December 2, 2022

NOTICE TO ALL BIDDERS

From: Javier Luna, PE – Director of Facilities, Planning, and Construction
Imperial Community College District
380 E. Aten Rd., Building 2000,
Imperial, CA 92251

Re: TENNIS COURT, SHADE, AND LIGHTING PROJECT
RFP No 22-23-01
ADDENDUM #02

This addendum forms a part of the contract documents and modifies the original bidding documents. Addenda shall be noted as received and acknowledged on the Bid Proposal Form when submitted as outlined in the Bid Package referenced above.

Document Additions, Revisions and Clarifications:

1. The Bid Opening Date and time is hereby extended to Thursday, December 15, 2022, at 2:00 PM. Sealed Bid Proposals will be accepted at 380 E. Aten Rd., Building 10, Room #16, Imperial, CA 92251, Attn: Javier Luna.

2. Specification sections 00 21 13, Instruction to and Information for Bidders, Section 1.16, Item. A, shall be disregarded and eliminated from the contract documents.

3. Specification sections 00 41 43, Bid Forms, Section 1.1, Item. C, last portion of sentence, "and that it shall self-perform at least twenty percent (20%) of the Work", shall be disregarded, and eliminated from the contract documents.

4. Specification sections 00 72 13, General Conditions, Section 6.9, Item. A, shall be disregarded and eliminated from the contract documents.

5. Corrections and/or clarifications to the contract documents, are hereby modified, based on the following attachment by the Sanders, Inc. (AOR), dated November 30, 2022.

6. Site Electrical Plan, E101, Keynote 7, shall delete "4 #2 CU, 1 #4 CU GND", and replace with, "4#1 CU and 1 #6 GND".

7. Addendum 02, Electrical Shade Structure Plan, E102, Note 5, shall be revised to state, “1 1/2" PVC. C., 3#6 CU and 1#10 CU GND (RECEPTACLES), 2#12 CU, 1#12 CU GND (LIGHTS)”.

8. Please be advised that the Contractor is responsible for all lights, electrical fixtures, and lighting appurtenances, which are to be installed to the shade structures.

Questions & Answers:

1. The mandatory walk agenda has a bid date of 11/15/22. The notice inviting bids (00 11 16) lists a bid date of 11/15/22. However, the legal advertisement published has a bid date of 11/17/22. Please clarify the bid date for the project.

A. Addressed within Addendum No. 1

2. Specification sections 00 21 13 and 00 41 43 indicate a self-perform requirement of 20 percent while specification 00 72 13 indicates a 30 percent requirement. Please clarify the requirement for self-performed percentage and confirm that general conditions are included in this calculation.

A. Please see above Document Additions, Revisions and Clarifications section.

3. Page E102 shows a total of 18 lights mounted to the ceiling of the shade structures. Detail 14 points to these lights but is missing from the plans. Do the shade structures come equipped with the necessary lights? If not, please provide specs on these lights.

A. Refer to attached Revised Plans Sheets.

4. Page AS3 states that the core samples taken from the existing Tennis Court (keynote L, M, N, and O) are Asphalt. Demolition keynote #1 states that the Tennis Court is a concrete slab. Please clarify whether the existing Tennis Court is Asphalt or Concrete.

A. Refer to attached Revised Plans Sheets. Keynote no. 1 is in error. The tennis court is built from asphalt.

5. Page E101 note 7 calls for “4 #2 CU, 1 #4 CU GND” while the single line on page E201 calls for “4#1 CU and 1 #6 GND” Please clarify which one is correct.

A. Please see above Document Additions, Revisions and Clarifications section.

6. Please provide sizes for the existing primary and secondary feeders to the existing transformer.

A. The existing transformer shall be removed and disposed of by the Contractor. Please refer to the single line diagram on E201.

7. Note #5 on E102 calls for “#36 CU, 1#10 CU GND”. It is my understanding that #36 wire does not exist. Please confirm this is an error and note 5 should state “3#6 CU and 1#10 CU GND”.

A. Please see above Document Additions, Revisions and Clarifications section.

8. Please advise if the following standard sizes can be used in lieu of the atypical sizing requirements called out per Sheet ASX4 detail 5- Fence Keynotes:
    a. Tennis Court Fabric:1-3/4" in lieu of 2"
    b. Terminal Post: 6-5/8" in lieu of 5.563
    c. Corner Posts: 4" in lieu of 4.5"

A. For a – Refer to attached Revised Plans Sheets. For b – A substitution shall not be considered. For c - Refer to attached Revised Plans Sheets.

9. Public Contract Code states that contractors must be prequalified to bid public projects over 1 million dollars but we could not find any prequalification requirements in the project bid documents. Please advise what, if any, are the prequalification requirements for this project.

A. Please be advised that there is no pre-qualification requirements for this Project.

10. Please indicate who provides lights for shade canopy.

A. Please see above Document Additions, Revisions and Clarifications section.

11. Please indicate model of light fixtures required for shade canopy?

A. Refer to attached Revised Plans Sheets.

12. Is there a soils report for this project?

A. Please see attached Geotechnical Report.

13. Advertisement states BID DATE is 11/17/22, according to the spec book the BID DATE is 11/15/22. Please advise which on is correct.

A. Addressed within Addendum No. 1

14. No specifications on the Tennis Courts Equipment in the spec book or plans. Please provide the specs.

A. Refer to attached Specifications. Specification section 11 68 23.33 tennis equipment is incorporated into the project manual.

END OF ADDENDUM NO. 02

November 30, 2022

IMPERIAL VALLEY COLLEGE
TENNIS COURTS, SHADE, AND LIGHTING PROJECT RFP NO. 22-23-01

ADDENDUM #2

THE FOLLOWING ITEMS ARE LISTED AS CORRECTIONS OR CLARIFICATIONS TO THE CONSTRUCTION DOCUMENTS.

GEOTECHNICAL REPORTS

1. The Geotechnical report for this project is attached to this Addendum.
   Sports Facilities Improvements, Imperial Valley College. LCI Report No. LE2211.

SPECIFICATIONS

Section 32 31 13 CHAIN LINK FENCING AND GATES

1. Paragraph 1.2.A.7 describes 2" chain link fabric in error. All chain link fabric for fencing and gates for this project shall be 1-1/2" x 9 gauge.
2. The Tennis Windscreen is not specified in error. Provide Paragraph 1.2A is missing component number 10 in error. Provide Tennis Windscreen as detailed in Drawings. Provide Tennis Windscreen Fabric, Permascreen Plus, Vinyl Coated Polyester, Opacity:85%, Weight: 10. oz per square yd. Tensile Strength: 375 lbs x 300 lbs. Fabrication: Four-ply, reinforced with 18 oz. Vinyl tape on all sides w/#2 grommets placed at 12" intervals as manufactured by ALL COURT FABRICS Inc. Color is to be determined by Architect.

ARCHITECTURAL SITE DRAWINGS

SHEET ASX2 TYPICAL SITE DETAILS

1. Detail A, Tennis Court Pad Section.
   a. The ac paving at the existing tennis court may be grinded, and used granular soil for constructing the pad.
   b. The depth of the preparation of native soil is dimensioned at 8" in error. Contractor shall scarify and moisture condition 18" of native soil.
   c. The elevation of the bottom of the granular material shall be 9.72

SHEET ASX4 – SITE DETAILS

1. Detail 5, Chain Link Fence and Gate.
   a. Fence Keynote 2 calls out for a 4.5" DIA Corner Post. Post. It is acceptable to provide a 4" DIA. Corner post.
   b. The spacing between line posts is dimensioned at 10'-0" in error. Provide line posts at 8'-0."
   c. Fence Keynote 3 calls out for a 2.75" size line post in error. Provide a 4" line post.
   d. Fence Keynote 5 describes 2" fabric in error. Provide 1-1/2" fabric

SHEET ASX6 – SITE DETAILS – FENCE ELEVATIONS

1. The spacing between line posts is dimensioned at 10’-0” max. in error. Provide line posts at 8’-0.”

The following referenced sheets in the plan set have been revised and shall be replaced:

1. AS3 – SITE SURVEY AND DEMOLITION PLAN
2. AS5 – HARDSCAPE PLAN
3. ASX1 – SITE ACCESSIBILITY DETAILS

The attached Addendum drawings will replace the referenced sheets; All revisions are clouded.

1. AD-03_AS3 – SITE SURVEY AND DEMOLITION PLAN
2. AD-03_AS5 – HARDSCAPE PLAN
3. AD-03_ASX1 – SITE ACCESSIBILITY DETAILS

ELECTRICAL DRAWINGS

The following referenced sheet in the plan set has been revised and is required to be replaced:

1. E102 – ELECTRICAL SHADE STRUCTURE PLAN

The attached Addendum drawing will replace the referenced sheet; the revisions are clouded.

1. AD-03_E102 – ELECTRICAL SHADE STRUCTURE PLAN

END OF ADDENDUM #2

Jesus Antonio Aguilera

Geotechnical Report

Sports Facilities Improvements
Imperial Valley College
Imperial, California

Prepared for:

Imperial Community College District
380 East Aten Road
Imperial, CA 92251

Prepared by:

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243
(760) 370-3000

June 2022

LANDMARK
Geo-Engineers and Geologists

780 N. 4th Street
El Centro, CA 92243
(760) 370-3000
landmark@landmark-ca.com

77-948 Wildcat Drive
Palm Desert, CA 92211
(760) 360-0665
gchandra@landmark-ca.com

June 17, 2022

Mr. Javier Luna, PE
Imperial Community College District
380 East Aten Road
Imperial, CA 92251

Geotechnical Report
Sports Facilities Improvements
Imperial Valley College
380 East Aten Road
Imperial, California
LCI Report No. LE22111

Dear Mr. Luna:

Attached hereto is our geotechnical report for the proposed improvements to the sports facilities at the Imperial Valley College campus located at 380 East Aten Road in Imperial, California. Our geotechnical investigation was conducted in response to your request for our services. The enclosed report describes our soil engineering investigation and presents our professional opinions regarding geotechnical aspects for design and construction of the project.

This executive summary presents ***selected*** elements of our findings and professional opinions only. It ***does not*** present all details needed for the proper application of our findings and professional opinions. Our findings, professional opinions, and application options are related ***only through reading the full report***, and are best evaluated with the active participation of the engineer of record who developed them.

The findings of this study are summarized below:

- The soils at the proposed project site consists of 3 to 5 feet of surficial lean silty clays (CL) of low to moderate expansion potential with interbedded silty sands, sandy/clayey silts and clays below. Groundwater should be anticipated at 8 feet below ground surface.

- The proposed footings may be supported on compacted granular fill soils

- The clay soils are aggressive to concrete and steel. Concrete mixes should have a maximum water cement ratio of 0.45 and a minimum compressive strength of 4,500 psi (minimum of 6.0 sacks Type V cement per cubic yard).

- All reinforcing bars, anchor bolts and hold down bolts should have a minimum concrete cover of 3.0 inches unless epoxy coated (ASTM D3963/A934). Hold-down straps are not allowed at the foundation perimeter.

- Interpretive engineering parameters of the subsurface soil used for design of cast-in-place drilled piers (EPRI MFAD and Allpile Computer Programs) are provided in Section 5.3 of this report.

- Evaluation of liquefaction potential at the site indicates that isolated, interbedded sandy silt to silty sand layers at depths of 8 to 45 feet may liquefy under seismically induced groundshaking, potentially resulting in approximately ¼ to 1 inch of deep-seated settlement. About 8 to 12 feet of non-liquefiable soils overlie the potentially liquefiable soil layer; therefore, there is a low to moderate probability of rapid deformation or punching bearing failures of the surface soils should liquefaction occur. The potential for generalized liquefaction is low. Deep foundations or deep soil improvement is not required at this project site.

The site is suitable for the proposed building addition, provided the professional opinions expressed in this report are implemented in the design and construction of this project.

We appreciate the opportunity to provide our professional services. If you have any questions or comments regarding our findings, please call our office at (760) 370-3000.

Respectfully Submitted,
Landmark Consultants, Inc.

Peter E. LaBrucherie, PE
Principal Engineer

Steven K. Williams, PG, CEG
Senior Engineering Geologist

Julian Avalos, GE
Senior Geotechnical Engineer

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Section 1
INTRODUCTION

1.1 Project Description

The proposed project will consist of the construction of an approximately 5,000 square-foot concession/restroom building, four (4) steel light poles and Border Link antennas for the soccer field, six (6) steel light poles for the tennis courts, and new tennis courts on the western portion of the Imperial Valley College campus located at 380 East Aten Road in Imperial, California.

As planned, the proposed concession/restroom building will be masonry construction with a slab-on-grade and shallow foundations. For the purposes of our analysis and report, we have assumed that structural loads will not exceed 5 kips per linear foot for wall footings and 30 kips for the column footings for the concession/restroom building. ***If structural loads exceed those used in our analysis, we should be notified so we may evaluate their impact on settlement estimates for the foundations*** The light poles are planned to be supported by concrete drilled pier or pre-cast concrete foundations. The tennis court is planned to be post-tensioned slabs.

Site development will include building pad preparation, underground utility installation including trench backfill, concrete foundation construction, drilled pier installation and concrete hardscape placement.

1.2 Purpose and Scope of Work

The purpose of our geotechnical investigation was to evaluate the physical characteristics of the on-site soils and to provide geotechnical criteria for site grading, design of foundations and slabs. Our scope of work included the following:

- Review of background information including available published geologic maps and literature.
- Field exploration consisting of performing six (6) Cone Penetrometer Test (CPT) soundings to a depth of 50 feet below the existing ground surface.
- Laboratory testing of selected soil samples including: grain size analysis, plasticity index tests, and chemical analyses consisting of soluble sulfate and chloride contents, pH, and resistivity.

- Engineering analysis and evaluation of the data collected.
- Preparation of this report presenting our findings, professional opinions, and design criteria for the geotechnical aspects of the project development.

Our scope of work specifically excluded an evaluation of the site for the presence of hazardous materials or conditions.

1.3 Authorization

Dr. Lennor Johnson, Imperial Community College District Superintendent, provided written authorization to proceed with our work on May 21, 2022. We conducted our work according to our written proposal dated April 12, 2022.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

The subsurface exploration was performed on May 26, 2022 using Kehoe Testing and Engineering, Inc. of Huntington Beach, California to advance six (6) electric CPT soundings to an approximate depth of 50 feet below existing ground surface. The soundings were completed at the approximate locations shown on the Site and Exploration Plan (Plate A-2). Shallow (3-foot deep) hand auger borings (3-inch diameter) were made adjacent to the CPT soundings in order to obtain near surface soil samples for laboratory testing. The approximate sounding locations were established in the field and plotted on the site map by sighting to discernible site features.

CPT soundings provide a continuous profile of the soil stratigraphy with readings every 2.5 cm (1 inch) in depth. The CPTs were conducted by hydraulically advancing an instrumented 15 cm^2 conical probe into the ground at a rate of 2 centimeters per second (cm/s) using a 30-ton truck as a reaction mass. An electronic data acquisition system recorded a nearly continuous log of the resistance of the soil against the cone tip (Q_c) and soil friction against the cone sleeve (F_s) as the probe was advanced. Empirical relationships (Robertson and Campanella, 1989) were then applied to the data to obtain a continuous profile of the soil stratigraphy. Interpretation of CPT data provides correlations for Standard Penetration Test (SPT) blow count, phi (ϕ) angle (soil friction angle), undrained shear strength (S_u) of clays and over-consolidation ratio (OCR). These correlations may then be used to evaluate vertical and lateral soil bearing capacities and consolidation characteristics of the subsurface soil.

Interpretive logs of the CPT soundings are presented on Plates B-1 through B-6 in Appendix B. A key to the interpretation of CPT soundings is presented on Plate B-7. The stratification lines shown on the subsurface logs represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

2.2 Laboratory Testing

Laboratory tests were conducted on selected bulk soil samples obtained from the hollow-stem auger borings to aid in classification and evaluation of selected engineering properties of the near surface soils. The tests were conducted in general conformance to the procedures of the American Society for Testing and Materials (ASTM) or other standardized methods as referenced below. The laboratory testing program consisted of the following tests:

- Plasticity Index (ASTM D4318) – used for soil classification and expansive soil design criteria
- Grain Size Analysis (ASTM D422) – used for soil classification
- Chemical Analyses (soluble sulfates & chlorides, pH, and resistivity) (Caltrans Methods) – used for concrete mix design parameters and corrosion protection requirements.

The laboratory test results are presented on Plates C-1 through C-3 in Appendix C of this report.

Section 3
DISCUSSION

3.1 Site Conditions

The Imperial Valley College campus is located at 380 East Aten Road in Imperial, California. The campus location is depicted on Plate A-1, Vicinity Map. The coordinates of the project site are 32.8285N / -115.5056W. The proposed concession/restroom building will be located west of Lot E parking lot between the soccer field and the baseball field. Light poles are planned for both sides of the soccer field and around the tennis court area. The tennis courts are located north of the gymnasium and east of the swimming pool. The project site is shown on Plate A-2. Concrete sidewalks, campus buildings, and sports field are located adjacent to the project site. The topography in the site vicinity is planar as depicted on Plate A-4, Topographic Map.

3.2 Geologic Setting

The project site is located in the Salton Trough physiographic province of southern California. The Salton Trough is a geologic structural depression resulting from large scale regional faulting. The trough is bounded on the northeast by the San Andreas Fault and on the southwest by faults of the San Jacinto Fault Zone. The Salton Trough represents the northward extension of the Gulf of California, which has experienced continual in-filling with both marine and non-marine sediments since the Miocene Epoch. The tectonic activity that formed the trough continues to the present at a high rate as evidenced by deformed young sedimentary deposits and high levels of historic seismicity.

The site is directly underlain by Holocene (1 to 11,000 years before present) Cahuilla Lake bed deposits, which consist of interbedded lenticular and tabular silts, sands, and clays. The Holocene Lake deposits are probably less than 100 feet thick beneath the site. The Pleistocene Brawley Formation underlies the Cahuilla Lake bed deposits. The Brawley Formation consists of at least 2,000 feet of gray clays, sands, and pebbles, which in turn overlie about 6,000 feet of the late Pliocene Borrego Formation. The Borrego Formation consists of lacustrine clays and sands. The Borrego Formation overlies an undetermined thickness of the Pliocene marine Imperial Formation, Alverson Andesite, and Miocene continental sediments of the Split Mountain Formation.

Basement rock consisting of Mesozoic granite and possibly Paleozoic metamorphic rocks are estimated to exist at depths between 15,000 and 20,000 feet below the surface. The surface geology of the site is depicted on Plate A-5.

3.3 Site Subsurface Conditions

The results of our subsurface investigation at the site, along with the review of available geologic maps and literature, indicate that the site is underlain by Cahuilla Lake bed deposits to the maximum depth explored of 50 feet. Interbedded stiff silty clays (CL), silts (ML), and silty sands (SM) were encountered from the ground surface to a depth of about 7 to 17 feet. An approximately 10 to 14-foot thick stiff clay (CL) layer extends from about 7 and 17 to 17 to 31 feet. A 3 to 4 foot thick medium dense silty sand to sandy silt layer underlies the clay layer. Stiff silty clays (CL) extend from between 21 and 34 feet below ground surface to the maximum depth of exploration of 50 feet. The subsurface stratigraphy dips towards the northeast. A schematic geologic cross section is presented on Plate A-6.

Landmark reviewed the geotechnical investigation conducted at the Imperial Valley College school campus in 2006 (Landmark Consultants, Inc., 2006). The 2006 report included eight (8) CPT soundings to a depth of 50 feet and twenty-two (22) hollow stem borings to a depth of 11.5 to 41.5 feet. Laboratory testing was conducted by Landmark on subsurface soil samples obtained from the borings. The CPT data obtained for this project is consistent with the subsurface boring data reported in the 2006 report. A copy of the boring logs and CPT soundings from the 2006 report along with a site plan showing the location of the tennis courts (this study) in relation to the 2006 area of exploration are provided in Appendix F of this report.

Groundwater was not measured in the CPT soundings during the exploration. Groundwater was reported at a depth of about 8.9 feet during a previous geotechnical investigation performed at Imperial Valley College by Landmark. There is uncertainty in the accuracy of short-term water level measurements, particularly in fine-grained soil. Groundwater levels may fluctuate with precipitation, irrigation of adjacent properties, drainage, and site grading. The referenced groundwater level should not be interpreted to represent an accurate or permanent condition.

Historic groundwater levels are approximately 8 feet below ground surface at the project site. USGS Professional Paper 486-K, Plate 1 shows the project site being located between the -60 and -80 foot groundwater elevation contours. Historical groundwater is estimated to be at an elevation of -73 feet at the project site. The site elevation is approximately 65 feet below sea level which would equate to a historical groundwater depth of about 8 feet.

3.4 Seismic Hazards

3.4.1 Faulting and Seismicity

The project site is located in the seismically active southern California region and is expected to be subjected to moderate to strong ground shaking during the design life of the project. A fault map illustrating known active faults relative to the site is presented on Figure 1, *Regional Fault Map*. Figure 2 shows the project site in relation to local faults.

The criterion for fault classification adopted by the California Geological Survey defines Earthquake Fault Zones along Holocene-active or pre-Holocene faults (CGS, 2022b). Earthquake Fault Zones are regulatory zones that address the hazard of surface fault rupture. A Holocene-active fault is one that has ruptured during Holocene time (within the last 11,700 years). A pre-Holocene fault is a fault that has not ruptured in the last 11,700 years. Pre-Holocene faults may still be capable of surface rupture in the future, but are not regulated by the A-P Act. Table 1 lists the known active faults or seismic zones that lie within a 33 mile radius of the project site.

The site is not located within a currently designated Earthquake Fault-Rupture Hazard Zone (CGS, 2022b). Review of the current Alquist-Priolo Earthquake Fault Zone maps (CGS, 2022a) indicates that the nearest mapped Earthquake Fault Zone is the Imperial fault, located approximately 0.4 miles northeast of the site. The possibility of ground surface rupture related to active faulting on currently unrecognized faults exists throughout the seismically active Imperial Valley region. However, given the current state of knowledge regarding seismicity of the Imperial Valley, the potential for fault rupture at the project site is considered low.

3.4.2 Historic Seismicity

The Imperial Valley is one of the most seismically active regions in the United States, and has experienced several historical events of magnitude 5.5 or more. The following briefly outlines seismic events that have significantly affected the Imperial Valley in the past 100 years.

Imperial Valley Events: June 22, 1915. Two earthquakes with magnitudes of 6.0 and 5.9 occurred about an hour apart near El Centro.

El Centro Event: May 19, 1940: A magnitude 7+ earthquake ruptured the Imperial Fault with horizontal offsets up to 19 feet at the international border with Mexico. This earthquake triggered widespread liquefaction as evidenced by sand boils throughout the Imperial Valley.

Imperial Valley Event: October 15, 1979. A magnitude 6.6 earthquake ruptured the Imperial Fault with horizontal offsets up to 2 feet and damage to buildings in El Centro, Imperial, and Calexico. This event triggered widespread liquefaction as evidenced by sand boils throughout the Valley.

A magnitude 5.8 aftershock occurred along the Brawley Fault on that same evening causing severe damage to several unreinforced masonry buildings in Brawley.

Westmorland Event: April 26, 1981. A magnitude 6.0 earthquake occurred 4 miles north of Westmorland triggering liquefaction in the epicentral region. Although there was no evidence of surface rupture associated with this event, canals and buildings were damaged. Liquefaction reportedly occurred in the Brawley Seismic Zone during magnitude 5+ events in 1930, 1950 and 1957.

Superstition Hills Events: November 24, 1987. A magnitude 6.6 earthquake ruptured the Superstition Hills fault, causing 15 miles of surface rupture displaying a right lateral offset (maximum 26 inch offset). The earthquake triggered liquefaction in areas from the Salton Sea to Seeley. A magnitude 6.2 event occurred as a foreshock along the Elmore Ranch fault. The Elmore Ranch fault had not been recognized until this event.

El Mayor-Cucapah Event: April 4, 2010. A magnitude 7.2M_w earthquake ruptured the Laguna Salada, Borrego and Pescadores faults south of Mexicali, Mexico. The Borrego and Pescadores faults exhibited approximately 60 miles of surface rupture with a dip-slip displacement of up to 250 cm (8 feet). Widespread liquefaction and lateral spreading occurred in the Mexicali and Imperial Valleys during this event.

Brawley Swarm Event: August 26-28, 2012. An earthquake swarm with eleven (11) earthquakes above magnitude 4.0 (the largest being $5.5M_{w)}$ occurred approximately 2 miles northwest of Brawley, California. Although there was no evidence of surface rupture associated with this event, numerous structures in Brawley were damaged.

3.5 General Ground Motion Analysis

The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone. Acceleration magnitudes also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area.

2019 CBC General Ground Motion Parameters: The California Building Code (CBC) requires that a site-specific ground motion hazard analysis be performed in accordance with ASCE 7-16 Section 11.4.8 (ASCE, 2016) for structures on Site Class D and E sites with S_1 greater than or equal to 0.2 and Site Class E sites with S_s greater than or equal to 1.0 (CBC, 2019). **This project site has been classified as Site Class E based on review of previous geotechnical subsurface data as described above in Section 3.3 and has a S_1 value of 0.79, which would require a site-specific ground motion hazard analysis**. However, ASCE 7-16 Section 11.4.8 provides three exceptions which permit the use of conservative values of design parameters for certain conditions for Site Class D and E sites in lieu of a site specific hazard analysis. The exceptions are:

- Exception 1: Structures on Site Class E sites with S_s greater than or equal to 1.0, provided the site coefficient F_a is taken as equal to that of Site Class C.
- Exception 2: Structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_s is determined by Equations 12.8-2 for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the value computed in accordance with either Equation 12.8-3 for $T_L \geq T > 1.5T_S$ or Equation 12.8-4 for $T > T_L$.
- Exception 3: Structures on Site Class E sites with S_1 greater than or equal to 0.2, provided that T is less than or equal to T_S and the equivalent static force procedure is used for design.

Based on our understanding of the proposed development, the seismic design parameters presented in Table 2 were calculated assuming that one of the exceptions listed above applies to the proposed structures at this site. **However, the structural engineer should verify that one of the exceptions is applicable to the proposed structures.** If none of the exceptions apply, our office should be consulted to perform a site-specific ground motion hazard analysis.

The 2019 CBC general ground motion parameters are based on the Risk-Targeted Maximum Considered Earthquake (MCE_R). The Structural Engineers Association of California (SEAOC) and Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps Web Application (SEAOC, 2022) was used to obtain the site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. Design spectral response acceleration parameters are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding MCE_R ground motions. The Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration adjusted for soil site class effects (PGA_M) value to be used for liquefaction and seismic settlement analysis in accordance with 2019 CBC Section 1803.5.12 ($PGA_M = F_{PGA}*PGA$) is estimated at 1.02g for the project site. **Design earthquake ground motion parameters are provided in Table 2.**

3.6 Liquefaction

Liquefaction occurs when granular soils below the water table are subjected to vibratory motions, such as produced by earthquakes. With strong ground shaking, an increase in pore water pressure develops as the soil tends to reduce in volume. If the increase in pore water pressure is sufficient to reduce the vertical effective stress (suspending the soil particles in water), the soil strength decreases and the soil behaves as a liquid (similar to quicksand). Liquefaction can produce excessive settlement, ground rupture, lateral spreading, or failure of shallow bearing foundations. Four conditions are generally required for liquefaction to occur:

(1) the soil must be saturated (relatively shallow groundwater);
(2) the soil must be loosely packed (low to medium relative density);
(3) the soil must be relatively cohesionless (not clayey); and
(4) groundshaking of sufficient intensity must occur to function as a trigger mechanism.

All of these conditions exist to some degree at this site.

Methods of Analysis: The liquefaction potential at the project site was evaluated using the 1998 NCEER Liquefaction Workshop method. The 1998 NCEER method utilizes CPT readings from the site explorations and earthquake magnitude/PGA estimates from the seismic hazard analysis. The resistance to liquefaction is plotted on a chart of cyclic shear stress ratio (CSR) versus a corrected $Q_{tn,cs}$. The analysis was performed using a site-specific PGA_M value of 1.02g, a groundwater depth of 8 feet and a threshold factor of safety (FS) of 1.3.

The computer program CLiq (Version 2.2.0.32, Geologismiki, 2017) was utilized for liquefaction assessment of the project site. The estimated settlements have been adjusted for transition zones between layers. Computer printouts of the liquefaction analyses are provided in Appendix D.

The fine content of the liquefiable sands and silts increases their liquefaction resistance in that more ground motion cycles are required to fully develop the increased pore pressures. The CPT tip pressures (Q_c) were adjusted to an equivalent clean sand pressure ($Q_{tn,cs}$) in accordance with 1998 NCEER method.

The soil encountered at the points of exploration included saturated sandy silts and silty sands that could liquefy during a Risk-Targeted Maximum Considered Earthquake (MCE_R). Liquefaction can occur within isolated, interbedded sandy silt to silty sand layers at depths of 8 to 45 feet. The likely triggering mechanism for liquefaction appears to be strong groundshaking associated with the rupture of the Imperial, Brawley, and Superstition Hills faults.

Liquefaction Induced Settlements: ***Based on empirical relationships, total induced settlements are estimated to be about ¼ to 1 inch should liquefaction occur at the concession/restroom building.*** Differential settlement is estimated at be one-half of the total potential settlement (Martin and Lew, 1999). Accordingly, ***there is a potential for ½ inch of liquefaction induced differential settlement at the project site.*** The differential settlement based on seismic settlements is estimated at ½ inch over a distance of 50 feet.

Generally stiff to hard clays and dense silty sands and sandy silts about 8 to 12 feet in thickness overlie the liquefiable layer. The non-liquefiable materials may act as a bridge over the liquefiable layer resulting in a fairly uniform ground surface settlement; therefore, wide area subsidence of the overburden soils would be the expected effect of liquefaction.

Liquefaction Induced Ground Failure: Based on research from Ishihara (1985) and Youd and Garris (1995) because of the thickness of the overlying non-liquefiable soil, there is a low potential for formation of small ground fissures or sand boils (Plate D-1). Sand boils are conical piles of sand derived from the upward flow of groundwater caused by excess porewater pressures created during strong ground shaking. Sand boils are not inherently damaging by themselves, but are an indication that liquefaction occurred at depth (Jones, 2003).

Liquefaction induced lateral spreading is not expected to occur at this site due to the planar topography. According to Youd (2005), if the liquefiable layer lies at a depth greater that about twice the height of a free face, lateral spread is not likely to develop. No slopes or free faces occur at this site.

Liquefaction effects have not been reported after large earthquakes proximal to the Imperial Valley College project site. Review of McCrink, et al (2011) and Youd and Wieczorek (1982) indicate that the effects of liquefaction (sand boils, lateral spread, slumps) were observed after the 1979 Imperial Valley Earthquake and the 2010 El Mayor-Cucapah Earthquake approximately 3¾ miles east of the college campus along the Alamo River.

Mitigation: Based on an estimate of about 1 inch of total liquefaction induced settlements (½ inch differential settlement), structural slabs and/or grade beams may be used to resist the effects of the estimated settlements.

3.7 Other Geologic Hazards

Landsliding. No indications of landsliding were observed within the immediate vicinity of the project site from the geologic maps and during our site investigation. Based on the relatively planar topography of the site, the potential for landsliding is considered remote.

Volcanic hazards. The site is not located proximal to any known volcanically active area and the risk of volcanic hazards is considered very low. Obsidian Butte and Red Hill, located at the south end of the Salton Sea approximately 24 miles north of the project site, are small remnants of volcanic domes formed about 2,000 to 7,500 years ago.

The subsurface brine fluids around the domes have a high heat flow and are currently being utilized to produce geothermal energy.

Tsunamis, sieches, and flooding. The site does not lie near any large bodies of water, so the threat of tsunami, sieches, or other seismically-induced flooding is unlikely. The project site is located in FEMA Flood Zone X (Plate A-9), an area determined to be outside the 0.2% annual chance floodplain (FIRM Panel 06025C1725C).

Expansive soil. The surficial soils at the project site consist of silty clays with a Plasticity Index (PI) of 19 to 24 and are considered to be low to moderately expansive (Expansion Index (EI) = 21 to 70). The clay is expansive when wetted and can shrink with moisture loss (drying). Development of building foundations and concrete flatwork will require provisions for mitigating potential soil expansion forces.

Hazardous materials. The site is not located in proximity to any known hazardous materials (methane gas, tar seeps, hydrogen sulfide gas), and the risk of hazardous materials is considered very low.

Radon 222 Gas. Radon gas is not believed to be a potential hazard at the site.

Naturally occurring asbestos. The site is not located in proximity to any known naturally occurring asbestos, and the risk of naturally occurring asbestos is considered very low.

Hydrocollapse. The site is dominantly underlain by stiff silty clays and clays that are not susceptible to collapse with the addition of water to the site. The risk of hydrocollapse is considered very low.

Regional Subsidence. The project site is not located within a known area of regional subsidence.

Section 4
CONCLUSIONS

Based on the results of our field investigation and laboratory tests, it is our opinion that construction of the proposed 5,000 square-foot concession/restroom building, four (4) steel light poles and Border Link antennas for the soccer field, six (6) steel light poles for the tennis courts, and a new concrete slab for the tennis courts are feasible from a geotechnical standpoint, provided that the conclusions and professional opinions contained in this report are incorporated in the project plans and specifications and implemented during construction of the project.

The following summarizes some of the pertinent geotechnical issues identified in our study:

- No known active or potentially active faults cross the site. The closest active fault to the site is the Imperial fault, located approximately 0.4 miles to the northeast.
- The site is considered likely to be subjected to moderate to high ground accelerations due to regional fault activity. A PGA value of 1.02g was estimated for liquefaction and seismic settlement analysis in accordance with CGS Note 48.
- Individual cast-in-place drilled piers should be adequate to support the light pole foundations.
- The near surface (upper 3 to 5 feet) of on-site soils consists of moderate plasticity silty clay (CL). These soils have low to moderate expansion potential. If these soils are allowed to exist in close proximity to exterior flatwork, specialized design and construction procedures will be necessary to resist expansive forces. Building foundation and floor support will require provisions to mitigate the effects of soil heave due to the expansive soil conditions.

- To provide more uniform support, one of the following options for mitigating the effects of expansive soils and liquefaction on the proposed concession/restroom building may be implemented:

  OPTION 1: Remove the upper 3 feet of soils beneath building and the upper 18 inches beneath hardscaped areas and replace with compacted non-expansive granular fill. A minimum of 18 inches of compacted granular fill should underlie the footings.

  OPTION 2: Support the structures on foundation and slab systems designed to resist expansive soil movement. This design method requires grade-beam stiffening of floor slabs at a maximum spacing of 20 feet on center or structural mat foundation.

- Isolated, interbedded sandy silt to silty sand layers were encountered at depths of 8 to 45 feet. These layers may liquefy under seismically induced groundshaking, potentially resulting in about ¼ to 1 inch of deep seated settlement. About 8 to 12 feet of non-liquefiable soils overlie the potentially liquefiable soil layer; therefore, there is a low to moderate probability of rapid deformation or punching bearing failures of the surface soils should liquefaction occur. The potential for generalized liquefaction is low.
- The potential for other geologic hazards including landsliding, tsunamis/seiches, volcanic hazards, hazardous materials, radon gas, naturally occurring asbestos, hydrocollapse, and regional subsidence are considered low.
- Groundwater is expected to be encountered at a depth of about 8 feet below ground surface.
- The on-site native soils are considered to have a high corrosion potential with respect to buried steel and sulfate attack to concrete materials.

Section 5
DESIGN CRITERIA

5.1 Site Preparation

5.1.1 Clearing and Grubbing

At the time of construction, all existing pavement, debris and vegetation such as grass or trees on the site should be removed. Organic strippings should be hauled from the site and should not be incorporated into any engineered fills. Any trash, construction debris, concrete slabs, old pavement, landfill, and buried obstructions should be located by the grading contractor and removed under the observation of a qualified geotechnical firm. Excavations resulting from site clearing should be dish-shaped to the lowest depth of disturbance and backfilled with engineered fill as described below under continuous observations by the geotechnical engineer's representative.

Native soil, free of concentrations of vegetation or other deleterious materials, may be used as engineered fill placed in loose lifts not exceeding 8 inches, moisture conditioned to 5 to 10% above optimum and compacted to 85 to 90% of ASTM D1557 maximum density.

5.1.2 Concession/Restroom Building Pad Preparation

The exposed surface soil within the building pad/foundation area should be removed to a minimum depth of 3 feet below the bottom of the proposed building pad elevation or existing natural surface grade (whichever is lower) extending five feet beyond all exterior wall/column lines (including concreted areas adjacent to the building). Prior to placement of the fill, the exposed subgrade should be scarified to a depth of 12 inches, uniformly moisture conditioned to 5 to 10% above optimum (clays) or 2% below to 4% above optimum (sands) and recompacted to 85 to 90% (clays) or a minimum of 90% (sands) of the maximum density determined in accordance with ASTM D1557 methods.

It is possible that wet sandy soils will pump under equipment loads. Light earthmoving and compaction equipment should be planned for compacting soil at depth.

An engineered building support pad consisting of a minimum of 3 feet of non-expansive compacted granular soil, placed in maximum 8-inch lifts (loose), compacted to a minimum of 95% of ASTM D1557 maximum density at 2% below to 4% above optimum moisture, should be placed below the bottom of the slab. The on-site soils are not considered suitable material for fill.

The imported soils should consist of non-expansive (Expansion Index less than 5) granular soils that meet the USCS classifications of ML (non-plastic), SM, SP-SM, or SW-SM with a maximum rock size of 3 inches, no less than 5% passing the No. 200 sieve and a minimum Sand Equivalent of 25. The geotechnical engineer should approve imported fill soil sources before hauling material to the site.

In areas other than the building pad which are to receive sidewalks or area concrete slabs, the upper 24 inches should be removed and replaced with granular fill compacted to a minimum of 90% of ASTM D1557 maximum density.

Before placement of concrete for footings, the bottom of the footing excavation should be moisture conditioned to 2% below to 4% above optimum moisture content to a minimum depth of 12 inches. Surface grades should be designed to drain away from the structure.

5.1.3 Tennis Court Pad Preparation

5.1.3.1 Tennis Court Pad Preparation on Native Clay Soil

When tennis court slab is designed to include provisions for expansive soil conditions (e.g. post-tension slab with grade beams), the existing soils within the tennis court concrete slab should be overexcavated to a minimum depth of 24 inches below the existing natural surface grade (below existing slab) and should extend at least two (2) feet beyond all concrete slab edges. Exposed subgrade should be scarified to a depth of 12 inches, uniformly moisture conditioned to 5 to 10% above optimum and recompacted to 85 to 90% of the maximum density determined in accordance with ASTM D1557 methods.

The native soil is suitable for use as engineered fill provided it is free from concentrations of organic matter or other deleterious material. The fill soil should be uniformly moisture conditioned by discing and watering to the limits specified above, placed in maximum 8-inch lifts (loose), and compacted to the limits specified above.

Clay soil should not be overcompacted because highly compacted soil will result in increased swelling. Imported fill soil (for foundations designed for expansive soil conditions) should have a Plasticity Index less than 25 and sulfates (SO_4) less than 4,000 ppm.

5.1.3.2 Tennis Court Pad Preparation Placed on Imported Non-expansive Soil

If tennis court slab designs are to be utilized which do not include provisions for expansive soil, an engineered building support pad consisting of a minimum of 2.0 feet of imported non-expansive soil should be used. The existing soils within the tennis court concrete slab should be overexcavated to a minimum depth of 24 inches below the existing natural surface grade (below existing slab) and should extend at least two (2) feet beyond all concrete slab edges. The imported non-expansive fill material shall be placed in maximum 8-inch lifts (loose), compacted to a minimum of 95% of ASTM D1557 maximum density at 2% below to 4% above optimum moisture, should be placed below the bottom of the slab. The imported non-expansive soils should be placed over a minimum of 8 inches of uniformly moisture conditioned native soil per Section 5.3.1.

The imported soils should consist of non-expansive (Expansion Index less than 5) granular soils that meet the USCS classifications of SM, SP-SM, or SW-SM with a maximum rock size of 3 inches, no less than 5% passing the No. 200 sieve and a minimum Sand Equivalent of 25. The geotechnical engineer should approve imported fill soil sources before hauling material to the site.

5.1.4 Observation and Density Testing

All site preparation and fill placement should be continuously observed and tested by a representative of a qualified geotechnical engineering firm as required by the CBC. This includes the excavation and scarification process to detect any undesirable materials, conditions or soft areas that may be encountered in the construction area.

The geotechnical firm that provides observation and testing during construction shall assume the responsibility of "*geotechnical engineer of record*", and as such, shall perform additional testing/investigation as necessary to satisfy themselves as to the site conditions and the geotechnical recommendations for site development. The geotechnical engineer should provide a verified report of the as-graded site and building support pad conditions.

5.2 Foundations and Settlements

Shallow spread footings are suitable to support the concession/restroom building provided they are structurally tied with grade-beams to continuous perimeter wall footings to resist differential movement associated with expansive soils and potential liquefaction induced settlement. Exterior footings shall have a minimum embedment depth of 24 inches below the finish subgrade. Interior footings shall have a minimum embedment depth of 12 inches. All footings should be underlain by at least 18 inches of compacted non-expansive granular fill.

The foundations may be designed using an allowable soil bearing pressure of 2,000 psf when foundations are supported on compacted granular fill (extending a minimum of 1.5 feet below footings). The allowable soil pressure may be increased by 20% for each foot of embedment depth of the footings in excess of 18 inches and by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 3,000 psf.

Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings and concrete slabs. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 300 pcf to resist lateral loadings. The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.35 may also be used at the base of the footings to resist lateral loading.

As an alternative to shallow spread foundations, flat plate structural mats or grade-beam reinforced foundations may be used to mitigate expansive soil heave related movement.

Flat Plate Structural Mats: Flat plate structural mats may be used to mitigate the liquefaction induced settlement at the project site. The structural mat shall have a double mat of steel (minimum No. 4's @ 12 inches O.C. each way – top and bottom) and a minimum thickness of 10 inches. Mat edges shall have a minimum edge footing of 12 inches width and 24 inches depth (below the building pad surface).

Mats may be designed in accordance with the CBC Chapter 18, Section 1808A.6.2 methods (*WRI/CRSI Design of Slab-on-Ground Foundations*).

Structural mats may be designed for a modulus of subgrade reaction (Ks) of 50 pci when placed on compacted clay. Mats shall overlay 2 inches of sand and a 10-mil polyethylene vapor retarder. The building support pad shall be moisture conditioned and recompacted as specified in Section 5.1 of this report.

Grade-beam Reinforced Foundations: Structures with grade beam reinforced foundations placed on the native clay soils shall have a maximum grade-beam spacing of 20 feet in accordance with the CBC Chapter 18 Section 1808.6.2 (*WRI/CRSI Design of Slab-on-Ground Foundations).*

All exterior footings should be embedded a minimum of 24 inches below the building support pad or lowest adjacent final grade, whichever is deeper. Minimum embedment depth of interior slab stiffening elements should be at least 12 inches into the building support pad.

Continuous wall footings should have a minimum width of 12 inches. Spread footings should have a minimum dimension of 24 inches and should be structurally tied to perimeter footings or grade beams. Concrete reinforcement and sizing for all footings should be provided by the structural engineer.

Settlements: Foundation movement under the estimated static (non-seismic) loadings and static site conditions are estimated to not exceed 1 inch with differential movement of about two-thirds of total movement for the loading assumptions stated above when the subgrade preparation guidelines given above are followed. Seismically induced liquefaction settlement the surrounding land mass and structure may be on the order of 1 inch with differential settlement estimated to be on the order of ½ inch at the concession stand/restroom building. The differential settlement is estimate at ½ inch in 50 feet.

5.3 Drilled Pier Foundations

No site clearing or grading (cutting or filling) is anticipated to occur for installation of the light pole foundations.

5.3.1 Soccer Field Steel Light Poles (CPT-3 & 4):

Individual piers should be adequate to support the light pole foundations. Embedment depth and diameter for the light pole piers to resist lateral loads where no constraint is provided at ground surface may be determined using the following formula per 2019 CBC Section 1807.3.2.1:

$$d = A/2 \{1 + [1+(4.36h/A)]^{1/2}\}$$

Where:

A = $2.34P/S_1b$

b = Pier diameter in feet

d = Embedment depth in feet (but not over 12 ft for purpose of computing lateral pressure)

h = Distance in feet from ground surface to point of application of "P"

P = Applied lateral force in pounds

S_1 = Allowable lateral soil bearing pressure S_1 = 150 psf/ft. (Table 1806.2 for Class 5 soil and Section 1806). Isolated piers that are not adversely affected by a 0.5 inch motion at the ground surface due to short-term lateral loads are permitted to be designed using lateral soil bearing pressures equal to two times the basic value.

Arching capability for a medium to stiff clay= 2.0

The pole pier foundations may be designed using an allowable soil vertical bearing pressure of 1,500 psf and a cohesion of 130 psf for the native clay soil and a coefficient of friction of 0.25 for the native sand soils. The cohesion value shall be multiplied by the contact area, as limited by Section 1806.3 of the 2019 CBC. Uplift capacity may be determined by using ⅔ of the cohesion value.

The uplift capacity may be defined as the sum of the frictional resistance of the soils against the concrete pile plus the weight of the pile as follows:

Pall = (KHT*Po*Tan δ*π*D*H)/FS + Wp,
Incorporating the soil conditions at the site and applying a Safety Factor of 3 it may be expressed as,

Pall = 16DH2 + Wp

where:

Pall = Allowable Uplift Capacity in pounds

D = Diameter of the pile in feet

H = Depth of embedment below ground surface in feet (to a maximum of 14 feet)

Wp = Weight of the pile in pounds

Soil Parameters: Interpretive engineering soil parameters of the subsurface soil for EPRI MFAD and Allpile Computer Programs are presented in the tables below for the light pole foundations.

Table 4 – Soil Strength Parameters

Layer Type	Depth (ft)	Unit Weight (pcf)	Friction Angle (deg)	Cohesion (ksf)	Lateral Soil Modulus, k (pci)	e_{50} or Dr
CL-ML	0 to 3	125	0°	1.25	325	0.85
SP-SM	3 to 12	115	35°	0.0	100	55
CL-ML	12 to 22	125	0°	1.00	225	1.00
ML	22 to 26	120	24°	0.30	100	1.30
CL-CH	26 to 50	125	0º	1.50	450	0.75

Notes: Soil strength parameters obtained from field exploration (CPT-3 and CPT-4) were modified (reduced) based on our judgment and our previous experience in the general site vicinity.

The potential for liquefaction induced ground damage has been determined for each CPT test location. From the liquefaction analysis performed at the CPT test soundings located at both sides of the soccer field (CPT-3 and CPT-4), most of the liquefiable soils are encountered at depths between 8 to 12 feet below ground surface elevation and based on an estimate of less than ⅓ inch of total induced settlement (no excessive lateral deformation around the pier shaft), no soil strength reduction was considered due to liquefaction induced settlement. However, embedding the proposed field light drilled pier to a minimum depth of 20 feet below ground surface will eliminate the liquefaction settlements below the shaft tip.

5.3.2 Tennis Courts Steel Light Poles (CPT-5 & 6):

Individual piers should be adequate to support the light pole foundations. Embedment depth and diameter for the light pole piers to resist lateral loads where no constraint is provided at ground surface may be determined using the following formula per 2019 CBC Section 1807.3.2.1:

$$d = A/2 \{1 + [1+(4.36h/A)]^{1/2}\}$$

Where:

A = $2.34P/S_1b$

b = Pier diameter in feet

d = Embedment depth in feet (but not over 12 ft for purpose of computing lateral pressure)

h = Distance in feet from ground surface to point of application of "P"

P = Applied lateral force in pounds

S_1 = Allowable lateral soil bearing pressure S_1 = 150 psf/ft. (Table 1806.2 for Class 5 soil and Section 1806). Isolated piers that are not adversely affected by a 0.5 inch motion at the ground surface due to short-term lateral loads are permitted to be designed using lateral soil bearing pressures equal to two times the basic value.

Arching capability for a medium to stiff clay= 2.0

The pole pier foundations may be designed using an allowable soil vertical bearing pressure of 1,500 psf and a cohesion of 130 psf for the native clay soil and a coefficient of friction of 0.25 for the native sand soils. The cohesion value shall be multiplied by the contact area, as limited by Section 1806.3 of the 2019 CBC. Uplift capacity may be determined by using ⅔ of the cohesion value.

The uplift capacity may be defined as the sum of the frictional resistance of the soils against the concrete pile plus the weight of the pile as follows:

Pall = (KHT*Po*Tan δ*π*D*H)/FS + Wp,
Incorporating the soil conditions at the site and applying a Safety Factor of 3 it may be expressed as,

Pall = 16DH2 + Wp

where:

Pall = Allowable Uplift Capacity in pounds

D = Diameter of the pile in feet

H = Depth of embedment below ground surface in feet (to a maximum of 14 feet)

Wp = Weight of the pile in pounds

Soil Parameters: Interpretive engineering soil parameters of the subsurface soil for EPRI MFAD and Allpile Computer Programs are presented in the tables below for the light pole foundations.

Table 5 – Soil Strength Parameters

Layer Type	Depth (ft)	Unit Weight (pcf)	Friction Angle (deg)	Cohesion (ksf)	Lateral Soil Modulus, k (pci)	e_{50} or Dr
CL-ML	0 to 4	125	0°	1.25	325	0.85
SM-ML	4 to 8	115	32°	0.0	50	35
(*) SM-ML	8 to 17	115	30°	0.0	25	30
CL-ML	17 to 27	125	0°	0.75	135	1.20
CL-CH	27 to 30	125	0°	1.30	375	0.80
ML	30 to 33	120	24°	0.30	100	1.30
CL-CH	33 to 50	125	0º	1.50	450	0.75

(*) Liquefiable soils layers

The light pole drilled pier foundation vertical and lateral capacities from the resettled lose liquefied soils can be calculated using the following interpretive engineering soil parameters determined in accordance with the Caltrans Geotechnical Manual for pile foundations subjected to liquefaction as follow:

- C=0 and $\phi = 30^{o}$ for coarse-grained liquefied soil (e.g. SW, SP, SM) or,
- C=0 and $\phi = 25^{o}$ for fine-grained liquefied soil (e.g.ML)

The potential for liquefaction induced ground damage has been determined for each CPT test location. From the liquefaction analysis performed at the CPT test soundings located at both sides of the tennis courts (CPT-5 and CPT-6), most of the liquefiable soils are encountered at depths between 8 to 17 feet below ground surface elevation. Embedding the proposed field light drilled piers to a minimum depth of 20 feet below ground surface will eliminate the liquefaction settlements below the shaft tip.

Note: Soil strength parameters obtained from field data and laboratory testing were modified (reduced) based on our engineering judgment and our previous experience in the general site vicinity.

***Installation*:** The drilled piers shall be placed in conformance to ACI 336 guidelines. Excavation for piers should be inspected by the geotechnical consultant. A tremie pipe should be used to pour concrete from the bottom up and to ensure less than five feet of free fall. The drilled pier requires casing below 8 feet to prevent caving or lateral deformation. Groundwater is expected to be encountered at 8 feet below ground surface.

The structural steel and concrete should be placed immediately after drilling. Prior to placing any structural steel or concrete, loose soil or slough material should be removed from the bottom of the drilled pier excavation.

5.4 Slabs-On-Grade

5.4.1 Tennis Court Slab on Native Clays

Grade-beam reinforced foundations, or post tensioned reinforced foundations may be used to mitigate expansive soil heave related movement.

- Grade-beam Reinforced Slabs: Structures with grade beam reinforced foundations placed on the native clay soils shall have a maximum grade-beam spacing of 20 feet in accordance with the CBC Chapter 18 Section 1808.6.2 (*WRI/CRSI Design of Slab-on-Ground Foundations).*

  Exterior footings shall be founded a minimum of 12 inches below the surface of the building support pad on a layer of properly prepared and compacted native soil as described in Section 4.1. Interior footings shall have a minimum embedment depth of 12 inches.

- If post-tensioned slabs are considered for the tennis court project, the following basic (minimum) soil criteria should be used in accordance with CBC Chapter 18 Section 1808.6.2 (*PTI 10.5 Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils*).

Atterberg Limits:		
Liquid Limit	35	
Plasticity Limit	16	
Plasticity Index	19	
Fines Content (<#200 sieve)	66	
% finer than 2μ	30	
Fabric Factor	1	
Thornthwaite Moisture Index	-40	
Maximum Edge Moisture Variation Distance, e_m		Center: 9.0 ft. Edge: 4.7 ft.
Differential Soil Movement, y_m		Center: 0.20 in. Edge: 1.0 in.
Bearing Capacity:		1,500 psf
Maximum Allowable Slab Deflection		Center: L/480 Edge: L/720

Clamping devices and end anchors for post-tensioned tendons are susceptible to corrosion from aggressive soil and landscape water conditions. Therefore, a fully encapsulated tendon and positive end seal system is required. Torched-off ends of cables are only allowed if the flame heat does not distort the end seal for the cable clamping devices. Grease caps must form a complete seal to the cup. Apply a bonding agent to the recessed pocket area and fill with polymer modified non-shrink grout.

The tennis court post-tensioned slab edges should have a perimeter footing embedded a minimum of 12 inches into the tennis court support pad to account for variable environmental conditions.

5.4.2 Structural Concrete:

Concrete floor slabs (including tennis court) should be a minimum of 5 inches thick and slabs shall be monolithically placed with the footings (no cold joints).

American Concrete Institute (ACI) guidelines (ACI 302.1R-15 Chapter 5, Section 5.2.3) provide recommendations regarding the use of moisture barriers beneath concrete slabs. The concrete floor slabs should be underlain by a 10-mil polyethylene vapor retarder that works as a capillary break to reduce moisture migration into the slab section. All laps and seams should be overlapped 6-inches or as recommended by the manufacturer. The vapor retarder should be protected from puncture. The joints and penetrations should be sealed with the manufacturer's recommended adhesive, pressure-sensitive tape, or both. The vapor retarder should extend a minimum of 12 inches into the footing excavations. The vapor retarder should be covered by 4 inches of clean sand (Sand Equivalent SE>30) unless placed on 3 (restroom building slab) or 2 (tennis court slab) feet of granular fill, in which case, the vapor retarder may lie directly on the granular fill with 2 inches of clean sand cover.

Concrete slabs may be placed without a sand cover directly over a 15-mil vapor retarder (Stego-Wrap or equivalent), provided that the concrete mix uses a low-water cement ratio and concrete curing methods are employed to compensate for release of bleed water through the top of the slab. For areas with moisture sensitive flooring materials, the concrete slab should be placed directly on a 15-mil vapor retarder constructed in accordance with ASTM E1643 and E1745.

Structural concrete slab reinforcement should consist of chaired rebar slab reinforcement (minimum of No. 3 bars at 16-inch centers, both horizontal directions) placed at slab mid-height to resist potential swell forces and cracking. Slab thickness and steel reinforcement are minimums only and should be verified by the structural engineer/designer knowing the actual project loadings.

All steel components of the foundation system should be protected from corrosion by maintaining a 3-inch minimum concrete cover of densely consolidated concrete at footings (by use of a vibrator).

The construction joint between the foundation and any mowstrips/sidewalks placed adjacent to foundations should be sealed with a polyurethane based non-hardening sealant to prevent moisture migration between the joint. Epoxy coated embedded steel components (ASTM D3963/A934) or permanent waterproofing membranes placed at the exterior footing sidewall may also be used to mitigate the corrosion potential of concrete placed in contact with native soil.

Control joints should be provided in all concrete slabs-on-grade at a maximum spacing (in feet) of 2 to 3 times the slab thickness (in inches) as recommended by American Concrete Institute (ACI) guidelines. All joints should form approximately square patterns to reduce randomly oriented contraction cracks. Contraction joints in the slabs should be tooled at the time of the pour or sawcut (¼ of slab depth) within 6 to 8 hours of concrete placement. Construction (cold) joints in foundations and area flatwork should either be thickened butt-joints with dowels or a thickened keyed-joint designed to resist vertical deflection at the joint. All joints in flatwork should be sealed to prevent moisture, vermin, or foreign material intrusion. Precautions should be taken to prevent curling of slabs in this arid desert region (refer to ACI guidelines).

Non-structural Concrete: All non-structural independent flatwork (sidewalks adjacent to the building foundation and uncovered patios) shall be a minimum of 4 inches thick and should be placed on a minimum of 24 inches of concrete sand or aggregate base, dowelled to the perimeter foundations where adjacent to the building to prevent separation. The flatwork should be sloped 2% (sidewalks) or 1 to 2% (patios) away from the building.

Patio slabs with shade structures shall have an 18-inch deep perimeter footing and shall have interior grade beams at 15 feet on centers. Planters that trap water between sidewalks and foundations are not allowed.

A minimum of 24 inches of compacted non-expansive fill and 8 inches of compacted subgrade (85 to 90%) should underlie all independent flatwork. The moisture content of the subgrade should be maintained 5 to 10% above optimum. Flatwork which contains steel reinforcing (except wire mesh) should be underlain by a 10-mil (minimum) polyethylene separation sheet and at least a 2-inch sand cover. All flatwork should be jointed in square patterns and at irregularities in shape at a maximum spacing of 8 feet or the least width of the sidewalk.

5.5 Concrete Mixes and Corrosivity

Selected chemical analyses for corrosivity were conducted on samples from the project site (Plate C-3). The native soils were found to have moderate to severe (S1 to S2) sulfate ion concentrations (1,764 to 8,514 ppm). Sulfate ions in high concentrations can attack the cementitious material in concrete, causing weakening of the cement matrix and eventual deterioration by raveling.

The following table provides American Concrete Institute (ACI, 2019) recommended cement types, water-cement ratio and minimum compressive strengths for concrete in contact with soils:

Table 6. Concrete Mix Design Criteria due to Soluble Sulfate Exposure

Sulfate Exposure Class	Water-soluble Sulfate (SO_4) in soil, ppm	Cement Type	Maximum Water-Cement Ratio by weight	Minimum Strength f'c (psi)
S0	0-1,000	–	–	–
S1	1,000-2,000	II	0.50	4,000
S2	2,000-20,000	V	0.45	4,500
S3 – Option 1	Over 20,000	V (plus Pozzolon)	0.45	4,500
S3 – Option 2	Over 20,000	V	0.40	5,000

Note: From ACI 318-19 Table 19.3.1.1 and Table 19.3.2.1

A minimum of 6.0 sacks per cubic yard of concrete (4,500 psi) of Type V Portland Cement with a maximum water/cement ratio of 0.45 (by weight) should be used for concrete placed in contact with native soil on this project (sitework including sidewalks, hardscape areas, and foundations). Admixtures may be required to allow placement of this low water/cement ratio concrete. Thorough concrete consolidation and hard trowel finishes should be used due to the aggressive soil exposure.

The native soils were also found to have moderate to very severe chloride ion concentrations (220 to 4,540 ppm). Chloride ions can cause corrosion of reinforcing steel, anchor bolts and other buried metallic conduits. Resistivity determinations on the soil indicate very severe potential for metal loss because of electrochemical corrosion processes.

Mitigation of the corrosion of steel can either be achieved by using steel pipes coated with epoxy corrosion inhibitors, asphaltic coatings, cathodic protection or by encapsulating the portion of the pipe lying above groundwater with a minimum of 3 inches of densely consolidated concrete. ***No metallic water pipes or conduits should be placed below foundations***

A minimum concrete cover of three (3) inches should be provided around steel reinforcing or embedded components exposed to native soil or landscape water (to 18 inches above grade). Additionally, the concrete should be thoroughly vibrated during placement to decrease the permeability of the concrete.

Due to the potential for corrosion of metallic piping, all water supply lines should be placed overhead, not beneath the slab. No portion of metallic piping on site should be placed in direct contact with native soils. Copper water lines shall be wrapped or fully encapsulated prior to installation in native soils. A corrosion engineer should be consulted to obtain final design recommendations.

5.6 Excavations

Temporary excavations in native clay soils should stand nearly vertical for short duration. The contractor is solely responsible for the safety of workers entering excavations and trenches. Temporary excavations deeper than 5 feet should be shored or sloped at 1.5 to 1 (horizontal to vertical). Groundwater is anticipated to be encountered at a depth of approximately 8 feet below ground surface.

Surcharge loads of stockpiled soils or construction materials and equipment should be set back from the top of the slopes a minimum distance equal to 10 feet or the height of the slope (whichever is greatest). Permanent slopes should not be steeper than 3 to 1 (horizontal to vertical) to reduce wind and rain erosion.

5.7 Utility Trench Backfill

Utility Trench Backfill: Prior to placement of utility bedding, the exposed subgrade at the bottom of trench excavations should be examined for soft, loose, or unstable soil. Loose materials at trench bottoms resulting from excavation disturbance should be removed to firm material. If extensive soft or unstable areas are encountered, these areas should be over-excavated to a depth of at least 2 feet or to a firm base and be replaced with additional bedding material.

Backfill Materials: Pipe zone backfill (i.e., material beneath and in the immediate vicinity of the pipe) should consist of a 4 to 8 inch bed of ⅜-inch crushed rock, sand/cement slurry (3 sack cement factor), and/or crusher fines (sand) extending to a minimum of 12 inches above the top of pipe. If crushed rock is used for pipe zone backfill for utilities, the crushed rock material should be completed surrounded by a non-woven filter fabric such as Mirafi 140N or equivalent. The filter fabric shall cover the trench bottom, sidewalls and over the top of the crushed rock. The filter fabric is recommended to inhibit the migration of fine material into void spaces in the crushed rock which may create the potential for sinkholes or depressions to develop at the ground surface.

Pipe bedding should be in accordance with pipe manufacturer's recommendations. Recommendations provided above for pipe zone backfill are minimum requirements only. More stringent material specifications may be required to fulfill local codes and/or bedding requirements for specific types of pipes. On-site soil free of debris, vegetation, and other deleterious matter may be suitable for use as utility trench backfill above pipezone, but may be difficult to uniformly maintain at specified moistures and compact to the specified densities. Native backfill should only be placed and compacted after encapsulating buried pipes with suitable bedding and pipe envelope material.

Compaction Criteria: Mechanical compaction is recommended; ponding or jetting should not be allowed, especially in areas supporting structural loads or beneath concrete slabs supported-on-grade, pavements, or other improvements. All trench backfill should be placed and compacted in accordance with recommendations provided in this report for engineered fill.

The pipe zone material (crusher fines, sand) shall be compacted to a minimum of 95% of ASTM D1557 maximum dry density. Pipe deflection should be checked to not exceed 2% of pipe diameter. Native clay/silt soils may be used to backfill the remainder of the trench. Soils used for trench backfill shall be placed in maximum 6 inch lifts (loose), compacted to a minimum of 90% of ASTM D1557 maximum dry density at a minimum of 4% above optimum moisture.

Imported granular material is acceptable for backfill of utility trenches. Granular trench backfill used in building pad areas should be plugged with a solid (no clods or voids) 2-foot width of native clay soils at each end of the building foundation to prevent landscape water migration into the trench below the building.

Backfill soil of utility trenches within paved areas should be uniformly moisture conditioned to a minimum of 4% above optimum moisture, placed in layers not more than 6 inches in thickness and mechanically compacted to a minimum of 90% of the ASTM D1557 maximum dry density, except that the top 12 inches shall be compacted to 95% (if granular trench backfill).

5.8 Seismic Design

This site is located in the seismically active southern California area and the site structures are subject to strong ground shaking due to potential fault movements along the Superstition Hills, Imperial and Brawley faults. Engineered design and earthquake-resistant construction are the common solutions to increase safety and development of seismic areas. Designs should comply with the latest edition of the CBC for Site Class E using the seismic coefficients given in Section 3.5 and Table 2 of this report.

Section 6
LIMITATIONS AND ADDITIONAL SERVICES

6.1 Limitations

The professional opinions and conclusions within this report are based on current information regarding the proposed improvements to the sports facilities at the Imperial Valley College campus located at 380 East Aten Road in Imperial, California. The conclusions of this report are invalid if:

- Structural loads change from those stated or the structures are relocated.
- The Additional Services section of this report is not followed.
- This report is used for adjacent or other property.
- Changes of grade or groundwater occur between the issuance of this report and construction other than those anticipated in this report.
- Any other change that materially alters the project from that proposed at the time this report was prepared.

We have based our findings and professional opinions in this report on selected points of field exploration, laboratory testing, and our understanding of the proposed project. Furthermore, findings and professional opinions are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions could exist between and beyond the exploration points and groundwater conditions may change. These conditions may require additional studies, consultation, and possible design revisions.

This report contains information that may be useful in the preparation of contract specifications. However, the report is not worded is such a manner that we recommend its use as a construction specification document without proper modification. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report was prepared according to the generally accepted *geotechnical engineering standards of practice* that existed in Imperial County at the time the report was prepared. No warranty, express or implied, is made in connection with our services. Because of potential changes in the Geotechnical Engineering Standards of Practice, this report should be considered invalid for periods after three years from the report date without a review of the validity of the findings and professional opinions by our firm.

The client has responsibility to see that all parties to the project including designer, contractor, subcontractor, and future owners are made aware of this entire report. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

6.2 Additional Services

The professional opinions presented in this report are based on the assumption that an adequate program of tests and observations will be conducted during construction to check the field subsurface conditions and compliance of the professional opinions that are the basis of this report. *The geotechnical engineering firm providing the tests and observations shall assume the responsibility of geotechnical engineer of record.*

Additional tests and observations should include, but not necessarily be limited to the following:

- Review of project plans and specifications, prior to their issuance for bidding, to check for compatibility with our professional opinions and conclusions;
- Observation and testing by the geotechnical consultant of record during site clearing, grading, excavation, placement of fills, building pad and subgrade preparation, and backfilling of utility trenches;
- Observation of foundation excavations and reinforcing steel before concrete placement;
- Consultation as may be required during construction.

Additional information concerning the scope and cost of these services can be obtained from our office.

Section 7

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TABLES

Table 1
Summary of Characteristics of Closest Known Active Faults

Fault Name	Approximate Distance (miles)	Approximate Distance (km)	Maximum Moment Magnitude (Mw)	Fault Length (km)	Slip Rate (mm/yr)
Imperial	0.4	0.6	7	62 ± 6	20 ± 5
Brawley *	1.9	3.0			
Superstition Hills	5.7	9.1	6.6	23 ± 2	4 ± 2
Rico *	6.2	9.9			
Superstition Mountain	11.2	18.0	6.6	24 ± 2	5 ± 3
Northern Centinela*	14.3	22.8			
Route 247*	15.3	24.5			
Yuha*	17.2	27.5			
Shell Beds	19.6	31.4			
Yuha Well *	19.8	31.7			
Borrego (Mexico)*	20.8	33.3			
Laguna Salada	21.9	35.0	7	67 ± 7	3.5 ± 1.5
Cerro Prieto *	22.5	36.0			
Vista de Anza*	23.1	37.0			
Painted Gorge Wash*	23.5	37.6			
Elmore Ranch	24.2	38.7	6.6	29 ± 3	1 ± 0.5
Pescadores (Mexico)*	25.3	40.4			
Cucapah (Mexico)*	26.2	42.0			
Ocotillo*	27.3	43.7			
Elsinore - Coyote Mountain	30.6	49.0	6.8	39 ± 4	4 ± 2
San Jacinto - Borrego	31.0	49.5	6.6	29 ± 3	4 ± 2
Algodones *	32.8	52.5			

* Note: Faults not included in CGS database.

