5	12	12	-	-	1.2	5.9	53	2.92	15	N/A	N/A
17.06	14.0	-	14.0	0.6	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	9	9	-	-	0.9	4.3	59	3.01	15	N/A	N/A
17.23	12.8	-	12.8	0.5	0.0	3.8	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.8	3.8	59	3.01	15	N/A	N/A
17.39	14.8	-	14.8	0.6	0.2	4.0	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.0	4.4	56	2.97	15	N/A	N/A
17.55	20.3	-	20.3	0.8	0.1	3.9	3	silty CLAY to CLAY	115	1.5	14	13	-	-	1.4	6.2	49	2.85	15	N/A	N/A
17.72	23.9	-	23.9	1.0	-0.2	4.2	3	silty CLAY to CLAY	115	1.5	16	15	-	-	1.6	7.2	47	2.82	15	N/A	N/A
17.88	26.1	-	26.1	1.1	-0.6	4.2	3	silty CLAY to CLAY	115	1.5	17	17	-	-	1.8	7.9	45	2.79	15	N/A	N/A
18.05	29.5	-	29.5	0.8	-0.7	2.7	4	clayy SILT to silty CLAY	115	2.0	15	14	-	-	2.0	8.8	37	2.63	15	N/A	N/A
18.21	35.0	-	35.0	1.1	-1.3	3.3	4	clayy SILT to silty CLAY	115	2.0	18	16	-	-	2.4	9.9	37	2.63	15	N/A	N/A
18.37	41.5	119.3	41.5	1.3	-2.9	3.2	4	clayy SILT to silty CLAY	115	2.0	21	19	-	-	2.9	9.9	33	2.56	15	N/A	N/A
18.54	42.7	122.3	42.6	1.4	-2.2	3.3	4	clayy SILT to silty CLAY	115	2.0	21	20	-	-	2.9	9.9	33	2.56	15	N/A	N/A
18.70	43.4	122.6	43.4	1.4	-2.0	3.2	4	clayy SILT to silty CLAY	115	2.0	22	20	-	-	3.0	9.9	33	2.55	15	N/A	N/A
18.87	43.3	128.2	43.3	1.5	-2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	22	20	-	-	3.0	9.9	34	2.58	15	N/A	N/A
19.03	41.9	-	41.8	1.6	-1.7	3.9	4	clayy SILT to silty CLAY	115	2.0	21	19	-	-	2.9	9.9	37	2.63	15	N/A	N/A
19.19	43.0	-	43.0	1.5	-1.0	3.7	4	clayy SILT to silty CLAY	115	2.0	22	19	-	-	3.0	9.9	36	2.61	15	N/A	N/A
19.36	50.6	124.2	50.5	1.5	-2.4	3.0	4	clayy SILT to silty CLAY	115	2.0	25	23	-	-	3.5	9.9	30	2.49	15	N/A	N/A
19.52	56.1	122.3	56.1	1.5	-1.3	2.7	5	silty SAND to sandy SILT	120	4.0	14	13	45	36	-	-	27	2.42	16	N/A	N/A
19.69	59.8	127.2	59.8	1.6	-1.2	2.8	5	silty SAND to sandy SILT	120	4.0	15	13	47	37	-	-	27	2.41	16	N/A	N/A
19.85	62.5	128.7	62.4	1.7	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	16	14	48	37	-	-	26	2.39	16	N/A	N/A
20.01	65.0	133.4	65.0	1.8	-1.2	2.8	5	silty SAND to sandy SILT	120	4.0	16	15	49	37	-	-	26	2.39	16	N/A	N/A
20.18	65.0	134.4	65.0	1.8	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	16	14	49	37	-	-	26	2.40	16	N/A	N/A
20.34	67.2	136.6	67.2	1.9	-1.0	2.9	5	silty SAND to sandy SILT	120	4.0	17	15	50	37	-	-	26	2.39	16	N/A	N/A
20.51	70.6	139.7	70.6	2.0	-1.0	2.9	5	silty SAND to sandy SILT	120	4.0	18	16	51	38	-	-	26	2.38	16	N/A	N/A
20.67	74.0	144.2	74.0	2.2	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	19	16	53	38	-	-	25	2.37	16	N/A	N/A
20.83	74.5	145.5	74.5	2.2	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	19	16	53	38	-	-	26	2.38	16	N/A	N/A
21.00	74.4	146.2	74.4	2.2	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	37	33	-	-	5.2	9.9	26	2.38	15	N/A	N/A
21.16	75.5	145.1	75.5	2.2	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	19	16	53	38	-	-	25	2.37	16	N/A	N/A
21.33	79.3	144.9	79.3	2.2	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	20	17	55	38	-	-	24	2.35	16	N/A	N/A
21.49	85.8	147.1	85.8	2.3	-1.0	2.8	5	silty SAND to sandy SILT	120	4.0	21	19	57	38	-	-	23	2.31	16	N/A	N/A
21.65	92.5	143.5	92.5	2.2	-1.0	2.4	5	silty SAND to sandy SILT	120	4.0	23	20	59	39	-	-	21	2.25	16	N/A	N/A
21.82	99.2	154.3	99.1	2.6	-1.0	2.6	5	silty SAND to sandy SILT	120	4.0	25	21	62	39	-	-	21	2.26	16	N/A	N/A
21.98	100.7	160.7	100.7	2.8	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	25	22	62	39	-	-	22	2.27	16	N/A	N/A
22.15	105.0	165.6	105.0	3.0	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	26	22	63	39	-	-	21	2.27	16	N/A	N/A
22.31	108.1	167.4	108.1	3.1	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	27	23	64	39	-	-	21	2.26	16	N/A	N/A
22.47	111.7	168.6	111.7	3.1	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	28	24	65	40	-	-	21	2.25	16	N/A	N/A
22.64	116.9	172.0	116.9	3.3	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	29	25	66	40	-	-	20	2.23	16	N/A	N/A
22.80	120.5	175.4	120.4	3.4	-1.2	2.8	5	silty SAND to sandy SILT	120	4.0	30	25	67	40	-	-	20	2.23	16	N/A	N/A
22.97	122.8	177.0	122.7	3.5	-1.2	2.8	5	silty SAND to sandy SILT	120	4.0	31	26	68	40	-	-	20	2.22	16	N/A	N/A
23.13	126.8	180.5	126.7	3.6	-1.2	2.9	5	silty SAND to sandy SILT	120	4.0	32	26	69	40	-	-	20	2.22	16	N/A	N/A
23.30	132.3	184.7	132.3	3.8	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	33	27	70	40	-	-	19	2.21	16	N/A	N/A
23.46	131.2	184.1	131.2	3.7	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	33	27	70	40	-	-	19	2.21	16	N/A	N/A
23.62	124.9	181.9	124.9	3.7	-1.3	3.0	5	silty SAND to sandy SILT	120	4.0	31	26	68	40	-	-	20	2.24	16	N/A	N/A
23.79	118.0	178.8	118.0	3.6	-1.3	3.1	5	silty SAND to sandy SILT	120	4.0	29	24	66	40	-	-	21	2.27	16	N/A	N/A
23.95	117.9	180.8	117.8	3.7	-1.3	3.2	5	silty SAND to sandy SILT	120	4.0	29	24	66	40	-	-	22	2.28	16	N/A	N/A
24.12	125.0	187.4	124.9	4.0	-1.4	3.2	5	silty SAND to sandy SILT	120	4.0	31	25	68	40	-	-	21	2.26	16	N/A	N/A
24.28	131.7	192.9	131.7	4.2	-1.5	3.2	5	silty SAND to sandy SILT	120	4.0	33	27	69	40	-	-	21	2.25	16	N/A	N/A
24.44	134.9	198.7	134.8	4.4	-1.5	3.3	5	silty SAND to sandy SILT	120	4.0	34	27	70	40	-	-	21	2.26	16	N/A	N/A
24.61	131.4	182.1	131.3	3.8	-1.5	2.9	5	silty SAND to sandy SILT	120	4.0	33	26	69	40	-	-	20	2.22	16	N/A	N/A
24.77	128.4	163.1	128.4	3.0	-1.6	2.4	5	silty SAND to sandy SILT	120	4.0	32	26	68	40	-	-	18	2.16	16	N/A	N/A
24.94	128.8	173.5	128.8	3.4	-1.7	2.7	5	silty SAND to sandy SILT	120	4.0	32	26	68	40	-	-	19	2.21	16	N/A	N/A
25.10	120.5	170.3	120.4	3.4	-1.9	2.8	5	silty SAND to sandy SILT	120	4.0	30	24	66	39	-	-	20	2.24	16	N/A	N/A
25.26	119.1	160.5	119.1	3.0	-1.9	2.5	5	silty SAND to sandy SILT	120	4.0	30	24	65	39	-	-	19	2.21	16	N/A	N/A
25.43	115.5	157.1	115.5	2.9	-1.9	2.5	5	silty SAND to sandy SILT	120	4.0	29	23	64	39	-	-	20	2.22	16	N/A	N/A
25.59	130.3	164.3	130.3	3.1	-2.0	2.4	5	silty SAND to sandy SILT	120	4.0	33	26	68	40	-	-	18	2.17	16	N/A	N/A
25.76	148.4	171.7	148.3	3.3	-2.0	2.2	5	silty SAND to sandy SILT	120	4.0	37	29	72	40	-	-	16	2.11	16	N/A	N/A
25.92	143.0	166.9	142.9	3.1	-2.0	2.2	5	silty SAND to sandy SILT	120	4.0	36	28	71	40	-	-	16	2.12	16	N/A	N/A
26.08	120.3	151.8	120.2	2.7	-1.9	2.3	5	silty SAND to sandy SILT	120	4.0	30	24	65	39	-	-	18	2.18	16	N/A	N/A
26.25	95.2	136.9	95.2	2.2	-1.8	2.4	5	silty SAND to sandy SILT	120	4.0	24	19	57	38	-	-	21	2.27	16	N/A	N/A
26.41	72.3	125.6	72.3	1.8	-1.8	2.6	5	silty SAND to sandy SILT	120	4.0	18	14	48	36	-	-	26	2.38	16	N/A	N/A
26.58	58.7	127.7	58.7	1.8	-1.7	3.2	4	clayy SILT to silty CLAY	115	2.0	29	23	-	-	4.0	9.9	31	2.51	15	N/A	N/A
26.74	45.0	-	44.9	1.7	-1.7	3.9	4	clayy SILT to silty CLAY	115	2.0	22	14	-	-	3.1	9.1	42	2.72	15	N/A	N/A
26.90	27.0	-	27.0	1.4	-1.7	5.3	3	silty CLAY to CLAY	115	1.5	18	11	-	-	1.8	5.3	58	2.99	15	N/A	N/A
27.07	23.4	-	23.4	1.0	-1.4	4.8	3	silty CLAY to CLAY	115	1.5	16	10	-	-	1.5	4.5	59	3.01	15	N/A	N/A
27.23	19.4	-	19.4	0.9	-2.7	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	3.7	65	3.09	15	N/A	N/A
27.40	17.5	-	17.4	0.7	-2.5	4.4	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.1	3.2	66	3.10	15	N/A	N/A
27.56	17.1	-	17.1	0.6	-2.1	3.9	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	3.1	64	3.08	15	N/A	N/A
27.72	15.0	-	14.9	0.5	-2.2	4.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.7	68	3.14	15	N/A	N/A
27.89	13.9	-	13.8	0.3	-2.1	2.8	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	2.4	65	3.09	15	N/A	N/A
28.05	13.6	-	13.5	0.4	-2.1	3.5	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.4	70	3.16	15	N/A	N/A
28.22	14.4	-	14.4	0.5	-1.7	4.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.5	70	3.16	15	N/A	N/A
28.38	16.6	-	16.5	0.6	-1.7	3.9	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	2.9	66	3.11	15	N/A	N/A
28.54	16.0	-	16.0	0.6	-1.6	4.2	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.0	2.8	68	3.14	15	N/A	N/A
28.71	14.0	-	13.9	0.5	-1.6	4.2	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	2.4	72	3.19	15	N/A	N/A
28.87	12.0	-	12.0	0.4	-1.4	3.9	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.7	2.0	76	3.24	15	N/A	N/A
29.04	12.4	-	12.4	0.3	-1.3	3.2	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.1	72	3.18	15	N/A	N/A
29.20	12.6	-	12.6	0.4	-1.3	3.4	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	2.1	72	3.19	15	N/A	N/A
29.36	13.3	-	13.2	0.4	-1.2	3.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.2	69	3.15	15	N/A	N/A
29.53	14.2	-	14.2	0.4	-1.1	3.6	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	2.4	70	3.16	15	N/A	N/A
29.69	15.6	-	15.6	0.6	-1.1	4.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.6	69	3.15	15	N/A	N/A
29.86	14.8	-	14.8	0.6	-1.1	4.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	0.9	2.5	72	3.19	15	N/A	N/A
30.02	14.4	-	14.3	0.5	-1.0	4.2	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.4	73	3.20	15	N/A	N/A
30.19	14.3	-	14.3	0.5	-0.6	4.1	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.3	73	3.20	15	N/A	N/A
30.35	15.3	-	15.3	0.5	-0.5	3.9	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.5	70	3.16	15	N/A	N/A
30.51	15.3	-	15.3	0.5	-0.5	4.0	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	2.5	71	3.17	15	N/A	N/A
30.68	14.6	-	14.6	0.5	-0.4	4.1	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.3	73	3.20	15	N/A	N/A
30.84	13.8	-	13.8	0.5	-0.4	3.8	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.2	73	3.21	15	N/A	N/A

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

.	.	.	*	.	.	.	*	*	.	.	.	*	*	*	.	.	*	*	*	*	*
Depth ft	qc PS tsf	q1ncs PS -	qt PS tsf	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Ic SBT Indx	Nk -	Vol Strn %	Cycl SStn %
31.01	12.6	-	12.6	0.4	-0.4	4.1	3	silty CLAY to CLAY	115	1.5	8	5	-	-	0.8	1.9	78	3.26	15	N/A	N/A
31.17	13.5	-	13.5	0.4	-0.3	3.5	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	73	3.20	15	N/A	N/A
31.33	13.3	-	13.3	0.5	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	77	3.26	15	N/A	N/A
31.50	14.1	-	14.1	0.6	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	2.2	78	3.26	15	N/A	N/A
31.66	13.5	-	13.5	0.6	-0.1	4.8	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.1	80	3.28	15	N/A	N/A
31.83	13.3	-	13.3	0.4	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	76	3.24	15	N/A	N/A
31.99	13.0	-	13.0	0.4	0.0	3.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	74	3.21	15	N/A	N/A
32.15	13.2	-	13.2	0.4	0.0	3.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	73	3.21	15	N/A	N/A
32.32	12.9	-	12.9	0.4	0.1	3.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	74	3.21	15	N/A	N/A
32.48	12.1	-	12.1	0.3	0.2	3.0	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.8	75	3.23	15	N/A	N/A
32.65	11.5	-	11.5	0.3	0.2	2.6	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.6	75	3.22	15	N/A	N/A
32.81	11.6	-	11.6	0.3	0.3	3.1	3	silty CLAY to CLAY	115	1.5	8	4	-	-	0.7	1.7	77	3.25	15	N/A	N/A
32.97	12.9	-	12.9	0.4	0.3	3.2	3	silty CLAY to CLAY	115	1.5	9	4	-	-	0.8	1.9	75	3.22	15	N/A	N/A
33.14	13.5	-	13.6	0.4	0.4	3.4	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	74	3.22	15	N/A	N/A
33.30	13.9	-	13.9	0.4	0.4	3.2	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	72	3.19	15	N/A	N/A
33.47	13.9	-	13.9	0.4	0.5	3.2	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	2.0	73	3.20	15	N/A	N/A
33.63	14.6	-	14.6	0.4	0.5	3.4	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	72	3.19	15	N/A	N/A
33.79	15.6	-	15.6	0.5	0.6	3.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	2.3	71	3.18	15	N/A	N/A
33.96	18.7	-	18.7	0.4	0.6	2.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	2.8	59	3.01	15	N/A	N/A
34.12	14.6	-	14.7	0.3	0.7	2.7	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	69	3.14	15	N/A	N/A
34.29	13.9	-	13.9	0.3	0.8	2.7	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.8	1.9	70	3.16	15	N/A	N/A
34.45	14.7	-	14.8	0.3	0.8	2.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	68	3.13	15	N/A	N/A
34.61	16.1	-	16.1	0.5	0.9	3.4	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.3	70	3.16	15	N/A	N/A
34.78	14.2	-	14.2	0.6	1.0	5.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	2.0	82	3.31	15	N/A	N/A
34.94	18.0	-	18.0	0.6	1.1	3.7	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.1	2.6	69	3.14	15	N/A	N/A
35.11	15.2	-	15.2	0.6	1.5	4.9	3	silty CLAY to CLAY	115	1.5	10	5	-	-	0.9	2.1	79	3.28	15	N/A	N/A
35.27	23.9	-	23.9	0.7	1.6	3.3	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.5	3.5	58	3.00	15	N/A	N/A
35.43	23.0	-	23.1	0.9	1.4	4.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	3.3	65	3.09	15	N/A	N/A
35.60	23.3	-	23.3	1.0	1.6	4.7	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.5	3.4	66	3.11	15	N/A	N/A
35.76	25.0	-	25.0	1.1	1.5	5.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.6	3.6	65	3.10	15	N/A	N/A
35.93	34.8	-	34.8	1.5	1.7	4.4	3	silty CLAY to CLAY	115	1.5	23	11	-	-	2.3	5.1	55	2.95	15	N/A	N/A
36.09	61.7	-	61.7	2.0	-0.5	3.4	4	clayy SILT to silty CLAY	115	2.0	31	15	-	-	4.2	9.3	39	2.67	15	N/A	N/A
36.26	66.2	-	66.2	2.4	-1.2	3.7	4	clayy SILT to silty CLAY	115	2.0	33	16	-	-	4.5	9.9	39	2.68	15	N/A	N/A
36.42	67.1	-	67.0	2.8	-1.1	4.3	4	clayy SILT to silty CLAY	115	2.0	34	16	-	-	4.6	9.9	41	2.72	15	N/A	N/A
36.58	92.7	157.4	92.7	3.3	-1.5	3.6	4	clayy SILT to silty CLAY	115	2.0	46	31	-	-	6.4	9.9	29	2.46	15	N/A	N/A
36.75	90.1	159.5	90.1	3.4	-0.6	3.8	4	clayy SILT to silty CLAY	115	2.0	45	30	-	-	6.2	9.9	30	2.48	15	N/A	N/A
36.91	75.3	-	75.3	3.3	-0.6	4.5	4	clayy SILT to silty CLAY	115	2.0	38	17	-	-	5.2	9.9	40	2.70	15	N/A	N/A
37.08	50.8	-	50.8	2.7	-0.6	5.6	3	silty CLAY to CLAY	115	1.5	34	16	-	-	3.4	7.4	52	2.89	15	N/A	N/A
37.24	44.7	-	44.7	2.1	-0.3	4.9	3	silty CLAY to CLAY	115	1.5	30	14	-	-	3.0	6.4	52	2.90	15	N/A	N/A
37.40	36.7	-	36.6	1.9	-0.8	5.6	3	silty CLAY to CLAY	115	1.5	24	11	-	-	2.4	5.2	59	3.01	15	N/A	N/A
37.57	21.5	-	21.5	1.1	0.7	6.0	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	2.9	75	3.22	15	N/A	N/A
37.73	17.0	-	17.0	0.8	1.0	5.5	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.2	81	3.30	15	N/A	N/A
37.90	16.3	-	16.4	0.8	1.3	5.4	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	82	3.31	15	N/A	N/A
38.06	16.6	-	16.6	0.7	1.3	5.1	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.0	2.1	80	3.29	15	N/A	N/A
38.22	17.2	-	17.2	0.7	1.3	4.9	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	2.2	78	3.26	15	N/A	N/A
38.39	18.1	-	18.1	0.8	1.3	4.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.3	76	3.24	15	N/A	N/A
38.55	18.1	-	18.1	0.9	1.3	5.7	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.3	80	3.29	15	N/A	N/A
38.72	20.4	-	20.4	1.1	1.4	6.1	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.3	2.6	77	3.26	15	N/A	N/A
38.88	36.0	-	36.0	1.5	1.2	4.4	3	silty CLAY to CLAY	115	1.5	24	11	-	-	2.4	4.9	56	2.96	15	N/A	N/A
39.04	53.3	-	53.2	1.8	-1.0	3.6	4	clayy SILT to silty CLAY	115	2.0	27	12	-	-	3.6	7.4	44	2.76	15	N/A	N/A
39.21	54.5	-	54.4	2.0	-3.5	3.9	3	silty CLAY to CLAY	115	1.5	36	16	-	-	3.7	7.5	45	2.78	15	N/A	N/A
39.37	44.2	-	44.1	2.0	-3.7	4.7	3	silty CLAY to CLAY	115	1.5	29	13	-	-	3.0	6.0	53	2.91	15	N/A	N/A
39.54	51.2	-	51.2	2.0	-3.5	4.2	3	silty CLAY to CLAY	115	1.5	34	15	-	-	3.5	7.0	48	2.83	15	N/A	N/A
39.70	59.9	-	59.8	2.2	-4.4	3.9	4	clayy SILT to silty CLAY	115	2.0	30	13	-	-	4.1	8.2	43	2.75	15	N/A	N/A
39.86	57.6	-	57.5	2.2	-4.1	3.9	4	clayy SILT to silty CLAY	115	2.0	29	12	-	-	3.9	7.8	44	2.77	15	N/A	N/A
40.03	61.3	-	61.2	2.3	-4.0	3.9	4	clayy SILT to silty CLAY	115	2.0	31	13	-	-	4.2	8.3	43	2.75	15	N/A	N/A
40.19	73.1	-	73.0	2.3	-5.6	3.3	4	clayy SILT to silty CLAY	115	2.0	37	16	-	-	5.0	9.9	38	2.64	15	N/A	N/A
40.36	78.7	-	78.6	2.4	-6.4	3.1	4	clayy SILT to silty CLAY	115	2.0	39	17	-	-	5.4	9.9	36	2.61	15	N/A	N/A
40.52	80.2	-	80.0	2.5	-7.0	3.2	4	clayy SILT to silty CLAY	115	2.0	40	17	-	-	5.5	9.9	36	2.60	15	N/A	N/A
40.68	81.6	-	81.5	2.8	-7.8	3.5	4	clayy SILT to silty CLAY	115	2.0	41	17	-	-	5.6	9.9	37	2.63	15	N/A	N/A
40.85	83.2	-	83.0	3.0	-8.9	3.7	4	clayy SILT to silty CLAY	115	2.0	42	17	-	-	5.7	9.9	37	2.64	15	N/A	N/A
41.01	83.5	-	83.3	3.0	-9.6	3.7	4	clayy SILT to silty CLAY	115	2.0	42	17	-	-	5.7	9.9	37	2.64	15	N/A	N/A
41.18	86.1	-	85.9	2.9	-10.4	3.4	4	clayy SILT to silty CLAY	115	2.0	43	18	-	-	5.9	9.9	36	2.61	15	N/A	N/A
41.34	86.8	-	86.6	2.9	-10.7	3.4	4	clayy SILT to silty CLAY	115	2.0	43	18	-	-	6.0	9.9	36	2.60	15	N/A	N/A
41.50	84.3	-	84.1	2.8	-10.9	3.5	4	clayy SILT to silty CLAY	115	2.0	42	17	-	-	5.8	9.9	36	2.62	15	N/A	N/A
41.67	80.9	-	80.6	2.9	-11.1	3.8	4	clayy SILT to silty CLAY	115	2.0	40	17	-	-	5.5	9.9	38	2.66	15	N/A	N/A
41.83	74.1	-	73.9	2.8	-11.3	3.9	4	clayy SILT to silty CLAY	115	2.0	37	15	-	-	5.1	9.7	40	2.70	15	N/A	N/A
42.00	73.0	-	72.8	2.6	-11.3	3.6	4	clayy SILT to silty CLAY	115	2.0	37	15	-	-	5.0	9.5	40	2.69	15	N/A	N/A
42.16	79.6	-	79.4	2.6	-11.6	3.4	4	clayy SILT to silty CLAY	115	2.0	40	16	-	-	5.5	9.9	37	2.64	15	N/A	N/A
42.32	88.2	136.9	88.0	2.7	-11.7	3.1	4	clayy SILT to silty CLAY	115	2.0	44	27	-	-	6.1	9.9	28	2.45	15	N/A	N/A
42.49	92.2	141.8	91.9	2.9	-11.7	3.2	4	clayy SILT to silty CLAY	115	2.0	46	28	-	-	6.3	9.9	28	2.44	15	N/A	N/A
42.65	94.9	145.5	94.6	3.0	-11.7	3.3	4	clayy SILT to silty CLAY	115	2.0	47	29	-	-	6.5	9.9	28	2.44	15	N/A	N/A
42.82	97.9	151.1	97.7	3.3	-11.8	3.4	4	clayy SILT to silty CLAY	115	2.0	49	30	-	-	6.7	9.9	28	2.45	15	N/A	N/A
42.98	106.7	140.6	106.4	2.9	-11.8	2.8	5	silty SAND to sandy SILT	120	4.0	27	16	53	36	-	-	25	2.36	16	N/A	N/A
43.15	103.5	136.4	103.2	2.8	-11.8	2.7	5	silty SAND to sandy SILT	120	4.0	26	16	52	35	-	-	25	2.36	16	N/A	N/A
43.31	92.7	135.5	92.4	2.7	-11.7	3.0	4	clayy SILT to silty CLAY	115	2.0	46	28	-	-	6.4	9.9	27	2.42	15	N/A	N/A
43.47	91.6	143.4	91.4	3.0	-11.7	3.3	4	clayy SILT to silty CLAY	115	2.0	46	28	-	-	6.3	9.9	29	2.46	15	N/A	N/A
43.64	88.3	-	88.0	3.0	-11.7	3.5	4	clayy SILT to silty CLAY	115	2.0	44	17	-	-	6.1	9.9	37	2.63	15	N/A	N/A
43.80	55.2	-	54.9	2.6	-11.6	4.9	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.7	6.8	51	2.88	15	N/A	N/A
43.97	31.7	-	31.5	1.7	-11.5	5.8	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	3.7	68	3.13	15	N/A	N/A
44.13	21.6	-	21.4	1.4	-11.3	7.5	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.3	2.4	85	3.34	15	N/A	N/A
44.29	37.2	-	37.0	0.8	-11.3	2.3	4	clayy SILT to silty CLAY	115	2.0	19	7	-	-	2.4	4.4	48	2.83	15	N/A	N/A
44.46	50.2	-	50.0	1.4	-11.5	3.0	4	clayy SILT to silty CLAY	115	2.0	25	10	-	-	3.4	6.1	45	2.78	15	N/A	N/A
44.62	39.0	-	38.8	1.3	-11.4	3.6	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	4.6	53	2.92	15	N/A	N/A
44.79	29.9	-	29.7	1.1	-11.4	4.2	3	silty CLAY to CLAY	115	1.5	20	8	-	-	1.9	3.4	63	3.07	15	N/A	N/A
44.95	22.9	-	22.7	1.2	-11.3	5.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	2.5	77	3.26	15	N/A	N/A
45.11	25.1	-	24.9	1.4	-11.0	6.2	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	2.8	76	3.24	15	N/A	N/A
45.28	59.0	-	58.8	2.0	-11.1	3.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.0	7.0	45	2.78	15	N/A	N/A
45.44	132.5	140.6	132.2	3.1	-11.5	2.4	5	silty SAND to sandy SILT	120	4.0	33	20	59	37	-	-	20	2.24	16	N/A	N/A
45.61	153.3	155.1	153.3	3.7	-1.2	2.5	5	silty SAND to sandy SILT	120	4.0	38	23	64	37	-	-	19	2.21	16	N/A	N/A
45.77	142.2	154.6	142.2	3.7	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	36	21	61	37	-	-	21	2.26	16	N/A	N/A
45.93	97.0	-	96.9	3.6	-0.8	3.8	4	clayy SILT to silty CLAY	115	2.0	48	18	-	-	6.7	9.9	37	2.63	15	N/A	N/A
46.10	79.8	-	79.8	3.0	-1.8	3.9	4	clayy SILT to silty CLAY	115	2.0	40	15	-	-	5.5	9.5	41	2.70	15	-	-
46.26	118.2	131.8	118.1	2.7	-2.8	2.3	5	silty SAND to sandy SILT	120	4.0	30	17	55	36	-	-	22	2.28	16	0.49	2.5

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Instructional Bldg I El Camino College Compton Center

Project ID: Heider Inspections
Data File: SDF(351).cpt
CPT Date: 11/2/2015 1:33:51 PM
GW During Test: 46 ft

Sounding ID: CPT-03
Project No: 150249
Cone/Rig: DDG1333

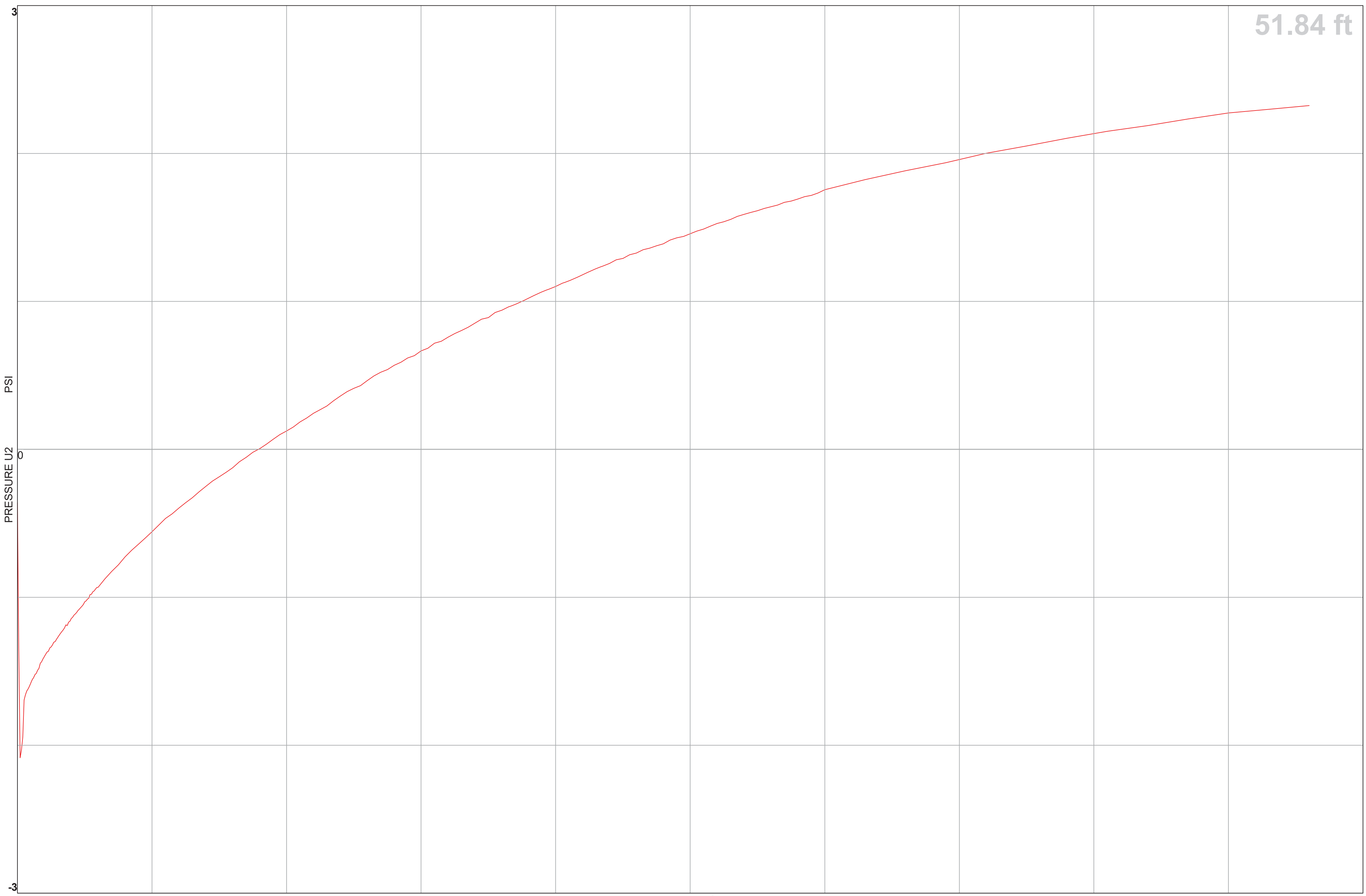
. Depth ft	. qc PS tsf	. q1ncs PS -	* qt PS tsf	. Slv Stss tsf	. pore prss (psi)	. Frct Rato %	* Mat Typ Zon	* Material Behavior Description	. Unit Wght pcf	. Qc to N	. SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	. Und Shr tsf	. OCR -	* Fin Ic %	* Ic SBT Indx	* Nk -	* Vol Strn %	* Cycl SStn %
46.43	173.8	152.0	173.7	3.4	-3.6	2.0	5	silty SAND to sandy SILT	120	4.0	43	26	68	38	-	-	16	2.11	16	0.18	1.1
46.59	182.5	167.8	182.5	4.3	-1.5	2.4	5	silty SAND to sandy SILT	120	4.0	46	27	69	38	-	-	17	2.15	16	0.00	0.0
46.75	202.4	183.6	202.4	5.0	-1.8	2.5	5	silty SAND to sandy SILT	120	4.0	51	30	73	39	-	-	17	2.14	16	0.00	0.0
46.92	215.0	190.4	215.0	5.4	-1.9	2.5	5	silty SAND to sandy SILT	120	4.0	54	32	75	39	-	-	17	2.12	16	0.00	0.0
47.08	230.1	197.9	230.0	5.7	-3.1	2.5	5	silty SAND to sandy SILT	120	4.0	58	34	77	40	-	-	16	2.10	16	0.00	0.0
47.25	234.4	205.0	234.3	6.1	-4.1	2.6	5	silty SAND to sandy SILT	120	4.0	59	34	78	40	-	-	16	2.12	16	0.00	0.0
47.41	240.5	198.2	240.3	5.6	-5.9	2.3	5	silty SAND to sandy SILT	120	4.0	60	35	78	40	-	-	15	2.07	16	0.00	0.0
47.57	252.8	208.0	252.7	6.1	-8.0	2.4	5	silty SAND to sandy SILT	120	4.0	63	37	80	40	-	-	15	2.07	16	0.00	0.0
47.74	266.7	222.0	266.5	6.9	-8.0	2.6	5	silty SAND to sandy SILT	120	4.0	67	39	82	40	-	-	15	2.08	16	0.00	0.0
47.90	276.8	230.5	276.6	7.4	-8.0	2.7	5	silty SAND to sandy SILT	120	4.0	69	41	83	41	-	-	15	2.08	16	0.00	0.0
48.07	274.4	235.9	274.3	7.9	-8.0	2.9	5	silty SAND to sandy SILT	120	4.0	69	40	83	41	-	-	16	2.11	16	0.00	0.0
48.23	260.2	230.3	260.1	7.7	-7.9	3.0	5	silty SAND to sandy SILT	120	4.0	65	38	81	40	-	-	17	2.13	16	0.00	0.0
48.39	236.4	220.9	236.2	7.2	-7.8	3.1	5	silty SAND to sandy SILT	120	4.0	59	35	78	40	-	-	18	2.17	16	0.00	0.0
48.56	212.7	206.7	212.5	6.5	-7.7	3.1	5	silty SAND to sandy SILT	120	4.0	53	31	74	39	-	-	19	2.20	16	0.00	0.0
48.72	198.8	196.5	198.7	5.9	-7.3	3.0	5	silty SAND to sandy SILT	120	4.0	50	29	72	39	-	-	19	2.21	16	0.00	0.0
48.89	192.1	190.7	191.9	5.6	-6.1	3.0	5	silty SAND to sandy SILT	120	4.0	48	28	71	38	-	-	19	2.21	16	0.00	0.0
49.05	176.7	178.2	176.6	5.0	-4.6	2.9	5	silty SAND to sandy SILT	120	4.0	44	26	68	38	-	-	20	2.22	16	0.00	0.0
49.22	159.8	155.3	159.7	3.8	-3.6	2.4	5	silty SAND to sandy SILT	120	4.0	40	23	65	37	-	-	19	2.20	16	0.15	0.8
49.38	170.7	150.7	170.7	3.5	-2.3	2.1	5	silty SAND to sandy SILT	120	4.0	43	25	67	38	-	-	17	2.13	16	0.19	1.1
49.54	169.8	146.8	169.8	3.3	0.4	2.0	5	silty SAND to sandy SILT	120	4.0	42	25	67	38	-	-	16	2.12	16	0.22	1.4
49.71	211.9	155.4	211.9	3.2	-1.5	1.5	6	clean SAND to silty SAND	125	5.0	42	25	74	39	-	-	12	1.97	16	0.17	1.3
49.87	220.2	161.3	220.1	3.4	-1.8	1.6	6	clean SAND to silty SAND	125	5.0	44	26	75	39	-	-	12	1.97	16	0.00	0.0
50.04	216.9	160.5	216.9	3.4	-1.1	1.6	6	clean SAND to silty SAND	125	5.0	43	25	75	39	-	-	12	1.98	16	0.00	0.0
50.20	211.6	158.0	211.6	3.4	-0.1	1.6	6	clean SAND to silty SAND	125	5.0	42	25	74	39	-	-	13	1.99	16	0.15	1.1
50.36	200.3	149.4	200.3	3.0	-0.4	1.5	6	clean SAND to silty SAND	125	5.0	40	23	72	39	-	-	13	1.99	16	0.21	1.5
50.53	154.6	140.4	154.6	3.1	-0.4	2.0	5	silty SAND to sandy SILT	120	4.0	39	22	63	37	-	-	18	2.16	16	0.34	1.8
50.69	72.9	-	72.9	3.0	0.9	4.2	3	silty CLAY to CLAY	115	1.5	49	18	-	-	5.0	8.2	44	2.76	15	-	-
50.86	51.2	-	51.2	1.6	0.3	3.4	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.4	5.6	47	2.82	15	-	-
51.02	32.5	-	32.5	1.5	0.0	5.1	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.1	3.4	65	3.10	15	-	-
51.18	59.9	-	60.0	1.8	1.4	3.2	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.0	6.6	43	2.75	15	-	-
51.35	83.1	-	83.1	2.3	-0.3	2.9	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.7	9.3	36	2.61	15	-	-
51.51	76.1	-	76.1	2.9	0.1	4.0	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.2	8.5	42	2.73	15	-	-
51.68	112.7	148.8	112.7	3.4	0.0	3.1	4	clayy SILT to silty CLAY	115	2.0	56	32	-	-	7.8	9.9	26	2.40	15	0.18	0.5
51.84	181.7	172.6	181.6	4.7	-0.5	2.6	5	silty SAND to sandy SILT	120	4.0	45	26	68	38	-	-	19	2.19	16	0.00	0.0
52.00	202.0	186.4	202.0	5.4	1.5	2.7	5	silty SAND to sandy SILT	120	4.0	50	29	72	39	-	-	18	2.17	16	0.00	0.0
52.17	207.3	197.9	207.3	6.1	1.5	3.0	5	silty SAND to sandy SILT	120	4.0	52	30	73	39	-	-	19	2.20	16	0.00	0.0
52.33	199.4	190.2	199.4	5.7	1.5	2.9	5	silty SAND to sandy SILT	120	4.0	50	29	71	39	-	-	19	2.20	16	0.00	0.0
52.50	173.5	175.2	173.6	4.9	1.5	2.9	5	silty SAND to sandy SILT	120	4.0	43	25	67	38	-	-	20	2.24	16	0.00	0.0
52.66	209.7	173.0	209.7	4.5	1.4	2.2	5	silty SAND to sandy SILT	120	4.0	52	30	73	39	-	-	16	2.09	16	0.00	0.0
52.82	241.8	190.9	241.8	5.3	1.3	2.2	5	silty SAND to sandy SILT	120	4.0	60	35	78	40	-	-	15	2.06	16	0.00	0.0
52.99	254.3	202.8	254.3	5.9	0.8	2.4	5	silty SAND to sandy SILT	120	4.0	64	36	79	40	-	-	15	2.06	16	0.00	0.0
53.15	250.5	209.5	250.6	6.5	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	63	36	79	40	-	-	16	2.10	16	0.00	0.0
53.32	247.8	209.0	247.8	6.5	0.8	2.7	5	silty SAND to sandy SILT	120	4.0	62	35	78	40	-	-	16	2.11	16	0.00	0.0
53.48	249.8	205.1	249.8	6.2	0.8	2.5	5	silty SAND to sandy SILT	120	4.0	62	36	79	40	-	-	16	2.09	16	0.00	0.0
53.64	244.8	209.9	244.8	6.6	0.8	2.7	5	silty SAND to sandy SILT	120	4.0	61	35	78	40	-	-	17	2.13	16	0.00	0.0
53.81	228.1	206.2	228.1	6.5	0.9	2.9	5	silty SAND to sandy SILT	120	4.0	57	32	76	39	-	-	18	2.17	16	0.00	0.0
53.97	219.6	202.2	219.6	6.4	0.8	2.9	5	silty SAND to sandy SILT	120	4.0	55	31	74	39	-	-	18	2.18	16	0.00	0.0
54.14	236.2	212.3	236.2	6.9	0.7	3.0	5	silty SAND to sandy SILT	120	4.0	59	34	77	39	-	-	18	2.16	16	0.00	0.0
54.30	263.0	225.0	263.0	7.5	0.5	2.9	5	silty SAND to sandy SILT	120	4.0	66	37	80	40	-	-	17	2.13	16	0.00	0.0
54.46	262.6	226.6	262.6	7.7	0.4	3.0	5	silty SAND to sandy SILT	120	4.0	66	37	80	40	-	-	17	2.13	16	0.00	0.0
54.63	265.4	225.6	265.4	7.6	0.3	2.9	5	silty SAND to sandy SILT	120	4.0	66	38	80	40	-	-	17	2.12	16	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