Table 2
2019 California Building Code (CBC) and ASCE 7-16 Seismic Parameters

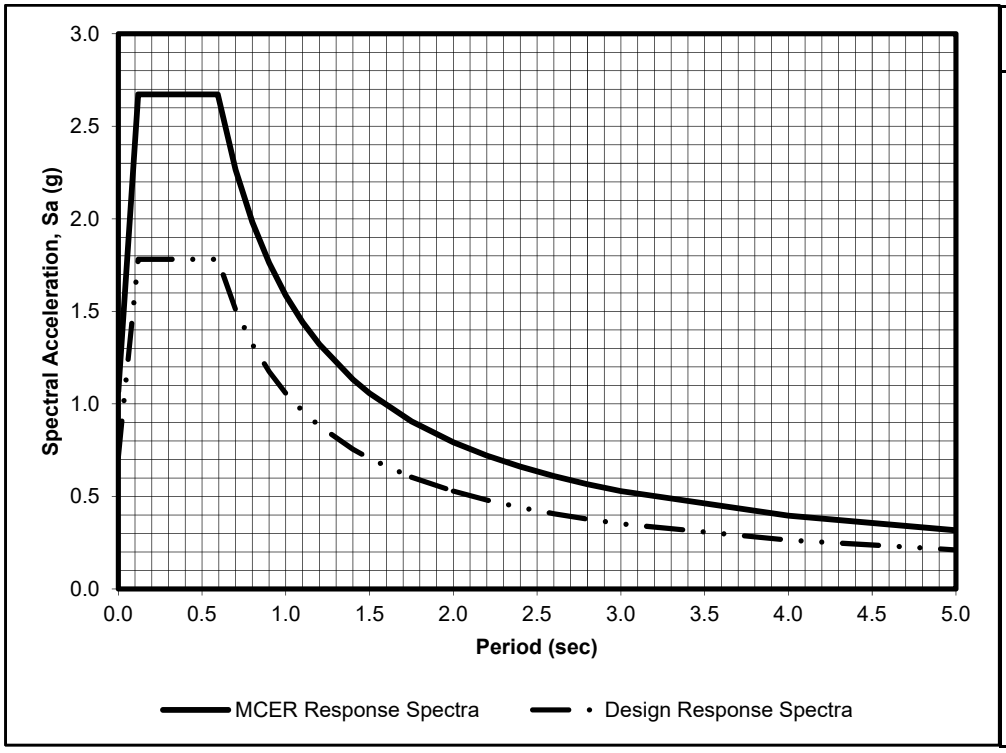
			ASCE 7-16 Reference
Soil Site Class:	**E**		Table 20.3-1
Latitude:	32.8285	N	
Longitude:	-115.5056	W	
Risk Category:	III		
Seismic Design Category:	E		

Maximum Considered Earthquake (MCE) Ground Motion

Mapped MCE_R Short Period Spectral Response	S_s	2.227 g	ASCE Figure 22-1	
Mapped MCE_R 1 second Spectral Response	S_1	0.793 g	ASCE Figure 22-2	
Short Period (0.2 s) Site Coefficient	F_a	1.20	ASCE Table 11.4-1	
Long Period (1.0 s) Site Coefficient	F_v	2.00	ASCE Table 11.4-2	
MCE_R Spectral Response Acceleration Parameter (0.2 s)	S_{MS}	2.672 g	= Fa * S_s	ASCE Equation 11.4-1
MCE_R Spectral Response Acceleration Parameter (1.0 s)	S_{M1}	1.586 g	= Fv * S_1	ASCE Equation 11.4-2

Design Earthquake Ground Motion

Design Spectral Response Acceleration Parameter (0.2 s)	S_{DS}	1.782 g	= 2/3*S_{MS}	ASCE Equation 11.4-3
Design Spectral Response Acceleration Parameter (1.0 s)	S_{D1}	1.057 g	= 2/3*S_{M1}	ASCE Equation 11.4-4
Risk Coefficient at Short Periods (less than 0.2 s)	C_{RS}	0.950		ASCE Figure 22-17
Risk Coefficient at Long Periods (greater than 1.0 s)	C_{R1}	0.923		ASCE Figure 22-18
	T_L	8.00 sec		ASCE Figure 22-12
	T_O	0.12 sec	=0.2*S_{D1}/S_{DS}	
	T_S	0.59 sec	=S_{D1}/S_{DS}	
Peak Ground Acceleration	PGA_M	1.02 g		ASCE Equation 11.8-1



Period T (sec)	Sa (g)	MCE_R Sa (g)
0.00	0.71	1.07
0.12	1.78	2.67
0.59	1.78	2.67
0.70	1.51	2.27
0.80	1.32	1.98
0.90	1.17	1.76
1.00	1.06	1.59
1.10	0.96	1.44
1.20	0.88	1.32
1.20	0.88	1.32
1.40	0.76	1.13
1.50	0.70	1.06
1.75	0.60	0.91
2.00	0.53	0.79
2.20	0.48	0.72
2.40	0.44	0.66
2.60	0.41	0.61
2.80	0.38	0.57
3.00	0.35	0.53
4.00	0.26	0.40
5.00	0.21	0.32

Table 3
Soil Site Class Determination per ASCE 7-16, Section 20.4
Imperial Valley College Expansion Project
LCI Project No. LE06360

Boring B-17

Sample Depth	SPT Blow Count	di/Ni	Sum di/Ni	Avg. Nch
0				
5	65	0.08	3.81	**10**
10	8	0.63		
15	19	0.26		
17.5	19	0.13		
20	11	0.23		
22.5	14	0.18		
25	8	0.31		
27.5	9	0.28		
30	6	0.42		
32.5	7	0.36		
35	9	0.28		
37.5	7	0.36		
40	8	0.31		

FIGURES

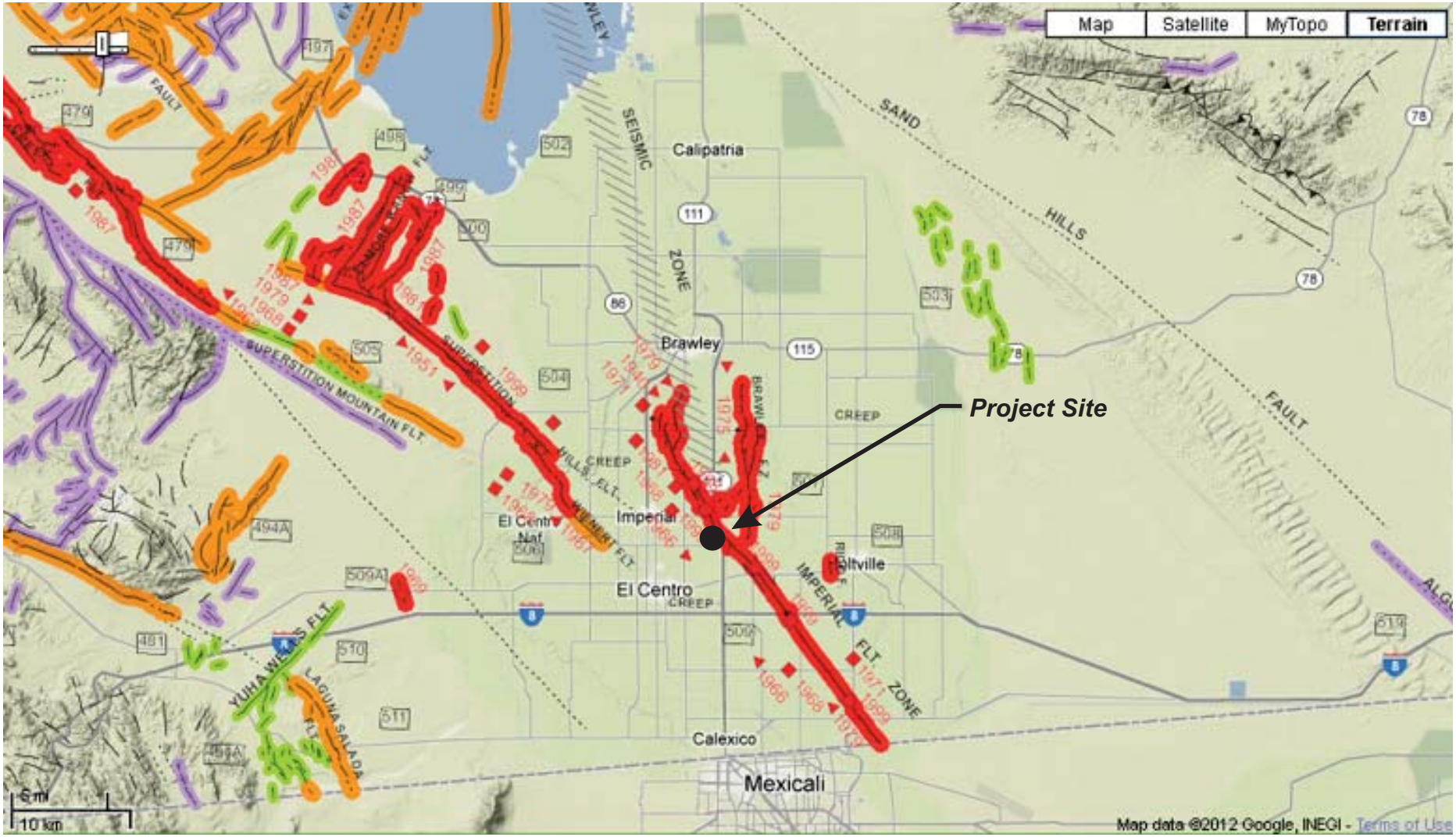
Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

Regional Fault Map

Figure 1



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

LANDMARK Geo-Engineers and Geologists **Project No.: LE22111**	**Map of Local Faults**	**Figure 2**

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. Concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximate and may indicate structural trend only. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

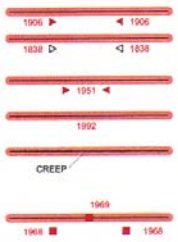
FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following:

(a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks.

(b) fault creep slippage - slow ground displacement usually without accompanying earthquakes.

(c) displaced survey lines.



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 fault break.

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. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissnce nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

ADDITIONAL FAULT SYMBOLS

Bar and ball on downthrown side (relative or apparent).

Arrows along fault indicate relative or apparent direction of lateral movement.

Arrow on fault indicates direction of dip.

Low angle fault (barbs on upper plate). Fault surface generally dips less than 45° but locally may have been subsequently steepened. On offshore faults, barbs simply indicate a reverse fault regardless of steepness of dip.

OTHER SYMBOLS

Numbers refer to annotations listed in the appendices of the accompanying report. Annotations include fault name, age of fault displacement, and pertinent references including Earthquake Fault Zone maps where a fault has been zoned by the Alquist-Priolo Earthquake Fault Zoning Act. This Act requires the State Geologist to delineate zones to encompass faults with Holocene displacement.

Structural discontinuity (offshore) separating differing Neogene structural domains. May indicate discontinuities between basement rocks.

Brawley Seismic Zone, a linear zone of seismicity locally up to 10 km wide associated with the releasing step between the Imperial and San Andreas faults.

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
						ON LAND	OFFSHORE
Quaternary	Late Quaternary	Historic	200			Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene*	11,700		? ? ?	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
	Early Quaternary	Pleistocene	700,000		? ?	Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
					?	Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000*			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

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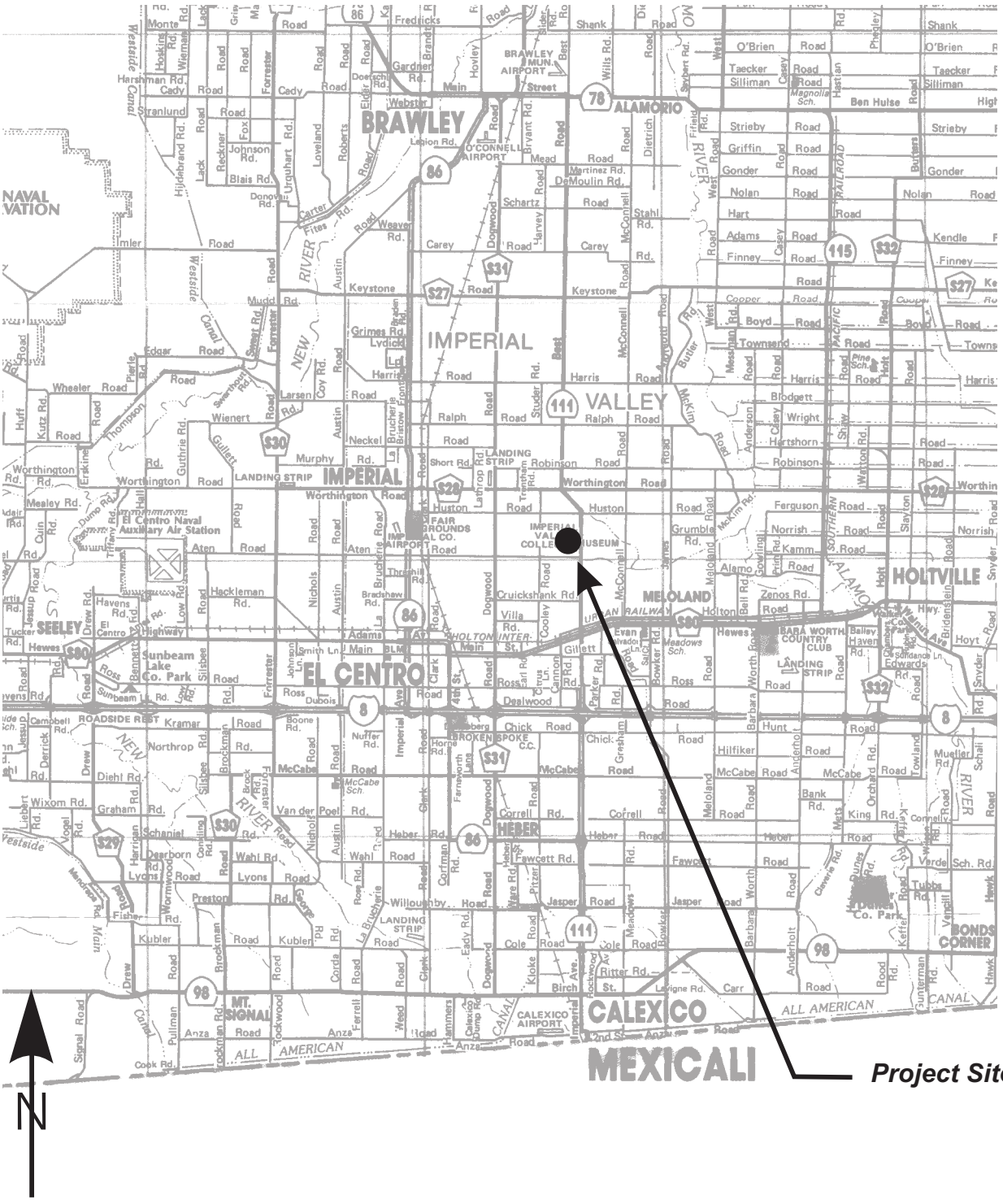
Fault Map Legend

Figure 3

APPENDIX A



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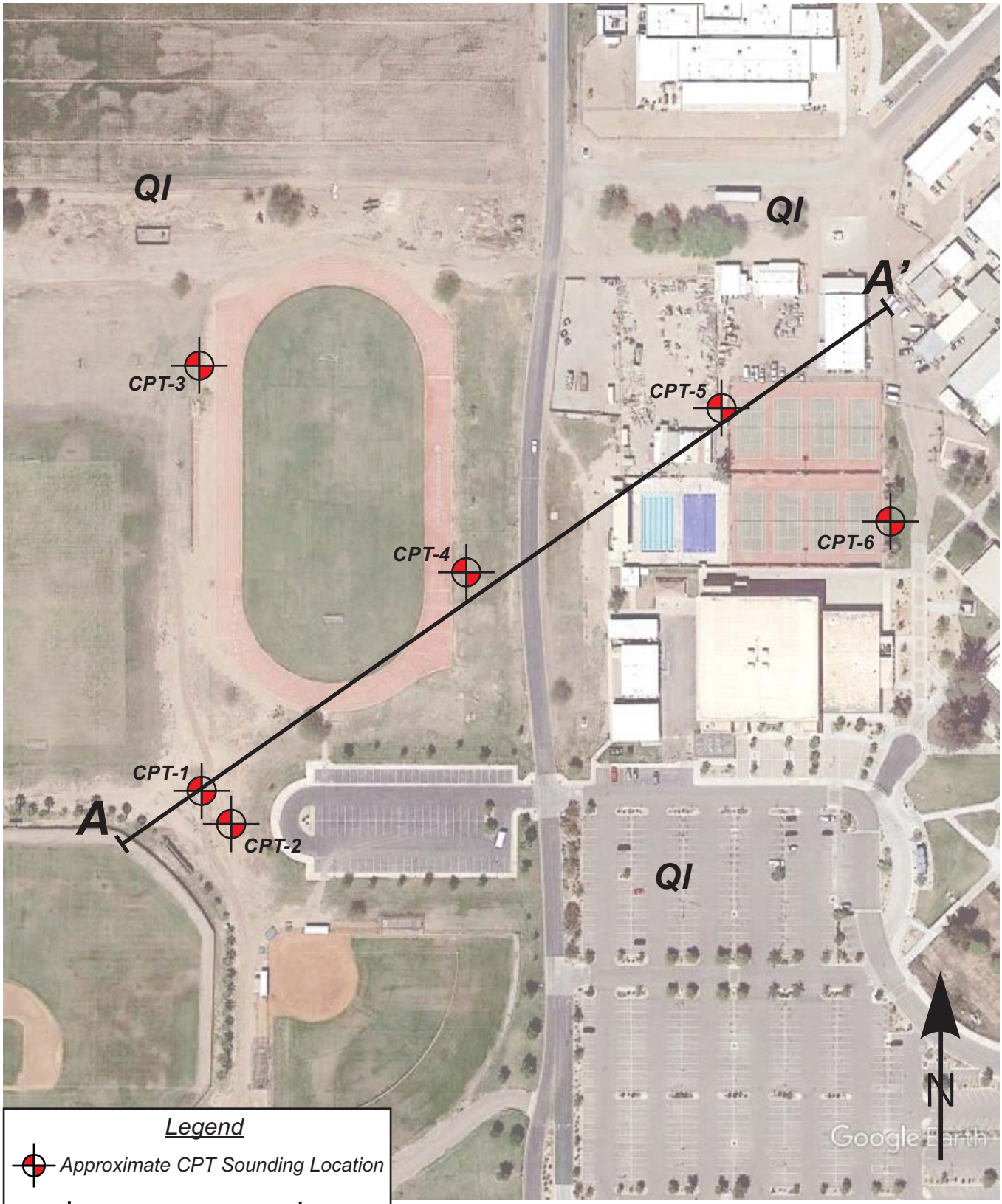
Vicinity Map

Plate A-1



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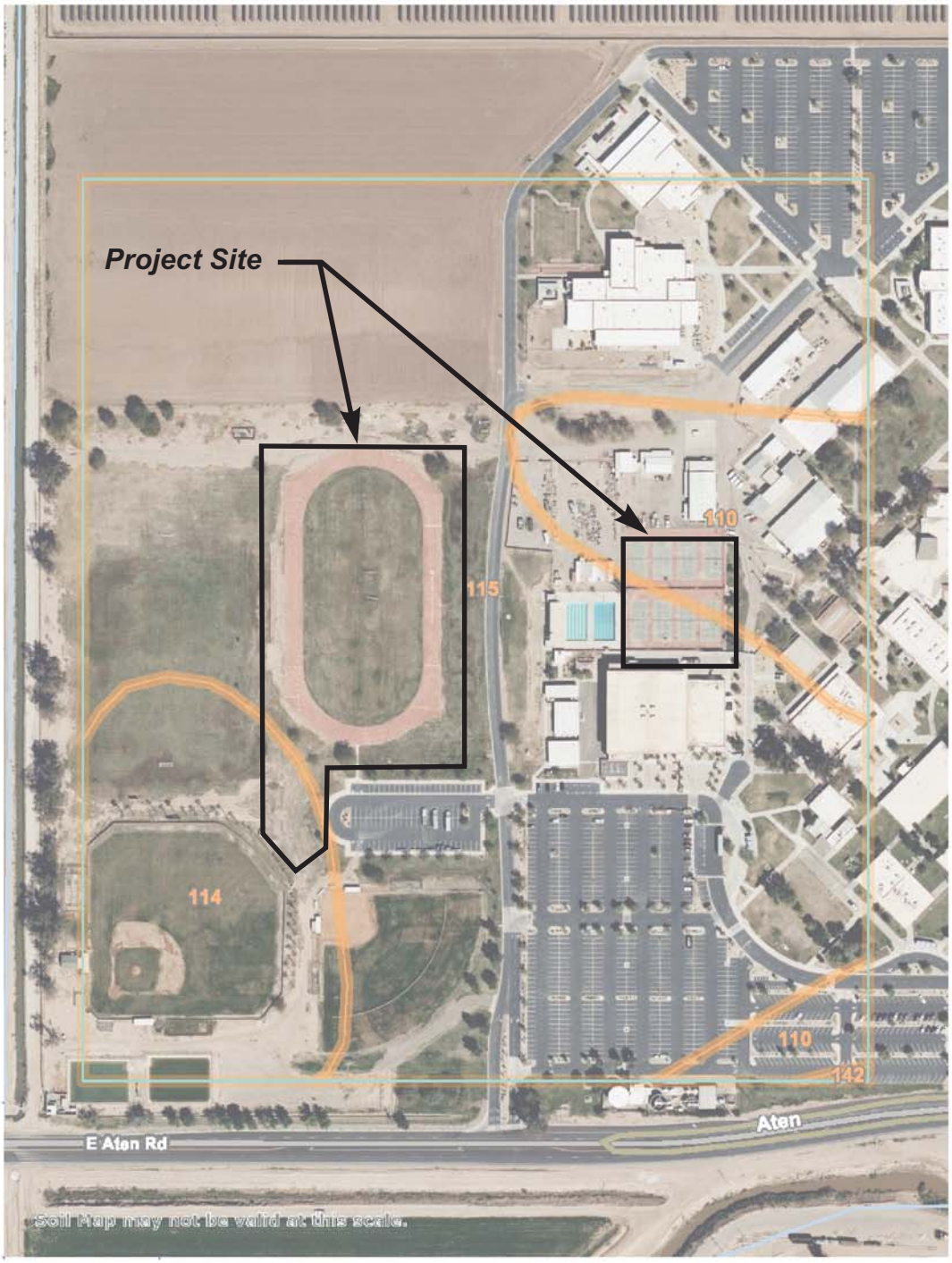
Site and Exploration Map

Plate
A-2



115° 37' 55" W

115° 37' 13" W

N

Map Scale: 1:3,640 if printed on A portrait (8.5" x 11") sheet.

Meters
0 50 100 200 300

Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/31/2022
Page 1 of 3

LANDMARK
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Soil Survey Map

Plate A-3

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Imperial County, California, Imperial Valley Area
Survey Area Data: Version 13, Sep 15, 2021

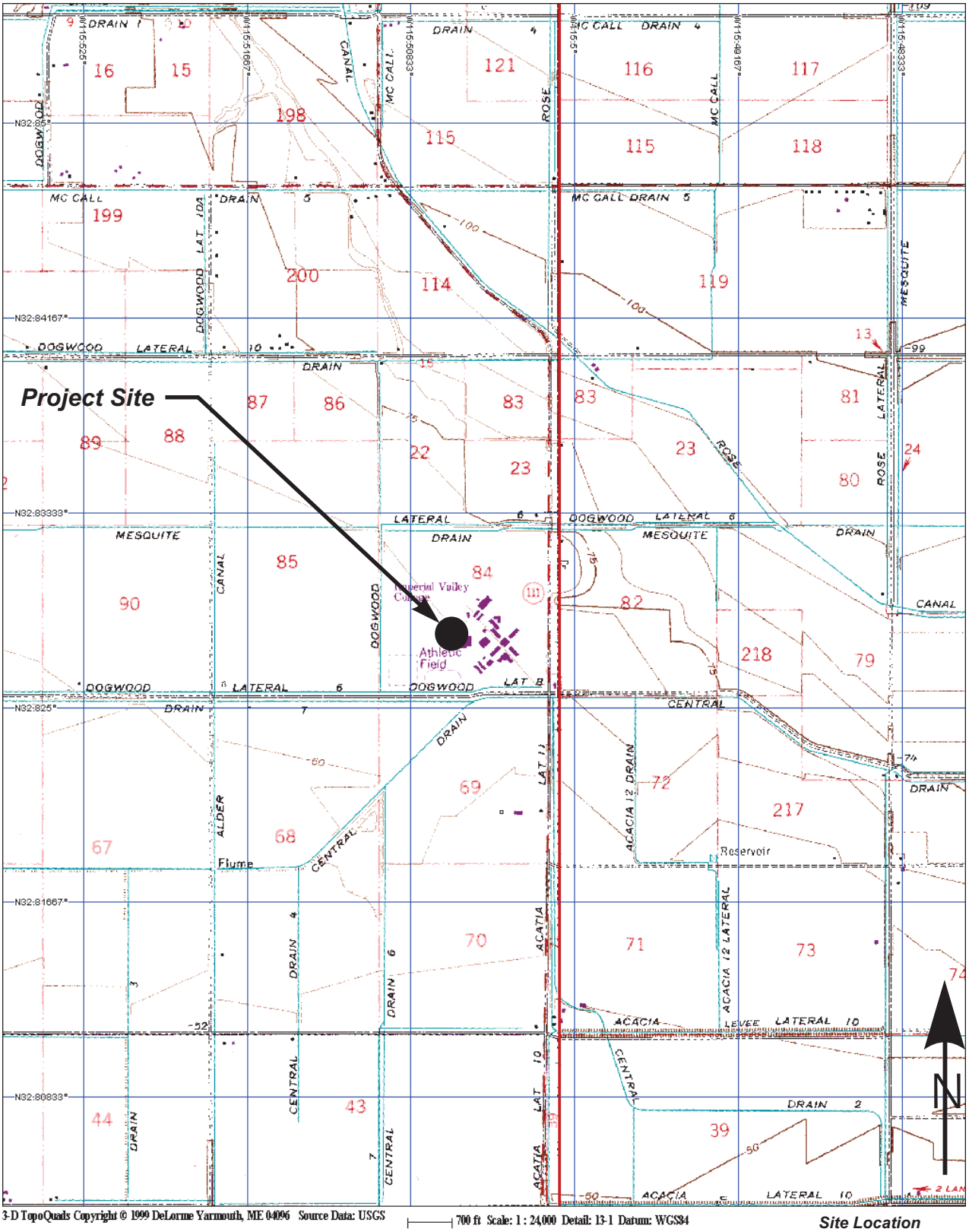
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2021—May 22, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

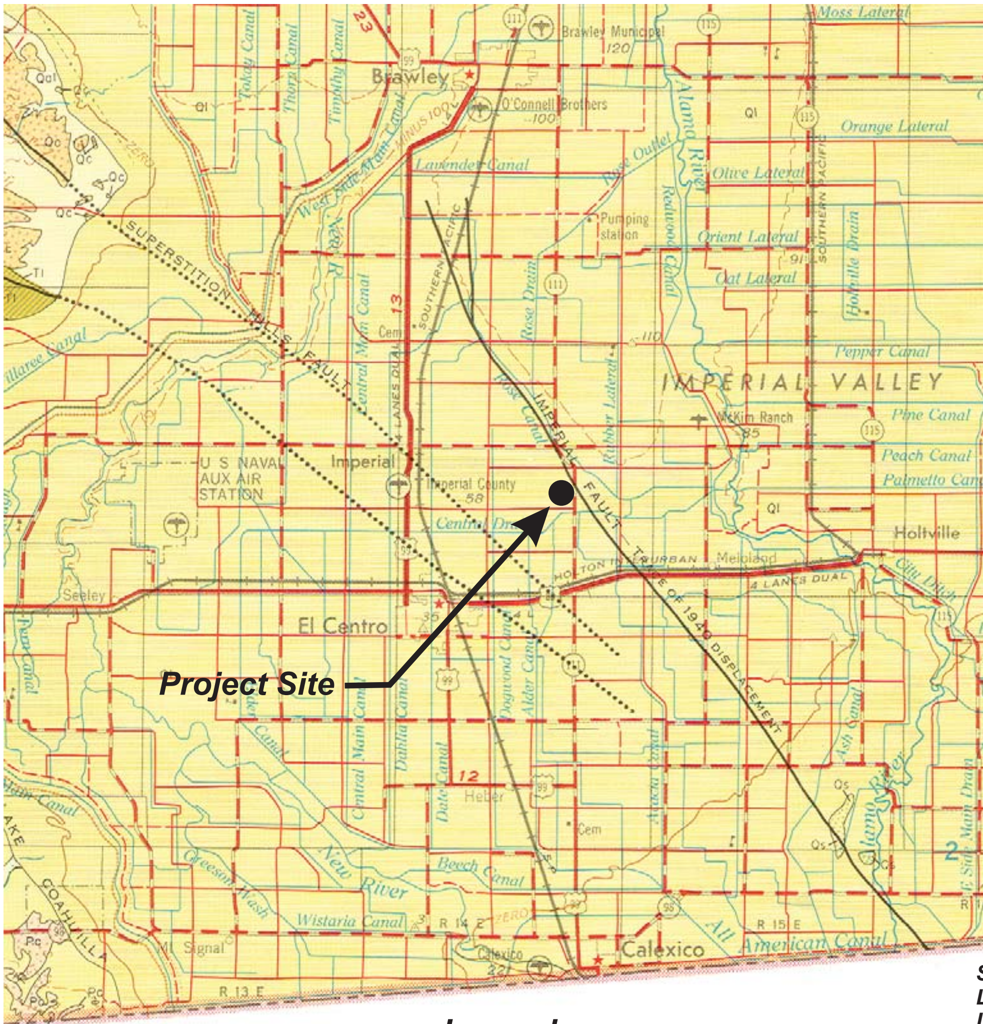
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
110	Holtville silty clay, wet	7.5	11.9%
114	Imperial silty clay, wet	8.2	13.2%
115	Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes	46.8	74.8%
142	Vint loamy very fine sand, wet	0.0	0.1%
Totals for Area of Interest		**62.6**	**100.0%**



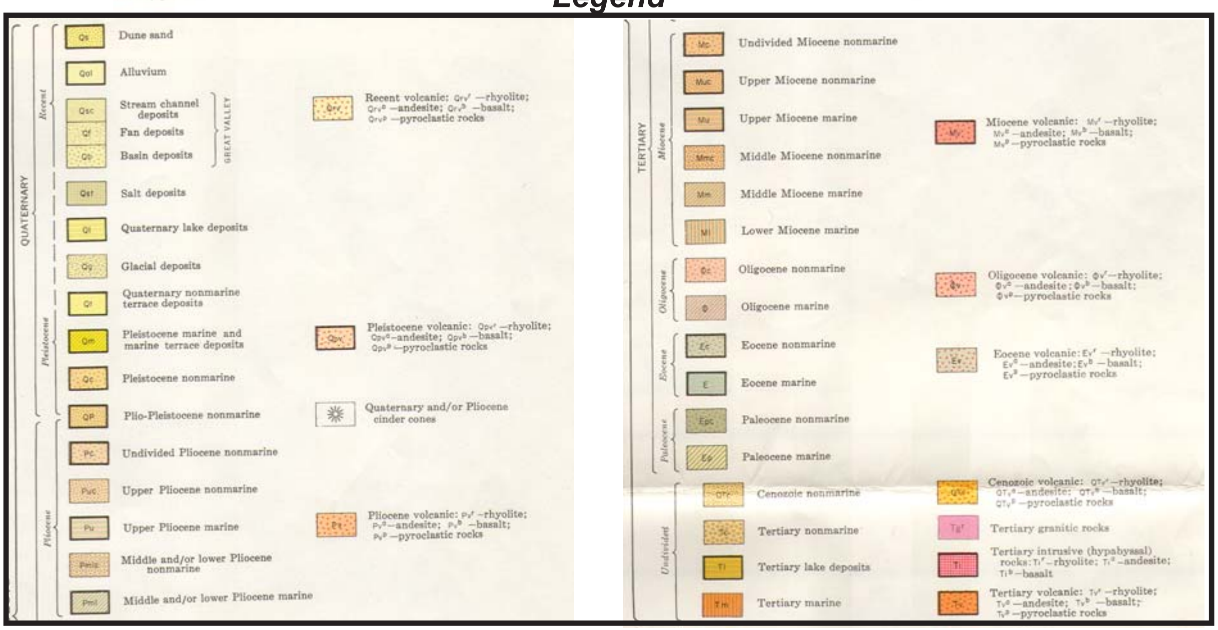
Site Location
Lat: 32.8285 N
Long: -115.5056 W

LANDMARK Geo-Engineers and Geologists **Project No.: LE22111**	**Topographic Map**	**Plate A-4**



Site Location
Lat: 32.8285 N
Long: -115.5056 W

Legend

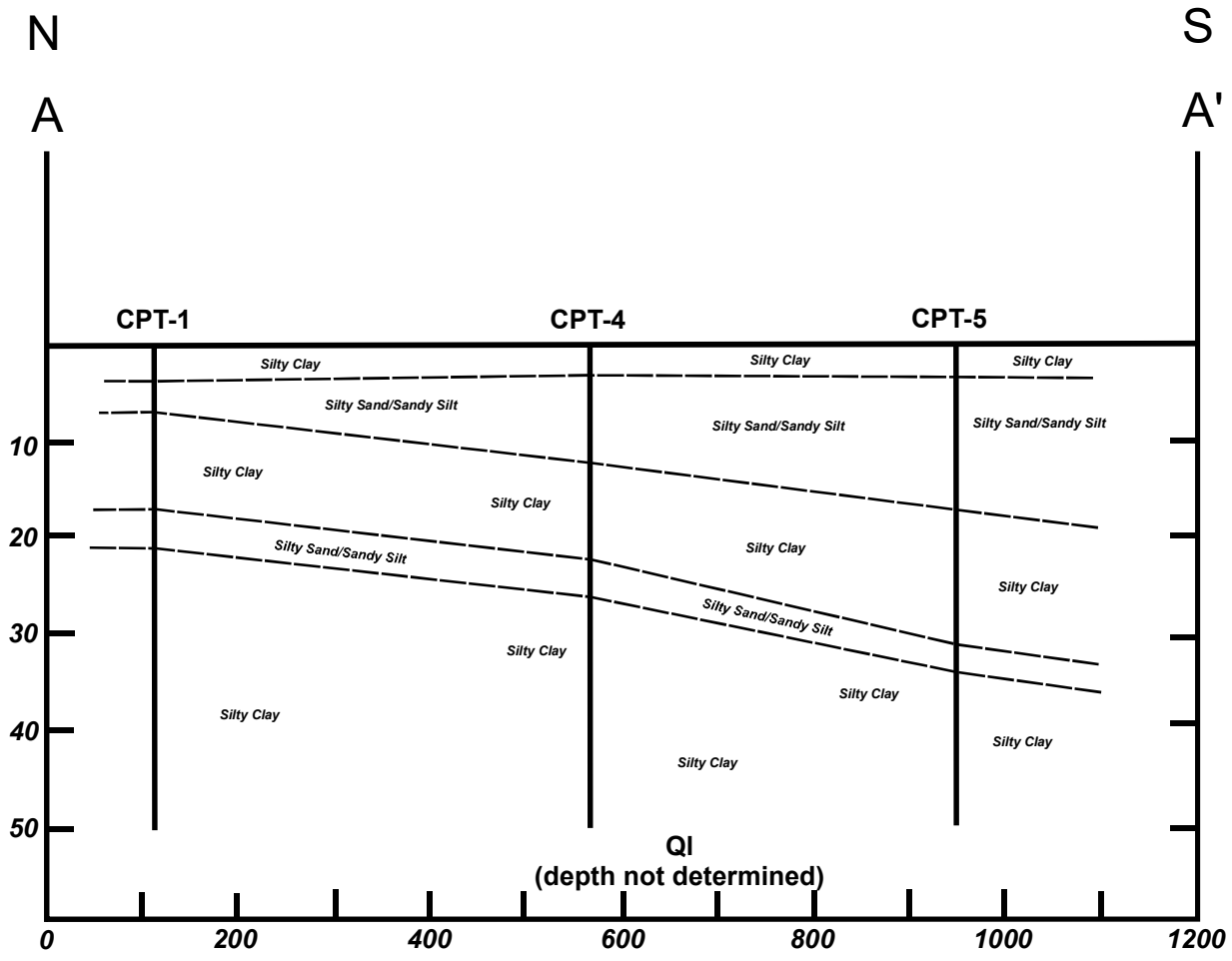


LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

Regional Geologic Map

Plate A-5



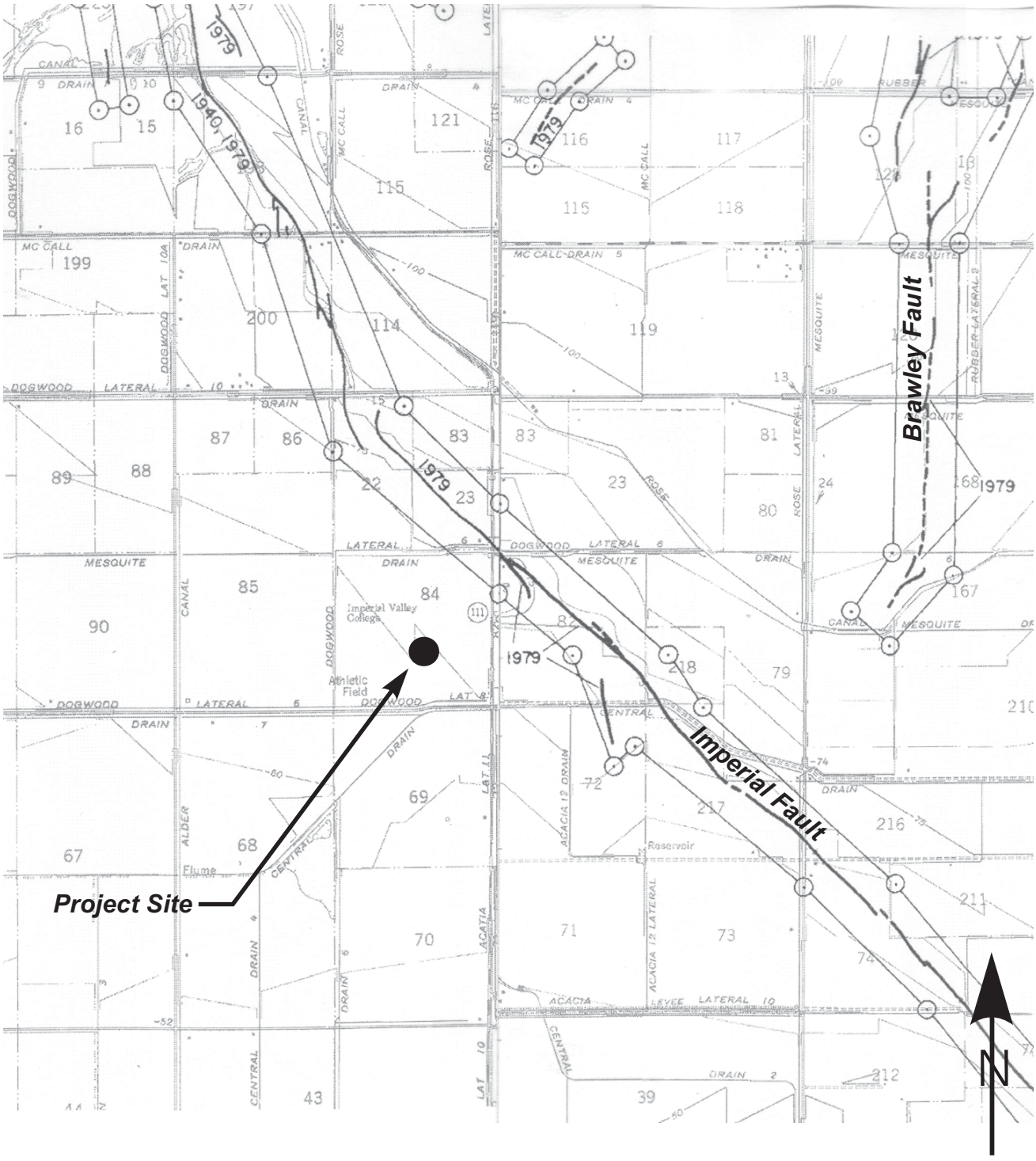
Scale
1" = 200' Horizontal
1" = 20' Vertical

LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

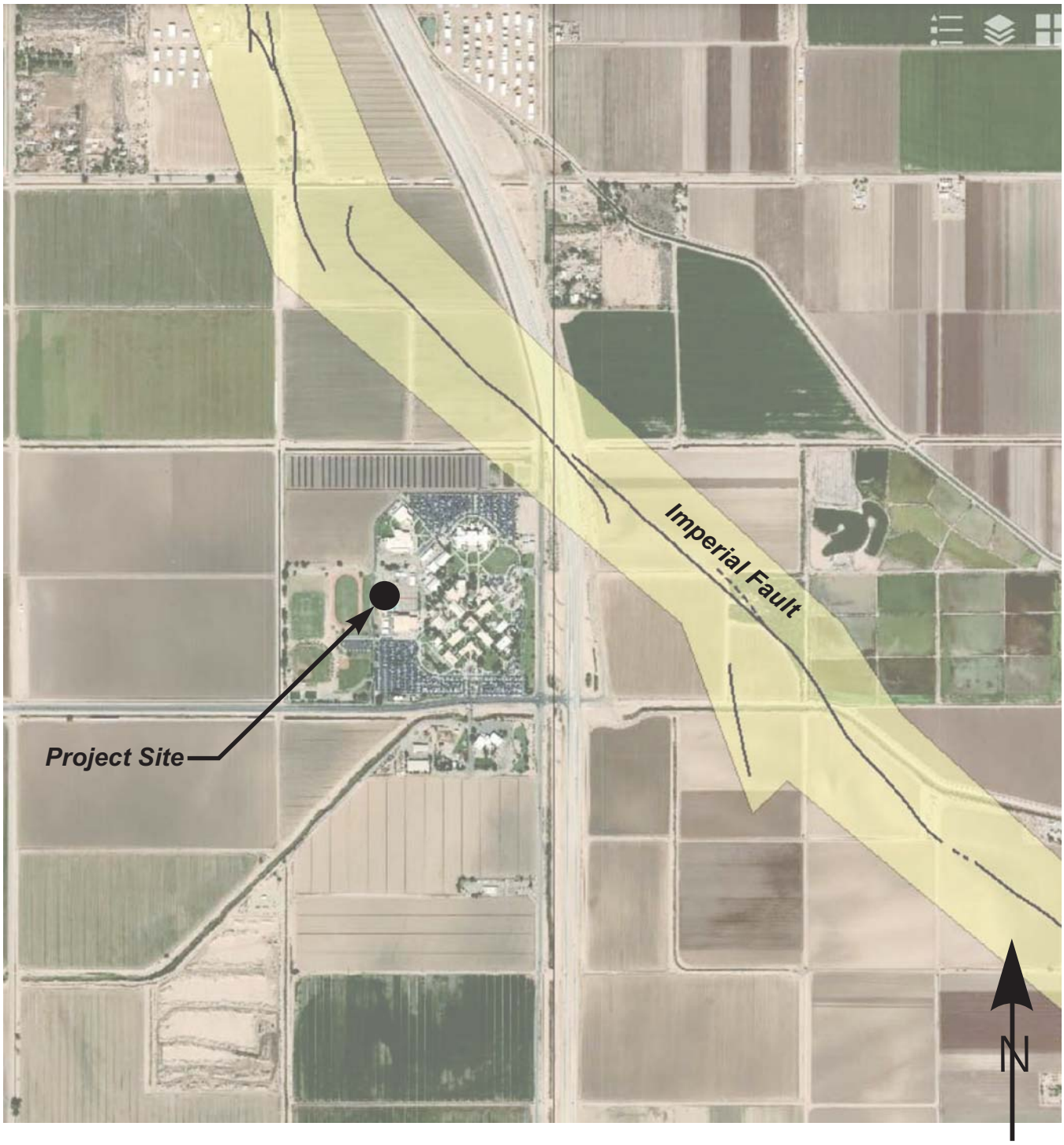
Schematic Geologic Cross-section (A-A')

Plate A-6



Site Location
Lat: 32.8285 N
Long: -115.5056 W

LANDMARK Geo-Engineers and Geologists **Project No.: LE22111**	**A-P Earthquake Fault Map**	**Plate A-7**



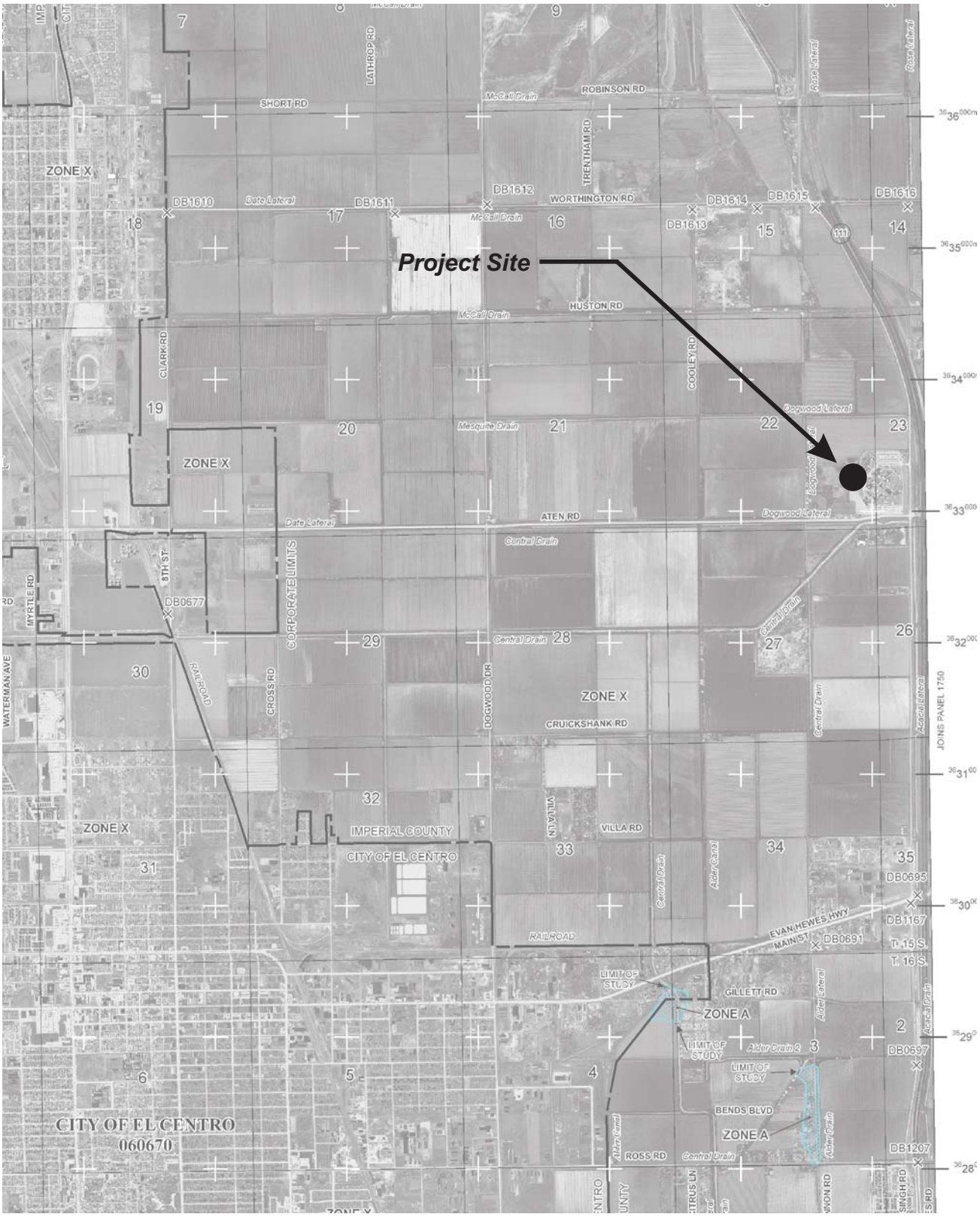
Site Location
Lat: 32.8285 N
Long: -115.5056 W

LANDMARK
Geo-Engineers and Geologists

Project No.: LE20129

Earthquake Zones of Required Investigation Map

Plate A-8



Reference: Federal Emergency Management Agency (FEMA)
Panel Number 06025C1725C

LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

FEMA Flood Map

Plate
A-9

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

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.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

APPENDIX B

CLIENT: Imperial Community College District
PROJECT: Sports Field Improvements - Imperial, CA

CONE PENETROMETER: Kehoe Testing & Engineering Truck Mounted Electric Cone with 30 ton reaction weight

LOCATION: See Site and Boring Location Plan

DATE: 5/26/2022

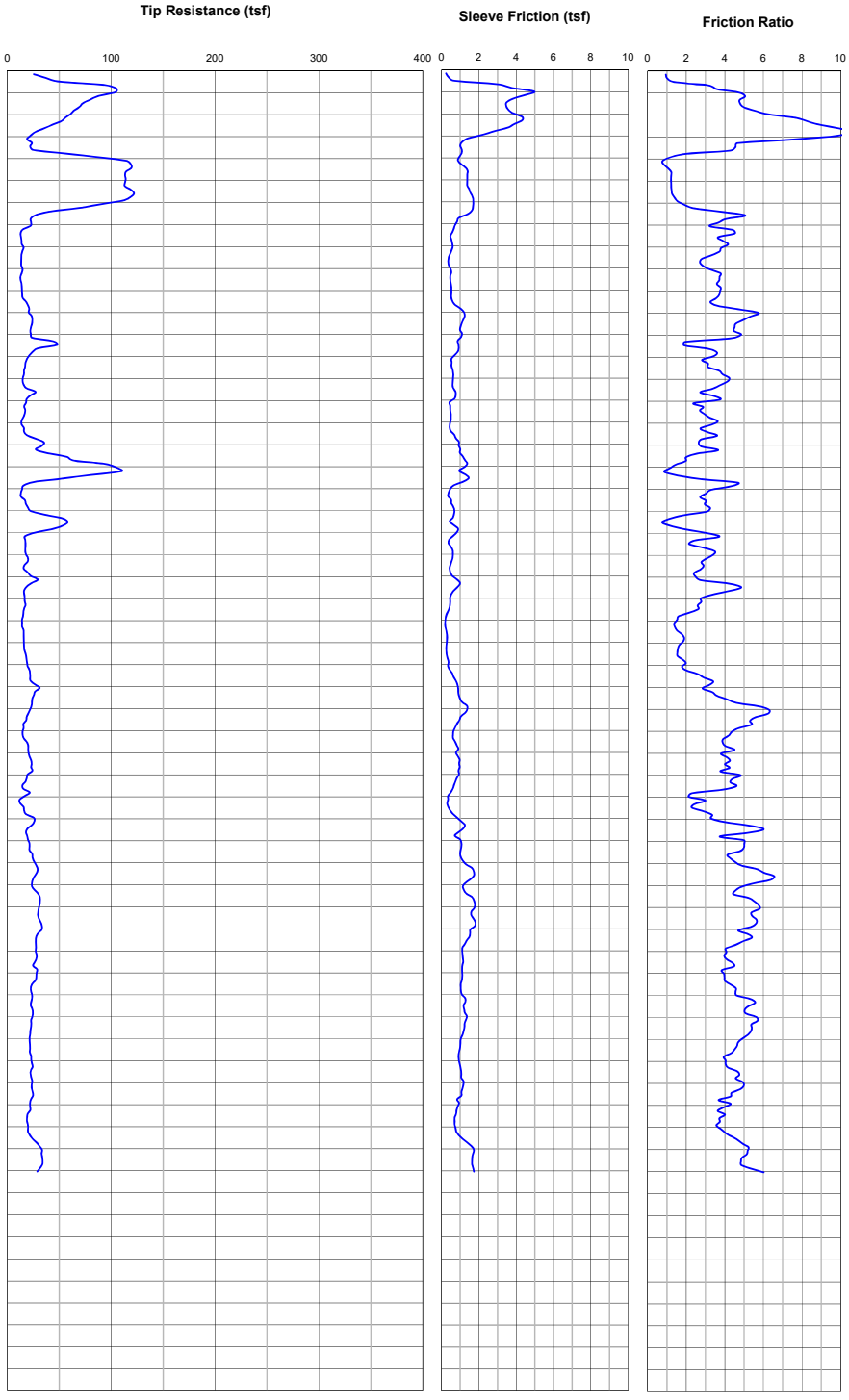
CONE SOUNDING DATA CPT-1

INTERPRETED SOIL PROFILE
From Robertson and Campanella (1989

GROUND ELEVATION +/-

DEPTH			
	Sandy Silt to Clayey Silt	ML	very dense
	Overconsolidated Soil	??	very dense
	Clay	CL/CH	hard
	Clayey Silt to Silty Clay	ML/CL	hard
5	Sand to Silty Sand	SP/SM	very dense
	Sand to Silty Sand	" "	very dense
	Clayey Silt to Silty Clay	ML/CL	hard
	Clay	CL/CH	stiff
	Silty Clay to Clay	CL	stiff
10	Silty Clay to Clay	" "	stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Silty Clay to Clay	CL	stiff
15	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Sandy Silt to Clayey Silt	ML	medium dense
20	Clayey Silt to Silty Clay	ML/CL	stiff
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
25	Clayey Silt to Silty Clay	ML/CL	stiff
	Sandy Silt to Clayey Silt	ML	very loose
	Sandy Silt to Clayey Silt	" "	loose
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clay	CL/CH	very stiff
30	Clay	" "	stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clay	CL/CH	very stiff
35	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
40	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
45	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
50	Clay	" "	very stiff
55			

END OF SOUNDING AT 50 ft.



Project No.		PLATE
LE22111	LANDMARK Geo-Engineers and Geologists	B-1

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-1

Est. GWT (ft): 8

Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
0.15	0.5	37.01	1.09	Silty Sand to Sandy Silt	SM/ML	very dense	115	8	70.0	30	105	43		
0.30	1.0	101.17	3.85	Clayey Silt to Silty Clay	ML/CL	hard	120	40		40			5.95	>10
0.45	1.5	80.35	4.87	Overconsolidated Soil	??	very dense	120	80	151.9	50	104	43		
0.60	2.0	64.96	5.60	Overconsolidated Soil	??	very dense	120	65	122.8	60	92	41		
0.75	2.5	50.34	8.36	Clay	CL/CH	hard	125	40		75			2.95	>10
0.93	3.0	28.20	10.10	Clay	CL/CH	very stiff	125	23		100			1.65	>10
1.08	3.5	21.48	5.55	Clay	CL/CH	very stiff	125	17		85			1.25	>10
1.23	4.0	56.68	2.44	Sandy Silt to Clayey Silt	ML	dense	115	16	107.2	40	77	39		
1.38	4.5	117.68	0.90	Sand to Silty Sand	SP/SM	very dense	115	21	222.5	10	97	42		
1.53	5.0	113.82	1.22	Sand to Silty Sand	SP/SM	very dense	115	21	207.5	15	94	41		
1.68	5.5	116.80	1.24	Sand to Silty Sand	SP/SM	very dense	115	21	202.9	15	93	41		
1.83	6.0	106.82	1.60	Sand to Silty Sand	SP/SM	dense	115	19	177.6	20	89	41		
1.98	6.5	46.81	3.76	Clayey Silt to Silty Clay	ML/CL	hard	120	19		55			2.73	>10
2.13	7.0	22.56	3.65	Silty Clay to Clay	CL	very stiff	125	13		70			1.30	>10
2.28	7.5	13.55	4.19	Clay	CL/CH	stiff	125	11		95			0.77	>10
2.45	8.0	14.31	3.96	Clay	CL/CH	stiff	125	11		90			0.81	>10
2.60	8.5	13.76	3.29	Silty Clay to Clay	CL	stiff	125	8		85			0.78	>10
2.75	9.0	13.72	2.95	Clayey Silt to Silty Clay	ML/CL	stiff	120	5		85			0.78	>10
2.90	9.5	13.06	3.74	Silty Clay to Clay	CL	stiff	125	7		95			0.74	>10
3.05	10.0	13.86	3.71	Silty Clay to Clay	CL	stiff	125	8		90			0.78	>10
3.20	10.5	15.61	3.50	Silty Clay to Clay	CL	stiff	125	9		85			0.89	>10
3.35	11.0	20.44	4.69	Clay	CL/CH	very stiff	125	16		85			1.17	>10
3.50	11.5	23.70	4.95	Clay	CL/CH	very stiff	125	19		85			1.36	>10
3.65	12.0	22.45	4.61	Clay	CL/CH	very stiff	125	18		85			1.29	>10
3.80	12.5	38.80	2.73	Sandy Silt to Clayey Silt	ML	medium dense	115	11	48.6	55	51	35		
3.95	13.0	24.50	3.41	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		75			1.40	>10
4.13	13.5	17.74	3.03	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		85			1.01	>10
4.28	14.0	15.66	3.94	Silty Clay to Clay	CL	stiff	125	9		95			0.88	>10
4.43	14.5	16.29	3.75	Silty Clay to Clay	CL	stiff	125	9		95			0.92	>10
4.58	15.0	22.56	3.31	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		80			1.29	>10
4.73	15.5	17.08	2.66	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		85			0.96	>10
4.88	16.0	14.84	3.27	Silty Clay to Clay	CL	stiff	125	8		95			0.83	>10
5.03	16.5	16.91	3.15	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		90			0.95	>10
5.18	17.0	31.88	2.74	Sandy Silt to Clayey Silt	ML	medium dense	115	9	36.2	65	42	34		
5.33	17.5	41.19	2.72	Sandy Silt to Clayey Silt	ML	medium dense	115	12	46.3	60	50	35		
5.48	18.0	87.77	1.53	Silty Sand to Sandy Silt	SM/ML	dense	115	20	97.8	30	72	38		
5.65	18.5	81.66	1.71	Silty Sand to Sandy Silt	SM/ML	medium dense	115	18	90.2	35	69	38		
5.80	19.0	18.12	4.10	Silty Clay to Clay	CL	very stiff	125	10		100			1.02	>10
5.95	19.5	14.27	2.93	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		100			0.79	>10
6.10	20.0	19.99	3.09	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		90			1.13	>10
6.25	20.5	48.85	1.26	Silty Sand to Sandy Silt	SM/ML	medium dense	115	11	52.1	40	53	35		
6.40	21.0	41.37	2.11	Sandy Silt to Clayey Silt	ML	medium dense	115	12	43.8	55	48	35		
6.55	21.5	17.15	2.77	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		95			0.96	>10
6.70	22.0	17.46	3.25	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.98	>10
6.85	22.5	18.57	2.91	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		95			1.04	>10
7.00	23.0	19.27	2.55	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		90			1.08	>10
7.18	23.5	23.56	3.96	Silty Clay to Clay	CL	very stiff	125	13		95			1.33	>10
7.33	24.0	16.28	3.46	Silty Clay to Clay	CL	stiff	125	9		100			0.90	7.70
7.48	24.5	16.73	2.67	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.93	>10
7.63	25.0	14.90	1.77	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		95			0.82	8.70
7.78	25.5	14.62	1.44	Sandy Silt to Clayey Silt	ML	very loose	115	4	14.4	90	15	30		
7.93	26.0	15.71	1.84	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		95			0.87	9.19
8.08	26.5	16.71	1.58	Sandy Silt to Clayey Silt	ML	very loose	115	5	16.2	90	19	31		
8.23	27.0	18.92	1.86	Sandy Silt to Clayey Silt	ML	loose	115	5	18.2	90	22	31		
8.38	27.5	21.65	2.51	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		90			1.21	>10
8.53	28.0	26.50	3.15	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		90			1.50	>10
8.68	28.5	25.40	3.68	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		95			1.43	>10
8.85	29.0	22.90	5.58	Clay	CL/CH	very stiff	125	18		100			1.28	8.27
9.00	29.5	18.99	5.71	Clay	CL/CH	very stiff	125	15		100			1.05	5.88
9.15	30.0	15.25	4.82	Clay	CL/CH	stiff	125	12		100			0.83	4.00
9.30	30.5	16.39	4.01	Silty Clay to Clay	CL	stiff	125	9		100			0.90	5.76
9.45	31.0	20.15	4.12	Silty Clay to Clay	CL	very stiff	125	12		100			1.12	8.00
9.60	31.5	22.49	4.12	Silty Clay to Clay	CL	very stiff	125	13		100			1.25	9.59
9.75	32.0	22.11	4.28	Silty Clay to Clay	CL	very stiff	125	13		100			1.23	9.00
9.90	32.5	16.81	4.44	Clay	CL/CH	stiff	125	13		100			0.92	4.18
10.05	33.0	17.81	2.78	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.98	8.14
10.20	33.5	13.24	2.57	Clayey Silt to Silty Clay	ML/CL	stiff	120	5		100			0.71	4.78
10.38	34.0	19.85	3.18	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.10	9.59
10.53	34.5	22.94	5.10	Clay	CL/CH	very stiff	125	18		100			1.28	6.43
10.68	35.0	18.88	4.63	Clay	CL/CH	very stiff	125	15		100			1.04	4.57
10.83	35.5	21.27	4.94	Clay	CL/CH	very stiff	125	17		100			1.18	5.53
10.98	36.0	24.53	4.32	Silty Clay to Clay	CL	very stiff	125	14		100			1.37	9.00
11.13	36.5	27.91	5.77	Clay	CL/CH	very stiff	125	22		100			1.56	8.41
11.28	37.0	23.98	5.56	Clay	CL/CH	very stiff	125	19		100			1.33	6.32
11.43	37.5	29.00	4.75	Silty Clay to Clay	CL	very stiff	125	17		100			1.63	>10
11.58	38.0	30.91	5.70	Clay	CL/CH	very stiff	125	25		100			1.74	9.59
11.73	38.5	29.87	5.49	Clay	CL/CH	very stiff	125	24		100			1.68	8.70

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-1
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
11.88	39.0	32.81	5.23	Clay	CL/CH	very stiff	125	26		100			1.85	>10
12.05	39.5	28.17	5.18	Clay	CL/CH	very stiff	125	23		100			1.57	7.41
12.20	40.0	27.37	4.23	Silty Clay to Clay	CL	very stiff	125	16		100			1.53	9.39
12.35	40.5	27.48	4.16	Silty Clay to Clay	CL	very stiff	125	16		100			1.53	9.19
12.50	41.0	27.13	4.10	Silty Clay to Clay	CL	very stiff	125	16		100			1.51	8.85
12.65	41.5	26.30	4.10	Silty Clay to Clay	CL	very stiff	125	15		100			1.46	8.14
12.80	42.0	23.01	4.58	Clay	CL/CH	very stiff	125	18		100			1.27	4.89
12.95	42.5	23.08	5.38	Clay	CL/CH	very stiff	125	18		100			1.27	4.89
13.10	43.0	24.22	5.25	Clay	CL/CH	very stiff	125	19		100			1.34	5.10
13.25	43.5	22.87	5.50	Clay	CL/CH	very stiff	125	18		100			1.26	4.57
13.40	44.0	21.78	5.14	Clay	CL/CH	very stiff	125	17		100			1.19	4.18
13.58	44.5	21.65	4.61	Clay	CL/CH	very stiff	125	17		100			1.18	4.09
13.73	45.0	22.49	4.11	Silty Clay to Clay	CL	very stiff	125	13		100			1.23	5.53
13.88	45.5	23.49	4.28	Silty Clay to Clay	CL	very stiff	125	13		100			1.29	5.88
14.03	46.0	23.08	4.75	Clay	CL/CH	very stiff	125	18		100			1.26	4.28
14.18	46.5	23.74	4.71	Clay	CL/CH	very stiff	125	19		100			1.30	4.47
14.33	47.0	22.75	4.06	Silty Clay to Clay	CL	very stiff	125	13		100			1.24	5.31
14.48	47.5	20.17	3.79	Silty Clay to Clay	CL	very stiff	125	12		100			1.09	4.28
14.63	48.0	19.44	3.70	Silty Clay to Clay	CL	very stiff	125	11		100			1.05	4.00
14.78	48.5	22.03	4.34	Silty Clay to Clay	CL	very stiff	125	13		100			1.20	4.78
14.93	49.0	30.87	5.11	Clay	CL/CH	very stiff	125	25		100			1.72	6.32
15.10	49.5	33.47	4.95	Clay	CL/CH	very stiff	125	27		100			1.87	7.13
15.25	50.0	31.32	5.42	Clay	CL/CH	very stiff	125	25		100			1.74	6.32

CLIENT: Imperial Community College District
PROJECT: Sports Field Improvements - Imperial, CA

CONE PENETROMETER: Kehoe Testing & Engineering Truck Mounted Electric Cone with 30 ton reaction weight

LOCATION: See Site and Boring Location Plan

DATE: 5/26/2022

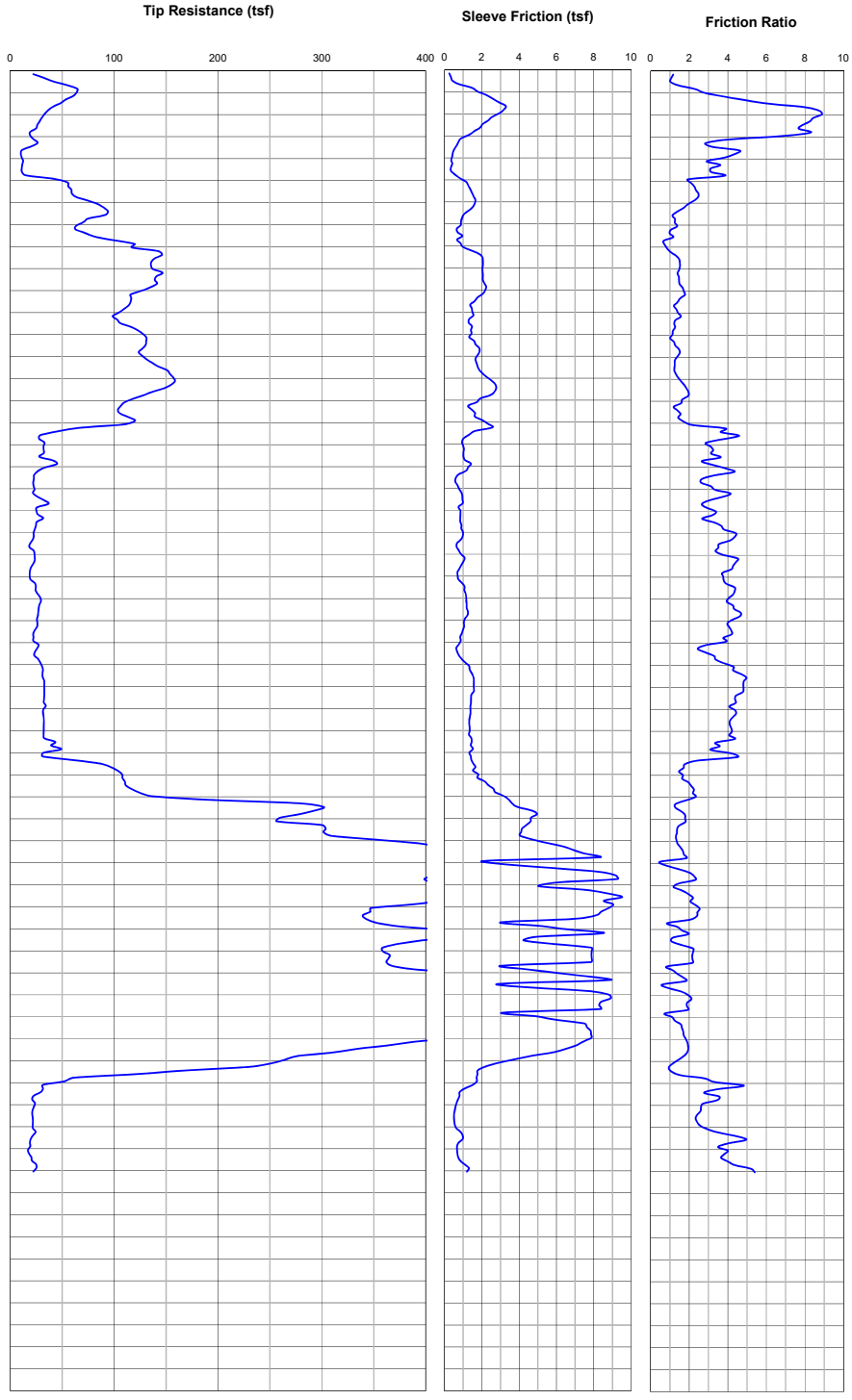
CONE SOUNDING DATA CPT-2

INTERPRETED SOIL PROFILE
From Robertson and Campanella (1989

GROUND ELEVATION +/-

DEPTH			
	Silty Sand to Sandy Silt	SM/ML	very dense
	Clay	CL/CH	hard
	Clay	" "	very stiff
	Silty Clay to Clay	CL	stiff
5	Clayey Silt to Silty Clay	ML/CL	stiff
	Silty Sand to Sandy Silt	SM/ML	dense
	Sand to Silty Sand	SP/SM	dense
	Sand to Silty Sand	" "	dense
	Sand to Silty Sand	" "	very dense
10	Sand to Silty Sand	" "	very dense
	Sand to Silty Sand	" "	dense
	Sand to Silty Sand	" "	dense
	Sand to Silty Sand	" "	dense
	Sand to Silty Sand	" "	very dense
15	Sand to Silty Sand	" "	dense
	Sand to Silty Sand	" "	dense
	Clayey Silt to Silty Clay	ML/CL	hard
	Clayey Silt to Silty Clay	" "	hard
	Clayey Silt to Silty Clay	" "	very stiff
20	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
25	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
30	Silty Clay to Clay	" "	very stiff
	Clayey Silt to Silty Clay	ML/CL	hard
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Silty Sand to Sandy Silt	" "	dense
	Sand to Silty Sand	SP/SM	very dense
	Sand	SP	very dense
35	Sand	" "	very dense
	Sand to Silty Sand	SP/SM	very dense
	Sand to Silty Sand	" "	very dense
	Sand to Silty Sand	" "	very dense
	Sand to Silty Sand	" "	very dense
40	Sand to Silty Sand	" "	very dense
	Sand	SP	very dense
	Sand	" "	very dense
	Sand	" "	very dense
	Sand to Silty Sand	SP/SM	very dense
45	Sand to Silty Sand	" "	dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
50			
55			

END OF SOUNDING AT 50 ft.