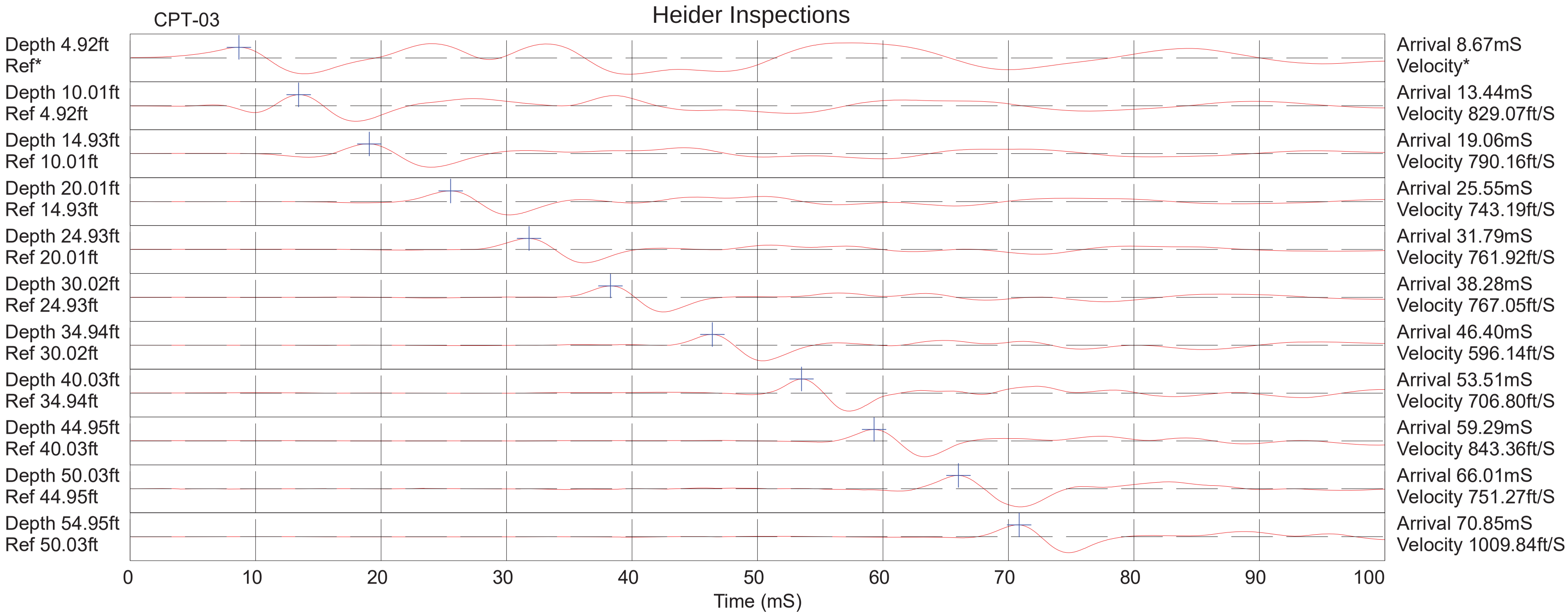
Middle Earth Geo Testing

Heider Inspections

LocaInstructional Bldg I El Camino College Comptoı		Operator	RC-DG		
Job Number	150249	Cone Number	DDG1333	GPS	
Hole Number	CPT-03	Date and Time	11/2/2015 1:33:51 PM		
Equilized Pressure	2.3	EST GW Depth During Test	46.4		



Heider Inspections



Hammer to Rod String Distance (ft): 5.83
* = Not Determined

LOCATION: Instructional Bldg I El Camino College Compton Center

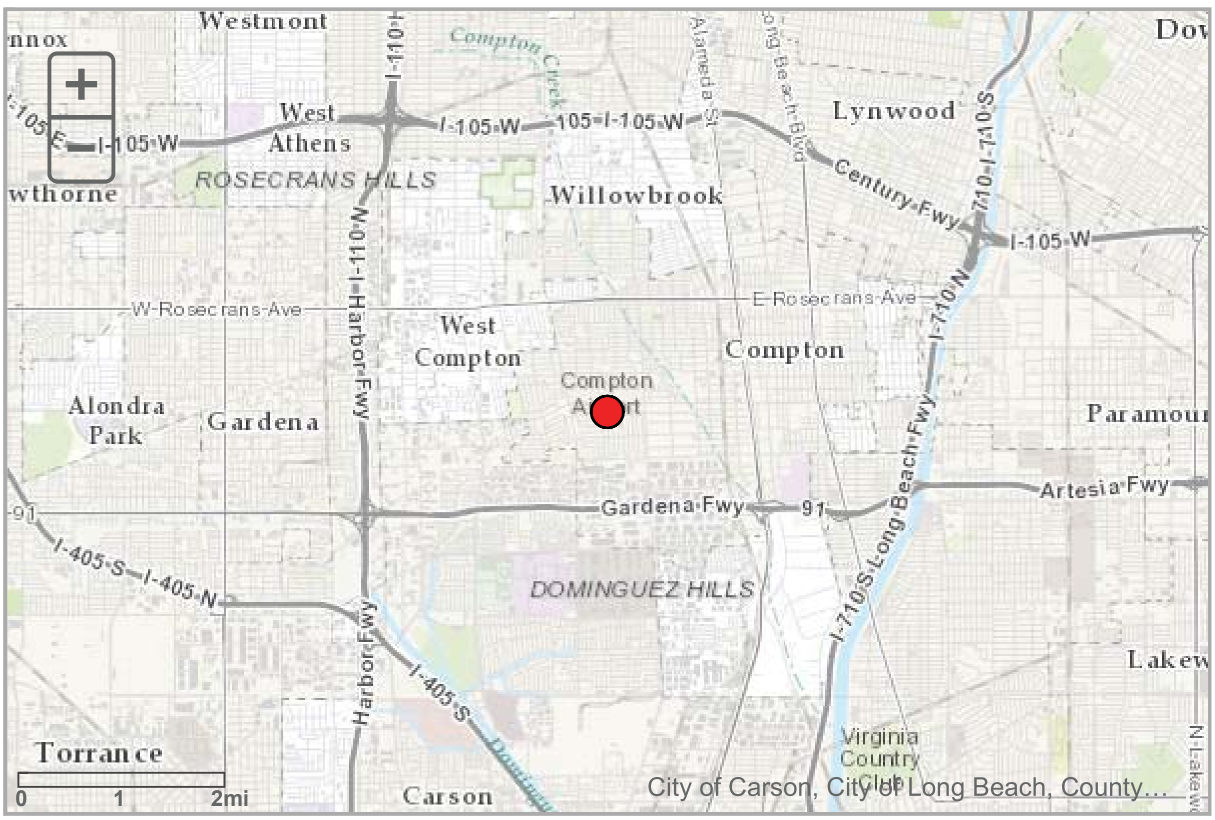
Groundwater Levels for Station 338872N1182432W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data Recent Groundwater Level Data Historical Groundwater Level Data

State Well Number: 03S13W21R003S
Local Well ID:
Site Code: 338872N1182432W001
Latitude (NAD83): 33.887200
Longitude (NAD83): -118.2432
Groundwater Basin (code): Central (4-11.04)

Well Use: Unknown
Well Status: Active
Well Completion Report Number:
Reference Point Elevation (NAVD88 ft): 92.46
Ground Surface Elevation (NAVD88 ft): 92.46
Total Depth (ft): Confidential
Perforated Interval Depths (ft): Confidential

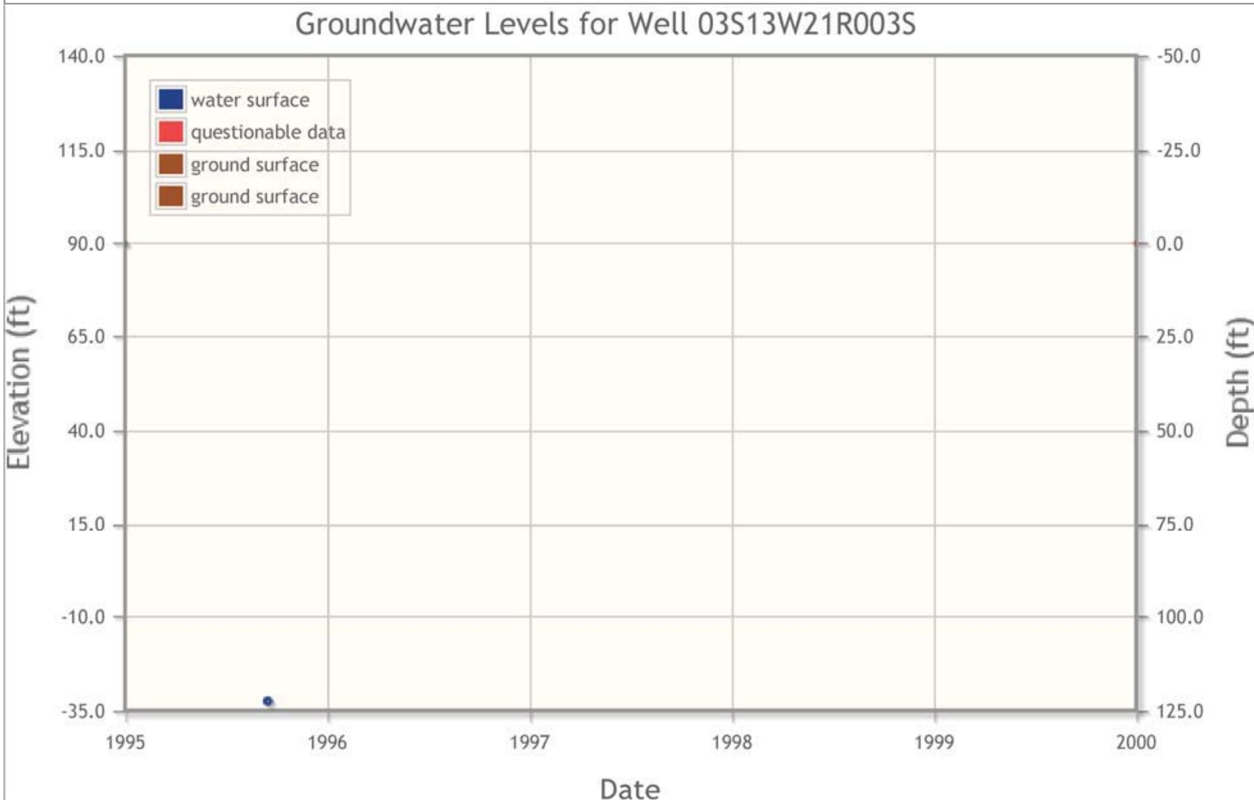


Perform a New Well Search

Groundwater Levels for Station 338872N1182432W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data Recent Groundwater Level Data **Historical Groundwater Level Data**



Download CSV File

Date	RPE	GSE	RPWS	WSE	GS to...	NM Code	QM Code	Agency
09/14/1995 00:00	90	90	122.45	-32.45	122.45			5000

All elevation and depth measurements are in feet. The vertical datum for historical measurements is NGVD29.

Perform a New Well Search

APPENDIX C

Laboratory Test Procedures and Test Results

LABORATORY TESTING - GENERAL

The laboratory testing was performed in general accordance with applicable procedures and standards of the American Society for Testing and Materials (ASTM) and California Test Methods. Unless otherwise noted, the tests were performed in the United - Heider Inspection Group, Inc. laboratories in Moreno Valley, LOR Geotechnical in Riverside, and Hilltop Geotechnical, Inc. in San Bernardino, California. Based on our review of the laboratory data, the undersigned engineers concur with and accept the laboratory testing results.

Brief descriptions of the testing are presented in the following sections.

MOISTURE CONTENT AND DRY DENSITY

The moisture content and dry unit weight were determined for selected soil samples in general accordance with ASTM D 2216 and ASTM D 2937, respectively. The moisture content and dry unit weight are presented on the boring logs at the corresponding sample depths.

SIEVE ANALYSIS

Selected soil samples were tested to determine the quantitative determination of the distribution of particle sizes in soils (particle sizes larger than 75 micrometers) in general accordance with ASTM D 422. The results of the Sieve analyses are presented in this Appendix.

WASH SIEVE ANALYSIS

Selected soil samples were tested to determine the percent fines (the percentage of soil passing the Standard No. 200 sieve) in general accordance with ASTM D 1140. The results of the wash sieve analyses are presented at the appropriate depths on the boring logs.

DIRECT SHEAR

Direct shear tests were performed on ring and remolded samples in general accordance with ASTM D 3080 to evaluate the shear strength of the soils. Samples were tested in a saturated state. Both peak and ultimate shear strengths were measured and reported in the test plots. Test results are attached in this appendix.

CORROSIVITY TESTS

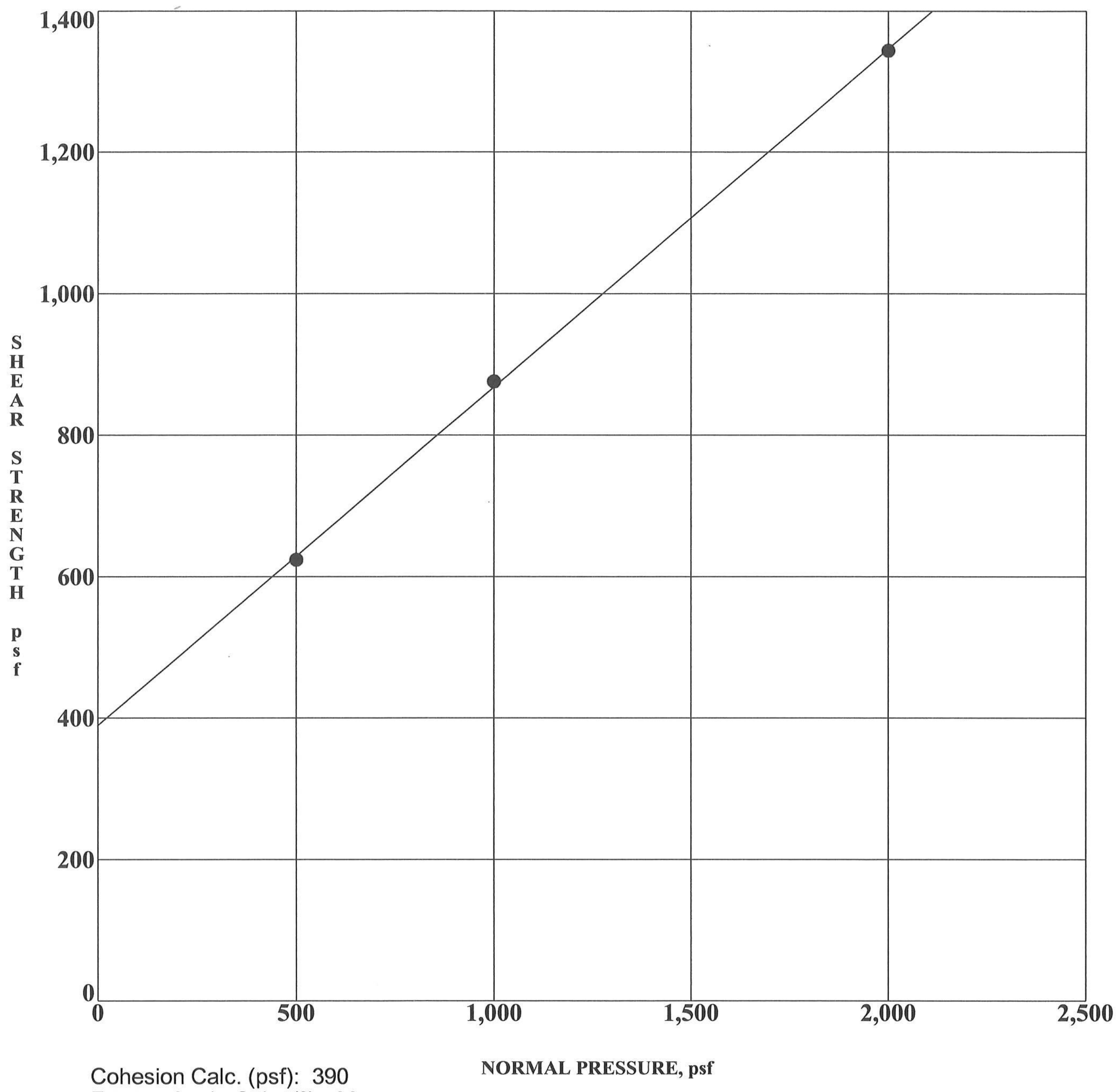
Corrosivity tests were performed on a selected bulk sample to evaluate minimum resistivity, pH, water-soluble sulfates and chlorides (CTMs 643, 417 and 422 respectively). Test results are attached in this appendix.

EXPANSION INDEX TEST

Expansion Index tests were performed on selected bulk samples in general accordance with ASTM D 4829 to evaluate the expansion potential of the onsite soils. Test results are attached in this appendix.

MAXIMUM DENSITY TESTS

The maximum dry density and optimum moisture content of a representative bulk soil sample were determined in accordance with ASTM Test Method D1557. Test results and a graphical plot of maximum density vs. optimum moisture content are attached in this appendix.



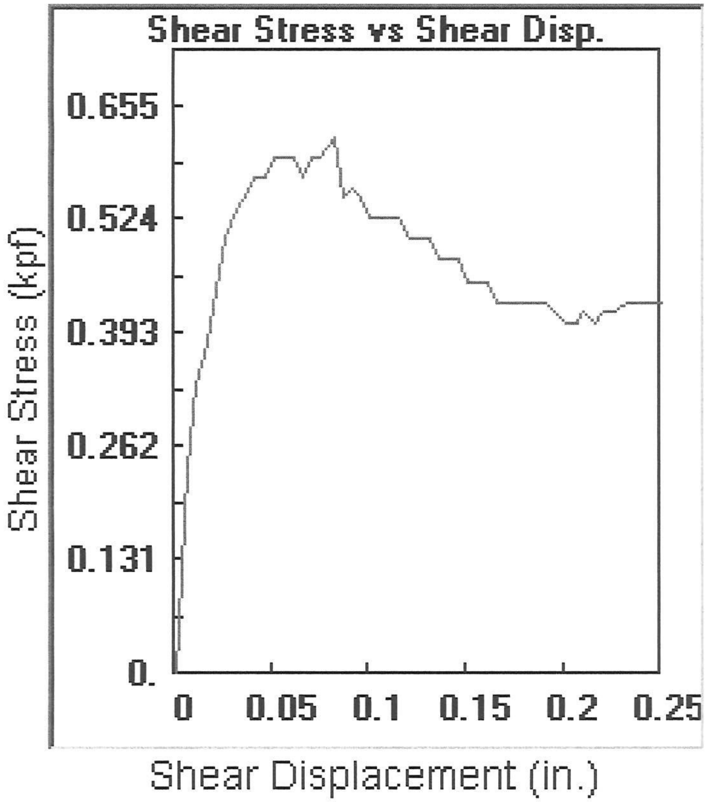
Cohesion Calc. (psf): 390
Friction Angle Calc. (°): 26

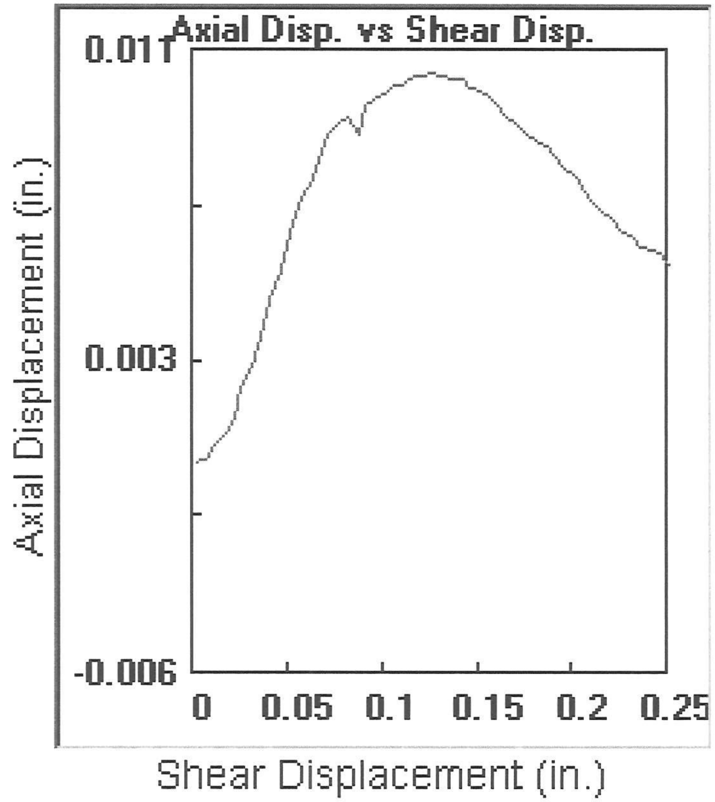
	Specimen Identification	Classification	DD	MC%
●	*Compton B1 5.0*	*Grey-Brown Sandy Clayey Silt*	*109*	*13*

PROJECT *Misc Lab Testing*

PROJECT NO. *60750.9*
DATE *2/16/18*

SHEAR TEST DIAGRAM
LOR Geotechnical Group, Inc.
Riverside, CA 92507





Parameters

Client: UNITED-HEIDER INSPECTION

Location: INSTRUCTIONAL BUILDING NO. 2 COMPTON CC

Job # 10-18020PW

Soil Type:GREY BROWN

Sample: B1 0-5

Technician: MARK

Boring: 1

Axial Load: 500 psf

Depth: 0-5 ft.

Shear Rate: .01 in./min.

File: 60750-10-8020-B1-500K.dat

Distance: 0.25 in.

Stress at Max Def
624 0.081

Stress at Max Disp
0.245 432

Maximum Load

624 psf

Shear Displacement at maximum Load

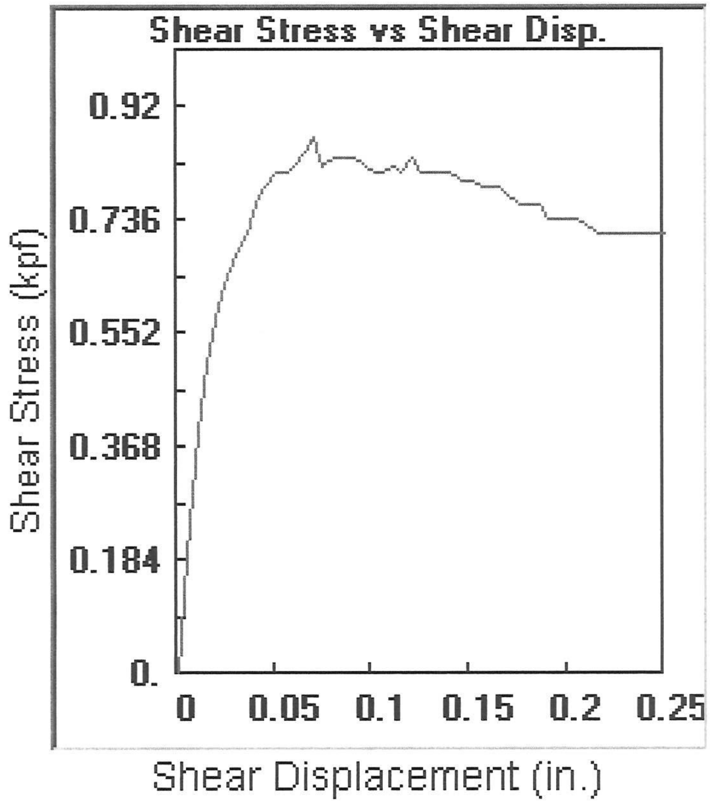
0.0805 in.

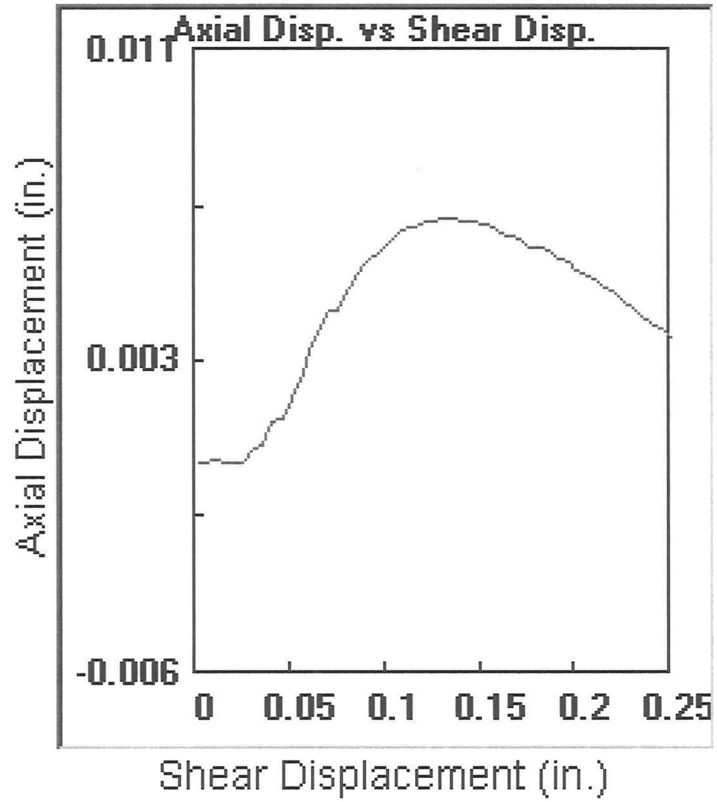
Date

2/13/2018

LOR Geotechnical

V71





Parameters

Client: UNITED-HEIDER INSPECTION

Location: INSTRUCTIONAL BUILDING NO. 2 COMPTON CC

Job # 10-18020PW

Soil Type:GREY BROWN

Sample: B1 0-5

Technician: MARK

Boring: 1

Axial Load: 1000 psf

Depth: 0-5 ft.

Shear Rate: .01 in./min.

File: 60750-10-8020-B1-1K.dat

Distance: 0.25 in.

Stress at Max Def
876 0.07

Stress at Max Disp
0.245 720

Maximum Load

876 psf

Shear Displacement at maximum Load

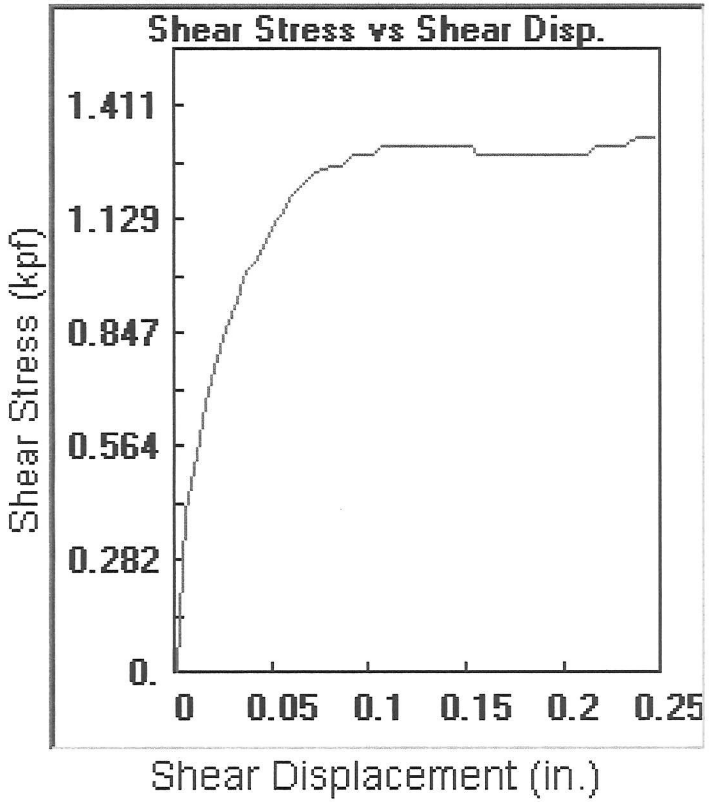
0.0700 in.

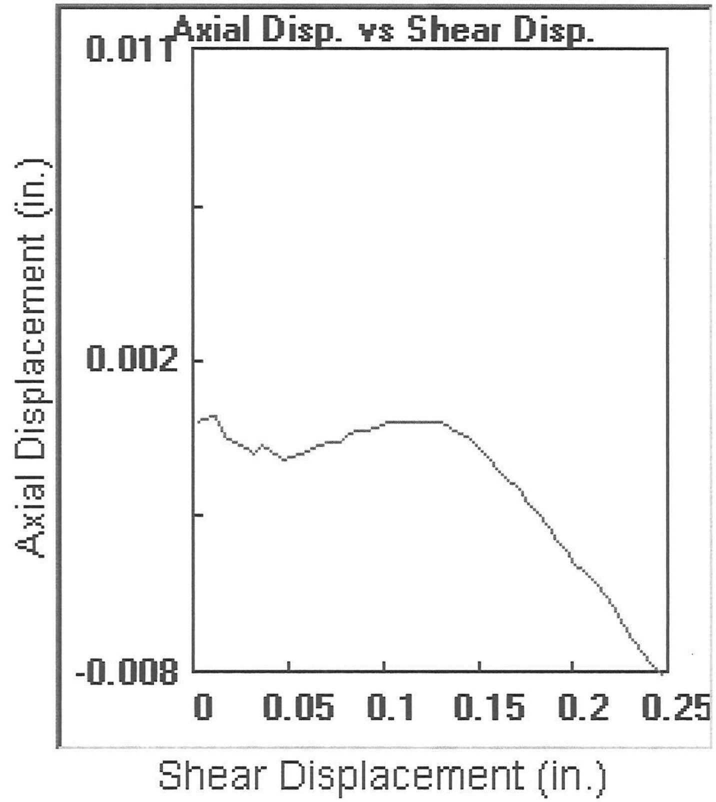
Date

2/13/2018

LOR Geotechnical

V71





Parameters

Client: UNITED-HEIDER INSPECTION

Location: INSTRUCTIONAL BUILDING NO. 2 COMPTON CC

Job # 10-18020PW

Soil Type:GREY BROWN

Sample: B1 0-5

Technician: MARK

Boring: 1

Axial Load: 2000 psf

Depth: 0-5 ft.

Shear Rate: .01 in./min.

File: 60750-10-8020-B1-2K.dat

Distance: 0.25 in.