Project No.		PLATE
LE22111	LANDMARK Geo-Engineers and Geologists	B-2

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-2

Est. GWT (ft): 8

Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
0.15	0.5	31.87	1.09	Silty Sand to Sandy Silt	SM/ML	very dense	115	7	60.2	35	101	42		
0.30	1.0	60.86	2.18	Sandy Silt to Clayey Silt	ML	very dense	115	17	115.1	35	103	42		
0.45	1.5	54.28	4.85	Silty Clay to Clay	CL	hard	125	31		55			3.19	>10
0.60	2.0	36.92	8.54	Clay	CL/CH	hard	125	30		85			2.17	>10
0.75	2.5	28.30	8.18	Clay	CL/CH	very stiff	125	23		90			1.66	>10
0.93	3.0	21.06	7.62	Clay	CL/CH	very stiff	125	17		95			1.23	>10
1.08	3.5	22.96	3.32	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		70			1.34	>10
1.23	4.0	10.81	4.26	Clay	CL/CH	stiff	125	9		100			0.62	>10
1.38	4.5	11.68	3.21	Silty Clay to Clay	CL	stiff	125	7		90			0.67	>10
1.53	5.0	22.65	2.98	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		65			1.32	>10
1.68	5.5	57.26	2.30	Sandy Silt to Clayey Silt	ML	dense	115	16	98.5	40	72	38		
1.83	6.0	74.10	2.19	Silty Sand to Sandy Silt	SM/ML	dense	115	16	122.1	30	78	39		
1.98	6.5	91.83	1.40	Sand to Silty Sand	SP/SM	dense	115	17	145.4	20	84	40		
2.13	7.0	69.59	1.30	Silty Sand to Sandy Silt	SM/ML	dense	115	15	106.2	25	74	38		
2.28	7.5	72.12	1.07	Sand to Silty Sand	SP/SM	dense	115	13	106.4	20	74	38		
2.45	8.0	112.06	0.75	Sand	SP	dense	110	17	160.2	10	86	40		
2.60	8.5	142.54	1.25	Sand to Silty Sand	SP/SM	very dense	115	26	201.1	15	93	41		
2.75	9.0	136.24	1.51	Sand to Silty Sand	SP/SM	very dense	115	25	189.6	15	91	41		
2.90	9.5	142.16	1.44	Sand to Silty Sand	SP/SM	very dense	115	26	195.2	15	92	41		
3.05	10.0	134.33	1.63	Sand to Silty Sand	SP/SM	very dense	115	24	182.1	20	90	41		
3.20	10.5	116.11	1.57	Sand to Silty Sand	SP/SM	dense	115	21	155.4	20	86	40		
3.35	11.0	109.53	1.32	Sand to Silty Sand	SP/SM	dense	115	20	144.8	20	83	40		
3.50	11.5	102.57	1.36	Sand to Silty Sand	SP/SM	dense	115	19	134.0	20	81	39		
3.65	12.0	122.42	1.18	Sand to Silty Sand	SP/SM	dense	115	22	158.0	15	86	40		
3.80	12.5	130.73	1.16	Sand to Silty Sand	SP/SM	dense	115	24	166.8	15	88	40		
3.95	13.0	125.98	1.46	Sand to Silty Sand	SP/SM	dense	115	23	159.0	20	86	40		
4.13	13.5	136.93	1.25	Sand to Silty Sand	SP/SM	dense	115	25	170.9	15	88	40		
4.28	14.0	153.80	1.33	Sand to Silty Sand	SP/SM	very dense	115	28	189.9	15	91	41		
4.43	14.5	153.94	1.74	Sand to Silty Sand	SP/SM	very dense	115	28	188.1	20	91	41		
4.58	15.0	127.26	1.85	Silty Sand to Sandy Silt	SM/ML	dense	115	28	153.9	25	85	40		
4.73	15.5	106.38	1.39	Sand to Silty Sand	SP/SM	dense	115	19	127.4	25	80	39		
4.88	16.0	112.42	1.70	Silty Sand to Sandy Silt	SM/ML	dense	115	25	133.3	25	81	39		
5.03	16.5	46.45	4.04	Clayey Silt to Silty Clay	ML/CL	hard	120	19		65			2.69	>10
5.18	17.0	30.87	3.23	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		70			1.77	>10
5.33	17.5	30.79	3.34	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		70			1.77	>10
5.48	18.0	39.59	3.22	Clayey Silt to Silty Clay	ML/CL	hard	120	16		65			2.29	>10
5.65	18.5	24.08	3.43	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		80			1.37	>10
5.80	19.0	22.62	3.03	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		80			1.29	>10
5.95	19.5	26.67	3.60	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		80			1.52	>10
6.10	20.0	29.22	2.99	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		75			1.67	>10
6.25	20.5	27.99	3.06	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		75			1.60	>10
6.40	21.0	23.62	3.96	Silty Clay to Clay	CL	very stiff	125	13		90			1.34	>10
6.55	21.5	21.06	4.01	Silty Clay to Clay	CL	very stiff	125	12		95			1.19	>10
6.70	22.0	21.41	3.55	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		95			1.21	>10
6.85	22.5	22.72	4.41	Silty Clay to Clay	CL	very stiff	125	13		100			1.29	>10
7.00	23.0	18.97	3.89	Silty Clay to Clay	CL	very stiff	125	11		100			1.06	>10
7.18	23.5	22.62	4.02	Silty Clay to Clay	CL	very stiff	125	13		95			1.28	>10
7.33	24.0	26.59	4.22	Silty Clay to Clay	CL	very stiff	125	15		95			1.51	>10
7.48	24.5	28.30	4.18	Silty Clay to Clay	CL	very stiff	125	16		90			1.61	>10
7.63	25.0	26.39	4.51	Silty Clay to Clay	CL	very stiff	125	15		95			1.50	>10
7.78	25.5	25.22	4.08	Silty Clay to Clay	CL	very stiff	125	14		95			1.43	>10
7.93	26.0	22.24	3.96	Silty Clay to Clay	CL	very stiff	125	13		100			1.25	>10
8.08	26.5	24.99	2.85	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		85			1.41	>10
8.23	27.0	28.72	3.82	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		90			1.63	>10
8.38	27.5	31.21	4.64	Silty Clay to Clay	CL	very stiff	125	18		95			1.78	>10
8.53	28.0	32.65	4.82	Silty Clay to Clay	CL	very stiff	125	19		95			1.86	>10
8.68	28.5	32.70	4.52	Silty Clay to Clay	CL	very stiff	125	19		95			1.86	>10
8.85	29.0	32.73	4.29	Silty Clay to Clay	CL	very stiff	125	19		90			1.86	>10
9.00	29.5	32.01	4.26	Silty Clay to Clay	CL	very stiff	125	18		95			1.82	>10
9.15	30.0	32.20	4.17	Silty Clay to Clay	CL	very stiff	125	18		90			1.83	>10
9.30	30.5	36.13	3.93	Clayey Silt to Silty Clay	ML/CL	hard	120	14		85			2.06	>10
9.45	31.0	40.04	3.64	Clayey Silt to Silty Clay	ML/CL	hard	120	16		80			2.29	>10
9.60	31.5	59.44	2.89	Sandy Silt to Clayey Silt	ML	medium dense	115	17	54.2	60	54	36		
9.75	32.0	102.83	1.62	Silty Sand to Sandy Silt	SM/ML	dense	115	23	93.2	35	70	38		
9.90	32.5	109.88	1.90	Silty Sand to Sandy Silt	SM/ML	dense	115	24	99.0	40	72	38		
10.05	33.0	125.50	2.26	Silty Sand to Sandy Silt	SM/ML	dense	115	28	112.5	40	76	39		
10.20	33.5	256.99	1.46	Sand to Silty Sand	SP/SM	very dense	115	47	229.0	20	97	42		
10.38	34.0	277.01	1.72	Sand to Silty Sand	SP/SM	very dense	115	50	245.5	20	99	42		
10.53	34.5	286.82	1.55	Sand to Silty Sand	SP/SM	very dense	115	52	252.8	20	100	42		
10.68	35.0	320.07	1.34	Sand	SP	very dense	110	49	280.7	15	103	42		
10.83	35.5	405.56	1.54	Sand	SP	very dense	110	62	354.0	15	110	43		
10.98	36.0	441.48	1.35	Sand	SP	very dense	110	68	383.5	15	112	44		
11.13	36.5	414.45	1.62	Sand to Silty Sand	SP/SM	very dense	115	75	358.2	15	110	43		
11.28	37.0	410.20	1.66	Sand to Silty Sand	SP/SM	very dense	115	75	352.7	15	110	43		
11.43	37.5	444.32	1.94	Sand to Silty Sand	SP/SM	very dense	115	81	380.1	20	112	44		
11.58	38.0	382.97	2.31	Sand to Silty Sand	SP/SM	very dense	115	70	326.0	25	107	43		
11.73	38.5	342.90	2.30	Sand to Silty Sand	SP/SM	very dense	115	62	290.4	25	104	43		

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-2
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
11.88	39.0	378.40	1.28	Sand	SP	very dense	110	58	319.0	15	107	43		
12.05	39.5	417.37	1.40	Sand	SP	very dense	110	64	350.2	15	109	43		
12.20	40.0	363.14	1.99	Sand to Silty Sand	SP/SM	very dense	115	66	303.3	20	105	43		
12.35	40.5	363.82	2.16	Sand to Silty Sand	SP/SM	very dense	115	66	302.4	25	105	43		
12.50	41.0	397.04	1.12	Sand	SP	very dense	110	61	328.5	15	108	43		
12.65	41.5	476.57	1.37	Sand	SP	very dense	110	73	392.7	15	113	44		
12.80	42.0	468.02	1.51	Sand	SP	very dense	110	72	384.0	15	112	44		
12.95	42.5	434.86	1.97	Sand to Silty Sand	SP/SM	very dense	115	79	355.2	20	110	43		
13.10	43.0	433.10	1.26	Sand	SP	very dense	110	67	352.2	15	110	43		
13.25	43.5	475.77	1.48	Sand	SP	very dense	110	73	385.3	15	112	44		
13.40	44.0	451.91	1.74	Sand to Silty Sand	SP/SM	very dense	115	82	364.4	20	111	43		
13.58	44.5	363.47	1.93	Sand to Silty Sand	SP/SM	very dense	115	66	291.8	25	104	43		
13.73	45.0	284.15	1.65	Sand to Silty Sand	SP/SM	very dense	115	52	227.1	25	97	42		
13.88	45.5	216.84	1.04	Sand	SP	dense	110	33	172.6	20	89	40		
14.03	46.0	78.66	2.52	Sandy Silt to Clayey Silt	ML	medium dense	115	22	62.3	60	59	36		
14.18	46.5	30.69	3.69	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		100			1.72	>10
14.33	47.0	22.58	3.08	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.24	8.00
14.48	47.5	21.38	2.45	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.17	7.13
14.63	48.0	21.72	2.62	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.19	7.13
14.78	48.5	21.96	4.31	Silty Clay to Clay	CL	very stiff	125	13		100			1.20	5.31
14.93	49.0	18.39	3.83	Silty Clay to Clay	CL	stiff	125	11		100			0.99	3.91
15.10	49.5	19.71	3.82	Silty Clay to Clay	CL	very stiff	125	11		100			1.06	4.28
15.25	50.0	24.08	4.98	Clay	CL/CH	very stiff	125	19		100			1.32	4.47

CLIENT: Imperial Community College District
PROJECT: Sports Field Improvements - Imperial, CA

CONE PENETROMETER: Kehoe Testing & Engineering Truck Mounted Electric Cone with 30 ton reaction weight

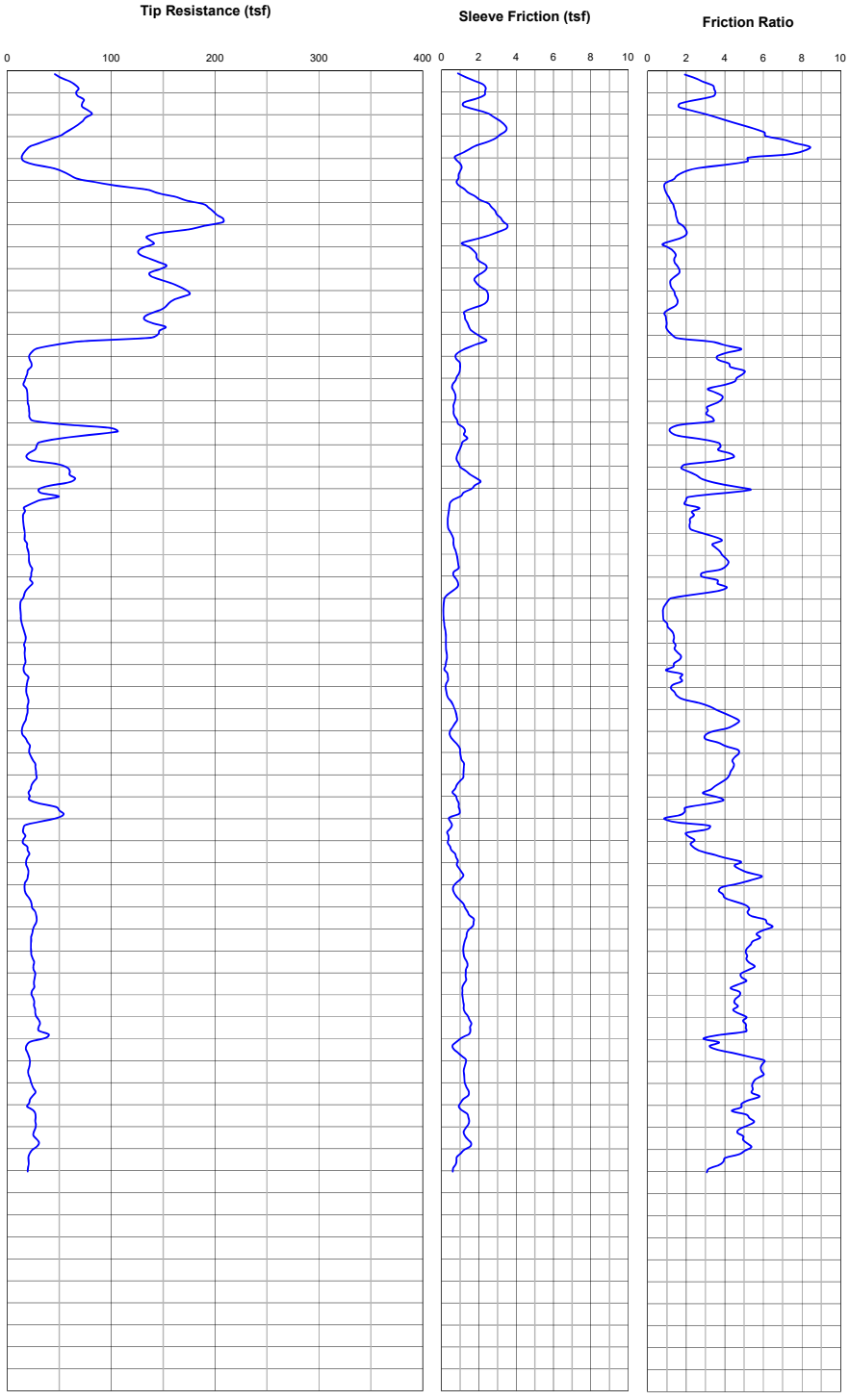
LOCATION: See Site and Boring Location Plan

DATE: 5/26/2022

CONE SOUNDING DATA CPT-3

DEPTH	INTERPRETED SOIL PROFILE From Robertson and Campanella (1989		
	GROUND ELEVATION +/-		
	Sandy Silt to Clayey Silt	ML	very dense
	Sandy Silt to Clayey Silt	" "	very dense
	Overconsolidated Soil	??	dense
	Clay	CL/CH	very stiff
5	Sandy Silt to Clayey Silt	ML	medium dense
	Sand	SP	very dense
	Sand to Silty Sand	SP/SM	very dense
	Sand to Silty Sand	" "	very dense
	Sand to Silty Sand	" "	very dense
10	Sand to Silty Sand	" "	very dense
	Sand to Silty Sand	" "	very dense
	Sand	SP	very dense
	Clayey Silt to Silty Clay	ML/CL	hard
	Clay	CL/CH	very stiff
	Silty Clay to Clay	CL	very stiff
15	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	hard
	Sandy Silt to Clayey Silt	ML	loose
20	Clayey Silt to Silty Clay	ML/CL	stiff
	Silty Clay to Clay	CL	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Sandy Silt to Clayey Silt	ML	very loose
25	Sandy Silt to Clayey Silt	" "	very loose
	Sandy Silt to Clayey Silt	" "	very loose
	Sandy Silt to Clayey Silt	" "	loose
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clay	CL/CH	stiff
30	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
35	Clayey Silt to Silty Clay	" "	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
40	Clay	" "	very stiff
	Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
45	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
50	Silty Clay to Clay	CL	very stiff
55			

END OF SOUNDING AT 50 ft.



Project No.		PLATE
LE22111	LANDMARK Geo-Engineers and Geologists	B-3

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-3

Est. GWT (ft): 8

Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
0.15	0.5	52.53	2.43	Sandy Silt to Clayey Silt	ML	very dense	115	15	99.3	40	115	44		
0.30	1.0	66.76	3.45	Sandy Silt to Clayey Silt	ML	very dense	115	19	126.2	45	106	43		
0.45	1.5	71.13	2.53	Sandy Silt to Clayey Silt	ML	very dense	115	20	134.5	35	100	42		
0.60	2.0	77.02	2.33	Silty Sand to Sandy Silt	SM/ML	very dense	115	17	145.6	35	98	42		
0.75	2.5	71.86	4.29	Clayey Silt to Silty Clay	ML/CL	hard	120	29		50			4.22	>10
0.93	3.0	56.86	5.90	Clay	CL/CH	hard	125	45		60			3.34	>10
1.08	3.5	31.53	7.71	Clay	CL/CH	very stiff	125	25		85			1.84	>10
1.23	4.0	15.70	6.93	Clay	CL/CH	stiff	125	13		100			0.91	>10
1.38	4.5	28.10	3.88	Silty Clay to Clay	CL	very stiff	125	16		65			1.64	>10
1.53	5.0	60.60	1.57	Silty Sand to Sandy Silt	SM/ML	dense	115	13	110.5	30	75	39		
1.68	5.5	118.71	0.92	Sand to Silty Sand	SP/SM	very dense	115	22	206.2	10	94	41		
1.83	6.0	174.62	1.21	Sand to Silty Sand	SP/SM	very dense	115	32	290.4	10	104	43		
1.98	6.5	198.01	1.43	Sand to Silty Sand	SP/SM	very dense	115	36	316.2	15	106	43		
2.13	7.0	201.65	1.66	Sand to Silty Sand	SP/SM	very dense	115	37	310.2	15	106	43		
2.28	7.5	151.76	1.94	Silty Sand to Sandy Silt	SM/ML	very dense	115	34	225.5	20	96	42		
2.45	8.0	136.41	1.05	Sand to Silty Sand	SP/SM	very dense	115	25	196.2	10	92	41		
2.60	8.5	129.93	1.40	Sand to Silty Sand	SP/SM	very dense	115	24	184.2	15	91	41		
2.75	9.0	148.47	1.53	Sand to Silty Sand	SP/SM	very dense	115	27	207.7	15	94	41		
2.90	9.5	141.22	1.40	Sand to Silty Sand	SP/SM	very dense	115	26	194.9	15	92	41		
3.05	10.0	166.24	1.26	Sand to Silty Sand	SP/SM	very dense	115	30	226.4	15	97	42		
3.20	10.5	165.62	1.50	Sand to Silty Sand	SP/SM	very dense	115	30	222.7	15	96	41		
3.35	11.0	147.95	1.14	Sand to Silty Sand	SP/SM	very dense	115	27	196.5	15	92	41		
3.50	11.5	134.95	0.96	Sand to Silty Sand	SP/SM	dense	115	25	177.1	10	89	41		
3.65	12.0	148.05	1.09	Sand to Silty Sand	SP/SM	very dense	115	27	192.0	15	92	41		
3.80	12.5	85.23	2.98	Sandy Silt to Clayey Silt	ML	dense	115	24	109.3	40	75	39		
3.95	13.0	24.25	4.20	Silty Clay to Clay	CL	very stiff	125	14		80			1.39	>10
4.13	13.5	22.52	4.06	Silty Clay to Clay	CL	very stiff	125	13		80			1.29	>10
4.28	14.0	18.85	4.85	Clay	CL/CH	very stiff	125	15		95			1.07	>10
4.43	14.5	16.70	3.85	Silty Clay to Clay	CL	stiff	125	10		95			0.94	>10
4.58	15.0	19.30	3.73	Silty Clay to Clay	CL	very stiff	125	11		90			1.10	>10
4.73	15.5	20.34	3.26	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		85			1.16	>10
4.88	16.0	30.16	2.86	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		65			1.73	>10
5.03	16.5	93.90	1.31	Sand to Silty Sand	SP/SM	dense	115	17	109.5	25	75	39		
5.18	17.0	35.83	3.43	Clayey Silt to Silty Clay	ML/CL	hard	120	14		70			2.07	>10
5.33	17.5	21.83	4.15	Silty Clay to Clay	CL	very stiff	125	12		90			1.24	>10
5.48	18.0	42.89	2.41	Sandy Silt to Clayey Silt	ML	medium dense	115	12	48.5	55	51	35		
5.65	18.5	61.81	2.50	Sandy Silt to Clayey Silt	ML	medium dense	115	18	69.3	45	62	37		
5.80	19.0	43.73	4.40	Silty Clay to Clay	CL	hard	125	25		70			2.53	>10
5.95	19.5	37.73	2.59	Sandy Silt to Clayey Silt	ML	medium dense	115	11	41.5	60	47	35		
6.10	20.0	18.78	2.30	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		85			1.06	>10
6.25	20.5	15.18	2.27	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		90			0.85	>10
6.40	21.0	16.15	2.42	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		90			0.90	>10
6.55	21.5	17.39	3.56	Silty Clay to Clay	CL	stiff	125	10		100			0.97	>10
6.70	22.0	19.78	3.71	Silty Clay to Clay	CL	very stiff	125	11		100			1.11	>10
6.85	22.5	21.17	4.11	Silty Clay to Clay	CL	very stiff	125	12		100			1.19	>10
7.00	23.0	23.29	3.15	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		90			1.32	>10
7.18	23.5	22.42	3.78	Silty Clay to Clay	CL	very stiff	125	13		95			1.27	>10
7.33	24.0	16.56	2.42	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		95			0.92	>10
7.48	24.5	12.54	0.91	Sandy Silt to Clayey Silt	ML	very loose	115	4	12.7	85	11	30		
7.63	25.0	12.92	0.81	Sandy Silt to Clayey Silt	ML	very loose	115	4	12.9	80	12	30		
7.78	25.5	14.76	1.10	Sandy Silt to Clayey Silt	ML	very loose	115	4	14.7	85	16	30		
7.93	26.0	17.22	1.35	Sandy Silt to Clayey Silt	ML	loose	115	5	17.0	80	20	31		
8.08	26.5	16.57	1.53	Sandy Silt to Clayey Silt	ML	very loose	115	5	16.3	85	19	31		
8.23	27.0	16.80	1.45	Sandy Silt to Clayey Silt	ML	very loose	115	5	16.4	85	19	31		
8.38	27.5	17.60	1.47	Sandy Silt to Clayey Silt	ML	loose	115	5	17.0	85	20	31		
8.53	28.0	18.81	1.43	Sandy Silt to Clayey Silt	ML	loose	115	5	18.1	80	22	31		
8.68	28.5	18.99	1.58	Sandy Silt to Clayey Silt	ML	loose	115	5	18.2	85	22	31		
8.85	29.0	19.68	3.16	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.10	>10
9.00	29.5	18.36	4.41	Clay	CL/CH	very stiff	125	15		100			1.02	5.76
9.15	30.0	14.60	3.99	Clay	CL/CH	stiff	125	12		100			0.80	3.91
9.30	30.5	17.22	3.21	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.95	9.00
9.45	31.0	21.31	4.49	Clay	CL/CH	very stiff	125	17		100			1.19	6.88
9.60	31.5	24.67	4.46	Silty Clay to Clay	CL	very stiff	125	14		100			1.39	>10
9.75	32.0	27.37	4.32	Silty Clay to Clay	CL	very stiff	125	16		100			1.54	>10
9.90	32.5	25.54	3.80	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		100			1.43	>10
10.05	33.0	21.45	3.23	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.19	>10
10.20	33.5	32.78	2.97	Clayey Silt to Silty Clay	ML/CL	very stiff	120	13		85			1.86	>10
10.38	34.0	50.93	1.50	Silty Sand to Sandy Silt	SM/ML	medium dense	115	11	45.3	55	49	35		
10.53	34.5	21.79	2.57	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.21	>10
10.68	35.0	15.97	2.19	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		100			0.87	6.43
10.83	35.5	17.85	2.44	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.98	7.70
10.98	36.0	19.47	4.11	Silty Clay to Clay	CL	very stiff	125	11		100			1.07	6.32
11.13	36.5	19.44	5.10	Clay	CL/CH	very stiff	125	16		100			1.07	4.78
11.28	37.0	17.57	4.67	Clay	CL/CH	stiff	125	14		100			0.96	4.00
11.43	37.5	18.22	3.87	Silty Clay to Clay	CL	stiff	125	10		100			1.00	5.31
11.58	38.0	23.25	4.96	Clay	CL/CH	very stiff	125	19		100			1.29	6.00
11.73	38.5	27.58	5.54	Clay	CL/CH	very stiff	125	22		100			1.54	7.85

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-3
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
11.88	39.0	26.05	6.21	Clay	CL/CH	very stiff	125	21		100			1.45	6.88
12.05	39.5	23.28	5.65	Clay	CL/CH	very stiff	125	19		100			1.29	5.65
12.20	40.0	22.73	5.19	Clay	CL/CH	very stiff	125	18		100			1.26	5.42
12.35	40.5	24.43	5.19	Clay	CL/CH	very stiff	125	20		100			1.35	6.00
12.50	41.0	25.67	5.20	Clay	CL/CH	very stiff	125	21		100			1.43	6.32
12.65	41.5	25.95	4.89	Clay	CL/CH	very stiff	125	21		100			1.44	6.32
12.80	42.0	24.25	4.61	Clay	CL/CH	very stiff	125	19		100			1.34	5.53
12.95	42.5	25.50	4.58	Silty Clay to Clay	CL	very stiff	125	15		100			1.41	7.70
13.10	43.0	27.06	4.76	Clay	CL/CH	very stiff	125	22		100			1.51	6.43
13.25	43.5	30.56	5.04	Clay	CL/CH	very stiff	125	24		100			1.71	7.70
13.40	44.0	35.62	3.88	Clayey Silt to Silty Clay	ML/CL	hard	120	14		100			2.01	>10
13.58	44.5	19.58	3.50	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.06	6.32
13.73	45.0	20.48	5.26	Clay	CL/CH	very stiff	125	16		100			1.11	3.83
13.88	45.5	20.93	5.91	Clay	CL/CH	very stiff	125	17		100			1.14	3.91
14.03	46.0	21.38	5.72	Clay	CL/CH	very stiff	125	17		100			1.17	4.00
14.18	46.5	25.33	5.42	Clay	CL/CH	very stiff	125	20		100			1.40	5.10
14.33	47.0	21.57	5.19	Clay	CL/CH	very stiff	125	17		100			1.17	3.91
14.48	47.5	26.26	4.92	Clay	CL/CH	very stiff	125	21		100			1.45	5.31
14.63	48.0	27.06	5.17	Clay	CL/CH	very stiff	125	22		100			1.50	5.42
14.78	48.5	26.19	4.85	Clay	CL/CH	very stiff	125	21		100			1.44	5.10
14.93	49.0	27.69	5.20	Clay	CL/CH	very stiff	125	22		100			1.53	5.53
15.10	49.5	20.72	4.23	Silty Clay to Clay	CL	very stiff	125	12		100			1.12	4.37
15.25	50.0	19.96	3.31	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.07	5.42

CLIENT: Imperial Community College District
PROJECT: Sports Field Improvements - Imperial, CA

CONE PENETROMETER: Kehoe Testing & Engineering Truck Mounted Electric Cone with 30 ton reaction weight

LOCATION: See Site and Boring Location Plan

DATE: 5/26/2022

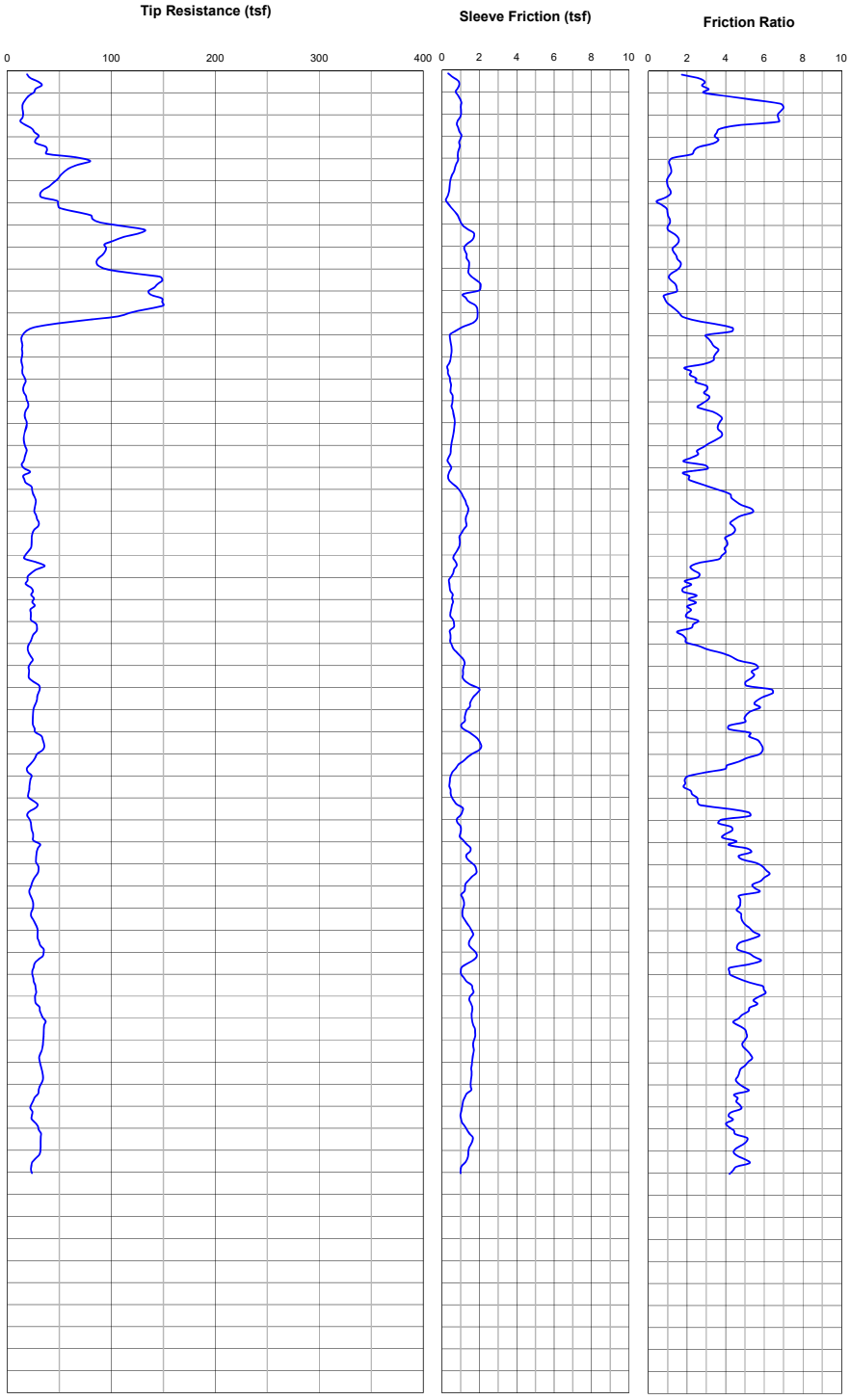
CONE SOUNDING DATA CPT-4

INTERPRETED SOIL PROFILE
From Robertson and Campanella (1989

GROUND ELEVATION +/-

DEPTH			
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clay	CL/CH	stiff
	Clay	" "	very stiff
	Sandy Silt to Clayey Silt	ML	medium dense
5	Silty Sand to Sandy Silt	SM/ML	dense
	Silty Sand to Sandy Silt	" "	medium dense
	Sand to Silty Sand	SP/SM	dense
	Sand to Silty Sand	" "	dense
	Silty Sand to Sandy Silt	SM/ML	dense
10	Sand to Silty Sand	SP/SM	very dense
	Sand to Silty Sand	" "	very dense
	Sandy Silt to Clayey Silt	ML	medium dense
	Silty Clay to Clay	CL	stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
15	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clay	CL/CH	very stiff
20	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sandy Silt to Clayey Silt	ML	loose
	Sandy Silt to Clayey Silt	" "	loose
25	Sandy Silt to Clayey Silt	" "	loose
	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
30	Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Sandy Silt to Clayey Silt	ML	loose
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
35	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
40	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	very stiff
45	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
50			
55			

END OF SOUNDING AT 50 ft.



Project No.		PLATE
LE22111	LANDMARK Geo-Engineers and Geologists	B-4

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-4
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
0.15	0.5	23.41	2.43	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		60			1.38	>10
0.30	1.0	28.60	2.92	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		60			1.68	>10
0.45	1.5	17.63	5.51	Clay	CL/CH	very stiff	125	14		90			1.03	>10
0.60	2.0	14.75	6.86	Clay	CL/CH	stiff	125	12		100			0.86	>10
0.75	2.5	14.72	6.02	Clay	CL/CH	stiff	125	12		100			0.86	>10
0.93	3.0	26.56	3.55	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		65			1.55	>10
1.08	3.5	30.40	3.19	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		60			1.78	>10
1.23	4.0	47.55	1.95	Sandy Silt to Clayey Silt	ML	dense	115	14	89.9	40	72	38		
1.38	4.5	68.95	1.12	Sand to Silty Sand	SP/SM	dense	115	13	130.3	20	81	39		
1.53	5.0	51.25	1.07	Silty Sand to Sandy Silt	SM/ML	dense	115	11	93.2	25	70	38		
1.68	5.5	37.53	1.07	Silty Sand to Sandy Silt	SM/ML	medium dense	115	8	65.1	30	60	36		
1.83	6.0	43.05	0.66	Silty Sand to Sandy Silt	SM/ML	medium dense	115	10	71.4	25	63	37		
1.98	6.5	65.28	0.98	Sand to Silty Sand	SP/SM	dense	115	12	104.1	20	74	38		
2.13	7.0	94.06	1.07	Sand to Silty Sand	SP/SM	dense	115	17	144.5	15	83	40		
2.28	7.5	123.43	1.30	Sand to Silty Sand	SP/SM	very dense	115	22	183.1	15	90	41		
2.45	8.0	97.04	1.43	Sand to Silty Sand	SP/SM	dense	115	18	139.4	20	82	40		
2.60	8.5	90.80	1.42	Sand to Silty Sand	SP/SM	dense	115	17	128.6	20	80	39		
2.75	9.0	89.94	1.60	Silty Sand to Sandy Silt	SM/ML	dense	115	20	125.6	25	79	39		
2.90	9.5	138.35	1.15	Sand to Silty Sand	SP/SM	very dense	115	25	190.7	15	92	41		
3.05	10.0	140.46	1.44	Sand to Silty Sand	SP/SM	very dense	115	26	191.1	15	92	41		
3.20	10.5	145.24	0.87	Sand	SP	very dense	110	22	195.2	10	92	41		
3.35	11.0	133.57	1.40	Sand to Silty Sand	SP/SM	dense	115	24	177.4	15	89	41		
3.50	11.5	75.74	2.59	Sandy Silt to Clayey Silt	ML	dense	115	22	99.4	35	72	38		
3.65	12.0	19.67	3.88	Silty Clay to Clay	CL	very stiff	125	11		85			1.12	>10
3.80	12.5	13.89	3.25	Silty Clay to Clay	CL	stiff	125	8		90			0.78	>10
3.95	13.0	14.16	3.51	Silty Clay to Clay	CL	stiff	125	8		95			0.80	>10
4.13	13.5	13.96	2.70	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		90			0.79	>10
4.28	14.0	15.24	2.28	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		80			0.86	>10
4.43	14.5	16.24	2.83	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		85			0.92	>10
4.58	15.0	17.38	3.03	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		85			0.98	>10
4.73	15.5	19.15	2.85	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		80			1.09	>10
4.88	16.0	17.66	3.68	Silty Clay to Clay	CL	stiff	125	10		95			1.00	>10
5.03	16.5	16.76	3.73	Silty Clay to Clay	CL	stiff	125	10		95			0.94	>10
5.18	17.0	16.45	3.15	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		95			0.93	>10
5.33	17.5	17.59	2.42	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		85			0.99	>10
5.48	18.0	15.20	2.60	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		90			0.85	>10
5.65	18.5	17.80	2.01	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		80			1.00	>10
5.80	19.0	21.47	3.18	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		85			1.22	>10
5.95	19.5	26.08	4.35	Silty Clay to Clay	CL	very stiff	125	15		90			1.49	>10
6.10	20.0	26.32	5.18	Clay	CL/CH	very stiff	125	21		95			1.50	>10
6.25	20.5	28.78	4.49	Silty Clay to Clay	CL	very stiff	125	16		90			1.64	>10
6.40	21.0	26.49	4.42	Silty Clay to Clay	CL	very stiff	125	15		90			1.51	>10
6.55	21.5	23.32	4.04	Silty Clay to Clay	CL	very stiff	125	13		95			1.32	>10
6.70	22.0	20.02	3.91	Silty Clay to Clay	CL	very stiff	125	11		100			1.13	>10
6.85	22.5	26.77	2.81	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		80			1.52	>10
7.00	23.0	23.38	2.51	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		80			1.32	>10
7.18	23.5	19.88	1.97	Sandy Silt to Clayey Silt	ML	loose	115	6	20.3	80	25	32		
7.33	24.0	24.35	2.13	Sandy Silt to Clayey Silt	ML	loose	115	7	24.7	75	31	32		
7.48	24.5	24.14	2.23	Sandy Silt to Clayey Silt	ML	loose	115	7	24.3	80	31	32		
7.63	25.0	22.62	2.18	Sandy Silt to Clayey Silt	ML	loose	115	6	22.6	80	29	32		
7.78	25.5	28.02	2.01	Sandy Silt to Clayey Silt	ML	loose	115	8	27.8	70	35	33		
7.93	26.0	23.55	1.89	Sandy Silt to Clayey Silt	ML	loose	115	7	23.2	75	29	32		
8.08	26.5	20.62	3.47	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.16	>10
8.23	27.0	22.27	5.29	Clay	CL/CH	very stiff	125	18		100			1.25	9.00
8.38	27.5	20.74	5.38	Clay	CL/CH	very stiff	125	17		100			1.16	7.70
8.53	28.0	28.74	5.49	Clay	CL/CH	very stiff	125	23		100			1.63	>10
8.68	28.5	29.09	6.02	Clay	CL/CH	very stiff	125	23		100			1.65	>10
8.85	29.0	25.97	5.53	Clay	CL/CH	very stiff	125	21		100			1.47	>10
9.00	29.5	24.50	5.02	Clay	CL/CH	very stiff	125	20		100			1.38	9.39
9.15	30.0	25.87	4.54	Silty Clay to Clay	CL	very stiff	125	15		100			1.46	>10
9.30	30.5	33.83	5.56	Clay	CL/CH	very stiff	125	27		100			1.92	>10
9.45	31.0	32.62	5.85	Clay	CL/CH	very stiff	125	26		100			1.85	>10
9.60	31.5	24.38	4.61	Clay	CL/CH	very stiff	125	20		100			1.37	8.27
9.75	32.0	20.53	2.98	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.14	>10
9.90	32.5	21.68	1.87	Sandy Silt to Clayey Silt	ML	loose	115	6	19.5	90	24	31		
10.05	33.0	20.44	2.33	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		95			1.13	>10
10.20	33.5	26.98	3.11	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		95			1.52	>10
10.38	34.0	20.33	4.74	Clay	CL/CH	very stiff	125	16		100			1.12	5.53
10.53	34.5	22.93	4.08	Silty Clay to Clay	CL	very stiff	125	13		100			1.28	8.70
10.68	35.0	24.80	4.13	Silty Clay to Clay	CL	very stiff	125	14		100			1.39	>10
10.83	35.5	29.75	4.87	Clay	CL/CH	very stiff	125	24		100			1.68	>10
10.98	36.0	27.63	5.04	Clay	CL/CH	very stiff	125	22		100			1.55	8.56
11.13	36.5	28.88	6.07	Clay	CL/CH	very stiff	125	23		100			1.62	9.00
11.28	37.0	23.41	5.57	Clay	CL/CH	very stiff	125	19		100			1.30	6.10
11.43	37.5	22.10	5.06	Clay	CL/CH	very stiff	125	18		100			1.22	5.53
11.58	38.0	24.52	4.68	Clay	CL/CH	very stiff	125	20		100			1.36	6.32
11.73	38.5	23.62	4.82	Clay	CL/CH	very stiff	125	19		100			1.31	5.88

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-4
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
11.88	39.0	28.15	5.22	Clay	CL/CH	very stiff	125	23		100			1.58	7.70
12.05	39.5	29.54	5.28	Clay	CL/CH	very stiff	125	24		100			1.66	8.27
12.20	40.0	33.73	4.81	Silty Clay to Clay	CL	very stiff	125	19		100			1.90	>10
12.35	40.5	29.75	5.52	Clay	CL/CH	very stiff	125	24		100			1.67	8.14
12.50	41.0	24.43	4.22	Silty Clay to Clay	CL	very stiff	125	14		100			1.35	7.41
12.65	41.5	25.69	5.26	Clay	CL/CH	very stiff	125	21		100			1.43	6.10
12.80	42.0	27.19	5.92	Clay	CL/CH	very stiff	125	22		100			1.51	6.54
12.95	42.5	28.26	5.44	Clay	CL/CH	very stiff	125	23		100			1.58	6.76
13.10	43.0	32.59	4.90	Clay	CL/CH	very stiff	125	26		100			1.83	8.70
13.25	43.5	35.78	4.69	Silty Clay to Clay	CL	hard	125	20		100			2.02	>10
13.40	44.0	34.73	5.06	Clay	CL/CH	very stiff	125	28		100			1.95	9.39
13.58	44.5	33.76	4.98	Clay	CL/CH	very stiff	125	27		100			1.90	8.70
13.73	45.0	31.06	5.27	Clay	CL/CH	very stiff	125	25		100			1.74	7.27
13.88	45.5	32.73	4.83	Silty Clay to Clay	CL	very stiff	125	19		100			1.83	>10
14.03	46.0	33.80	4.61	Silty Clay to Clay	CL	very stiff	125	19		100			1.89	>10
14.18	46.5	30.27	4.86	Clay	CL/CH	very stiff	125	24		100			1.69	6.65
14.33	47.0	24.08	4.68	Clay	CL/CH	very stiff	125	19		100			1.32	4.57
14.48	47.5	23.65	4.27	Silty Clay to Clay	CL	very stiff	125	14		100			1.29	5.65
14.63	48.0	28.68	4.20	Silty Clay to Clay	CL	very stiff	125	16		100			1.59	7.70
14.78	48.5	32.17	4.90	Clay	CL/CH	very stiff	125	26		100			1.79	6.88
14.93	49.0	31.84	4.60	Silty Clay to Clay	CL	very stiff	125	18		100			1.77	9.00
15.10	49.5	27.05	4.95	Clay	CL/CH	very stiff	125	22		100			1.49	5.10
15.25	50.0	23.10	4.38	Silty Clay to Clay	CL	very stiff	125	13		100			1.26	5.00

CLIENT: Imperial Community College District
PROJECT: Sports Field Improvements - Imperial, CA

CONE PENETROMETER: Kehoe Testing & Engineering Truck Mounted Electric Cone with 30 ton reaction weight

LOCATION: See Site and Boring Location Plan

DATE: 5/26/2022

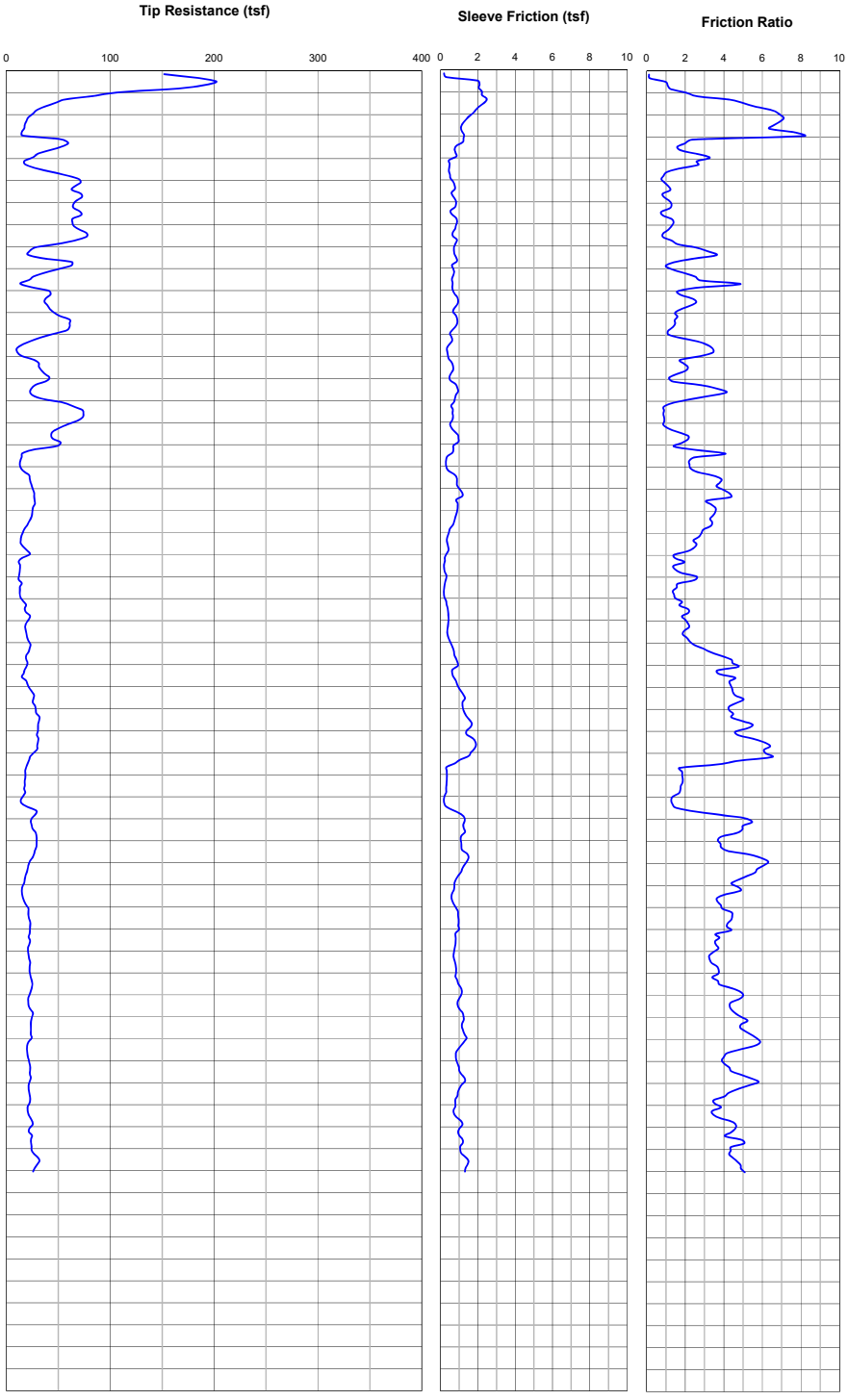
CONE SOUNDING DATA CPT-5

INTERPRETED SOIL PROFILE
From Robertson and Campanella (1989

GROUND ELEVATION +/-

DEPTH			
	Sand	SP	very dense
	Clay	CL/CH	hard
	Clay	" "	very stiff
	Sandy Silt to Clayey Silt	ML	dense
5	Silty Sand to Sandy Silt	SM/ML	medium dense
	Sand to Silty Sand	SP/SM	dense
	Silty Sand to Sandy Silt	SM/ML	dense
	Silty Sand to Sandy Silt	" "	medium dense
	Sandy Silt to Clayey Silt	ML	medium dense
10	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	stiff
	Sandy Silt to Clayey Silt	ML	medium dense
15	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sand to Silty Sand	SP/SM	medium dense
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clayey Silt to Silty Clay	" "	very stiff
20	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	stiff
25	Sandy Silt to Clayey Silt	ML	loose
	Sandy Silt to Clayey Silt	" "	loose
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
30	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sandy Silt to Clayey Silt	ML	very loose
	Clayey Silt to Silty Clay	ML/CL	very stiff
35	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Silty Clay to Clay	CL	stiff
	Silty Clay to Clay	" "	very stiff
40	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
45	Clay	" "	very stiff
	Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
50	Silty Clay to Clay	" "	very stiff
55			

END OF SOUNDING AT 50 ft.



Project No.
LE22111

LANDMARK
Geo-Engineers and Geologists

PLATE
B-5

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-5

Est. GWT (ft): 8

Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
0.15	0.5	179.06	0.42	Sand	SP	very dense	110	28	338.5	0	152	49		
0.30	1.0	154.57	1.46	Sand to Silty Sand	SP/SM	very dense	115	28	292.2	15	131	46		
0.45	1.5	62.64	4.03	Clayey Silt to Silty Clay	ML/CL	hard	120	25		50			3.68	>10
0.60	2.0	30.25	6.41	Clay	CL/CH	very stiff	125	24		80			1.77	>10
0.75	2.5	19.30	6.87	Clay	CL/CH	very stiff	125	15		95			1.13	>10
0.93	3.0	15.80	7.41	Clay	CL/CH	stiff	125	13		100			0.92	>10
1.08	3.5	55.20	1.98	Silty Sand to Sandy Silt	SM/ML	dense	115	12	104.3	35	78	39		
1.23	4.0	32.88	2.57	Sandy Silt to Clayey Silt	ML	medium dense	115	9	62.2	50	61	37		
1.38	4.5	21.03	2.32	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		60			1.22	>10
1.53	5.0	56.51	0.89	Sand to Silty Sand	SP/SM	dense	115	10	103.5	20	73	38		
1.68	5.5	67.90	1.03	Sand to Silty Sand	SP/SM	dense	115	12	118.4	20	77	39		
1.83	6.0	68.24	1.13	Sand to Silty Sand	SP/SM	dense	115	12	113.9	20	76	39		
1.98	6.5	69.05	0.93	Sand to Silty Sand	SP/SM	dense	115	13	110.6	20	75	39		
2.13	7.0	64.05	1.32	Silty Sand to Sandy Silt	SM/ML	dense	115	14	98.8	25	72	38		
2.28	7.5	74.74	0.94	Sand to Silty Sand	SP/SM	dense	115	14	111.4	20	76	39		
2.45	8.0	47.99	1.86	Silty Sand to Sandy Silt	SM/ML	medium dense	115	11	69.2	35	62	37		
2.60	8.5	26.05	3.07	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		65			1.51	>10
2.75	9.0	58.35	1.25	Silty Sand to Sandy Silt	SM/ML	medium dense	115	13	81.7	25	67	37		
2.90	9.5	28.41	2.43	Sandy Silt to Clayey Silt	ML	medium dense	115	8	39.3	55	45	34		
3.05	10.0	26.05	3.03	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		65			1.50	>10
3.20	10.5	39.12	2.23	Sandy Silt to Clayey Silt	ML	medium dense	115	11	52.6	45	54	35		
3.35	11.0	42.31	1.83	Silty Sand to Sandy Silt	SM/ML	medium dense	115	9	56.2	40	55	36		
3.50	11.5	57.81	1.51	Silty Sand to Sandy Silt	SM/ML	medium dense	115	13	75.9	30	64	37		
3.65	12.0	54.26	1.19	Silty Sand to Sandy Silt	SM/ML	medium dense	115	12	70.4	30	62	37		
3.80	12.5	23.32	2.58	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		65			1.34	>10
3.95	13.0	11.57	3.20	Silty Clay to Clay	CL	stiff	125	7		100			0.65	9.59
4.13	13.5	29.21	1.93	Sandy Silt to Clayey Silt	ML	medium dense	115	8	36.5	55	43	34		
4.28	14.0	37.28	1.57	Silty Sand to Sandy Silt	SM/ML	medium dense	115	8	46.1	45	50	35		
4.43	14.5	30.42	2.63	Sandy Silt to Clayey Silt	ML	medium dense	115	9	37.2	60	43	34		
4.58	15.0	27.93	3.18	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		70			1.60	>10
4.73	15.5	64.06	1.03	Sand to Silty Sand	SP/SM	medium dense	115	12	76.7	25	65	37		
4.88	16.0	68.73	0.89	Sand to Silty Sand	SP/SM	medium dense	115	12	81.5	25	66	37		
5.03	16.5	46.24	1.63	Silty Sand to Sandy Silt	SM/ML	medium dense	115	10	54.3	40	54	36		
5.18	17.0	48.65	1.79	Silty Sand to Sandy Silt	SM/ML	medium dense	115	11	56.6	45	56	36		
5.33	17.5	18.78	3.07	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		85			1.06	>10
5.48	18.0	13.37	2.23	Clayey Silt to Silty Clay	ML/CL	stiff	120	5		90			0.74	>10
5.65	18.5	20.20	3.29	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		85			1.14	>10
5.80	19.0	24.34	3.80	Silty Clay to Clay	CL	very stiff	125	14		85			1.39	>10
5.95	19.5	26.85	3.93	Silty Clay to Clay	CL	very stiff	125	15		85			1.53	>10
6.10	20.0	26.04	3.49	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		80			1.49	>10
6.25	20.5	23.32	3.38	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		85			1.32	>10
6.40	21.0	17.63	3.03	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		95			0.99	>10
6.55	21.5	13.99	2.57	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		100			0.77	>10
6.70	22.0	19.72	2.00	Sandy Silt to Clayey Silt	ML	loose	115	6	20.9	80	26	32		
6.85	22.5	13.38	1.62	Clayey Silt to Silty Clay	ML/CL	stiff	120	5		90			0.74	8.85
7.00	23.0	12.61	1.96	Clayey Silt to Silty Clay	ML/CL	stiff	120	5		100			0.69	7.70
7.18	23.5	13.17	1.88	Clayey Silt to Silty Clay	ML/CL	stiff	120	5		100			0.72	8.14
7.33	24.0	13.17	1.42	Sandy Silt to Clayey Silt	ML	very loose	115	4	13.5	90	13	30		
7.48	24.5	17.60	1.89	Sandy Silt to Clayey Silt	ML	loose	115	5	17.9	85	22	31		
7.63	25.0	21.00	2.00	Sandy Silt to Clayey Silt	ML	loose	115	6	21.2	80	27	32		
7.78	25.5	18.57	2.10	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		90			1.04	>10
7.93	26.0	20.16	2.07	Sandy Silt to Clayey Silt	ML	loose	115	6	20.1	85	25	32		
8.08	26.5	21.52	3.17	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		95			1.21	>10
8.23	27.0	19.54	4.53	Clay	CL/CH	very stiff	125	16		100			1.09	7.27
8.38	27.5	16.35	4.00	Silty Clay to Clay	CL	stiff	125	9		100			0.90	6.88
8.53	28.0	20.37	4.36	Clay	CL/CH	very stiff	125	16		100			1.14	7.41
8.68	28.5	25.68	4.70	Clay	CL/CH	very stiff	125	21		100			1.45	>10
8.85	29.0	27.06	4.41	Silty Clay to Clay	CL	very stiff	125	15		100			1.53	>10
9.00	29.5	30.63	4.61	Silty Clay to Clay	CL	very stiff	125	18		95			1.74	>10
9.15	30.0	30.46	5.11	Clay	CL/CH	very stiff	125	24		100			1.73	>10
9.30	30.5	30.14	5.50	Clay	CL/CH	very stiff	125	24		100			1.71	>10
9.45	31.0	28.51	6.22	Clay	CL/CH	very stiff	125	23		100			1.61	>10
9.60	31.5	21.72	5.01	Clay	CL/CH	very stiff	125	17		100			1.21	7.00
9.75	32.0	18.47	1.79	Sandy Silt to Clayey Silt	ML	very loose	115	5	16.8	95	20	31		
9.90	32.5	17.81	1.83	Sandy Silt to Clayey Silt	ML	very loose	115	5	16.1	95	19	31		
10.05	33.0	17.05	1.59	Sandy Silt to Clayey Silt	ML	very loose	115	5	15.4	95	17	30		
10.20	33.5	16.36	1.37	Sandy Silt to Clayey Silt	ML	very loose	115	5	14.7	95	16	30		
10.38	34.0	27.16	3.80	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		100			1.53	>10
10.53	34.5	24.32	5.14	Clay	CL/CH	very stiff	125	19		100			1.36	7.56
10.68	35.0	28.69	4.09	Silty Clay to Clay	CL	very stiff	125	16		100			1.62	>10
10.83	35.5	28.50	3.96	Silty Clay to Clay	CL	very stiff	125	16		100			1.60	>10
10.98	36.0	24.81	5.87	Clay	CL/CH	very stiff	125	20		100			1.39	7.27
11.13	36.5	19.99	5.65	Clay	CL/CH	very stiff	125	16		100			1.10	5.00
11.28	37.0	16.80	4.63	Clay	CL/CH	stiff	125	13		100			0.91	3.74
11.43	37.5	15.21	4.21	Clay	CL/CH	stiff	125	12		100			0.82	3.21
11.58	38.0	18.88	3.82	Silty Clay to Clay	CL	very stiff	125	11		100			1.03	5.53
11.73	38.5	21.41	4.41	Silty Clay to Clay	CL	very stiff	125	12		100			1.18	6.65

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-5
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
11.88	39.0	22.80	4.25	Silty Clay to Clay	CL	very stiff	125	13		100			1.26	7.27
12.05	39.5	22.21	3.63	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.23	9.79
12.20	40.0	21.21	3.59	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		100			1.17	8.70
12.35	40.5	22.00	3.29	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.21	9.19
12.50	41.0	22.38	3.70	Silty Clay to Clay	CL	very stiff	125	13		100			1.23	6.54
12.65	41.5	24.22	3.63	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		100			1.34	>10
12.80	42.0	23.39	4.75	Clay	CL/CH	very stiff	125	19		100			1.29	5.31
12.95	42.5	21.10	4.49	Clay	CL/CH	very stiff	125	17		100			1.16	4.37
13.10	43.0	24.46	4.64	Clay	CL/CH	very stiff	125	20		100			1.35	5.42
13.25	43.5	23.63	5.00	Clay	CL/CH	very stiff	125	19		100			1.30	5.10
13.40	44.0	23.80	5.45	Clay	CL/CH	very stiff	125	19		100			1.31	5.10
13.58	44.5	20.44	5.43	Clay	CL/CH	very stiff	125	16		100			1.11	3.91
13.73	45.0	20.62	4.03	Silty Clay to Clay	CL	very stiff	125	12		100			1.12	5.00
13.88	45.5	22.62	4.24	Silty Clay to Clay	CL	very stiff	125	13		100			1.24	5.76
14.03	46.0	22.87	5.38	Clay	CL/CH	very stiff	125	18		100			1.25	4.47
14.18	46.5	21.55	4.73	Clay	CL/CH	very stiff	125	17		100			1.17	4.00
14.33	47.0	22.07	3.72	Silty Clay to Clay	CL	very stiff	125	13		100			1.20	5.21
14.48	47.5	21.41	3.55	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		100			1.17	6.65
14.63	48.0	24.08	4.55	Clay	CL/CH	very stiff	125	19		100			1.32	4.47
14.78	48.5	23.32	4.45	Silty Clay to Clay	CL	very stiff	125	13		100			1.28	5.42
14.93	49.0	24.03	4.60	Clay	CL/CH	very stiff	125	19		100			1.32	4.37
15.10	49.5	29.31	4.48	Silty Clay to Clay	CL	very stiff	125	17		100			1.63	7.85
15.25	50.0	27.58	4.95	Clay	CL/CH	very stiff	125	22		100			1.52	5.31

CLIENT: Imperial Community College District
PROJECT: Sports Field Improvements - Imperial, CA

CONE PENETROMETER: Kehoe Testing & Engineering Truck Mounted Electric Cone with 30 ton reaction weight

LOCATION: See Site and Boring Location Plan

DATE: 5/26/2022

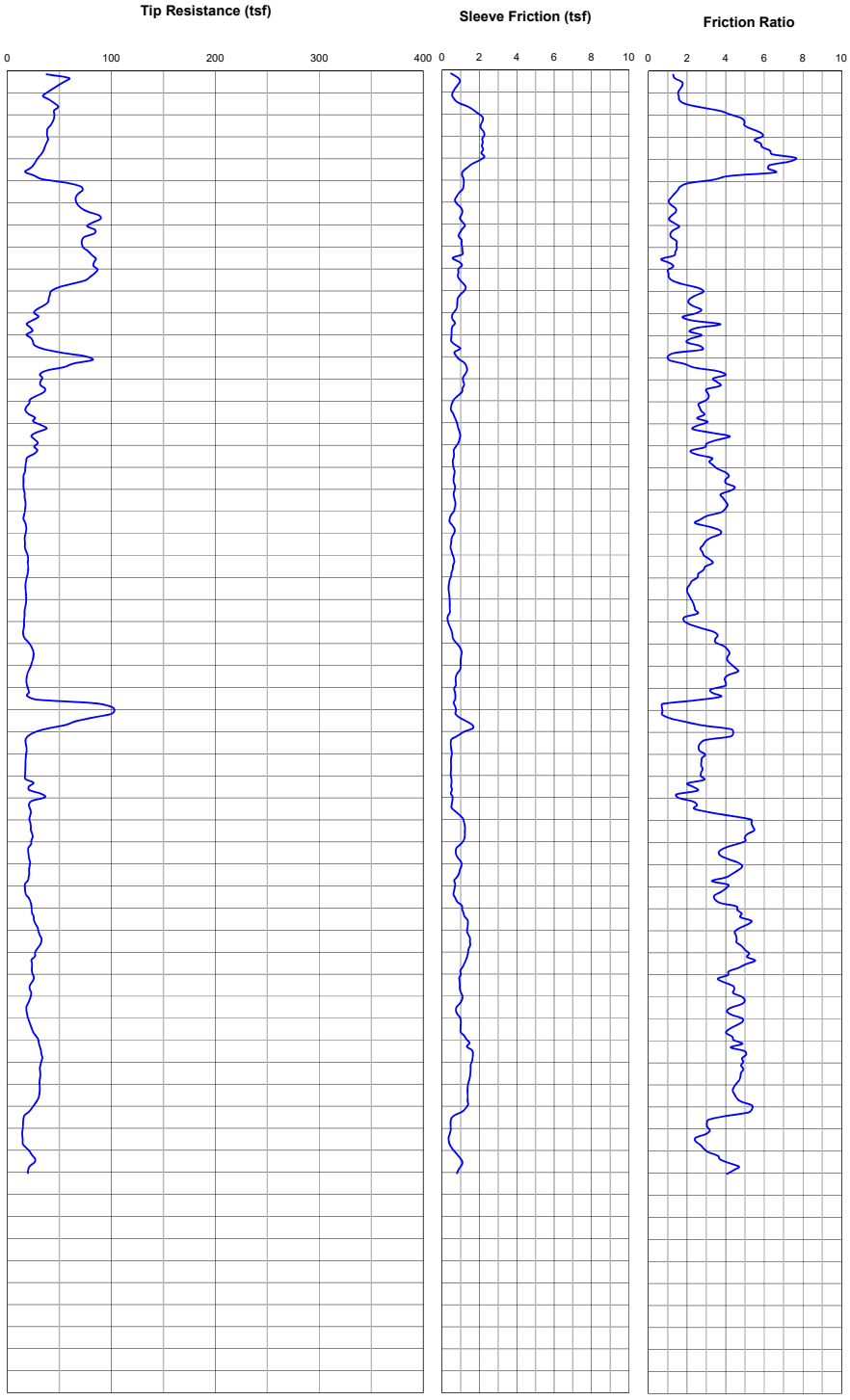
CONE SOUNDING DATA CPT-6

INTERPRETED SOIL PROFILE
From Robertson and Campanella (1989

GROUND ELEVATION +/-

DEPTH			
	Silty Sand to Sandy Silt	SM/ML	very dense
	Sandy Silt to Clayey Silt	ML	dense
	Clay	CL/CH	hard
	Clay	" "	hard
	Clay	" "	very stiff
5	Silty Sand to Sandy Silt	SM/ML	dense
	Sand to Silty Sand	SP/SM	dense
	Silty Sand to Sandy Silt	SM/ML	dense
	Sand to Silty Sand	SP/SM	dense
	Silty Sand to Sandy Silt	SM/ML	medium dense
10	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Sandy Silt to Clayey Silt	" "	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
15	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clay	CL/CH	stiff
	Silty Clay to Clay	CL	stiff
20	Clayey Silt to Silty Clay	ML/CL	stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	stiff
25	Clayey Silt to Silty Clay	" "	stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Sandy Silt to Clayey Silt	ML	medium dense
30	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	stiff
	Sandy Silt to Clayey Silt	ML	loose
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clay	CL/CH	very stiff
35	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
	Silty Clay to Clay	CL	very stiff
40	Clay	CL/CH	very stiff
	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
45	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Silty Clay to Clay	CL	very stiff
50			
55			

END OF SOUNDING AT 50 ft.