Stress at Max Def
1344 0.236

Stress at Max Disp
0.241 1344

Maximum Load

1344 psf

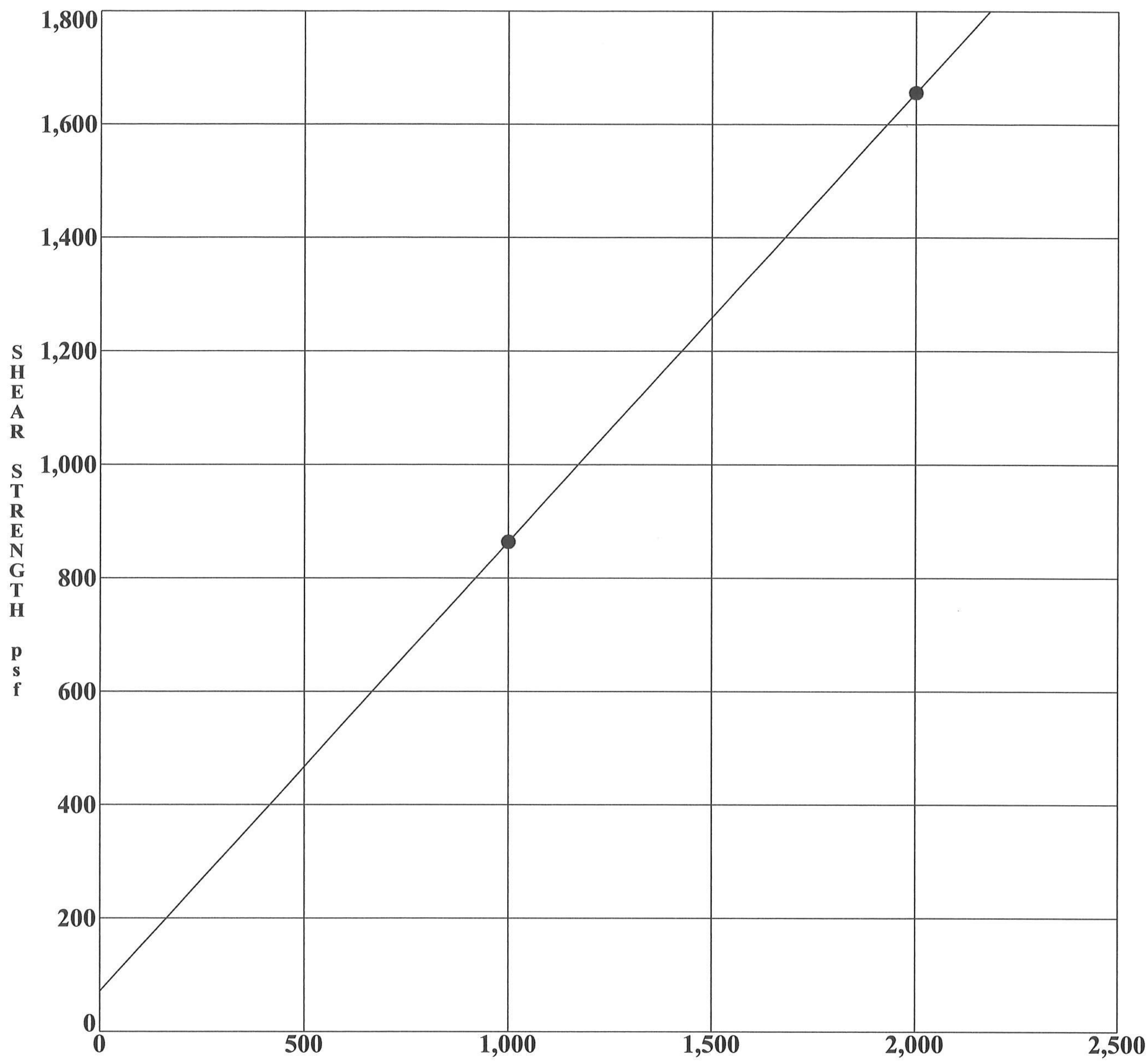
Shear Displacement at maximum Load

0.2355 in.

Date
2/13/2018

LOR Geotechnical

V71



NORMAL PRESSURE, psf

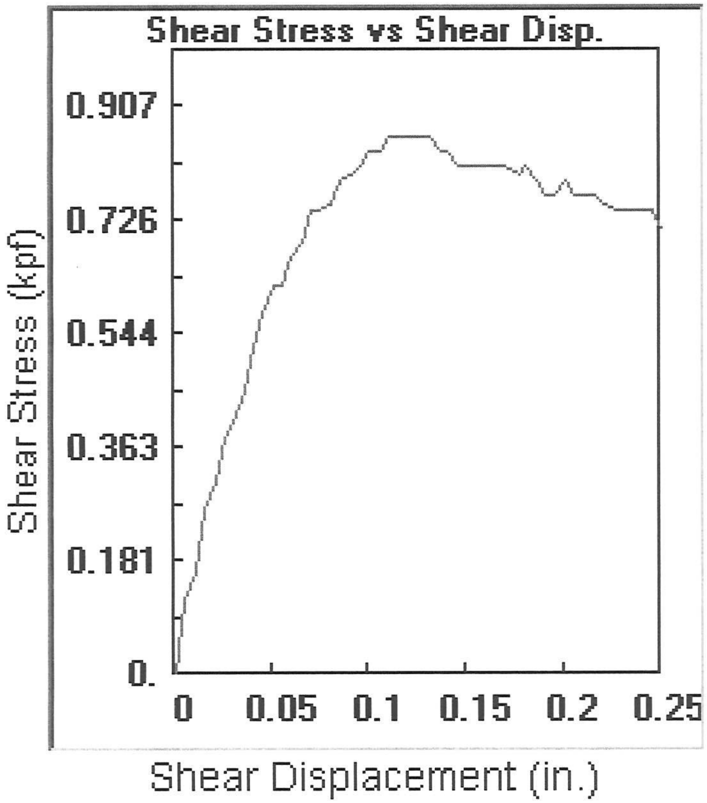
Cohesion Calc. (psf): 72
Friction Angle Calc. (°): 38

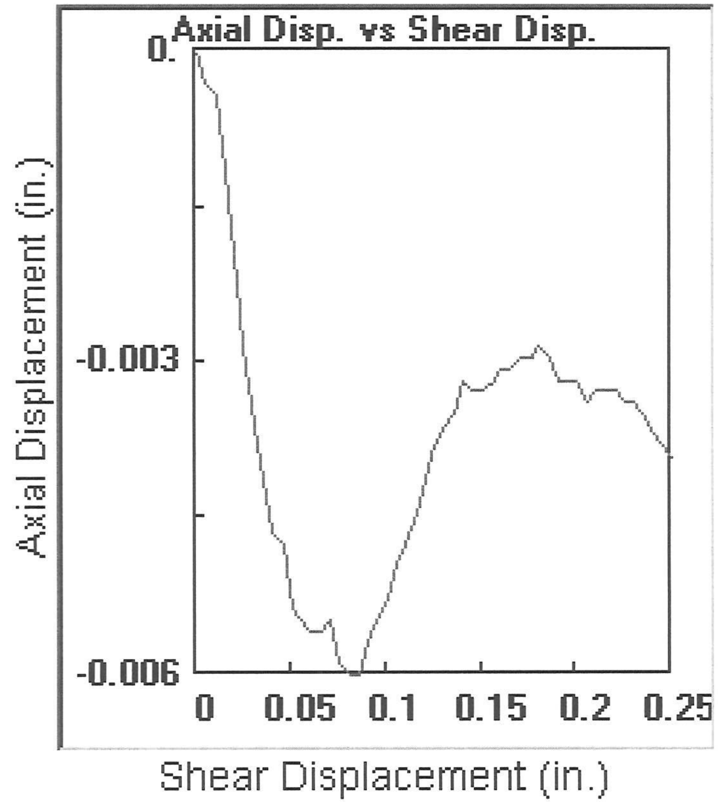
	Specimen Identification	Classification	DD	MC%
●	*Compton B3 5.0*	*Brown Clayey Sandy Silt*	*99*	*13*

PROJECT *Misc Lab Testing*

PROJECT NO. *60750.9*
DATE *2/16/18*

SHEAR TEST DIAGRAM
LOR Geotechnical Group, Inc.
Riverside, CA 92507





Parameters

Client: UNITED-HEIDER INSPECTION

Location: INSTRUCTIONAL BUILDING NO. 2 COMPTON CC

Job # 10-18020PW

Soil Type:BROWN CLAYEY

Sample: B3 5

Technician: MARK

Boring: 3

Axial Load: 1000 psf

Depth: 5 ft.

Shear Rate: .01 in./min.

File: 60750-10-8020-B3-1K.dat

Distance: 0.25 in.

Stress at Max Def
864 0.11

Stress at Max Disp
0.245 744

Maximum Load

864 psf

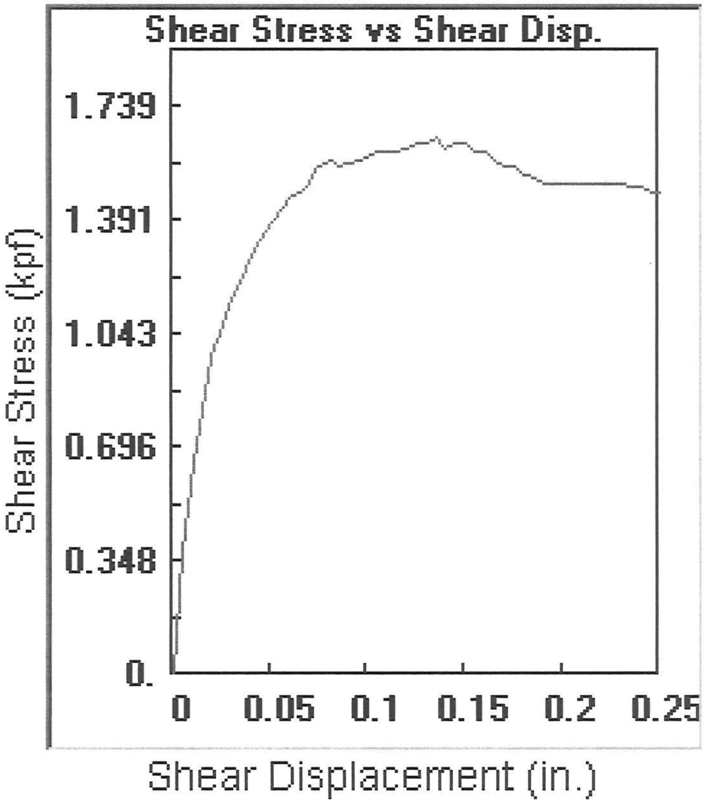
Shear Displacement at maximum Load

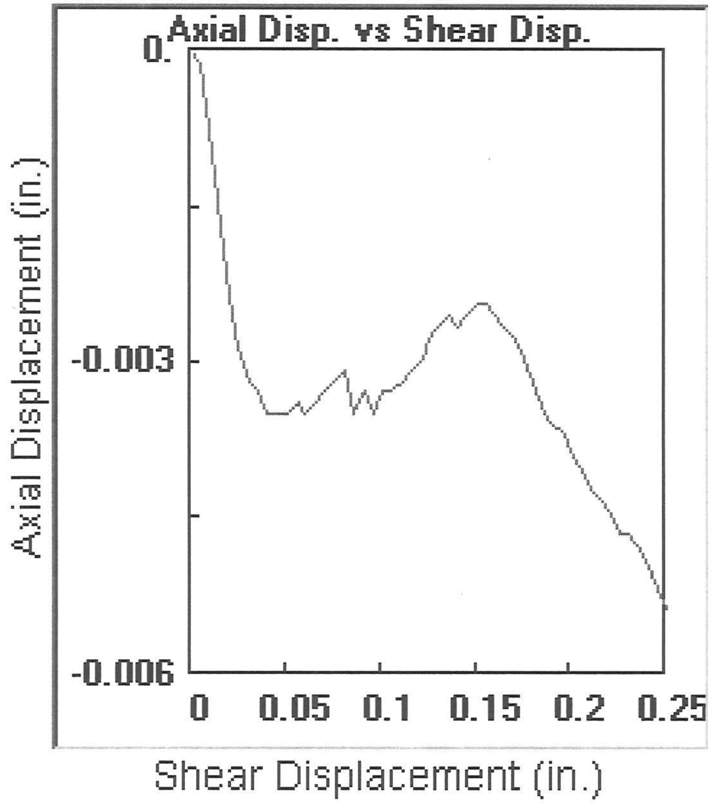
0.1100 in.

Date
2/12/2018

LOR Geotechnical

V71





Parameters

Client: UNITED-HEIDER INSPECTION

Location: INSTRUCTIONAL BUILDING NO. 2 COMPTON CC

Job # 10-18020PW

Soil Type:BROWN CLAYEY

Sample: B3 5

Technician: MARK

Boring: 3

Axial Load: 2000 psf

Depth: 5 ft.

Shear Rate: .01 in./min.

File: 60750-10-8020-B3-2K.dat

Distance: 0.25 in.

Stress at Max Def
1656 0.135

Stress at Max Disp
0.245 1488

Maximum Load

1656 psf

Shear Displacement at maximum Load

0.1350 in.

Date
2/12/2018

LOR Geotechnical

V71

UNITED-HEIDER INSPECTION GROUP

An ETS Company

22620 Goldencrest Drive, Suite 114 | Moreno Valley, California 92553

P: 951.697.4777 | F: 951.653.1143 | www.united-heider.com

LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING MODIFIED EFFORT, ASTM D 1557

Tested For: Compton Community College District
1111 East Artesia Blvd.
Compton, CA 90221

Project: Compton Center New Instructional Building 2
1111 East Artesia Boulevard
Compton, CA 90221

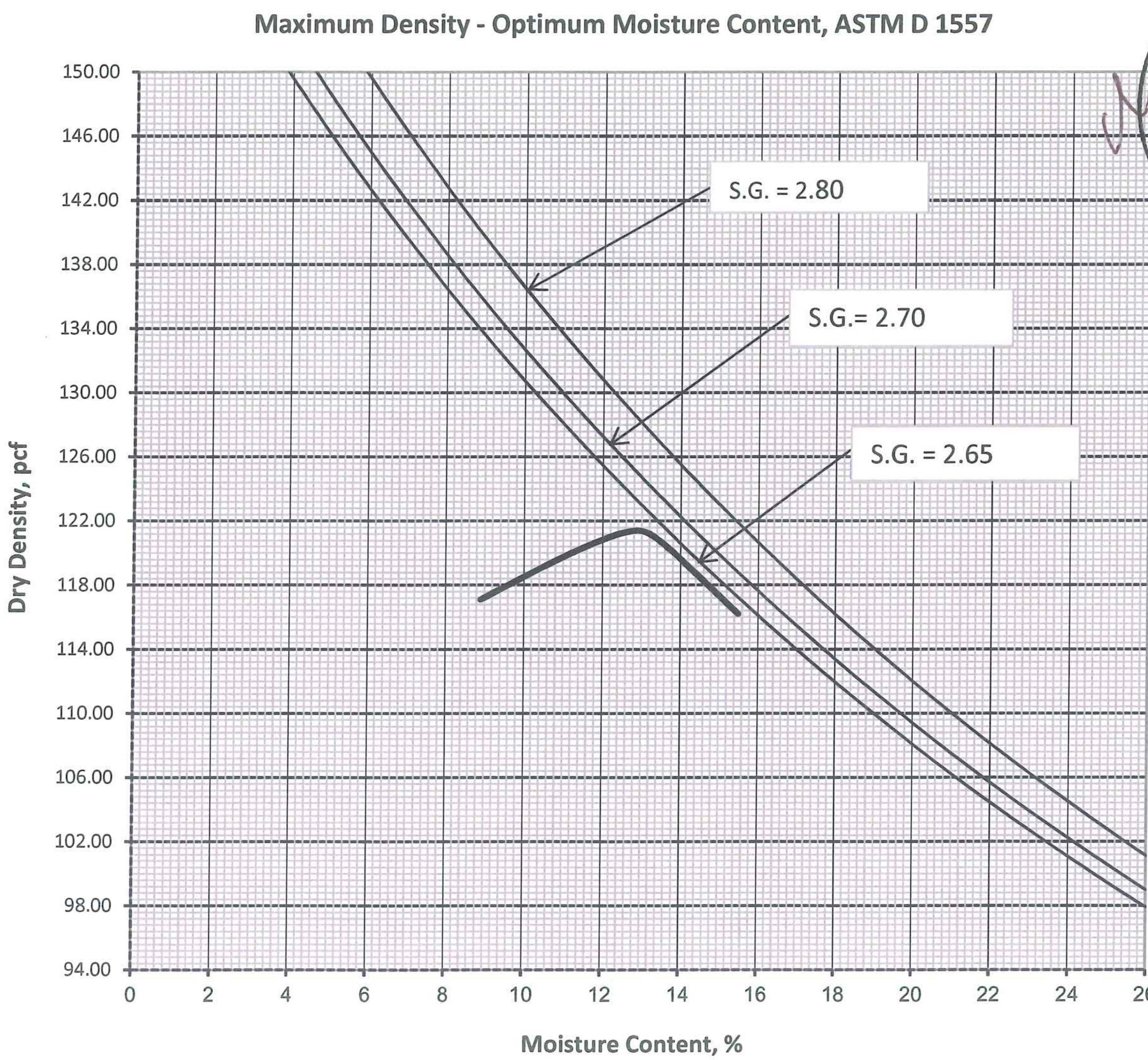
DSA File No.: N/A
Dsa App No.: N/A

Date: February 2, 2018

United-Heider Inspection Group File No.: 10-18020PW

Lab Sample No.:	10S180207-5-1		
Visual Class.:	Grey Brown Sandy Clayey SILT	**Test Results:**	
Sample Source:	Boring 1 from 0-5'	**Maximum Dry Density, pcf:**	121.4
Method of Test:	ASTM D 1557	**Optimum Moisture Content, %:**	12.8

REGISTERED PROFESSIONAL ENGINEER DENNIS W. HEIDER C 47379 EXP 12/31/2019 CIVIL STATE OF CALIFORNIA



UNITED-HEIDER INSPECTION GROUP
An ETS Company

February 15, 2018

Instructional Building No. 2
Compton Center – Compton Community College
United-Heider Inspection Group Project No. 10-18020PW

ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Sample ID	Liquid Limit	Plastic Limit	Plasticity Index
B-1, 0-5'	34	23	11
B-1, 10' (similar to 0-5')	34	23	11
B-1, 12.5'	Non Plastic		
B-1, 20' (similar to 30')	60	33	27
B-1, 30'	60	33	27
B-1, 40'	Non Plastic		
B-1, 45'	39	27	12

UNITED-HEIDER
INSPECTION GROUP
An ETS Company

22620 Goldencrest Drive, Suite 114, PO Box 7668
Moreno Valley, California 92553
Tel: 951.697.4777 Fax: 951.653.1144
www.uit-inc.us

MATERIAL TEST REPORT

DATE OF ISSUE: 2/8/2018

RE: Compton Center New Instructional Building 2
1111 East Artesia Boulevard
Compton, CA 90221

UIT# 1018020PW
LAB# 10S180207-5

MATERIAL/SAMPLE DATA

Material: Soil
Source: Job Site
Location: B-1, 0-5'

Sample Date: 02/02/2018
Sampled By: Dennis

TESTS COMPLETED

United Inspection and Testing Laboratories has performed testing of materials for the above project as noted below. Testing was performed in accordance with the indicated test method. Results as follows:

1 **Compaction - Modified Proctor ASTM D 1557**

Please refer to the attached data sheets for results.

2 **Expansion Index Test ASTM D 4829**

Expansion Index: B-1 0-5'	85 = Medium

REGISTERED PROFESSIONAL ENGINEER
DENNIS W. HEIDER
C 47379
EXP 12/31/2019
CIVIL
STATE OF CALIFORNIA

3 **Sieve Analysis - Bulk Sample Gradation 3" to #200 ASTM C 136, C 117**

Sieve Size	3/8	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	100	99	99	84	65.5

BABCOCK Laboratories, Inc.
The Standard of Excellence for Over 100 Years

Client Name:	United-Heider Inspection Group
Contact:	Bob Russell
Address:	22620 Goldencrest Drive, Ste. 114 Moreno Valley, CA 92553
Report Date:	14-Feb-2018

Analytical Report:	Page 1 of 3
Project Name:	Pricing for Effluent Sampling & Analysis
Project Number:	10-18020PW Compton Community College
Work Order Number:	**B8B0145**

Received on Ice (Y/N): No Temp: 30 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	Matrix	Date Sampled	By	Date Submitted	By
B8B0145-01	10-18020 PW Compton Community College	Soil	01/31/18 00:00	Dennis Heider	02/02/18 15:10	Steve Lindquist

Client Name: United-Heider Inspection Group
Contact: Bob Russell
Address: 22620 Goldencrest Drive, Ste. 114
Moreno Valley, CA 92553

Report Date: 14-Feb-2018

Project Name: Pricing for Effluent Sampling & Analysis
Project Number: 10-18020PW Compton Community College
Work Order Number: B8B0145
Received on Ice (Y/N): No Temp: 30 °C

Laboratory Reference Number

B8B0145-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
10-18020 PW Compton Community College	Soil	01/31/18 00:00	02/02/18 15:10

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Saturated Paste							
pH	7.3	0.1	pH Units	S-1.10 W.S.	02/07/18 17:50	RER	
Redox Potential	220	1.0	mV	SM 2580	02/07/18 17:50	RER	
Saturated Extract							
Saturated Resistivity	2700	5	ohm-cm	SM 2520B	02/07/18 17:50	RER	
Water Extract							
Chloride	ND	10	ppm	Ion Chromat.	02/07/18 10:47	KBS	N_WEX
Sulfate	36	10	ppm	Ion Chromat.	02/07/18 10:47	KBS	N_WEX

BABCOCK Laboratories, Inc.
The Standard of Excellence for Over 100 Years

Client Name:	United-Heider Inspection Group	Analytical Report:	Page 3 of 3
Contact:	Bob Russell	Project Name:	Pricing for Effluent Sampling & Analysis
Address:	22620 Goldencrest Drive, Ste. 114 Moreno Valley, CA 92553	Project Number:	10-18020PW Compton Community College
Report Date:	14-Feb-2018	**Work Order Number:**	**B8B0145**

Received on Ice (Y/N): No Temp: 30 °C

Notes and Definitions

N_WEX	Analyte determined on a 1:10 water extract from the sample.
ND:	Analyte NOT DETECTED at or above the Method Detection Limit **(if MDL is reported)**, otherwise at or above the Reportable Detection Limit (RDL)
NR:	Not Reported
RDL:	Reportable Detection Limit
MDL:	Method Detection Limit
* / "' :	NELAP does not offer accreditation for this analyte/method/matrix combination

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

KayeLani A. Deener

KayeLani A. Deener

cc:

e-Short_No Alias.rpt

mailing
P.O Box 432
Riverside, CA 92502-0432

location
6100 Quail Valley Court
Riverside, CA 92507-0704

P 951 653 3351
F 951 653 1662
www.babcocklabs.com

CA ELAP No. 2698
EPA No. CA00102
NELAP No. OR4035
LACSD No. 10119

Lab Results
Heider Inspection Group (2015)

APPENDIX B

LABORATORY TEST RESULTS
Atterberg Limits (Liquid and Plastic) Test Results
Sieve Analysis Result (Grain Size Distribution)
Direct Shear Test Results
Collapse Potential Test (Consolidation Test)
Corrosivity Test Results

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

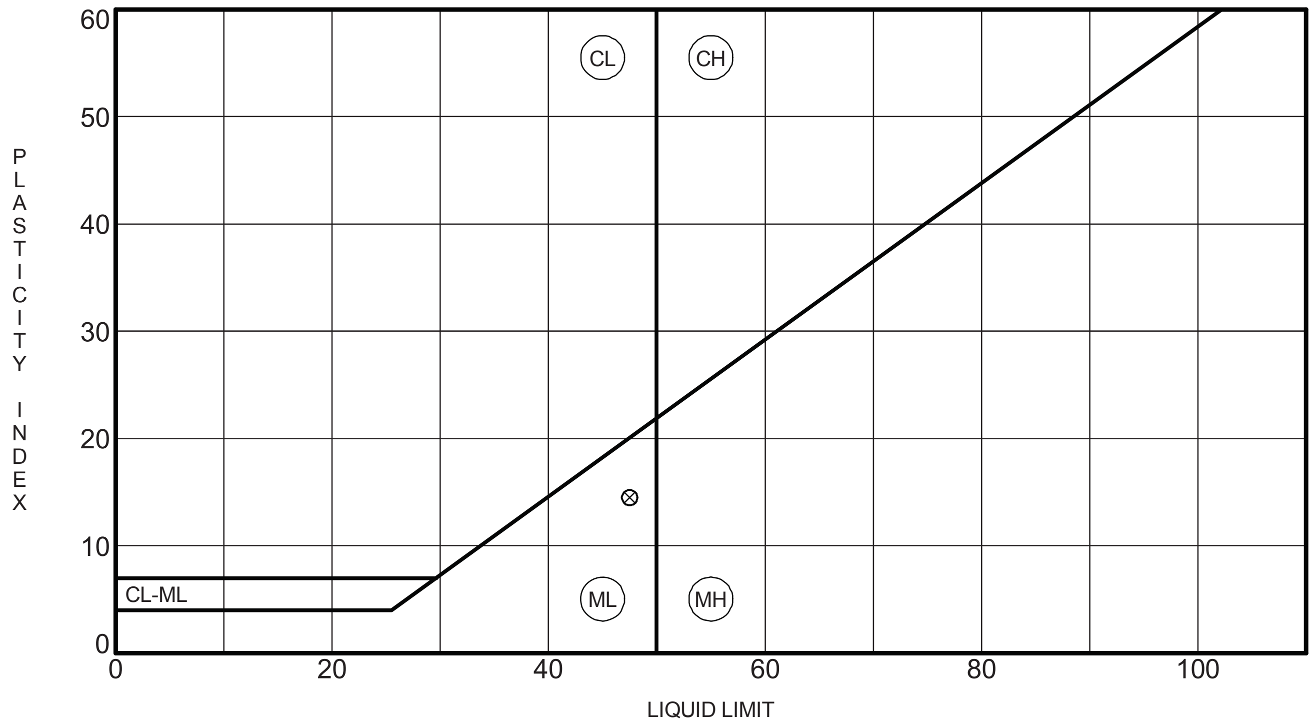
ATTERBERG LIMITS RESULTS

CLIENT El Camino College Compton Center

PROJECT NAME Proposed Instructional Building I

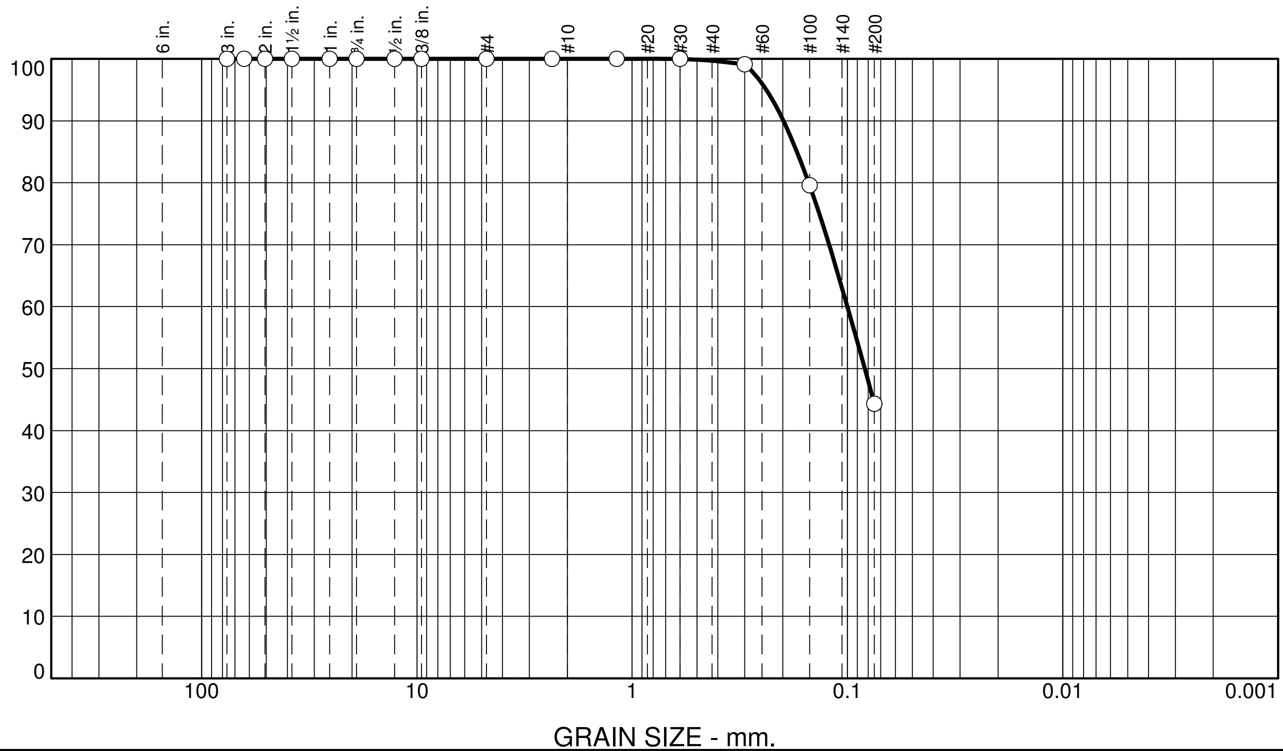
PROJECT NUMBER HE15281-2

PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221



	Specimen Identification		LL	PL	PI	Fines	Classification
⊗	**B-2**	**19.5**	**48**	**33**	**15**	**94**	**SILT (ML)**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	56	44	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2 1/2"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#8	100		
#16	100		
#30	100		
#50	99		
#100	80		
#200	44		

* (no specification provided)

Material Description

Sample Type B-2 @ 5

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 0.1986 D_{85}= 0.1718 D_{60}= 0.1001
D_{50}= 0.0832 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**

Tested By:

Checked By:

Title:

Date Sampled:

CONSOLIDATED ENGINEERING LABORATORIES

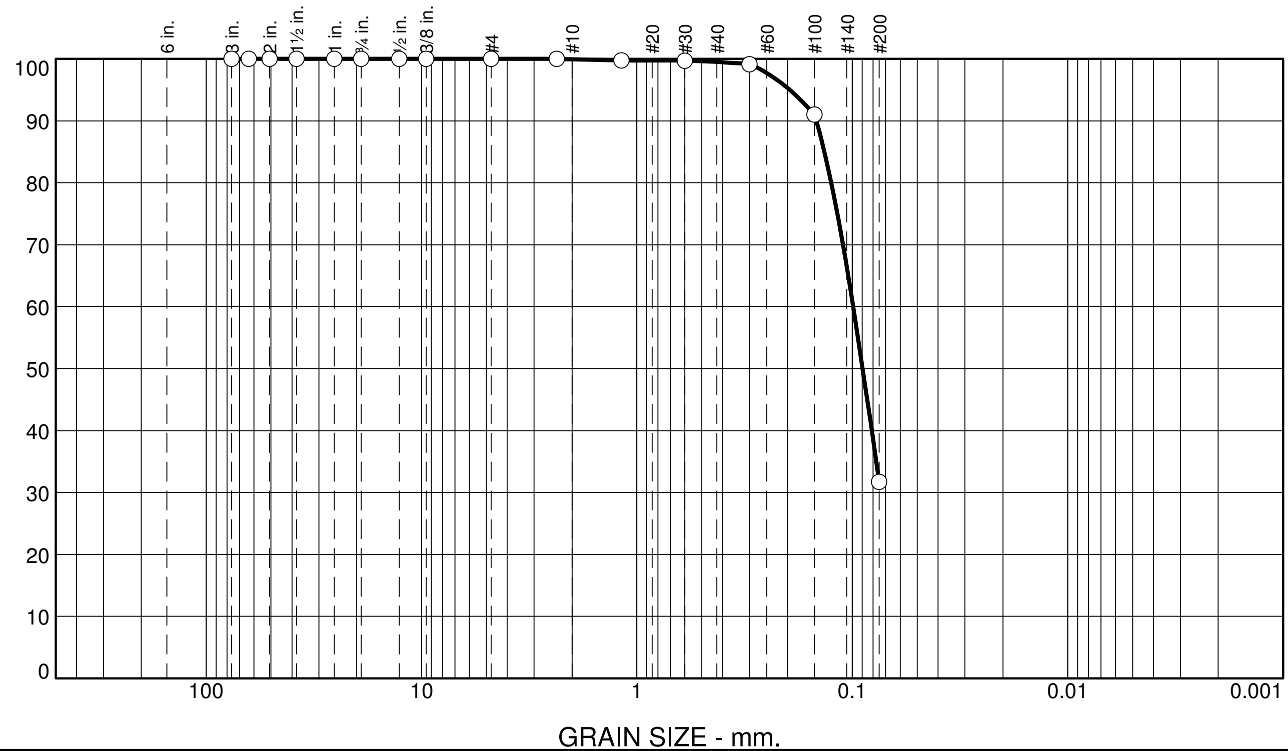
San Ramon, California

Client:

Project: Proposed Instructional Building 1

Project No: HE15281-2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	68	32	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2 1/2"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#8	100		
#16	100		
#30	100		
#50	99		
#100	91		
#200	32		

* (no specification provided)

Material Description

Sample Type: B-3 @ 5

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 0.1469 D_{85}= 0.1347 D_{60}= 0.0991
D_{50}= 0.0895 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**
Tested By:
Checked By:
Title:

Date Sampled:

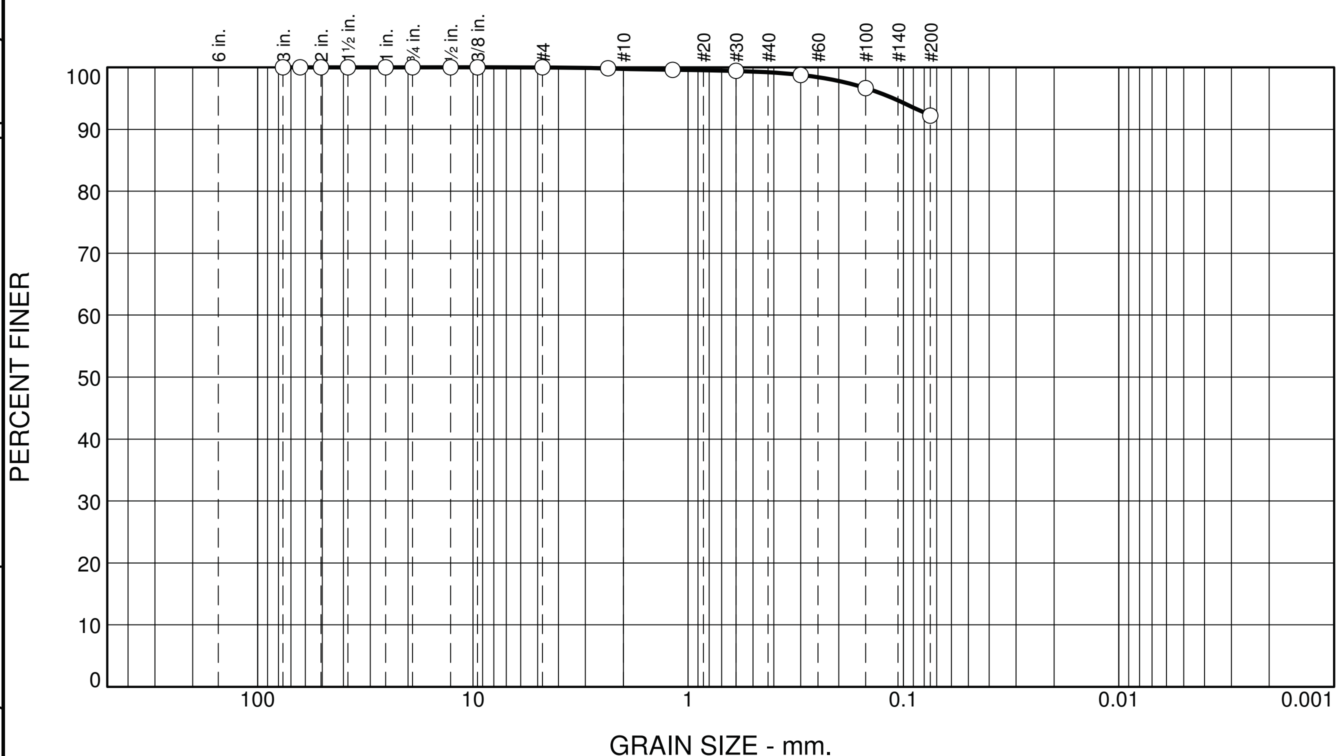
CONSOLIDATED ENGINEERING LABORATORIES

San Ramon, California

Client:
Project: Proposed Instructional Building 1

Project No: HE15281-2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	7	92	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2 1/2"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#8	100		
#16	100		
#30	99		
#50	99		
#100	97		
#200	92		

* (no specification provided)

Material Description

Sample Type: B-3 @ 15

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**

Tested By: ____________________

Checked By: ____________________

Title: ____________________

Date Sampled:

CONSOLIDATED ENGINEERING LABORATORIES

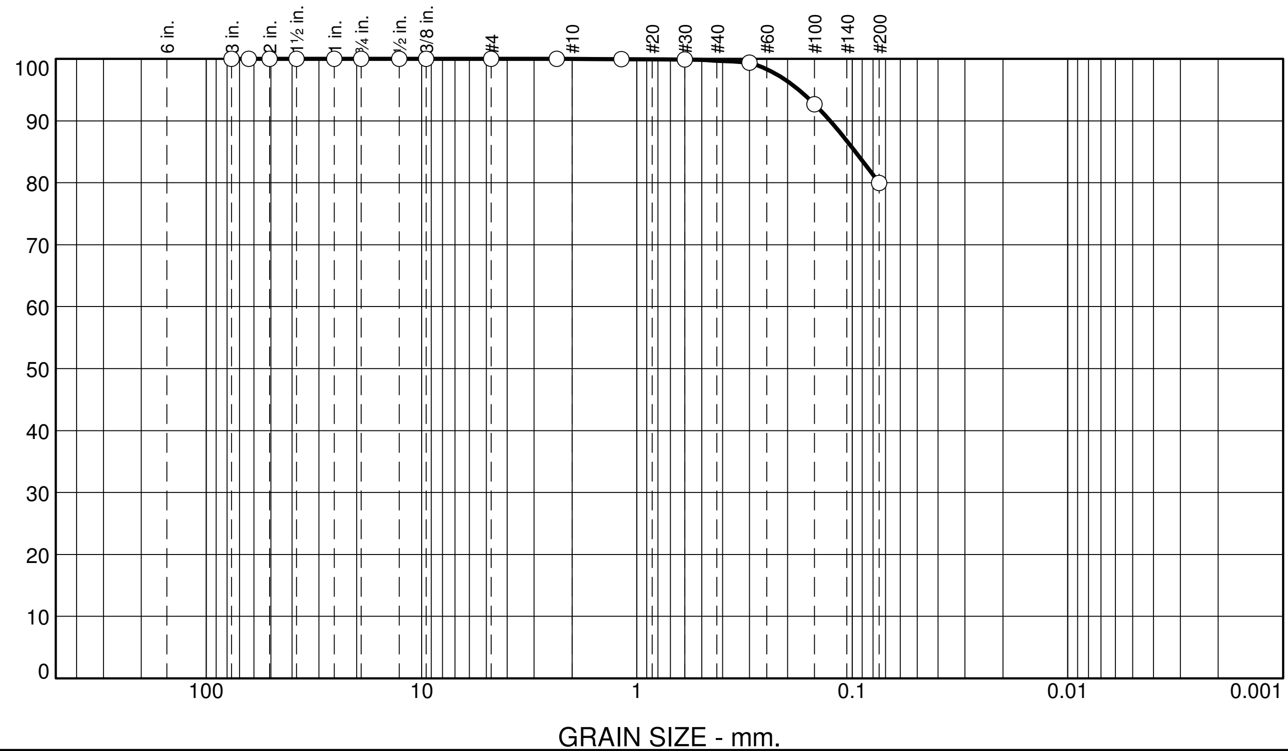
San Ramon, California

Client:

Project: Proposed Instructional Building 1

Project No: HE15281-2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	20	80	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100		
2 1/2"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#8	100		
#16	100		
#30	100		
#50	99		
#100	93		
#200	80		

* (no specification provided)

Material Description

Sample Type: B-3 @ 40

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 0.1269 D_{85}= 0.0967 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:**

Tested By:

Checked By:

Title:

Date Sampled:

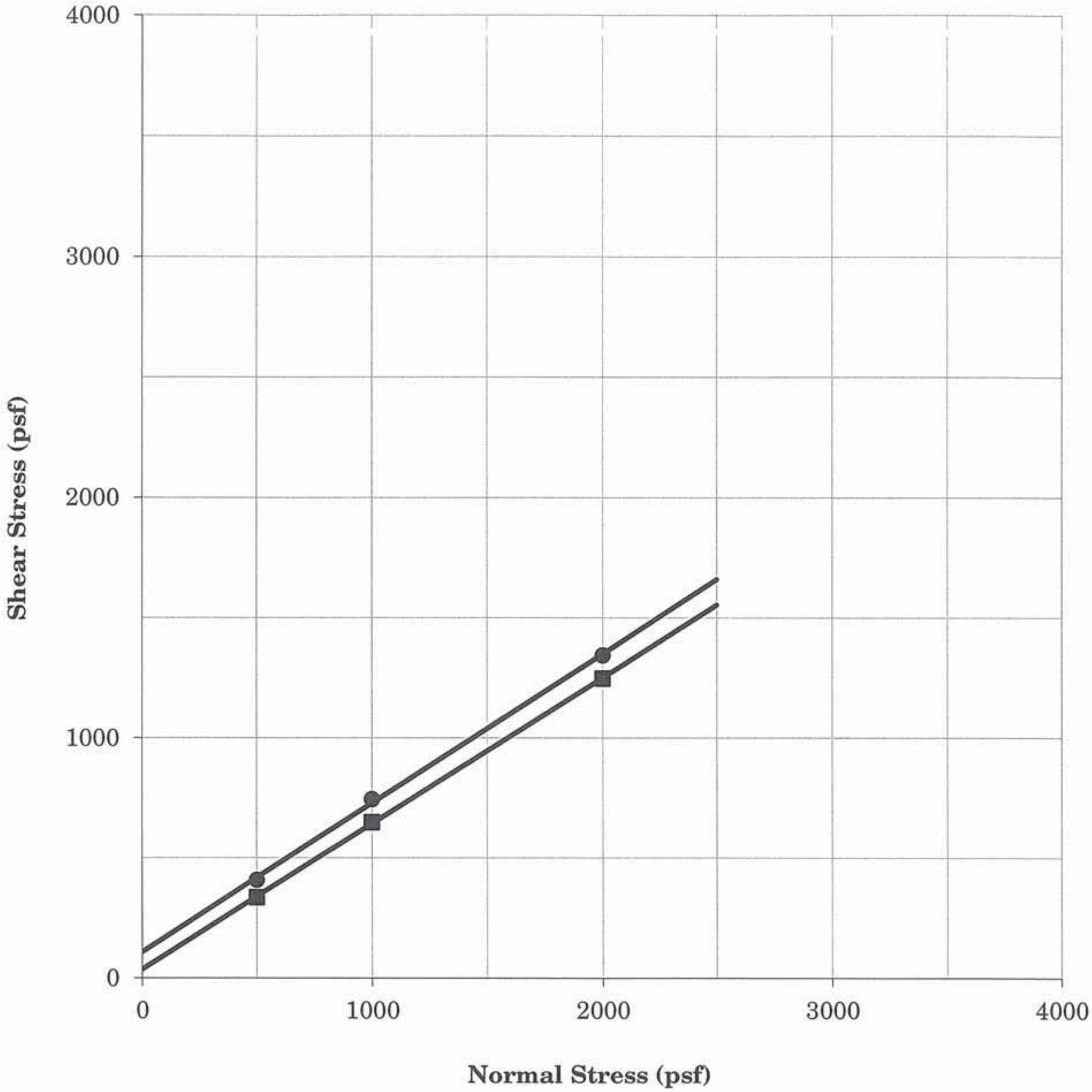
CONSOLIDATED ENGINEERING LABORATORIES

San Ramon, California

Client:

Project: Propsed Instructional Building 1

Project No: HE15281-2



Shear Speed: 0.005 in. / min. Samples tested in a submerged condition.

Average In-Situ Dry Density (pcf)	95.6
Average In-Situ Moisture Content	4.6

Peak	Cohesion	108 psf
	Internal Friction Angle	32 degrees
Ultimate	Cohesion	36 psf
	Internal Friction Angle	31 degrees
Residual	Cohesion	
	Internal Friction Angle	

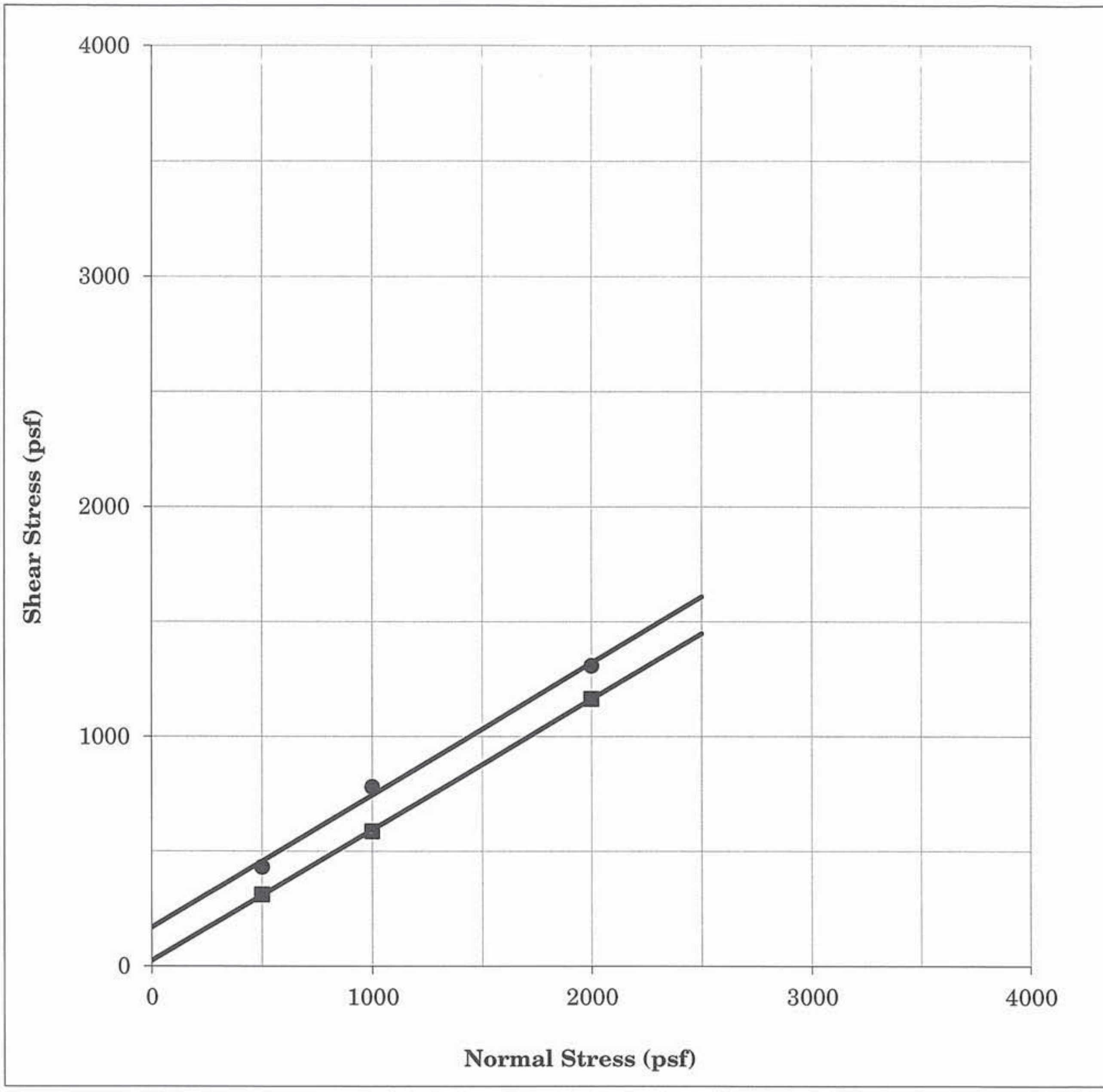
HILLTOP GEOTECHNICAL
INCORPORATED

DIRECT SHEAR TEST RESULTS
(ASTM D3080 Test Method)

SAMPLE: B1, 5.0'

SOIL DESCRIPTION: Silty, fine sand (SM), Grayish brown

BY:	JGS	DATE:	11/2015
PROJECT NO.:	1015-B15	PLATE NO.:	1



Shear Speed: 0.005 in. / min. Samples tested in a submerged condition.

Average In-Situ Dry Density (pcf)	103.2
Average In-Situ Moisture Content	13.7

Peak	Cohesion	168 psf
	Internal Friction Angle	30 degrees
Ultimate	Cohesion	24 psf
	Internal Friction Angle	30 degrees
Residual	Cohesion	
	Internal Friction Angle	

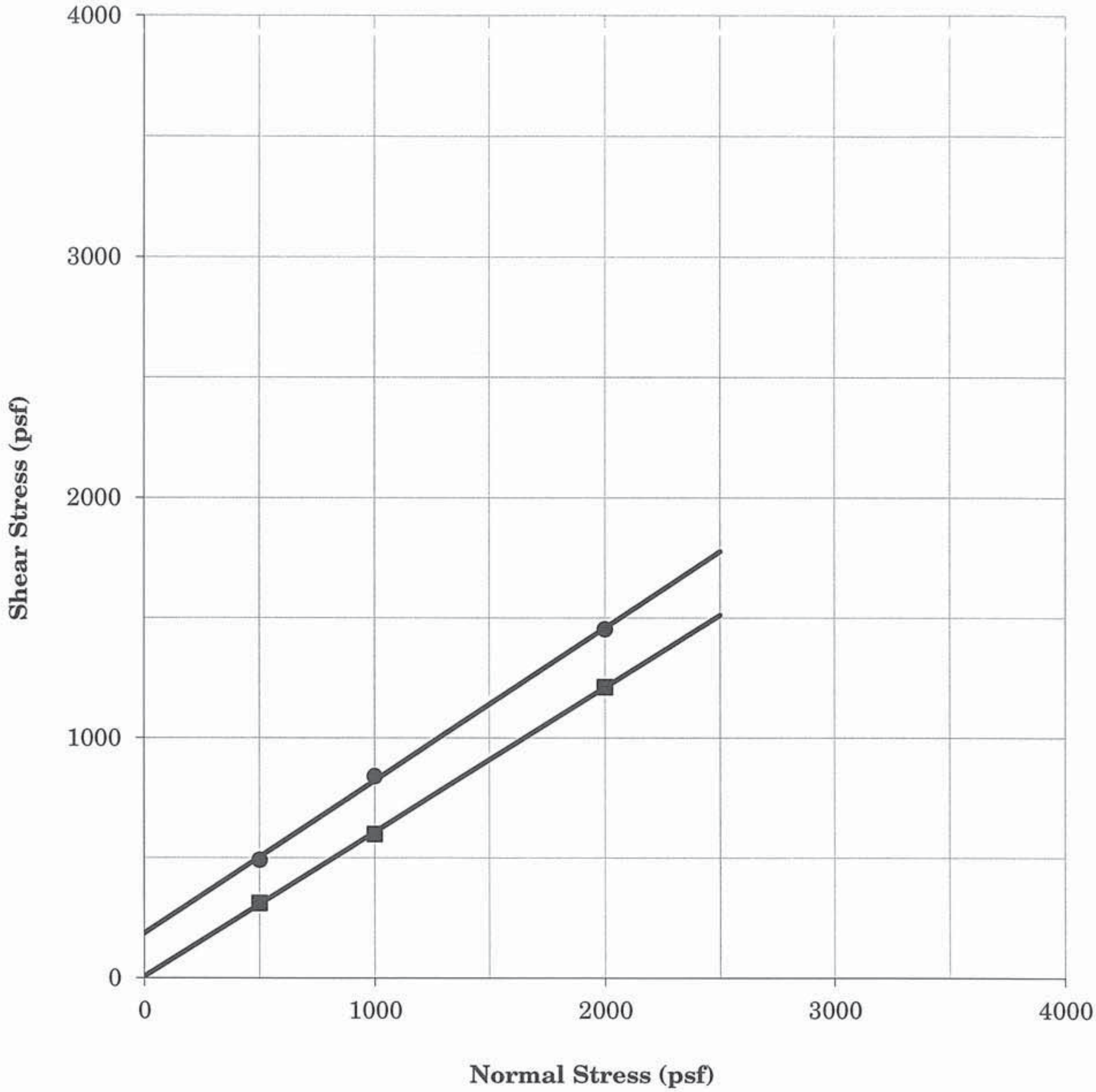
HILLTOP GEOTECHNICAL
INCORPORATED

DIRECT SHEAR TEST RESULTS
(ASTM D3080 Test Method)

SAMPLE: B2, 10.0'

SOIL DESCRIPTION: Silty, fine sand (SM), Grayish brown

BY:	JGS	DATE:	11/2015
PROJECT NO.:	1015-B15	PLATE NO.:	2



Shear Speed: 0.005 in. / min. Samples tested in a submerged condition.

Average In-Situ Dry Density (pcf)	108.5
Average In-Situ Moisture Content	13.3

Peak	Cohesion	186 psf
	Internal Friction Angle	32 degrees
Ultimate	Cohesion	6 psf
	Internal Friction Angle	31 degrees
Residual	Cohesion	
	Internal Friction Angle	

HILLTOP GEOTECHNICAL
INCORPORATED

DIRECT SHEAR TEST RESULTS
(ASTM D3080 Test Method)

SAMPLE: B1, 0'-5' (Remolded sample)

SOIL DESCRIPTION: Silty, fine sand (SM), Grayish brown

BY:	JGS	DATE:	11/2015
PROJECT NO.:	1015-B15	PLATE NO.:	3

Heider Inspection Group - An ETS Company
800 S Rochester Ave, Ste A
Ontario, CA 91761
Office: 909-673-0292; Fax: 909-673-0272

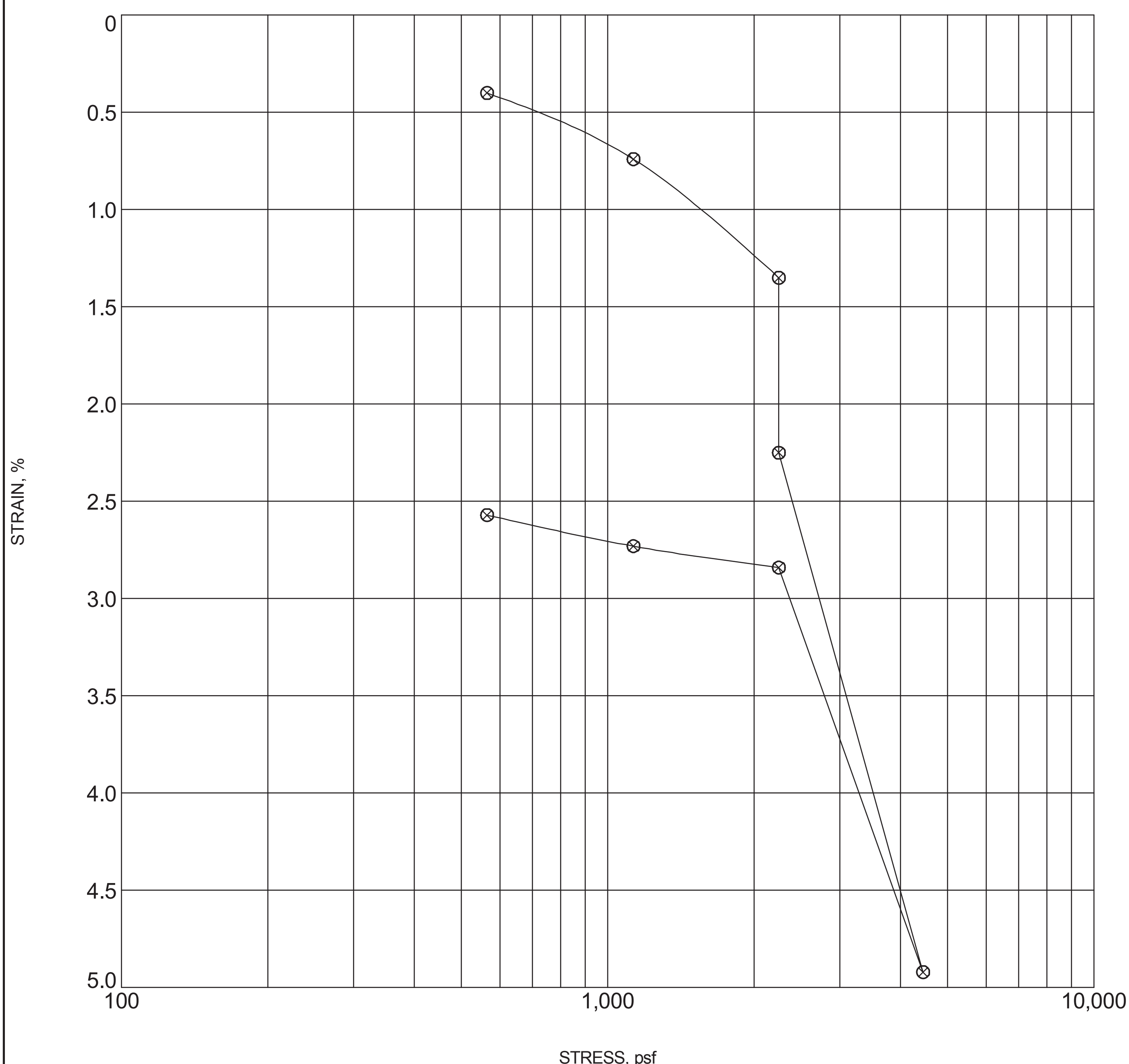
CONSOLIDATION TEST
For Collapse Potential

CLIENT El Camino College Compton Center

PROJECT NAME Proposed Instructional Building I

PROJECT NUMBER HE15281-2

PROJECT LOCATION 1111 E Artesia Blvd, Compton, CA 90221



	Specimen Identification		Classification	γ_d	MC%
⊗	**B-2**	**4.5**	**(SM) SILTY SAND: Gray, med dense.**	**95**	**3%**

TRANSMITTAL LETTER

DATE: December 1, 2015

ATTENTION: **Steven Runyan**

TO: Heider Engineering Services, Inc.
800-A South Rochester Avenue
Ontario, CA 91761

SUBJECT: Laboratory Test Data
Your #150249, HDR Lab #15-0906LAB

COMMENTS: Enclosed are the results for the subject project.

James T. Keegan
Laboratory Services Manager

431 West Baseline Road · Claremont, CA 91711
Phone: 909.962.5485 · Fax: 909.626.3316

Table 1 - Laboratory Tests on Soil Samples

Heider Engineering Services, Inc.
Your #150249, HDR Lab #15-0906LAB
17-Nov-15

Sample ID			
			#2 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	124,000
saturated		ohm-cm	3,120
pH			6.9
Electrical Conductivity		mS/cm	0.16
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	104
magnesium	Mg^{2+}	mg/kg	14
sodium	Na^{1+}	mg/kg	71
potassium	K^{1+}	mg/kg	19
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	366
fluoride	F^{1-}	mg/kg	22
chloride	Cl^{1-}	mg/kg	16
sulfate	SO_4^{2-}	mg/kg	45
phosphate	PO_4^{3-}	mg/kg	ND
Other Tests			
ammonium	NH_4^{1+}	mg/kg	0.8
nitrate	NO_3^{1-}	mg/kg	9.1
sulfide	S^{2-}	qual	na
Redox		mV	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

431 West Baseline Road · Claremont, CA 91711
Phone: 909.962.5485 · Fax: 909.626.3316

APPENDIX D
Calculations

USGS Design Maps Detailed Report

ASCE 7-10 Standard (33.87889°N, 118.21043°W)

Site Class D – "Stiff Soil", Risk Category IV (e.g. essential facilities)

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 1.674 g
From Figure 22-2 [2]	S_1 = 0.611 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_S$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.674 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.611 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.674 = 1.674$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.611 = 0.916$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

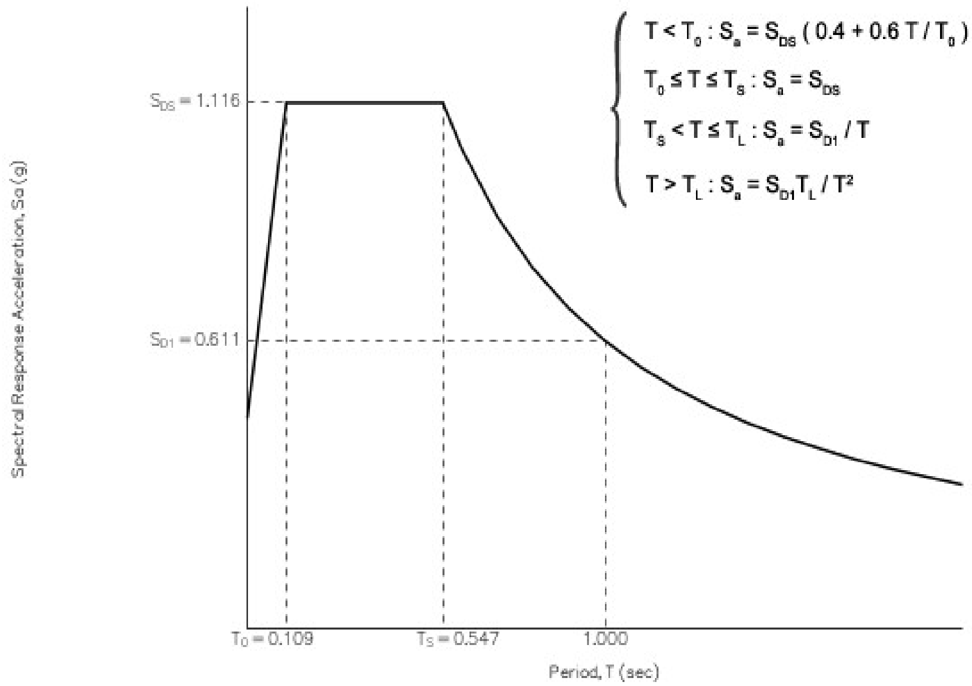
Equation (11.4–3): $S_{DS} = ⅔\, S_{MS} = ⅔ \times 1.674 = 1.116$ g

Equation (11.4–4): $S_{D1} = ⅔\, S_{M1} = ⅔ \times 0.916 = 0.611$ g

Section 11.4.5 — Design Response Spectrum

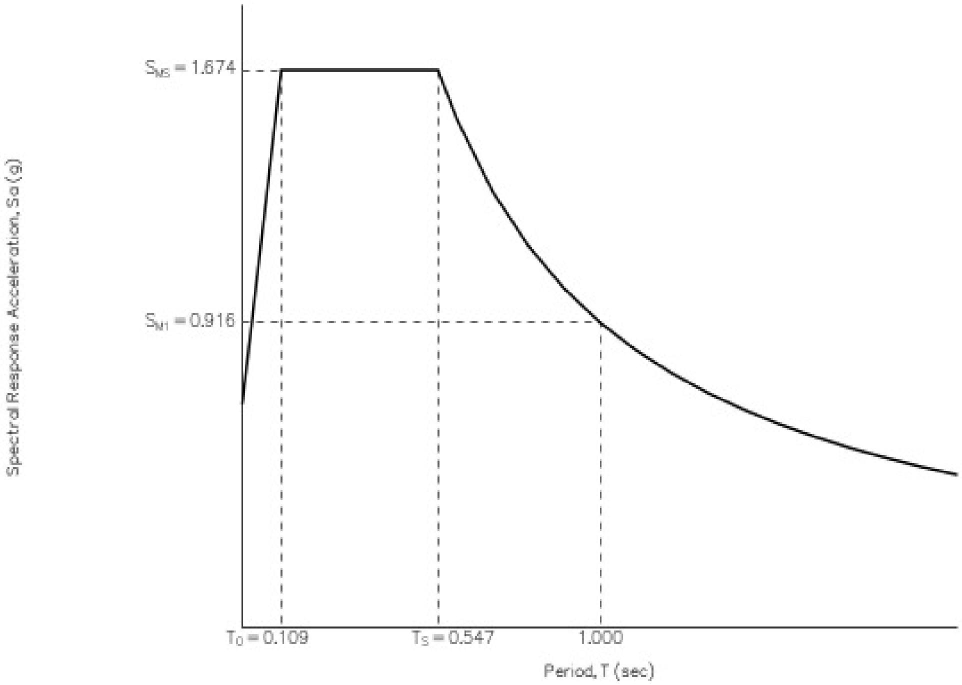
From Figure 22-12 [3] T_L = 8 seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.623

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.623 = 0.623$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.623 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.981

From Figure 22-18 [6] C_{R1} = 1.000

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = IV and S_{DS} = 1.116 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = IV and S_{D1} = 0.611 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

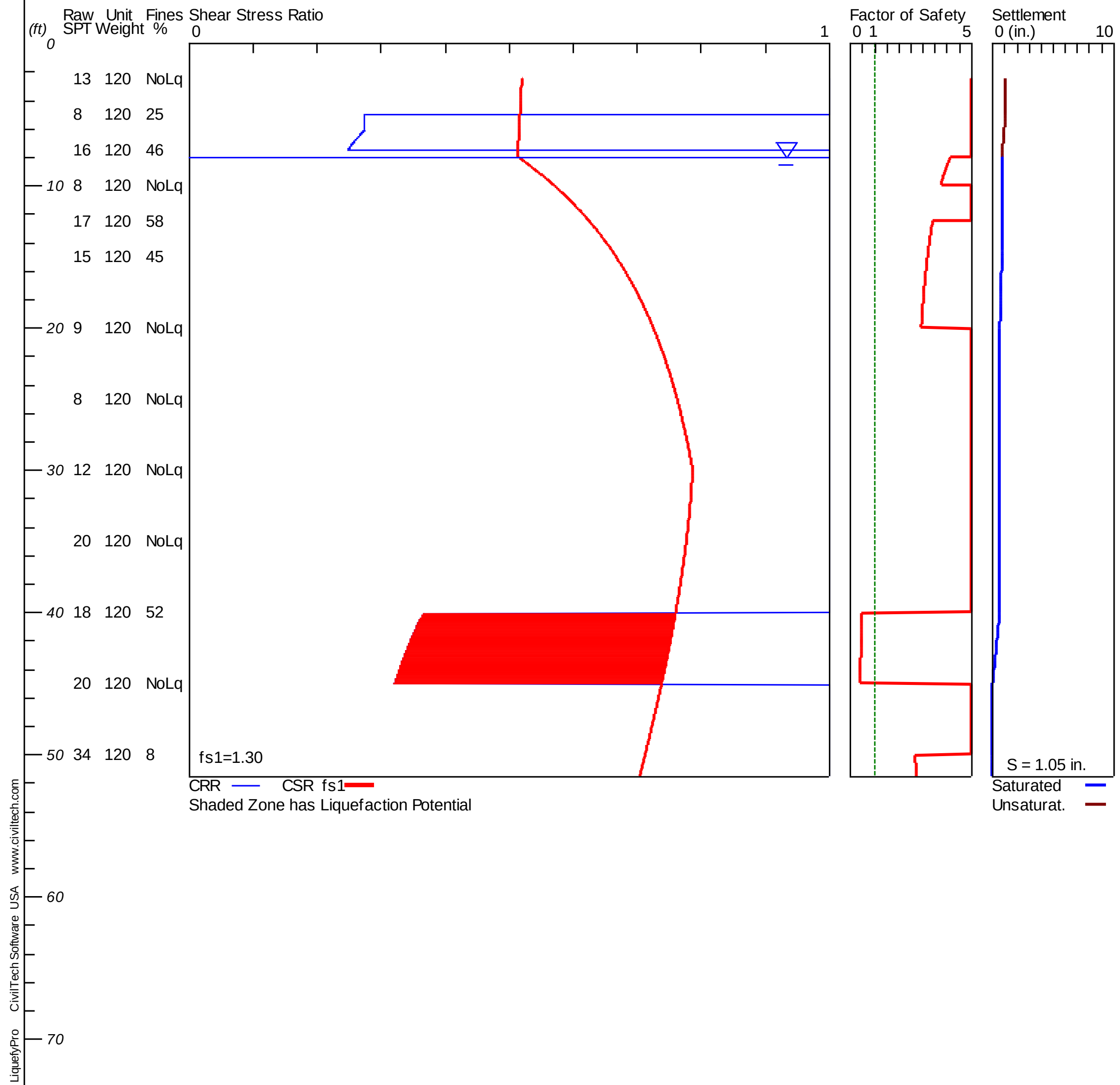
1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

LIQUEFACTION ANALYSIS

Compton CC- Instructional Building #2

Hole No.=B-1 Water Depth=8 ft Surface Elev.=1000

Magnitude=7.3
Acceleration=0.62g



Civiltech Corporation

Plate A-1

Liquefaction Analyses
Heider Inspection Group (2015)

APPENDIX D

Seismic Design Maps and Liquefaction Analysis Results

Geosphere Consultants Inc.
2001 Crow Canyon Road, Suite # 210
San Ramon, California 94583

Project title : El Camino College - Comption Center

Location : Compton California

Overall vertical settlements report

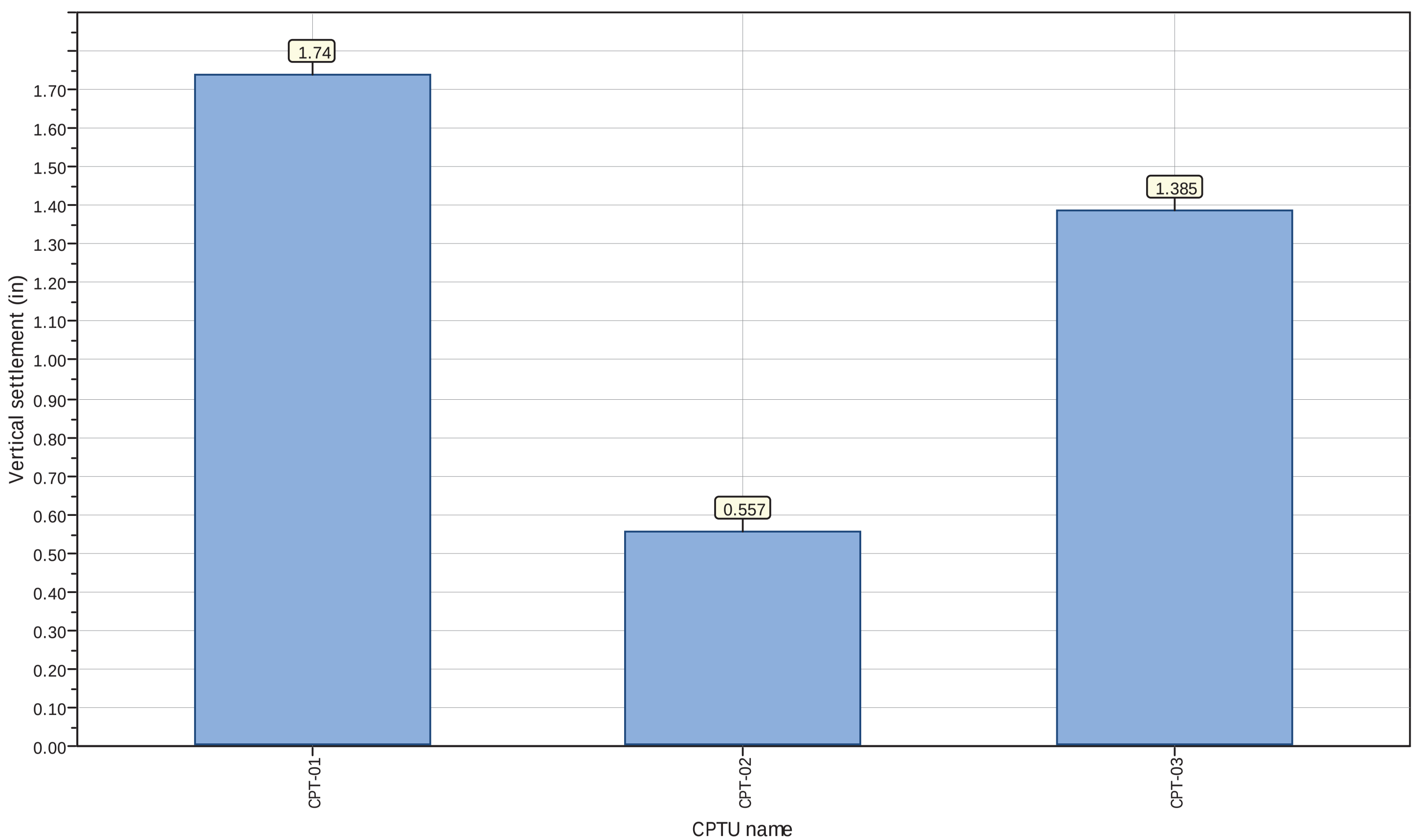


TABLE OF CONTENTS

CPT-01 results

Geosphere Consultants, Inc.
AN ETS COMPANY
Geotechnical Engineering · Environmental Management

Geosphere Consultants Inc.
2001 Crow Canyon Road, Suite # 210
San Ramon, California 94583