Project No.		PLATE
LE22111	LANDMARK Geo-Engineers and Geologists	B-6

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-6

Est. GWT (ft): 8

Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
0.15	0.5	50.71	1.46	Silty Sand to Sandy Silt	SM/ML	very dense	115	11	95.9	30	114	44		
0.30	1.0	43.68	1.64	Silty Sand to Sandy Silt	SM/ML	very dense	115	10	82.6	35	94	41		
0.45	1.5	39.87	1.68	Silty Sand to Sandy Silt	SM/ML	dense	115	9	75.4	40	83	40		
0.60	2.0	46.30	3.55	Clayey Silt to Silty Clay	ML/CL	hard	120	19		50			2.72	>10
0.75	2.5	43.51	4.92	Silty Clay to Clay	CL	hard	125	25		65			2.55	>10
0.93	3.0	38.38	5.69	Clay	CL/CH	hard	125	31		70			2.25	>10
1.08	3.5	37.62	5.73	Clay	CL/CH	hard	125	30		70			2.20	>10
1.23	4.0	32.49	6.78	Clay	CL/CH	very stiff	125	26		80			1.90	>10
1.38	4.5	24.91	6.60	Clay	CL/CH	very stiff	125	20		85			1.45	>10
1.53	5.0	25.36	4.72	Clay	CL/CH	very stiff	125	20		75			1.47	>10
1.68	5.5	66.95	1.63	Silty Sand to Sandy Silt	SM/ML	dense	115	15	115.4	30	77	39		
1.83	6.0	66.37	1.13	Silty Sand to Sandy Silt	SM/ML	dense	115	15	109.6	25	75	39		
1.98	6.5	78.74	1.34	Silty Sand to Sandy Silt	SM/ML	dense	115	17	124.9	25	79	39		
2.13	7.0	82.79	1.33	Sand to Silty Sand	SP/SM	dense	115	15	126.6	20	79	39		
2.28	7.5	80.60	1.20	Sand to Silty Sand	SP/SM	dense	115	15	119.1	20	78	39		
2.45	8.0	72.17	1.46	Silty Sand to Sandy Silt	SM/ML	dense	115	16	103.2	25	73	38		
2.60	8.5	81.44	1.13	Sand to Silty Sand	SP/SM	dense	115	15	114.9	20	77	39		
2.75	9.0	84.28	1.12	Sand to Silty Sand	SP/SM	dense	115	15	117.3	20	77	39		
2.90	9.5	79.53	1.12	Sand to Silty Sand	SP/SM	dense	115	14	109.2	20	75	39		
3.05	10.0	50.64	2.43	Sandy Silt to Clayey Silt	ML	medium dense	115	14	68.6	40	61	37		
3.20	10.5	39.91	2.22	Sandy Silt to Clayey Silt	ML	medium dense	115	11	53.4	45	54	36		
3.35	11.0	29.61	2.50	Sandy Silt to Clayey Silt	ML	medium dense	115	8	39.2	55	45	34		
3.50	11.5	24.39	2.60	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		65			1.40	>10
3.65	12.0	21.44	2.46	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		70			1.23	>10
3.80	12.5	24.59	2.28	Sandy Silt to Clayey Silt	ML	loose	115	7	31.3	60	38	33		
3.95	13.0	53.86	1.70	Silty Sand to Sandy Silt	SM/ML	medium dense	115	12	67.8	35	61	37		
4.13	13.5	66.75	1.79	Silty Sand to Sandy Silt	SM/ML	medium dense	115	15	83.2	35	67	37		
4.28	14.0	33.95	3.66	Clayey Silt to Silty Clay	ML/CL	very stiff	120	14		65			1.96	>10
4.43	14.5	33.27	3.43	Clayey Silt to Silty Clay	ML/CL	very stiff	120	13		65			1.92	>10
4.58	15.0	28.02	3.06	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		70			1.61	>10
4.73	15.5	18.88	2.67	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		80			1.07	>10
4.88	16.0	25.98	2.76	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		70			1.49	>10
5.03	16.5	29.79	3.25	Clayey Silt to Silty Clay	ML/CL	very stiff	120	12		70			1.71	>10
5.18	17.0	27.09	3.17	Clayey Silt to Silty Clay	ML/CL	very stiff	120	11		75			1.55	>10
5.33	17.5	24.49	2.66	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		75			1.40	>10
5.48	18.0	17.60	3.36	Silty Clay to Clay	CL	stiff	125	10		95			0.99	>10
5.65	18.5	15.93	4.05	Silty Clay to Clay	CL	stiff	125	9		100			0.89	>10
5.80	19.0	15.59	4.25	Clay	CL/CH	stiff	125	12		100			0.87	7.56
5.95	19.5	16.80	3.87	Silty Clay to Clay	CL	stiff	125	10		100			0.94	>10
6.10	20.0	17.14	3.95	Silty Clay to Clay	CL	stiff	125	10		100			0.96	>10
6.25	20.5	16.11	2.72	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		95			0.90	>10
6.40	21.0	17.91	3.53	Silty Clay to Clay	CL	very stiff	125	10		100			1.00	>10
6.55	21.5	16.77	3.02	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.94	>10
6.70	22.0	18.11	2.79	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		95			1.01	>10
6.85	22.5	19.81	3.15	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		95			1.11	>10
7.00	23.0	19.47	2.66	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		90			1.09	>10
7.18	23.5	17.56	2.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		90			0.98	>10
7.33	24.0	17.91	2.11	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		90			1.00	>10
7.48	24.5	17.35	2.37	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		95			0.97	>10
7.63	25.0	16.31	2.09	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		95			0.90	>10
7.78	25.5	15.68	2.73	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		100			0.87	9.79
7.93	26.0	17.18	3.51	Silty Clay to Clay	CL	stiff	125	10		100			0.95	7.85
8.08	26.5	24.19	4.07	Silty Clay to Clay	CL	very stiff	125	14		100			1.36	>10
8.23	27.0	23.24	4.29	Silty Clay to Clay	CL	very stiff	125	13		100			1.31	>10
8.38	27.5	19.26	4.25	Silty Clay to Clay	CL	very stiff	125	11		100			1.07	8.85
8.53	28.0	19.02	3.73	Silty Clay to Clay	CL	very stiff	125	11		100			1.06	8.41
8.68	28.5	22.69	3.18	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		95			1.27	>10
8.85	29.0	95.88	0.72	Sand to Silty Sand	SP/SM	medium dense	115	17	90.2	25	69	38		
9.00	29.5	82.16	1.27	Sand to Silty Sand	SP/SM	medium dense	115	15	76.8	35	65	37		
9.15	30.0	40.25	3.85	Clayey Silt to Silty Clay	ML/CL	hard	120	16		80			2.30	>10
9.30	30.5	18.43	3.29	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		100			1.02	>10
9.45	31.0	18.26	2.73	Clayey Silt to Silty Clay	ML/CL	very stiff	120	7		100			1.01	9.79
9.60	31.5	17.49	2.75	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.96	8.70
9.75	32.0	17.11	2.75	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.94	8.14
9.90	32.5	21.13	2.41	Clayey Silt to Silty Clay	ML/CL	very stiff	120	8		95			1.17	>10
10.05	33.0	29.75	1.86	Sandy Silt to Clayey Silt	ML	loose	115	9	26.6	75	33	33		
10.20	33.5	21.93	2.40	Clayey Silt to Silty Clay	ML/CL	very stiff	120	9		95			1.22	>10
10.38	34.0	21.89	4.27	Silty Clay to Clay	CL	very stiff	125	13		100			1.22	8.27
10.53	34.5	22.31	5.41	Clay	CL/CH	very stiff	125	18		100			1.24	6.32
10.68	35.0	23.66	5.04	Clay	CL/CH	very stiff	125	19		100			1.32	6.76
10.83	35.5	20.99	3.98	Silty Clay to Clay	CL	very stiff	125	12		100			1.16	7.13
10.98	36.0	20.99	4.20	Silty Clay to Clay	CL	very stiff	125	12		100			1.16	7.00
11.13	36.5	20.91	4.46	Clay	CL/CH	very stiff	125	17		100			1.15	5.21
11.28	37.0	17.87	3.81	Silty Clay to Clay	CL	stiff	125	10		100			0.97	5.10
11.43	37.5	18.64	3.54	Silty Clay to Clay	CL	very stiff	125	11		100			1.02	5.42
11.58	38.0	22.90	4.28	Silty Clay to Clay	CL	very stiff	125	13		100			1.27	7.41
11.73	38.5	24.83	4.98	Clay	CL/CH	very stiff	125	20		100			1.38	6.43

LANDMARK CONSULTANTS, INC.
CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

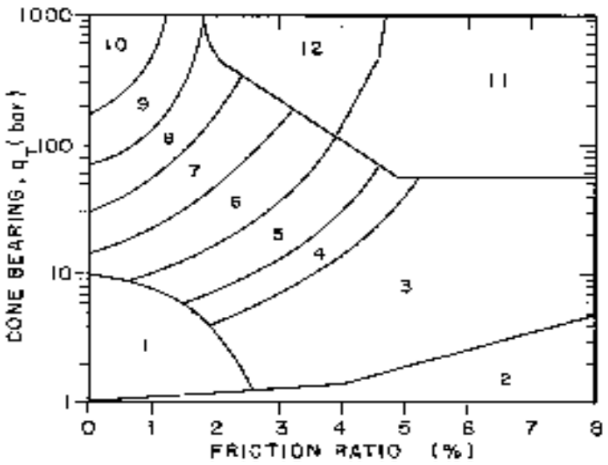
Project: Sports Field Improvements - Imperial, CA **Project No:** LE22111 **Date:** 5/26/2022

CONE SOUNDING: CPT-6
Est. GWT (ft): 8
Phi Correlation: **0** 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth (m)	Base Depth (ft)	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	SPT N(60)	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	**Nk:** Phi (deg.)	**17** Su (tsf)	OCR
11.88	39.0	28.57	4.77	Clay	CL/CH	very stiff	125	23		100			1.60	8.00
12.05	39.5	32.07	4.56	Silty Clay to Clay	CL	very stiff	125	18		100			1.81	>10
12.20	40.0	28.75	5.02	Clay	CL/CH	very stiff	125	23		100			1.61	7.85
12.35	40.5	24.45	5.23	Clay	CL/CH	very stiff	125	20		100			1.36	5.88
12.50	41.0	23.83	4.31	Silty Clay to Clay	CL	very stiff	125	14		100			1.32	7.13
12.65	41.5	23.76	3.97	Silty Clay to Clay	CL	very stiff	125	14		100			1.31	6.88
12.80	42.0	22.27	4.56	Clay	CL/CH	very stiff	125	18		100			1.22	4.78
12.95	42.5	19.88	4.71	Clay	CL/CH	very stiff	125	16		100			1.08	3.91
13.10	43.0	19.02	4.41	Clay	CL/CH	very stiff	125	15		100			1.03	3.58
13.25	43.5	22.17	4.51	Clay	CL/CH	very stiff	125	18		100			1.22	4.47
13.40	44.0	27.26	4.26	Silty Clay to Clay	CL	very stiff	125	16		100			1.51	8.14
13.58	44.5	31.21	4.70	Silty Clay to Clay	CL	very stiff	125	18		100			1.75	>10
13.73	45.0	33.01	4.94	Clay	CL/CH	very stiff	125	26		100			1.85	8.27
13.88	45.5	31.56	4.84	Silty Clay to Clay	CL	very stiff	125	18		100			1.76	>10
14.03	46.0	31.24	4.68	Silty Clay to Clay	CL	very stiff	125	18		100			1.74	9.79
14.18	46.5	31.00	4.42	Silty Clay to Clay	CL	very stiff	125	18		100			1.73	9.39
14.33	47.0	27.05	5.02	Clay	CL/CH	very stiff	125	22		100			1.50	5.53
14.48	47.5	17.59	4.09	Silty Clay to Clay	CL	stiff	125	10		100			0.94	3.50
14.63	48.0	14.89	3.09	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		100			0.78	3.58
14.78	48.5	14.44	2.62	Clayey Silt to Silty Clay	ML/CL	stiff	120	6		100			0.75	3.35
14.93	49.0	18.19	2.89	Clayey Silt to Silty Clay	ML/CL	stiff	120	7		100			0.97	4.78
15.10	49.5	25.42	3.83	Clayey Silt to Silty Clay	ML/CL	very stiff	120	10		100			1.40	8.27
15.25	50.0	20.47	4.39	Clay	CL/CH	very stiff	125	16		100			1.10	3.35

Simplified Soil Classification Chart

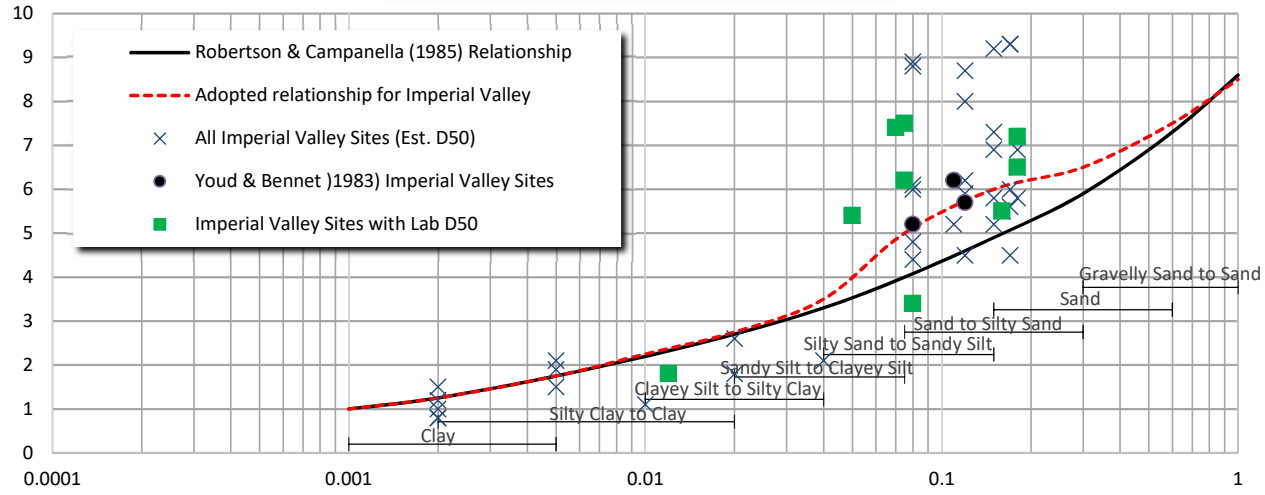
After Robertson & Campanella (1989)



Geotechnical Parameters from CPT Data:

Equivalent SPT N(60) blow count = Qc/(Qc/N Ratio)
N1(60) = Cn*N(60) Normalized SPT blow count
Cn = 1/(p'o)^0.5 < 1.6 max. from Liao & Whitman (1986)
p'o = effective overburden pressure (tsf) using unit densities given below and estimated groundwater table.
Dr = Relative density (%) from Jamiolkowski et. al. (1986) relationship
= -98 +68*log(Qc/p'o^0.5) where Qc, p'o in tonne/sqm
Note: 1 tonne/sqm = 0.1024 tsf, 1 bar =1.0443 tsf
Phi = Friction Angle estimated from either:
1. Roberton & Campanella (1983) chart:
Phi = 5.3 + 24*(log(Qc/p'o))+3(log(Qc/p'o))^2
2. Peck, Hansen & Thornburn (1974) N-Phi Correlation
3. Schmertman (1978) chart [Phi = 28+0.14*Dr for fine uniform sands]
Su = undrained shear strength (tsf)
= (Qc-p'o)/Nk where Nk varies from 10 to 22, 17 for OC clays
OCR = Overconsolidation Ratio estimated from Schmertman (1978) chart using Su/p'o ratio and estimated normal consolidated Su/p'o

Variation of Qc/N Ratio with Grain Size



Note: Assumed Properties and Adopted Qc/N Ratio based on correlations from Imperial Valley, California soils

Table of Soil Types and Assumed Properties

Zone	Soil Classification	UCS	Density (pcf)	R&C Qc/N	Adopted Qc/N	Est. PI	Fines (%)	D50 (mm)
1	Sensitive fine grained	ML	120	2	2	NP-15	65-100	0.02
2	Organic Material	OL/OH	120	1	1	--	--	--
3	Clay	CL/CH	125	1	1.25	25-40+	90-100	0.002
4	Silty Clay to Clay	CL	125	1.5	2	15-40	90-100	0.01
5	Clayey Silt to Silty Clay	ML/CL	120	2	2.75	25-May	90-100	0.02
6	Sandy Silt to Clayey Silt	ML	115	2.5	3.5	NP-10	65-100	0.04
7	Silty Sand to Sandy Silt	SM/ML	115	3	5	NP	35-75	0.075
8	Sand to Silty Sand	SP/SM	115	4	6	NP	May-35	0.15
9	Sand	SP	110	5	6.5	NP	0-5	0.3
10	Gravelly Sand to Sand	SW	115	6	7.5	NP	0-5	0.6
11	Overconsolidated Soil	--	120	1	1	NP	90-100	0.01
12	Sand to Clayey Sand	SP/SC	115	2	2	NP-5	--	---

Su (tsf)	Consistency
0-0.13	very soft
0.13-.25	soft
0.25-0.5	firm
0.5-1.0	stiff
1.0-2.0	very stiff
>2.0	hard
Dr (%)	**Relative Density**
0-15	very loose
15-35	loose
35-65	medium dense
65-85	dense
>85	very dense

LANDMARK
Geo-Engineers and Geologists

Project No: LE22111

Key to CPT Interpretation of Logs

Plate B-7

APPENDIX C

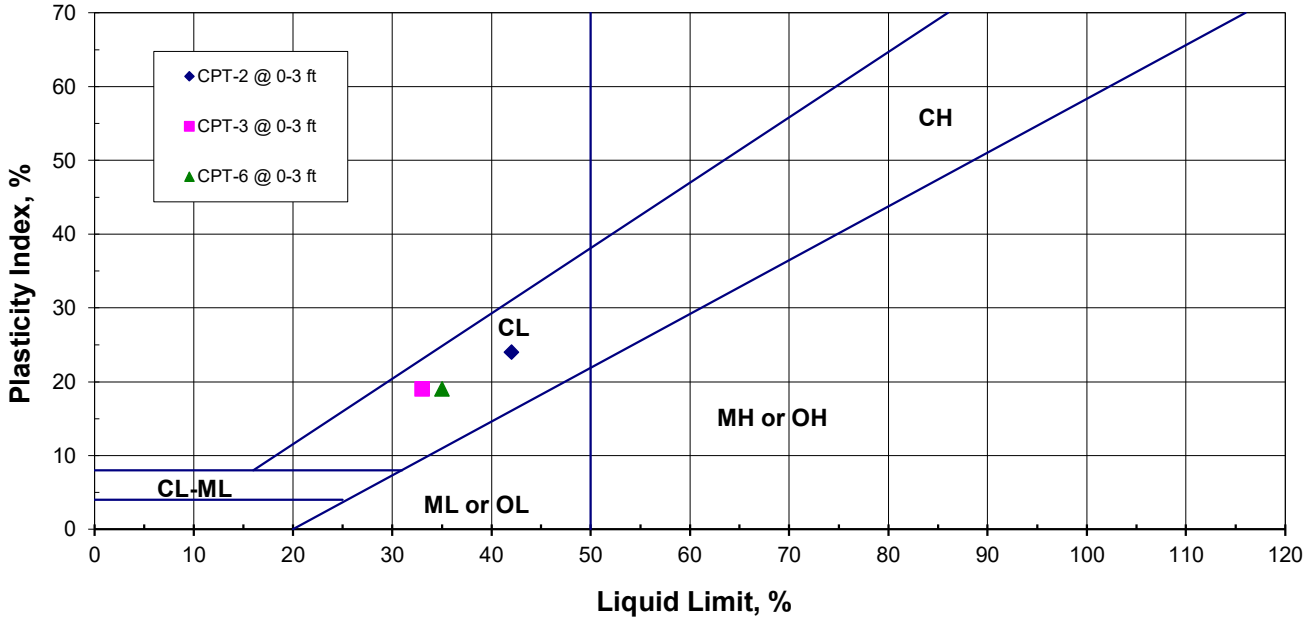
LANDMARK CONSULTANTS, INC.

CLIENT: Imperial Community College District
PROJECT: IVC Sports Facilities Improvements
JOB No.: LE22111
DATE: 06/02/22

ATTERBERG LIMITS (ASTM D4318)

Sample Location	Sample Depth (ft)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	USCS Classification
CPT-2	0-3	42	18	24	CL
CPT-3	0-3	33	14	19	CL
CPT-6	0-3	35	16	19	CL

PLASTICITY CHART



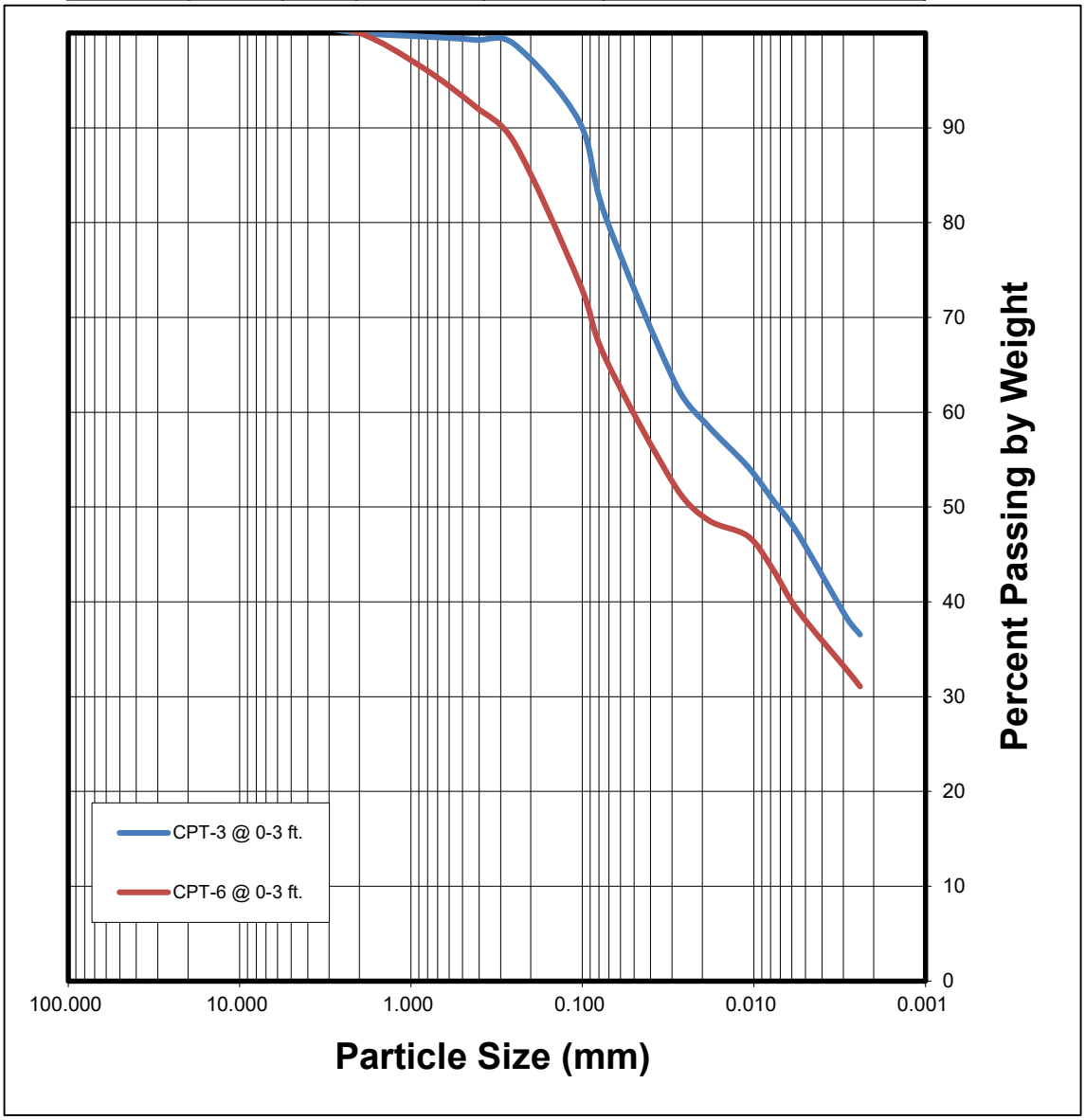
LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

Atterberg Limits Test Results

Plate C-1

SIEVE ANALYSIS					HYDROMETER ANALYSIS
Gravel		Sand			Silt and Clay Fraction
Coarse	Fine	Coarse	Medium	Fine	



LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

Grain Size Analysis

Plate C-2

LANDMARK CONSULTANTS, INC.

CLIENT: Imperial Community College District
PROJECT: IVC Sports Facilities Improvements
JOB No.: LE22111
DATE: 06/02/22

CHEMICAL ANALYSIS

Boring: / **Sample Depth, ft:**	CPT-2 0-3	CPT-3 0-3	CPT-6 0-3	**Caltrans Method**
pH:	6.11	6.10	6.06	**643**
Electrical Conductivity (mmhos):	--	--	--	**424**
Resistivity (ohm-cm):	120	510	290	**643**
Chloride (Cl), ppm:	4,540	220	1,360	**422**
Sulfate (SO4), ppm:	8,514	1,764	2,004	**417**

General Guidelines for Soil Corrosivity

Material Affected	Chemical Agent	Range of Values	Degree of Corrosivity
Concrete	Soluble Sulfates (ppm)	0 - 1,000	Low
		1,000 - 2,000	Moderate
		2,000 - 20,000	Severe
		> 20,000	Very Severe
Normal Grade Steel	Soluble Chlorides (ppm)	0 - 200	Low
		200 - 700	Moderate
		700 - 1,500	Severe
		> 1,500	Very Severe
Normal Grade Steel	Resistivity (ohm-cm)	1 - 1,000	Very Severe
		1,000 - 2,000	Severe
		2,000 - 10,000	Moderate
		> 10,000	Low

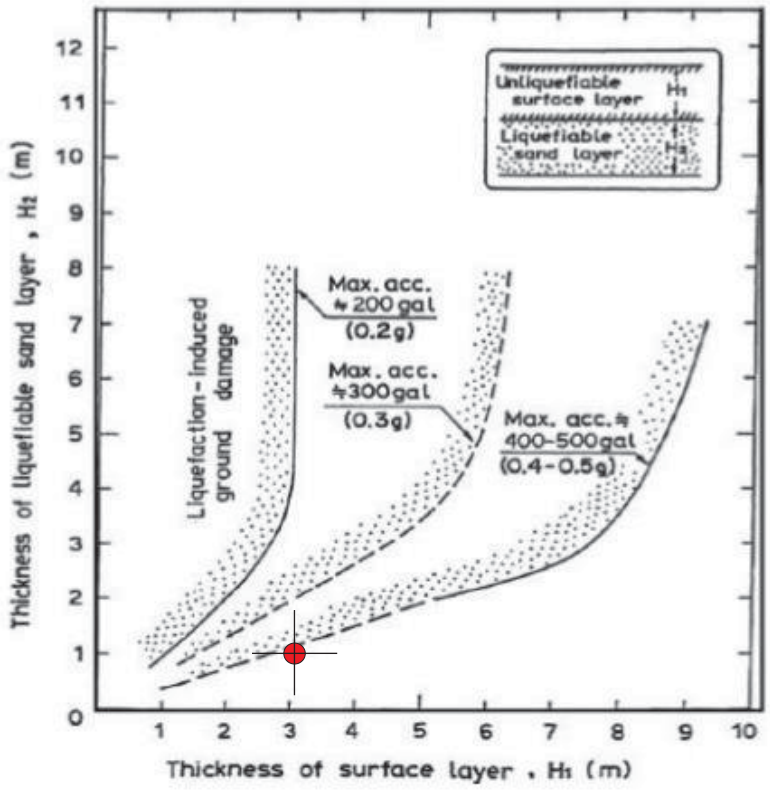
LANDMARK Geo-Engineers and Geologists

Project No.: LE22111

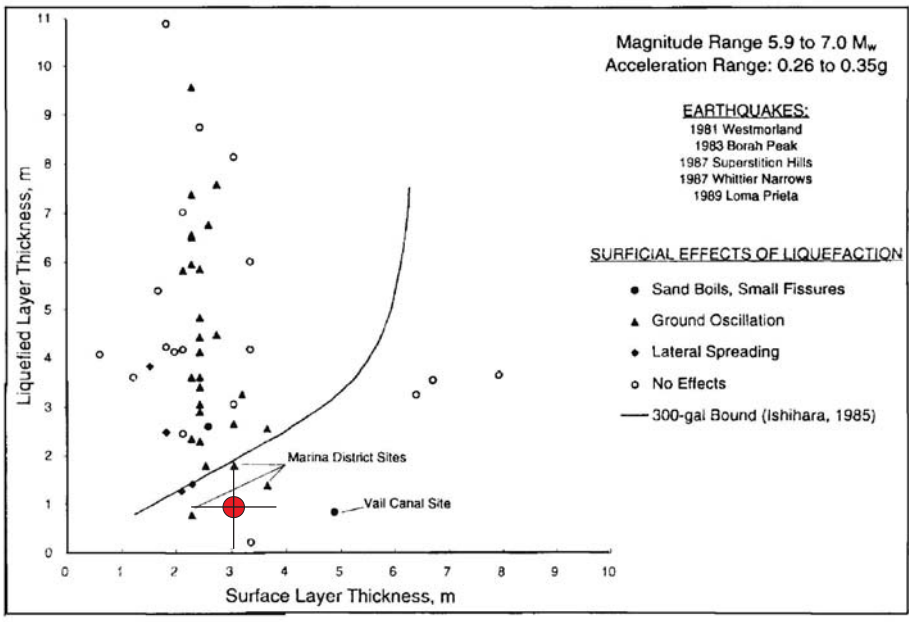
Selected Chemical Test Results

Plate C-3

APPENDIX D



after Ishihara (1985)



after Youd & Garris (1995)

Figure 4. Thicknesses of Liquefied and Overlying Non-liquefied Layers for Various Types of Surface Effects of Liquefaction: Data Compiled in This Study for Magnitude 5.9 to 7.0 Earthquakes.

LANDMARK
Geo-Engineers and Geologists

Project No.: LE22111

Potential Occurrance of Surficial Effects of Liquefaction

Plate D-1

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243

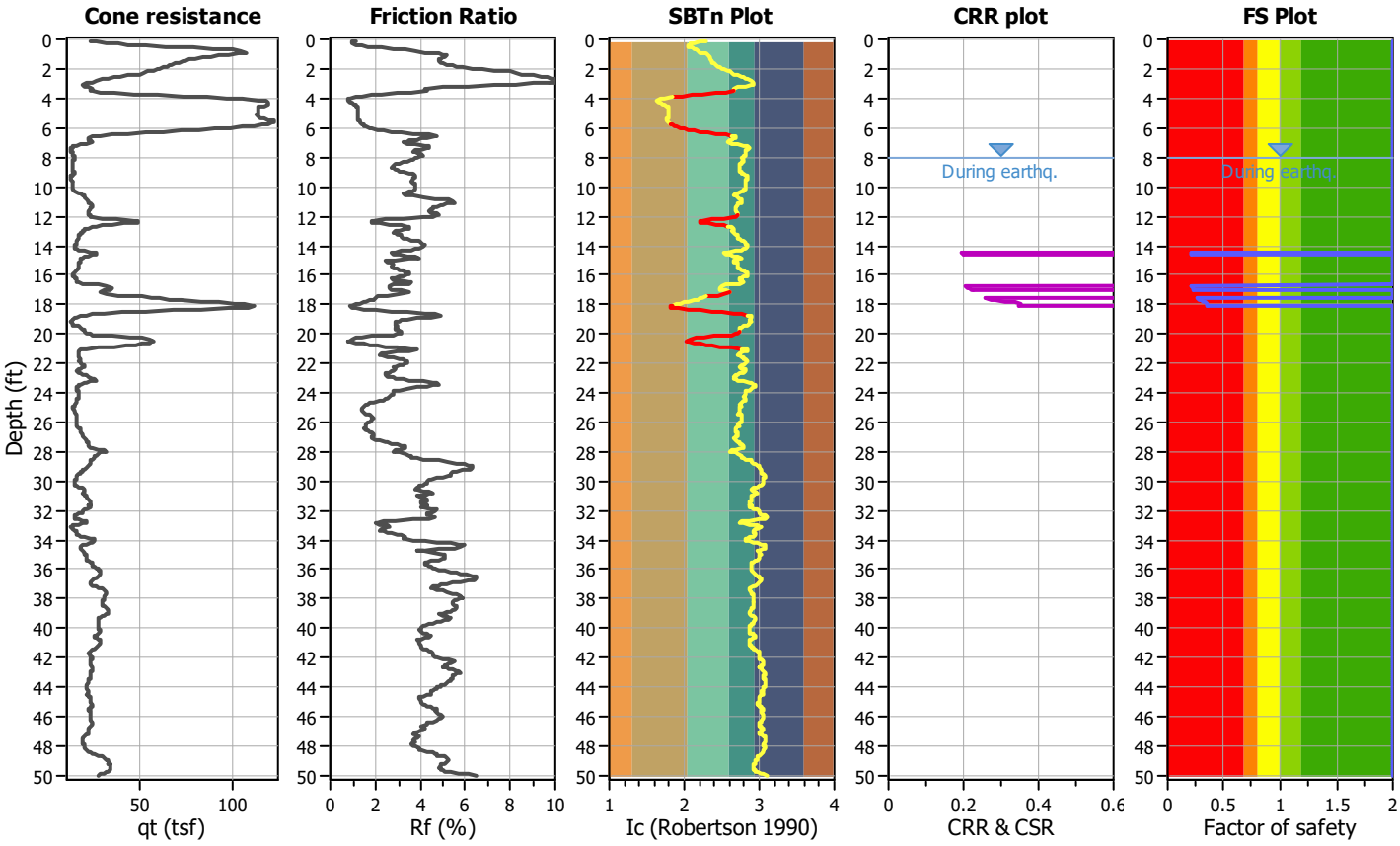
LIQUEFACTION ANALYSIS REPORT

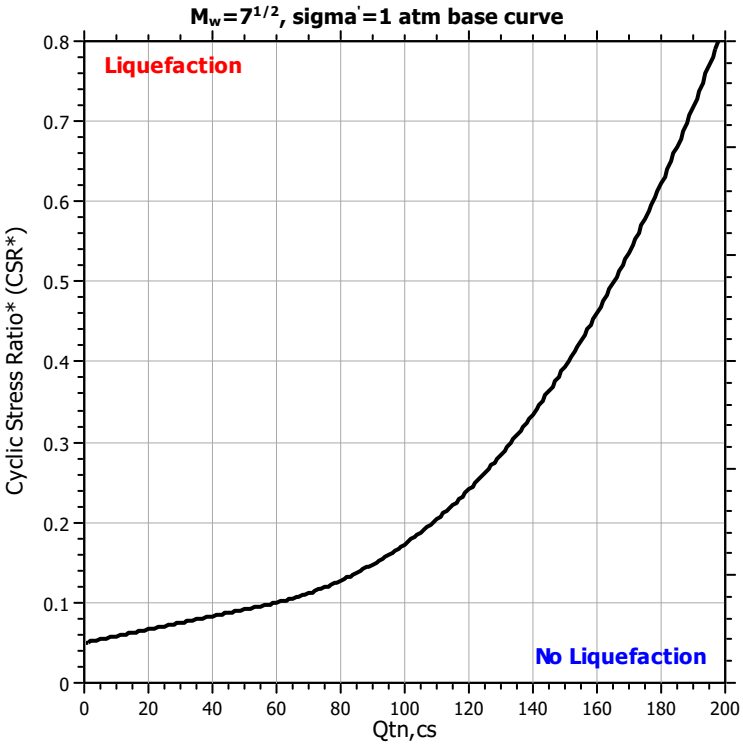
Project title : IVC Sports Field Improvements **Location : Imperial, CA**

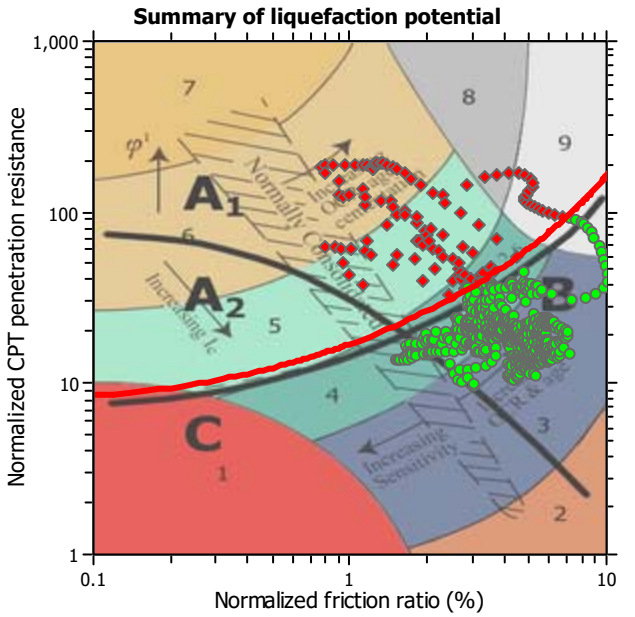
CPT file : CPT-1

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 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:	7.00	Ic cut-off value:	2.55	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	1.02	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

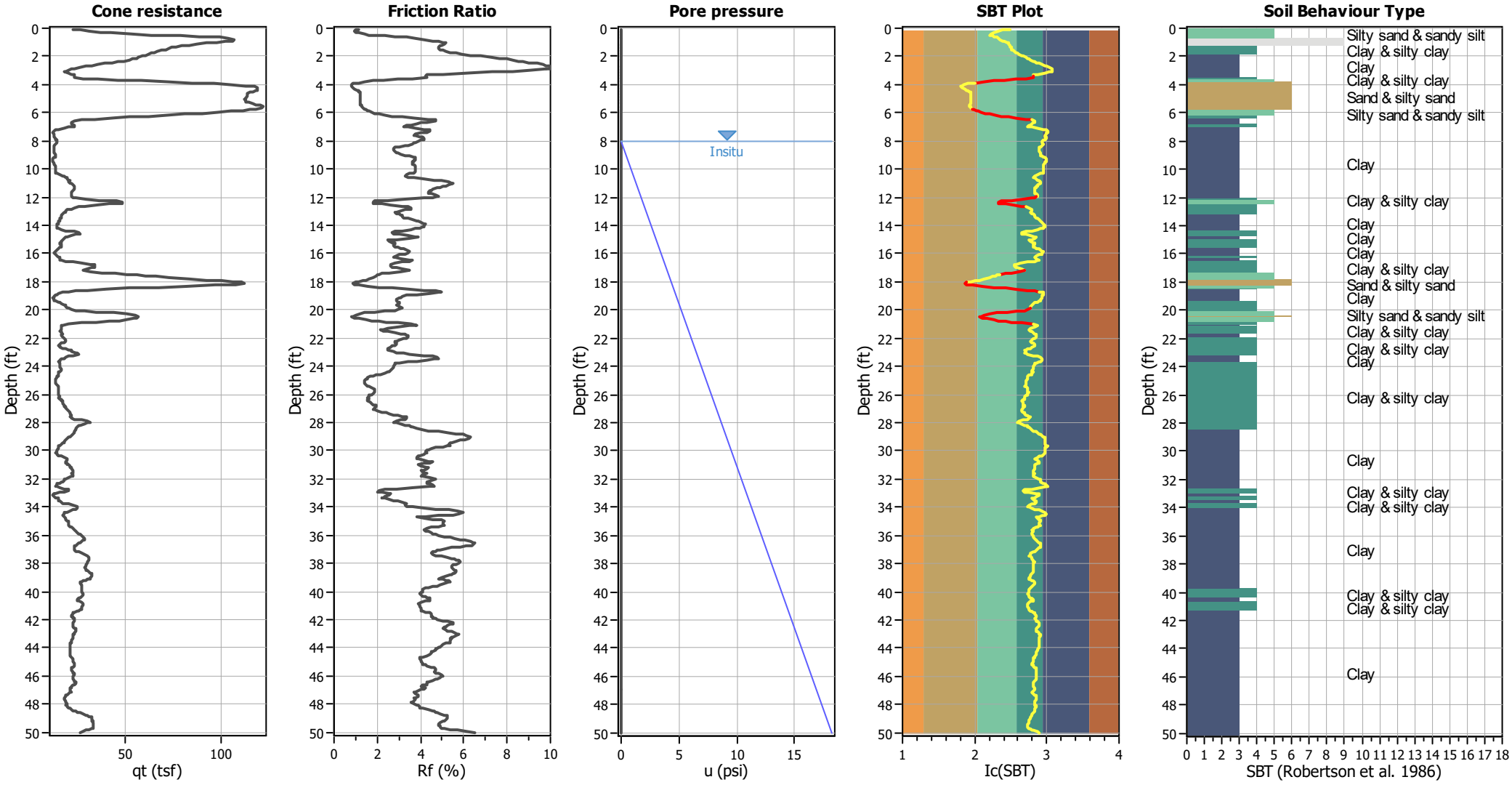






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



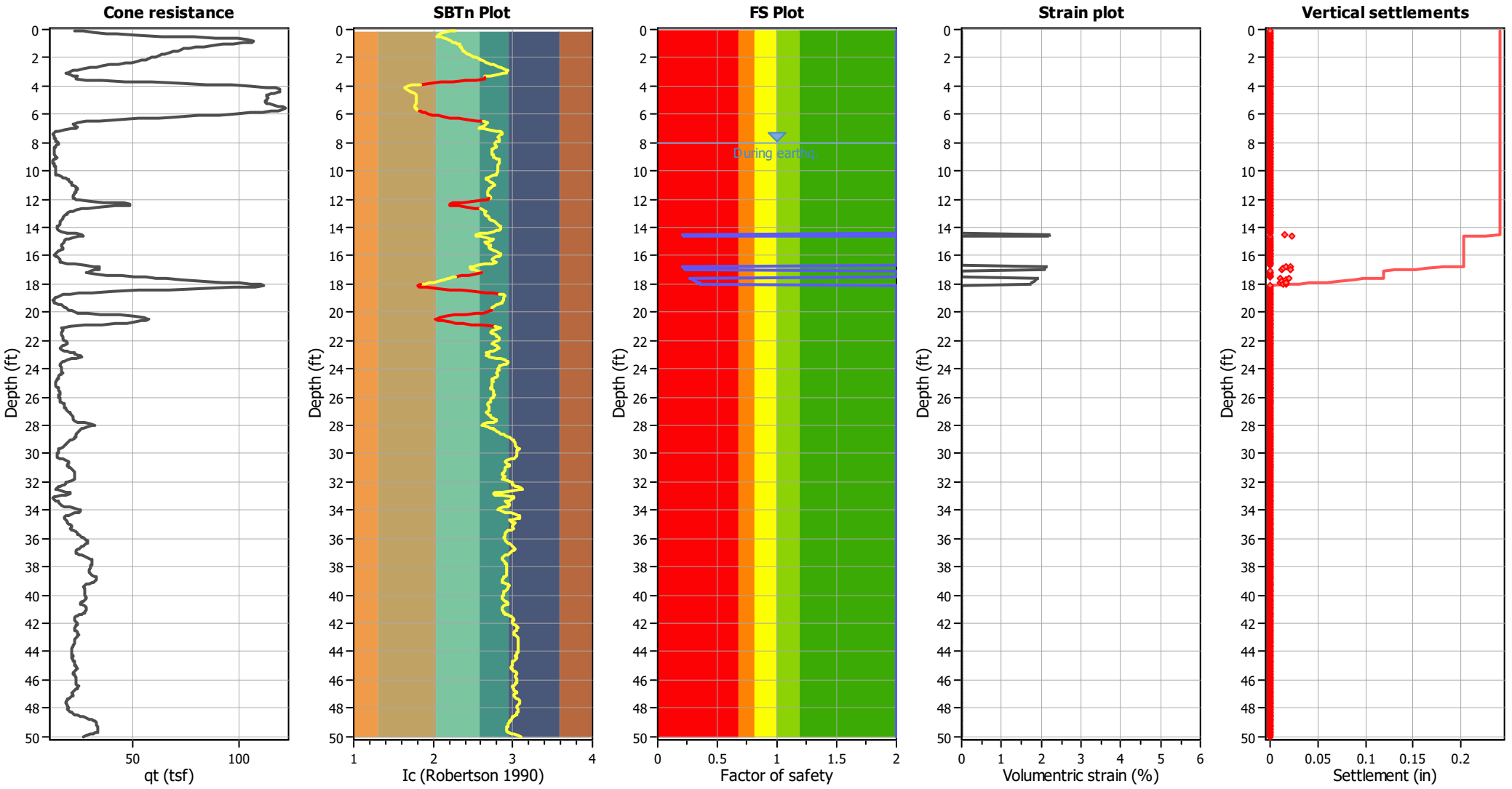
Input parameters and analysis data

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:	2.55	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.02	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	8.00 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

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

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.01	108.69	2.00	0.00	1.00	0.00	8.08	106.70	2.00	0.00	1.00	0.00
8.14	103.93	2.00	0.00	1.00	0.00	8.21	101.18	2.00	0.00	1.00	0.00
8.29	98.27	2.00	0.00	1.00	0.00	8.34	95.09	2.00	0.00	1.00	0.00
8.40	91.72	2.00	0.00	1.00	0.00	8.48	89.10	2.00	0.00	1.00	0.00
8.54	87.55	2.00	0.00	1.00	0.00	8.63	86.93	2.00	0.00	1.00	0.00
8.68	86.92	2.00	0.00	1.00	0.00	8.74	87.77	2.00	0.00	1.00	0.00
8.83	88.95	2.00	0.00	1.00	0.00	8.88	90.26	2.00	0.00	1.00	0.00
8.93	93.26	2.00	0.00	1.00	0.00	9.02	97.31	2.00	0.00	1.00	0.00
9.08	101.18	2.00	0.00	1.00	0.00	9.13	102.60	2.00	0.00	1.00	0.00
9.20	101.79	2.00	0.00	1.00	0.00	9.27	100.16	2.00	0.00	1.00	0.00
9.32	99.04	2.00	0.00	1.00	0.00	9.41	98.76	2.00	0.00	1.00	0.00
9.46	98.70	2.00	0.00	1.00	0.00	9.52	98.82	2.00	0.00	1.00	0.00
9.60	99.26	2.00	0.00	1.00	0.00	9.65	100.41	2.00	0.00	1.00	0.00
9.72	101.87	2.00	0.00	1.00	0.00	9.79	102.96	2.00	0.00	1.00	0.00
9.85	103.52	2.00	0.00	1.00	0.00	9.91	103.64	2.00	0.00	1.00	0.00
9.97	103.67	2.00	0.00	1.00	0.00	10.05	103.60	2.00	0.00	1.00	0.00
10.11	103.53	2.00	0.00	1.00	0.00	10.21	103.47	2.00	0.00	1.00	0.00
10.25	103.20	2.00	0.00	1.00	0.00	10.31	103.30	2.00	0.00	1.00	0.00
10.39	104.24	2.00	0.00	1.00	0.00	10.45	105.99	2.00	0.00	1.00	0.00
10.51	109.10	2.00	0.00	1.00	0.00	10.60	112.52	2.00	0.00	1.00	0.00
10.63	118.69	2.00	0.00	1.00	0.00	10.70	127.32	2.00	0.00	1.00	0.00
10.77	136.40	2.00	0.00	1.00	0.00	10.84	143.35	2.00	0.00	1.00	0.00
10.90	148.15	2.00	0.00	1.00	0.00	10.97	151.96	2.00	0.00	1.00	0.00
11.06	154.53	2.00	0.00	1.00	0.00	11.09	154.72	2.00	0.00	1.00	0.00
11.17	153.36	2.00	0.00	1.00	0.00	11.25	151.72	2.00	0.00	1.00	0.00
11.29	149.34	2.00	0.00	1.00	0.00	11.37	146.79	2.00	0.00	1.00	0.00
11.42	143.62	2.00	0.00	1.00	0.00	11.50	141.40	2.00	0.00	1.00	0.00
11.55	139.07	2.00	0.00	1.00	0.00	11.65	137.31	2.00	0.00	1.00	0.00
11.69	136.47	2.00	0.00	1.00	0.00	11.75	138.30	2.00	0.00	1.00	0.00
11.84	141.39	2.00	0.00	1.00	0.00	11.89	143.94	2.00	0.00	1.00	0.00
11.95	143.54	2.00	0.00	1.00	0.00	12.04	141.44	2.00	0.00	1.00	0.00
12.08	136.84	2.00	0.00	1.00	0.00	12.15	127.38	2.00	0.00	1.00	0.00
12.24	118.76	2.00	0.00	1.00	0.00	12.28	114.47	2.00	0.00	1.00	0.00
12.34	114.97	2.00	0.00	1.00	0.00	12.44	115.81	2.00	0.00	1.00	0.00
12.48	117.47	2.00	0.00	1.00	0.00	12.57	119.97	2.00	0.00	1.00	0.00
12.63	123.29	2.00	0.00	1.00	0.00	12.69	124.17	2.00	0.00	1.00	0.00
12.73	122.02	2.00	0.00	1.00	0.00	12.83	118.05	2.00	0.00	1.00	0.00
12.88	110.80	2.00	0.00	1.00	0.00	12.97	105.08	2.00	0.00	1.00	0.00
13.02	100.17	2.00	0.00	1.00	0.00	13.08	98.72	2.00	0.00	1.00	0.00
13.13	98.70	2.00	0.00	1.00	0.00	13.22	99.44	2.00	0.00	1.00	0.00
13.28	100.40	2.00	0.00	1.00	0.00	13.32	100.26	2.00	0.00	1.00	0.00
13.42	100.07	2.00	0.00	1.00	0.00	13.47	100.80	2.00	0.00	1.00	0.00
13.52	103.04	2.00	0.00	1.00	0.00	13.61	105.55	2.00	0.00	1.00	0.00
13.67	107.67	2.00	0.00	1.00	0.00	13.71	108.93	2.00	0.00	1.00	0.00
13.81	109.87	2.00	0.00	1.00	0.00	13.86	110.46	2.00	0.00	1.00	0.00
13.91	110.22	2.00	0.00	1.00	0.00	13.99	109.31	2.00	0.00	1.00	0.00
14.06	108.42	2.00	0.00	1.00	0.00	14.11	107.84	2.00	0.00	1.00	0.00
14.19	106.91	2.00	0.00	1.00	0.00	14.25	105.70	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
14.31	105.01	2.00	0.00	1.00	0.00	14.38	104.77	2.00	0.00	1.00	0.00
14.45	105.57	2.00	0.00	1.00	0.00	14.51	106.67	0.21	2.22	1.00	0.02
14.59	108.48	0.22	2.19	1.00	0.02	14.65	110.70	2.00	0.00	1.00	0.00
14.70	113.38	2.00	0.00	1.00	0.00	14.79	115.70	2.00	0.00	1.00	0.00
14.84	114.89	2.00	0.00	1.00	0.00	14.90	106.17	2.00	0.00	1.00	0.00
15.00	95.78	2.00	0.00	1.00	0.00	15.03	87.96	2.00	0.00	1.00	0.00
15.10	88.66	2.00	0.00	1.00	0.00	15.20	90.25	2.00	0.00	1.00	0.00
15.25	91.20	2.00	0.00	1.00	0.00	15.29	91.24	2.00	0.00	1.00	0.00
15.36	90.98	2.00	0.00	1.00	0.00	15.44	91.51	2.00	0.00	1.00	0.00
15.52	92.40	2.00	0.00	1.00	0.00	15.55	93.45	2.00	0.00	1.00	0.00
15.64	94.02	2.00	0.00	1.00	0.00	15.69	94.56	2.00	0.00	1.00	0.00
15.78	95.04	2.00	0.00	1.00	0.00	15.84	95.37	2.00	0.00	1.00	0.00
15.88	94.73	2.00	0.00	1.00	0.00	15.98	93.26	2.00	0.00	1.00	0.00
16.03	91.13	2.00	0.00	1.00	0.00	16.08	89.64	2.00	0.00	1.00	0.00
16.17	88.55	2.00	0.00	1.00	0.00	16.23	87.87	2.00	0.00	1.00	0.00
16.28	89.67	2.00	0.00	1.00	0.00	16.37	93.39	2.00	0.00	1.00	0.00
16.43	99.02	2.00	0.00	1.00	0.00	16.48	103.54	2.00	0.00	1.00	0.00
16.55	106.28	2.00	0.00	1.00	0.00	16.62	107.23	2.00	0.00	1.00	0.00
16.67	108.10	2.00	0.00	1.00	0.00	16.75	109.97	0.21	2.16	1.00	0.02
16.82	112.39	0.22	2.12	1.00	0.02	16.87	113.94	0.23	2.10	1.00	0.01
16.96	114.56	0.23	2.09	1.00	0.02	17.01	116.57	0.23	2.06	1.00	0.01
17.07	119.90	2.00	0.00	1.00	0.00	17.16	122.98	2.00	0.00	1.00	0.00
17.19	122.55	2.00	0.00	1.00	0.00	17.26	119.12	2.00	0.00	1.00	0.00
17.36	115.63	2.00	0.00	1.00	0.00	17.40	114.95	2.00	0.00	1.00	0.00
17.46	116.92	2.00	0.00	1.00	0.00	17.52	120.72	2.00	0.00	1.00	0.00
17.61	124.25	0.26	1.96	1.00	0.02	17.65	127.44	0.28	1.92	1.00	0.01
17.73	130.43	0.29	1.88	1.00	0.02	17.78	135.56	0.32	1.82	1.00	0.01
17.87	140.01	0.34	1.77	1.00	0.02	17.92	142.77	0.36	1.74	1.00	0.01
17.98	142.87	0.36	1.74	1.00	0.01	18.07	142.03	0.35	1.75	1.00	0.02
18.14	140.16	2.00	0.00	1.00	0.00	18.19	137.42	2.00	0.00	1.00	0.00
18.25	133.26	2.00	0.00	1.00	0.00	18.32	131.13	2.00	0.00	1.00	0.00
18.38	131.88	2.00	0.00	1.00	0.00	18.45	134.52	2.00	0.00	1.00	0.00
18.54	137.03	2.00	0.00	1.00	0.00	18.59	137.25	2.00	0.00	1.00	0.00
18.64	133.43	2.00	0.00	1.00	0.00	18.73	127.61	2.00	0.00	1.00	0.00
18.79	118.26	2.00	0.00	1.00	0.00	18.84	108.07	2.00	0.00	1.00	0.00
18.92	96.77	2.00	0.00	1.00	0.00	18.98	89.54	2.00	0.00	1.00	0.00
19.03	85.09	2.00	0.00	1.00	0.00	19.13	82.96	2.00	0.00	1.00	0.00
19.19	82.49	2.00	0.00	1.00	0.00	19.23	81.12	2.00	0.00	1.00	0.00
19.32	80.90	2.00	0.00	1.00	0.00	19.38	82.88	2.00	0.00	1.00	0.00
19.44	86.92	2.00	0.00	1.00	0.00	19.49	90.09	2.00	0.00	1.00	0.00
19.58	91.16	2.00	0.00	1.00	0.00	19.63	91.50	2.00	0.00	1.00	0.00
19.69	92.90	2.00	0.00	1.00	0.00	19.76	95.53	2.00	0.00	1.00	0.00
19.82	98.38	2.00	0.00	1.00	0.00	19.90	100.13	2.00	0.00	1.00	0.00
19.99	100.00	2.00	0.00	1.00	0.00	20.04	98.99	2.00	0.00	1.00	0.00
20.08	95.93	2.00	0.00	1.00	0.00	20.16	92.29	2.00	0.00	1.00	0.00
20.23	89.61	2.00	0.00	1.00	0.00	20.29	88.41	2.00	0.00	1.00	0.00
20.34	86.91	2.00	0.00	1.00	0.00	20.44	84.71	2.00	0.00	1.00	0.00
20.49	82.86	2.00	0.00	1.00	0.00	20.54	85.14	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.63	89.70	2.00	0.00	1.00	0.00	20.68	96.73	2.00	0.00	1.00	0.00
20.78	100.83	2.00	0.00	1.00	0.00	20.82	104.02	2.00	0.00	1.00	0.00
20.87	104.72	2.00	0.00	1.00	0.00	20.93	105.24	2.00	0.00	1.00	0.00
21.03	104.66	2.00	0.00	1.00	0.00	21.08	101.84	2.00	0.00	1.00	0.00
21.13	96.15	2.00	0.00	1.00	0.00	21.23	88.91	2.00	0.00	1.00	0.00
21.27	81.04	2.00	0.00	1.00	0.00	21.37	77.32	2.00	0.00	1.00	0.00
21.42	75.77	2.00	0.00	1.00	0.00	21.47	76.98	2.00	0.00	1.00	0.00
21.52	80.95	2.00	0.00	1.00	0.00	21.62	86.03	2.00	0.00	1.00	0.00
21.67	90.42	2.00	0.00	1.00	0.00	21.72	92.98	2.00	0.00	1.00	0.00
21.81	94.04	2.00	0.00	1.00	0.00	21.87	95.00	2.00	0.00	1.00	0.00
21.94	95.22	2.00	0.00	1.00	0.00	21.99	95.60	2.00	0.00	1.00	0.00
22.07	95.08	2.00	0.00	1.00	0.00	22.14	93.30	2.00	0.00	1.00	0.00
22.21	91.18	2.00	0.00	1.00	0.00	22.25	89.30	2.00	0.00	1.00	0.00
22.32	88.07	2.00	0.00	1.00	0.00	22.38	86.71	2.00	0.00	1.00	0.00
22.45	84.85	2.00	0.00	1.00	0.00	22.56	83.06	2.00	0.00	1.00	0.00
22.58	81.67	2.00	0.00	1.00	0.00	22.65	81.41	2.00	0.00	1.00	0.00
22.71	81.81	2.00	0.00	1.00	0.00	22.78	83.87	2.00	0.00	1.00	0.00
22.85	86.01	2.00	0.00	1.00	0.00	22.91	88.70	2.00	0.00	1.00	0.00
22.97	93.34	2.00	0.00	1.00	0.00	23.05	97.96	2.00	0.00	1.00	0.00
23.11	105.11	2.00	0.00	1.00	0.00	23.19	110.55	2.00	0.00	1.00	0.00
23.25	115.70	2.00	0.00	1.00	0.00	23.31	117.12	2.00	0.00	1.00	0.00
23.37	115.83	2.00	0.00	1.00	0.00	23.45	112.74	2.00	0.00	1.00	0.00
23.51	107.31	2.00	0.00	1.00	0.00	23.59	101.34	2.00	0.00	1.00	0.00
23.63	95.07	2.00	0.00	1.00	0.00	23.70	89.45	2.00	0.00	1.00	0.00
23.80	85.11	2.00	0.00	1.00	0.00	23.83	82.74	2.00	0.00	1.00	0.00
23.89	82.61	2.00	0.00	1.00	0.00	24.00	82.44	2.00	0.00	1.00	0.00
24.04	82.46	2.00	0.00	1.00	0.00	24.10	82.51	2.00	0.00	1.00	0.00
24.15	82.12	2.00	0.00	1.00	0.00	24.25	81.31	2.00	0.00	1.00	0.00
24.30	80.19	2.00	0.00	1.00	0.00	24.39	78.48	2.00	0.00	1.00	0.00
24.44	76.58	2.00	0.00	1.00	0.00	24.49	73.91	2.00	0.00	1.00	0.00
24.58	71.28	2.00	0.00	1.00	0.00	24.64	68.21	2.00	0.00	1.00	0.00
24.69	65.22	2.00	0.00	1.00	0.00	24.74	62.68	2.00	0.00	1.00	0.00
24.81	60.74	2.00	0.00	1.00	0.00	24.89	59.57	2.00	0.00	1.00	0.00
24.93	58.58	2.00	0.00	1.00	0.00	25.02	57.73	2.00	0.00	1.00	0.00
25.08	56.94	2.00	0.00	1.00	0.00	25.14	56.90	2.00	0.00	1.00	0.00
25.21	57.62	2.00	0.00	1.00	0.00	25.28	58.78	2.00	0.00	1.00	0.00
25.33	60.03	2.00	0.00	1.00	0.00	25.41	61.14	2.00	0.00	1.00	0.00
25.47	62.93	2.00	0.00	1.00	0.00	25.53	64.85	2.00	0.00	1.00	0.00
25.61	66.43	2.00	0.00	1.00	0.00	25.67	67.08	2.00	0.00	1.00	0.00
25.72	66.86	2.00	0.00	1.00	0.00	25.82	66.51	2.00	0.00	1.00	0.00
25.86	66.25	2.00	0.00	1.00	0.00	25.92	65.69	2.00	0.00	1.00	0.00
26.02	64.71	2.00	0.00	1.00	0.00	26.05	63.12	2.00	0.00	1.00	0.00
26.15	62.23	2.00	0.00	1.00	0.00	26.21	61.97	2.00	0.00	1.00	0.00
26.25	62.40	2.00	0.00	1.00	0.00	26.32	62.58	2.00	0.00	1.00	0.00
26.40	62.48	2.00	0.00	1.00	0.00	26.45	62.85	2.00	0.00	1.00	0.00
26.51	64.16	2.00	0.00	1.00	0.00	26.60	65.90	2.00	0.00	1.00	0.00
26.66	67.50	2.00	0.00	1.00	0.00	26.72	69.29	2.00	0.00	1.00	0.00
26.81	70.91	2.00	0.00	1.00	0.00	26.85	72.17	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
26.91	71.81	2.00	0.00	1.00	0.00	27.00	70.81	2.00	0.00	1.00	0.00
27.04	70.19	2.00	0.00	1.00	0.00	27.11	71.88	2.00	0.00	1.00	0.00
27.17	75.20	2.00	0.00	1.00	0.00	27.24	79.22	2.00	0.00	1.00	0.00
27.30	82.70	2.00	0.00	1.00	0.00	27.38	85.78	2.00	0.00	1.00	0.00
27.44	88.50	2.00	0.00	1.00	0.00	27.51	91.70	2.00	0.00	1.00	0.00
27.59	94.63	2.00	0.00	1.00	0.00	27.64	97.07	2.00	0.00	1.00	0.00
27.69	98.78	2.00	0.00	1.00	0.00	27.79	100.19	2.00	0.00	1.00	0.00
27.84	101.48	2.00	0.00	1.00	0.00	27.94	101.87	2.00	0.00	1.00	0.00
27.96	102.06	2.00	0.00	1.00	0.00	28.02	102.02	2.00	0.00	1.00	0.00
28.09	102.91	2.00	0.00	1.00	0.00	28.18	104.24	2.00	0.00	1.00	0.00
28.23	105.61	2.00	0.00	1.00	0.00	28.28	106.12	2.00	0.00	1.00	0.00
28.36	106.89	2.00	0.00	1.00	0.00	28.44	108.41	2.00	0.00	1.00	0.00
28.49	111.40	2.00	0.00	1.00	0.00	28.58	113.93	2.00	0.00	1.00	0.00
28.61	119.24	2.00	0.00	1.00	0.00	28.72	123.60	2.00	0.00	1.00	0.00
28.78	128.05	2.00	0.00	1.00	0.00	28.83	129.63	2.00	0.00	1.00	0.00
28.88	130.68	2.00	0.00	1.00	0.00	28.97	130.94	2.00	0.00	1.00	0.00
29.02	130.40	2.00	0.00	1.00	0.00	29.08	128.43	2.00	0.00	1.00	0.00
29.17	125.58	2.00	0.00	1.00	0.00	29.22	121.81	2.00	0.00	1.00	0.00
29.29	117.99	2.00	0.00	1.00	0.00	29.36	114.27	2.00	0.00	1.00	0.00
29.41	111.49	2.00	0.00	1.00	0.00	29.47	109.14	2.00	0.00	1.00	0.00
29.56	106.81	2.00	0.00	1.00	0.00	29.62	104.31	2.00	0.00	1.00	0.00
29.66	101.55	2.00	0.00	1.00	0.00	29.75	98.99	2.00	0.00	1.00	0.00
29.79	96.27	2.00	0.00	1.00	0.00	29.86	94.07	2.00	0.00	1.00	0.00
29.94	91.93	2.00	0.00	1.00	0.00	29.99	90.10	2.00	0.00	1.00	0.00
30.05	89.17	2.00	0.00	1.00	0.00	30.16	88.84	2.00	0.00	1.00	0.00
30.20	88.76	2.00	0.00	1.00	0.00	30.25	88.75	2.00	0.00	1.00	0.00
30.34	89.41	2.00	0.00	1.00	0.00	30.39	91.86	2.00	0.00	1.00	0.00
30.45	94.68	2.00	0.00	1.00	0.00	30.55	96.77	2.00	0.00	1.00	0.00
30.59	98.30	2.00	0.00	1.00	0.00	30.65	100.43	2.00	0.00	1.00	0.00
30.73	102.54	2.00	0.00	1.00	0.00	30.79	103.83	2.00	0.00	1.00	0.00
30.85	102.69	2.00	0.00	1.00	0.00	30.92	100.22	2.00	0.00	1.00	0.00
30.98	98.05	2.00	0.00	1.00	0.00	31.04	98.85	2.00	0.00	1.00	0.00
31.11	101.81	2.00	0.00	1.00	0.00	31.18	105.59	2.00	0.00	1.00	0.00
31.24	107.17	2.00	0.00	1.00	0.00	31.33	107.31	2.00	0.00	1.00	0.00
31.39	106.11	2.00	0.00	1.00	0.00	31.43	104.77	2.00	0.00	1.00	0.00
31.51	105.02	2.00	0.00	1.00	0.00	31.59	105.59	2.00	0.00	1.00	0.00
31.64	106.34	2.00	0.00	1.00	0.00	31.69	104.91	2.00	0.00	1.00	0.00
31.77	104.26	2.00	0.00	1.00	0.00	31.84	104.28	2.00	0.00	1.00	0.00
31.93	105.04	2.00	0.00	1.00	0.00	31.98	104.49	2.00	0.00	1.00	0.00
32.03	102.40	2.00	0.00	1.00	0.00	32.12	99.54	2.00	0.00	1.00	0.00
32.18	96.60	2.00	0.00	1.00	0.00	32.23	94.10	2.00	0.00	1.00	0.00
32.32	91.79	2.00	0.00	1.00	0.00	32.38	90.12	2.00	0.00	1.00	0.00
32.42	89.39	2.00	0.00	1.00	0.00	32.52	88.91	2.00	0.00	1.00	0.00
32.57	87.84	2.00	0.00	1.00	0.00	32.62	85.59	2.00	0.00	1.00	0.00
32.72	81.72	2.00	0.00	1.00	0.00	32.77	77.25	2.00	0.00	1.00	0.00
32.81	72.82	2.00	0.00	1.00	0.00	32.92	69.58	2.00	0.00	1.00	0.00
32.95	68.25	2.00	0.00	1.00	0.00	33.01	68.24	2.00	0.00	1.00	0.00
33.09	67.71	2.00	0.00	1.00	0.00	33.15	65.92	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
33.21	64.82	2.00	0.00	1.00	0.00	33.31	64.58	2.00	0.00	1.00	0.00
33.35	66.01	2.00	0.00	1.00	0.00	33.41	68.52	2.00	0.00	1.00	0.00
33.51	71.11	2.00	0.00	1.00	0.00	33.54	73.76	2.00	0.00	1.00	0.00
33.61	77.20	2.00	0.00	1.00	0.00	33.70	80.90	2.00	0.00	1.00	0.00
33.74	85.15	2.00	0.00	1.00	0.00	33.80	88.63	2.00	0.00	1.00	0.00
33.87	92.59	2.00	0.00	1.00	0.00	33.94	97.07	2.00	0.00	1.00	0.00
34.01	101.91	2.00	0.00	1.00	0.00	34.06	108.14	2.00	0.00	1.00	0.00
34.15	113.17	2.00	0.00	1.00	0.00	34.19	116.31	2.00	0.00	1.00	0.00
34.29	116.21	2.00	0.00	1.00	0.00	34.35	114.76	2.00	0.00	1.00	0.00
34.39	111.85	2.00	0.00	1.00	0.00	34.49	108.53	2.00	0.00	1.00	0.00
34.54	104.69	2.00	0.00	1.00	0.00	34.59	99.10	2.00	0.00	1.00	0.00
34.68	94.06	2.00	0.00	1.00	0.00	34.74	91.22	2.00	0.00	1.00	0.00
34.79	95.14	2.00	0.00	1.00	0.00	34.89	99.85	2.00	0.00	1.00	0.00
34.94	104.00	2.00	0.00	1.00	0.00	34.98	106.26	2.00	0.00	1.00	0.00
35.05	107.66	2.00	0.00	1.00	0.00	35.12	108.32	2.00	0.00	1.00	0.00
35.18	108.28	2.00	0.00	1.00	0.00	35.26	107.78	2.00	0.00	1.00	0.00
35.30	106.88	2.00	0.00	1.00	0.00	35.37	105.86	2.00	0.00	1.00	0.00
35.45	104.80	2.00	0.00	1.00	0.00	35.51	104.11	2.00	0.00	1.00	0.00
35.57	103.92	2.00	0.00	1.00	0.00	35.64	104.43	2.00	0.00	1.00	0.00
35.70	105.75	2.00	0.00	1.00	0.00	35.77	107.99	2.00	0.00	1.00	0.00
35.86	110.60	2.00	0.00	1.00	0.00	35.93	113.07	2.00	0.00	1.00	0.00
35.96	115.51	2.00	0.00	1.00	0.00	36.03	118.40	2.00	0.00	1.00	0.00
36.11	122.36	2.00	0.00	1.00	0.00	36.16	126.55	2.00	0.00	1.00	0.00
36.24	129.88	2.00	0.00	1.00	0.00	36.31	132.18	2.00	0.00	1.00	0.00
36.35	133.81	2.00	0.00	1.00	0.00	36.45	134.74	2.00	0.00	1.00	0.00
36.51	134.89	2.00	0.00	1.00	0.00	36.55	133.28	2.00	0.00	1.00	0.00
36.65	130.63	2.00	0.00	1.00	0.00	36.71	127.47	2.00	0.00	1.00	0.00
36.75	123.38	2.00	0.00	1.00	0.00	36.85	119.61	2.00	0.00	1.00	0.00
36.88	115.46	2.00	0.00	1.00	0.00	36.95	112.54	2.00	0.00	1.00	0.00
37.04	110.05	2.00	0.00	1.00	0.00	37.09	109.15	2.00	0.00	1.00	0.00
37.14	109.76	2.00	0.00	1.00	0.00	37.21	111.14	2.00	0.00	1.00	0.00
37.29	113.15	2.00	0.00	1.00	0.00	37.34	116.54	2.00	0.00	1.00	0.00
37.43	120.26	2.00	0.00	1.00	0.00	37.48	124.42	2.00	0.00	1.00	0.00
37.54	127.88	2.00	0.00	1.00	0.00	37.64	130.39	2.00	0.00	1.00	0.00
37.68	132.11	2.00	0.00	1.00	0.00	37.74	132.94	2.00	0.00	1.00	0.00
37.81	133.83	2.00	0.00	1.00	0.00	37.90	134.18	2.00	0.00	1.00	0.00
37.94	133.74	2.00	0.00	1.00	0.00	38.00	132.18	2.00	0.00	1.00	0.00
38.09	130.28	2.00	0.00	1.00	0.00	38.13	128.28	2.00	0.00	1.00	0.00
38.21	126.94	2.00	0.00	1.00	0.00	38.27	125.98	2.00	0.00	1.00	0.00
38.33	126.13	2.00	0.00	1.00	0.00	38.42	126.92	2.00	0.00	1.00	0.00
38.48	128.37	2.00	0.00	1.00	0.00	38.54	130.06	2.00	0.00	1.00	0.00
38.59	131.68	2.00	0.00	1.00	0.00	38.68	132.57	2.00	0.00	1.00	0.00
38.72	132.90	2.00	0.00	1.00	0.00	38.78	132.43	2.00	0.00	1.00	0.00
38.86	131.70	2.00	0.00	1.00	0.00	38.92	128.41	2.00	0.00	1.00	0.00
39.02	125.42	2.00	0.00	1.00	0.00	39.08	122.76	2.00	0.00	1.00	0.00
39.12	122.71	2.00	0.00	1.00	0.00	39.20	122.26	2.00	0.00	1.00	0.00
39.25	121.56	2.00	0.00	1.00	0.00	39.31	120.39	2.00	0.00	1.00	0.00
39.38	118.53	2.00	0.00	1.00	0.00	39.44	116.55	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
39.51	114.30	2.00	0.00	1.00	0.00	39.59	112.37	2.00	0.00	1.00	0.00
39.64	110.26	2.00	0.00	1.00	0.00	39.70	108.21	2.00	0.00	1.00	0.00
39.78	106.22	2.00	0.00	1.00	0.00	39.86	104.84	2.00	0.00	1.00	0.00
39.92	104.32	2.00	0.00	1.00	0.00	40.01	104.13	2.00	0.00	1.00	0.00
40.03	103.92	2.00	0.00	1.00	0.00	40.10	103.91	2.00	0.00	1.00	0.00
40.17	104.19	2.00	0.00	1.00	0.00	40.24	104.73	2.00	0.00	1.00	0.00
40.31	105.33	2.00	0.00	1.00	0.00	40.36	105.77	2.00	0.00	1.00	0.00
40.43	105.94	2.00	0.00	1.00	0.00	40.51	105.73	2.00	0.00	1.00	0.00
40.55	104.89	2.00	0.00	1.00	0.00	40.64	103.90	2.00	0.00	1.00	0.00
40.69	102.94	2.00	0.00	1.00	0.00	40.76	102.65	2.00	0.00	1.00	0.00
40.83	102.69	2.00	0.00	1.00	0.00	40.90	102.96	2.00	0.00	1.00	0.00
40.95	103.11	2.00	0.00	1.00	0.00	41.02	103.07	2.00	0.00	1.00	0.00
41.09	102.98	2.00	0.00	1.00	0.00	41.14	102.92	2.00	0.00	1.00	0.00
41.24	102.53	2.00	0.00	1.00	0.00	41.29	101.68	2.00	0.00	1.00	0.00
41.34	100.52	2.00	0.00	1.00	0.00	41.44	99.61	2.00	0.00	1.00	0.00
41.49	99.31	2.00	0.00	1.00	0.00	41.54	99.41	2.00	0.00	1.00	0.00
41.63	99.28	2.00	0.00	1.00	0.00	41.69	98.94	2.00	0.00	1.00	0.00
41.77	98.95	2.00	0.00	1.00	0.00	41.82	99.58	2.00	0.00	1.00	0.00
41.88	100.71	2.00	0.00	1.00	0.00	41.93	102.20	2.00	0.00	1.00	0.00
42.02	103.74	2.00	0.00	1.00	0.00	42.08	106.17	2.00	0.00	1.00	0.00
42.13	108.13	2.00	0.00	1.00	0.00	42.21	109.23	2.00	0.00	1.00	0.00
42.27	108.78	2.00	0.00	1.00	0.00	42.33	107.37	2.00	0.00	1.00	0.00
42.42	105.99	2.00	0.00	1.00	0.00	42.48	105.39	2.00	0.00	1.00	0.00
42.52	105.57	2.00	0.00	1.00	0.00	42.62	106.09	2.00	0.00	1.00	0.00
42.67	106.67	2.00	0.00	1.00	0.00	42.72	107.92	2.00	0.00	1.00	0.00
42.82	109.11	2.00	0.00	1.00	0.00	42.85	110.52	2.00	0.00	1.00	0.00
42.91	111.20	2.00	0.00	1.00	0.00	42.99	111.39	2.00	0.00	1.00	0.00
43.06	110.57	2.00	0.00	1.00	0.00	43.11	108.87	2.00	0.00	1.00	0.00
43.21	107.33	2.00	0.00	1.00	0.00	43.25	106.40	2.00	0.00	1.00	0.00
43.31	106.27	2.00	0.00	1.00	0.00	43.40	106.09	2.00	0.00	1.00	0.00
43.44	105.66	2.00	0.00	1.00	0.00	43.51	104.94	2.00	0.00	1.00	0.00
43.61	104.06	2.00	0.00	1.00	0.00	43.64	103.04	2.00	0.00	1.00	0.00
43.70	101.54	2.00	0.00	1.00	0.00	43.80	99.91	2.00	0.00	1.00	0.00
43.84	98.63	2.00	0.00	1.00	0.00	43.95	97.88	2.00	0.00	1.00	0.00
44.00	97.23	2.00	0.00	1.00	0.00	44.05	96.72	2.00	0.00	1.00	0.00
44.11	96.37	2.00	0.00	1.00	0.00	44.19	96.15	2.00	0.00	1.00	0.00
44.25	95.72	2.00	0.00	1.00	0.00	44.30	95.23	2.00	0.00	1.00	0.00
44.37	94.77	2.00	0.00	1.00	0.00	44.42	94.54	2.00	0.00	1.00	0.00
44.49	93.88	2.00	0.00	1.00	0.00	44.59	92.88	2.00	0.00	1.00	0.00
44.64	91.85	2.00	0.00	1.00	0.00	44.69	91.30	2.00	0.00	1.00	0.00
44.79	90.97	2.00	0.00	1.00	0.00	44.84	91.32	2.00	0.00	1.00	0.00
44.88	91.70	2.00	0.00	1.00	0.00	44.98	92.11	2.00	0.00	1.00	0.00
45.03	92.44	2.00	0.00	1.00	0.00	45.09	93.33	2.00	0.00	1.00	0.00
45.18	94.45	2.00	0.00	1.00	0.00	45.23	95.38	2.00	0.00	1.00	0.00
45.28	95.96	2.00	0.00	1.00	0.00	45.38	96.36	2.00	0.00	1.00	0.00
45.43	96.81	2.00	0.00	1.00	0.00	45.48	97.00	2.00	0.00	1.00	0.00
45.57	96.99	2.00	0.00	1.00	0.00	45.63	96.92	2.00	0.00	1.00	0.00
45.67	97.55	2.00	0.00	1.00	0.00	45.77	98.74	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
45.83	100.35	2.00	0.00	1.00	0.00	45.87	101.41	2.00	0.00	1.00	0.00
45.97	101.82	2.00	0.00	1.00	0.00	46.02	101.61	2.00	0.00	1.00	0.00
46.07	100.87	2.00	0.00	1.00	0.00	46.17	100.00	2.00	0.00	1.00	0.00
46.21	99.20	2.00	0.00	1.00	0.00	46.27	98.33	2.00	0.00	1.00	0.00
46.36	97.45	2.00	0.00	1.00	0.00	46.41	96.74	2.00	0.00	1.00	0.00
46.46	96.50	2.00	0.00	1.00	0.00	46.55	96.31	2.00	0.00	1.00	0.00
46.60	94.78	2.00	0.00	1.00	0.00	46.66	91.53	2.00	0.00	1.00	0.00
46.73	90.28	2.00	0.00	1.00	0.00	46.81	90.03	2.00	0.00	1.00	0.00
46.85	90.70	2.00	0.00	1.00	0.00	46.96	89.27	2.00	0.00	1.00	0.00
47.00	88.14	2.00	0.00	1.00	0.00	47.05	87.34	2.00	0.00	1.00	0.00
47.13	86.15	2.00	0.00	1.00	0.00	47.18	84.84	2.00	0.00	1.00	0.00
47.28	83.90	2.00	0.00	1.00	0.00	47.33	83.55	2.00	0.00	1.00	0.00
47.38	82.84	2.00	0.00	1.00	0.00	47.47	81.64	2.00	0.00	1.00	0.00
47.53	80.16	2.00	0.00	1.00	0.00	47.57	79.59	2.00	0.00	1.00	0.00
47.67	79.52	2.00	0.00	1.00	0.00	47.72	79.64	2.00	0.00	1.00	0.00
47.77	79.55	2.00	0.00	1.00	0.00	47.86	79.51	2.00	0.00	1.00	0.00
47.92	79.75	2.00	0.00	1.00	0.00	47.97	80.59	2.00	0.00	1.00	0.00
48.06	81.70	2.00	0.00	1.00	0.00	48.11	82.87	2.00	0.00	1.00	0.00
48.17	83.82	2.00	0.00	1.00	0.00	48.25	84.91	2.00	0.00	1.00	0.00
48.30	87.18	2.00	0.00	1.00	0.00	48.37	91.03	2.00	0.00	1.00	0.00
48.46	94.87	2.00	0.00	1.00	0.00	48.51	97.88	2.00	0.00	1.00	0.00
48.56	100.62	2.00	0.00	1.00	0.00	48.64	103.67	2.00	0.00	1.00	0.00
48.69	107.69	2.00	0.00	1.00	0.00	48.76	111.27	2.00	0.00	1.00	0.00
48.82	114.66	2.00	0.00	1.00	0.00	48.91	116.72	2.00	0.00	1.00	0.00
48.95	117.85	2.00	0.00	1.00	0.00	49.04	118.20	2.00	0.00	1.00	0.00
49.10	117.95	2.00	0.00	1.00	0.00	49.17	117.10	2.00	0.00	1.00	0.00
49.26	116.08	2.00	0.00	1.00	0.00	49.29	115.48	2.00	0.00	1.00	0.00
49.36	115.19	2.00	0.00	1.00	0.00	49.45	114.97	2.00	0.00	1.00	0.00
49.50	115.05	2.00	0.00	1.00	0.00	49.55	115.33	2.00	0.00	1.00	0.00
49.65	115.19	2.00	0.00	1.00	0.00	49.69	115.55	2.00	0.00	1.00	0.00
49.74	115.72	2.00	0.00	1.00	0.00	49.81	116.70	2.00	0.00	1.00	0.00
49.87	117.18	2.00	0.00	1.00	0.00	49.94	117.79	2.00	0.00	1.00	0.00
50.04	117.95	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.24