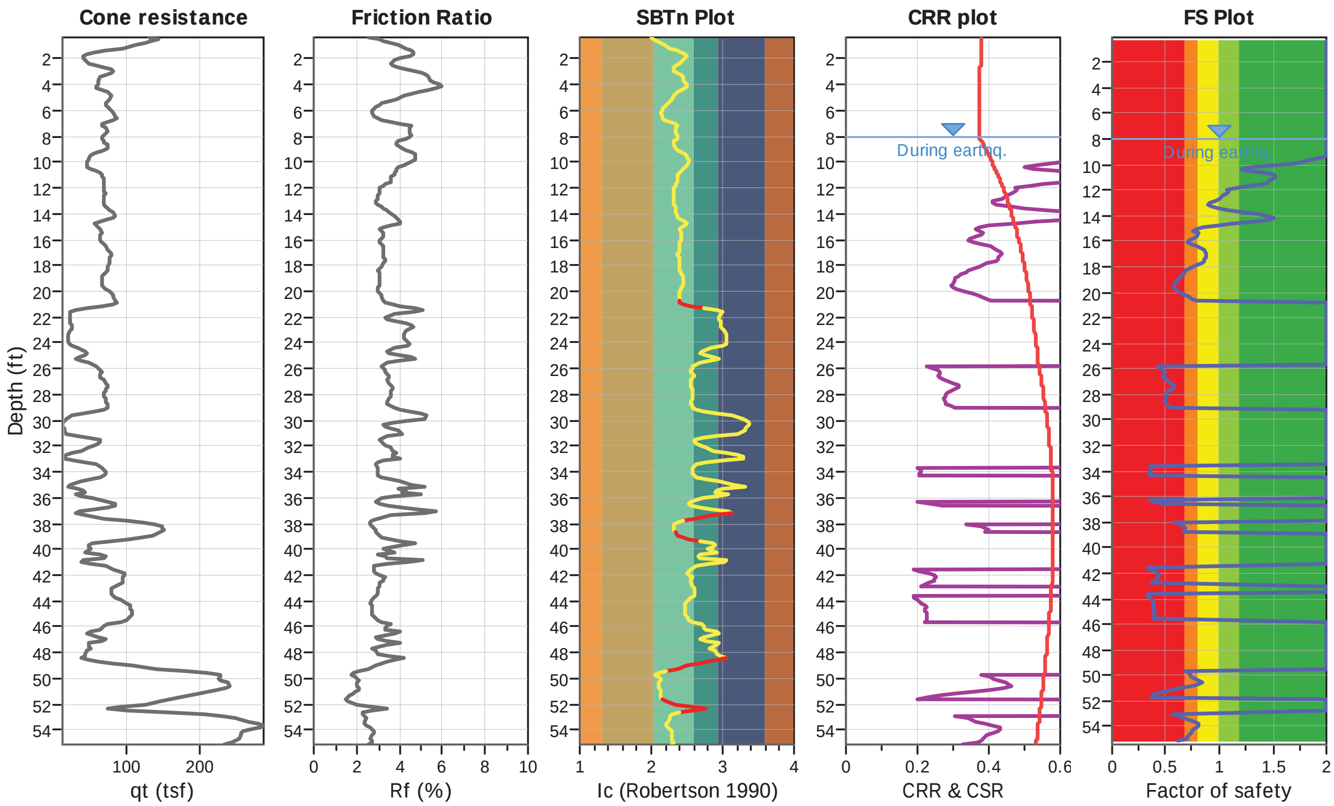
LIQUEFACTION ANALYSIS REPORT

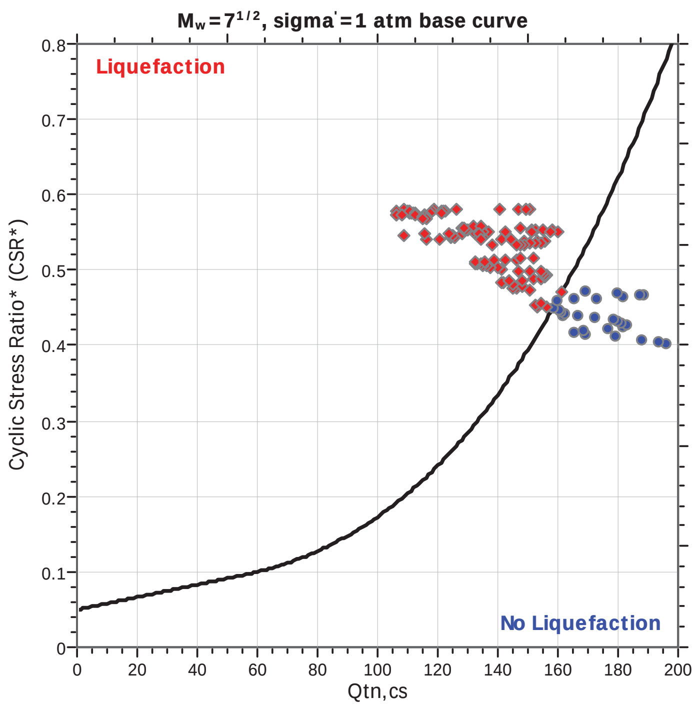
Project title : El Camino College - Comption Center **Location : Compton California**

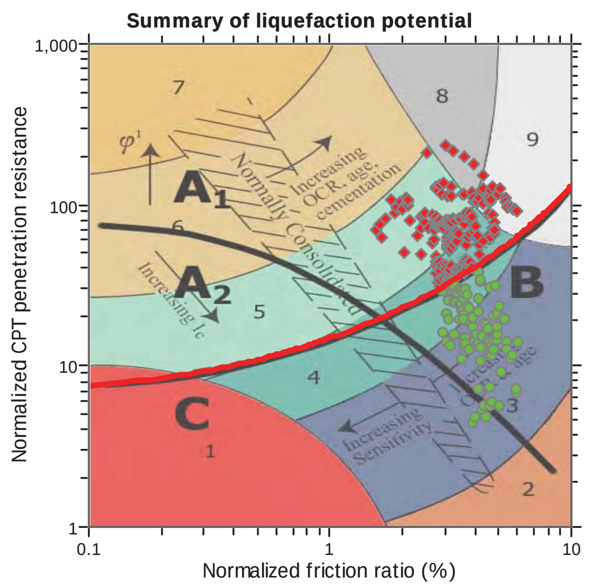
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	47.30 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	8.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.60	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.62	Unit weight calculation:	Based on SBT	$K_σ$ applied:	Yes		

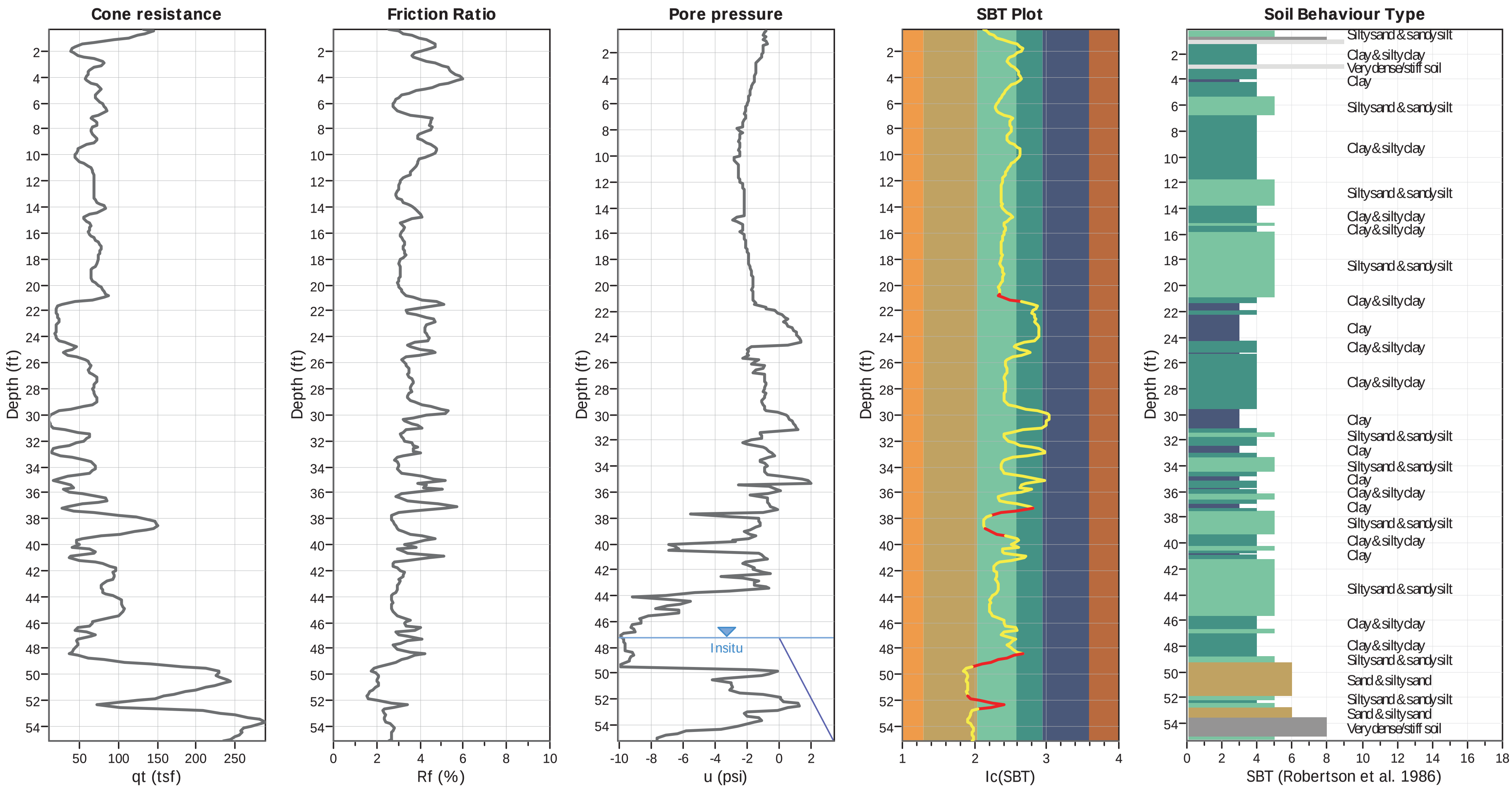






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



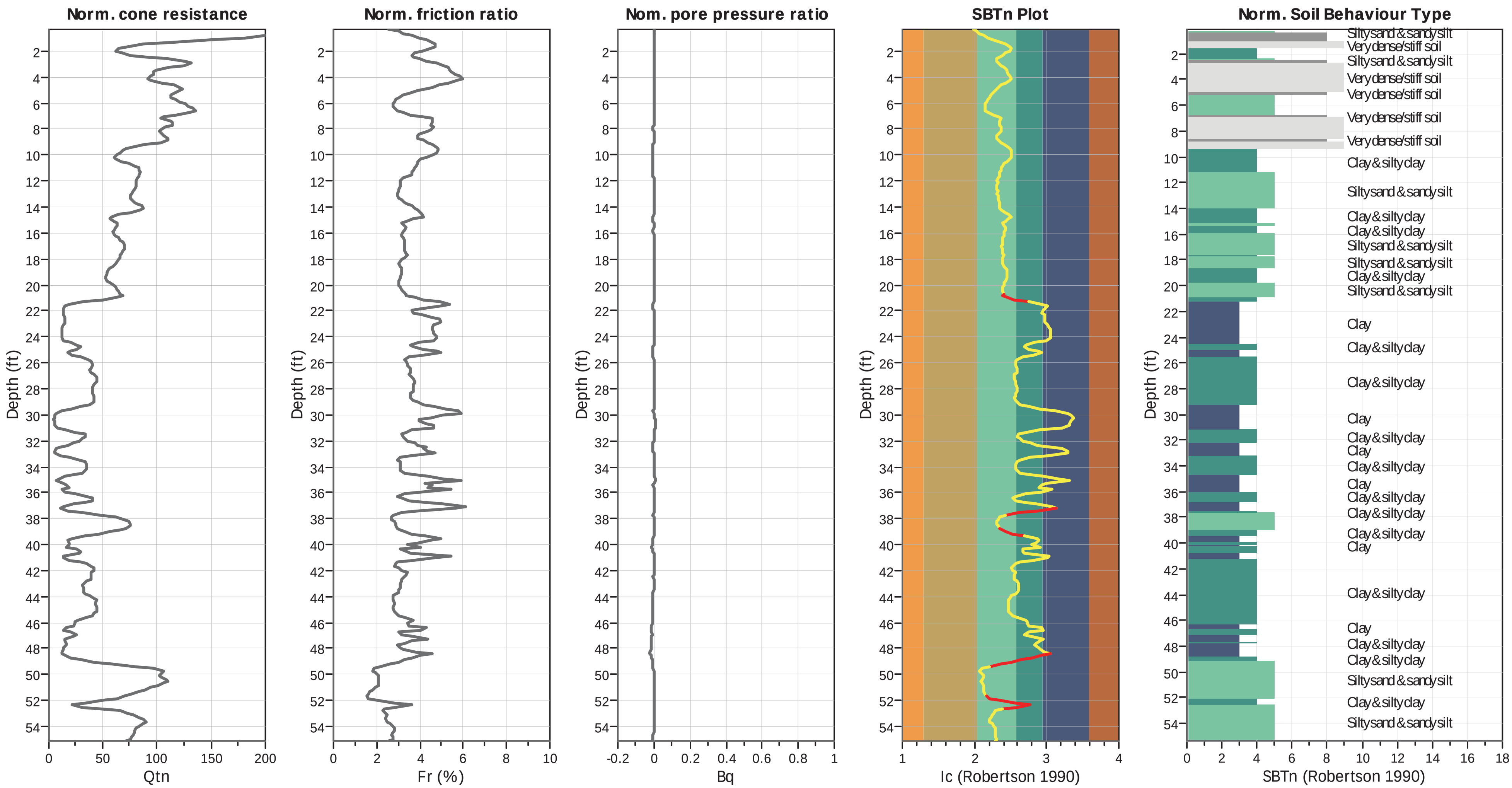
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	47.30 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



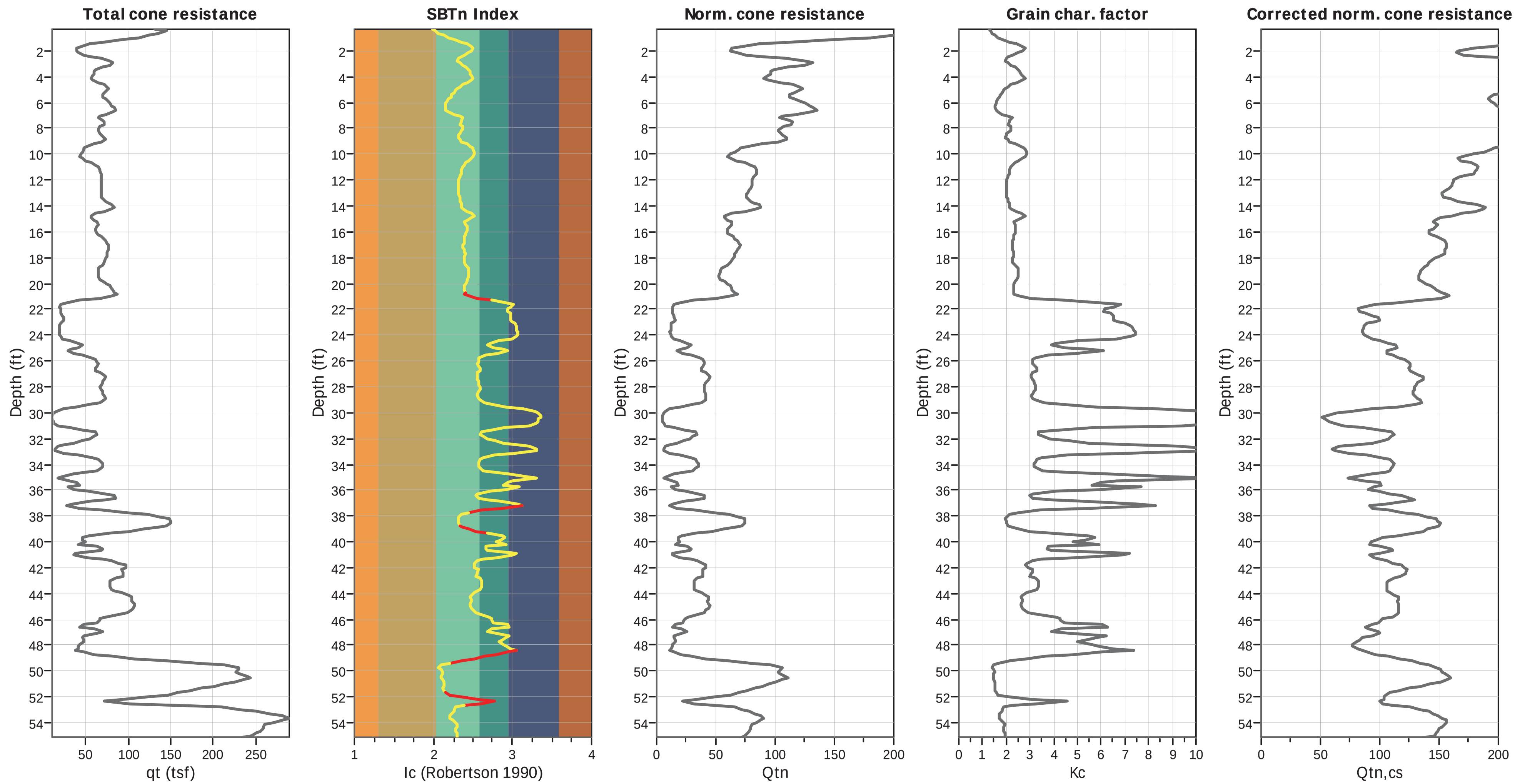
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	47.30 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

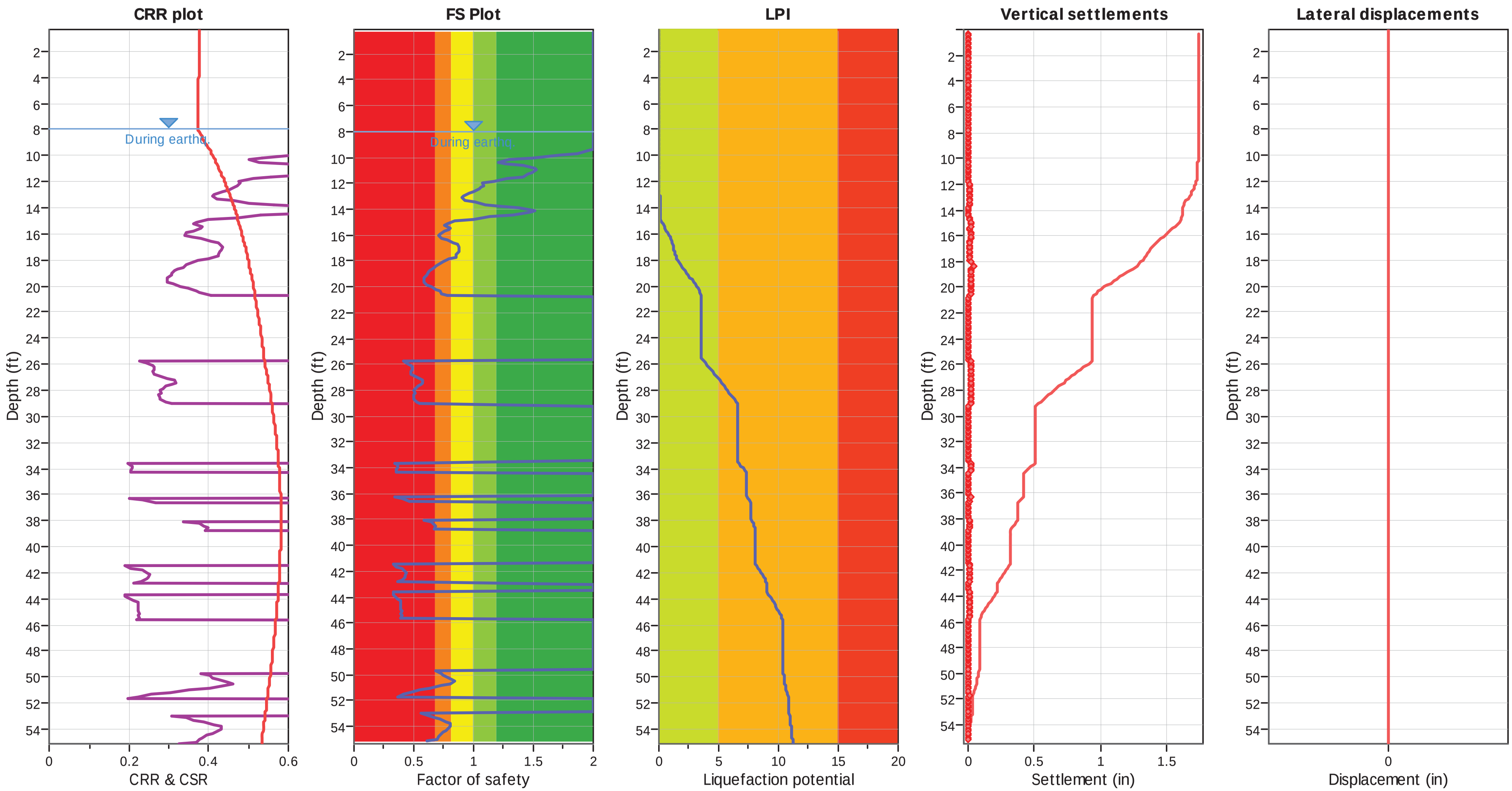
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	47.30 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	47.30 ft	Fill height:	N/A	Limit depth:	N/A

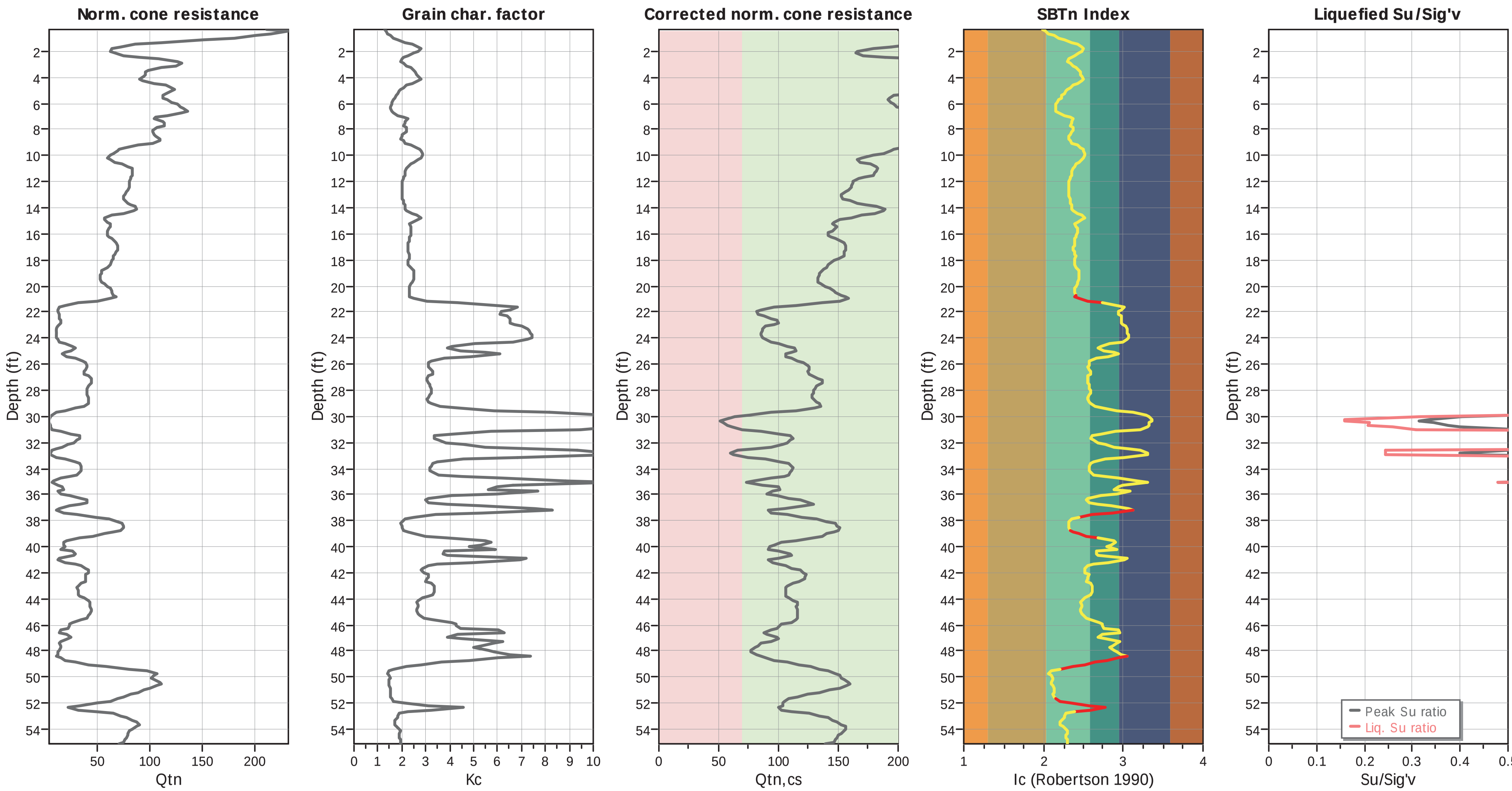
F.S. color scheme

- 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

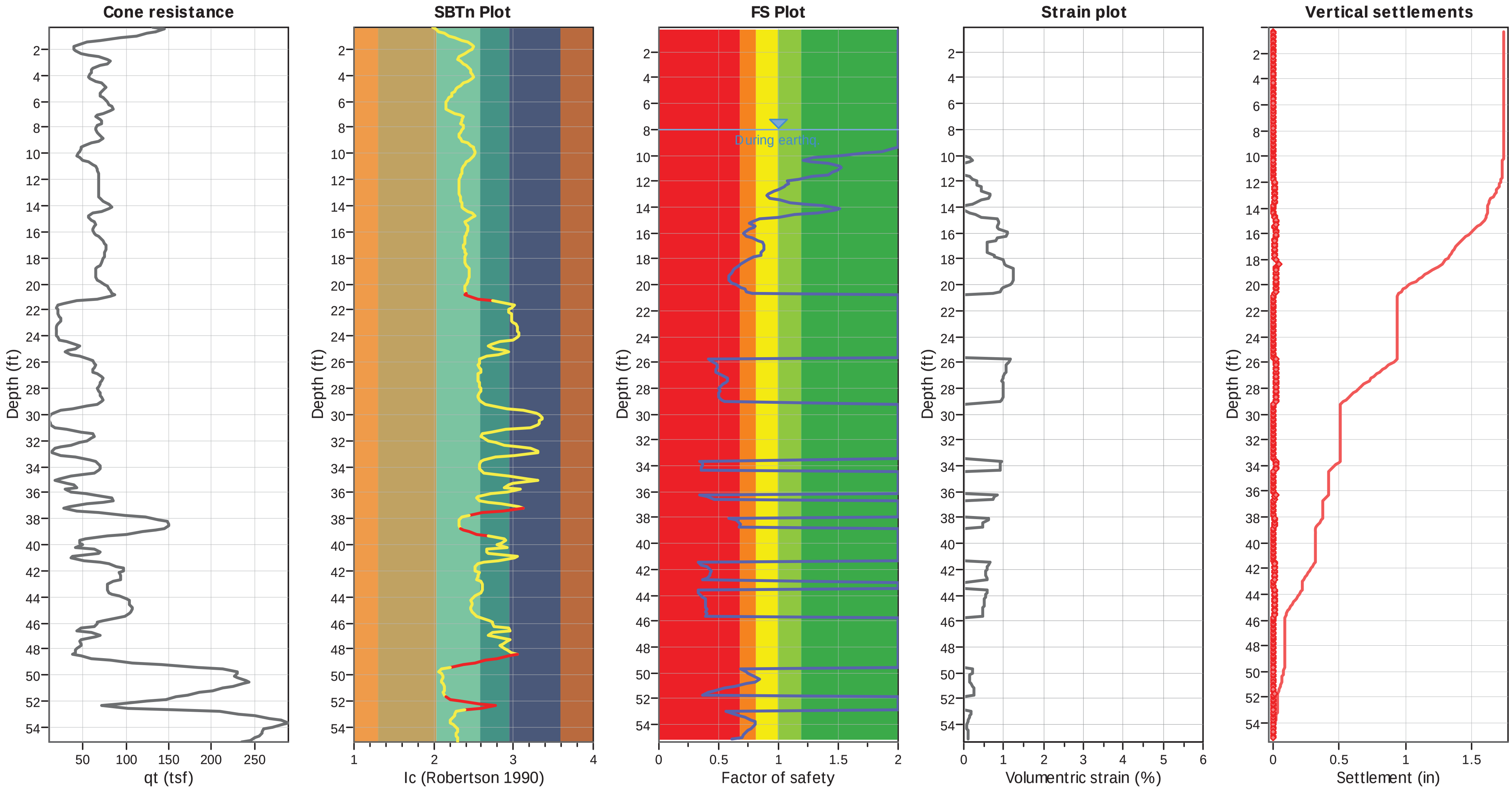
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	47.30 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

T A B L E   O F   C O N T E N T S

CPT-03 results

Geosphere Consultants Inc.
2001 Crow Canyon Road, Suite # 210
San Ramon, California 94583

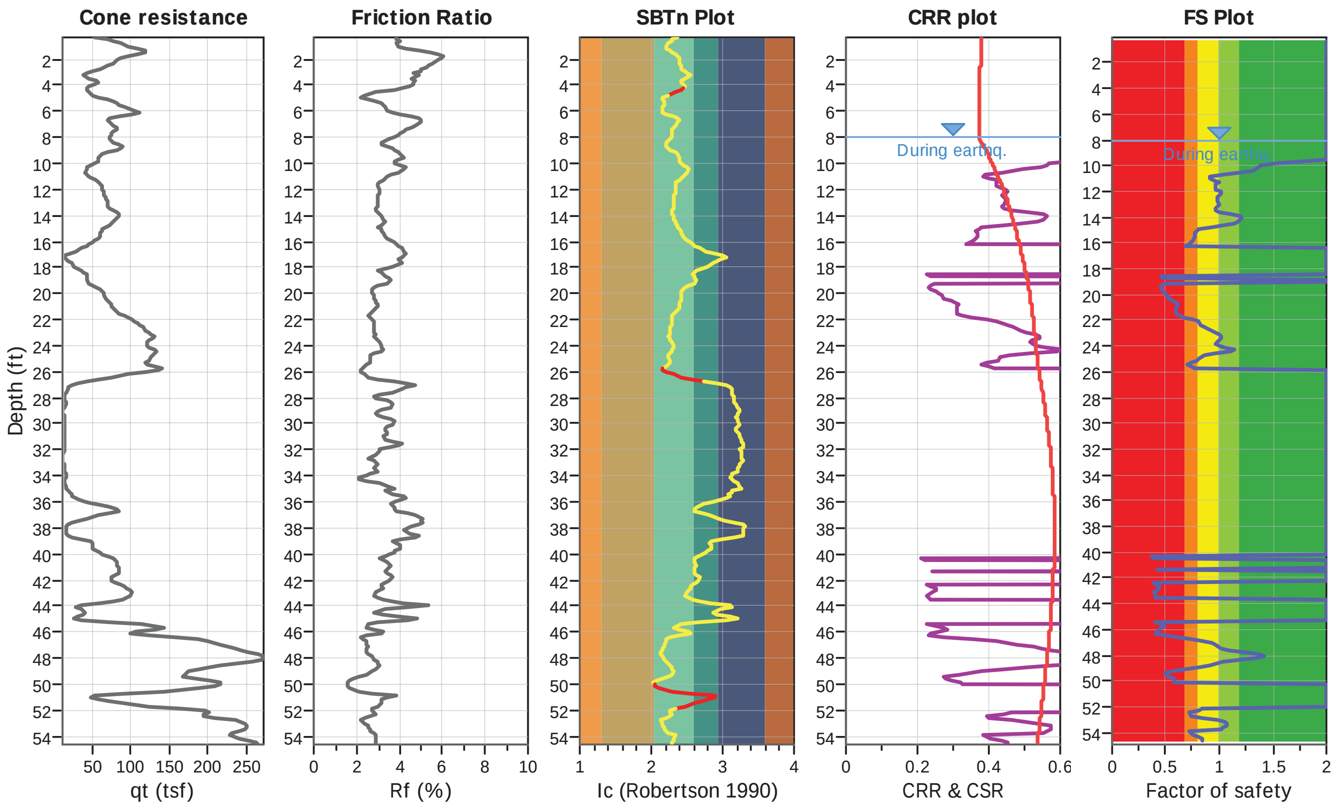
LIQUEFACTION ANALYSIS REPORT

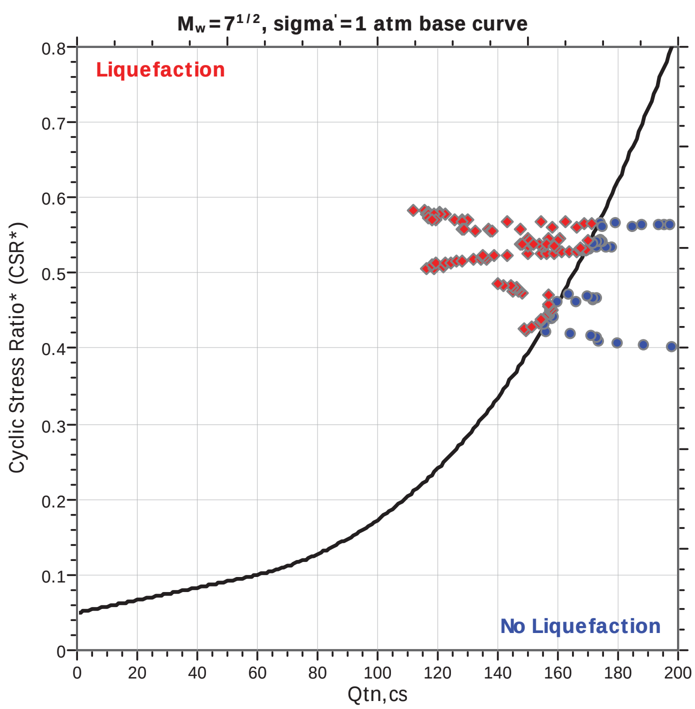
Project title : El Camino College - Comption Center **Location : Compton California**

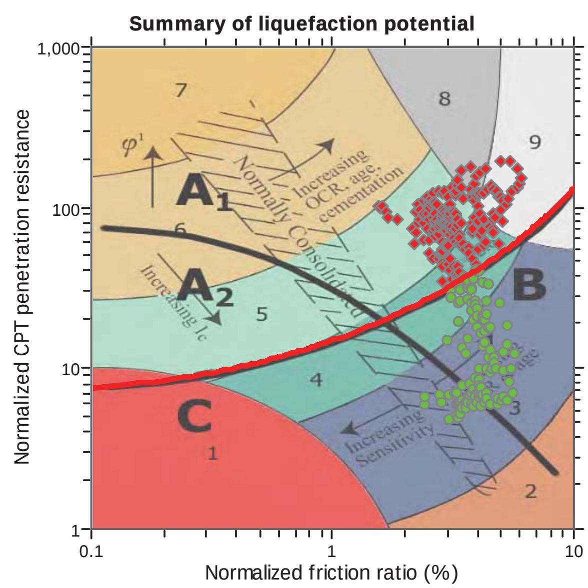
CPT file : CPT-03

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	46.40 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	8.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.60	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.62	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

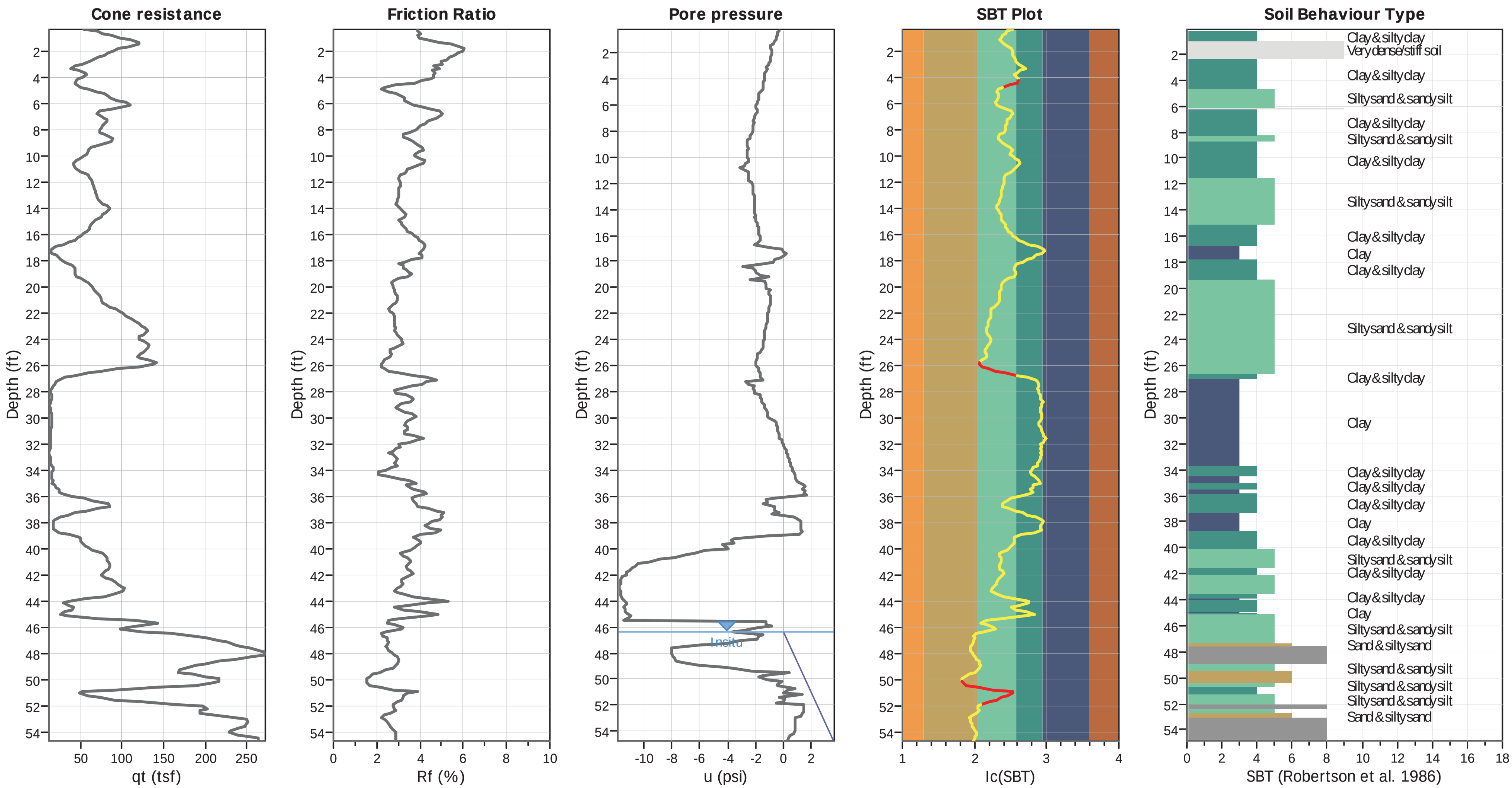






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



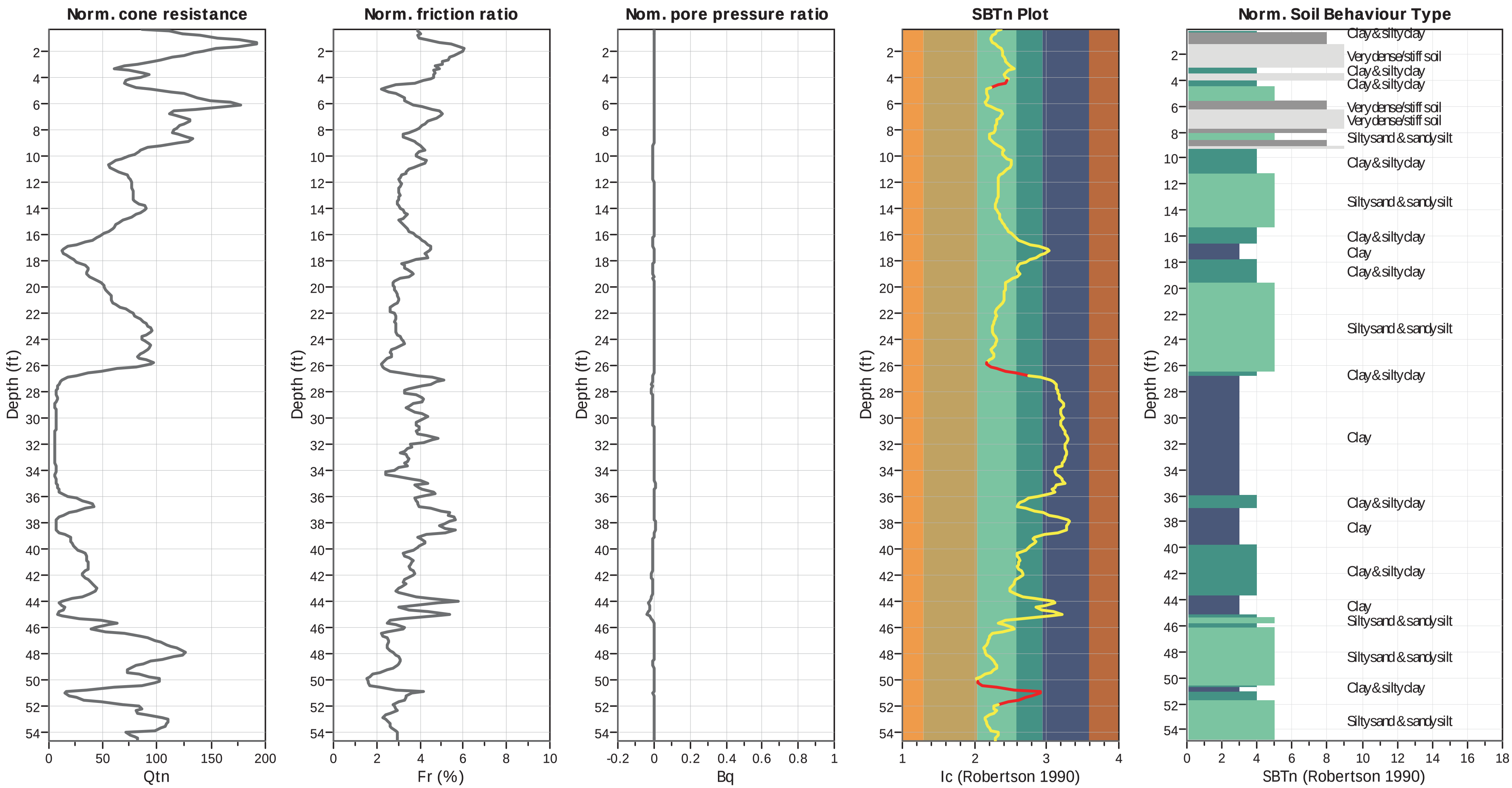
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



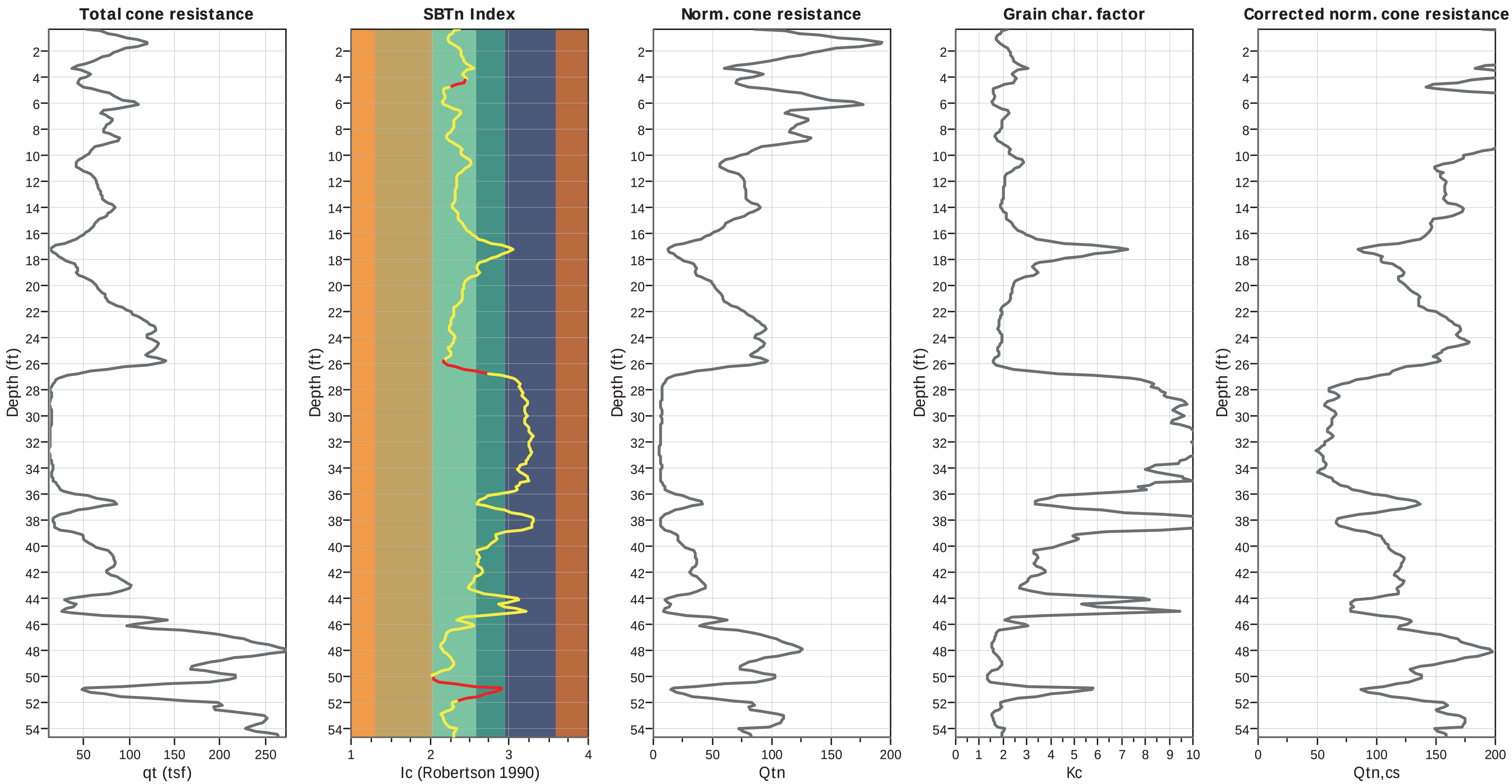
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

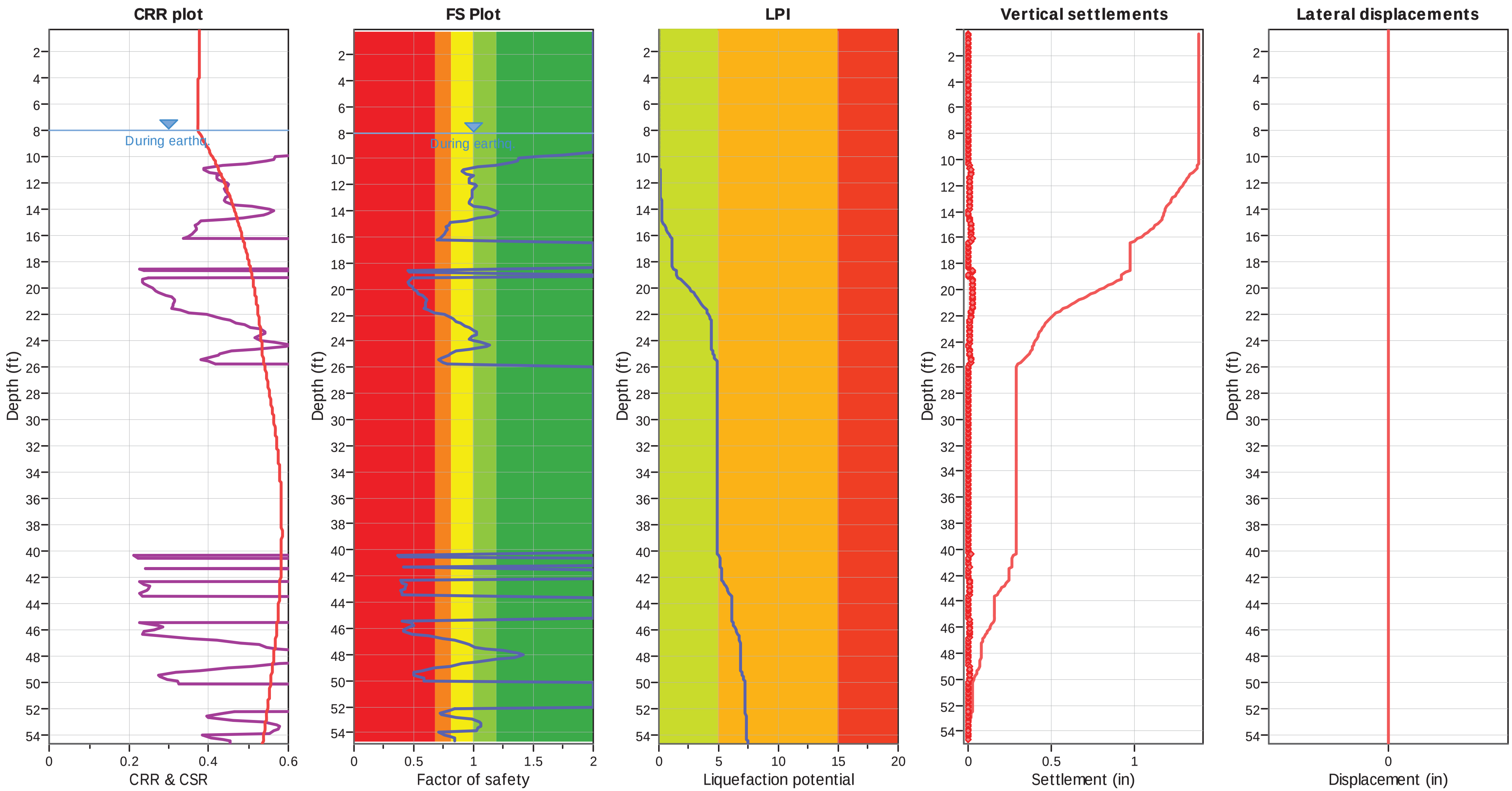
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

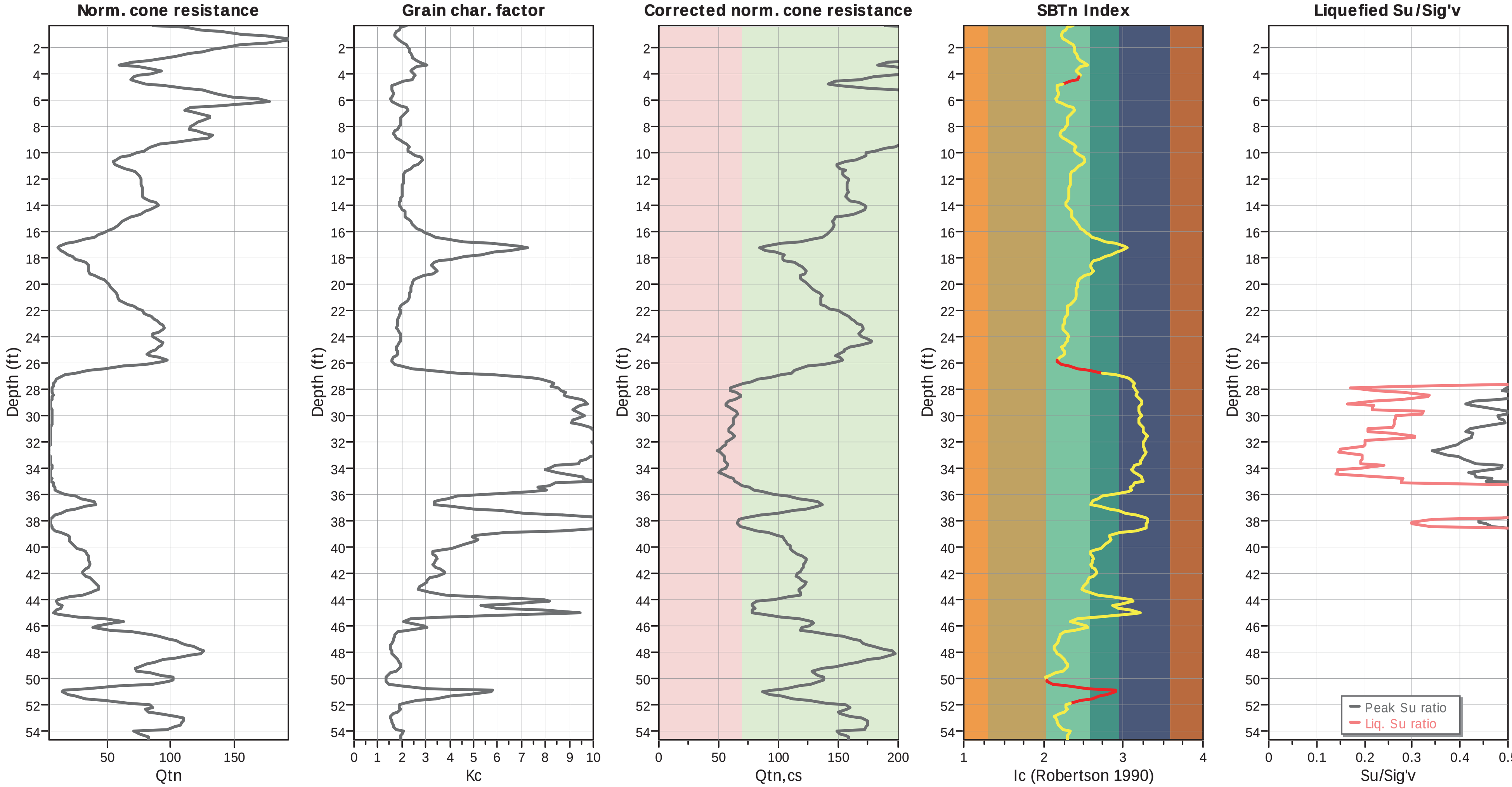
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

Project file: C:\Users\rshrestha\Box Sync\Geosphere-R Drive Folder\Geotech Projects by Number\3600-3699\91-03615-A Compton CCD\Liquefaction Analysis\Liquefaction- (GWT 8 ft with transition and weighted Volu Strain).clq

Check for strength loss plots (Robertson (2010))

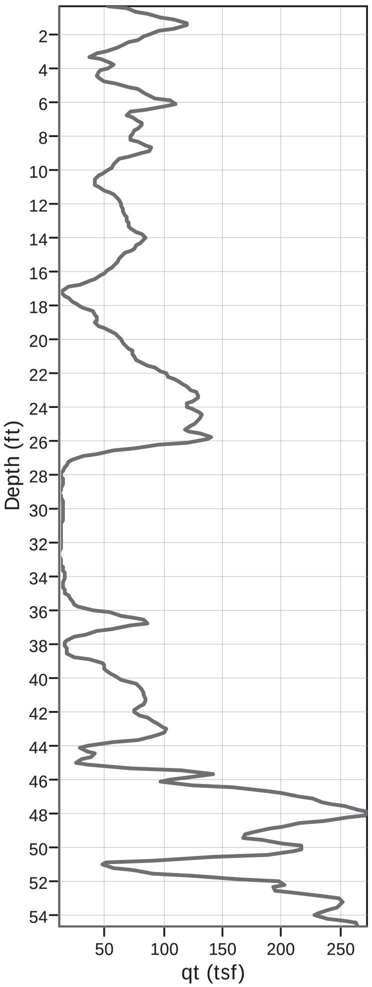


Input parameters and analysis data

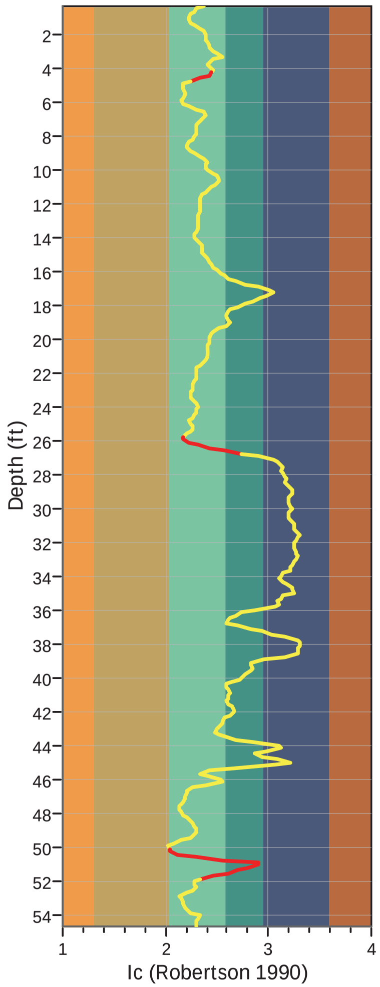
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements

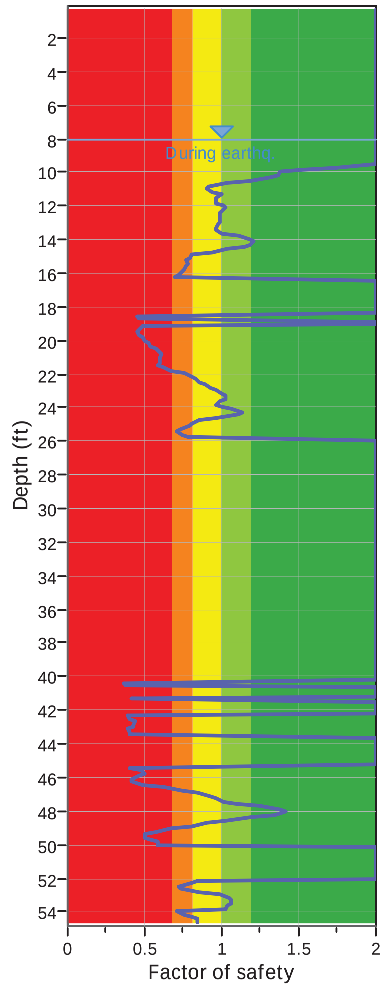
Cone resistance



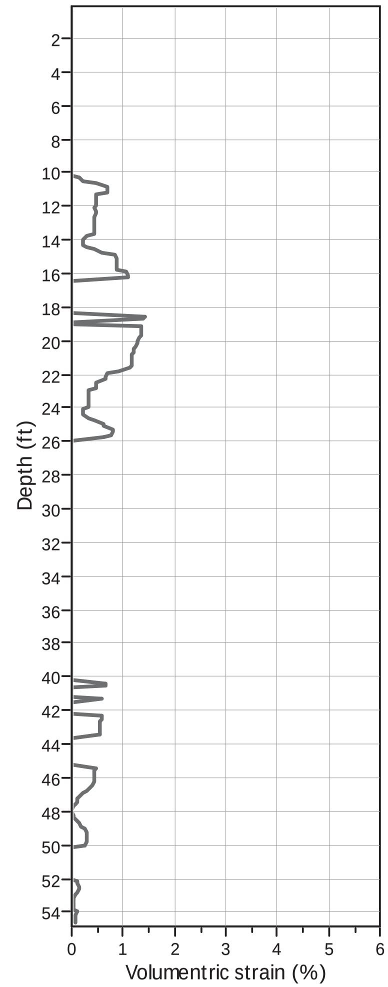
SBTn Plot



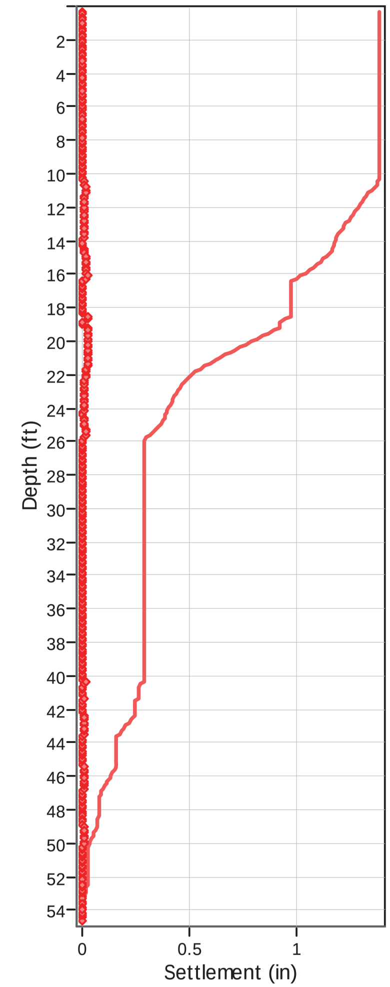
FS Plot



Strain plot



Vertical settlements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
FS: Calculated Factor of Safety against liquefaction
Volumentric strain: Post-liquefaction volumentric strain

State of California • Natural Resources Agency
Department of Conservation
California Geological Survey
801 K Street • MS 12-31
Sacramento, CA 95814
(916) 324-7324 • FAX (916) 445-3334

Edmund G. Brown Jr., *Governor*
John G. Parrish, Ph.D., *State Geologist*

RECEIVED
APR 30 2018
PCM3, INC.

April 25, 2018

Steven Haigler
Vice President, Administrative Services
Compton Community College District
1111 East Artesia Boulevard.
Compton, CA 90221

Subject: **Engineering Geology and Seismology Review for Compton College – New Instructional Building #2**
1111 East Artesia Boulevard, Compton, CA
CGS Application No. 03-CGS3321

Dear Mr. Haigler:

In accordance with your request and transmittal of documents received on February 27, 2018, the California Geological Survey has reviewed the engineering geology and seismology aspects of the consulting report prepared for Compton College in Compton. It is our understanding that this project involves construction of a new two-story Instructional Building #2. This review was performed in accordance with Title 24, California Code of Regulations, 2016 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated February 21, 2018, 34 pages, 8 figures, 4 appendices.

Based on our review of the data and reports presented by United-Heider Inspection Group, the consultants provide a good geotechnical assessment of engineering geology and seismology issues with respect to the proposed improvements. The consultants recommend design spectral acceleration parameters of $\mathbf{S_{DS} = 1.116}$ ***g*** and $\mathbf{S_{D1} = 0.611}$***g***, which are considered reasonable for the site. Based on their evaluation, the potential hazard associated with fault deformation and slope stability are not design concerns for the project. However, they have not been fully addressed all of the engineering geology and seismology issues at the site. Specifically, the consultants are requested to reevaluate the hazard associated with liquefaction settlement, and evaluate the potential for surface manifestation of liquefaction, loss of bearing capacity, and cyclical softening for the proposed improvement. Additional information that is requested is provided in the attached Checklist Comments.

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced report.*** It is recommended that additional information be provided as requested in the attached Note 48 Checklist Review Comments portion of this letter. The consultants are reminded that one copy of all supplemental documents should be submitted directly to CGS and should include the CGS application number. If you have any further questions about this review letter, please contact the reviewer at (650) 350-62885 or ante.mlinarevic@conservation.ca.gov.

Respectfully submitted,

Ante Mlinarevic
Engineering Geologist
PG 8352, CEG 2552

CERTIFIED ENGINEERING GEOLOGIST
Ante Nik Mlinarevic
No. 2552
STATE OF CALIFORNIA

Concur:

Anne Rosinski
Senior Engineering Geologist
PG 7481, CEG 2353

CERTIFIED ENGINEERING GEOLOGIST
Anne M. Rosinski
No. 2353
STATE OF CALIFORNIA

Enclosures:

Note 48 Checklist Review Comments
Keyed to: *Note 48 - Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*

Copies to:

Stephen E. Jacobs, *Certified Engineering Geologist*, and Param Piratheepan, *Registered Geotechnical Engineer*
United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553

Gary Moon, *Architect*
tBP Architecture, 4611 Teller Avenue, Newport Beach, CA 92660

Ted Beckwith, *Senior Structural Engineer*
Division of State Architect, 700 North Alameda Street, Suite 5-500, Los Angeles, CA 90012

Note 48 Checklist Review Comments

In the numbered paragraphs below, this review is keyed to the paragraph numbers of California Geological Survey Note 48 (October, 2013 edition), *Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings.*

Project Location

1. Site Location Map, Street Address, County Name: Adequately addressed.
2. Plot Plan with Exploration Data with Building Footprint: Adequately addressed.
3. Site Coordinates: Adequately addressed. Latitude and Longitude provided in report: 33.87889°N, 118.21043°W

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Not provided by the consultants and therefore not reviewed.
6. Subsurface Geology: Adequately addressed. The consultants report the site is underlain by young alluvial fan deposits comprised of sands, silts, and, clays. They report groundwater was encountered at the time of 45 feet during their recent investigation. The consultants utilized boring information from four hollow-stem auger borings drilled to a maximum depth of 51.5 feet, and a CPT from a previous (2015) site investigation to a maximum depth of 55.5 feet.
7. Geologic Cross Sections: Marginally adequate. The consultants present two "Geotechnical Cross Sections" depicting minimal geologic information. In the future, the consultants should provide geologic cross sections depicting additional subsurface soil information, and include foundation and site grading details.
8. Active Faulting & Coseismic Deformation Across Site: Adequately addressed. The consultants report there are no known active or potentially active faults that traverse the site, and the site is not located within an Alquist-Priolo Earthquake Fault Zone. They also report the nearest mapped Zone is the Newport-Inglewood Fault Zone, approximately 2 miles west of the site. The data presented appears to be reasonable.
9. Geologic Hazard Zones (Liquefaction & Landslides): Adequately addressed. The consultants report the site is mapped within an area shown as potentially susceptible to liquefaction on the California Geological Survey seismic hazard zones for the South Gate Quadrangle, which appears to be reasonable.
10. Geotechnical Testing of Representative Samples: Adequately addressed.
11. Geological Consideration of Grading Plans and Foundation Plans: **Additional information may be needed.** The consultants include foundation recommendations for a mat foundation/footings supported on a minimum of 5 feet of engineered fill. They also recommend overexcavation and recompaction of onsite soils and provide recommendations for import soils. The consultants should clarify if their foundation recommendations are still applicable based on the response to Items 21 and 31(I), and provide any associated bearing capacity calculations, including input parameters, for CGS review.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Marginally adequate. The consultants provide a general summary of historical seismicity in the Los Angeles area. In future reports, the consultants should also discuss the effects of the 1933 Long Beach Earthquake to the areas surrounding the site.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class D, Stiff Soil, based on the subsurface conditions and geology of the site. The site class designation appears to be reasonable based on results from a seismic cone penetration test (SCPT) suggesting an average shear wave velocity of 779 feet per second to a maximum depth of 55 feet.
14. General Procedure Seismic Parameters: Adequately addressed. The consultants report the following parameters derived from a map-based analysis:
    S_S = 1.674 and **S_1 = 0.611**
    S_{DS} = 1.116 and **S_{D1} = 0.611**
15. Seismic Design Category: Adequately addressed. The consultants report Seismic Design Category D, $S_1 < 0.75$.
16. Site-Specific Ground Motion Analysis: Not applicable.
17. Deaggregated Seismic Source Parameters: Not applicable.
18. Time-Histories of Earthquake Ground Motion: Not applicable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Liquefaction: Adequately addressed. The consultants report the site is situated on firm to stiff and loose to dense young alluvial fan deposits. The consultants also report that historically highest groundwater is mapped at about 8 feet below ground surface at the site. They conclude the site has a very high potential for the liquefaction susceptibility in layers occurring primarily between depths of 10 and 45 feet below existing ground surface. The data presented appear to support this conclusion.
20. Seismic Settlement Calculations: **Additional information is requested.** The consultants report they used a PGA_M of 0.623g, set groundwater to 8 feet below ground surface, and they used a deaggregated maximum earthquake magnitude of 7.3 for their analysis of boring B-1; however, it appears a lower earthquake magnitude was utilized for the liquefaction analysis of CPT-1 and CPT-2. The consultants should reevaluate the seismic settlement for CPT-1 and CPT-2 using a more appropriate earthquake magnitude.
21. Other Liquefaction Effects: **Additional information is requested.** The consultants report that calculated liquefaction occurs in relatively deep layers, and the potential for surface manifestation of liquefaction is considered low to moderate. However, the consultants do not address the potential for ground surface disruption, which is reported to have occurred in the vicinity of the college campus following the 1933 Long Beach earthquake (see Item 12). The consultants should evaluate and discuss the potential for surface manifestation of liquefaction at the site considering the SCEC guidelines for implementation of Special Publication 117 (Martin and Lew, 1999, P.33).
22. Mitigation Options for Liquefaction: **Additional information may be needed.** The consultants should provide appropriate mitigation options if their evaluation (see Item 21)

indicates potential for surface manifestation of liquefaction or loss of bearing capacity to impact the foundation.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report the site is relatively flat, and there no significant existing or proposed slopes at the site. They conclude the possibility for earthquake-induced landslides is considered negligible. The data presented appear to support this conclusion.
24. Determination of Static and Dynamic Strength Parameters: Not applicable.
25. Determination of Pseudo-Static Coefficient (Keq): Not applicable.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Not applicable.
27. Dynamic Site Conditions: Not applicable.
28. Mitigation Options/Other Slope Failure: Not applicable.

Other Geologic Hazards or Adverse Site Conditions

29. Expansive Soils: Adequately addressed. The consultants report the most expansive subsurface soils within the building site had an expansion index of 85, indicating a medium expansion potential. They conclude the onsite soils are anticipated to contain a **low to medium expansion potential**, which appears to be reasonable based on the laboratory results presented.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report the onsite soil is considered to be noncorrosive to foundation elements, which appears to be reasonable. However, the consultants state that consideration should be given to retaining a corrosion consultant to obtain recommendations for the protection of metal components embedded in the site soil.
31. Conditional Geologic Assessment: Selected geologic hazards addressed by the consultant are listed below:
    - C. Flooding: Adequately addressed. The consultants report the site is located in a FEMA-designated Zone X. They also report the site is mapped within an area shown as Potential Dam Inundation Areas on the Los Angeles County General Plan Dam and Reservoir Inundation Routes Map, and the potential of earthquake-induced flooding exists at the site, if a dam fails during a strong earthquake. The data presented appears to be reasonable.
    - G. Hydrocollapse: Adequately addressed. The consultants anticipate approximately **1 inch** of collapse settlement due to the presence of approximately 8 feet of surficial soils that may be susceptible to collapse under saturation.
    - H. Regional subsidence: Adequately addressed. The consultants report the site lies either within, or near, an area potential land subsidence due to withdrawal of oil and gas from nearby oil and gas fields.
    - I. Clays and cyclic softening: **Additional information is requested.** The consultants have not addressed the potential for cyclic softening and corresponding strength loss/deformation of clay soils that underlie the site. According to Idriss and Boulanger (2008), "soft, normally consolidated or lightly overconsolidated clays will generally have higher natural water content, higher liquidity index (LI) values, and higher

sensitivities and will therefore be most prone to strength loss during earthquakes." Based on the data presented in the boring logs, laboratory data, and CPT soundings, the consultants should evaluate the clay layers in the subsurface for cyclic softening and strength loss.

Report Documentation

32. Geology, Seismology, and Geotechnical References: Adequately addressed.
33. Certified Engineering Geologist: Adequately addressed.
    Stephen E. Jacobs, Certified Engineering Geologist #1307
34. Registered Geotechnical Engineer: Adequately addressed.
    Param Piratheepan, Registered Geotechnical Engineer #2826

UNITED-HEIDER
INSPECTION GROUP
An ETS Company

May 8, 2018

Ms. Linda Owens
Director of Facilities
Compton Community College District
1111 East Artesia Blvd.
Compton, CA 90221

Re: **CGS Application No. 03-CGS3321**
RESPONSE TO REVIEW COMMENTS
Preliminary Geotechnical Investigation Report
Proposed New Instructional Building #2
El Camino College Compton Center Campus
1111 E. Artesia Boulevard
Compton, CA 90221

United - Heider Inspection Group Project No. 10-18020PW

Reference: Engineering Geology and Seismology Review for Compton College – New Instructional Building #2, 1111 East Artesia Boulevard, Compton, CA; CGS Application No. 03-CGS3021.

United - Heider Inspection Group (February 21, 2018), Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 1111 E. Artesia Boulevard, Compton, CA 90221; Project No. 10-18020PW, dated February 21, 2018.

Bray, J.D, and Sancio, R. B. (2006). "Assessment of Liquefaction susceptibility of fine-grained soils." Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 132(9), 1165-1177.

Boulanger, R. W., and Idriss, I. M. (2006). "Liquefaction susceptibility criteria for silts and clays." Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 132(11), 1413-1426.

Boulanger, R. W., and Idriss, I. M. (2007). "Evaluation of cyclic softening in silts and clays." Journal of Geotechnical and Geoenvironmental Engineering, ASCE, 133(6), 641-652.

Idriss, I. M., and Boulanger, R. W. (2008). Soil liquefaction during earthquakes. Monograph MNO-12, Earthquake Engineering Research Institute, Oakland, CA, 261 pp.

Ishihara, K. "Stability of natural deposits during earthquakes", Proceedings, 11th International Conference on Soil Mechanics and Foundation Engineering, San Francisco , Vol. 1, pp. 321-376, 1985.4) CDMG, California Geology, March 1973.

Oakeshott, G.B. (March 1973). “40 Years Ago...The Long Beach – Compton Earthquake of March 10, 1933.” California Geology, California Division of Mines and Geology (CDMG), 55-59.

Southern California Earthquake Center (1999) Recommended Procedures for implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California.

Youd, T. Leslie, and Garris, Christopher T., 1995, Liquefaction–induced ground–surface disruption: ASCE Journal of Geotechnical Engineering, vol. 121, no. 11, November 1995 issue, p. 805–809.