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243

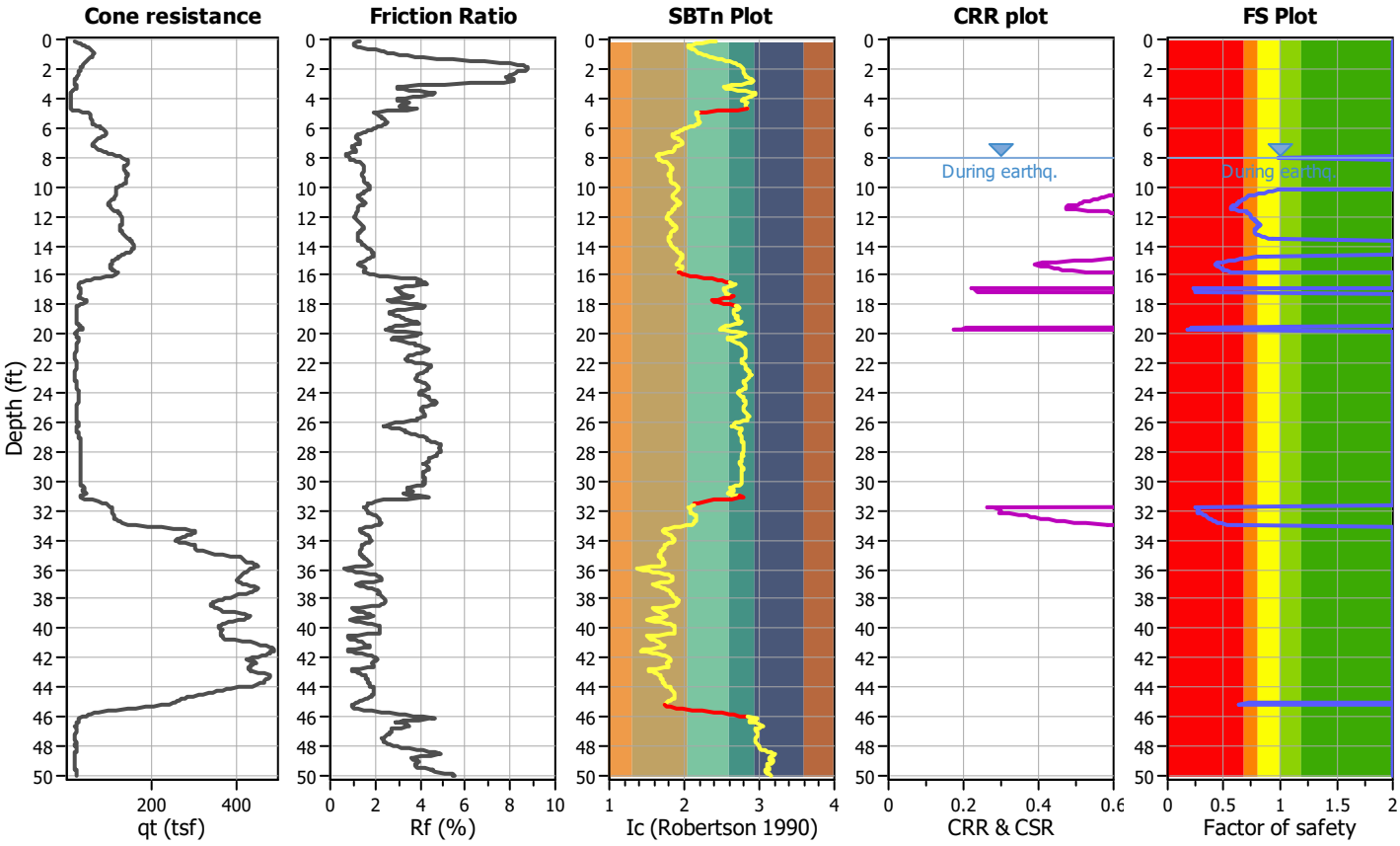
LIQUEFACTION ANALYSIS REPORT

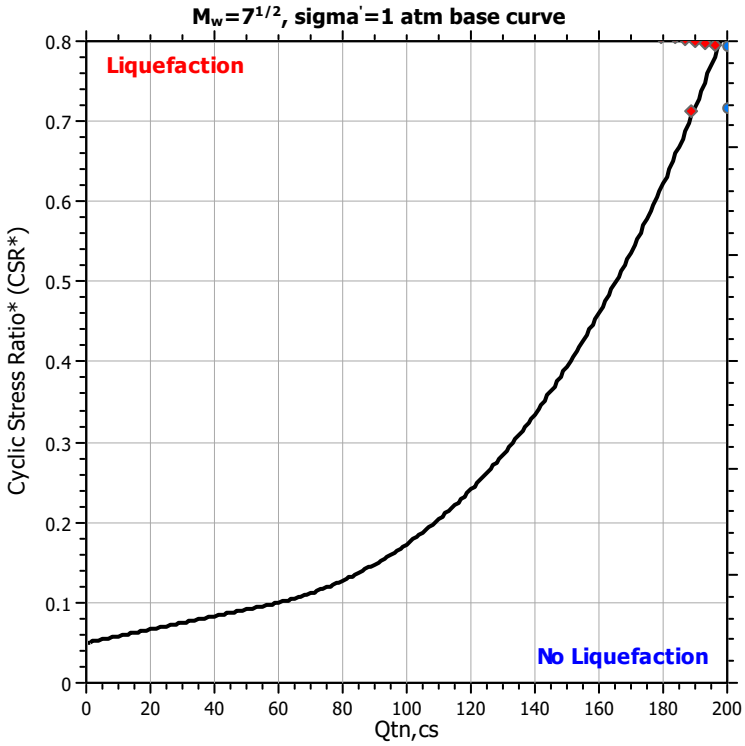
Project title : IVC Sports Field Improvements **Location : Imperial, CA**

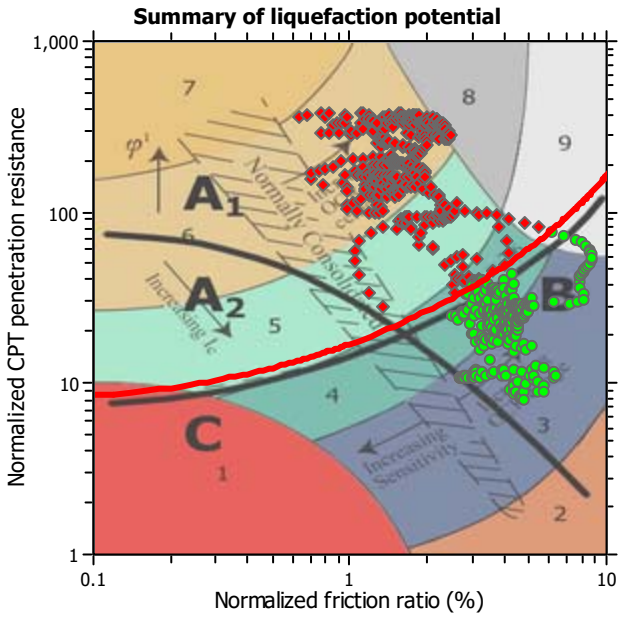
CPT file : CPT-2

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 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:	7.00	Ic cut-off value:	2.55	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	1.02	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

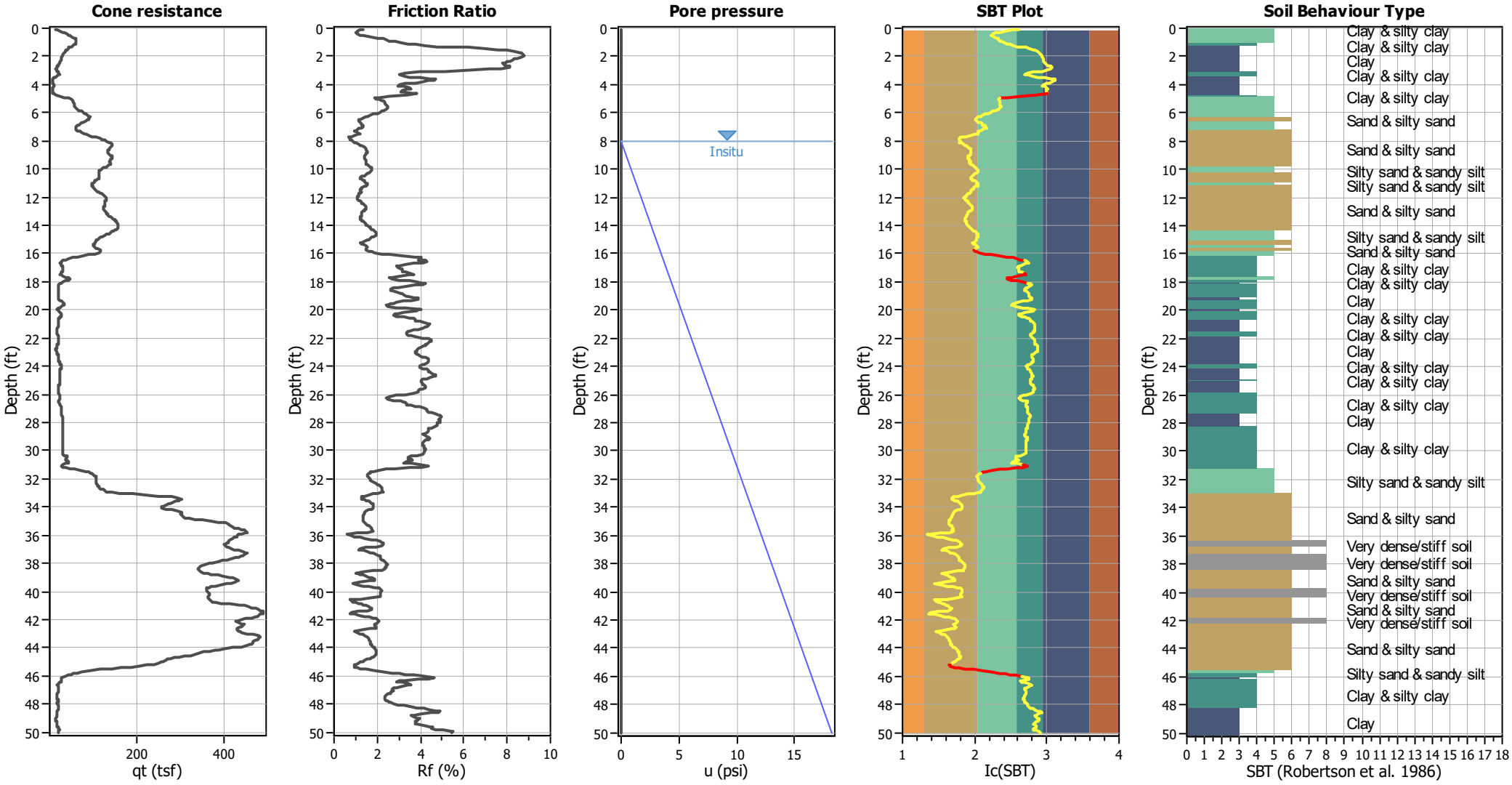






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



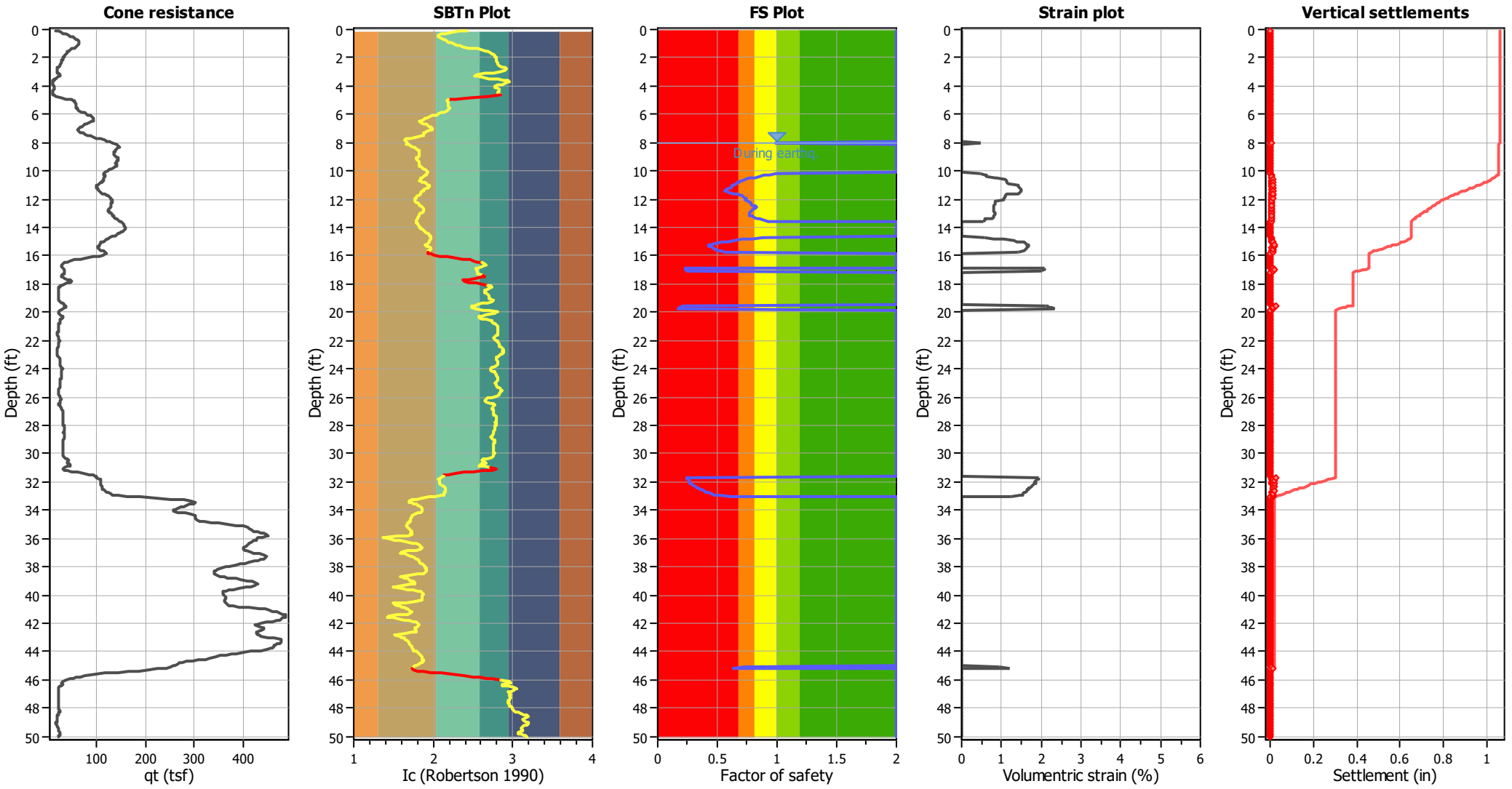
Input parameters and analysis data

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:	2.55	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.02	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	8.00 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

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

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.05	188.76	0.99	0.49	1.00	0.01	8.09	200.43	2.00	0.00	1.00	0.00
8.14	209.23	2.00	0.00	1.00	0.00	8.24	216.96	2.00	0.00	1.00	0.00
8.29	223.05	2.00	0.00	1.00	0.00	8.34	225.26	2.00	0.00	1.00	0.00
8.44	225.58	2.00	0.00	1.00	0.00	8.49	225.18	2.00	0.00	1.00	0.00
8.54	224.08	2.00	0.00	1.00	0.00	8.60	223.08	2.00	0.00	1.00	0.00
8.68	222.16	2.00	0.00	1.00	0.00	8.74	221.67	2.00	0.00	1.00	0.00
8.84	221.19	2.00	0.00	1.00	0.00	8.88	220.95	2.00	0.00	1.00	0.00
8.93	222.16	2.00	0.00	1.00	0.00	9.03	223.55	2.00	0.00	1.00	0.00
9.08	225.62	2.00	0.00	1.00	0.00	9.13	226.09	2.00	0.00	1.00	0.00
9.22	225.09	2.00	0.00	1.00	0.00	9.28	223.48	2.00	0.00	1.00	0.00
9.33	221.90	2.00	0.00	1.00	0.00	9.42	220.36	2.00	0.00	1.00	0.00
9.48	219.11	2.00	0.00	1.00	0.00	9.52	219.41	2.00	0.00	1.00	0.00
9.61	220.12	2.00	0.00	1.00	0.00	9.67	221.65	2.00	0.00	1.00	0.00
9.72	221.55	2.00	0.00	1.00	0.00	9.82	219.42	2.00	0.00	1.00	0.00
9.87	216.09	2.00	0.00	1.00	0.00	9.92	211.56	2.00	0.00	1.00	0.00
10.02	207.45	2.00	0.00	1.00	0.00	10.05	203.68	2.00	0.00	1.00	0.00
10.12	200.48	2.00	0.00	1.00	0.00	10.17	196.49	0.99	0.47	1.00	0.00
10.26	192.96	0.94	0.59	1.00	0.01	10.31	189.76	0.90	0.61	1.00	0.00
10.40	186.89	0.86	0.62	1.00	0.01	10.46	183.49	0.81	0.84	1.00	0.01
10.51	179.54	0.77	0.86	1.00	0.01	10.60	175.99	0.73	1.10	1.00	0.01
10.65	174.26	0.71	1.12	1.00	0.01	10.70	173.58	0.70	1.12	1.00	0.01
10.80	172.72	0.69	1.13	1.00	0.01	10.85	171.38	0.67	1.14	1.00	0.01
10.91	169.80	0.65	1.16	1.00	0.01	11.00	168.29	0.64	1.43	1.00	0.02
11.05	167.45	0.63	1.44	1.00	0.01	11.10	166.97	0.62	1.44	1.00	0.01
11.18	165.96	0.61	1.46	1.00	0.01	11.25	164.03	0.59	1.48	1.00	0.01
11.30	162.31	0.58	1.50	1.00	0.01	11.38	161.50	0.57	1.51	1.00	0.02
11.45	162.00	0.57	1.51	1.00	0.01	11.49	165.37	0.60	1.46	1.00	0.01
11.59	169.32	0.63	1.41	1.00	0.02	11.64	173.70	0.68	1.12	1.00	0.01
11.69	175.77	0.70	1.10	1.00	0.01	11.77	176.83	0.70	1.09	1.00	0.01
11.84	178.48	0.72	1.08	1.00	0.01	11.88	180.17	0.74	1.07	1.00	0.01
11.98	180.79	0.74	1.06	1.00	0.01	12.03	180.00	0.73	1.07	1.00	0.01
12.08	180.63	0.74	1.06	1.00	0.01	12.17	182.11	0.75	0.85	1.00	0.01
12.23	184.42	0.77	0.83	1.00	0.01	12.28	184.49	0.77	0.83	1.00	0.00
12.34	185.31	0.78	0.83	1.00	0.01	12.43	186.22	0.79	0.82	1.00	0.01
12.48	188.39	0.81	0.81	1.00	0.00	12.54	189.38	0.82	0.80	1.00	0.01
12.63	189.31	0.82	0.80	1.00	0.01	12.68	188.55	0.81	0.80	1.00	0.01
12.74	187.48	0.80	0.81	1.00	0.01	12.82	186.26	0.78	0.82	1.00	0.01
12.88	185.79	0.78	0.82	1.00	0.01	12.93	185.39	0.77	0.83	1.00	0.01
13.01	185.23	0.77	0.83	1.00	0.01	13.07	185.11	0.76	0.83	1.00	0.01
13.13	186.01	0.77	0.82	1.00	0.00	13.22	187.46	0.79	0.81	1.00	0.01
13.28	189.47	0.81	0.80	1.00	0.01	13.32	191.81	0.83	0.79	1.00	0.00
13.41	194.08	0.86	0.59	1.00	0.01	13.47	197.10	0.89	0.57	1.00	0.00
13.56	199.50	0.92	0.56	1.00	0.01	13.61	202.34	2.00	0.00	1.00	0.00
13.66	204.95	2.00	0.00	1.00	0.00	13.71	208.71	2.00	0.00	1.00	0.00
13.81	212.05	2.00	0.00	1.00	0.00	13.86	215.90	2.00	0.00	1.00	0.00
13.96	218.27	2.00	0.00	1.00	0.00	14.00	220.72	2.00	0.00	1.00	0.00
14.06	222.25	2.00	0.00	1.00	0.00	14.13	223.60	2.00	0.00	1.00	0.00
14.20	224.02	2.00	0.00	1.00	0.00	14.26	223.58	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
14.30	222.25	2.00	0.00	1.00	0.00	14.40	220.36	2.00	0.00	1.00	0.00
14.45	218.02	2.00	0.00	1.00	0.00	14.51	214.69	2.00	0.00	1.00	0.00
14.57	210.18	2.00	0.00	1.00	0.00	14.65	204.77	2.00	0.00	1.00	0.00
14.70	197.73	0.88	0.57	1.00	0.00	14.79	190.14	0.79	0.80	1.00	0.01
14.85	182.45	0.71	1.05	1.00	0.01	14.90	176.20	0.64	1.34	1.00	0.01
14.98	170.47	0.59	1.40	1.00	0.01	15.03	164.27	0.54	1.56	1.00	0.01
15.10	157.97	0.49	1.61	1.00	0.01	15.19	152.26	0.44	1.66	1.00	0.02
15.24	149.18	0.42	1.68	1.00	0.01	15.29	149.51	0.42	1.68	1.00	0.01
15.38	151.76	0.44	1.66	1.00	0.02	15.43	155.28	0.46	1.63	1.00	0.01
15.49	157.56	0.48	1.61	1.00	0.01	15.57	158.97	0.49	1.60	1.00	0.02
15.64	160.52	0.50	1.59	1.00	0.01	15.68	164.10	0.53	1.56	1.00	0.01
15.77	168.89	0.57	1.42	1.00	0.01	15.83	173.77	2.00	0.00	1.00	0.00
15.88	177.55	2.00	0.00	1.00	0.00	15.97	179.56	2.00	0.00	1.00	0.00
16.03	179.78	2.00	0.00	1.00	0.00	16.10	179.43	2.00	0.00	1.00	0.00
16.16	181.27	2.00	0.00	1.00	0.00	16.22	183.48	2.00	0.00	1.00	0.00
16.28	174.16	2.00	0.00	1.00	0.00	16.36	161.65	2.00	0.00	1.00	0.00
16.42	147.82	2.00	0.00	1.00	0.00	16.47	145.51	2.00	0.00	1.00	0.00
16.55	140.17	2.00	0.00	1.00	0.00	16.62	132.82	2.00	0.00	1.00	0.00
16.68	124.06	2.00	0.00	1.00	0.00	16.73	118.03	2.00	0.00	1.00	0.00
16.83	114.74	2.00	0.00	1.00	0.00	16.89	114.46	0.23	2.09	1.00	0.01
16.93	115.90	0.24	2.07	1.00	0.01	17.02	117.18	0.24	2.05	1.00	0.02
17.08	119.17	0.25	2.02	1.00	0.01	17.13	120.49	0.25	2.01	1.00	0.01
17.23	121.19	2.00	0.00	1.00	0.00	17.28	120.46	2.00	0.00	1.00	0.00
17.33	120.62	2.00	0.00	1.00	0.00	17.41	121.75	2.00	0.00	1.00	0.00
17.47	122.75	2.00	0.00	1.00	0.00	17.52	121.92	2.00	0.00	1.00	0.00
17.61	120.02	2.00	0.00	1.00	0.00	17.67	120.17	2.00	0.00	1.00	0.00
17.72	123.26	2.00	0.00	1.00	0.00	17.80	128.61	2.00	0.00	1.00	0.00
17.87	133.38	2.00	0.00	1.00	0.00	17.92	135.13	2.00	0.00	1.00	0.00
18.01	134.23	2.00	0.00	1.00	0.00	18.07	131.96	2.00	0.00	1.00	0.00
18.12	127.99	2.00	0.00	1.00	0.00	18.21	122.22	2.00	0.00	1.00	0.00
18.26	113.98	2.00	0.00	1.00	0.00	18.31	106.42	2.00	0.00	1.00	0.00
18.41	99.90	2.00	0.00	1.00	0.00	18.46	96.02	2.00	0.00	1.00	0.00
18.51	94.02	2.00	0.00	1.00	0.00	18.60	92.77	2.00	0.00	1.00	0.00
18.65	93.67	2.00	0.00	1.00	0.00	18.70	96.93	2.00	0.00	1.00	0.00
18.80	99.85	2.00	0.00	1.00	0.00	18.83	102.37	2.00	0.00	1.00	0.00
18.90	104.02	2.00	0.00	1.00	0.00	19.00	106.17	2.00	0.00	1.00	0.00
19.03	107.99	2.00	0.00	1.00	0.00	19.10	111.11	2.00	0.00	1.00	0.00
19.19	114.07	2.00	0.00	1.00	0.00	19.25	116.36	2.00	0.00	1.00	0.00
19.30	115.78	2.00	0.00	1.00	0.00	19.39	114.41	2.00	0.00	1.00	0.00
19.45	112.62	2.00	0.00	1.00	0.00	19.55	111.44	0.21	2.14	1.00	0.03
19.59	110.99	0.21	2.15	1.00	0.01	19.64	107.96	0.20	2.19	1.00	0.01
19.70	103.41	0.18	2.27	1.00	0.02	19.75	100.04	0.17	2.34	1.00	0.02
19.83	102.21	2.00	0.00	1.00	0.00	19.89	106.47	2.00	0.00	1.00	0.00
19.99	110.86	2.00	0.00	1.00	0.00	20.01	111.33	2.00	0.00	1.00	0.00
20.08	110.93	2.00	0.00	1.00	0.00	20.17	108.15	2.00	0.00	1.00	0.00
20.23	106.52	2.00	0.00	1.00	0.00	20.28	105.16	2.00	0.00	1.00	0.00
20.38	104.19	2.00	0.00	1.00	0.00	20.43	105.18	2.00	0.00	1.00	0.00
20.49	107.66	2.00	0.00	1.00	0.00	20.58	110.36	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.62	111.96	2.00	0.00	1.00	0.00	20.68	112.29	2.00	0.00	1.00	0.00
20.77	112.28	2.00	0.00	1.00	0.00	20.81	113.50	2.00	0.00	1.00	0.00
20.87	115.66	2.00	0.00	1.00	0.00	20.97	117.68	2.00	0.00	1.00	0.00
21.02	118.32	2.00	0.00	1.00	0.00	21.07	117.55	2.00	0.00	1.00	0.00
21.16	116.16	2.00	0.00	1.00	0.00	21.22	114.26	2.00	0.00	1.00	0.00
21.26	110.79	2.00	0.00	1.00	0.00	21.36	106.47	2.00	0.00	1.00	0.00
21.41	102.01	2.00	0.00	1.00	0.00	21.46	98.85	2.00	0.00	1.00	0.00
21.56	97.17	2.00	0.00	1.00	0.00	21.60	96.61	2.00	0.00	1.00	0.00
21.66	98.18	2.00	0.00	1.00	0.00	21.76	100.00	2.00	0.00	1.00	0.00
21.79	102.82	2.00	0.00	1.00	0.00	21.85	105.73	2.00	0.00	1.00	0.00
21.92	110.06	2.00	0.00	1.00	0.00	21.99	115.00	2.00	0.00	1.00	0.00
22.06	118.85	2.00	0.00	1.00	0.00	22.13	120.67	2.00	0.00	1.00	0.00
22.19	120.14	2.00	0.00	1.00	0.00	22.25	118.37	2.00	0.00	1.00	0.00
22.32	115.80	2.00	0.00	1.00	0.00	22.39	113.54	2.00	0.00	1.00	0.00
22.45	111.03	2.00	0.00	1.00	0.00	22.55	108.87	2.00	0.00	1.00	0.00
22.58	105.91	2.00	0.00	1.00	0.00	22.64	103.16	2.00	0.00	1.00	0.00
22.74	100.53	2.00	0.00	1.00	0.00	22.78	99.33	2.00	0.00	1.00	0.00
22.84	99.15	2.00	0.00	1.00	0.00	22.93	99.35	2.00	0.00	1.00	0.00
22.99	99.95	2.00	0.00	1.00	0.00	23.04	102.28	2.00	0.00	1.00	0.00
23.14	105.16	2.00	0.00	1.00	0.00	23.18	108.41	2.00	0.00	1.00	0.00
23.23	111.59	2.00	0.00	1.00	0.00	23.32	114.65	2.00	0.00	1.00	0.00
23.38	117.27	2.00	0.00	1.00	0.00	23.43	118.53	2.00	0.00	1.00	0.00
23.52	118.71	2.00	0.00	1.00	0.00	23.58	118.25	2.00	0.00	1.00	0.00
23.63	118.63	2.00	0.00	1.00	0.00	23.72	119.49	2.00	0.00	1.00	0.00
23.77	120.72	2.00	0.00	1.00	0.00	23.83	121.14	2.00	0.00	1.00	0.00
23.92	121.34	2.00	0.00	1.00	0.00	23.97	120.91	2.00	0.00	1.00	0.00
24.03	120.68	2.00	0.00	1.00	0.00	24.11	120.93	2.00	0.00	1.00	0.00
24.16	121.96	2.00	0.00	1.00	0.00	24.22	122.98	2.00	0.00	1.00	0.00
24.32	123.25	2.00	0.00	1.00	0.00	24.36	123.22	2.00	0.00	1.00	0.00
24.44	123.07	2.00	0.00	1.00	0.00	24.50	124.08	2.00	0.00	1.00	0.00
24.59	125.59	2.00	0.00	1.00	0.00	24.64	126.83	2.00	0.00	1.00	0.00
24.69	126.37	2.00	0.00	1.00	0.00	24.74	124.05	2.00	0.00	1.00	0.00
24.83	120.72	2.00	0.00	1.00	0.00	24.89	117.65	2.00	0.00	1.00	0.00
24.94	115.90	2.00	0.00	1.00	0.00	25.02	114.80	2.00	0.00	1.00	0.00
25.09	114.65	2.00	0.00	1.00	0.00	25.14	114.65	2.00	0.00	1.00	0.00
25.23	114.74	2.00	0.00	1.00	0.00	25.28	113.75	2.00	0.00	1.00	0.00
25.36	112.22	2.00	0.00	1.00	0.00	25.43	110.54	2.00	0.00	1.00	0.00
25.48	109.50	2.00	0.00	1.00	0.00	25.53	109.04	2.00	0.00	1.00	0.00
25.62	107.96	2.00	0.00	1.00	0.00	25.68	106.11	2.00	0.00	1.00	0.00
25.73	104.51	2.00	0.00	1.00	0.00	25.81	104.16	2.00	0.00	1.00	0.00
25.87	104.79	2.00	0.00	1.00	0.00	25.92	103.82	2.00	0.00	1.00	0.00
26.01	101.00	2.00	0.00	1.00	0.00	26.06	96.53	2.00	0.00	1.00	0.00
26.12	92.15	2.00	0.00	1.00	0.00	26.20	88.74	2.00	0.00	1.00	0.00
26.26	87.37	2.00	0.00	1.00	0.00	26.31	88.55	2.00	0.00	1.00	0.00
26.40	90.94	2.00	0.00	1.00	0.00	26.45	94.13	2.00	0.00	1.00	0.00
26.51	97.05	2.00	0.00	1.00	0.00	26.59	99.70	2.00	0.00	1.00	0.00
26.66	102.04	2.00	0.00	1.00	0.00	26.71	104.91	2.00	0.00	1.00	0.00
26.78	108.90	2.00	0.00	1.00	0.00	26.84	113.35	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
26.90	117.80	2.00	0.00	1.00	0.00	26.98	121.32	2.00	0.00	1.00	0.00
27.05	123.82	2.00	0.00	1.00	0.00	27.13	124.89	2.00	0.00	1.00	0.00
27.17	125.51	2.00	0.00	1.00	0.00	27.24	126.47	2.00	0.00	1.00	0.00
27.31	128.14	2.00	0.00	1.00	0.00	27.39	130.27	2.00	0.00	1.00	0.00
27.44	132.48	2.00	0.00	1.00	0.00	27.50	134.08	2.00	0.00	1.00	0.00
27.59	134.83	2.00	0.00	1.00	0.00	27.65	134.98	2.00	0.00	1.00	0.00
27.70	134.92	2.00	0.00	1.00	0.00	27.77	134.73	2.00	0.00	1.00	0.00
27.83	134.85	2.00	0.00	1.00	0.00	27.89	134.86	2.00	0.00	1.00	0.00
27.99	134.84	2.00	0.00	1.00	0.00	28.03	134.22	2.00	0.00	1.00	0.00
28.09	133.91	2.00	0.00	1.00	0.00	28.18	133.75	2.00	0.00	1.00	0.00
28.23	133.50	2.00	0.00	1.00	0.00	28.29	131.46	2.00	0.00	1.00	0.00
28.36	128.85	2.00	0.00	1.00	0.00	28.44	126.90	2.00	0.00	1.00	0.00
28.49	126.72	2.00	0.00	1.00	0.00	28.55	126.95	2.00	0.00	1.00	0.00
28.62	126.88	2.00	0.00	1.00	0.00	28.68	125.97	2.00	0.00	1.00	0.00
28.77	125.04	2.00	0.00	1.00	0.00	28.83	124.29	2.00	0.00	1.00	0.00
28.88	124.46	2.00	0.00	1.00	0.00	28.98	124.61	2.00	0.00	1.00	0.00
29.02	124.80	2.00	0.00	1.00	0.00	29.09	124.77	2.00	0.00	1.00	0.00
29.17	124.73	2.00	0.00	1.00	0.00	29.21	124.22	2.00	0.00	1.00	0.00
29.27	123.04	2.00	0.00	1.00	0.00	29.37	121.78	2.00	0.00	1.00	0.00
29.42	121.15	2.00	0.00	1.00	0.00	29.46	120.99	2.00	0.00	1.00	0.00
29.56	120.85	2.00	0.00	1.00	0.00	29.61	120.71	2.00	0.00	1.00	0.00
29.67	120.59	2.00	0.00	1.00	0.00	29.73	120.84	2.00	0.00	1.00	0.00
29.82	121.22	2.00	0.00	1.00	0.00	29.86	121.76	2.00	0.00	1.00	0.00
29.95	121.76	2.00	0.00	1.00	0.00	30.00	121.58	2.00	0.00	1.00	0.00
30.07	120.72	2.00	0.00	1.00	0.00	30.13	120.18	2.00	0.00	1.00	0.00
30.19	121.44	2.00	0.00	1.00	0.00	30.26	123.23	2.00	0.00	1.00	0.00
30.35	124.09	2.00	0.00	1.00	0.00	30.39	123.01	2.00	0.00	1.00	0.00
30.45	121.58	2.00	0.00	1.00	0.00	30.52	120.36	2.00	0.00	1.00	0.00
30.60	120.04	2.00	0.00	1.00	0.00	30.65	121.70	2.00	0.00	1.00	0.00
30.72	122.69	2.00	0.00	1.00	0.00	30.80	122.68	2.00	0.00	1.00	0.00
30.85	121.06	2.00	0.00	1.00	0.00	30.91	120.24	2.00	0.00	1.00	0.00
31.00	120.42	2.00	0.00	1.00	0.00	31.05	121.41	2.00	0.00	1.00	0.00
31.14	121.29	2.00	0.00	1.00	0.00	31.20	119.45	2.00	0.00	1.00	0.00
31.25	116.73	2.00	0.00	1.00	0.00	31.30	116.01	2.00	0.00	1.00	0.00
31.37	117.08	2.00	0.00	1.00	0.00	31.44	119.91	2.00	0.00	1.00	0.00
31.54	122.79	2.00	0.00	1.00	0.00	31.59	124.87	2.00	0.00	1.00	0.00
31.63	125.33	2.00	0.00	1.00	0.00	31.73	125.06	0.24	1.95	1.00	0.02
31.76	126.20	0.24	1.93	1.00	0.01	31.83	129.19	0.26	1.89	1.00	0.02
31.93	132.00	0.27	1.86	1.00	0.02	31.98	133.31	0.27	1.85	1.00	0.01
32.03	132.71	0.27	1.85	1.00	0.01	32.12	132.65	0.27	1.85	1.00	0.02
32.16	133.80	0.27	1.84	1.00	0.01	32.22	137.38	0.29	1.80	1.00	0.01
32.30	141.88	0.31	1.75	1.00	0.02	32.37	145.60	0.33	1.72	1.00	0.01
32.42	147.56	0.34	1.70	1.00	0.01	32.48	148.98	0.35	1.69	1.00	0.01
32.55	151.68	0.37	1.66	1.00	0.01	32.64	154.72	0.38	1.63	1.00	0.02
32.70	157.76	0.40	1.61	1.00	0.01	32.75	160.75	0.42	1.58	1.00	0.01
32.83	164.36	0.45	1.55	1.00	0.02	32.89	168.81	0.48	1.52	1.00	0.01
32.95	175.56	0.53	1.47	1.00	0.01	33.02	185.62	0.61	1.24	1.00	0.01
33.08	200.45	2.00	0.00	1.00	0.00	33.15	218.86	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
33.21	237.37	2.00	0.00	1.00	0.00	33.28	254.28	2.00	0.00	1.00	0.00
33.36	264.10	2.00	0.00	1.00	0.00	33.40	271.44	2.00	0.00	1.00	0.00
33.48	274.32	2.00	0.00	1.00	0.00	33.56	275.57	2.00	0.00	1.00	0.00
33.60	274.16	2.00	0.00	1.00	0.00	33.68	271.99	2.00	0.00	1.00	0.00
33.73	268.70	2.00	0.00	1.00	0.00	33.80	264.17	2.00	0.00	1.00	0.00
33.87	258.83	2.00	0.00	1.00	0.00	33.95	254.10	2.00	0.00	1.00	0.00
33.99	251.74	2.00	0.00	1.00	0.00	34.06	251.90	2.00	0.00	1.00	0.00
34.14	255.43	2.00	0.00	1.00	0.00	34.19	263.03	2.00	0.00	1.00	0.00
34.25	269.83	2.00	0.00	1.00	0.00	34.34	273.34	2.00	0.00	1.00	0.00
34.40	272.36	2.00	0.00	1.00	0.00	34.49	271.08	2.00	0.00	1.00	0.00
34.52	270.33	2.00	0.00	1.00	0.00	34.59	270.34	2.00	0.00	1.00	0.00
34.69	270.95	2.00	0.00	1.00	0.00	34.74	273.73	2.00	0.00	1.00	0.00
34.79	281.11	2.00	0.00	1.00	0.00	34.88	291.22	2.00	0.00	1.00	0.00
34.93	303.59	2.00	0.00	1.00	0.00	34.98	318.08	2.00	0.00	1.00	0.00
35.08	332.48	2.00	0.00	1.00	0.00	35.13	344.94	2.00	0.00	1.00	0.00
35.18	352.51	2.00	0.00	1.00	0.00	35.26	357.42	2.00	0.00	1.00	0.00
35.30	361.96	2.00	0.00	1.00	0.00	35.37	367.81	2.00	0.00	1.00	0.00
35.48	374.12	2.00	0.00	1.00	0.00	35.53	380.47	2.00	0.00	1.00	0.00
35.57	385.43	2.00	0.00	1.00	0.00	35.65	390.90	2.00	0.00	1.00	0.00
35.71	396.82	2.00	0.00	1.00	0.00	35.77	385.08	2.00	0.00	1.00	0.00
35.85	376.31	2.00	0.00	1.00	0.00	35.90	368.20	2.00	0.00	1.00	0.00
35.97	361.30	2.00	0.00	1.00	0.00	36.03	358.13	2.00	0.00	1.00	0.00
36.11	358.87	2.00	0.00	1.00	0.00	36.17	353.38	2.00	0.00	1.00	0.00
36.23	352.64	2.00	0.00	1.00	0.00	36.29	362.02	2.00	0.00	1.00	0.00
36.36	371.53	2.00	0.00	1.00	0.00	36.44	375.65	2.00	0.00	1.00	0.00
36.50	377.62	2.00	0.00	1.00	0.00	36.56	376.74	2.00	0.00	1.00	0.00
36.63	375.05	2.00	0.00	1.00	0.00	36.68	373.44	2.00	0.00	1.00	0.00
36.76	369.64	2.00	0.00	1.00	0.00	36.84	360.43	2.00	0.00	1.00	0.00
36.90	342.90	2.00	0.00	1.00	0.00	36.95	342.81	2.00	0.00	1.00	0.00
37.02	349.49	2.00	0.00	1.00	0.00	37.07	357.34	2.00	0.00	1.00	0.00
37.14	370.92	2.00	0.00	1.00	0.00	37.22	383.23	2.00	0.00	1.00	0.00
37.30	390.15	2.00	0.00	1.00	0.00	37.34	392.71	2.00	0.00	1.00	0.00
37.43	393.39	2.00	0.00	1.00	0.00	37.48	393.40	2.00	0.00	1.00	0.00
37.54	388.87	2.00	0.00	1.00	0.00	37.62	380.94	2.00	0.00	1.00	0.00
37.69	372.84	2.00	0.00	1.00	0.00	37.74	366.38	2.00	0.00	1.00	0.00
37.80	362.29	2.00	0.00	1.00	0.00	37.89	357.67	2.00	0.00	1.00	0.00
37.93	348.09	2.00	0.00	1.00	0.00	38.03	343.12	2.00	0.00	1.00	0.00
38.06	336.46	2.00	0.00	1.00	0.00	38.13	334.76	2.00	0.00	1.00	0.00
38.21	328.62	2.00	0.00	1.00	0.00	38.27	324.69	2.00	0.00	1.00	0.00
38.32	321.95	2.00	0.00	1.00	0.00	38.41	318.24	2.00	0.00	1.00	0.00
38.46	315.02	2.00	0.00	1.00	0.00	38.52	303.01	2.00	0.00	1.00	0.00
38.62	289.07	2.00	0.00	1.00	0.00	38.66	284.43	2.00	0.00	1.00	0.00
38.72	292.39	2.00	0.00	1.00	0.00	38.82	297.67	2.00	0.00	1.00	0.00
38.85	315.26	2.00	0.00	1.00	0.00	38.92	328.11	2.00	0.00	1.00	0.00
39.00	344.05	2.00	0.00	1.00	0.00	39.06	355.28	2.00	0.00	1.00	0.00
39.11	364.57	2.00	0.00	1.00	0.00	39.17	368.98	2.00	0.00	1.00	0.00
39.24	358.76	2.00	0.00	1.00	0.00	39.30	339.93	2.00	0.00	1.00	0.00
39.40	332.90	2.00	0.00	1.00	0.00	39.45	324.92	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
39.51	312.91	2.00	0.00	1.00	0.00	39.58	308.64	2.00	0.00	1.00	0.00
39.63	312.79	2.00	0.00	1.00	0.00	39.73	316.64	2.00	0.00	1.00	0.00
39.77	320.01	2.00	0.00	1.00	0.00	39.84	321.15	2.00	0.00	1.00	0.00
39.90	322.15	2.00	0.00	1.00	0.00	39.98	322.70	2.00	0.00	1.00	0.00
40.03	323.61	2.00	0.00	1.00	0.00	40.11	324.47	2.00	0.00	1.00	0.00
40.16	324.60	2.00	0.00	1.00	0.00	40.23	324.10	2.00	0.00	1.00	0.00
40.30	323.30	2.00	0.00	1.00	0.00	40.36	322.50	2.00	0.00	1.00	0.00
40.42	307.04	2.00	0.00	1.00	0.00	40.52	288.51	2.00	0.00	1.00	0.00
40.55	288.72	2.00	0.00	1.00	0.00	40.62	290.09	2.00	0.00	1.00	0.00
40.72	292.72	2.00	0.00	1.00	0.00	40.77	298.40	2.00	0.00	1.00	0.00
40.82	308.81	2.00	0.00	1.00	0.00	40.88	323.54	2.00	0.00	1.00	0.00
40.95	341.41	2.00	0.00	1.00	0.00	41.02	355.81	2.00	0.00	1.00	0.00
41.11	366.04	2.00	0.00	1.00	0.00	41.15	373.88	2.00	0.00	1.00	0.00
41.21	383.56	2.00	0.00	1.00	0.00	41.30	387.89	2.00	0.00	1.00	0.00
41.35	381.49	2.00	0.00	1.00	0.00	41.41	379.81	2.00	0.00	1.00	0.00
41.50	380.47	2.00	0.00	1.00	0.00	41.55	379.20	2.00	0.00	1.00	0.00
41.60	374.27	2.00	0.00	1.00	0.00	41.68	372.23	2.00	0.00	1.00	0.00
41.75	368.15	2.00	0.00	1.00	0.00	41.80	376.36	2.00	0.00	1.00	0.00
41.88	376.42	2.00	0.00	1.00	0.00	41.93	372.75	2.00	0.00	1.00	0.00
42.00	366.39	2.00	0.00	1.00	0.00	42.09	360.77	2.00	0.00	1.00	0.00
42.13	358.66	2.00	0.00	1.00	0.00	42.19	360.67	2.00	0.00	1.00	0.00
42.26	363.41	2.00	0.00	1.00	0.00	42.33	364.13	2.00	0.00	1.00	0.00
42.39	362.71	2.00	0.00	1.00	0.00	42.49	360.44	2.00	0.00	1.00	0.00
42.53	358.58	2.00	0.00	1.00	0.00	42.59	354.82	2.00	0.00	1.00	0.00
42.65	345.18	2.00	0.00	1.00	0.00	42.73	328.28	2.00	0.00	1.00	0.00
42.80	330.12	2.00	0.00	1.00	0.00	42.85	332.59	2.00	0.00	1.00	0.00
42.93	335.03	2.00	0.00	1.00	0.00	43.00	346.28	2.00	0.00	1.00	0.00
43.05	355.56	2.00	0.00	1.00	0.00	43.14	366.17	2.00	0.00	1.00	0.00
43.18	371.90	2.00	0.00	1.00	0.00	43.24	372.68	2.00	0.00	1.00	0.00
43.31	372.96	2.00	0.00	1.00	0.00	43.39	371.39	2.00	0.00	1.00	0.00
43.44	369.64	2.00	0.00	1.00	0.00	43.53	367.20	2.00	0.00	1.00	0.00
43.59	366.40	2.00	0.00	1.00	0.00	43.66	365.87	2.00	0.00	1.00	0.00
43.73	364.80	2.00	0.00	1.00	0.00	43.78	362.07	2.00	0.00	1.00	0.00
43.83	356.78	2.00	0.00	1.00	0.00	43.93	350.46	2.00	0.00	1.00	0.00
43.98	338.15	2.00	0.00	1.00	0.00	44.03	328.52	2.00	0.00	1.00	0.00
44.12	317.38	2.00	0.00	1.00	0.00	44.17	311.23	2.00	0.00	1.00	0.00
44.23	302.67	2.00	0.00	1.00	0.00	44.29	294.68	2.00	0.00	1.00	0.00
44.37	287.06	2.00	0.00	1.00	0.00	44.43	278.50	2.00	0.00	1.00	0.00
44.52	269.52	2.00	0.00	1.00	0.00	44.58	259.67	2.00	0.00	1.00	0.00
44.62	249.71	2.00	0.00	1.00	0.00	44.69	239.47	2.00	0.00	1.00	0.00
44.77	230.44	2.00	0.00	1.00	0.00	44.82	222.38	2.00	0.00	1.00	0.00
44.91	215.54	2.00	0.00	1.00	0.00	44.96	209.10	2.00	0.00	1.00	0.00
45.03	203.45	2.00	0.00	1.00	0.00	45.09	196.42	0.72	0.94	1.00	0.01
45.16	187.79	0.64	1.22	1.00	0.01	45.21	174.94	2.00	0.00	1.00	0.00
45.28	161.79	2.00	0.00	1.00	0.00	45.35	148.65	2.00	0.00	1.00	0.00
45.41	137.08	2.00	0.00	1.00	0.00	45.47	126.47	2.00	0.00	1.00	0.00
45.54	116.68	2.00	0.00	1.00	0.00	45.61	112.07	2.00	0.00	1.00	0.00
45.67	110.56	2.00	0.00	1.00	0.00	45.76	111.15	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
45.81	112.14	2.00	0.00	1.00	0.00	45.87	112.30	2.00	0.00	1.00	0.00
45.94	111.94	2.00	0.00	1.00	0.00	46.02	110.25	2.00	0.00	1.00	0.00
46.07	105.35	2.00	0.00	1.00	0.00	46.17	99.32	2.00	0.00	1.00	0.00
46.22	93.49	2.00	0.00	1.00	0.00	46.27	89.49	2.00	0.00	1.00	0.00
46.36	85.76	2.00	0.00	1.00	0.00	46.42	82.41	2.00	0.00	1.00	0.00
46.46	81.07	2.00	0.00	1.00	0.00	46.56	80.67	2.00	0.00	1.00	0.00
46.61	79.55	2.00	0.00	1.00	0.00	46.66	77.73	2.00	0.00	1.00	0.00
46.76	75.82	2.00	0.00	1.00	0.00	46.81	74.39	2.00	0.00	1.00	0.00
46.86	73.27	2.00	0.00	1.00	0.00	46.95	72.27	2.00	0.00	1.00	0.00
47.00	71.52	2.00	0.00	1.00	0.00	47.07	71.07	2.00	0.00	1.00	0.00
47.13	70.24	2.00	0.00	1.00	0.00	47.22	69.12	2.00	0.00	1.00	0.00
47.27	67.79	2.00	0.00	1.00	0.00	47.32	66.76	2.00	0.00	1.00	0.00
47.42	66.11	2.00	0.00	1.00	0.00	47.47	65.97	2.00	0.00	1.00	0.00
47.51	66.09	2.00	0.00	1.00	0.00	47.61	66.30	2.00	0.00	1.00	0.00
47.66	66.64	2.00	0.00	1.00	0.00	47.71	67.23	2.00	0.00	1.00	0.00
47.80	67.84	2.00	0.00	1.00	0.00	47.85	68.47	2.00	0.00	1.00	0.00
47.91	69.37	2.00	0.00	1.00	0.00	47.99	70.72	2.00	0.00	1.00	0.00
48.04	73.36	2.00	0.00	1.00	0.00	48.11	77.38	2.00	0.00	1.00	0.00
48.18	81.74	2.00	0.00	1.00	0.00	48.24	84.83	2.00	0.00	1.00	0.00
48.30	86.22	2.00	0.00	1.00	0.00	48.39	86.49	2.00	0.00	1.00	0.00
48.43	86.34	2.00	0.00	1.00	0.00	48.50	85.40	2.00	0.00	1.00	0.00
48.56	83.20	2.00	0.00	1.00	0.00	48.63	80.35	2.00	0.00	1.00	0.00
48.70	77.11	2.00	0.00	1.00	0.00	48.77	74.98	2.00	0.00	1.00	0.00
48.83	73.75	2.00	0.00	1.00	0.00	48.89	73.69	2.00	0.00	1.00	0.00
48.99	73.54	2.00	0.00	1.00	0.00	49.04	73.18	2.00	0.00	1.00	0.00
49.09	73.18	2.00	0.00	1.00	0.00	49.19	73.66	2.00	0.00	1.00	0.00
49.24	75.00	2.00	0.00	1.00	0.00	49.28	76.66	2.00	0.00	1.00	0.00
49.38	78.08	2.00	0.00	1.00	0.00	49.43	79.41	2.00	0.00	1.00	0.00
49.48	81.92	2.00	0.00	1.00	0.00	49.58	85.44	2.00	0.00	1.00	0.00
49.63	88.66	2.00	0.00	1.00	0.00	49.68	91.06	2.00	0.00	1.00	0.00
49.77	93.85	2.00	0.00	1.00	0.00	49.83	96.43	2.00	0.00	1.00	0.00
49.88	97.01	2.00	0.00	1.00	0.00	49.97	95.52	2.00	0.00	1.00	0.00
50.02	94.08	2.00	0.00	1.00	0.00						