Dear Ms. Owens:

This letter transmits itemized responses to the review comments made by the California Geological Survey (CGS) related to the above referenced report prepared by United-Heider Inspection Group, Inc. for the planned New Instructional Building #2 located within the El Camino College Compton Center located 1111 E. Artesia Boulevard in the City of Compton, California.

In a review letter dated April 25, 2018, the CGS has requested the following additional geotechnical information per Note 48 Checklist. For convenience, a copy of the review letter is attached. United-Heider Inspection Group’s responses are provided only for the Note 48 checklist comments that required additional information per CGS. Our responses are provided below:

Item 11) *Geological Consideration of Grading Plans and Foundation Plans: Additional Information May be needed.*

Response: We have re-reviewed and re-evaluated Items 21 and 31 (I). Based on our re-review of Items 21 and 31 (I), our foundation recommendations are still applicable. Please see our response to Items 21 and 31 (I) for supporting discussions.

For the construction of the proposed building, mat foundation/footings will be supported minimum of 5 feet of engineered fill. Due to this thicker upper engineered fill layer with no potential for significant surface manifestation of liquefied soil underneath and no significant cyclic softening potential in the fine-grained layers in the upper 40 feet, we conclude that our foundation recommendations for the project remain appropriate.

Item 20) *Seismic Settlement Calculations: Additional information is requested.*

Response: No Cone Penetration Tests (CPT) were performed as part of our investigation. As reported, four (4) hollow-stem auger borings were drilled during our investigation, and liquefaction analysis was performed on soil boring B-1 that was drilled to approximately 51.5 ft below the ground surface.

Seismic settlement calculations on CPT-1 and CPT-2 were performed for the adjacent building #1 project by others within the same campus in 2015. These CPT analyses results were attached to this report as a supplemental data based on our comprehensive literature review.

As you noted, we have used a higher earthquake magnitude for our analyses than the 2015 analyses by others for the adjacent building and we believe our analyses and recommendations for the project remain appropriate.

Item 21) *Other Liquefaction Effects: Additional information is requested.*

Response: According to the Ground Shaking Intensity (Isoseismal) Maps for the Magnitude 6.4, 1933 Long Beach Earthquake (from Trifunac, 2003; CGS website), the El Camino College site is mapped within an area that reportedly sustained damage that ranged from Modified Mercalli Scale Intensity 7 (people run outdoors, damage to poorly build structures) to Intensity 9 (buildings shifted off foundation). In Compton, almost every building in a three-block radius on unconsolidated material and landfill was damaged; and water, electricity, gas, and phones were all turned off within minutes of the main shock (CDMG, California Geology, March 1973, p. 56). The worst of all building failures included Compton Union High School and Compton Junior College (CDMG, California Geology, March 1973, p. 57). Other buildings in Compton with reported major damage included the Young Hotel and Aranbe Hotel (Daily News with photos from Orange County Register).

Extensive damage consisted of fracturing and dislocation of streets and curbs in water-saturated, lowland sediments of the Compton basin, especially at Compton Junior College (CDMG, California Geology, March 1973, p. 58).

Based on our review, it appears that most of the reported damages were due to seismic shaking/ground motion. There was no conclusive evidence of surface manifestation of liquefaction such as sand boils and/or ground cracking that was reported near El Camino College Compton Center Campus (called Compton Junior College in 1933).

The method suggested by the reviewers as proposed on the SCEC guidelines for implementation of Special Publication 117 (Martin and Lew, 1999, P.33), i.e., occurrence of liquefaction potential by relying on the method of Ishihara (1985) was invalidated ten years later by Youd and Garris (1995). And also ground–motion at the site is far higher than the low–level curves for 0.1 g, 0.2g, 0.3g, and 0.4g shown in Ishihara (1985).

In addition, Ishihara has ceased to use his older 1985 method in his 1996 textbook published by Oxford University Press. We are not aware of any method that is currently peer reviewed or recommended by DSA/CGS for the analysis of surface manifestation of liquefaction that can be used to evaluate the surface manifestation due to liquefaction at the site.

However, we have checked the (Layer A overlying Layer B) by following the Ishihara (1985) guidelines per your request. Using an analysis based on recommendations provided by Ishihara (1985) for stratified soils in soil Boring B-1, an identified uppermost nonliquefiable soil layer (H1) 40 feet in thickness over a liquefiable layer (H2) 5 feet in thickness (40.0-45.0 = 5.0 ft.), the ratio of non-liquefiable to potential liquefiable layer is 8, in our opinion providing an adequate capping layer, indicating that a potential for significant surface manifestation and loss of bearing capacity is unlikely.

Item 22) *Mitigation Options for Liquefaction: Additional information may be needed.*

Response: We conclude that our foundation recommendations for the project remain appropriate. Please see our response to Items 21 and 31 (I) for supporting discussions.

Item 31 I) *Clays and Cyclic Softening: Additional information is requested.*

Response: As reported in our report, we have done several Atterberg limit tests on all of our fine-grained soil layers identified in our soil Boring B-1 that was used for our liquefaction analysis. The clay-like fine-grained layers were sampled at 2.5 ft, 10 ft, 20 ft, 25 ft, 30 ft, 35 ft, and 45 ft. The fine-grained layers of Boring B-1 have shown PI values ranging from 11 to 27 that indicate all of the fine-grained layers at the site may exhibit a “clay-like behavior” during a seismic event as their PI values were greater than 7 (Boulanger and Idriss, 2006).

Consequences of cyclic softening of each fine-grained layers were analyzed following the procedure outlined in Idriss and Boulanger (2008) and Bray and Sancio (2006). Liquefaction potential/cyclic softening consequences of fine-grained soil layers were analyzed based on the methods referred above and the calculation results are attached to this response letter. The “clay-like” fine grained layer at 2.5 feet will be removed and recompacted during the overexcavation and grading as recommended in our report and therefore not analyzed.

Based on our analysis, except the fine-grained layer at 45 ft, all of the layers exhibit a lower Liquidity Index (LI), w_c/LL below 0.8, and Sensitivity (S_t) well below 8. Therefore, these fine-grained soil layers appear to be less sensitive to remolding, and the consequences of cyclic softening of these layers are anticipated to be relatively minor. The layer at 45 ft was classified as very stiff with an uncorrected SPT blow-count of 20 (undrained-shear strength (Su) > 1500 psf) and therefore, anticipated to be less prone to strength loss during earthquakes.

Provided there has been no change in the proposed project description and loading requirements, all other geotechnical foundation design and construction recommendations contained in the United-Heider Inspection Group’s report dated February 21, 2018 remain valid.

We trust that this letter provides the additional information requested by the CGS. Should there be any questions, we can be reached at 323-679-4666.

Very truly yours,

United - Heider Inspection Group

Param Piratheepan, PE, GE

Geotechnical Engineer

Dennis Heider, RCE

Principal Engineer

Stephen E. Jacobs, PG, CEG

Principal Engineering Geologist

UNITED-HEIDER INSPECTION GROUP
An ETS Company

Cyclic Softening in Clays and Plastic Silts

Project : Proposed New Instructional Building #2, El Camino College Compton Center Campus
Project # : 10-18020PW
Soil Boring : B-1

Layer	Sample Depth (ft)	Natural Water Content - w_c (%)	Liquid Limit - LL (%)	Plastic Limit - PL (%)	Bray and Sancio (2006)			Idriss and Boulanger (2008)			
					Plasticity Index -PI (%)	wc/LL	Liquefaction Susceptible	Liquidity Index (LI)	Vertical Effective Stress (atm)	Estimated Soil Sensitivity S_t	Potential Ground Deformation from Cyclic Softening
#1	10	20.3	34	23	11	0.60	Unlikely	-0.25	0.6	< 1	Minor
#2	20	28.9	60	33	27	0.48	Unlikely	-0.15	1.1	< 1	Minor
#3	25	36.7	60	33	27	0.61	Unlikely	0.14	1.4	< 2	Minor
#4	30	35.5	60	33	27	0.59	Unlikely	0.09	1.7	< 2	Minor
#5	35	18.7	60	33	27	0.31	Unlikely	-0.53	2.0	< 1	Minor
#6	45	36.9	39	27	12	0.95	Moderate	0.83	2.6	~ 8.5	Moderate

State of California • Natural Resources Agency
Department of Conservation
California Geological Survey
801 K Street • MS 12-31
Sacramento, CA 95814
(916) 324-7324 • FAX (916) 445-3334

Edmund G. Brown Jr., *Governor*
John G. Parrish, Ph.D., *State Geologist*

Steven Haigler
Vice President, Administrative Services
Compton Community College District
1111 East Artesia Boulevard.
Compton, CA 90221

April 25, 2018

Subject: **Engineering Geology and Seismology Review for Compton College – New Instructional Building #2**
1111 East Artesia Boulevard, Compton, CA
CGS Application No. 03-CGS3321

Dear Mr. Haigler:

In accordance with your request and transmittal of documents received on February 27, 2018, the California Geological Survey has reviewed the engineering geology and seismology aspects of the consulting report prepared for Compton College in Compton. It is our understanding that this project involves construction of a new two-story Instructional Building #2. This review was performed in accordance with Title 24, California Code of Regulations, 2016 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated February 21, 2018, 34 pages, 8 figures, 4 appendices.

Based on our review of the data and reports presented by United-Heider Inspection Group, the consultants provide a good geotechnical assessment of engineering geology and seismology issues with respect to the proposed improvements. The consultants recommend design spectral acceleration parameters of $\mathbf{S_{DS} = 1.116\,g}$ and $\mathbf{S_{D1} = 0.611g}$, which are considered reasonable for the site. Based on their evaluation, the potential hazard associated with fault deformation and slope stability are not design concerns for the project. However, they have not been fully addressed all of the engineering geology and seismology issues at the site. Specifically, the consultants are requested to reevaluate the hazard associated with liquefaction settlement, and evaluate the potential for surface manifestation of liquefaction, loss of bearing capacity, and cyclical softening for the proposed improvement. Additional information that is requested is provided in the attached Checklist Comments.

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced report.*** It is recommended that additional information be provided as requested in the attached Note 48 Checklist Review Comments portion of this letter. The consultants are reminded that one copy of all supplemental documents should be submitted directly to CGS and should include the CGS application number. If you have any further questions about this review letter, please contact the reviewer at (650) 350-62885 or ante.mlinarevic@conservation.ca.gov.

Respectfully submitted,

Ante Mlinarevic
Engineering Geologist
PG 8352, CEG 2552

Concur:

Anne Rosinski
Senior Engineering Geologist
PG 7481, CEG 2353

Enclosures:

Note 48 Checklist Review Comments
Keyed to: *Note 48 - Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*

Copies to:

Stephen E. Jacobs, *Certified Engineering Geologist*, and Param Piratheepan, *Registered Geotechnical Engineer*
United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553

Gary Moon, *Architect*
tBP Architecture, 4611 Teller Avenue, Newport Beach, CA 92660

Ted Beckwith, *Senior Structural Engineer*
Division of State Architect, 700 North Alameda Street, Suite 5-500, Los Angeles, CA 90012

Note 48 Checklist Review Comments

In the numbered paragraphs below, this review is keyed to the paragraph numbers of California Geological Survey Note 48 (October, 2013 edition), *Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings.*

Project Location

1. Site Location Map, Street Address, County Name: Adequately addressed.
2. Plot Plan with Exploration Data with Building Footprint: Adequately addressed.
3. Site Coordinates: Adequately addressed. Latitude and Longitude provided in report: 33.87889°N, 118.21043°W

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Not provided by the consultants and therefore not reviewed.
6. Subsurface Geology: Adequately addressed. The consultants report the site is underlain by young alluvial fan deposits comprised of sands, silts, and, clays. They report groundwater was encountered at the time of 45 feet during their recent investigation. The consultants utilized boring information from four hollow-stem auger borings drilled to a maximum depth of 51.5 feet, and a CPT from a previous (2015) site investigation to a maximum depth of 55.5 feet.
7. Geologic Cross Sections: Marginally adequate. The consultants present two "Geotechnical Cross Sections" depicting minimal geologic information. In the future, the consultants should provide geologic cross sections depicting additional subsurface soil information, and include foundation and site grading details.
8. Active Faulting & Coseismic Deformation Across Site: Adequately addressed. The consultants report there are no known active or potentially active faults that traverse the site, and the site is not located within an Alquist-Priolo Earthquake Fault Zone. They also report the nearest mapped Zone is the Newport-Inglewood Fault Zone, approximately 2 miles west of the site. The data presented appears to be reasonable.
9. Geologic Hazard Zones (Liquefaction & Landslides): Adequately addressed. The consultants report the site is mapped within an area shown as potentially susceptible to liquefaction on the California Geological Survey seismic hazard zones for the South Gate Quadrangle, which appears to be reasonable.
10. Geotechnical Testing of Representative Samples: Adequately addressed.
11. Geological Consideration of Grading Plans and Foundation Plans: **Additional information may be needed.** The consultants include foundation recommendations for a mat foundation/footings supported on a minimum of 5 feet of engineered fill. They also recommend overexcavation and recompaction of onsite soils and provide recommendations for import soils. The consultants should clarify if their foundation recommendations are still applicable based on the response to Items 21 and 31(I), and provide any associated bearing capacity calculations, including input parameters, for CGS review.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Marginally adequate. The consultants provide a general summary of historical seismicity in the Los Angeles area. In future reports, the consultants should also discuss the effects of the 1933 Long Beach Earthquake to the areas surrounding the site.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class D, Stiff Soil, based on the subsurface conditions and geology of the site. The site class designation appears to be reasonable based on results from a seismic cone penetration test (SCPT) suggesting an average shear wave velocity of 779 feet per second to a maximum depth of 55 feet.
14. General Procedure Seismic Parameters: Adequately addressed. The consultants report the following parameters derived from a map-based analysis:
    S_S = 1.674 and **S_1 = 0.611**
    S_{DS} = 1.116 and **S_{D1} = 0.611**
15. Seismic Design Category: Adequately addressed. The consultants report Seismic Design Category D, $S_1 < 0.75$.
16. Site-Specific Ground Motion Analysis: Not applicable.
17. Deaggregated Seismic Source Parameters: Not applicable.
18. Time-Histories of Earthquake Ground Motion: Not applicable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Liquefaction: Adequately addressed. The consultants report the site is situated on firm to stiff and loose to dense young alluvial fan deposits. The consultants also report that historically highest groundwater is mapped at about 8 feet below ground surface at the site. They conclude the site has a very high potential for the liquefaction susceptibility in layers occurring primarily between depths of 10 and 45 feet below existing ground surface. The data presented appear to support this conclusion.
20. Seismic Settlement Calculations: **Additional information is requested.** The consultants report they used a PGA_M of 0.623*g*, set groundwater to 8 feet below ground surface, and they used a deaggregated maximum earthquake magnitude of 7.3 for their analysis of boring B-1; however, it appears a lower earthquake magnitude was utilized for the liquefaction analysis of CPT-1 and CPT-2. The consultants should reevaluate the seismic settlement for CPT-1 and CPT-2 using a more appropriate earthquake magnitude.
21. Other Liquefaction Effects: **Additional information is requested.** The consultants report that calculated liquefaction occurs in relatively deep layers, and the potential for surface manifestation of liquefaction is considered low to moderate. However, the consultants do not address the potential for ground surface disruption, which is reported to have occurred in the vicinity of the college campus following the 1933 Long Beach earthquake (see Item 12). The consultants should evaluate and discuss the potential for surface manifestation of liquefaction at the site considering the SCEC guidelines for implementation of Special Publication 117 (Martin and Lew, 1999, P.33).
22. Mitigation Options for Liquefaction: **Additional information may be needed.** The consultants should provide appropriate mitigation options if their evaluation (see Item 21)

indicates potential for surface manifestation of liquefaction or loss of bearing capacity to impact the foundation.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report the site is relatively flat, and there no significant existing or proposed slopes at the site. They conclude the possibility for earthquake-induced landslides is considered negligible. The data presented appear to support this conclusion.
24. Determination of Static and Dynamic Strength Parameters: Not applicable.
25. Determination of Pseudo-Static Coefficient (Keq): Not applicable.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Not applicable.
27. Dynamic Site Conditions: Not applicable.
28. Mitigation Options/Other Slope Failure: Not applicable.

Other Geologic Hazards or Adverse Site Conditions

29. Expansive Soils: Adequately addressed. The consultants report the most expansive subsurface soils within the building site had an expansion index of 85, indicating a medium expansion potential. They conclude the onsite soils are anticipated to contain a **low to medium expansion potential**, which appears to be reasonable based on the laboratory results presented.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report the onsite soil is considered to be noncorrosive to foundation elements, which appears to be reasonable. However, the consultants state that consideration should be given to retaining a corrosion consultant to obtain recommendations for the protection of metal components embedded in the site soil.
31. Conditional Geologic Assessment: Selected geologic hazards addressed by the consultant are listed below:
    - C. Flooding: Adequately addressed. The consultants report the site is located in a FEMA-designated Zone X. They also report the site is mapped within an area shown as Potential Dam Inundation Areas on the Los Angeles County General Plan Dam and Reservoir Inundation Routes Map, and the potential of earthquake-induced flooding exists at the site, if a dam fails during a strong earthquake. The data presented appears to be reasonable.
    - G. Hydrocollapse: Adequately addressed. The consultants anticipate approximately **1 inch** of collapse settlement due to the presence of approximately 8 feet of surficial soils that may be susceptible to collapse under saturation.
    - H. Regional subsidence: Adequately addressed. The consultants report the site lies either within, or near, an area potential land subsidence due to withdrawal of oil and gas from nearby oil and gas fields.
    - I. Clays and cyclic softening: **Additional information is requested.** The consultants have not addressed the potential for cyclic softening and corresponding strength loss/deformation of clay soils that underlie the site. According to Idriss and Boulanger (2008), "soft, normally consolidated or lightly overconsolidated clays will generally have higher natural water content, higher liquidity index (LI) values, and higher

sensitivities and will therefore be most prone to strength loss during earthquakes." Based on the data presented in the boring logs, laboratory data, and CPT soundings, the consultants should evaluate the clay layers in the subsurface for cyclic softening and strength loss.

Report Documentation

32. Geology, Seismology, and Geotechnical References: Adequately addressed.
33. Certified Engineering Geologist: Adequately addressed.
    Stephen E. Jacobs, Certified Engineering Geologist #1307
34. Registered Geotechnical Engineer: Adequately addressed.
    Param Piratheepan, Registered Geotechnical Engineer #2826

State of California • Natural Resources Agency
Department of Conservation
California Geological Survey
801 K Street • MS 12-31
Sacramento, CA 95814
(916) 324-7324 • FAX (916) 445-3334

Edmund G. Brown Jr., *Governor*
John G. Parrish, Ph.D., *State Geologist*

May 21, 2018

Steven Haigler
Vice President, Administrative Services
Compton Community College District
1111 East Artesia Boulevard.
Compton, CA 90221

Subject: **Second Engineering Geology and Seismology Review for Compton College – New Instructional Building #2**
1111 East Artesia Boulevard, Compton, CA
CGS Application No. 03-CGS3321

Dear Mr. Haigler:

In accordance with your request and transmittal of documents received on February 27, 2018 and May 9, 2018, the California Geological Survey has reviewed the engineering geology and seismology aspects of the consulting report prepared for Compton College. It is our understanding that this project involves construction of a new two-story Instructional Building #2. This second review was performed in accordance with Title 24, California Code of Regulations, 2016 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Response to Review Comments, Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated May 8, 2018, 5 pages, 2 attachments.

In addition, we previously reviewed the following report:

> **Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated February 21, 2018, 34 pages, 8 figures, 4 appendices.

The CGS previously reviewed and submitted our findings regarding this project in our review letter dated April 25, 2018, in which additional information was requested to clarify the hazard associated with liquefaction settlement, and to evaluate the potential for surface manifestation of liquefaction, loss of bearing capacity, and cyclical softening for the proposed project.

Discussion of Historical Liquefaction Affects

In the previous report, the consultants did not address the potential for ground surface disruption, which is reported to have occurred in the vicinity of the college campus following the 1933 Long Beach earthquake. The consultants respond to our comment by presenting additional historical documentation from the Long Beach earthquake. They concluded most of the reported damages were due to seismic shaking/ground motion. However, CGS notes surface effects of liquefaction from the Long Beach earthquake occurred based on references presented in the Seismic Hazard Zone Report for South Gate and depicted in Plate 1.2. The consultants should address additional historical records of ground surface disruption in the area and discuss the hazards posed to the proposed project.

Discussion of Estimated Seismic Settlement

In the previous report, the consultants reported using PGA_M of 0.623g, groundwater at 8 feet below ground surface, and a deaggregated maximum earthquake magnitude of 7.3 for their analysis of boring B-1, which appears to be reasonable. CGS requested the consultants to apply these parameters to the seismic settlement analysis for the adjacent sounding, specifically CPT-1.

The consultants respond to our comment by stating data exclusively from boring B-1 was used for settlement analysis of the proposed project, however, they do not fully address our comment. We note CPT-1 represents higher resolution subsurface information adjacent to the proposed project and calculations of estimated seismic settlement performed using data from CPT-1 indicate there is potential for settlement at lower earthquake magnitudes than the consultants' conclusions indicate. We also note, settlement values typically increase with larger magnitude, and longer duration, earthquakes. We continue to request the consultants reevaluate the seismic settlement for CPT-1 using the more appropriate earthquake magnitude of 7.3, and provide appropriate mitigation options if their evaluation indicates potential for surface manifestation of liquefaction or loss of bearing capacity to impact the foundation.

Discussion of Cyclic Softening

In the previous report the consultants did not address the potential for cyclic softening and corresponding strength loss/deformation of clay soils that underlie the site. The consultants respond to our comment by evaluating the clay layers in boring B-1 for cyclic softening and strength loss. They conclude the fine-grained soil layers appear to be less sensitive to remolding, and the consequences of cyclic softening of these layers are anticipated to be relatively minor. The data presented appears to support this conclusion and the consultants adequately address our comment.

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced report.*** It is recommended that additional information be provided as requested in this letter. The consultants are reminded that one copy of all supplemental documents should be submitted directly to CGS and should include the CGS application number. If you have any further questions about this review letter, please contact the reviewer at (650) 350-62885 or ante.mlinarevic@conservation.ca.gov.

Respectfully submitted,

Ante Mlinarevic
Engineering Geologist
PG 8352, CEG 2552

CERTIFIED ENGINEERING GEOLOGIST
Ante Nik Mlinarevic
No. 2552
STATE OF CALIFORNIA

Concur,

Anne Rosinski
Senior Engineering Geologist
PG 7481, CEG 2353

CERTIFIED ENGINEERING GEOLOGIST
Anne M. Rosinski
No. 2353
STATE OF CALIFORNIA

Copies to:

Stephen E. Jacobs, *Certified Engineering Geologist*, and Param Piratheepan, *Registered Geotechnical Engineer*
United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553

Gary Moon, *Architect*
tBP Architecture, 4611 Teller Avenue, Newport Beach, CA 92660

Ted Beckwith, *Senior Structural Engineer*
Division of State Architect, 700 North Alameda Street, Suite 5-500, Los Angeles, CA 90012

June 15, 2018

Ms. Linda Owens
Director of Facilities
Compton Community College District
1111 East Artesia Blvd.
Compton, CA 90221

Re: **CGS Application No. 03-CGS3321**
RESPONSE TO SECOND REVIEW COMMENTS
Preliminary Geotechnical Investigation Report
Proposed New Instructional Building #2
El Camino College Compton Center Campus
1111 E. Artesia Boulevard
Compton, CA 90221

United - Heider Inspection Group Project No. 10-18020PW

Reference: Second Engineering Geology and Seismology Review for Compton College – New Instructional Building #2, 1111 East Artesia Boulevard, Compton, CA; CGS Application No. 03-CGS3021, dated May 21, 2018.

Engineering Geology and Seismology Review for Compton College – New Instructional Building #2, 1111 East Artesia Boulevard, Compton, CA; CGS Application No. 03-CGS3021.

United - Heider Inspection Group (February 21, 2018), Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 1111 E. Artesia Boulevard, Compton, CA 90221; Project No. 10-18020PW, dated February 21, 2018.

Barrows, A.G., 1974, A review of the geology and earthquake history of the Newport-Inglewood structural zone, southern California: California Department of Conservation, Division of Mines and Geology, Special Report 114, 115 p.

California Division of Mines and Geology (CDMG), 1998, Seismic Hazard Zone Report for the South Gate 7.5-Minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 034, Open- File Report 98-25, 40 p.

Hillis, D., 1933, Cracks produced by Long Beach, California, Earthquake: American Association of Petroleum Geologists Bulletin, v. 17, p. 739-740.

Wood, H.O., 1933, Preliminary report on the Long Beach earthquake: Bulletin of the Seismological Society of America, v. 23, p. 43-56.

Dear Ms. Owens:

This letter transmits itemized responses to the second review comments made by the California Geological Survey (CGS) related to the above referenced report prepared by United-Heider Inspection Group, Inc. for the planned New Instructional Building #2 located within the El Camino College Compton Center located on 1111 E. Artesia Boulevard in the City of Compton, California.

In a review letter dated May 21, 2018, the CGS has requested the following additional geotechnical information per the Note 48 Checklist. For convenience, a copy of the review letter is attached. United-Heider Inspection Group's responses are provided only for the follow-up discussion/comments that required additional information per CGS. Our responses are provided below:

Discussion of Historical Liquefaction effects

Response: We have reviewed the historic references (CDMG, 1998; Barrows, 1974; Hillis, 1933; Wood, 1933) that discuss the ground surface disruption due to liquefaction and have prepared the attached compilation of our findings from those references regarding liquefaction features.

The results of our review indicate that only two cracks attributed to liquefaction were reported near the Compton College campus. One of these cracks is illustrated in the attached photograph from Wood (1933, Plate 5a). These cracks occurred where water, sand, and mud were ejected that formed "craterlet" features and were reportedly located (CDMG, 1998; see attached map showing site of historic liquefaction) about ½ mile east of the subject proposed development on the Compton College campus. These cracks are interpreted to have formed as the result of liquefaction during earthquake ground shaking from the 1933 Long Beach earthquake. Water-soaked ground was also reported in the vicinity of City of Compton during the time of the 1933 earthquake.

However, Wood (1933, p. 52) indicated that the most severe damage associated with ground cracks due to liquefaction occurred on "ground formerly marshy in part, along Compton Creek and the former courses of the Los Angeles River, with deep deposits of loose, wet alluvium beneath." "The area most markedly affected by the extrusion of water lies west of Santa Ana and north and northwest of Newport Beach and Huntington Beach" (Wood, 1933, p. 54).

It appears that the Compton College campus site experienced much less severe ground failure due to liquefaction, because it was outside of the formerly marshy areas along the former courses of the Los Angeles River, which experienced the most severe ground failure.

Based on our site-specific liquefaction analysis, much of the calculated liquefaction occurring in relatively deep layers, the potential for surface manifestation of liquefaction is considered to be low to moderate.

Seismic Settlement Calculations: Additional information is requested.

Response: Per CGS's request, we have requested the previous Building #1 geotechnical report authors to reanalyze the Cone Penetration Test - 1 (CPT-1) with an earthquake magnitude of 7.3. Based on their updated liquefaction analyses, a post-seismic liquefaction settlement on the order of 2 inches was calculated.

The liquefaction analysis on CPT-1 shows potentially liquefiable soil layers at the following depths:

Depth of Potentially Liquefiable Layers Per CPT-1 Analyses	Approximate Layer Thickness (ft.)	Soil Behavior Type per CPT Interpretation [Robertson et al. (1986) and Robertson (1990)]
~10.2 ft to 10.7 ft	0.5	Clay & Silty Clay
~11.7 ft to 13.9 ft	2.2	Silty Sand & Sandy Silt
~14.6 ft to 20.8 ft	6.2	Clay & Silty Clay and Silty Sand & Sandy Silt layers
~25.8 ft to 29.2 ft	3.4	Clay & Silty Clay and Clay layers
~33.6 ft to 34.5 ft	0.9	Clay & Silty Clay and Clay layers
~36.3 ft to 36.8 ft	0.5	Clay & Silty Clay and Clay layers
~38.6 ft to 38.9 ft	0.3	Clay & Silty Clay and Clay layers
~41.5 ft to 43.0 ft	1.5	Clay & Silty Clay
~43.6 ft to 45.8 ft	2.2	Clay & Silty Clay
~49.7 ft to 51.8 ft	2.7	Silty Sand & Sandy Silt

As tabulated and shown above, although Soil Behavior Type was interpreted as Clay & Silty Clay and Clay layers [page 2 & 3 of attached revised analysis], the CPT liquefaction analysis procedures identified these layers are potentially liquefiable and consequently calculated respective liquefaction settlements. As part of our response to CGS's first review comments, we have provided backup data and calculations showing that the fine-grained layers at this site have shown PI values ranging from 11 to 27 and indicate that all of the fine-grained layers at the site exhibit a “clay-like behavior” during a seismic event as their PI values were greater than 7 (Boring B-1 – see our response to first review comments) and therefore potentially not liquefiable.

Therefore, the liquefaction potential analysis of these clay & silty clay and clay layers needs refinement or excluded from the settlement calculations. CPT-1 liquefaction analysis appeared to be overly conservative based on the field sampling and testing data from the Boring B-1 of our current investigation. It is important to note that CPT-1 that was done as part of the Building #1 investigation was not explored in combination with an SPT boring to check for consistency and verify the CPT soil behavior type interpretations empirical correlations.

For the Building # 2 foundation design, we recommended the designers to take account for a maximum differential seismic settlement on the order 1.2 inches in 30 feet in their foundation design that is well above ½ of the revised CPT-1 total seismic settlement.

We believe our analyses and recommendations for the project remain conservative and appropriate.

We trust that this letter provides the additional information requested by the CGS. Should there be any questions, we can be reached at 323-679-4666.

Very truly yours,

United - Heider Inspection Group

REGISTERED PROFESSIONAL ENGINEER
PARAM PIRATHEEPAN
GE 2826
Exp. 09/30/18
GEOTECHNICAL
STATE OF CALIFORNIA

Param Piratheepan, PE, GE

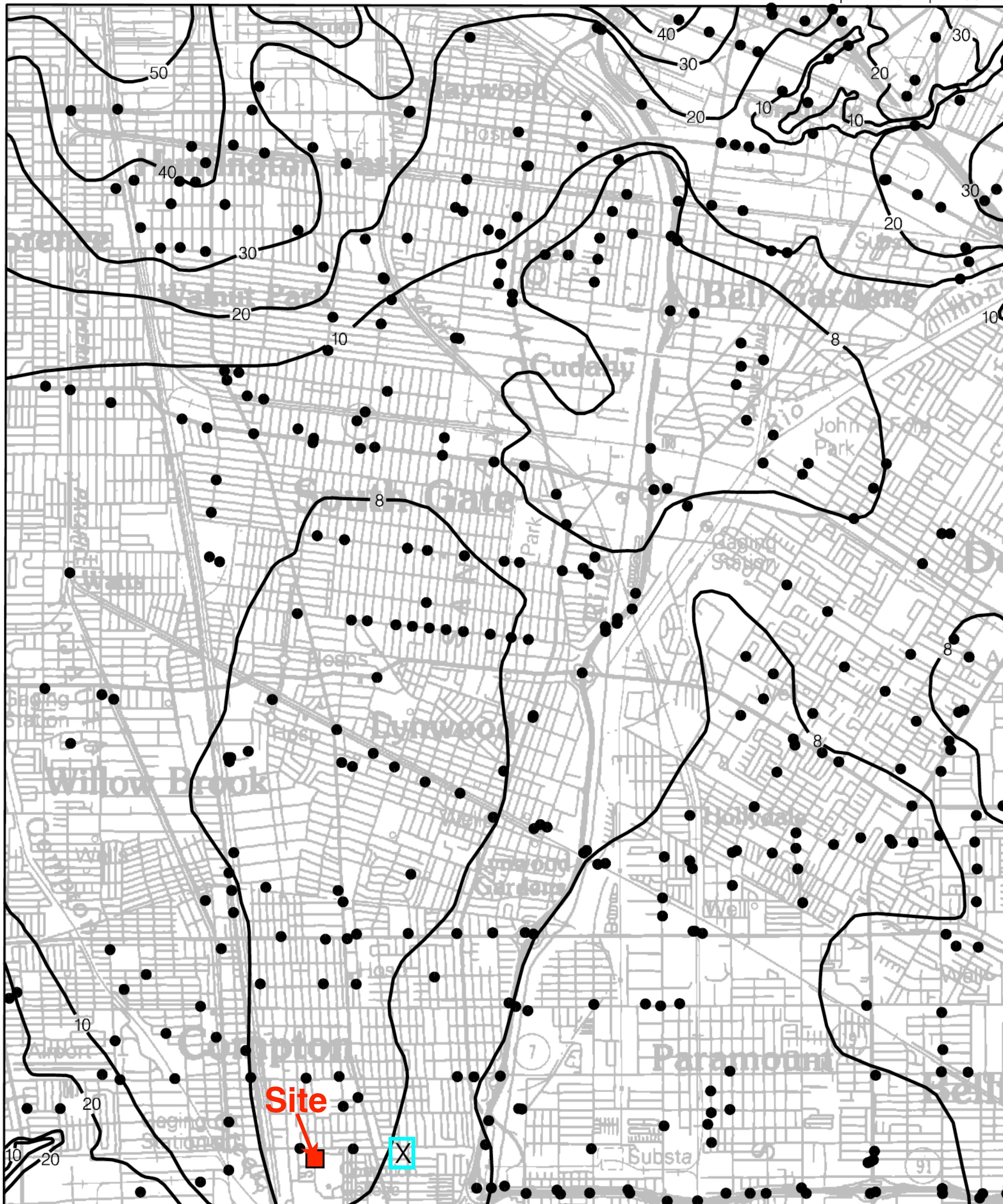
Geotechnical Engineer

Stephen E. Jacobs, PG, CEG

Principal Engineering Geologist

CERTIFIED ENGINEERING GEOLOGIST
STEPHEN E. JACOBS
No. 1307
Exp. 08/31/19
ENGINEERING GEOLOGY
STATE OF CALIFORNIA

a) Northwest-southeast crack in ground near Compton, showing sand washed out with incipient craterlet development. (Photo courtesy Mr. Donuil Hillis)



Base map enlarged from U.S.G.S. 30 x 60–minute series

Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, South Gate Quadrangle.

● Borehole Site — 30 — Depth to ground water in feet

X Site of historical earthquake–generated liquefaction. See "Areas of Past Liquefaction" discussion in text.

ONE MILE

SCALE

Geosphere Consultants Inc.
2001 Crow Canyon Road, Suite # 210
San Ramon, California 94583

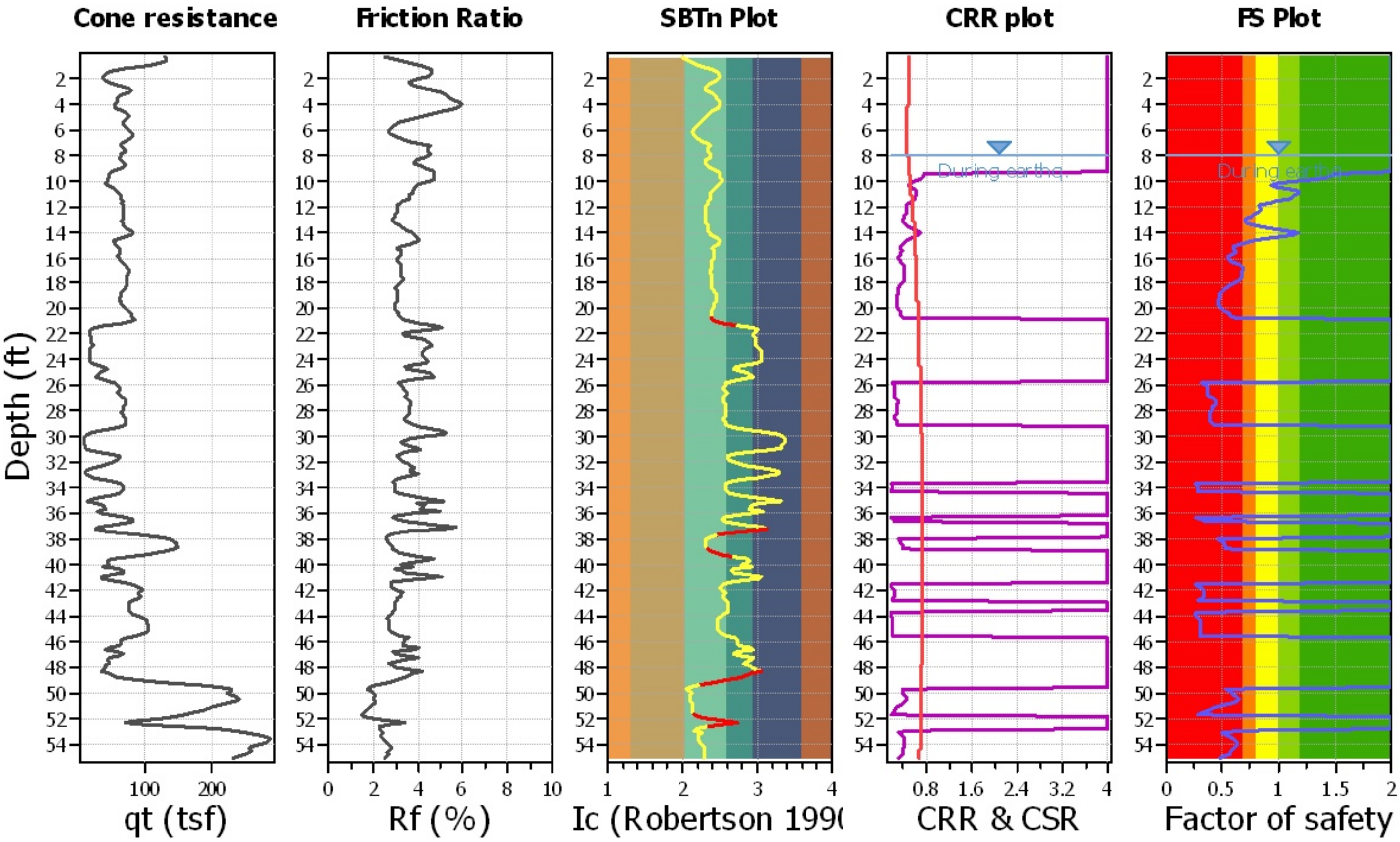
LIQUEFACTION ANALYSIS REPORT

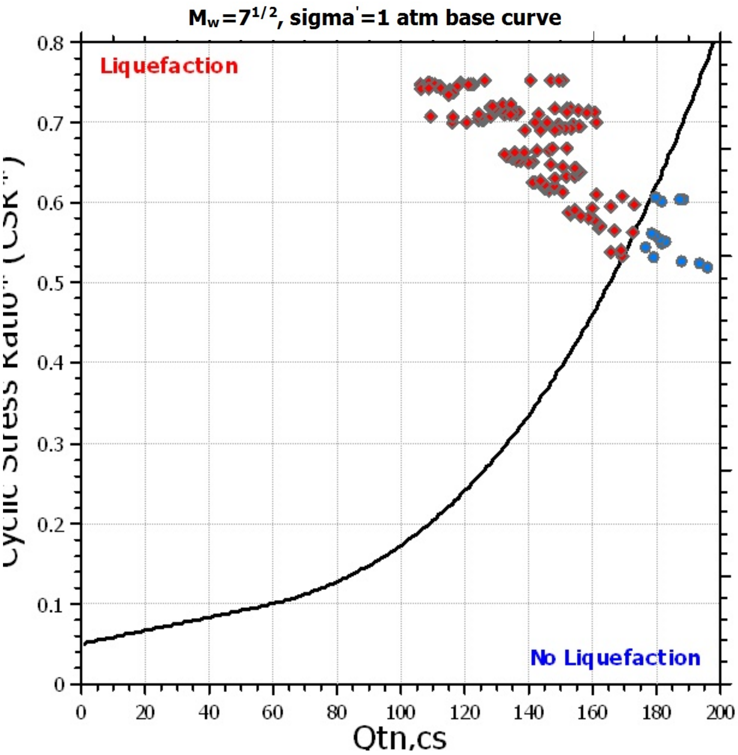
Project title : El Camino College - Compton Center **Location : Compton California**

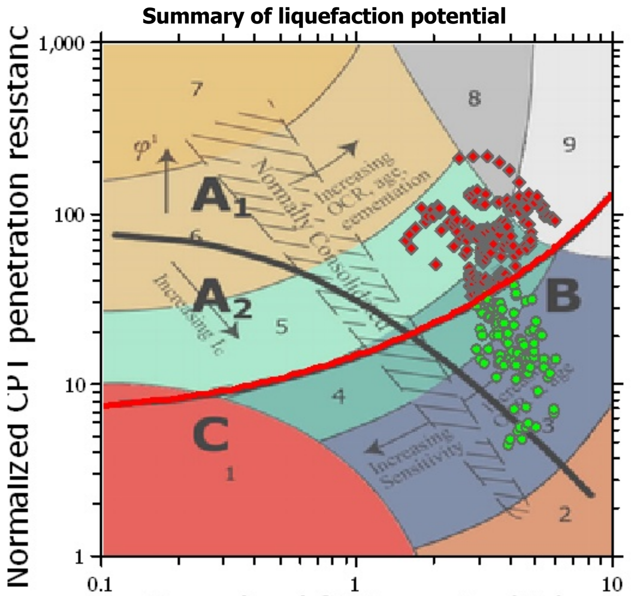
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	46.40 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	8.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.30	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.62	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

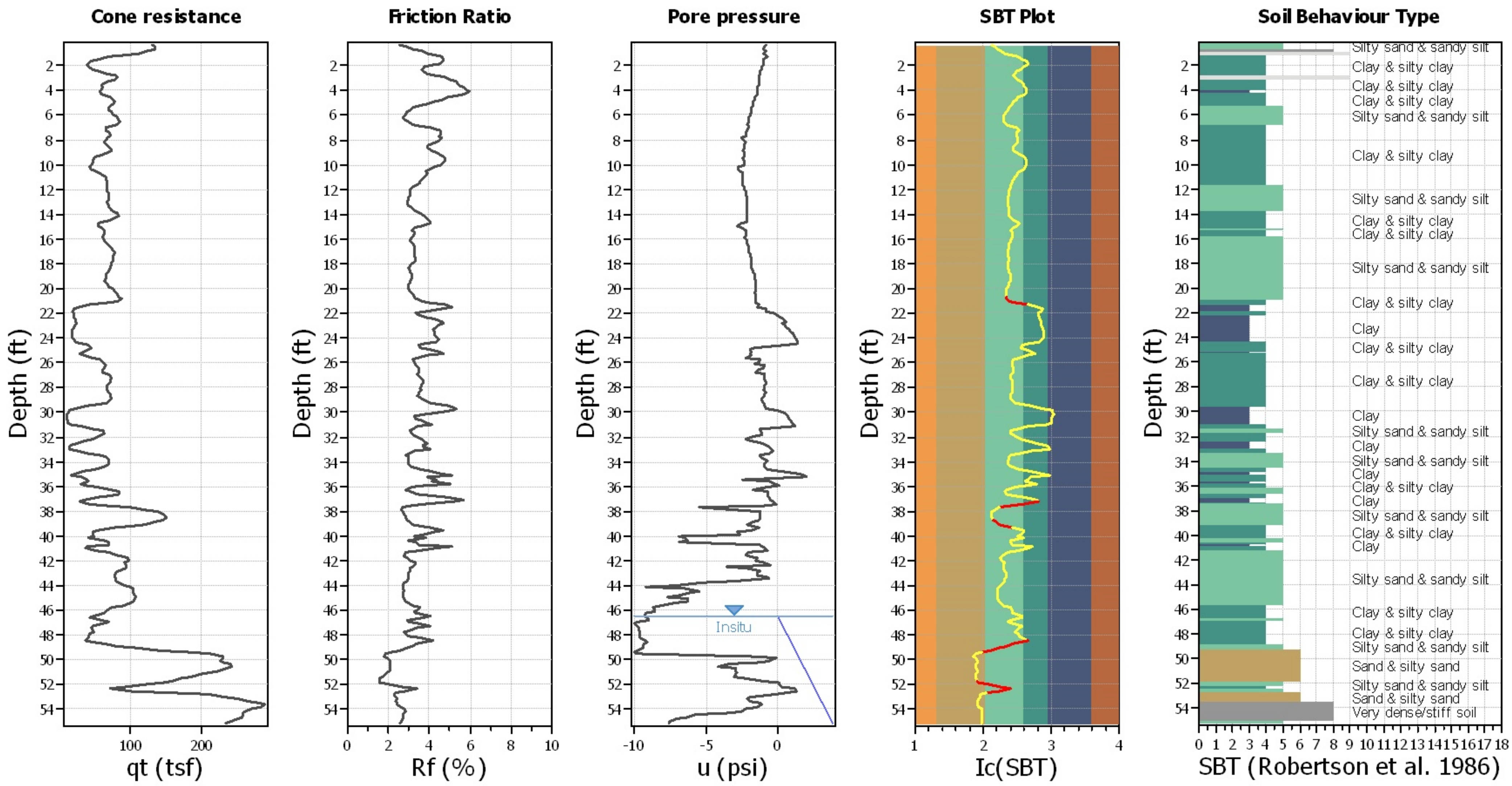






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plo



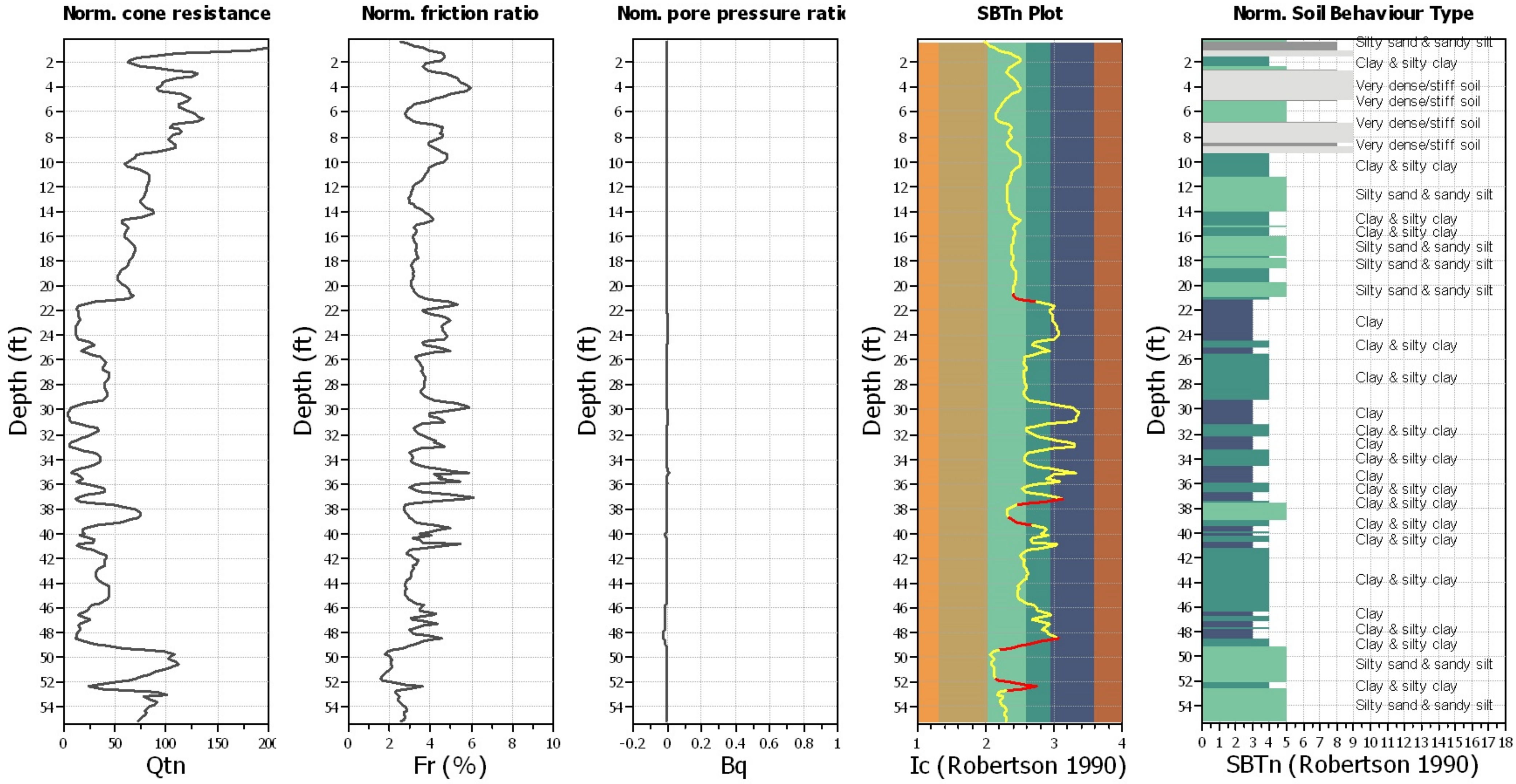
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

CPT basic interpretation plots (normaliz



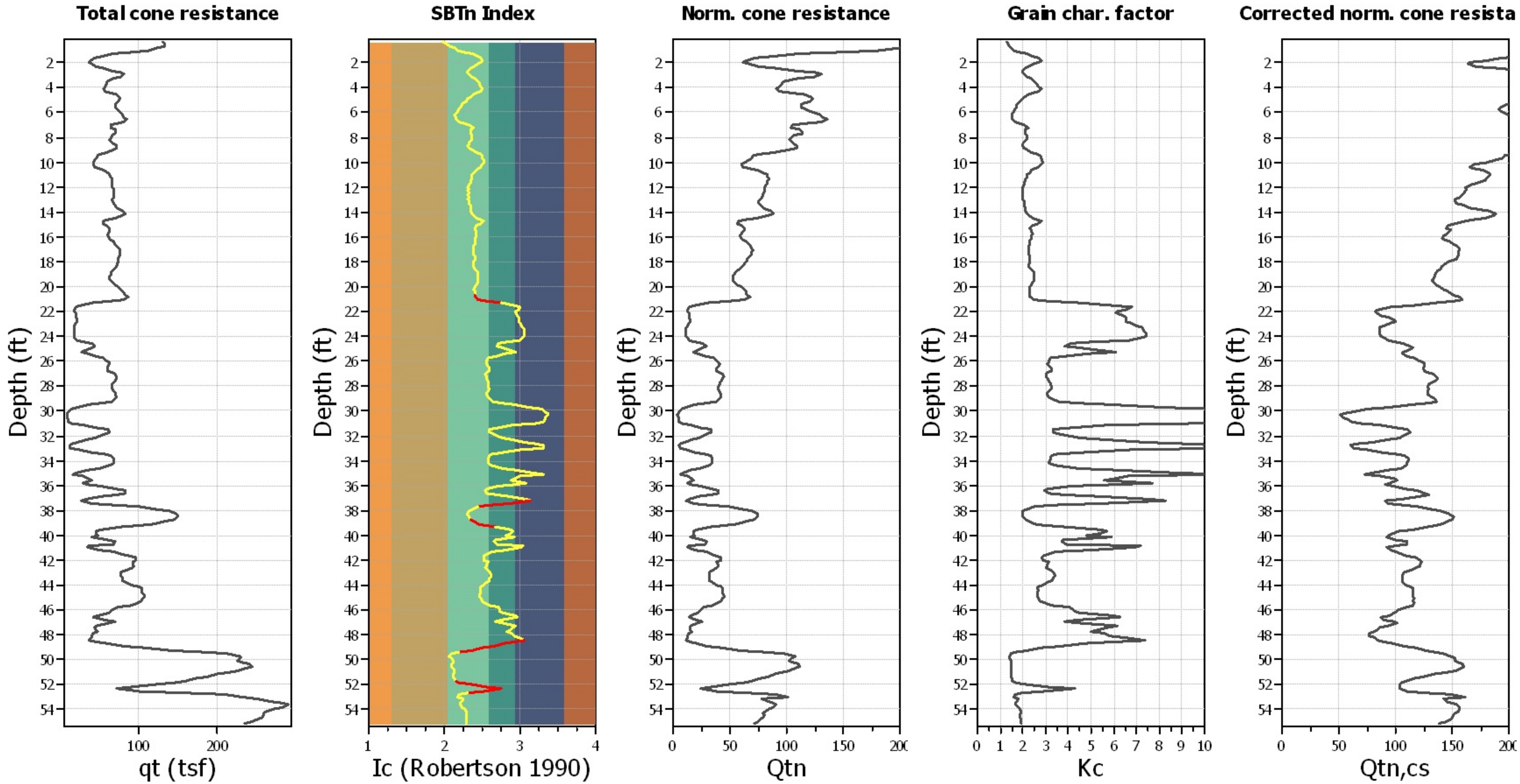
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

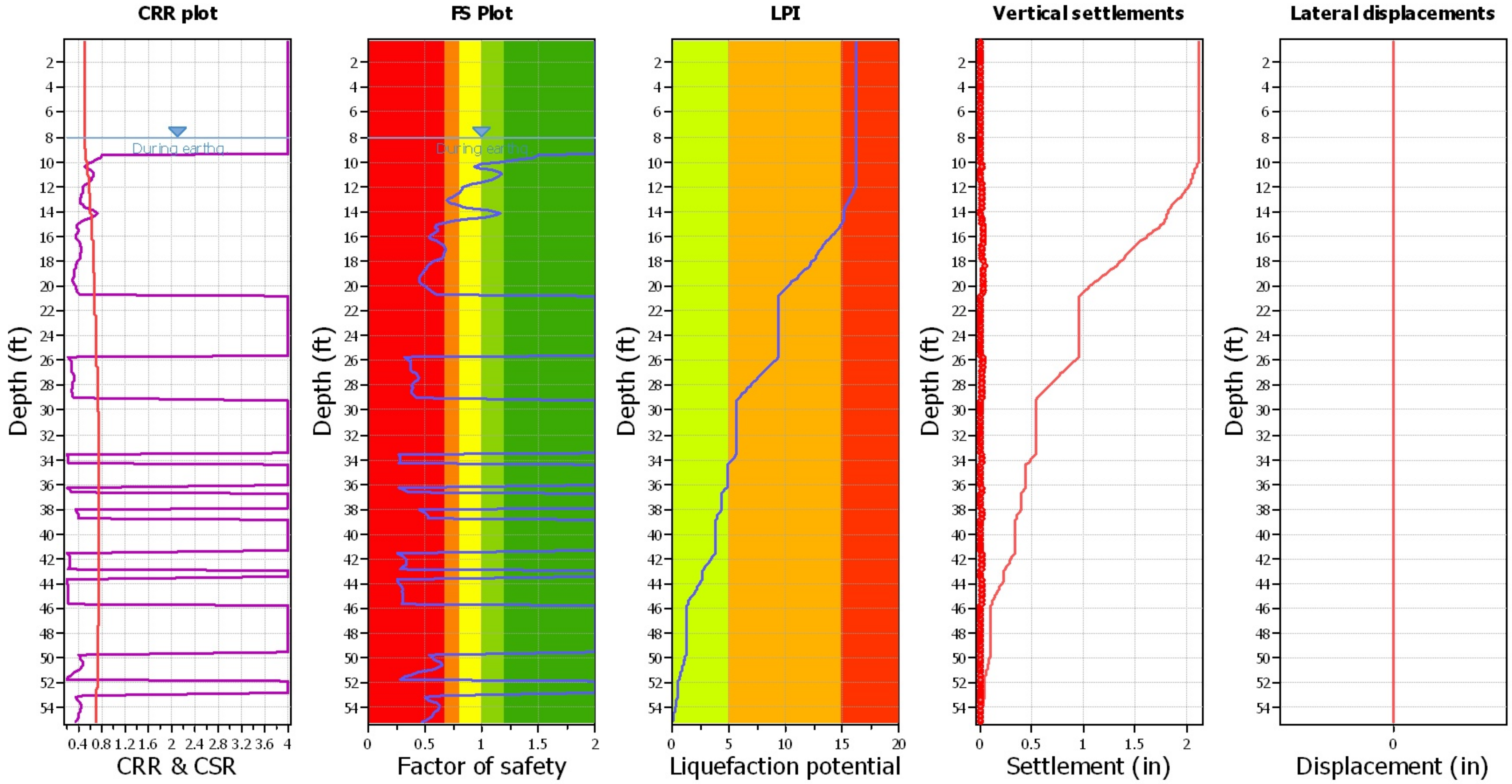
Liquefaction analysis overall plots (intermediate resu



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

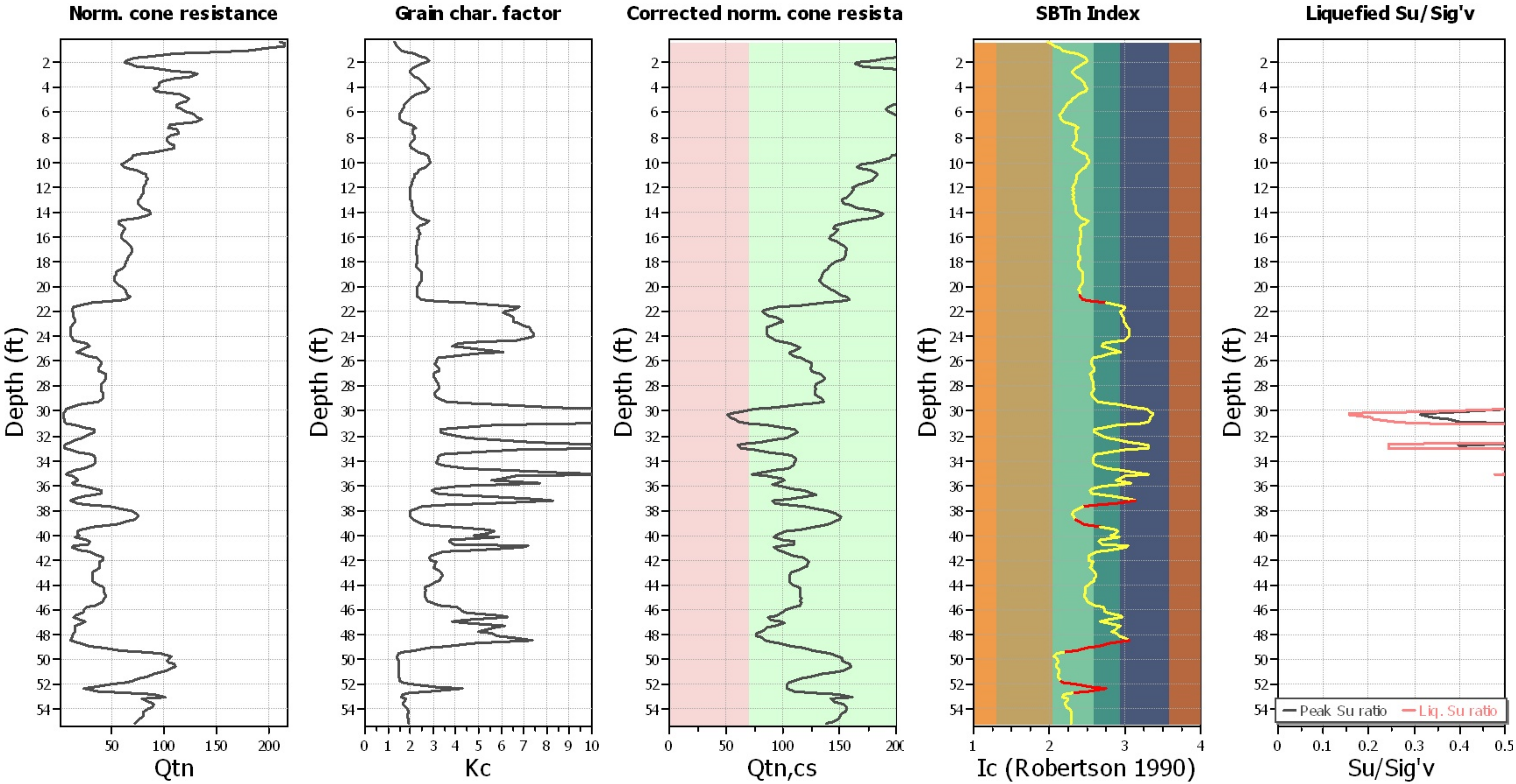
F.S. color scheme

- 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

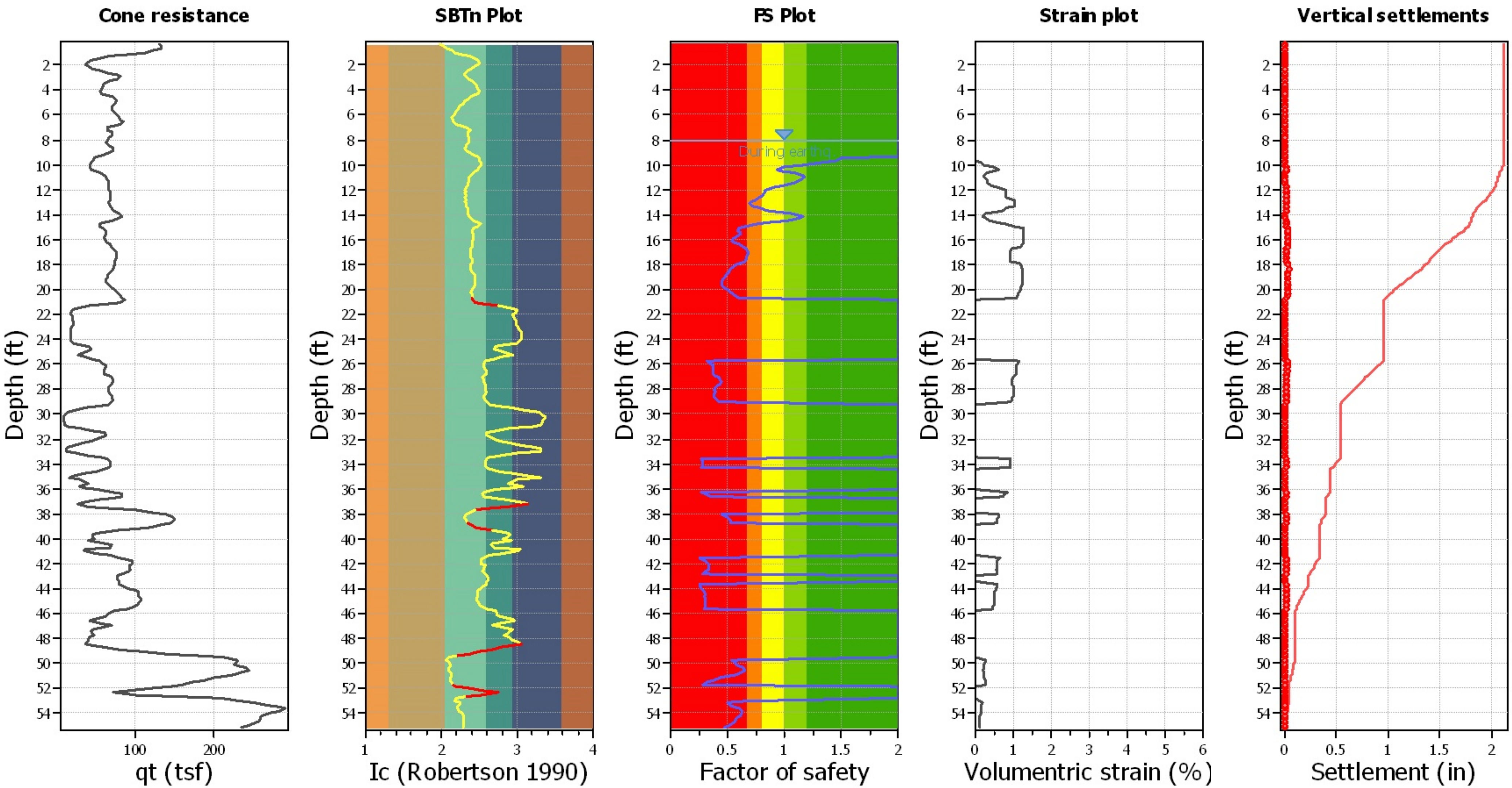
Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	8.00 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:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.62	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	46.40 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

State of California • Natural Resources Agency
Department of Conservation
California Geological Survey
801 K Street • MS 12-31
Sacramento, CA 95814
(916) 324-7324 • FAX (916) 445-3334

Edmund G. Brown Jr., *Governor*
John G. Parrish, Ph.D., *State Geologist*

May 21, 2018

Steven Haigler
Vice President, Administrative Services
Compton Community College District
1111 East Artesia Boulevard.
Compton, CA 90221

Subject: **Second Engineering Geology and Seismology Review for Compton College – New Instructional Building #2
1111 East Artesia Boulevard, Compton, CA
CGS Application No. 03-CGS3321**

Dear Mr. Haigler:

In accordance with your request and transmittal of documents received on February 27, 2018 and May 9, 2018, the California Geological Survey has reviewed the engineering geology and seismology aspects of the consulting report prepared for Compton College. It is our understanding that this project involves construction of a new two-story Instructional Building #2. This second review was performed in accordance with Title 24, California Code of Regulations, 2016 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Response to Review Comments, Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated May 8, 2018, 5 pages, 2 attachments.

In addition, we previously reviewed the following report:

> **Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated February 21, 2018, 34 pages, 8 figures, 4 appendices.

The CGS previously reviewed and submitted our findings regarding this project in our review letter dated April 25, 2018, in which additional information was requested to clarify the hazard associated with liquefaction settlement, and to evaluate the potential for surface manifestation of liquefaction, loss of bearing capacity, and cyclical softening for the proposed project.

Discussion of Historical Liquefaction Affects

In the previous report, the consultants did not address the potential for ground surface disruption, which is reported to have occurred in the vicinity of the college campus following the 1933 Long Beach earthquake. The consultants respond to our comment by presenting additional historical documentation from the Long Beach earthquake. They concluded most of the reported damages were due to seismic shaking/ground motion. However, CGS notes surface effects of liquefaction from the Long Beach earthquake occurred based on references presented in the Seismic Hazard Zone Report for South Gate and depicted in Plate 1.2. The consultants should address additional historical records of ground surface disruption in the area and discuss the hazards posed to the proposed project.

Discussion of Estimated Seismic Settlement

In the previous report, the consultants reported using PGA_M of 0.623g, groundwater at 8 feet below ground surface, and a deaggregated maximum earthquake magnitude of 7.3 for their analysis of boring B-1, which appears to be reasonable. CGS requested the consultants to apply these parameters to the seismic settlement analysis for the adjacent sounding, specifically CPT-1.

The consultants respond to our comment by stating data exclusively from boring B-1 was used for settlement analysis of the proposed project, however, they do not fully address our comment. We note CPT-1 represents higher resolution subsurface information adjacent to the proposed project and calculations of estimated seismic settlement performed using data from CPT-1 indicate there is potential for settlement at lower earthquake magnitudes than the consultants' conclusions indicate. We also note, settlement values typically increase with larger magnitude, and longer duration, earthquakes. We continue to request the consultants reevaluate the seismic settlement for CPT-1 using the more appropriate earthquake magnitude of 7.3, and provide appropriate mitigation options if their evaluation indicates potential for surface manifestation of liquefaction or loss of bearing capacity to impact the foundation.

Discussion of Cyclic Softening

In the previous report the consultants did not address the potential for cyclic softening and corresponding strength loss/deformation of clay soils that underlie the site. The consultants respond to our comment by evaluating the clay layers in boring B-1 for cyclic softening and strength loss. They conclude the fine-grained soil layers appear to be less sensitive to remolding, and the consequences of cyclic softening of these layers are anticipated to be relatively minor. The data presented appears to support this conclusion and the consultants adequately address our comment.

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced report.*** It is recommended that additional information be provided as requested in this letter. The consultants are reminded that one copy of all supplemental documents should be submitted directly to CGS and should include the CGS application number. If you have any further questions about this review letter, please contact the reviewer at (650) 350-62885 or ante.mlinarevic@conservation.ca.gov.

Respectfully submitted,

Ante Mlinarevic
Engineering Geologist
PG 8352, CEG 2552

CERTIFIED ENGINEERING GEOLOGIST
Ante Nik Mlinarevic
No. 2552
STATE OF CALIFORNIA

Concur:

Anne Rosinski
Senior Engineering Geologist
PG 7481, CEG 2353

CERTIFIED ENGINEERING GEOLOGIST
Anne M. Rosinski
No. 2353
STATE OF CALIFORNIA

Copies to:

Stephen E. Jacobs, *Certified Engineering Geologist*, and Param Pirattheepan, *Registered Geotechnical Engineer*
United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553

Gary Moon, *Architect*
tBP Architecture, 4611 Teller Avenue, Newport Beach, CA 92660

Ted Beckwith, *Senior Structural Engineer*
Division of State Architect, 700 North Alameda Street, Suite 5-500, Los Angeles, CA 90012

State of California • Natural Resources Agency
Department of Conservation
California Geological Survey
801 K Street • MS 12-31
Sacramento, CA 95814
(916) 324-7324 • FAX (916) 445-3334

Edmund G. Brown Jr., *Governor*
John G. Parrish, Ph.D., *State Geologist*

Steven Haigler
Vice President, Administrative Services
Compton Community College District
1111 East Artesia Boulevard.
Compton, CA 90221

July 30, 2018

Subject: **Third Engineering Geology and Seismology Review for Compton College – New Instructional Building #2**
1111 East Artesia Boulevard, Compton, CA
CGS Application No. 03-CGS3321

Dear Mr. Haigler:

In accordance with your request and transmittal of documents received on February 27, 2018 and May 9, 2018, the California Geological Survey has reviewed the engineering geology and seismology aspects of the consulting report prepared for Compton College. It is our understanding that this project involves construction of a new two-story Instructional Building #2. This third review was performed in accordance with Title 24, California Code of Regulations, 2016 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Response to Second Review Comments, Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 1111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated June 15, 2018, 4 pages, 3 attachments.

In addition, we previously reviewed the following report:

> **Response to Review Comments, Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 1111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553; company Project No. 10-18020PW, report dated May 8, 2018, 5 pages, 2 attachments.

> **Preliminary Geotechnical Investigation Report, Proposed New Instructional Building #2, El Camino College Compton Center Campus, 1111 E. Artesia Blvd. Compton, CA 90221:** United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno

Valley, CA 92553; company Project No. 10-18020PW, report dated February 21, 2018, 34 pages, 8 figures, 4 appendices.

The CGS previously reviewed and submitted our findings regarding this project in our review letters dated April 25 and May 21, 2018, in which additional information was requested to clarify the hazard associated with liquefaction settlement, and to evaluate the potential for surface manifestation of liquefaction, and loss of bearing capacity for the proposed project.

Discussion of Historical Liquefaction Affects

In the previous reports, the consultants did not address the potential for ground surface disruption, which is reported to have occurred near the college campus following the 1933 Long Beach earthquake. The consultants respond to our comment by stating they reviewed additional historical references and now report that cracks had formed as the result of liquefaction during the 1933 Long Beach earthquake. They also state these cracks were located about ½ mile east of the subject proposed development and occurred primarily in former marshy areas. The consultants conclude Compton College campus site experienced much less severe ground failure due to liquefaction because it was outside of the formerly marshy areas, and the potential for surface manifestation of liquefaction at the site is low to moderate. The data presented appears to be reasonable.

Discussion of Estimated Seismic Settlement

In the previous report, the consultants reported using PGA_M of 0.623g, groundwater at 8 feet below ground surface, and a deaggregated maximum earthquake magnitude of 7.3 for their analysis of boring B-1, which appears to be reasonable. Additionally, CGS requested the consultants to apply these parameters to the seismic settlement analysis for the adjacent sounding, specifically CPT-1.

The consultants respond to our comment by presenting updated liquefaction analyses for CPT-1 with a reported post-seismic liquefaction settlement on the order of 2 inches and a maximum differential seismic settlement on the order of 1.2 inches in 30 feet. The analysis appears to be reasonable, and the consultants recommend the designer account for these revised seismic settlement values.

Based on the responses provided above, the consultants address our previous concerns regarding the proposed improvements.

In conclusion, ***the engineering geology and seismology issues at this site are adequately assessed in the referenced report***. If you have any further questions about this review letter, please contact the reviewer at (650) 350-7309 or ante.mlinarevic@conservation.ca.gov.

Respectfully submitted,

Ante Mlinarevic
Engineering Geologist
PG 8352, CEG 2552

CERTIFIED ENGINEERING GEOLOGIST
Ante Nik Mlinarevic
No. 2552
STATE OF CALIFORNIA

Concur:

Anne Rosinski
Senior Engineering Geologist
PG 7481, CEG 2353

CERTIFIED ENGINEERING GEOLOGIST
Anne M. Rosinski
No. 2353
STATE OF CALIFORNIA

Copies to:

Stephen E. Jacobs, *Certified Engineering Geologist*, and Param Piratheepan, *Registered Geotechnical Engineer*
United-Heider Inspection Group, 22620 Goldencrest Drive, Suite 114, Moreno Valley, CA 92553

Gary Moon, *Architect*
tBP Architecture, 4611 Teller Avenue, Newport Beach, CA 92660

Ted Beckwith, *Senior Structural Engineer*
Division of State Architect, 700 North Alameda Street, Suite 5-500, Los Angeles, CA 90012