Total estimated settlement: 1.06

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243

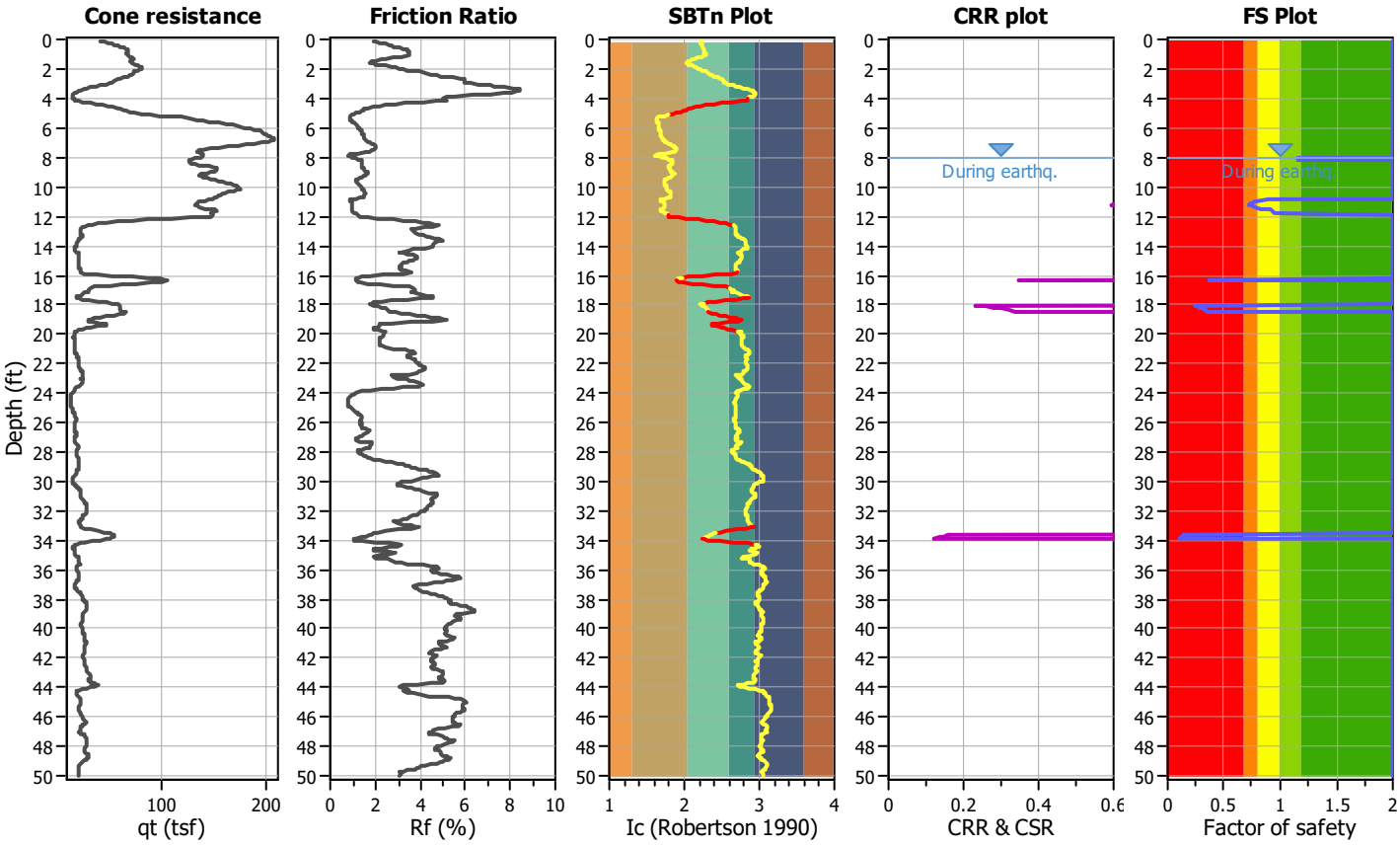
LIQUEFACTION ANALYSIS REPORT

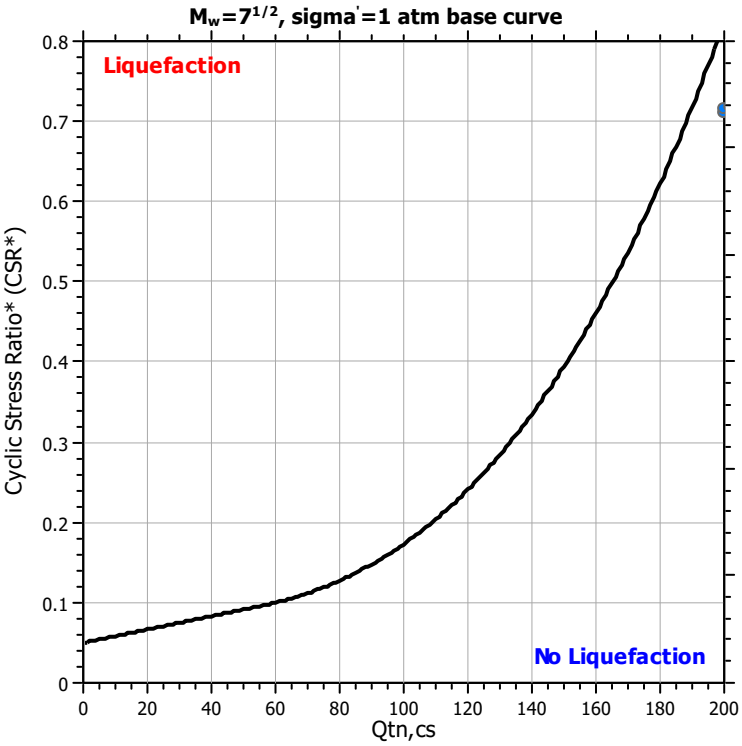
Project title : IVC Sports Field Improvements **Location : Imperial, CA**

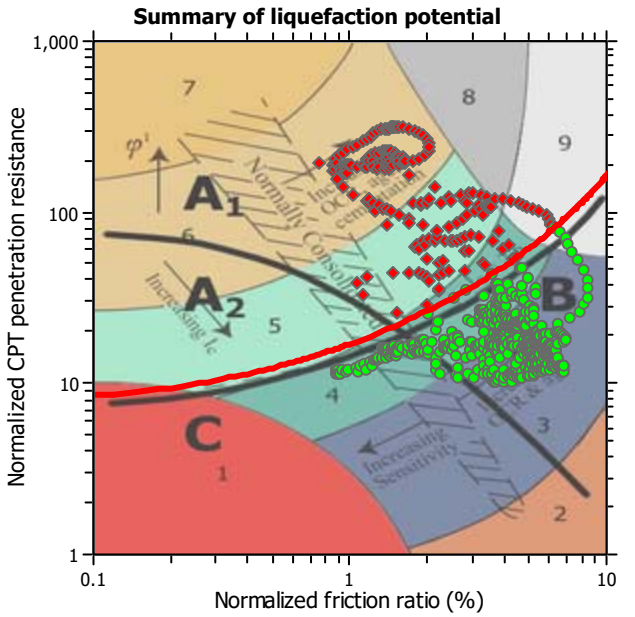
CPT file : CPT-3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 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:	7.00	Ic cut-off value:	2.55	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	1.02	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

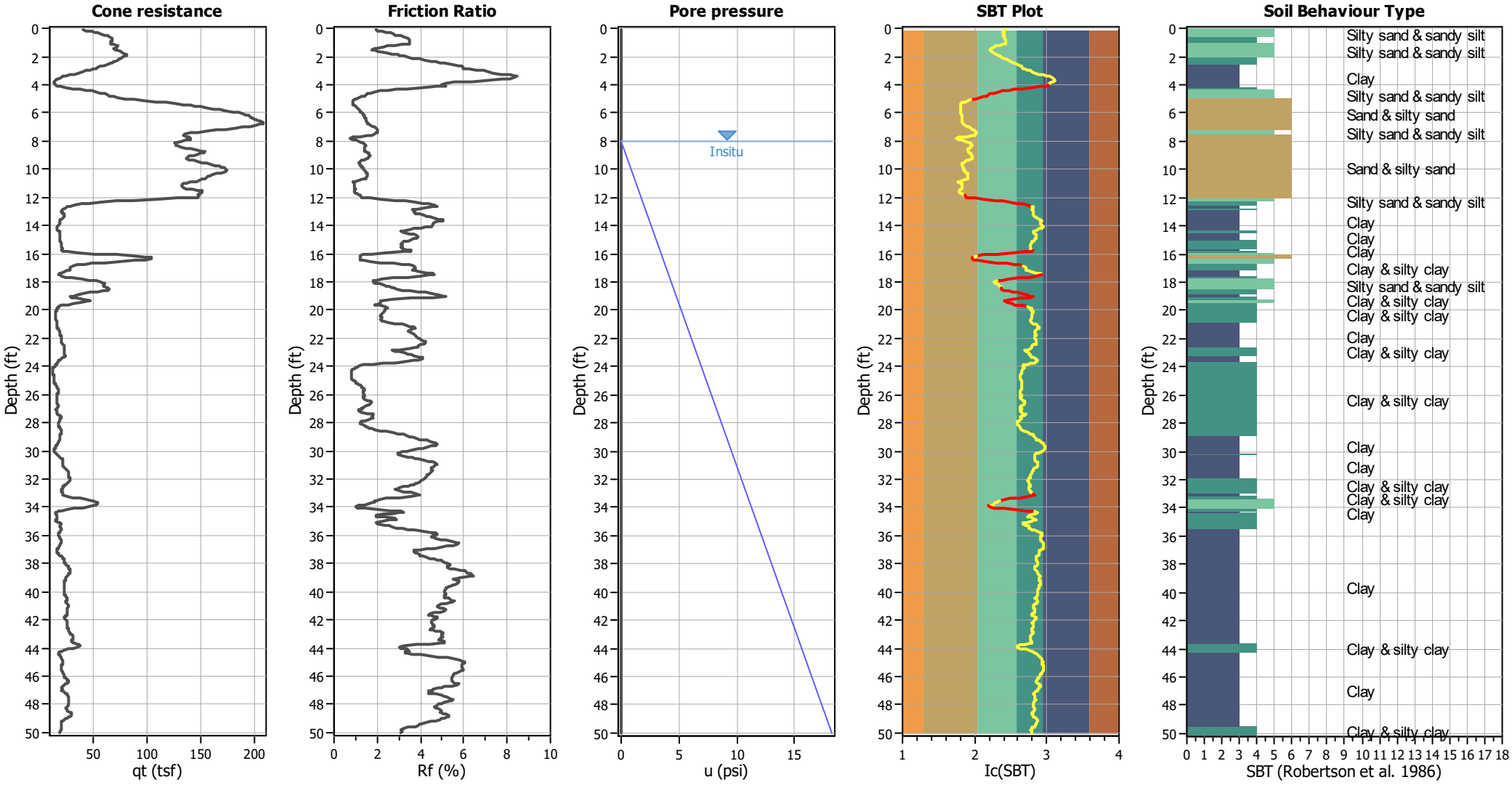






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



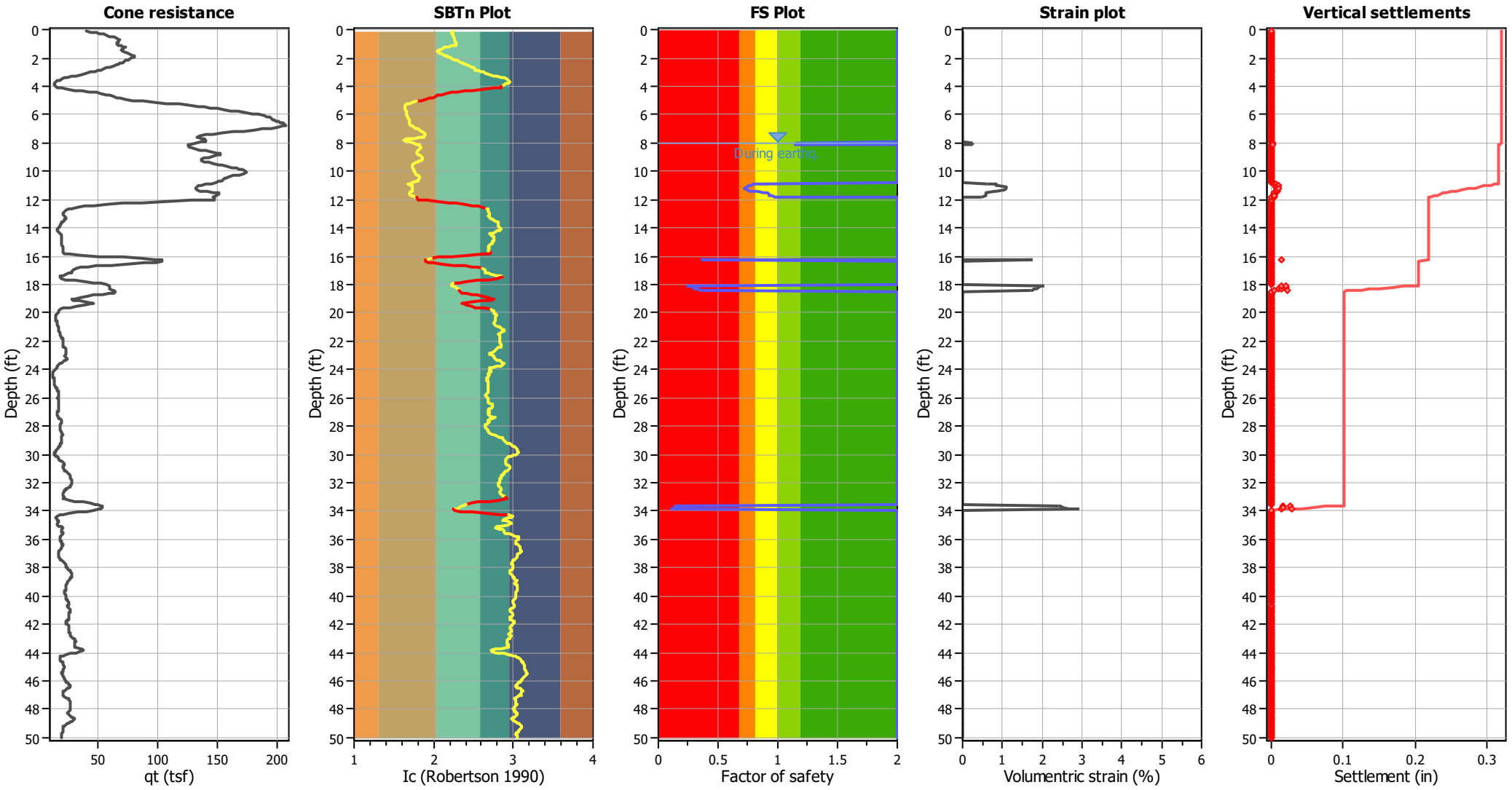
Input parameters and analysis data

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:	2.55	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.02	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	8.00 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

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

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.01	199.77	1.16	0.25	1.00	0.00	8.10	199.98	1.15	0.25	1.00	0.00
8.15	202.18	2.00	0.00	1.00	0.00	8.21	204.62	2.00	0.00	1.00	0.00
8.30	206.32	2.00	0.00	1.00	0.00	8.35	208.04	2.00	0.00	1.00	0.00
8.40	210.15	2.00	0.00	1.00	0.00	8.50	213.52	2.00	0.00	1.00	0.00
8.54	218.53	2.00	0.00	1.00	0.00	8.60	225.19	2.00	0.00	1.00	0.00
8.70	230.97	2.00	0.00	1.00	0.00	8.73	236.04	2.00	0.00	1.00	0.00
8.84	237.22	2.00	0.00	1.00	0.00	8.89	236.94	2.00	0.00	1.00	0.00
8.94	233.87	2.00	0.00	1.00	0.00	9.04	229.59	2.00	0.00	1.00	0.00
9.08	225.17	2.00	0.00	1.00	0.00	9.14	220.45	2.00	0.00	1.00	0.00
9.23	216.17	2.00	0.00	1.00	0.00	9.28	213.07	2.00	0.00	1.00	0.00
9.33	211.82	2.00	0.00	1.00	0.00	9.39	211.86	2.00	0.00	1.00	0.00
9.48	212.43	2.00	0.00	1.00	0.00	9.53	214.76	2.00	0.00	1.00	0.00
9.58	218.18	2.00	0.00	1.00	0.00	9.65	223.38	2.00	0.00	1.00	0.00
9.73	228.67	2.00	0.00	1.00	0.00	9.78	234.66	2.00	0.00	1.00	0.00
9.87	239.26	2.00	0.00	1.00	0.00	9.92	243.58	2.00	0.00	1.00	0.00
9.98	246.67	2.00	0.00	1.00	0.00	10.07	248.64	2.00	0.00	1.00	0.00
10.11	249.67	2.00	0.00	1.00	0.00	10.17	248.39	2.00	0.00	1.00	0.00
10.27	245.30	2.00	0.00	1.00	0.00	10.31	241.09	2.00	0.00	1.00	0.00
10.41	237.08	2.00	0.00	1.00	0.00	10.46	234.21	2.00	0.00	1.00	0.00
10.51	231.67	2.00	0.00	1.00	0.00	10.61	228.18	2.00	0.00	1.00	0.00
10.66	224.29	2.00	0.00	1.00	0.00	10.71	216.50	2.00	0.00	1.00	0.00
10.78	203.46	2.00	0.00	1.00	0.00	10.85	190.25	0.89	0.61	1.00	0.00
10.90	182.55	0.79	0.84	1.00	0.01	11.00	181.23	0.78	0.85	1.00	0.01
11.05	179.56	0.76	0.86	1.00	0.01	11.10	178.01	0.74	1.08	1.00	0.01
11.18	176.99	0.72	1.09	1.00	0.01	11.24	176.92	0.72	1.09	1.00	0.01
11.30	178.69	0.74	1.08	1.00	0.01	11.37	181.73	0.77	0.85	1.00	0.01
11.44	186.61	0.83	0.82	1.00	0.01	11.50	191.21	0.88	0.60	1.00	0.00
11.56	194.57	0.92	0.59	1.00	0.00	11.62	195.72	0.93	0.58	1.00	0.00
11.68	195.46	0.93	0.58	1.00	0.00	11.76	197.23	0.95	0.57	1.00	0.00
11.82	199.17	0.97	0.47	1.00	0.00	11.88	203.02	2.00	0.00	1.00	0.00
11.98	204.63	2.00	0.00	1.00	0.00	12.02	205.69	2.00	0.00	1.00	0.00
12.09	198.89	2.00	0.00	1.00	0.00	12.18	192.44	2.00	0.00	1.00	0.00
12.21	188.97	2.00	0.00	1.00	0.00	12.27	184.83	2.00	0.00	1.00	0.00
12.34	179.15	2.00	0.00	1.00	0.00	12.42	172.10	2.00	0.00	1.00	0.00
12.47	164.95	2.00	0.00	1.00	0.00	12.54	159.84	2.00	0.00	1.00	0.00
12.62	153.13	2.00	0.00	1.00	0.00	12.68	143.06	2.00	0.00	1.00	0.00
12.74	131.26	2.00	0.00	1.00	0.00	12.81	121.05	2.00	0.00	1.00	0.00
12.87	116.00	2.00	0.00	1.00	0.00	12.93	115.43	2.00	0.00	1.00	0.00
13.02	115.93	2.00	0.00	1.00	0.00	13.07	117.56	2.00	0.00	1.00	0.00
13.14	119.71	2.00	0.00	1.00	0.00	13.20	123.97	2.00	0.00	1.00	0.00
13.27	127.80	2.00	0.00	1.00	0.00	13.36	130.20	2.00	0.00	1.00	0.00
13.41	131.12	2.00	0.00	1.00	0.00	13.46	131.89	2.00	0.00	1.00	0.00
13.56	132.63	2.00	0.00	1.00	0.00	13.61	132.77	2.00	0.00	1.00	0.00
13.66	131.56	2.00	0.00	1.00	0.00	13.71	128.14	2.00	0.00	1.00	0.00
13.80	124.61	2.00	0.00	1.00	0.00	13.85	121.73	2.00	0.00	1.00	0.00
13.94	120.63	2.00	0.00	1.00	0.00	13.99	118.81	2.00	0.00	1.00	0.00
14.05	115.56	2.00	0.00	1.00	0.00	14.13	110.75	2.00	0.00	1.00	0.00
14.19	106.77	2.00	0.00	1.00	0.00	14.25	103.44	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
14.34	101.30	2.00	0.00	1.00	0.00	14.39	99.15	2.00	0.00	1.00	0.00
14.45	99.37	2.00	0.00	1.00	0.00	14.51	102.09	2.00	0.00	1.00	0.00
14.57	106.14	2.00	0.00	1.00	0.00	14.64	109.78	2.00	0.00	1.00	0.00
14.73	111.47	2.00	0.00	1.00	0.00	14.78	112.12	2.00	0.00	1.00	0.00
14.84	112.06	2.00	0.00	1.00	0.00	14.90	111.79	2.00	0.00	1.00	0.00
14.96	110.37	2.00	0.00	1.00	0.00	15.04	107.40	2.00	0.00	1.00	0.00
15.11	104.75	2.00	0.00	1.00	0.00	15.17	102.71	2.00	0.00	1.00	0.00
15.23	102.21	2.00	0.00	1.00	0.00	15.33	102.05	2.00	0.00	1.00	0.00
15.38	102.65	2.00	0.00	1.00	0.00	15.44	102.85	2.00	0.00	1.00	0.00
15.50	102.47	2.00	0.00	1.00	0.00	15.56	102.34	2.00	0.00	1.00	0.00
15.62	103.91	2.00	0.00	1.00	0.00	15.71	106.44	2.00	0.00	1.00	0.00
15.76	110.13	2.00	0.00	1.00	0.00	15.82	112.37	2.00	0.00	1.00	0.00
15.89	112.54	2.00	0.00	1.00	0.00	15.96	108.31	2.00	0.00	1.00	0.00
16.02	108.43	2.00	0.00	1.00	0.00	16.10	116.26	2.00	0.00	1.00	0.00
16.16	127.12	2.00	0.00	1.00	0.00	16.21	136.97	2.00	0.00	1.00	0.00
16.28	142.30	0.37	1.75	1.00	0.01	16.36	143.16	2.00	0.00	1.00	0.00
16.41	138.71	2.00	0.00	1.00	0.00	16.50	132.16	2.00	0.00	1.00	0.00
16.55	127.81	2.00	0.00	1.00	0.00	16.64	128.67	2.00	0.00	1.00	0.00
16.70	132.52	2.00	0.00	1.00	0.00	16.75	133.27	2.00	0.00	1.00	0.00
16.80	131.46	2.00	0.00	1.00	0.00	16.89	128.72	2.00	0.00	1.00	0.00
16.95	126.32	2.00	0.00	1.00	0.00	17.04	124.95	2.00	0.00	1.00	0.00
17.09	123.77	2.00	0.00	1.00	0.00	17.14	122.12	2.00	0.00	1.00	0.00
17.20	120.15	2.00	0.00	1.00	0.00	17.29	118.72	2.00	0.00	1.00	0.00
17.34	118.22	2.00	0.00	1.00	0.00	17.39	117.35	2.00	0.00	1.00	0.00
17.48	115.87	2.00	0.00	1.00	0.00	17.53	114.13	2.00	0.00	1.00	0.00
17.59	112.70	2.00	0.00	1.00	0.00	17.68	110.25	2.00	0.00	1.00	0.00
17.73	106.97	2.00	0.00	1.00	0.00	17.79	105.69	2.00	0.00	1.00	0.00
17.87	106.62	2.00	0.00	1.00	0.00	17.93	109.11	2.00	0.00	1.00	0.00
17.98	112.26	2.00	0.00	1.00	0.00	18.06	117.67	0.24	2.04	1.00	0.02
18.12	123.81	0.26	1.96	1.00	0.01	18.21	129.20	0.29	1.89	1.00	0.02
18.27	132.73	0.31	1.85	1.00	0.01	18.32	137.08	0.33	1.80	1.00	0.01
18.42	140.69	0.35	1.77	1.00	0.02	18.44	145.25	0.37	1.72	1.00	0.00
18.51	149.95	2.00	0.00	1.00	0.00	18.59	155.50	2.00	0.00	1.00	0.00
18.65	160.81	2.00	0.00	1.00	0.00	18.71	162.71	2.00	0.00	1.00	0.00
18.77	161.03	2.00	0.00	1.00	0.00	18.85	157.37	2.00	0.00	1.00	0.00
18.91	154.05	2.00	0.00	1.00	0.00	19.00	150.83	2.00	0.00	1.00	0.00
19.06	145.73	2.00	0.00	1.00	0.00	19.10	137.32	2.00	0.00	1.00	0.00
19.18	127.11	2.00	0.00	1.00	0.00	19.25	117.20	2.00	0.00	1.00	0.00
19.30	111.74	2.00	0.00	1.00	0.00	19.38	109.31	2.00	0.00	1.00	0.00
19.45	102.62	2.00	0.00	1.00	0.00	19.50	93.33	2.00	0.00	1.00	0.00
19.60	82.91	2.00	0.00	1.00	0.00	19.63	79.19	2.00	0.00	1.00	0.00
19.70	79.57	2.00	0.00	1.00	0.00	19.75	80.27	2.00	0.00	1.00	0.00
19.82	80.95	2.00	0.00	1.00	0.00	19.88	80.34	2.00	0.00	1.00	0.00
19.99	78.66	2.00	0.00	1.00	0.00	20.04	76.90	2.00	0.00	1.00	0.00
20.09	75.64	2.00	0.00	1.00	0.00	20.19	74.31	2.00	0.00	1.00	0.00
20.23	73.20	2.00	0.00	1.00	0.00	20.28	72.72	2.00	0.00	1.00	0.00
20.34	72.39	2.00	0.00	1.00	0.00	20.43	72.46	2.00	0.00	1.00	0.00
20.49	72.65	2.00	0.00	1.00	0.00	20.54	72.95	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.62	72.86	2.00	0.00	1.00	0.00	20.68	72.84	2.00	0.00	1.00	0.00
20.74	73.60	2.00	0.00	1.00	0.00	20.82	75.12	2.00	0.00	1.00	0.00
20.87	79.19	2.00	0.00	1.00	0.00	20.96	83.79	2.00	0.00	1.00	0.00
21.02	88.45	2.00	0.00	1.00	0.00	21.07	91.08	2.00	0.00	1.00	0.00
21.15	93.16	2.00	0.00	1.00	0.00	21.22	95.10	2.00	0.00	1.00	0.00
21.27	96.86	2.00	0.00	1.00	0.00	21.33	97.35	2.00	0.00	1.00	0.00
21.42	96.76	2.00	0.00	1.00	0.00	21.46	96.09	2.00	0.00	1.00	0.00
21.54	96.42	2.00	0.00	1.00	0.00	21.61	97.83	2.00	0.00	1.00	0.00
21.67	100.02	2.00	0.00	1.00	0.00	21.76	101.66	2.00	0.00	1.00	0.00
21.81	102.73	2.00	0.00	1.00	0.00	21.86	103.76	2.00	0.00	1.00	0.00
21.94	105.10	2.00	0.00	1.00	0.00	22.00	106.50	2.00	0.00	1.00	0.00
22.05	107.51	2.00	0.00	1.00	0.00	22.14	108.37	2.00	0.00	1.00	0.00
22.20	109.27	2.00	0.00	1.00	0.00	22.25	110.11	2.00	0.00	1.00	0.00
22.32	110.64	2.00	0.00	1.00	0.00	22.39	110.83	2.00	0.00	1.00	0.00
22.45	110.66	2.00	0.00	1.00	0.00	22.54	110.43	2.00	0.00	1.00	0.00
22.59	110.77	2.00	0.00	1.00	0.00	22.65	110.03	2.00	0.00	1.00	0.00
22.72	104.57	2.00	0.00	1.00	0.00	22.80	96.69	2.00	0.00	1.00	0.00
22.84	91.34	2.00	0.00	1.00	0.00	22.92	92.43	2.00	0.00	1.00	0.00
22.98	96.00	2.00	0.00	1.00	0.00	23.03	99.53	2.00	0.00	1.00	0.00
23.10	102.35	2.00	0.00	1.00	0.00	23.18	105.28	2.00	0.00	1.00	0.00
23.24	108.07	2.00	0.00	1.00	0.00	23.34	110.12	2.00	0.00	1.00	0.00
23.39	110.38	2.00	0.00	1.00	0.00	23.43	107.24	2.00	0.00	1.00	0.00
23.52	101.94	2.00	0.00	1.00	0.00	23.58	95.75	2.00	0.00	1.00	0.00
23.63	88.53	2.00	0.00	1.00	0.00	23.72	81.81	2.00	0.00	1.00	0.00
23.76	73.61	2.00	0.00	1.00	0.00	23.82	65.66	2.00	0.00	1.00	0.00
23.91	57.95	2.00	0.00	1.00	0.00	23.96	53.09	2.00	0.00	1.00	0.00
24.02	51.03	2.00	0.00	1.00	0.00	24.09	49.04	2.00	0.00	1.00	0.00
24.18	47.29	2.00	0.00	1.00	0.00	24.22	45.54	2.00	0.00	1.00	0.00
24.32	44.43	2.00	0.00	1.00	0.00	24.37	43.83	2.00	0.00	1.00	0.00
24.42	44.09	2.00	0.00	1.00	0.00	24.51	44.32	2.00	0.00	1.00	0.00
24.57	44.39	2.00	0.00	1.00	0.00	24.61	44.46	2.00	0.00	1.00	0.00
24.71	44.57	2.00	0.00	1.00	0.00	24.76	44.57	2.00	0.00	1.00	0.00
24.80	44.73	2.00	0.00	1.00	0.00	24.89	45.27	2.00	0.00	1.00	0.00
24.96	46.27	2.00	0.00	1.00	0.00	25.01	47.69	2.00	0.00	1.00	0.00
25.09	48.95	2.00	0.00	1.00	0.00	25.16	50.15	2.00	0.00	1.00	0.00
25.20	51.60	2.00	0.00	1.00	0.00	25.30	53.22	2.00	0.00	1.00	0.00
25.35	54.72	2.00	0.00	1.00	0.00	25.40	55.89	2.00	0.00	1.00	0.00
25.49	57.02	2.00	0.00	1.00	0.00	25.55	58.63	2.00	0.00	1.00	0.00
25.60	59.72	2.00	0.00	1.00	0.00	25.68	60.17	2.00	0.00	1.00	0.00
25.75	59.90	2.00	0.00	1.00	0.00	25.79	59.33	2.00	0.00	1.00	0.00
25.89	58.86	2.00	0.00	1.00	0.00	25.94	58.55	2.00	0.00	1.00	0.00
25.99	58.75	2.00	0.00	1.00	0.00	26.06	58.71	2.00	0.00	1.00	0.00
26.13	58.95	2.00	0.00	1.00	0.00	26.18	58.61	2.00	0.00	1.00	0.00
26.26	58.71	2.00	0.00	1.00	0.00	26.33	59.49	2.00	0.00	1.00	0.00
26.39	61.52	2.00	0.00	1.00	0.00	26.48	63.42	2.00	0.00	1.00	0.00
26.52	64.35	2.00	0.00	1.00	0.00	26.58	64.37	2.00	0.00	1.00	0.00
26.68	64.15	2.00	0.00	1.00	0.00	26.73	63.57	2.00	0.00	1.00	0.00
26.78	61.90	2.00	0.00	1.00	0.00	26.87	59.86	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
26.91	57.88	2.00	0.00	1.00	0.00	26.97	56.48	2.00	0.00	1.00	0.00
27.07	55.10	2.00	0.00	1.00	0.00	27.11	52.75	2.00	0.00	1.00	0.00
27.17	53.61	2.00	0.00	1.00	0.00	27.27	56.47	2.00	0.00	1.00	0.00
27.32	61.55	2.00	0.00	1.00	0.00	27.37	65.36	2.00	0.00	1.00	0.00
27.45	67.25	2.00	0.00	1.00	0.00	27.50	68.45	2.00	0.00	1.00	0.00
27.56	68.61	2.00	0.00	1.00	0.00	27.66	68.79	2.00	0.00	1.00	0.00
27.71	68.04	2.00	0.00	1.00	0.00	27.76	64.64	2.00	0.00	1.00	0.00
27.86	61.22	2.00	0.00	1.00	0.00	27.91	57.91	2.00	0.00	1.00	0.00
27.99	57.17	2.00	0.00	1.00	0.00	28.05	56.91	2.00	0.00	1.00	0.00
28.10	57.89	2.00	0.00	1.00	0.00	28.19	59.56	2.00	0.00	1.00	0.00
28.25	61.39	2.00	0.00	1.00	0.00	28.30	63.31	2.00	0.00	1.00	0.00
28.39	65.06	2.00	0.00	1.00	0.00	28.44	67.38	2.00	0.00	1.00	0.00
28.49	70.82	2.00	0.00	1.00	0.00	28.57	75.25	2.00	0.00	1.00	0.00
28.64	79.46	2.00	0.00	1.00	0.00	28.69	83.29	2.00	0.00	1.00	0.00
28.79	86.07	2.00	0.00	1.00	0.00	28.83	88.59	2.00	0.00	1.00	0.00
28.88	90.15	2.00	0.00	1.00	0.00	28.97	91.69	2.00	0.00	1.00	0.00
29.02	93.44	2.00	0.00	1.00	0.00	29.09	95.58	2.00	0.00	1.00	0.00
29.18	97.42	2.00	0.00	1.00	0.00	29.21	98.75	2.00	0.00	1.00	0.00
29.27	99.34	2.00	0.00	1.00	0.00	29.35	99.89	2.00	0.00	1.00	0.00
29.40	100.52	2.00	0.00	1.00	0.00	29.47	100.16	2.00	0.00	1.00	0.00
29.57	99.22	2.00	0.00	1.00	0.00	29.60	96.73	2.00	0.00	1.00	0.00
29.68	93.23	2.00	0.00	1.00	0.00	29.77	89.34	2.00	0.00	1.00	0.00
29.80	86.11	2.00	0.00	1.00	0.00	29.86	82.89	2.00	0.00	1.00	0.00
29.96	79.81	2.00	0.00	1.00	0.00	30.00	77.24	2.00	0.00	1.00	0.00
30.07	76.33	2.00	0.00	1.00	0.00	30.13	76.19	2.00	0.00	1.00	0.00
30.19	77.05	2.00	0.00	1.00	0.00	30.25	79.08	2.00	0.00	1.00	0.00
30.32	83.06	2.00	0.00	1.00	0.00	30.41	87.64	2.00	0.00	1.00	0.00
30.46	92.13	2.00	0.00	1.00	0.00	30.51	96.08	2.00	0.00	1.00	0.00
30.61	99.19	2.00	0.00	1.00	0.00	30.65	102.76	2.00	0.00	1.00	0.00
30.76	105.15	2.00	0.00	1.00	0.00	30.80	107.19	2.00	0.00	1.00	0.00
30.85	107.91	2.00	0.00	1.00	0.00	30.94	107.97	2.00	0.00	1.00	0.00
31.00	107.84	2.00	0.00	1.00	0.00	31.05	108.17	2.00	0.00	1.00	0.00
31.14	108.83	2.00	0.00	1.00	0.00	31.19	109.83	2.00	0.00	1.00	0.00
31.24	111.73	2.00	0.00	1.00	0.00	31.34	113.52	2.00	0.00	1.00	0.00
31.39	115.35	2.00	0.00	1.00	0.00	31.44	116.16	2.00	0.00	1.00	0.00
31.53	116.14	2.00	0.00	1.00	0.00	31.58	115.78	2.00	0.00	1.00	0.00
31.68	115.10	2.00	0.00	1.00	0.00	31.71	114.89	2.00	0.00	1.00	0.00
31.77	114.71	2.00	0.00	1.00	0.00	31.87	114.40	2.00	0.00	1.00	0.00
31.92	114.11	2.00	0.00	1.00	0.00	31.96	113.79	2.00	0.00	1.00	0.00
32.04	113.23	2.00	0.00	1.00	0.00	32.09	111.56	2.00	0.00	1.00	0.00
32.16	108.96	2.00	0.00	1.00	0.00	32.26	105.91	2.00	0.00	1.00	0.00
32.31	103.13	2.00	0.00	1.00	0.00	32.36	99.98	2.00	0.00	1.00	0.00
32.46	96.71	2.00	0.00	1.00	0.00	32.51	93.75	2.00	0.00	1.00	0.00
32.56	90.54	2.00	0.00	1.00	0.00	32.66	87.21	2.00	0.00	1.00	0.00
32.70	84.23	2.00	0.00	1.00	0.00	32.76	83.04	2.00	0.00	1.00	0.00
32.81	84.95	2.00	0.00	1.00	0.00	32.90	88.52	2.00	0.00	1.00	0.00
32.95	93.02	2.00	0.00	1.00	0.00	33.04	95.34	2.00	0.00	1.00	0.00
33.10	97.24	2.00	0.00	1.00	0.00	33.15	98.85	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
33.24	99.71	2.00	0.00	1.00	0.00	33.29	99.20	2.00	0.00	1.00	0.00
33.34	96.48	2.00	0.00	1.00	0.00	33.44	95.13	2.00	0.00	1.00	0.00
33.49	94.68	2.00	0.00	1.00	0.00	33.54	95.23	2.00	0.00	1.00	0.00
33.63	95.34	0.14	2.43	1.00	0.03	33.69	94.56	0.14	2.45	1.00	0.02
33.74	90.61	0.13	2.53	1.00	0.02	33.83	84.69	0.12	2.68	1.00	0.03
33.87	76.09	0.11	2.92	1.00	0.01	33.94	70.12	2.00	0.00	1.00	0.00
34.02	67.22	2.00	0.00	1.00	0.00	34.07	70.47	2.00	0.00	1.00	0.00
34.13	75.93	2.00	0.00	1.00	0.00	34.23	79.51	2.00	0.00	1.00	0.00
34.27	80.12	2.00	0.00	1.00	0.00	34.33	78.17	2.00	0.00	1.00	0.00
34.40	74.45	2.00	0.00	1.00	0.00	34.47	70.05	2.00	0.00	1.00	0.00
34.52	65.75	2.00	0.00	1.00	0.00	34.58	62.52	2.00	0.00	1.00	0.00
34.65	62.96	2.00	0.00	1.00	0.00	34.72	69.08	2.00	0.00	1.00	0.00
34.79	73.84	2.00	0.00	1.00	0.00	34.86	73.96	2.00	0.00	1.00	0.00
34.92	69.01	2.00	0.00	1.00	0.00	35.01	65.51	2.00	0.00	1.00	0.00
35.05	64.80	2.00	0.00	1.00	0.00	35.11	66.96	2.00	0.00	1.00	0.00
35.20	69.65	2.00	0.00	1.00	0.00	35.26	72.57	2.00	0.00	1.00	0.00
35.31	74.79	2.00	0.00	1.00	0.00	35.39	77.50	2.00	0.00	1.00	0.00
35.46	80.92	2.00	0.00	1.00	0.00	35.51	84.76	2.00	0.00	1.00	0.00
35.60	87.94	2.00	0.00	1.00	0.00	35.65	90.48	2.00	0.00	1.00	0.00
35.71	92.40	2.00	0.00	1.00	0.00	35.80	94.06	2.00	0.00	1.00	0.00
35.84	95.61	2.00	0.00	1.00	0.00	35.90	95.95	2.00	0.00	1.00	0.00
35.97	95.21	2.00	0.00	1.00	0.00	36.04	94.23	2.00	0.00	1.00	0.00
36.10	94.33	2.00	0.00	1.00	0.00	36.16	96.24	2.00	0.00	1.00	0.00
36.24	98.84	2.00	0.00	1.00	0.00	36.29	101.97	2.00	0.00	1.00	0.00
36.37	104.68	2.00	0.00	1.00	0.00	36.42	107.12	2.00	0.00	1.00	0.00
36.49	108.61	2.00	0.00	1.00	0.00	36.56	108.43	2.00	0.00	1.00	0.00
36.63	106.59	2.00	0.00	1.00	0.00	36.69	103.52	2.00	0.00	1.00	0.00
36.75	99.82	2.00	0.00	1.00	0.00	36.82	96.00	2.00	0.00	1.00	0.00
36.89	91.73	2.00	0.00	1.00	0.00	36.95	87.64	2.00	0.00	1.00	0.00
37.03	84.22	2.00	0.00	1.00	0.00	37.08	82.05	2.00	0.00	1.00	0.00
37.18	81.42	2.00	0.00	1.00	0.00	37.22	82.15	2.00	0.00	1.00	0.00
37.28	83.79	2.00	0.00	1.00	0.00	37.34	86.22	2.00	0.00	1.00	0.00
37.42	88.98	2.00	0.00	1.00	0.00	37.48	92.90	2.00	0.00	1.00	0.00
37.57	96.47	2.00	0.00	1.00	0.00	37.62	99.61	2.00	0.00	1.00	0.00
37.67	102.88	2.00	0.00	1.00	0.00	37.77	105.79	2.00	0.00	1.00	0.00
37.80	108.30	2.00	0.00	1.00	0.00	37.87	109.34	2.00	0.00	1.00	0.00
37.96	110.45	2.00	0.00	1.00	0.00	38.02	112.18	2.00	0.00	1.00	0.00
38.06	114.36	2.00	0.00	1.00	0.00	38.16	115.93	2.00	0.00	1.00	0.00
38.21	116.92	2.00	0.00	1.00	0.00	38.26	118.11	2.00	0.00	1.00	0.00
38.35	120.18	2.00	0.00	1.00	0.00	38.40	123.12	2.00	0.00	1.00	0.00
38.45	126.08	2.00	0.00	1.00	0.00	38.53	128.23	2.00	0.00	1.00	0.00
38.59	129.19	2.00	0.00	1.00	0.00	38.66	129.04	2.00	0.00	1.00	0.00
38.72	128.71	2.00	0.00	1.00	0.00	38.79	128.14	2.00	0.00	1.00	0.00
38.85	126.68	2.00	0.00	1.00	0.00	38.92	123.52	2.00	0.00	1.00	0.00
39.00	117.71	2.00	0.00	1.00	0.00	39.05	114.53	2.00	0.00	1.00	0.00
39.13	112.98	2.00	0.00	1.00	0.00	39.17	114.55	2.00	0.00	1.00	0.00
39.25	114.06	2.00	0.00	1.00	0.00	39.34	113.34	2.00	0.00	1.00	0.00
39.38	112.26	2.00	0.00	1.00	0.00	39.46	111.07	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
39.52	109.71	2.00	0.00	1.00	0.00	39.61	108.68	2.00	0.00	1.00	0.00
39.64	107.70	2.00	0.00	1.00	0.00	39.71	107.03	2.00	0.00	1.00	0.00
39.77	106.46	2.00	0.00	1.00	0.00	39.86	106.07	2.00	0.00	1.00	0.00
39.91	105.96	2.00	0.00	1.00	0.00	40.01	105.99	2.00	0.00	1.00	0.00
40.05	106.34	2.00	0.00	1.00	0.00	40.10	106.97	2.00	0.00	1.00	0.00
40.20	107.61	2.00	0.00	1.00	0.00	40.25	108.37	2.00	0.00	1.00	0.00
40.30	109.40	2.00	0.00	1.00	0.00	40.39	110.53	2.00	0.00	1.00	0.00
40.45	111.95	2.00	0.00	1.00	0.00	40.49	113.13	2.00	0.00	1.00	0.00
40.59	113.90	2.00	0.00	1.00	0.00	40.65	114.21	2.00	0.00	1.00	0.00
40.70	113.34	2.00	0.00	1.00	0.00	40.79	112.15	2.00	0.00	1.00	0.00
40.84	110.86	2.00	0.00	1.00	0.00	40.90	110.35	2.00	0.00	1.00	0.00
40.95	109.92	2.00	0.00	1.00	0.00	41.04	109.56	2.00	0.00	1.00	0.00
41.08	109.47	2.00	0.00	1.00	0.00	41.14	109.84	2.00	0.00	1.00	0.00
41.21	110.32	2.00	0.00	1.00	0.00	41.28	110.71	2.00	0.00	1.00	0.00
41.34	109.92	2.00	0.00	1.00	0.00	41.43	108.17	2.00	0.00	1.00	0.00
41.48	105.41	2.00	0.00	1.00	0.00	41.58	103.27	2.00	0.00	1.00	0.00
41.63	102.19	2.00	0.00	1.00	0.00	41.68	102.28	2.00	0.00	1.00	0.00
41.77	102.40	2.00	0.00	1.00	0.00	41.83	102.15	2.00	0.00	1.00	0.00
41.87	101.76	2.00	0.00	1.00	0.00	41.97	101.43	2.00	0.00	1.00	0.00
42.02	101.85	2.00	0.00	1.00	0.00	42.07	102.49	2.00	0.00	1.00	0.00
42.17	103.26	2.00	0.00	1.00	0.00	42.22	103.52	2.00	0.00	1.00	0.00
42.27	103.75	2.00	0.00	1.00	0.00	42.36	103.98	2.00	0.00	1.00	0.00
42.41	104.41	2.00	0.00	1.00	0.00	42.46	104.43	2.00	0.00	1.00	0.00
42.56	104.18	2.00	0.00	1.00	0.00	42.61	103.91	2.00	0.00	1.00	0.00
42.66	104.21	2.00	0.00	1.00	0.00	42.73	105.22	2.00	0.00	1.00	0.00
42.80	107.35	2.00	0.00	1.00	0.00	42.85	109.95	2.00	0.00	1.00	0.00
42.93	112.33	2.00	0.00	1.00	0.00	42.99	114.03	2.00	0.00	1.00	0.00
43.05	115.48	2.00	0.00	1.00	0.00	43.15	116.69	2.00	0.00	1.00	0.00
43.19	117.87	2.00	0.00	1.00	0.00	43.25	116.64	2.00	0.00	1.00	0.00
43.34	115.39	2.00	0.00	1.00	0.00	43.40	114.47	2.00	0.00	1.00	0.00
43.44	115.10	2.00	0.00	1.00	0.00	43.52	115.82	2.00	0.00	1.00	0.00
43.58	116.86	2.00	0.00	1.00	0.00	43.64	117.99	2.00	0.00	1.00	0.00
43.71	116.56	2.00	0.00	1.00	0.00	43.78	110.55	2.00	0.00	1.00	0.00
43.86	103.00	2.00	0.00	1.00	0.00	43.91	96.36	2.00	0.00	1.00	0.00
44.00	92.73	2.00	0.00	1.00	0.00	44.05	89.82	2.00	0.00	1.00	0.00
44.10	85.89	2.00	0.00	1.00	0.00	44.20	81.26	2.00	0.00	1.00	0.00
44.25	76.72	2.00	0.00	1.00	0.00	44.30	75.29	2.00	0.00	1.00	0.00
44.40	75.87	2.00	0.00	1.00	0.00	44.44	78.32	2.00	0.00	1.00	0.00
44.49	82.49	2.00	0.00	1.00	0.00	44.59	87.04	2.00	0.00	1.00	0.00
44.62	92.56	2.00	0.00	1.00	0.00	44.70	97.12	2.00	0.00	1.00	0.00
44.79	100.84	2.00	0.00	1.00	0.00	44.82	103.68	2.00	0.00	1.00	0.00
44.94	105.05	2.00	0.00	1.00	0.00	44.98	106.13	2.00	0.00	1.00	0.00
45.03	105.84	2.00	0.00	1.00	0.00	45.09	105.03	2.00	0.00	1.00	0.00
45.18	104.06	2.00	0.00	1.00	0.00	45.21	103.06	2.00	0.00	1.00	0.00
45.28	102.18	2.00	0.00	1.00	0.00	45.37	101.35	2.00	0.00	1.00	0.00
45.43	100.95	2.00	0.00	1.00	0.00	45.48	101.17	2.00	0.00	1.00	0.00
45.57	101.63	2.00	0.00	1.00	0.00	45.63	102.05	2.00	0.00	1.00	0.00
45.67	102.18	2.00	0.00	1.00	0.00	45.76	102.13	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
45.82	102.30	2.00	0.00	1.00	0.00	45.87	102.96	2.00	0.00	1.00	0.00
45.96	103.62	2.00	0.00	1.00	0.00	46.02	104.21	2.00	0.00	1.00	0.00
46.07	104.84	2.00	0.00	1.00	0.00	46.14	106.11	2.00	0.00	1.00	0.00
46.21	108.03	2.00	0.00	1.00	0.00	46.29	109.64	2.00	0.00	1.00	0.00
46.34	110.65	2.00	0.00	1.00	0.00	46.41	110.96	2.00	0.00	1.00	0.00
46.46	110.45	2.00	0.00	1.00	0.00	46.55	109.34	2.00	0.00	1.00	0.00
46.59	105.28	2.00	0.00	1.00	0.00	46.67	100.28	2.00	0.00	1.00	0.00
46.76	96.11	2.00	0.00	1.00	0.00	46.79	94.43	2.00	0.00	1.00	0.00
46.85	93.30	2.00	0.00	1.00	0.00	46.95	91.16	2.00	0.00	1.00	0.00
47.00	89.64	2.00	0.00	1.00	0.00	47.06	89.95	2.00	0.00	1.00	0.00
47.13	92.18	2.00	0.00	1.00	0.00	47.21	95.55	2.00	0.00	1.00	0.00
47.25	100.35	2.00	0.00	1.00	0.00	47.35	103.93	2.00	0.00	1.00	0.00
47.39	106.60	2.00	0.00	1.00	0.00	47.45	107.80	2.00	0.00	1.00	0.00
47.53	109.03	2.00	0.00	1.00	0.00	47.59	110.14	2.00	0.00	1.00	0.00
47.65	110.59	2.00	0.00	1.00	0.00	47.73	110.32	2.00	0.00	1.00	0.00
47.78	109.54	2.00	0.00	1.00	0.00	47.84	107.72	2.00	0.00	1.00	0.00
47.95	105.86	2.00	0.00	1.00	0.00	47.97	104.08	2.00	0.00	1.00	0.00
48.03	102.76	2.00	0.00	1.00	0.00	48.11	101.04	2.00	0.00	1.00	0.00
48.17	99.23	2.00	0.00	1.00	0.00	48.23	98.43	2.00	0.00	1.00	0.00
48.30	99.09	2.00	0.00	1.00	0.00	48.38	100.75	2.00	0.00	1.00	0.00
48.43	103.40	2.00	0.00	1.00	0.00	48.53	105.86	2.00	0.00	1.00	0.00
48.59	108.34	2.00	0.00	1.00	0.00	48.63	110.43	2.00	0.00	1.00	0.00
48.70	111.85	2.00	0.00	1.00	0.00	48.77	112.30	2.00	0.00	1.00	0.00
48.83	110.34	2.00	0.00	1.00	0.00	48.91	106.89	2.00	0.00	1.00	0.00
48.97	102.79	2.00	0.00	1.00	0.00	49.03	99.21	2.00	0.00	1.00	0.00
49.10	95.63	2.00	0.00	1.00	0.00	49.17	92.17	2.00	0.00	1.00	0.00
49.22	88.34	2.00	0.00	1.00	0.00	49.31	85.40	2.00	0.00	1.00	0.00
49.37	83.30	2.00	0.00	1.00	0.00	49.43	82.66	2.00	0.00	1.00	0.00
49.48	82.13	2.00	0.00	1.00	0.00	49.55	81.42	2.00	0.00	1.00	0.00
49.62	77.97	2.00	0.00	1.00	0.00	49.71	75.58	2.00	0.00	1.00	0.00
49.77	73.37	2.00	0.00	1.00	0.00	49.82	73.96	2.00	0.00	1.00	0.00
49.91	73.44	2.00	0.00	1.00	0.00	49.96	72.95	2.00	0.00	1.00	0.00
50.01	72.68	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.32

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243

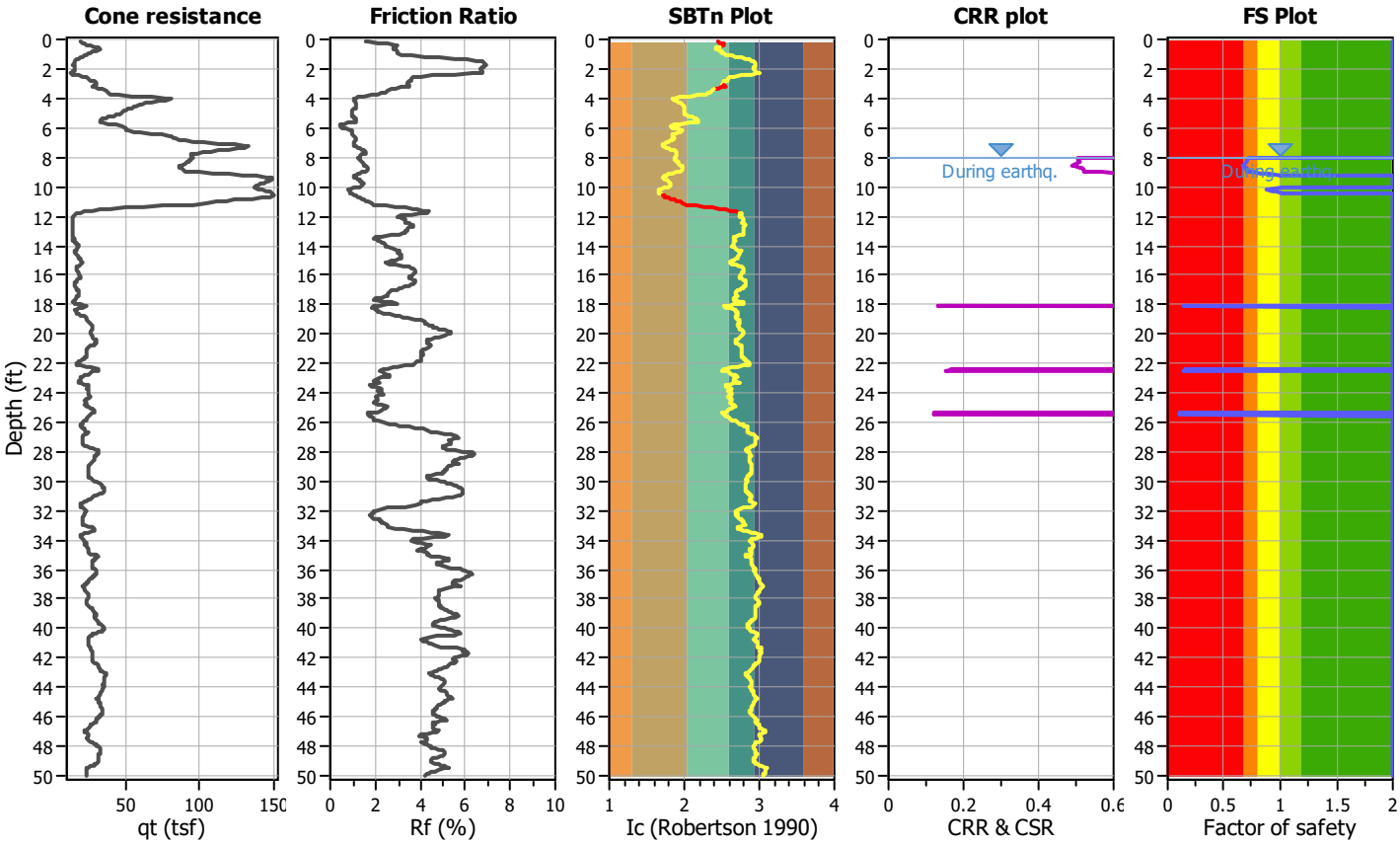
LIQUEFACTION ANALYSIS REPORT

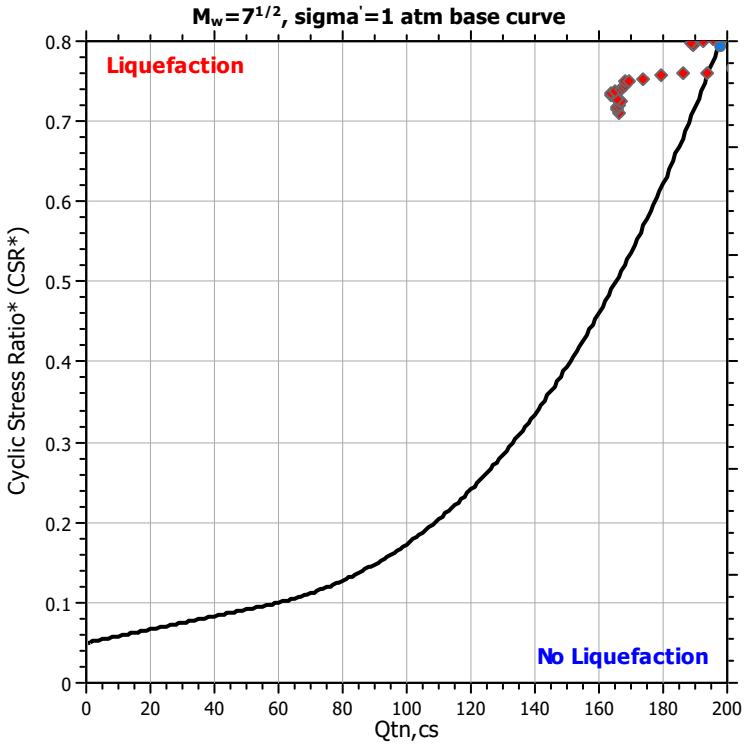
Project title : IVC Sports Field Improvements **Location : Imperial, CA**

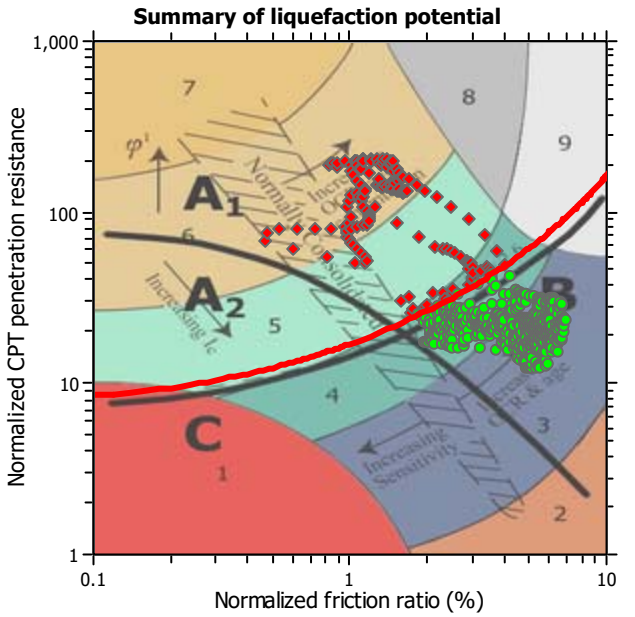
CPT file : CPT-4

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 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:	7.00	Ic cut-off value:	2.55	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	1.02	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

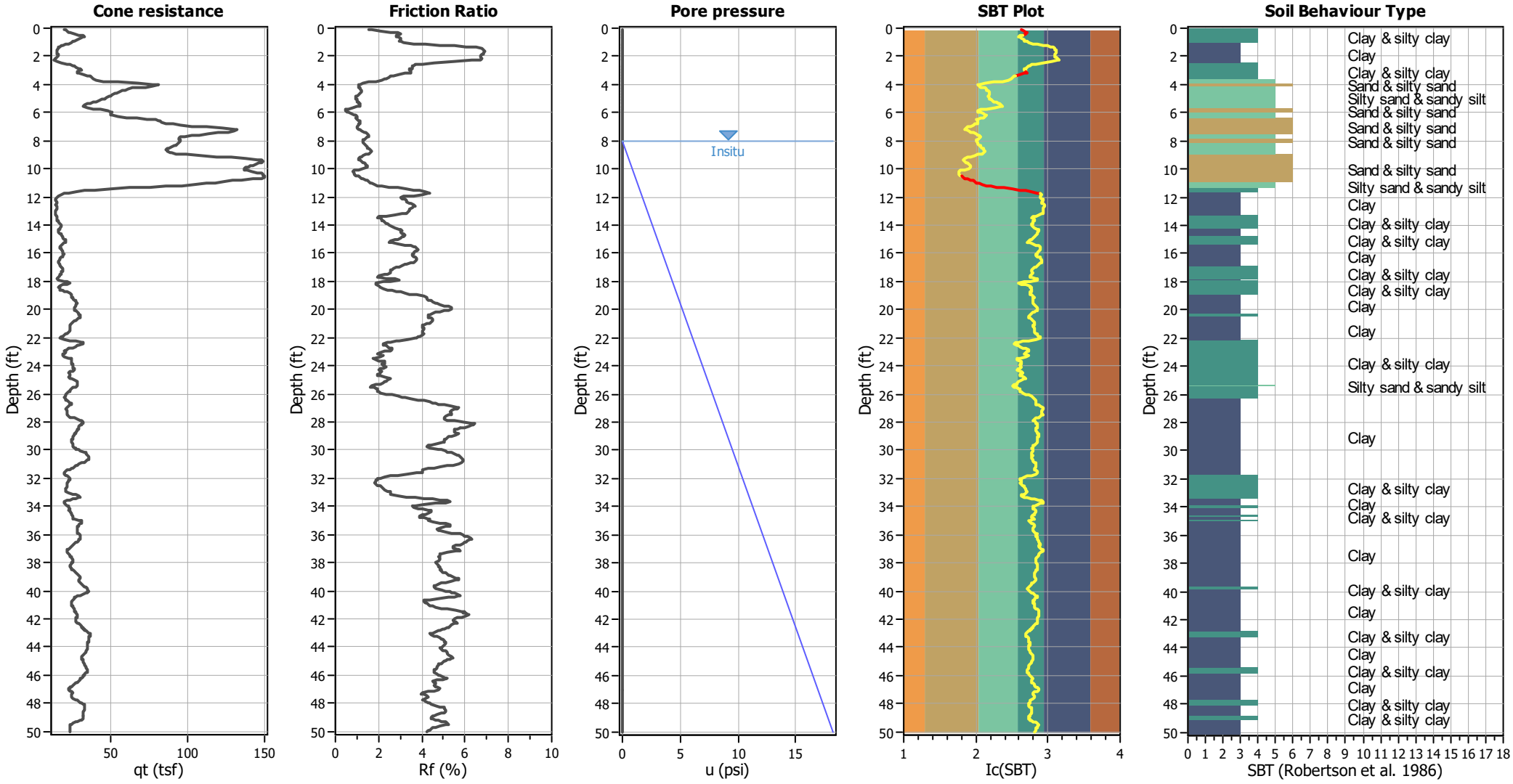






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



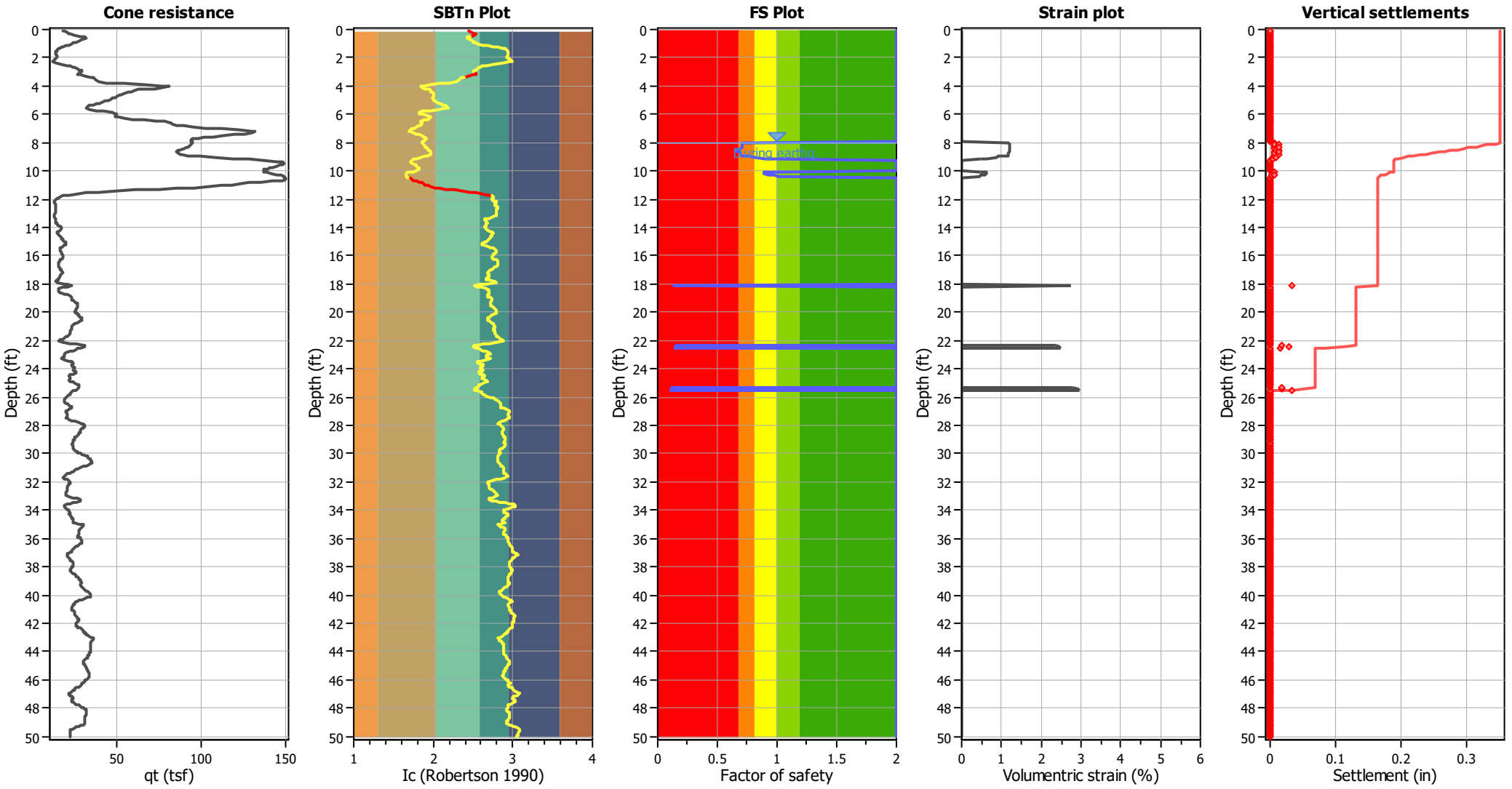
Input parameters and analysis data

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:	2.55	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.02	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	8.00 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

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

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.01	166.17	0.71	1.20	1.00	0.01	8.10	165.89	0.71	1.20	1.00	0.01
8.16	165.91	0.70	1.20	1.00	0.01	8.21	166.23	0.70	1.19	1.00	0.01
8.30	166.42	0.70	1.19	1.00	0.01	8.35	166.68	0.70	1.19	1.00	0.01
8.40	165.62	0.69	1.20	1.00	0.01	8.49	163.96	0.67	1.22	1.00	0.01
8.55	163.62	0.66	1.22	1.00	0.01	8.60	164.85	0.67	1.21	1.00	0.01
8.69	166.60	0.69	1.19	1.00	0.01	8.75	167.61	0.70	1.18	1.00	0.01
8.80	168.14	0.70	1.18	1.00	0.01	8.89	168.31	0.70	1.17	1.00	0.01
8.95	169.55	0.71	1.16	1.00	0.01	9.00	173.52	0.75	0.91	1.00	0.01
9.08	179.48	0.82	0.87	1.00	0.01	9.15	186.42	0.90	0.62	1.00	0.00
9.20	193.94	1.00	0.48	1.00	0.00	9.28	201.74	2.00	0.00	1.00	0.00
9.34	209.74	2.00	0.00	1.00	0.00	9.39	215.86	2.00	0.00	1.00	0.00
9.46	220.10	2.00	0.00	1.00	0.00	9.54	222.62	2.00	0.00	1.00	0.00
9.59	223.82	2.00	0.00	1.00	0.00	9.68	223.52	2.00	0.00	1.00	0.00
9.73	222.63	2.00	0.00	1.00	0.00	9.79	220.77	2.00	0.00	1.00	0.00
9.86	218.13	2.00	0.00	1.00	0.00	9.92	215.49	2.00	0.00	1.00	0.00
9.98	208.14	2.00	0.00	1.00	0.00	10.08	198.38	1.02	0.47	1.00	0.01
10.13	189.44	0.90	0.61	1.00	0.00	10.18	188.70	0.88	0.61	1.00	0.00
10.27	192.52	0.93	0.59	1.00	0.01	10.32	195.79	0.97	0.47	1.00	0.00
10.37	198.85	1.01	0.47	1.00	0.00	10.46	202.43	2.00	0.00	1.00	0.00
10.52	207.61	2.00	0.00	1.00	0.00	10.61	211.30	2.00	0.00	1.00	0.00
10.66	212.23	2.00	0.00	1.00	0.00	10.71	209.60	2.00	0.00	1.00	0.00
10.81	205.27	2.00	0.00	1.00	0.00	10.84	201.47	2.00	0.00	1.00	0.00
10.90	197.64	2.00	0.00	1.00	0.00	10.98	193.64	2.00	0.00	1.00	0.00
11.03	189.39	2.00	0.00	1.00	0.00	11.10	184.19	2.00	0.00	1.00	0.00
11.18	178.58	2.00	0.00	1.00	0.00	11.24	173.31	2.00	0.00	1.00	0.00
11.29	170.00	2.00	0.00	1.00	0.00	11.35	166.08	2.00	0.00	1.00	0.00
11.44	161.66	2.00	0.00	1.00	0.00	11.49	154.89	2.00	0.00	1.00	0.00
11.55	148.63	2.00	0.00	1.00	0.00	11.62	142.28	2.00	0.00	1.00	0.00
11.69	135.16	2.00	0.00	1.00	0.00	11.76	126.28	2.00	0.00	1.00	0.00
11.82	116.32	2.00	0.00	1.00	0.00	11.90	106.88	2.00	0.00	1.00	0.00
11.94	97.82	2.00	0.00	1.00	0.00	12.02	93.18	2.00	0.00	1.00	0.00
12.09	93.18	2.00	0.00	1.00	0.00	12.14	94.41	2.00	0.00	1.00	0.00
12.22	95.50	2.00	0.00	1.00	0.00	12.29	96.79	2.00	0.00	1.00	0.00
12.39	97.99	2.00	0.00	1.00	0.00	12.42	99.59	2.00	0.00	1.00	0.00
12.49	100.51	2.00	0.00	1.00	0.00	12.54	101.74	2.00	0.00	1.00	0.00
12.63	102.56	2.00	0.00	1.00	0.00	12.66	102.38	2.00	0.00	1.00	0.00
12.74	101.02	2.00	0.00	1.00	0.00	12.83	99.27	2.00	0.00	1.00	0.00
12.88	98.35	2.00	0.00	1.00	0.00	12.93	97.65	2.00	0.00	1.00	0.00
13.03	96.70	2.00	0.00	1.00	0.00	13.08	95.51	2.00	0.00	1.00	0.00
13.13	94.24	2.00	0.00	1.00	0.00	13.21	92.06	2.00	0.00	1.00	0.00
13.27	87.23	2.00	0.00	1.00	0.00	13.33	80.85	2.00	0.00	1.00	0.00
13.41	75.91	2.00	0.00	1.00	0.00	13.47	74.78	2.00	0.00	1.00	0.00
13.52	76.50	2.00	0.00	1.00	0.00	13.60	77.79	2.00	0.00	1.00	0.00
13.66	78.49	2.00	0.00	1.00	0.00	13.71	79.80	2.00	0.00	1.00	0.00
13.82	81.69	2.00	0.00	1.00	0.00	13.85	84.78	2.00	0.00	1.00	0.00
13.92	86.74	2.00	0.00	1.00	0.00	13.98	88.12	2.00	0.00	1.00	0.00
14.05	88.80	2.00	0.00	1.00	0.00	14.11	90.37	2.00	0.00	1.00	0.00
14.18	92.48	2.00	0.00	1.00	0.00	14.26	93.97	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
14.31	94.14	2.00	0.00	1.00	0.00	14.38	93.93	2.00	0.00	1.00	0.00
14.44	93.20	2.00	0.00	1.00	0.00	14.51	94.72	2.00	0.00	1.00	0.00
14.61	96.83	2.00	0.00	1.00	0.00	14.65	99.67	2.00	0.00	1.00	0.00
14.71	100.88	2.00	0.00	1.00	0.00	14.77	101.10	2.00	0.00	1.00	0.00
14.85	100.81	2.00	0.00	1.00	0.00	14.90	100.01	2.00	0.00	1.00	0.00
15.00	98.71	2.00	0.00	1.00	0.00	15.05	96.36	2.00	0.00	1.00	0.00
15.10	93.97	2.00	0.00	1.00	0.00	15.19	92.45	2.00	0.00	1.00	0.00
15.24	93.48	2.00	0.00	1.00	0.00	15.29	96.49	2.00	0.00	1.00	0.00
15.39	100.05	2.00	0.00	1.00	0.00	15.44	102.98	2.00	0.00	1.00	0.00
15.49	104.37	2.00	0.00	1.00	0.00	15.59	105.03	2.00	0.00	1.00	0.00
15.64	106.05	2.00	0.00	1.00	0.00	15.69	107.45	2.00	0.00	1.00	0.00
15.79	108.38	2.00	0.00	1.00	0.00	15.82	108.95	2.00	0.00	1.00	0.00
15.89	108.75	2.00	0.00	1.00	0.00	15.97	108.41	2.00	0.00	1.00	0.00
16.04	107.89	2.00	0.00	1.00	0.00	16.09	107.20	2.00	0.00	1.00	0.00
16.18	106.62	2.00	0.00	1.00	0.00	16.23	106.17	2.00	0.00	1.00	0.00
16.29	105.86	2.00	0.00	1.00	0.00	16.36	105.16	2.00	0.00	1.00	0.00
16.43	104.18	2.00	0.00	1.00	0.00	16.48	103.03	2.00	0.00	1.00	0.00
16.57	101.96	2.00	0.00	1.00	0.00	16.63	100.47	2.00	0.00	1.00	0.00
16.68	98.46	2.00	0.00	1.00	0.00	16.77	96.34	2.00	0.00	1.00	0.00
16.82	94.92	2.00	0.00	1.00	0.00	16.87	93.64	2.00	0.00	1.00	0.00
16.97	92.54	2.00	0.00	1.00	0.00	17.02	91.42	2.00	0.00	1.00	0.00
17.07	90.35	2.00	0.00	1.00	0.00	17.17	89.23	2.00	0.00	1.00	0.00
17.21	88.45	2.00	0.00	1.00	0.00	17.27	88.03	2.00	0.00	1.00	0.00
17.34	87.35	2.00	0.00	1.00	0.00	17.39	86.60	2.00	0.00	1.00	0.00
17.46	83.86	2.00	0.00	1.00	0.00	17.54	80.18	2.00	0.00	1.00	0.00
17.60	75.11	2.00	0.00	1.00	0.00	17.67	72.76	2.00	0.00	1.00	0.00
17.74	73.26	2.00	0.00	1.00	0.00	17.81	77.89	2.00	0.00	1.00	0.00
17.86	84.17	2.00	0.00	1.00	0.00	17.96	89.09	2.00	0.00	1.00	0.00
18.00	89.31	2.00	0.00	1.00	0.00	18.05	86.49	2.00	0.00	1.00	0.00
18.14	82.35	0.13	2.74	1.00	0.03	18.18	78.18	2.00	0.00	1.00	0.00
18.25	75.84	2.00	0.00	1.00	0.00	18.31	74.61	2.00	0.00	1.00	0.00
18.38	75.00	2.00	0.00	1.00	0.00	18.45	75.34	2.00	0.00	1.00	0.00
18.51	77.70	2.00	0.00	1.00	0.00	18.59	81.84	2.00	0.00	1.00	0.00
18.65	87.82	2.00	0.00	1.00	0.00	18.71	94.35	2.00	0.00	1.00	0.00
18.78	100.36	2.00	0.00	1.00	0.00	18.84	105.69	2.00	0.00	1.00	0.00
18.90	110.91	2.00	0.00	1.00	0.00	18.98	116.84	2.00	0.00	1.00	0.00
19.04	122.16	2.00	0.00	1.00	0.00	19.13	125.12	2.00	0.00	1.00	0.00
19.18	126.06	2.00	0.00	1.00	0.00	19.23	127.57	2.00	0.00	1.00	0.00
19.33	130.00	2.00	0.00	1.00	0.00	19.38	133.52	2.00	0.00	1.00	0.00
19.43	136.08	2.00	0.00	1.00	0.00	19.53	137.75	2.00	0.00	1.00	0.00
19.58	138.92	2.00	0.00	1.00	0.00	19.63	140.74	2.00	0.00	1.00	0.00
19.72	142.97	2.00	0.00	1.00	0.00	19.77	144.96	2.00	0.00	1.00	0.00
19.82	145.79	2.00	0.00	1.00	0.00	19.88	145.93	2.00	0.00	1.00	0.00
19.98	145.68	2.00	0.00	1.00	0.00	20.02	144.40	2.00	0.00	1.00	0.00
20.12	142.31	2.00	0.00	1.00	0.00	20.17	140.05	2.00	0.00	1.00	0.00
20.22	138.02	2.00	0.00	1.00	0.00	20.31	136.43	2.00	0.00	1.00	0.00
20.37	135.24	2.00	0.00	1.00	0.00	20.42	134.99	2.00	0.00	1.00	0.00
20.50	135.19	2.00	0.00	1.00	0.00	20.57	135.84	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.62	135.83	2.00	0.00	1.00	0.00	20.70	134.46	2.00	0.00	1.00	0.00
20.77	132.21	2.00	0.00	1.00	0.00	20.81	129.68	2.00	0.00	1.00	0.00
20.89	127.01	2.00	0.00	1.00	0.00	20.96	124.05	2.00	0.00	1.00	0.00
21.01	121.23	2.00	0.00	1.00	0.00	21.09	118.73	2.00	0.00	1.00	0.00
21.14	117.11	2.00	0.00	1.00	0.00	21.21	116.77	2.00	0.00	1.00	0.00
21.30	117.27	2.00	0.00	1.00	0.00	21.34	117.77	2.00	0.00	1.00	0.00
21.40	117.17	2.00	0.00	1.00	0.00	21.50	116.07	2.00	0.00	1.00	0.00
21.54	114.87	2.00	0.00	1.00	0.00	21.59	113.89	2.00	0.00	1.00	0.00
21.70	112.84	2.00	0.00	1.00	0.00	21.75	111.24	2.00	0.00	1.00	0.00
21.80	107.89	2.00	0.00	1.00	0.00	21.89	103.85	2.00	0.00	1.00	0.00
21.93	99.77	2.00	0.00	1.00	0.00	21.98	97.78	2.00	0.00	1.00	0.00
22.05	96.36	2.00	0.00	1.00	0.00	22.11	96.81	2.00	0.00	1.00	0.00
22.20	97.55	2.00	0.00	1.00	0.00	22.24	100.65	2.00	0.00	1.00	0.00
22.32	100.70	2.00	0.00	1.00	0.00	22.38	98.62	0.16	2.36	1.00	0.02
22.48	94.19	0.15	2.45	1.00	0.03	22.53	92.09	0.15	2.50	1.00	0.02
22.57	92.13	2.00	0.00	1.00	0.00	22.68	92.24	2.00	0.00	1.00	0.00
22.72	92.04	2.00	0.00	1.00	0.00	22.77	90.55	2.00	0.00	1.00	0.00
22.87	88.25	2.00	0.00	1.00	0.00	22.92	84.98	2.00	0.00	1.00	0.00
22.97	80.94	2.00	0.00	1.00	0.00	23.06	77.04	2.00	0.00	1.00	0.00
23.12	74.21	2.00	0.00	1.00	0.00	23.17	74.52	2.00	0.00	1.00	0.00
23.27	76.07	2.00	0.00	1.00	0.00	23.30	77.23	2.00	0.00	1.00	0.00
23.37	76.83	2.00	0.00	1.00	0.00	23.45	75.67	2.00	0.00	1.00	0.00
23.51	75.89	2.00	0.00	1.00	0.00	23.57	78.30	2.00	0.00	1.00	0.00
23.65	81.59	2.00	0.00	1.00	0.00	23.70	85.21	2.00	0.00	1.00	0.00
23.76	86.20	2.00	0.00	1.00	0.00	23.85	85.95	2.00	0.00	1.00	0.00
23.90	84.53	2.00	0.00	1.00	0.00	23.96	85.84	2.00	0.00	1.00	0.00
24.05	87.51	2.00	0.00	1.00	0.00	24.10	87.79	2.00	0.00	1.00	0.00
24.16	85.66	2.00	0.00	1.00	0.00	24.22	83.73	2.00	0.00	1.00	0.00
24.28	83.16	2.00	0.00	1.00	0.00	24.35	82.80	2.00	0.00	1.00	0.00
24.42	81.74	2.00	0.00	1.00	0.00	24.50	80.10	2.00	0.00	1.00	0.00
24.55	78.63	2.00	0.00	1.00	0.00	24.64	77.73	2.00	0.00	1.00	0.00
24.70	77.60	2.00	0.00	1.00	0.00	24.75	79.90	2.00	0.00	1.00	0.00
24.83	83.81	2.00	0.00	1.00	0.00	24.89	88.23	2.00	0.00	1.00	0.00
24.94	90.13	2.00	0.00	1.00	0.00	25.04	90.44	2.00	0.00	1.00	0.00
25.09	89.98	2.00	0.00	1.00	0.00	25.14	89.61	2.00	0.00	1.00	0.00
25.20	89.08	2.00	0.00	1.00	0.00	25.29	86.02	2.00	0.00	1.00	0.00
25.34	80.81	0.12	2.78	1.00	0.02	25.39	76.39	0.11	2.91	1.00	0.02
25.48	74.84	0.11	2.96	1.00	0.03	25.54	76.23	2.00	0.00	1.00	0.00
25.62	76.96	2.00	0.00	1.00	0.00	25.67	77.48	2.00	0.00	1.00	0.00
25.73	77.27	2.00	0.00	1.00	0.00	25.82	76.89	2.00	0.00	1.00	0.00
25.88	76.92	2.00	0.00	1.00	0.00	25.93	78.01	2.00	0.00	1.00	0.00
26.00	80.74	2.00	0.00	1.00	0.00	26.08	84.13	2.00	0.00	1.00	0.00
26.13	87.74	2.00	0.00	1.00	0.00	26.22	90.16	2.00	0.00	1.00	0.00
26.27	92.63	2.00	0.00	1.00	0.00	26.32	96.62	2.00	0.00	1.00	0.00
26.41	102.13	2.00	0.00	1.00	0.00	26.47	107.91	2.00	0.00	1.00	0.00
26.51	112.98	2.00	0.00	1.00	0.00	26.62	116.65	2.00	0.00	1.00	0.00
26.67	119.54	2.00	0.00	1.00	0.00	26.71	122.00	2.00	0.00	1.00	0.00
26.78	124.13	2.00	0.00	1.00	0.00	26.87	125.32	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
26.92	124.96	2.00	0.00	1.00	0.00	27.02	123.93	2.00	0.00	1.00	0.00
27.05	122.70	2.00	0.00	1.00	0.00	27.11	121.66	2.00	0.00	1.00	0.00
27.18	120.99	2.00	0.00	1.00	0.00	27.26	120.73	2.00	0.00	1.00	0.00
27.30	120.90	2.00	0.00	1.00	0.00	27.36	120.53	2.00	0.00	1.00	0.00
27.46	120.07	2.00	0.00	1.00	0.00	27.50	119.66	2.00	0.00	1.00	0.00
27.60	120.15	2.00	0.00	1.00	0.00	27.65	122.18	2.00	0.00	1.00	0.00
27.70	126.43	2.00	0.00	1.00	0.00	27.78	131.75	2.00	0.00	1.00	0.00
27.85	137.73	2.00	0.00	1.00	0.00	27.90	144.52	2.00	0.00	1.00	0.00
27.99	150.95	2.00	0.00	1.00	0.00	28.05	155.93	2.00	0.00	1.00	0.00
28.10	156.80	2.00	0.00	1.00	0.00	28.20	155.04	2.00	0.00	1.00	0.00
28.24	151.62	2.00	0.00	1.00	0.00	28.30	148.50	2.00	0.00	1.00	0.00
28.38	145.58	2.00	0.00	1.00	0.00	28.44	142.91	2.00	0.00	1.00	0.00
28.49	140.41	2.00	0.00	1.00	0.00	28.54	137.86	2.00	0.00	1.00	0.00
28.64	136.18	2.00	0.00	1.00	0.00	28.68	135.45	2.00	0.00	1.00	0.00
28.79	135.31	2.00	0.00	1.00	0.00	28.83	134.14	2.00	0.00	1.00	0.00
28.89	131.43	2.00	0.00	1.00	0.00	28.98	128.59	2.00	0.00	1.00	0.00
29.01	126.75	2.00	0.00	1.00	0.00	29.07	125.53	2.00	0.00	1.00	0.00
29.18	124.10	2.00	0.00	1.00	0.00	29.21	122.77	2.00	0.00	1.00	0.00
29.27	122.04	2.00	0.00	1.00	0.00	29.34	121.63	2.00	0.00	1.00	0.00
29.41	121.49	2.00	0.00	1.00	0.00	29.47	120.97	2.00	0.00	1.00	0.00
29.53	118.16	2.00	0.00	1.00	0.00	29.60	114.70	2.00	0.00	1.00	0.00
29.67	113.09	2.00	0.00	1.00	0.00	29.73	113.39	2.00	0.00	1.00	0.00
29.81	115.66	2.00	0.00	1.00	0.00	29.87	118.22	2.00	0.00	1.00	0.00
29.93	123.40	2.00	0.00	1.00	0.00	30.00	127.94	2.00	0.00	1.00	0.00
30.05	133.73	2.00	0.00	1.00	0.00	30.16	138.11	2.00	0.00	1.00	0.00
30.20	143.16	2.00	0.00	1.00	0.00	30.26	146.13	2.00	0.00	1.00	0.00
30.32	148.74	2.00	0.00	1.00	0.00	30.39	150.74	2.00	0.00	1.00	0.00
30.46	152.55	2.00	0.00	1.00	0.00	30.52	154.21	2.00	0.00	1.00	0.00
30.60	154.87	2.00	0.00	1.00	0.00	30.66	154.55	2.00	0.00	1.00	0.00
30.71	152.99	2.00	0.00	1.00	0.00	30.78	150.60	2.00	0.00	1.00	0.00
30.84	146.91	2.00	0.00	1.00	0.00	30.91	142.48	2.00	0.00	1.00	0.00
30.99	137.10	2.00	0.00	1.00	0.00	31.04	131.54	2.00	0.00	1.00	0.00
31.11	125.68	2.00	0.00	1.00	0.00	31.20	120.29	2.00	0.00	1.00	0.00
31.24	113.91	2.00	0.00	1.00	0.00	31.34	108.51	2.00	0.00	1.00	0.00
31.37	103.81	2.00	0.00	1.00	0.00	31.43	101.22	2.00	0.00	1.00	0.00
31.54	98.90	2.00	0.00	1.00	0.00	31.56	96.55	2.00	0.00	1.00	0.00
31.63	92.72	2.00	0.00	1.00	0.00	31.73	88.09	2.00	0.00	1.00	0.00
31.78	83.45	2.00	0.00	1.00	0.00	31.83	80.42	2.00	0.00	1.00	0.00
31.90	77.78	2.00	0.00	1.00	0.00	31.97	75.37	2.00	0.00	1.00	0.00
32.02	73.53	2.00	0.00	1.00	0.00	32.13	72.28	2.00	0.00	1.00	0.00
32.16	71.39	2.00	0.00	1.00	0.00	32.23	70.61	2.00	0.00	1.00	0.00
32.32	69.52	2.00	0.00	1.00	0.00	32.37	68.85	2.00	0.00	1.00	0.00
32.43	69.60	2.00	0.00	1.00	0.00	32.52	71.10	2.00	0.00	1.00	0.00
32.57	72.89	2.00	0.00	1.00	0.00	32.62	74.01	2.00	0.00	1.00	0.00
32.71	74.56	2.00	0.00	1.00	0.00	32.77	74.46	2.00	0.00	1.00	0.00
32.82	75.03	2.00	0.00	1.00	0.00	32.91	76.25	2.00	0.00	1.00	0.00
32.96	78.70	2.00	0.00	1.00	0.00	33.01	81.61	2.00	0.00	1.00	0.00
33.11	84.34	2.00	0.00	1.00	0.00	33.16	87.94	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
33.21	94.49	2.00	0.00	1.00	0.00	33.30	101.65	2.00	0.00	1.00	0.00
33.36	107.52	2.00	0.00	1.00	0.00	33.41	109.71	2.00	0.00	1.00	0.00
33.50	110.44	2.00	0.00	1.00	0.00	33.55	110.38	2.00	0.00	1.00	0.00
33.60	109.74	2.00	0.00	1.00	0.00	33.67	108.13	2.00	0.00	1.00	0.00
33.74	104.89	2.00	0.00	1.00	0.00	33.80	101.08	2.00	0.00	1.00	0.00
33.87	97.43	2.00	0.00	1.00	0.00	33.93	94.24	2.00	0.00	1.00	0.00
34.00	93.83	2.00	0.00	1.00	0.00	34.10	94.85	2.00	0.00	1.00	0.00
34.13	98.24	2.00	0.00	1.00	0.00	34.20	101.02	2.00	0.00	1.00	0.00
34.28	103.24	2.00	0.00	1.00	0.00	34.32	104.83	2.00	0.00	1.00	0.00
34.39	105.51	2.00	0.00	1.00	0.00	34.48	105.49	2.00	0.00	1.00	0.00
34.53	104.82	2.00	0.00	1.00	0.00	34.59	103.28	2.00	0.00	1.00	0.00
34.69	102.08	2.00	0.00	1.00	0.00	34.74	102.00	2.00	0.00	1.00	0.00
34.79	103.87	2.00	0.00	1.00	0.00	34.86	106.97	2.00	0.00	1.00	0.00
34.94	110.07	2.00	0.00	1.00	0.00	34.97	113.41	2.00	0.00	1.00	0.00
35.04	116.69	2.00	0.00	1.00	0.00	35.11	120.54	2.00	0.00	1.00	0.00
35.19	123.62	2.00	0.00	1.00	0.00	35.24	125.97	2.00	0.00	1.00	0.00
35.31	126.49	2.00	0.00	1.00	0.00	35.38	125.57	2.00	0.00	1.00	0.00
35.44	122.14	2.00	0.00	1.00	0.00	35.53	119.16	2.00	0.00	1.00	0.00
35.58	117.16	2.00	0.00	1.00	0.00	35.67	117.38	2.00	0.00	1.00	0.00
35.73	118.55	2.00	0.00	1.00	0.00	35.78	121.20	2.00	0.00	1.00	0.00
35.88	123.87	2.00	0.00	1.00	0.00	35.90	127.20	2.00	0.00	1.00	0.00
35.97	130.36	2.00	0.00	1.00	0.00	36.07	133.45	2.00	0.00	1.00	0.00
36.12	135.75	2.00	0.00	1.00	0.00	36.17	137.28	2.00	0.00	1.00	0.00
36.26	138.01	2.00	0.00	1.00	0.00	36.31	138.02	2.00	0.00	1.00	0.00
36.36	135.96	2.00	0.00	1.00	0.00	36.45	133.29	2.00	0.00	1.00	0.00
36.51	130.35	2.00	0.00	1.00	0.00	36.56	127.96	2.00	0.00	1.00	0.00
36.62	124.97	2.00	0.00	1.00	0.00	36.71	121.62	2.00	0.00	1.00	0.00
36.76	118.44	2.00	0.00	1.00	0.00	36.81	116.01	2.00	0.00	1.00	0.00
36.91	114.27	2.00	0.00	1.00	0.00	36.96	113.13	2.00	0.00	1.00	0.00
37.01	112.80	2.00	0.00	1.00	0.00	37.10	112.53	2.00	0.00	1.00	0.00
37.16	112.11	2.00	0.00	1.00	0.00	37.20	109.93	2.00	0.00	1.00	0.00
37.29	106.83	2.00	0.00	1.00	0.00	37.35	104.71	2.00	0.00	1.00	0.00
37.40	104.87	2.00	0.00	1.00	0.00	37.49	106.12	2.00	0.00	1.00	0.00
37.55	106.83	2.00	0.00	1.00	0.00	37.60	107.63	2.00	0.00	1.00	0.00
37.69	108.74	2.00	0.00	1.00	0.00	37.75	109.91	2.00	0.00	1.00	0.00
37.80	109.93	2.00	0.00	1.00	0.00	37.89	108.88	2.00	0.00	1.00	0.00
37.95	107.25	2.00	0.00	1.00	0.00	38.00	106.28	2.00	0.00	1.00	0.00
38.09	105.80	2.00	0.00	1.00	0.00	38.14	105.58	2.00	0.00	1.00	0.00
38.19	105.27	2.00	0.00	1.00	0.00	38.29	105.13	2.00	0.00	1.00	0.00
38.34	105.79	2.00	0.00	1.00	0.00	38.39	107.39	2.00	0.00	1.00	0.00
38.48	108.95	2.00	0.00	1.00	0.00	38.52	110.40	2.00	0.00	1.00	0.00
38.59	112.21	2.00	0.00	1.00	0.00	38.68	114.37	2.00	0.00	1.00	0.00
38.73	116.86	2.00	0.00	1.00	0.00	38.78	118.79	2.00	0.00	1.00	0.00
38.87	120.47	2.00	0.00	1.00	0.00	38.92	122.21	2.00	0.00	1.00	0.00
38.98	124.28	2.00	0.00	1.00	0.00	39.07	126.12	2.00	0.00	1.00	0.00
39.13	127.12	2.00	0.00	1.00	0.00	39.18	126.57	2.00	0.00	1.00	0.00
39.26	124.77	2.00	0.00	1.00	0.00	39.32	122.54	2.00	0.00	1.00	0.00
39.37	120.34	2.00	0.00	1.00	0.00	39.46	118.86	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
39.52	117.95	2.00	0.00	1.00	0.00	39.62	117.67	2.00	0.00	1.00	0.00
39.66	117.71	2.00	0.00	1.00	0.00	39.72	118.32	2.00	0.00	1.00	0.00
39.76	120.21	2.00	0.00	1.00	0.00	39.86	122.71	2.00	0.00	1.00	0.00
39.91	126.46	2.00	0.00	1.00	0.00	40.01	129.16	2.00	0.00	1.00	0.00
40.06	131.41	2.00	0.00	1.00	0.00	40.11	131.98	2.00	0.00	1.00	0.00
40.16	131.37	2.00	0.00	1.00	0.00	40.26	129.45	2.00	0.00	1.00	0.00
40.31	126.43	2.00	0.00	1.00	0.00	40.36	122.77	2.00	0.00	1.00	0.00
40.43	118.57	2.00	0.00	1.00	0.00	40.49	113.72	2.00	0.00	1.00	0.00
40.55	108.02	2.00	0.00	1.00	0.00	40.64	102.41	2.00	0.00	1.00	0.00
40.70	98.65	2.00	0.00	1.00	0.00	40.75	97.74	2.00	0.00	1.00	0.00
40.84	98.18	2.00	0.00	1.00	0.00	40.88	98.81	2.00	0.00	1.00	0.00
40.95	99.36	2.00	0.00	1.00	0.00	41.03	100.16	2.00	0.00	1.00	0.00
41.09	102.32	2.00	0.00	1.00	0.00	41.15	105.29	2.00	0.00	1.00	0.00
41.23	108.51	2.00	0.00	1.00	0.00	41.28	111.71	2.00	0.00	1.00	0.00
41.34	115.39	2.00	0.00	1.00	0.00	41.44	118.65	2.00	0.00	1.00	0.00
41.49	120.69	2.00	0.00	1.00	0.00	41.55	121.54	2.00	0.00	1.00	0.00
41.63	123.05	2.00	0.00	1.00	0.00	41.69	124.69	2.00	0.00	1.00	0.00
41.73	125.28	2.00	0.00	1.00	0.00	41.80	123.73	2.00	0.00	1.00	0.00
41.88	121.10	2.00	0.00	1.00	0.00	41.94	118.31	2.00	0.00	1.00	0.00
42.03	116.29	2.00	0.00	1.00	0.00	42.08	115.39	2.00	0.00	1.00	0.00
42.15	115.73	2.00	0.00	1.00	0.00	42.23	116.95	2.00	0.00	1.00	0.00
42.27	118.50	2.00	0.00	1.00	0.00	42.32	119.69	2.00	0.00	1.00	0.00
42.43	120.31	2.00	0.00	1.00	0.00	42.47	120.70	2.00	0.00	1.00	0.00
42.57	120.73	2.00	0.00	1.00	0.00	42.62	120.54	2.00	0.00	1.00	0.00
42.67	119.86	2.00	0.00	1.00	0.00	42.76	119.31	2.00	0.00	1.00	0.00
42.81	119.01	2.00	0.00	1.00	0.00	42.87	119.10	2.00	0.00	1.00	0.00
42.92	119.11	2.00	0.00	1.00	0.00	43.01	119.06	2.00	0.00	1.00	0.00
43.06	119.13	2.00	0.00	1.00	0.00	43.12	119.58	2.00	0.00	1.00	0.00
43.20	120.26	2.00	0.00	1.00	0.00	43.26	121.16	2.00	0.00	1.00	0.00
43.31	122.26	2.00	0.00	1.00	0.00	43.40	123.24	2.00	0.00	1.00	0.00
43.47	123.98	2.00	0.00	1.00	0.00	43.51	124.38	2.00	0.00	1.00	0.00
43.60	124.55	2.00	0.00	1.00	0.00	43.66	124.72	2.00	0.00	1.00	0.00
43.71	124.27	2.00	0.00	1.00	0.00	43.80	123.48	2.00	0.00	1.00	0.00
43.85	122.79	2.00	0.00	1.00	0.00	43.90	122.52	2.00	0.00	1.00	0.00
44.00	122.14	2.00	0.00	1.00	0.00	44.05	121.45	2.00	0.00	1.00	0.00
44.10	120.72	2.00	0.00	1.00	0.00	44.19	120.32	2.00	0.00	1.00	0.00
44.24	120.54	2.00	0.00	1.00	0.00	44.30	121.36	2.00	0.00	1.00	0.00
44.38	121.67	2.00	0.00	1.00	0.00	44.44	121.34	2.00	0.00	1.00	0.00
44.49	120.57	2.00	0.00	1.00	0.00	44.59	120.11	2.00	0.00	1.00	0.00
44.64	120.11	2.00	0.00	1.00	0.00	44.73	119.77	2.00	0.00	1.00	0.00
44.78	119.08	2.00	0.00	1.00	0.00	44.84	118.26	2.00	0.00	1.00	0.00
44.89	117.74	2.00	0.00	1.00	0.00	44.97	117.50	2.00	0.00	1.00	0.00
45.03	117.35	2.00	0.00	1.00	0.00	45.09	116.88	2.00	0.00	1.00	0.00
45.17	116.24	2.00	0.00	1.00	0.00	45.23	115.68	2.00	0.00	1.00	0.00
45.28	115.61	2.00	0.00	1.00	0.00	45.37	115.82	2.00	0.00	1.00	0.00
45.43	116.14	2.00	0.00	1.00	0.00	45.48	116.25	2.00	0.00	1.00	0.00
45.56	116.05	2.00	0.00	1.00	0.00	45.62	115.60	2.00	0.00	1.00	0.00
45.68	115.09	2.00	0.00	1.00	0.00	45.76	114.60	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
45.81	114.35	2.00	0.00	1.00	0.00	45.87	114.15	2.00	0.00	1.00	0.00
45.98	113.96	2.00	0.00	1.00	0.00	46.01	113.83	2.00	0.00	1.00	0.00
46.07	114.23	2.00	0.00	1.00	0.00	46.17	114.52	2.00	0.00	1.00	0.00
46.22	114.11	2.00	0.00	1.00	0.00	46.27	111.77	2.00	0.00	1.00	0.00
46.34	108.75	2.00	0.00	1.00	0.00	46.40	105.72	2.00	0.00	1.00	0.00
46.49	103.73	2.00	0.00	1.00	0.00	46.54	102.19	2.00	0.00	1.00	0.00
46.59	100.87	2.00	0.00	1.00	0.00	46.68	99.64	2.00	0.00	1.00	0.00
46.74	98.55	2.00	0.00	1.00	0.00	46.79	97.73	2.00	0.00	1.00	0.00
46.87	97.10	2.00	0.00	1.00	0.00	46.94	96.51	2.00	0.00	1.00	0.00
46.98	95.93	2.00	0.00	1.00	0.00	47.06	95.43	2.00	0.00	1.00	0.00
47.11	94.78	2.00	0.00	1.00	0.00	47.18	93.72	2.00	0.00	1.00	0.00
47.27	92.35	2.00	0.00	1.00	0.00	47.31	91.64	2.00	0.00	1.00	0.00
47.38	91.85	2.00	0.00	1.00	0.00	47.46	92.58	2.00	0.00	1.00	0.00
47.52	93.34	2.00	0.00	1.00	0.00	47.57	94.21	2.00	0.00	1.00	0.00
47.68	94.78	2.00	0.00	1.00	0.00	47.72	95.59	2.00	0.00	1.00	0.00
47.77	97.58	2.00	0.00	1.00	0.00	47.87	100.16	2.00	0.00	1.00	0.00
47.92	102.93	2.00	0.00	1.00	0.00	47.97	105.09	2.00	0.00	1.00	0.00
48.07	106.85	2.00	0.00	1.00	0.00	48.12	108.24	2.00	0.00	1.00	0.00
48.17	110.06	2.00	0.00	1.00	0.00	48.26	112.05	2.00	0.00	1.00	0.00
48.31	114.01	2.00	0.00	1.00	0.00	48.36	114.80	2.00	0.00	1.00	0.00
48.46	114.92	2.00	0.00	1.00	0.00	48.51	114.77	2.00	0.00	1.00	0.00
48.56	114.16	2.00	0.00	1.00	0.00	48.65	113.07	2.00	0.00	1.00	0.00
48.71	111.56	2.00	0.00	1.00	0.00	48.76	109.96	2.00	0.00	1.00	0.00
48.85	108.48	2.00	0.00	1.00	0.00	48.91	107.33	2.00	0.00	1.00	0.00
48.95	106.77	2.00	0.00	1.00	0.00	49.05	106.43	2.00	0.00	1.00	0.00
49.10	106.36	2.00	0.00	1.00	0.00	49.15	106.40	2.00	0.00	1.00	0.00
49.25	106.24	2.00	0.00	1.00	0.00	49.30	105.63	2.00	0.00	1.00	0.00
49.35	104.21	2.00	0.00	1.00	0.00	49.43	102.40	2.00	0.00	1.00	0.00
49.49	100.31	2.00	0.00	1.00	0.00	49.55	97.93	2.00	0.00	1.00	0.00
49.63	95.42	2.00	0.00	1.00	0.00	49.69	93.24	2.00	0.00	1.00	0.00
49.75	91.78	2.00	0.00	1.00	0.00	49.84	90.82	2.00	0.00	1.00	0.00
49.89	90.23	2.00	0.00	1.00	0.00	49.94	90.18	2.00	0.00	1.00	0.00
50.02	90.25	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.35

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243

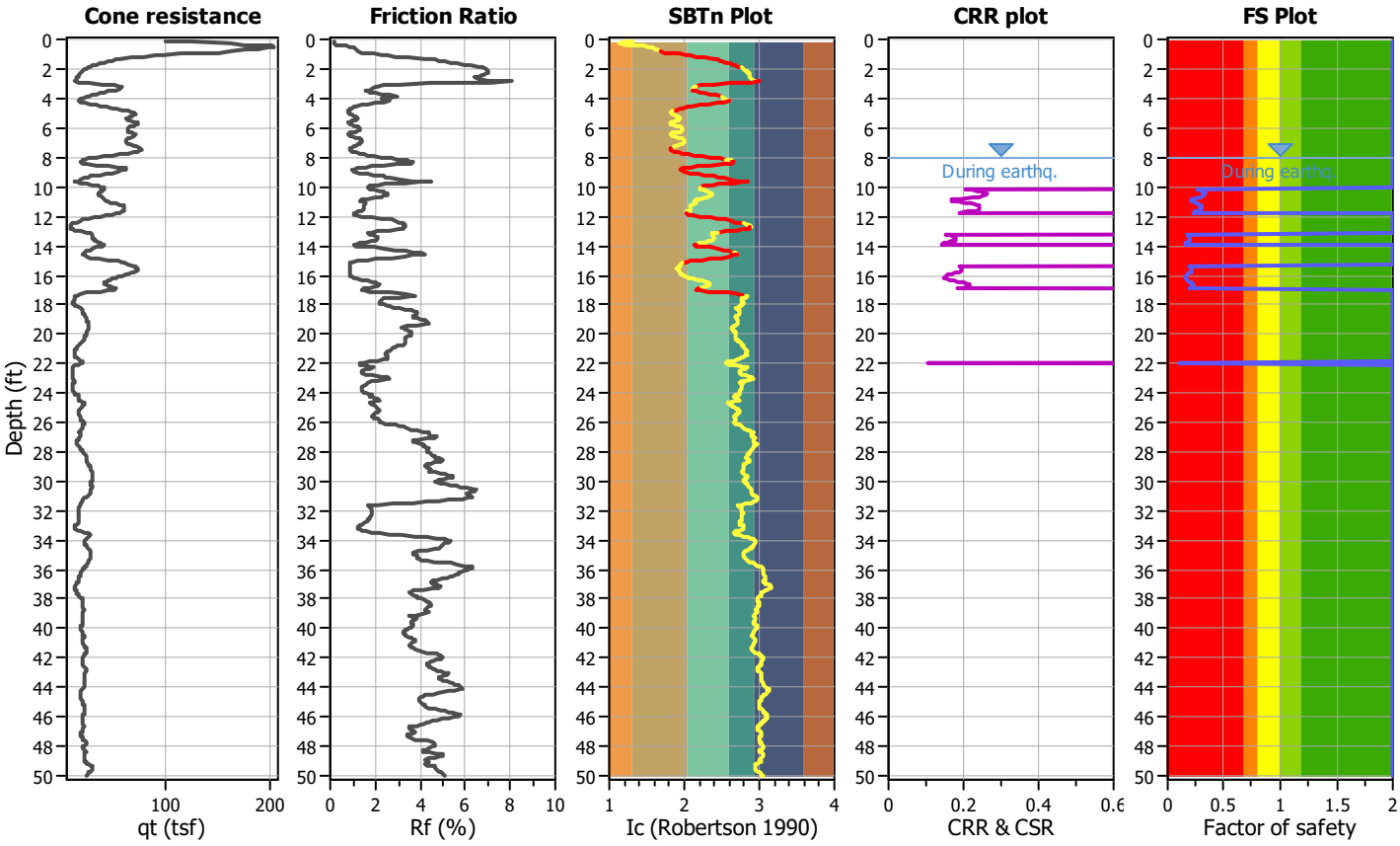
LIQUEFACTION ANALYSIS REPORT

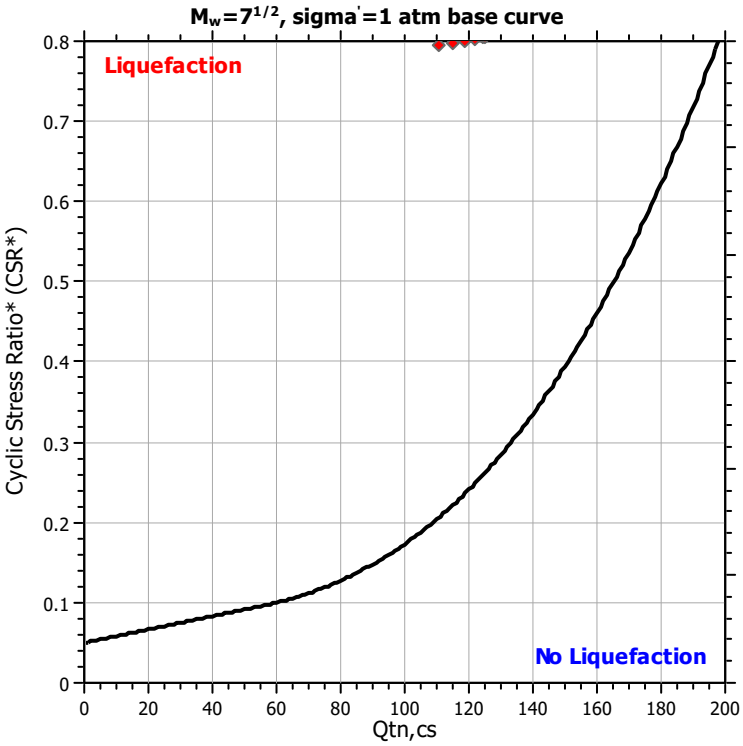
Project title : IVC Sports Field Improvements **Location : Imperial, CA**

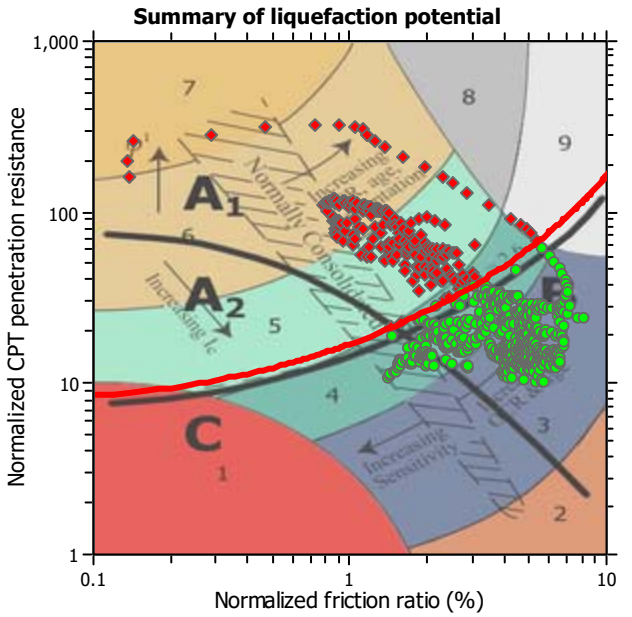
CPT file : CPT-5

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 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:	7.00	Ic cut-off value:	2.55	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	1.02	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

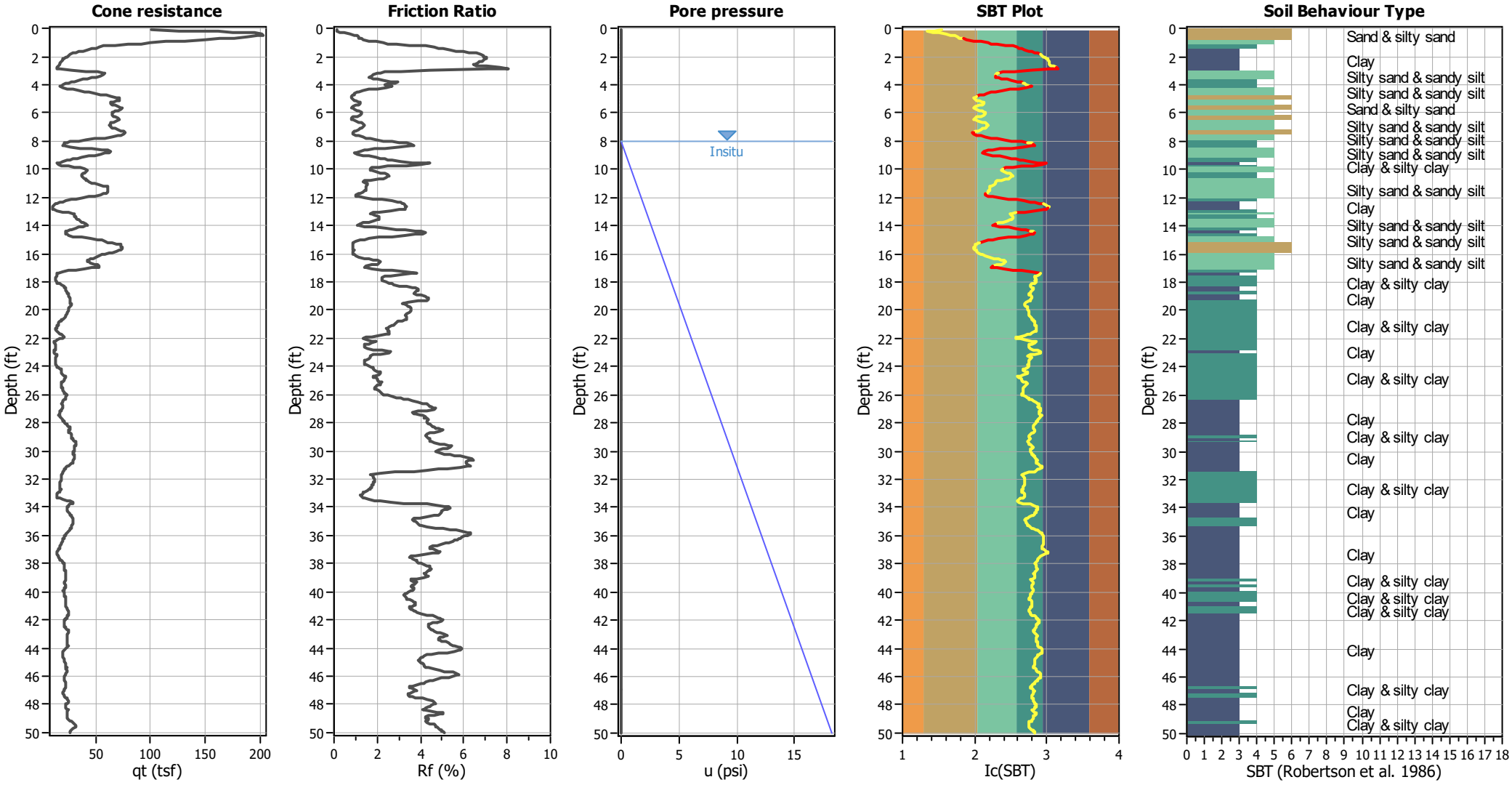






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



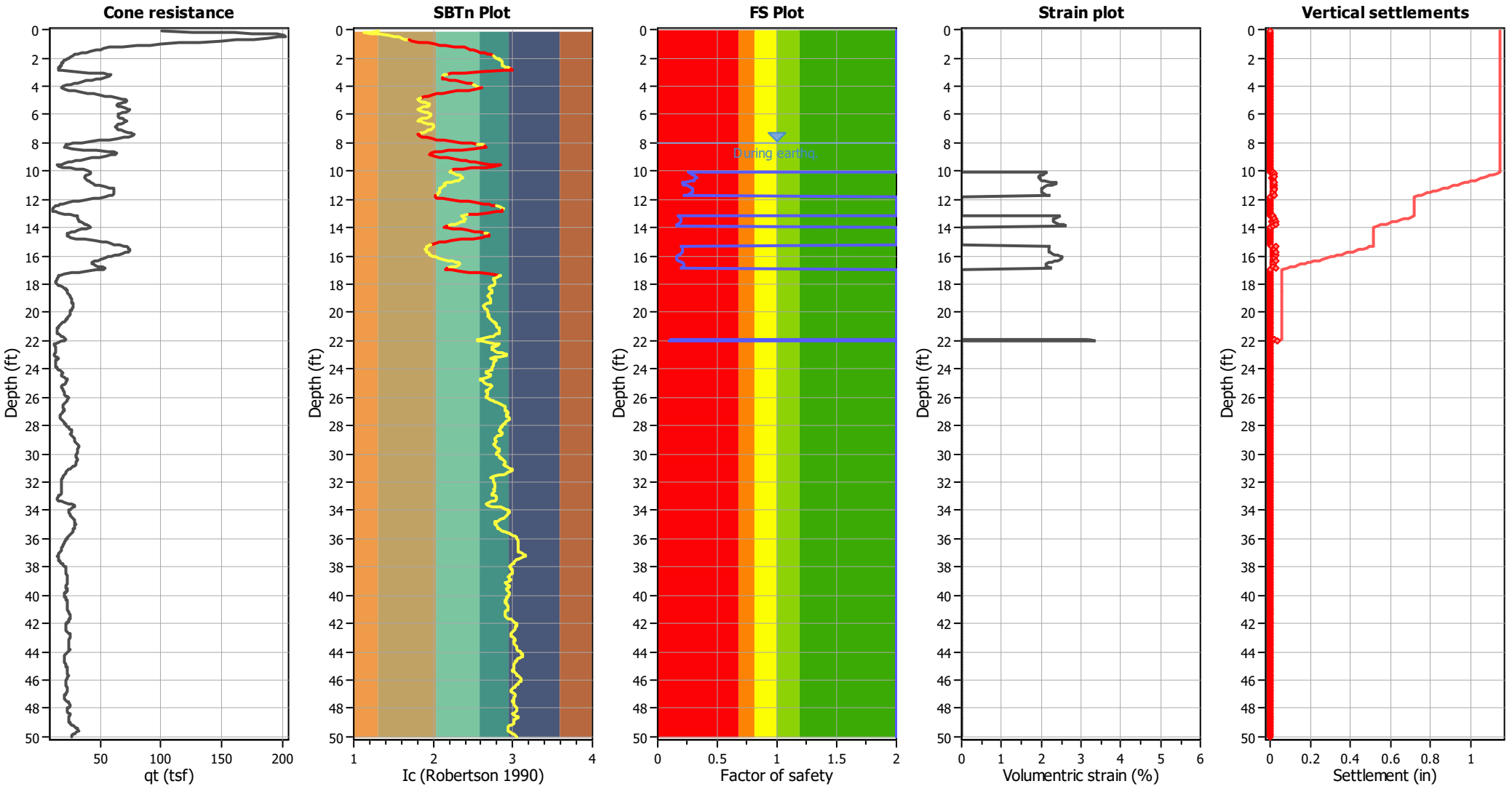
Input parameters and analysis data

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:	2.55	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.02	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	8.00 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

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

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.02	113.49	2.00	0.00	1.00	0.00	8.08	113.31	2.00	0.00	1.00	0.00
8.16	115.21	2.00	0.00	1.00	0.00	8.22	117.90	2.00	0.00	1.00	0.00
8.29	119.09	2.00	0.00	1.00	0.00	8.35	119.93	2.00	0.00	1.00	0.00
8.42	118.83	2.00	0.00	1.00	0.00	8.48	118.64	2.00	0.00	1.00	0.00
8.53	121.43	2.00	0.00	1.00	0.00	8.62	124.82	2.00	0.00	1.00	0.00
8.67	125.36	2.00	0.00	1.00	0.00	8.74	121.49	2.00	0.00	1.00	0.00
8.82	114.61	2.00	0.00	1.00	0.00	8.87	108.32	2.00	0.00	1.00	0.00
8.93	106.60	2.00	0.00	1.00	0.00	9.02	107.73	2.00	0.00	1.00	0.00
9.07	110.09	2.00	0.00	1.00	0.00	9.16	110.60	2.00	0.00	1.00	0.00
9.22	110.10	2.00	0.00	1.00	0.00	9.26	109.42	2.00	0.00	1.00	0.00
9.32	107.93	2.00	0.00	1.00	0.00	9.39	106.94	2.00	0.00	1.00	0.00
9.46	108.22	2.00	0.00	1.00	0.00	9.57	111.04	2.00	0.00	1.00	0.00
9.60	114.28	2.00	0.00	1.00	0.00	9.66	112.81	2.00	0.00	1.00	0.00
9.76	110.00	2.00	0.00	1.00	0.00	9.81	105.54	2.00	0.00	1.00	0.00
9.86	103.85	2.00	0.00	1.00	0.00	9.91	103.32	2.00	0.00	1.00	0.00
10.00	104.21	2.00	0.00	1.00	0.00	10.05	107.23	2.00	0.00	1.00	0.00
10.11	110.81	0.26	2.15	1.00	0.01	10.19	114.84	0.28	2.09	1.00	0.02
10.25	118.56	0.29	2.03	1.00	0.01	10.30	121.93	0.31	1.99	1.00	0.01
10.40	124.21	0.32	1.96	1.00	0.02	10.44	125.08	0.32	1.94	1.00	0.01
10.50	124.09	0.32	1.96	1.00	0.01	10.57	122.36	0.31	1.98	1.00	0.02
10.64	120.59	0.30	2.00	1.00	0.02	10.70	116.07	0.28	2.07	1.00	0.01
10.77	106.05	0.23	2.23	1.00	0.02	10.84	98.78	0.21	2.36	1.00	0.02
10.90	97.49	0.20	2.39	1.00	0.02	10.96	104.15	0.22	2.26	1.00	0.02
11.04	109.78	0.25	2.16	1.00	0.02	11.09	114.93	0.27	2.08	1.00	0.01
11.18	118.52	0.28	2.03	1.00	0.02	11.24	120.74	0.29	2.00	1.00	0.01
11.34	120.82	0.29	2.00	1.00	0.02	11.39	120.84	0.29	2.00	1.00	0.01
11.43	120.80	0.29	2.00	1.00	0.01	11.49	120.31	0.29	2.01	1.00	0.01
11.56	118.71	0.28	2.03	1.00	0.02	11.63	115.99	0.27	2.07	1.00	0.02
11.69	111.39	0.25	2.14	1.00	0.02	11.76	104.90	0.22	2.25	1.00	0.02
11.83	97.89	2.00	0.00	1.00	0.00	11.90	92.96	2.00	0.00	1.00	0.00
11.96	91.17	2.00	0.00	1.00	0.00	12.03	92.81	2.00	0.00	1.00	0.00
12.09	96.48	2.00	0.00	1.00	0.00	12.16	100.98	2.00	0.00	1.00	0.00
12.22	103.81	2.00	0.00	1.00	0.00	12.32	103.08	2.00	0.00	1.00	0.00
12.37	100.72	2.00	0.00	1.00	0.00	12.42	97.05	2.00	0.00	1.00	0.00
12.47	93.15	2.00	0.00	1.00	0.00	12.54	89.43	2.00	0.00	1.00	0.00
12.61	87.06	2.00	0.00	1.00	0.00	12.67	87.16	2.00	0.00	1.00	0.00
12.74	87.59	2.00	0.00	1.00	0.00	12.81	88.56	2.00	0.00	1.00	0.00
12.87	88.75	2.00	0.00	1.00	0.00	12.95	87.94	2.00	0.00	1.00	0.00
13.01	86.24	2.00	0.00	1.00	0.00	13.06	86.46	2.00	0.00	1.00	0.00
13.15	88.45	2.00	0.00	1.00	0.00	13.21	92.28	0.17	2.50	1.00	0.02
13.26	96.14	0.18	2.41	1.00	0.01	13.32	99.69	0.19	2.34	1.00	0.02
13.40	101.44	0.20	2.31	1.00	0.02	13.45	102.04	0.20	2.30	1.00	0.01
13.55	101.90	0.20	2.30	1.00	0.03	13.59	101.30	0.20	2.31	1.00	0.01
13.65	98.01	0.19	2.38	1.00	0.02	13.75	93.89	0.17	2.46	1.00	0.03
13.79	89.22	0.16	2.57	1.00	0.01	13.85	86.59	0.16	2.63	1.00	0.02
13.95	85.06	2.00	0.00	1.00	0.00	13.99	85.93	2.00	0.00	1.00	0.00
14.05	91.05	2.00	0.00	1.00	0.00	14.11	99.68	2.00	0.00	1.00	0.00
14.19	107.89	2.00	0.00	1.00	0.00	14.25	114.58	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
14.34	119.02	2.00	0.00	1.00	0.00	14.39	123.70	2.00	0.00	1.00	0.00
14.44	126.95	2.00	0.00	1.00	0.00	14.54	128.54	2.00	0.00	1.00	0.00
14.58	127.47	2.00	0.00	1.00	0.00	14.64	122.82	2.00	0.00	1.00	0.00
14.73	117.34	2.00	0.00	1.00	0.00	14.79	111.17	2.00	0.00	1.00	0.00
14.83	105.42	2.00	0.00	1.00	0.00	14.93	102.62	2.00	0.00	1.00	0.00
14.97	102.35	2.00	0.00	1.00	0.00	15.03	100.38	2.00	0.00	1.00	0.00
15.13	97.30	2.00	0.00	1.00	0.00	15.17	96.34	2.00	0.00	1.00	0.00
15.23	99.67	2.00	0.00	1.00	0.00	15.33	104.81	0.20	2.25	1.00	0.03
15.36	107.63	0.21	2.20	1.00	0.01	15.43	107.67	0.21	2.20	1.00	0.02
15.52	107.52	0.21	2.20	1.00	0.02	15.57	107.21	0.21	2.21	1.00	0.01
15.62	107.82	0.21	2.20	1.00	0.01	15.72	107.26	0.21	2.21	1.00	0.03
15.77	106.22	0.20	2.22	1.00	0.01	15.83	102.83	0.19	2.28	1.00	0.01
15.92	98.88	0.18	2.36	1.00	0.03	15.97	95.22	0.17	2.43	1.00	0.01
16.02	92.74	0.16	2.49	1.00	0.02	16.09	91.14	0.16	2.52	1.00	0.02
16.16	90.95	0.16	2.53	1.00	0.02	16.21	92.87	0.16	2.48	1.00	0.01
16.31	95.87	0.17	2.42	1.00	0.03	16.36	100.23	0.18	2.33	1.00	0.01
16.41	104.53	0.19	2.25	1.00	0.02	16.47	108.77	0.21	2.18	1.00	0.02
16.54	111.53	0.22	2.14	1.00	0.02	16.61	112.80	0.22	2.12	1.00	0.02
16.67	113.29	0.22	2.11	1.00	0.02	16.74	113.06	0.22	2.11	1.00	0.02
16.81	109.54	0.21	2.17	1.00	0.02	16.90	104.58	0.19	2.25	1.00	0.03
16.94	99.64	2.00	0.00	1.00	0.00	17.01	97.08	2.00	0.00	1.00	0.00
17.10	97.34	2.00	0.00	1.00	0.00	17.15	99.41	2.00	0.00	1.00	0.00
17.20	101.96	2.00	0.00	1.00	0.00	17.30	104.25	2.00	0.00	1.00	0.00
17.36	104.02	2.00	0.00	1.00	0.00	17.40	98.07	2.00	0.00	1.00	0.00
17.50	89.86	2.00	0.00	1.00	0.00	17.55	81.89	2.00	0.00	1.00	0.00
17.59	77.32	2.00	0.00	1.00	0.00	17.69	74.61	2.00	0.00	1.00	0.00
17.75	72.95	2.00	0.00	1.00	0.00	17.79	72.79	2.00	0.00	1.00	0.00
17.88	73.00	2.00	0.00	1.00	0.00	17.91	73.76	2.00	0.00	1.00	0.00
17.98	77.22	2.00	0.00	1.00	0.00	18.08	81.16	2.00	0.00	1.00	0.00
18.12	86.88	2.00	0.00	1.00	0.00	18.21	92.20	2.00	0.00	1.00	0.00
18.26	99.83	2.00	0.00	1.00	0.00	18.33	106.06	2.00	0.00	1.00	0.00
18.37	111.58	2.00	0.00	1.00	0.00	18.46	114.48	2.00	0.00	1.00	0.00
18.53	116.46	2.00	0.00	1.00	0.00	18.58	116.83	2.00	0.00	1.00	0.00
18.65	116.74	2.00	0.00	1.00	0.00	18.73	116.33	2.00	0.00	1.00	0.00
18.79	116.86	2.00	0.00	1.00	0.00	18.87	118.52	2.00	0.00	1.00	0.00
18.93	121.11	2.00	0.00	1.00	0.00	18.97	124.75	2.00	0.00	1.00	0.00
19.06	127.62	2.00	0.00	1.00	0.00	19.12	130.19	2.00	0.00	1.00	0.00
19.18	131.59	2.00	0.00	1.00	0.00	19.26	132.25	2.00	0.00	1.00	0.00
19.32	131.47	2.00	0.00	1.00	0.00	19.38	123.60	2.00	0.00	1.00	0.00
19.47	116.06	2.00	0.00	1.00	0.00	19.52	110.45	2.00	0.00	1.00	0.00
19.58	112.49	2.00	0.00	1.00	0.00	19.65	114.33	2.00	0.00	1.00	0.00
19.72	115.37	2.00	0.00	1.00	0.00	19.77	115.72	2.00	0.00	1.00	0.00
19.82	115.56	2.00	0.00	1.00	0.00	19.90	115.02	2.00	0.00	1.00	0.00
19.95	114.57	2.00	0.00	1.00	0.00	20.04	114.20	2.00	0.00	1.00	0.00
20.09	113.26	2.00	0.00	1.00	0.00	20.15	111.39	2.00	0.00	1.00	0.00
20.24	108.99	2.00	0.00	1.00	0.00	20.30	107.23	2.00	0.00	1.00	0.00
20.36	106.18	2.00	0.00	1.00	0.00	20.44	105.45	2.00	0.00	1.00	0.00
20.50	104.56	2.00	0.00	1.00	0.00	20.54	102.81	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.63	100.65	2.00	0.00	1.00	0.00	20.70	97.13	2.00	0.00	1.00	0.00
20.75	93.52	2.00	0.00	1.00	0.00	20.82	89.62	2.00	0.00	1.00	0.00
20.89	86.86	2.00	0.00	1.00	0.00	20.94	84.26	2.00	0.00	1.00	0.00
21.04	82.28	2.00	0.00	1.00	0.00	21.08	80.63	2.00	0.00	1.00	0.00
21.14	79.25	2.00	0.00	1.00	0.00	21.20	77.19	2.00	0.00	1.00	0.00
21.27	75.22	2.00	0.00	1.00	0.00	21.33	74.80	2.00	0.00	1.00	0.00
21.41	75.51	2.00	0.00	1.00	0.00	21.48	76.72	2.00	0.00	1.00	0.00
21.53	78.11	2.00	0.00	1.00	0.00	21.59	80.45	2.00	0.00	1.00	0.00
21.67	82.22	2.00	0.00	1.00	0.00	21.72	82.06	2.00	0.00	1.00	0.00
21.79	78.64	2.00	0.00	1.00	0.00	21.87	73.74	2.00	0.00	1.00	0.00
21.92	68.25	0.11	3.20	1.00	0.02	22.02	64.13	0.10	3.36	1.00	0.04
22.06	61.86	2.00	0.00	1.00	0.00	22.12	62.42	2.00	0.00	1.00	0.00
22.22	63.37	2.00	0.00	1.00	0.00	22.27	63.55	2.00	0.00	1.00	0.00
22.32	61.66	2.00	0.00	1.00	0.00	22.41	59.40	2.00	0.00	1.00	0.00
22.47	57.63	2.00	0.00	1.00	0.00	22.52	57.59	2.00	0.00	1.00	0.00
22.61	57.78	2.00	0.00	1.00	0.00	22.66	57.36	2.00	0.00	1.00	0.00
22.73	58.88	2.00	0.00	1.00	0.00	22.80	63.06	2.00	0.00	1.00	0.00
22.86	68.42	2.00	0.00	1.00	0.00	22.92	71.75	2.00	0.00	1.00	0.00
22.99	72.38	2.00	0.00	1.00	0.00	23.06	71.55	2.00	0.00	1.00	0.00
23.11	68.82	2.00	0.00	1.00	0.00	23.18	65.76	2.00	0.00	1.00	0.00
23.27	63.32	2.00	0.00	1.00	0.00	23.32	62.72	2.00	0.00	1.00	0.00
23.37	61.67	2.00	0.00	1.00	0.00	23.45	59.75	2.00	0.00	1.00	0.00
23.52	57.51	2.00	0.00	1.00	0.00	23.56	56.51	2.00	0.00	1.00	0.00
23.67	56.28	2.00	0.00	1.00	0.00	23.72	56.48	2.00	0.00	1.00	0.00
23.76	56.83	2.00	0.00	1.00	0.00	23.85	57.65	2.00	0.00	1.00	0.00
23.91	59.09	2.00	0.00	1.00	0.00	23.97	61.87	2.00	0.00	1.00	0.00
24.05	64.92	2.00	0.00	1.00	0.00	24.11	67.58	2.00	0.00	1.00	0.00
24.15	68.75	2.00	0.00	1.00	0.00	24.22	69.79	2.00	0.00	1.00	0.00
24.31	71.33	2.00	0.00	1.00	0.00	24.36	73.29	2.00	0.00	1.00	0.00
24.41	74.96	2.00	0.00	1.00	0.00	24.50	75.98	2.00	0.00	1.00	0.00
24.54	76.11	2.00	0.00	1.00	0.00	24.64	75.46	2.00	0.00	1.00	0.00
24.70	75.08	2.00	0.00	1.00	0.00	24.76	75.85	2.00	0.00	1.00	0.00
24.81	76.98	2.00	0.00	1.00	0.00	24.89	77.34	2.00	0.00	1.00	0.00
24.95	76.90	2.00	0.00	1.00	0.00	25.05	76.53	2.00	0.00	1.00	0.00
25.09	76.57	2.00	0.00	1.00	0.00	25.14	76.45	2.00	0.00	1.00	0.00
25.20	75.73	2.00	0.00	1.00	0.00	25.29	74.57	2.00	0.00	1.00	0.00
25.34	73.36	2.00	0.00	1.00	0.00	25.40	72.60	2.00	0.00	1.00	0.00
25.48	72.14	2.00	0.00	1.00	0.00	25.54	72.13	2.00	0.00	1.00	0.00
25.59	72.77	2.00	0.00	1.00	0.00	25.66	74.26	2.00	0.00	1.00	0.00
25.73	76.28	2.00	0.00	1.00	0.00	25.79	78.50	2.00	0.00	1.00	0.00
25.88	80.18	2.00	0.00	1.00	0.00	25.93	82.06	2.00	0.00	1.00	0.00
25.99	84.28	2.00	0.00	1.00	0.00	26.06	87.04	2.00	0.00	1.00	0.00
26.13	90.31	2.00	0.00	1.00	0.00	26.19	93.02	2.00	0.00	1.00	0.00
26.27	95.46	2.00	0.00	1.00	0.00	26.32	96.82	2.00	0.00	1.00	0.00
26.38	98.37	2.00	0.00	1.00	0.00	26.48	99.45	2.00	0.00	1.00	0.00
26.53	101.33	2.00	0.00	1.00	0.00	26.61	102.96	2.00	0.00	1.00	0.00
26.68	104.79	2.00	0.00	1.00	0.00	26.71	106.64	2.00	0.00	1.00	0.00
26.82	108.20	2.00	0.00	1.00	0.00	26.87	109.78	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
26.91	110.63	2.00	0.00	1.00	0.00	26.97	110.47	2.00	0.00	1.00	0.00
27.07	108.22	2.00	0.00	1.00	0.00	27.12	102.57	2.00	0.00	1.00	0.00
27.17	96.23	2.00	0.00	1.00	0.00	27.26	91.89	2.00	0.00	1.00	0.00
27.32	91.50	2.00	0.00	1.00	0.00	27.38	92.90	2.00	0.00	1.00	0.00
27.46	94.57	2.00	0.00	1.00	0.00	27.50	96.51	2.00	0.00	1.00	0.00
27.56	99.02	2.00	0.00	1.00	0.00	27.66	101.32	2.00	0.00	1.00	0.00
27.70	104.16	2.00	0.00	1.00	0.00	27.77	105.93	2.00	0.00	1.00	0.00
27.84	107.10	2.00	0.00	1.00	0.00	27.90	107.73	2.00	0.00	1.00	0.00
27.95	109.27	2.00	0.00	1.00	0.00	28.05	111.40	2.00	0.00	1.00	0.00
28.10	114.37	2.00	0.00	1.00	0.00	28.16	117.56	2.00	0.00	1.00	0.00
28.25	120.37	2.00	0.00	1.00	0.00	28.30	122.40	2.00	0.00	1.00	0.00
28.36	124.03	2.00	0.00	1.00	0.00	28.43	125.73	2.00	0.00	1.00	0.00
28.48	127.08	2.00	0.00	1.00	0.00	28.55	126.33	2.00	0.00	1.00	0.00
28.63	124.18	2.00	0.00	1.00	0.00	28.70	121.82	2.00	0.00	1.00	0.00
28.74	120.50	2.00	0.00	1.00	0.00	28.83	119.87	2.00	0.00	1.00	0.00
28.89	119.55	2.00	0.00	1.00	0.00	28.96	119.86	2.00	0.00	1.00	0.00
29.03	120.91	2.00	0.00	1.00	0.00	29.09	122.60	2.00	0.00	1.00	0.00
29.15	124.40	2.00	0.00	1.00	0.00	29.23	125.81	2.00	0.00	1.00	0.00
29.29	127.05	2.00	0.00	1.00	0.00	29.34	128.79	2.00	0.00	1.00	0.00
29.41	131.86	2.00	0.00	1.00	0.00	29.48	135.55	2.00	0.00	1.00	0.00
29.53	139.01	2.00	0.00	1.00	0.00	29.62	140.83	2.00	0.00	1.00	0.00
29.68	141.25	2.00	0.00	1.00	0.00	29.73	139.96	2.00	0.00	1.00	0.00
29.81	137.66	2.00	0.00	1.00	0.00	29.88	134.96	2.00	0.00	1.00	0.00
29.93	131.69	2.00	0.00	1.00	0.00	30.00	129.17	2.00	0.00	1.00	0.00
30.07	127.83	2.00	0.00	1.00	0.00	30.12	129.86	2.00	0.00	1.00	0.00
30.21	133.45	2.00	0.00	1.00	0.00	30.27	137.96	2.00	0.00	1.00	0.00
30.33	142.02	2.00	0.00	1.00	0.00	30.40	145.42	2.00	0.00	1.00	0.00
30.47	148.00	2.00	0.00	1.00	0.00	30.52	149.88	2.00	0.00	1.00	0.00
30.62	150.21	2.00	0.00	1.00	0.00	30.67	149.46	2.00	0.00	1.00	0.00
30.71	147.50	2.00	0.00	1.00	0.00	30.79	145.40	2.00	0.00	1.00	0.00
30.86	143.73	2.00	0.00	1.00	0.00	30.92	141.42	2.00	0.00	1.00	0.00
31.00	138.82	2.00	0.00	1.00	0.00	31.06	135.61	2.00	0.00	1.00	0.00
31.12	130.16	2.00	0.00	1.00	0.00	31.22	123.97	2.00	0.00	1.00	0.00
31.26	116.75	2.00	0.00	1.00	0.00	31.31	110.62	2.00	0.00	1.00	0.00
31.41	103.60	2.00	0.00	1.00	0.00	31.45	95.41	2.00	0.00	1.00	0.00
31.50	83.26	2.00	0.00	1.00	0.00	31.57	72.63	2.00	0.00	1.00	0.00
31.65	65.10	2.00	0.00	1.00	0.00	31.70	65.80	2.00	0.00	1.00	0.00
31.77	65.95	2.00	0.00	1.00	0.00	31.85	66.00	2.00	0.00	1.00	0.00
31.92	66.11	2.00	0.00	1.00	0.00	31.98	66.48	2.00	0.00	1.00	0.00
32.03	66.63	2.00	0.00	1.00	0.00	32.12	66.58	2.00	0.00	1.00	0.00
32.18	66.25	2.00	0.00	1.00	0.00	32.22	65.60	2.00	0.00	1.00	0.00
32.32	65.01	2.00	0.00	1.00	0.00	32.38	64.61	2.00	0.00	1.00	0.00
32.42	64.27	2.00	0.00	1.00	0.00	32.52	63.65	2.00	0.00	1.00	0.00
32.57	63.21	2.00	0.00	1.00	0.00	32.61	63.20	2.00	0.00	1.00	0.00
32.72	63.31	2.00	0.00	1.00	0.00	32.76	62.25	2.00	0.00	1.00	0.00
32.82	60.03	2.00	0.00	1.00	0.00	32.91	57.42	2.00	0.00	1.00	0.00
32.95	55.53	2.00	0.00	1.00	0.00	33.02	53.95	2.00	0.00	1.00	0.00
33.11	52.31	2.00	0.00	1.00	0.00	33.17	51.19	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
33.20	51.80	2.00	0.00	1.00	0.00	33.30	53.87	2.00	0.00	1.00	0.00
33.36	57.86	2.00	0.00	1.00	0.00	33.43	64.66	2.00	0.00	1.00	0.00
33.50	72.79	2.00	0.00	1.00	0.00	33.56	80.75	2.00	0.00	1.00	0.00
33.60	91.09	2.00	0.00	1.00	0.00	33.70	100.23	2.00	0.00	1.00	0.00
33.75	108.06	2.00	0.00	1.00	0.00	33.80	112.68	2.00	0.00	1.00	0.00
33.90	116.10	2.00	0.00	1.00	0.00	33.95	118.88	2.00	0.00	1.00	0.00
34.00	119.68	2.00	0.00	1.00	0.00	34.07	119.15	2.00	0.00	1.00	0.00
34.15	117.77	2.00	0.00	1.00	0.00	34.20	116.46	2.00	0.00	1.00	0.00
34.30	115.89	2.00	0.00	1.00	0.00	34.33	116.33	2.00	0.00	1.00	0.00
34.40	117.18	2.00	0.00	1.00	0.00	34.47	118.18	2.00	0.00	1.00	0.00
34.54	118.83	2.00	0.00	1.00	0.00	34.59	117.99	2.00	0.00	1.00	0.00
34.68	114.90	2.00	0.00	1.00	0.00	34.74	110.46	2.00	0.00	1.00	0.00
34.79	107.41	2.00	0.00	1.00	0.00	34.87	106.58	2.00	0.00	1.00	0.00
34.94	107.48	2.00	0.00	1.00	0.00	34.99	108.31	2.00	0.00	1.00	0.00
35.04	108.92	2.00	0.00	1.00	0.00	35.13	109.07	2.00	0.00	1.00	0.00
35.19	109.17	2.00	0.00	1.00	0.00	35.28	109.33	2.00	0.00	1.00	0.00
35.34	110.04	2.00	0.00	1.00	0.00	35.38	113.02	2.00	0.00	1.00	0.00
35.47	116.93	2.00	0.00	1.00	0.00	35.53	120.82	2.00	0.00	1.00	0.00
35.58	123.03	2.00	0.00	1.00	0.00	35.64	124.72	2.00	0.00	1.00	0.00
35.72	126.02	2.00	0.00	1.00	0.00	35.78	126.43	2.00	0.00	1.00	0.00
35.84	125.38	2.00	0.00	1.00	0.00	35.91	123.42	2.00	0.00	1.00	0.00
35.97	120.66	2.00	0.00	1.00	0.00	36.04	117.58	2.00	0.00	1.00	0.00
36.12	114.74	2.00	0.00	1.00	0.00	36.17	112.89	2.00	0.00	1.00	0.00
36.23	111.72	2.00	0.00	1.00	0.00	36.31	110.41	2.00	0.00	1.00	0.00
36.37	108.66	2.00	0.00	1.00	0.00	36.43	106.47	2.00	0.00	1.00	0.00
36.50	103.97	2.00	0.00	1.00	0.00	36.56	101.20	2.00	0.00	1.00	0.00
36.63	98.37	2.00	0.00	1.00	0.00	36.69	95.53	2.00	0.00	1.00	0.00
36.77	93.07	2.00	0.00	1.00	0.00	36.83	91.49	2.00	0.00	1.00	0.00
36.91	90.66	2.00	0.00	1.00	0.00	36.96	90.19	2.00	0.00	1.00	0.00
37.02	89.64	2.00	0.00	1.00	0.00	37.11	88.99	2.00	0.00	1.00	0.00
37.16	88.37	2.00	0.00	1.00	0.00	37.21	87.39	2.00	0.00	1.00	0.00
37.28	85.51	2.00	0.00	1.00	0.00	37.36	82.72	2.00	0.00	1.00	0.00
37.41	79.92	2.00	0.00	1.00	0.00	37.47	79.18	2.00	0.00	1.00	0.00
37.55	78.85	2.00	0.00	1.00	0.00	37.60	80.70	2.00	0.00	1.00	0.00
37.67	82.72	2.00	0.00	1.00	0.00	37.74	85.82	2.00	0.00	1.00	0.00
37.80	88.12	2.00	0.00	1.00	0.00	37.90	89.76	2.00	0.00	1.00	0.00
37.94	91.73	2.00	0.00	1.00	0.00	37.99	94.09	2.00	0.00	1.00	0.00
38.06	96.45	2.00	0.00	1.00	0.00	38.14	98.13	2.00	0.00	1.00	0.00
38.20	98.69	2.00	0.00	1.00	0.00	38.26	98.73	2.00	0.00	1.00	0.00
38.34	98.85	2.00	0.00	1.00	0.00	38.39	99.21	2.00	0.00	1.00	0.00
38.46	99.57	2.00	0.00	1.00	0.00	38.52	99.79	2.00	0.00	1.00	0.00
38.59	99.78	2.00	0.00	1.00	0.00	38.69	99.65	2.00	0.00	1.00	0.00
38.73	99.38	2.00	0.00	1.00	0.00	38.78	99.60	2.00	0.00	1.00	0.00
38.88	100.12	2.00	0.00	1.00	0.00	38.91	100.66	2.00	0.00	1.00	0.00
38.98	97.92	2.00	0.00	1.00	0.00	39.08	93.81	2.00	0.00	1.00	0.00
39.12	90.66	2.00	0.00	1.00	0.00	39.18	90.52	2.00	0.00	1.00	0.00
39.28	91.38	2.00	0.00	1.00	0.00	39.32	91.51	2.00	0.00	1.00	0.00
39.39	91.50	2.00	0.00	1.00	0.00	39.47	91.42	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
39.52	91.20	2.00	0.00	1.00	0.00	39.58	90.82	2.00	0.00	1.00	0.00
39.67	90.42	2.00	0.00	1.00	0.00	39.72	90.10	2.00	0.00	1.00	0.00
39.80	89.73	2.00	0.00	1.00	0.00	39.86	88.99	2.00	0.00	1.00	0.00
39.92	87.79	2.00	0.00	1.00	0.00	39.97	86.45	2.00	0.00	1.00	0.00
40.03	85.49	2.00	0.00	1.00	0.00	40.12	84.94	2.00	0.00	1.00	0.00
40.18	84.64	2.00	0.00	1.00	0.00	40.24	84.90	2.00	0.00	1.00	0.00
40.31	85.65	2.00	0.00	1.00	0.00	40.36	86.82	2.00	0.00	1.00	0.00
40.44	87.70	2.00	0.00	1.00	0.00	40.50	88.49	2.00	0.00	1.00	0.00
40.56	89.60	2.00	0.00	1.00	0.00	40.64	90.53	2.00	0.00	1.00	0.00
40.70	91.14	2.00	0.00	1.00	0.00	40.75	91.15	2.00	0.00	1.00	0.00
40.82	91.15	2.00	0.00	1.00	0.00	40.91	91.20	2.00	0.00	1.00	0.00
40.95	90.98	2.00	0.00	1.00	0.00	41.01	90.39	2.00	0.00	1.00	0.00
41.10	89.68	2.00	0.00	1.00	0.00	41.15	90.16	2.00	0.00	1.00	0.00
41.24	91.67	2.00	0.00	1.00	0.00	41.30	93.58	2.00	0.00	1.00	0.00
41.35	94.81	2.00	0.00	1.00	0.00	41.41	95.54	2.00	0.00	1.00	0.00
41.48	96.30	2.00	0.00	1.00	0.00	41.54	98.46	2.00	0.00	1.00	0.00
41.65	100.69	2.00	0.00	1.00	0.00	41.67	103.23	2.00	0.00	1.00	0.00
41.74	103.72	2.00	0.00	1.00	0.00	41.84	103.80	2.00	0.00	1.00	0.00
41.88	103.36	2.00	0.00	1.00	0.00	41.95	102.94	2.00	0.00	1.00	0.00
42.03	102.01	2.00	0.00	1.00	0.00	42.09	100.45	2.00	0.00	1.00	0.00
42.15	98.42	2.00	0.00	1.00	0.00	42.22	96.31	2.00	0.00	1.00	0.00
42.28	94.67	2.00	0.00	1.00	0.00	42.33	93.91	2.00	0.00	1.00	0.00
42.41	93.87	2.00	0.00	1.00	0.00	42.48	94.36	2.00	0.00	1.00	0.00
42.52	95.92	2.00	0.00	1.00	0.00	42.61	98.20	2.00	0.00	1.00	0.00
42.68	100.81	2.00	0.00	1.00	0.00	42.74	103.04	2.00	0.00	1.00	0.00
42.81	104.66	2.00	0.00	1.00	0.00	42.87	105.98	2.00	0.00	1.00	0.00
42.94	107.06	2.00	0.00	1.00	0.00	43.01	107.97	2.00	0.00	1.00	0.00
43.07	108.17	2.00	0.00	1.00	0.00	43.13	107.37	2.00	0.00	1.00	0.00
43.18	105.74	2.00	0.00	1.00	0.00	43.27	104.15	2.00	0.00	1.00	0.00
43.32	103.16	2.00	0.00	1.00	0.00	43.40	103.02	2.00	0.00	1.00	0.00
43.46	103.58	2.00	0.00	1.00	0.00	43.52	104.62	2.00	0.00	1.00	0.00
43.58	105.97	2.00	0.00	1.00	0.00	43.66	107.25	2.00	0.00	1.00	0.00
43.71	108.74	2.00	0.00	1.00	0.00	43.81	110.17	2.00	0.00	1.00	0.00
43.87	111.58	2.00	0.00	1.00	0.00	43.90	112.07	2.00	0.00	1.00	0.00
43.97	111.10	2.00	0.00	1.00	0.00	44.06	109.22	2.00	0.00	1.00	0.00
44.10	107.07	2.00	0.00	1.00	0.00	44.16	104.43	2.00	0.00	1.00	0.00
44.26	101.36	2.00	0.00	1.00	0.00	44.31	97.72	2.00	0.00	1.00	0.00
44.36	94.29	2.00	0.00	1.00	0.00	44.46	91.27	2.00	0.00	1.00	0.00
44.49	89.35	2.00	0.00	1.00	0.00	44.56	88.50	2.00	0.00	1.00	0.00
44.65	88.04	2.00	0.00	1.00	0.00	44.71	87.87	2.00	0.00	1.00	0.00
44.75	87.92	2.00	0.00	1.00	0.00	44.85	88.07	2.00	0.00	1.00	0.00
44.91	88.60	2.00	0.00	1.00	0.00	44.96	89.51	2.00	0.00	1.00	0.00
45.03	90.42	2.00	0.00	1.00	0.00	45.10	91.40	2.00	0.00	1.00	0.00
45.15	92.78	2.00	0.00	1.00	0.00	45.24	93.69	2.00	0.00	1.00	0.00
45.30	93.97	2.00	0.00	1.00	0.00	45.35	94.18	2.00	0.00	1.00	0.00
45.43	95.60	2.00	0.00	1.00	0.00	45.49	97.77	2.00	0.00	1.00	0.00
45.55	100.69	2.00	0.00	1.00	0.00	45.65	102.93	2.00	0.00	1.00	0.00
45.69	105.11	2.00	0.00	1.00	0.00	45.74	106.18	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
45.84	106.87	2.00	0.00	1.00	0.00	45.89	106.81	2.00	0.00	1.00	0.00
45.94	105.44	2.00	0.00	1.00	0.00	46.01	102.97	2.00	0.00	1.00	0.00
46.08	100.24	2.00	0.00	1.00	0.00	46.13	97.58	2.00	0.00	1.00	0.00
46.23	95.59	2.00	0.00	1.00	0.00	46.27	93.79	2.00	0.00	1.00	0.00
46.33	92.64	2.00	0.00	1.00	0.00	46.40	91.61	2.00	0.00	1.00	0.00
46.48	90.96	2.00	0.00	1.00	0.00	46.53	90.21	2.00	0.00	1.00	0.00
46.63	88.73	2.00	0.00	1.00	0.00	46.69	86.94	2.00	0.00	1.00	0.00
46.73	85.59	2.00	0.00	1.00	0.00	46.79	85.10	2.00	0.00	1.00	0.00
46.87	85.16	2.00	0.00	1.00	0.00	46.93	85.24	2.00	0.00	1.00	0.00
47.02	85.15	2.00	0.00	1.00	0.00	47.05	83.86	2.00	0.00	1.00	0.00
47.15	82.10	2.00	0.00	1.00	0.00	47.20	80.56	2.00	0.00	1.00	0.00
47.25	80.14	2.00	0.00	1.00	0.00	47.34	80.56	2.00	0.00	1.00	0.00
47.40	81.50	2.00	0.00	1.00	0.00	47.45	84.12	2.00	0.00	1.00	0.00
47.54	87.18	2.00	0.00	1.00	0.00	47.58	91.72	2.00	0.00	1.00	0.00
47.64	94.99	2.00	0.00	1.00	0.00	47.71	98.33	2.00	0.00	1.00	0.00
47.77	99.65	2.00	0.00	1.00	0.00	47.84	99.48	2.00	0.00	1.00	0.00
47.94	97.67	2.00	0.00	1.00	0.00	47.99	95.53	2.00	0.00	1.00	0.00
48.04	93.65	2.00	0.00	1.00	0.00	48.13	92.08	2.00	0.00	1.00	0.00
48.19	91.70	2.00	0.00	1.00	0.00	48.23	92.08	2.00	0.00	1.00	0.00
48.34	92.83	2.00	0.00	1.00	0.00	48.37	93.72	2.00	0.00	1.00	0.00
48.43	96.20	2.00	0.00	1.00	0.00	48.53	98.79	2.00	0.00	1.00	0.00
48.58	100.46	2.00	0.00	1.00	0.00	48.63	100.24	2.00	0.00	1.00	0.00
48.73	99.30	2.00	0.00	1.00	0.00	48.76	97.48	2.00	0.00	1.00	0.00
48.83	95.59	2.00	0.00	1.00	0.00	48.92	94.02	2.00	0.00	1.00	0.00
48.96	93.96	2.00	0.00	1.00	0.00	49.02	95.08	2.00	0.00	1.00	0.00
49.11	96.30	2.00	0.00	1.00	0.00	49.17	97.44	2.00	0.00	1.00	0.00
49.23	99.05	2.00	0.00	1.00	0.00	49.30	101.78	2.00	0.00	1.00	0.00
49.37	104.81	2.00	0.00	1.00	0.00	49.41	107.86	2.00	0.00	1.00	0.00
49.51	109.82	2.00	0.00	1.00	0.00	49.57	110.92	2.00	0.00	1.00	0.00
49.63	110.34	2.00	0.00	1.00	0.00	49.69	108.81	2.00	0.00	1.00	0.00
49.76	106.90	2.00	0.00	1.00	0.00	49.80	105.47	2.00	0.00	1.00	0.00
49.90	104.55	2.00	0.00	1.00	0.00	49.96	104.10	2.00	0.00	1.00	0.00
50.02	103.77	2.00	0.00	1.00	0.00						

Total estimated settlement: 1.15

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Landmark Consultants, Inc.
780 N. 4th Street
El Centro, CA 92243

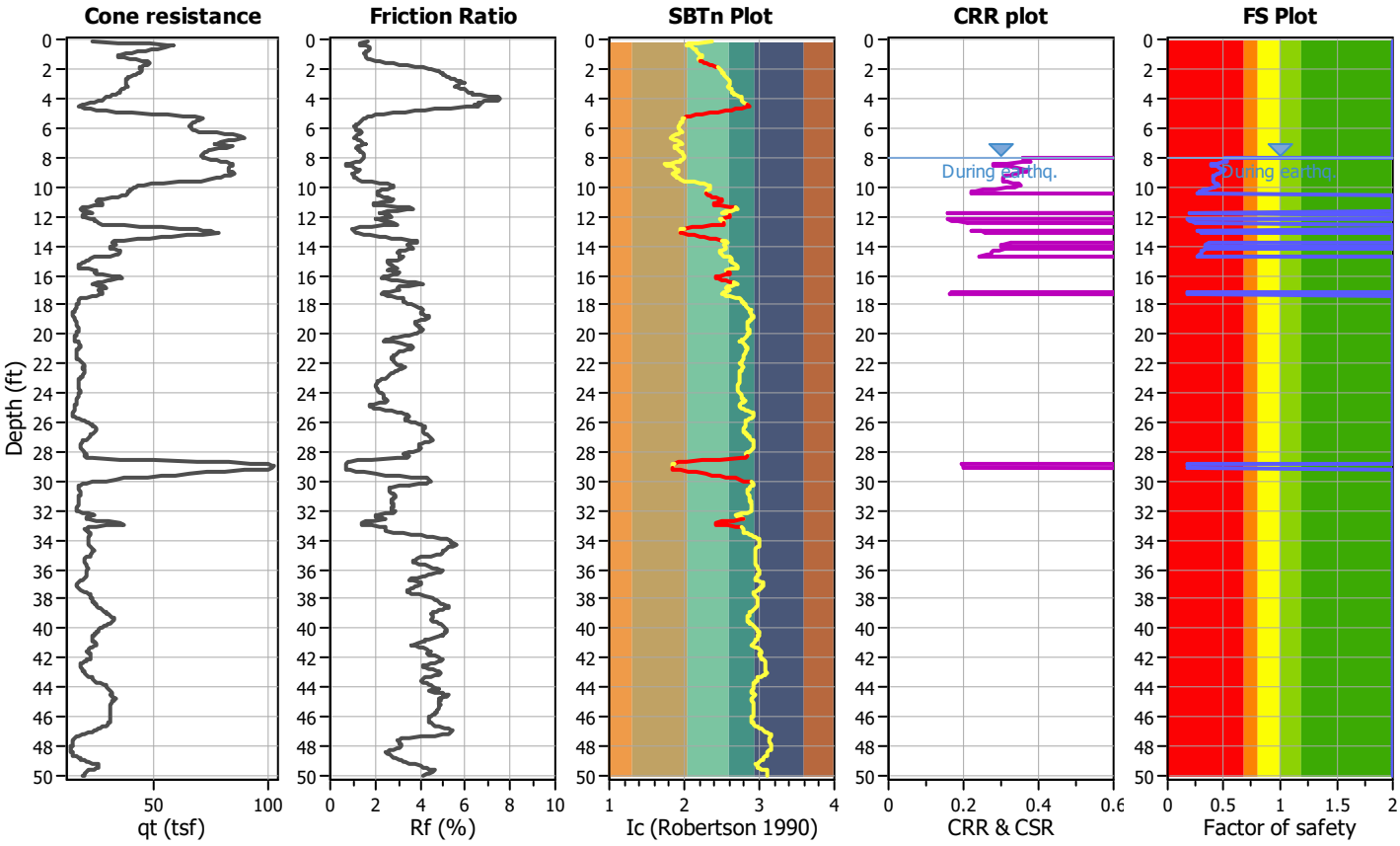
LIQUEFACTION ANALYSIS REPORT

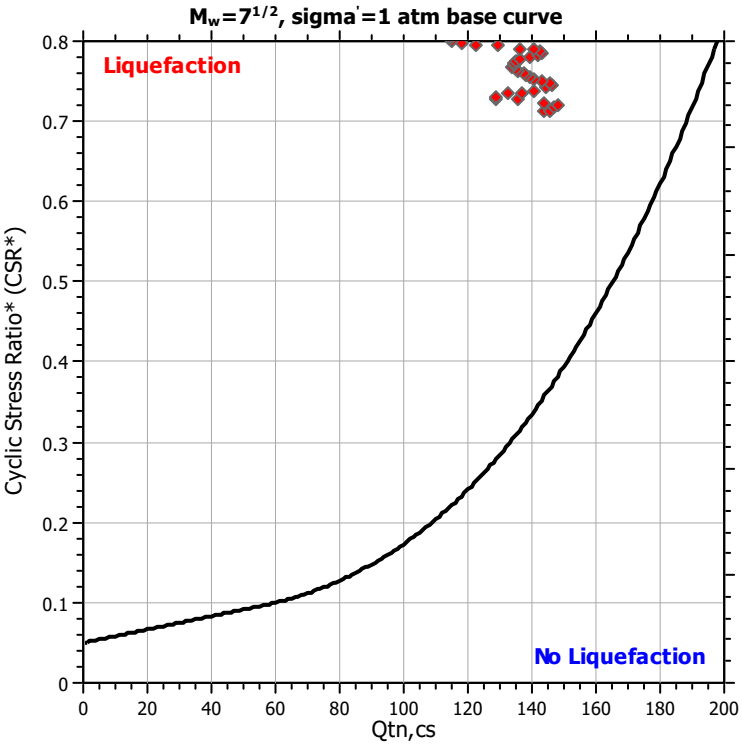
Project title : IVC Sports Field Improvements **Location : Imperial, CA**

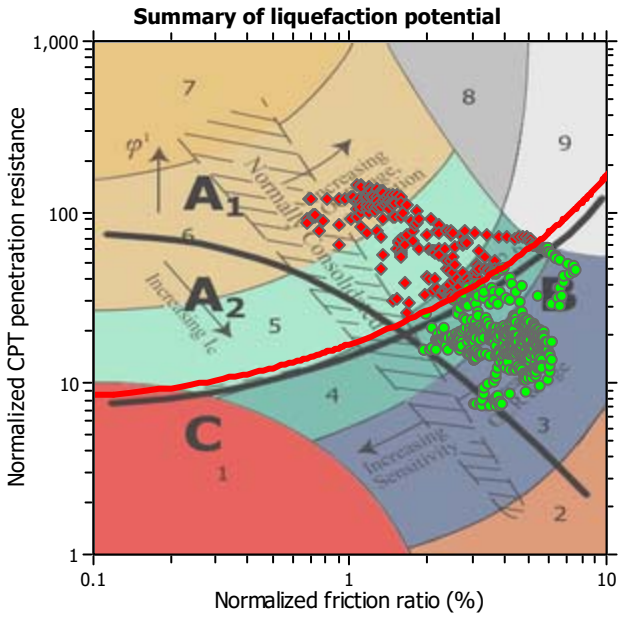
CPT file : CPT-6

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 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:	7.00	Ic cut-off value:	2.55	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	1.02	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

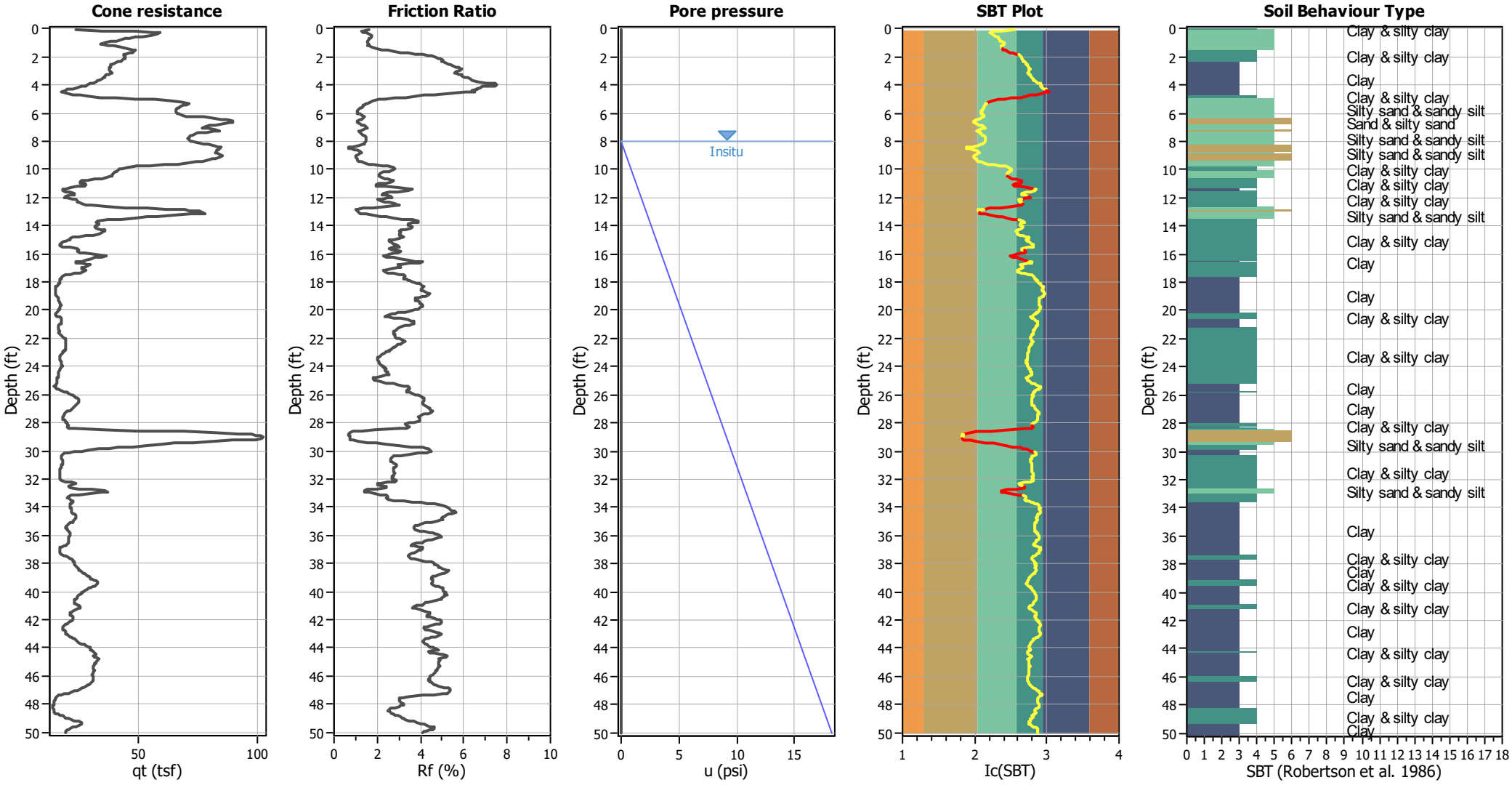






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



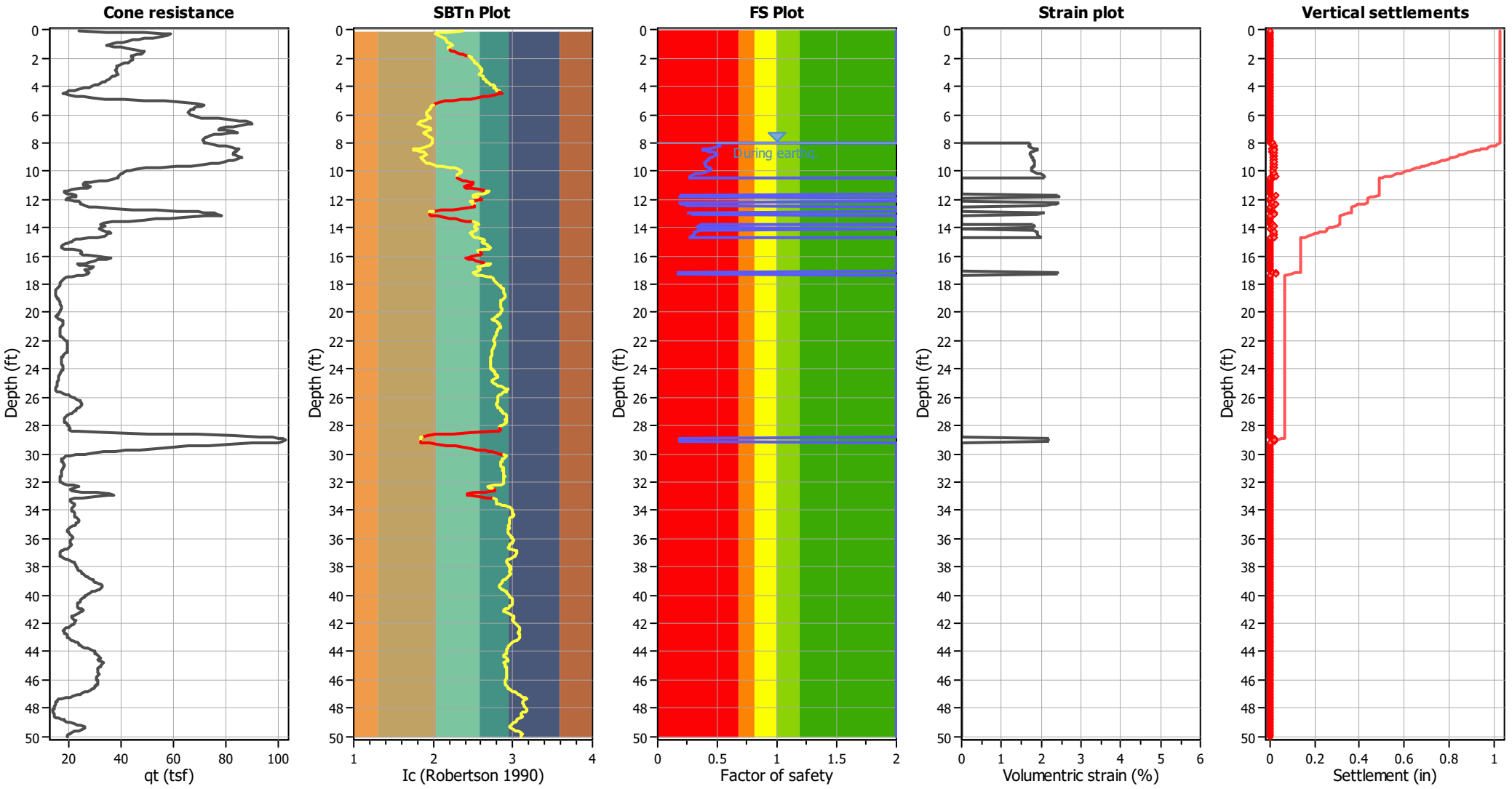
Input parameters and analysis data

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:	2.55	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.02	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	8.00 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

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

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.04	143.97	0.50	1.73	1.00	0.01	8.07	145.45	0.51	1.72	1.00	0.01
8.17	146.68	0.52	1.71	1.00	0.02	8.23	147.94	0.53	1.69	1.00	0.01
8.27	143.73	0.49	1.74	1.00	0.01	8.37	135.87	0.43	1.82	1.00	0.02
8.40	128.80	0.38	1.90	1.00	0.01	8.47	128.77	0.38	1.90	1.00	0.02
8.57	132.47	0.40	1.86	1.00	0.02	8.60	136.80	0.43	1.81	1.00	0.01
8.66	140.78	0.46	1.77	1.00	0.01	8.76	144.52	0.49	1.73	1.00	0.02
8.82	146.53	0.50	1.71	1.00	0.01	8.87	145.50	0.49	1.72	1.00	0.01
8.95	143.31	0.47	1.74	1.00	0.02	9.01	140.81	0.45	1.76	1.00	0.01
9.06	139.58	0.44	1.78	1.00	0.01	9.14	138.18	0.43	1.79	1.00	0.02
9.21	137.44	0.42	1.80	1.00	0.01	9.26	135.75	0.41	1.82	1.00	0.01
9.35	134.70	0.40	1.83	1.00	0.02	9.41	133.98	0.40	1.84	1.00	0.01
9.46	134.30	0.40	1.83	1.00	0.01	9.55	134.51	0.40	1.83	1.00	0.02
9.61	135.15	0.40	1.83	1.00	0.01	9.66	136.49	0.41	1.81	1.00	0.01
9.72	139.37	0.43	1.78	1.00	0.01	9.80	141.95	0.44	1.75	1.00	0.02
9.86	143.23	0.45	1.74	1.00	0.01	9.93	142.31	0.44	1.75	1.00	0.02
10.00	140.61	0.43	1.77	1.00	0.01	10.04	135.96	0.40	1.82	1.00	0.01
10.14	129.67	0.36	1.89	1.00	0.02	10.20	122.54	0.32	1.98	1.00	0.01
10.25	118.01	0.29	2.04	1.00	0.01	10.35	115.25	0.28	2.08	1.00	0.02
10.39	114.27	0.27	2.09	1.00	0.01	10.44	114.20	0.27	2.10	1.00	0.01
10.52	114.17	2.00	0.00	1.00	0.00	10.59	114.39	2.00	0.00	1.00	0.00
10.64	115.05	2.00	0.00	1.00	0.00	10.72	115.56	2.00	0.00	1.00	0.00
10.78	115.50	2.00	0.00	1.00	0.00	10.83	113.73	2.00	0.00	1.00	0.00
10.90	109.84	2.00	0.00	1.00	0.00	10.98	104.62	2.00	0.00	1.00	0.00
11.03	98.85	2.00	0.00	1.00	0.00	11.13	95.67	2.00	0.00	1.00	0.00
11.18	95.55	2.00	0.00	1.00	0.00	11.23	101.38	2.00	0.00	1.00	0.00
11.32	109.02	2.00	0.00	1.00	0.00	11.37	114.65	2.00	0.00	1.00	0.00
11.43	114.56	2.00	0.00	1.00	0.00	11.49	110.35	2.00	0.00	1.00	0.00
11.57	104.57	2.00	0.00	1.00	0.00	11.63	98.68	2.00	0.00	1.00	0.00
11.72	95.60	0.19	2.42	1.00	0.03	11.77	94.61	0.19	2.45	1.00	0.02
11.82	96.20	0.19	2.41	1.00	0.01	11.92	97.48	2.00	0.00	1.00	0.00
11.97	97.37	2.00	0.00	1.00	0.00	12.02	95.24	2.00	0.00	1.00	0.00
12.12	92.71	2.00	0.00	1.00	0.00	12.17	91.27	2.00	0.00	1.00	0.00
12.21	93.92	0.18	2.46	1.00	0.01	12.31	98.52	0.20	2.37	1.00	0.03
12.34	104.49	0.22	2.25	1.00	0.01	12.41	111.72	0.24	2.13	1.00	0.02
12.51	117.89	2.00	0.00	1.00	0.00	12.54	122.81	2.00	0.00	1.00	0.00
12.61	116.94	2.00	0.00	1.00	0.00	12.71	109.71	2.00	0.00	1.00	0.00
12.75	104.80	2.00	0.00	1.00	0.00	12.80	106.35	2.00	0.00	1.00	0.00
12.86	111.95	2.00	0.00	1.00	0.00	12.93	115.53	0.25	2.08	1.00	0.02
13.00	121.00	0.28	2.00	1.00	0.02	13.09	124.54	0.29	1.95	1.00	0.02
13.14	127.94	2.00	0.00	1.00	0.00	13.19	128.71	2.00	0.00	1.00	0.00
13.27	130.73	2.00	0.00	1.00	0.00	13.34	134.36	2.00	0.00	1.00	0.00
13.39	137.04	2.00	0.00	1.00	0.00	13.47	139.41	2.00	0.00	1.00	0.00
13.54	142.25	2.00	0.00	1.00	0.00	13.59	144.74	2.00	0.00	1.00	0.00
13.65	145.13	2.00	0.00	1.00	0.00	13.74	142.54	2.00	0.00	1.00	0.00
13.79	137.94	0.36	1.80	1.00	0.01	13.87	134.31	0.34	1.83	1.00	0.02
13.93	133.34	0.33	1.85	1.00	0.01	13.99	133.74	0.34	1.84	1.00	0.01
14.07	134.87	2.00	0.00	1.00	0.00	14.13	135.92	2.00	0.00	1.00	0.00
14.19	134.96	0.34	1.83	1.00	0.01	14.28	132.12	0.32	1.86	1.00	0.02

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
14.33	128.96	0.31	1.90	1.00	0.01	14.38	127.91	0.30	1.91	1.00	0.01
14.44	128.06	0.30	1.91	1.00	0.01	14.52	127.71	0.30	1.91	1.00	0.02
14.57	124.83	0.28	1.95	1.00	0.01	14.66	120.95	0.27	2.00	1.00	0.02
14.72	117.07	2.00	0.00	1.00	0.00	14.77	114.25	2.00	0.00	1.00	0.00
14.85	110.06	2.00	0.00	1.00	0.00	14.91	103.96	2.00	0.00	1.00	0.00
15.02	98.87	2.00	0.00	1.00	0.00	15.03	94.24	2.00	0.00	1.00	0.00
15.11	92.18	2.00	0.00	1.00	0.00	15.16	90.78	2.00	0.00	1.00	0.00
15.23	91.38	2.00	0.00	1.00	0.00	15.31	91.45	2.00	0.00	1.00	0.00
15.36	92.72	2.00	0.00	1.00	0.00	15.46	94.71	2.00	0.00	1.00	0.00
15.51	97.46	2.00	0.00	1.00	0.00	15.56	98.73	2.00	0.00	1.00	0.00
15.65	99.91	2.00	0.00	1.00	0.00	15.70	103.05	2.00	0.00	1.00	0.00
15.75	106.43	2.00	0.00	1.00	0.00	15.84	109.06	2.00	0.00	1.00	0.00
15.89	108.92	2.00	0.00	1.00	0.00	15.95	108.77	2.00	0.00	1.00	0.00
16.05	108.24	2.00	0.00	1.00	0.00	16.11	108.90	2.00	0.00	1.00	0.00
16.15	108.55	2.00	0.00	1.00	0.00	16.25	109.18	2.00	0.00	1.00	0.00
16.28	112.16	2.00	0.00	1.00	0.00	16.34	116.51	2.00	0.00	1.00	0.00
16.42	121.37	2.00	0.00	1.00	0.00	16.52	123.67	2.00	0.00	1.00	0.00
16.55	124.92	2.00	0.00	1.00	0.00	16.61	123.17	2.00	0.00	1.00	0.00
16.67	119.39	2.00	0.00	1.00	0.00	16.74	115.40	2.00	0.00	1.00	0.00
16.81	113.49	2.00	0.00	1.00	0.00	16.86	113.65	2.00	0.00	1.00	0.00
16.94	112.04	2.00	0.00	1.00	0.00	17.01	108.09	2.00	0.00	1.00	0.00
17.07	102.00	2.00	0.00	1.00	0.00	17.15	98.08	0.17	2.37	1.00	0.02
17.20	96.23	0.17	2.41	1.00	0.02	17.30	96.24	0.17	2.41	1.00	0.03
17.35	97.63	2.00	0.00	1.00	0.00	17.40	98.88	2.00	0.00	1.00	0.00
17.50	100.18	2.00	0.00	1.00	0.00	17.52	100.53	2.00	0.00	1.00	0.00
17.60	99.43	2.00	0.00	1.00	0.00	17.70	97.97	2.00	0.00	1.00	0.00
17.75	97.38	2.00	0.00	1.00	0.00	17.80	97.73	2.00	0.00	1.00	0.00
17.90	98.44	2.00	0.00	1.00	0.00	17.93	99.30	2.00	0.00	1.00	0.00
17.98	101.36	2.00	0.00	1.00	0.00	18.09	103.38	2.00	0.00	1.00	0.00
18.14	104.97	2.00	0.00	1.00	0.00	18.19	105.22	2.00	0.00	1.00	0.00
18.28	104.71	2.00	0.00	1.00	0.00	18.34	103.89	2.00	0.00	1.00	0.00
18.38	102.88	2.00	0.00	1.00	0.00	18.48	102.01	2.00	0.00	1.00	0.00
18.51	101.56	2.00	0.00	1.00	0.00	18.58	101.64	2.00	0.00	1.00	0.00
18.64	102.69	2.00	0.00	1.00	0.00	18.73	104.07	2.00	0.00	1.00	0.00
18.78	105.70	2.00	0.00	1.00	0.00	18.83	106.33	2.00	0.00	1.00	0.00
18.93	106.16	2.00	0.00	1.00	0.00	18.98	105.06	2.00	0.00	1.00	0.00
19.07	103.41	2.00	0.00	1.00	0.00	19.12	101.73	2.00	0.00	1.00	0.00
19.17	100.78	2.00	0.00	1.00	0.00	19.26	100.70	2.00	0.00	1.00	0.00
19.32	101.23	2.00	0.00	1.00	0.00	19.36	102.46	2.00	0.00	1.00	0.00
19.46	103.58	2.00	0.00	1.00	0.00	19.52	104.71	2.00	0.00	1.00	0.00
19.57	105.63	2.00	0.00	1.00	0.00	19.65	106.24	2.00	0.00	1.00	0.00
19.71	106.45	2.00	0.00	1.00	0.00	19.76	105.44	2.00	0.00	1.00	0.00
19.85	103.88	2.00	0.00	1.00	0.00	19.91	102.00	2.00	0.00	1.00	0.00
19.96	100.04	2.00	0.00	1.00	0.00	20.02	96.15	2.00	0.00	1.00	0.00
20.11	92.05	2.00	0.00	1.00	0.00	20.16	87.22	2.00	0.00	1.00	0.00
20.25	84.44	2.00	0.00	1.00	0.00	20.30	81.62	2.00	0.00	1.00	0.00
20.35	78.99	2.00	0.00	1.00	0.00	20.42	78.52	2.00	0.00	1.00	0.00
20.50	81.14	2.00	0.00	1.00	0.00	20.55	87.19	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.61	92.96	2.00	0.00	1.00	0.00	20.69	97.12	2.00	0.00	1.00	0.00
20.74	99.81	2.00	0.00	1.00	0.00	20.82	100.84	2.00	0.00	1.00	0.00
20.87	100.94	2.00	0.00	1.00	0.00	20.94	99.96	2.00	0.00	1.00	0.00
21.02	97.89	2.00	0.00	1.00	0.00	21.07	95.03	2.00	0.00	1.00	0.00
21.14	91.87	2.00	0.00	1.00	0.00	21.22	89.39	2.00	0.00	1.00	0.00
21.26	87.77	2.00	0.00	1.00	0.00	21.37	86.77	2.00	0.00	1.00	0.00
21.41	86.29	2.00	0.00	1.00	0.00	21.47	85.76	2.00	0.00	1.00	0.00
21.55	84.85	2.00	0.00	1.00	0.00	21.61	84.69	2.00	0.00	1.00	0.00
21.66	84.77	2.00	0.00	1.00	0.00	21.75	85.98	2.00	0.00	1.00	0.00
21.81	87.02	2.00	0.00	1.00	0.00	21.86	88.89	2.00	0.00	1.00	0.00
21.96	90.20	2.00	0.00	1.00	0.00	22.00	91.53	2.00	0.00	1.00	0.00
22.05	93.25	2.00	0.00	1.00	0.00	22.12	95.53	2.00	0.00	1.00	0.00
22.20	97.15	2.00	0.00	1.00	0.00	22.25	97.14	2.00	0.00	1.00	0.00
22.32	95.54	2.00	0.00	1.00	0.00	22.39	93.71	2.00	0.00	1.00	0.00
22.45	92.39	2.00	0.00	1.00	0.00	22.55	91.46	2.00	0.00	1.00	0.00
22.59	90.41	2.00	0.00	1.00	0.00	22.65	88.69	2.00	0.00	1.00	0.00
22.71	86.98	2.00	0.00	1.00	0.00	22.80	85.58	2.00	0.00	1.00	0.00
22.85	84.61	2.00	0.00	1.00	0.00	22.90	83.32	2.00	0.00	1.00	0.00
22.99	81.40	2.00	0.00	1.00	0.00	23.04	79.38	2.00	0.00	1.00	0.00
23.10	77.34	2.00	0.00	1.00	0.00	23.18	75.87	2.00	0.00	1.00	0.00
23.23	74.52	2.00	0.00	1.00	0.00	23.34	73.64	2.00	0.00	1.00	0.00
23.38	72.92	2.00	0.00	1.00	0.00	23.43	72.71	2.00	0.00	1.00	0.00
23.51	72.64	2.00	0.00	1.00	0.00	23.56	72.99	2.00	0.00	1.00	0.00
23.63	73.53	2.00	0.00	1.00	0.00	23.73	74.18	2.00	0.00	1.00	0.00
23.77	74.75	2.00	0.00	1.00	0.00	23.82	75.49	2.00	0.00	1.00	0.00
23.93	76.28	2.00	0.00	1.00	0.00	23.96	77.12	2.00	0.00	1.00	0.00
24.02	77.65	2.00	0.00	1.00	0.00	24.12	78.01	2.00	0.00	1.00	0.00
24.17	78.12	2.00	0.00	1.00	0.00	24.22	77.75	2.00	0.00	1.00	0.00
24.31	77.36	2.00	0.00	1.00	0.00	24.37	77.14	2.00	0.00	1.00	0.00
24.42	77.59	2.00	0.00	1.00	0.00	24.49	78.06	2.00	0.00	1.00	0.00
24.56	78.21	2.00	0.00	1.00	0.00	24.62	76.72	2.00	0.00	1.00	0.00
24.69	73.33	2.00	0.00	1.00	0.00	24.76	68.75	2.00	0.00	1.00	0.00
24.82	66.37	2.00	0.00	1.00	0.00	24.90	66.01	2.00	0.00	1.00	0.00
24.96	67.50	2.00	0.00	1.00	0.00	25.00	69.03	2.00	0.00	1.00	0.00
25.10	72.30	2.00	0.00	1.00	0.00	25.18	75.88	2.00	0.00	1.00	0.00
25.21	79.36	2.00	0.00	1.00	0.00	25.27	81.92	2.00	0.00	1.00	0.00
25.37	83.91	2.00	0.00	1.00	0.00	25.42	85.20	2.00	0.00	1.00	0.00
25.46	86.58	2.00	0.00	1.00	0.00	25.56	87.92	2.00	0.00	1.00	0.00
25.62	89.28	2.00	0.00	1.00	0.00	25.66	90.15	2.00	0.00	1.00	0.00
25.76	91.40	2.00	0.00	1.00	0.00	25.81	93.58	2.00	0.00	1.00	0.00
25.85	96.83	2.00	0.00	1.00	0.00	25.93	100.43	2.00	0.00	1.00	0.00
26.01	103.94	2.00	0.00	1.00	0.00	26.07	107.61	2.00	0.00	1.00	0.00
26.16	110.58	2.00	0.00	1.00	0.00	26.21	113.13	2.00	0.00	1.00	0.00
26.26	114.72	2.00	0.00	1.00	0.00	26.32	115.78	2.00	0.00	1.00	0.00
26.40	116.09	2.00	0.00	1.00	0.00	26.46	115.50	2.00	0.00	1.00	0.00
26.52	114.68	2.00	0.00	1.00	0.00	26.60	113.83	2.00	0.00	1.00	0.00
26.66	113.24	2.00	0.00	1.00	0.00	26.72	112.91	2.00	0.00	1.00	0.00
26.80	112.78	2.00	0.00	1.00	0.00	26.85	112.89	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
26.91	113.11	2.00	0.00	1.00	0.00	26.99	113.27	2.00	0.00	1.00	0.00
27.04	112.85	2.00	0.00	1.00	0.00	27.14	111.89	2.00	0.00	1.00	0.00
27.19	110.38	2.00	0.00	1.00	0.00	27.24	107.72	2.00	0.00	1.00	0.00
27.34	104.70	2.00	0.00	1.00	0.00	27.39	101.84	2.00	0.00	1.00	0.00
27.44	99.99	2.00	0.00	1.00	0.00	27.53	98.46	2.00	0.00	1.00	0.00
27.56	97.29	2.00	0.00	1.00	0.00	27.63	97.21	2.00	0.00	1.00	0.00
27.72	97.56	2.00	0.00	1.00	0.00	27.76	98.27	2.00	0.00	1.00	0.00
27.82	99.14	2.00	0.00	1.00	0.00	27.92	100.03	2.00	0.00	1.00	0.00
27.96	97.73	2.00	0.00	1.00	0.00	28.03	95.32	2.00	0.00	1.00	0.00
28.12	92.79	2.00	0.00	1.00	0.00	28.17	93.86	2.00	0.00	1.00	0.00
28.22	94.45	2.00	0.00	1.00	0.00	28.32	95.15	2.00	0.00	1.00	0.00
28.37	95.20	2.00	0.00	1.00	0.00	28.42	93.91	2.00	0.00	1.00	0.00
28.48	86.53	2.00	0.00	1.00	0.00	28.58	83.32	2.00	0.00	1.00	0.00
28.63	87.39	2.00	0.00	1.00	0.00	28.68	94.28	2.00	0.00	1.00	0.00
28.77	100.24	2.00	0.00	1.00	0.00	28.81	104.26	2.00	0.00	1.00	0.00
28.87	106.93	0.18	2.21	1.00	0.02	28.94	108.99	0.18	2.18	1.00	0.02
29.01	109.43	0.19	2.17	1.00	0.02	29.07	108.50	0.18	2.19	1.00	0.02
29.17	106.91	2.00	0.00	1.00	0.00	29.21	104.97	2.00	0.00	1.00	0.00
29.27	103.44	2.00	0.00	1.00	0.00	29.35	103.59	2.00	0.00	1.00	0.00
29.41	106.98	2.00	0.00	1.00	0.00	29.46	113.61	2.00	0.00	1.00	0.00
29.56	120.54	2.00	0.00	1.00	0.00	29.61	129.14	2.00	0.00	1.00	0.00
29.70	133.93	2.00	0.00	1.00	0.00	29.76	136.87	2.00	0.00	1.00	0.00
29.79	134.52	2.00	0.00	1.00	0.00	29.86	129.57	2.00	0.00	1.00	0.00
29.95	123.33	2.00	0.00	1.00	0.00	30.00	117.16	2.00	0.00	1.00	0.00
30.06	110.92	2.00	0.00	1.00	0.00	30.15	104.10	2.00	0.00	1.00	0.00
30.19	96.35	2.00	0.00	1.00	0.00	30.25	89.37	2.00	0.00	1.00	0.00
30.35	83.09	2.00	0.00	1.00	0.00	30.40	78.92	2.00	0.00	1.00	0.00
30.45	77.73	2.00	0.00	1.00	0.00	30.54	77.55	2.00	0.00	1.00	0.00
30.58	77.57	2.00	0.00	1.00	0.00	30.64	77.78	2.00	0.00	1.00	0.00
30.74	78.31	2.00	0.00	1.00	0.00	30.79	79.26	2.00	0.00	1.00	0.00
30.84	80.39	2.00	0.00	1.00	0.00	30.94	81.19	2.00	0.00	1.00	0.00
30.98	81.15	2.00	0.00	1.00	0.00	31.04	80.23	2.00	0.00	1.00	0.00
31.14	79.11	2.00	0.00	1.00	0.00	31.19	78.36	2.00	0.00	1.00	0.00
31.23	78.03	2.00	0.00	1.00	0.00	31.32	77.83	2.00	0.00	1.00	0.00
31.38	77.68	2.00	0.00	1.00	0.00	31.43	77.76	2.00	0.00	1.00	0.00
31.52	77.83	2.00	0.00	1.00	0.00	31.58	77.94	2.00	0.00	1.00	0.00
31.64	77.92	2.00	0.00	1.00	0.00	31.70	77.56	2.00	0.00	1.00	0.00
31.78	76.99	2.00	0.00	1.00	0.00	31.83	76.49	2.00	0.00	1.00	0.00
31.90	76.35	2.00	0.00	1.00	0.00	31.97	76.41	2.00	0.00	1.00	0.00
32.03	77.34	2.00	0.00	1.00	0.00	32.09	79.61	2.00	0.00	1.00	0.00
32.16	81.54	2.00	0.00	1.00	0.00	32.22	80.79	2.00	0.00	1.00	0.00
32.29	77.39	2.00	0.00	1.00	0.00	32.35	75.58	2.00	0.00	1.00	0.00
32.42	73.62	2.00	0.00	1.00	0.00	32.48	76.57	2.00	0.00	1.00	0.00
32.55	77.64	2.00	0.00	1.00	0.00	32.61	79.08	2.00	0.00	1.00	0.00
32.70	75.63	2.00	0.00	1.00	0.00	32.75	73.04	2.00	0.00	1.00	0.00
32.81	73.40	2.00	0.00	1.00	0.00	32.91	75.21	2.00	0.00	1.00	0.00
32.96	76.96	2.00	0.00	1.00	0.00	33.01	78.24	2.00	0.00	1.00	0.00
33.10	79.14	2.00	0.00	1.00	0.00	33.14	79.35	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
33.20	78.72	2.00	0.00	1.00	0.00	33.30	77.79	2.00	0.00	1.00	0.00
33.36	77.41	2.00	0.00	1.00	0.00	33.40	79.66	2.00	0.00	1.00	0.00
33.50	84.32	2.00	0.00	1.00	0.00	33.56	90.98	2.00	0.00	1.00	0.00
33.64	96.38	2.00	0.00	1.00	0.00	33.70	100.46	2.00	0.00	1.00	0.00
33.73	102.95	2.00	0.00	1.00	0.00	33.80	105.93	2.00	0.00	1.00	0.00
33.89	108.78	2.00	0.00	1.00	0.00	33.94	111.53	2.00	0.00	1.00	0.00
34.04	112.82	2.00	0.00	1.00	0.00	34.09	113.47	2.00	0.00	1.00	0.00
34.14	114.32	2.00	0.00	1.00	0.00	34.22	115.60	2.00	0.00	1.00	0.00
34.28	116.83	2.00	0.00	1.00	0.00	34.33	116.90	2.00	0.00	1.00	0.00
34.43	116.14	2.00	0.00	1.00	0.00	34.48	115.39	2.00	0.00	1.00	0.00
34.53	115.31	2.00	0.00	1.00	0.00	34.63	115.25	2.00	0.00	1.00	0.00
34.67	115.15	2.00	0.00	1.00	0.00	34.72	114.47	2.00	0.00	1.00	0.00
34.78	113.58	2.00	0.00	1.00	0.00	34.87	112.58	2.00	0.00	1.00	0.00
34.93	111.39	2.00	0.00	1.00	0.00	34.98	108.78	2.00	0.00	1.00	0.00
35.05	104.93	2.00	0.00	1.00	0.00	35.13	100.25	2.00	0.00	1.00	0.00
35.18	96.41	2.00	0.00	1.00	0.00	35.25	93.26	2.00	0.00	1.00	0.00
35.32	91.34	2.00	0.00	1.00	0.00	35.38	90.29	2.00	0.00	1.00	0.00
35.46	90.17	2.00	0.00	1.00	0.00	35.52	90.62	2.00	0.00	1.00	0.00
35.57	92.07	2.00	0.00	1.00	0.00	35.67	94.41	2.00	0.00	1.00	0.00
35.71	97.53	2.00	0.00	1.00	0.00	35.77	100.67	2.00	0.00	1.00	0.00
35.86	103.05	2.00	0.00	1.00	0.00	35.91	104.42	2.00	0.00	1.00	0.00
35.96	105.00	2.00	0.00	1.00	0.00	36.03	105.30	2.00	0.00	1.00	0.00
36.10	105.41	2.00	0.00	1.00	0.00	36.16	104.19	2.00	0.00	1.00	0.00
36.25	102.36	2.00	0.00	1.00	0.00	36.30	100.21	2.00	0.00	1.00	0.00
36.35	98.92	2.00	0.00	1.00	0.00	36.42	97.36	2.00	0.00	1.00	0.00
36.50	95.72	2.00	0.00	1.00	0.00	36.55	92.53	2.00	0.00	1.00	0.00
36.64	88.89	2.00	0.00	1.00	0.00	36.69	86.86	2.00	0.00	1.00	0.00
36.75	87.05	2.00	0.00	1.00	0.00	36.83	87.93	2.00	0.00	1.00	0.00
36.89	87.54	2.00	0.00	1.00	0.00	36.94	86.79	2.00	0.00	1.00	0.00
37.03	86.12	2.00	0.00	1.00	0.00	37.09	85.12	2.00	0.00	1.00	0.00
37.14	84.30	2.00	0.00	1.00	0.00	37.24	83.73	2.00	0.00	1.00	0.00
37.29	83.19	2.00	0.00	1.00	0.00	37.34	83.28	2.00	0.00	1.00	0.00
37.44	83.78	2.00	0.00	1.00	0.00	37.48	85.65	2.00	0.00	1.00	0.00
37.53	88.25	2.00	0.00	1.00	0.00	37.64	90.69	2.00	0.00	1.00	0.00
37.69	93.01	2.00	0.00	1.00	0.00	37.73	96.67	2.00	0.00	1.00	0.00
37.83	100.42	2.00	0.00	1.00	0.00	37.89	103.71	2.00	0.00	1.00	0.00
37.93	104.54	2.00	0.00	1.00	0.00	38.03	104.86	2.00	0.00	1.00	0.00
38.07	105.51	2.00	0.00	1.00	0.00	38.13	106.52	2.00	0.00	1.00	0.00
38.20	107.79	2.00	0.00	1.00	0.00	38.27	108.90	2.00	0.00	1.00	0.00
38.33	110.36	2.00	0.00	1.00	0.00	38.40	112.21	2.00	0.00	1.00	0.00
38.47	114.40	2.00	0.00	1.00	0.00	38.53	116.14	2.00	0.00	1.00	0.00
38.59	116.91	2.00	0.00	1.00	0.00	38.67	116.90	2.00	0.00	1.00	0.00
38.72	116.63	2.00	0.00	1.00	0.00	38.81	116.28	2.00	0.00	1.00	0.00
38.87	115.88	2.00	0.00	1.00	0.00	38.92	115.18	2.00	0.00	1.00	0.00
38.99	114.80	2.00	0.00	1.00	0.00	39.07	115.21	2.00	0.00	1.00	0.00
39.12	117.01	2.00	0.00	1.00	0.00	39.21	118.63	2.00	0.00	1.00	0.00
39.26	119.77	2.00	0.00	1.00	0.00	39.31	119.74	2.00	0.00	1.00	0.00
39.38	119.50	2.00	0.00	1.00	0.00	39.46	119.35	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
39.51	119.50	2.00	0.00	1.00	0.00	39.58	119.91	2.00	0.00	1.00	0.00
39.65	120.08	2.00	0.00	1.00	0.00	39.71	119.96	2.00	0.00	1.00	0.00
39.77	118.85	2.00	0.00	1.00	0.00	39.85	117.32	2.00	0.00	1.00	0.00
39.90	116.10	2.00	0.00	1.00	0.00	40.00	115.50	2.00	0.00	1.00	0.00
40.05	115.30	2.00	0.00	1.00	0.00	40.10	114.78	2.00	0.00	1.00	0.00
40.17	113.79	2.00	0.00	1.00	0.00	40.25	112.62	2.00	0.00	1.00	0.00
40.29	111.11	2.00	0.00	1.00	0.00	40.36	109.80	2.00	0.00	1.00	0.00
40.44	108.50	2.00	0.00	1.00	0.00	40.52	107.33	2.00	0.00	1.00	0.00
40.55	105.63	2.00	0.00	1.00	0.00	40.62	102.99	2.00	0.00	1.00	0.00
40.71	100.08	2.00	0.00	1.00	0.00	40.76	98.12	2.00	0.00	1.00	0.00
40.84	97.75	2.00	0.00	1.00	0.00	40.90	98.14	2.00	0.00	1.00	0.00
40.96	98.09	2.00	0.00	1.00	0.00	41.01	96.68	2.00	0.00	1.00	0.00
41.10	95.23	2.00	0.00	1.00	0.00	41.16	94.41	2.00	0.00	1.00	0.00
41.21	94.90	2.00	0.00	1.00	0.00	41.30	95.40	2.00	0.00	1.00	0.00
41.35	95.81	2.00	0.00	1.00	0.00	41.45	95.94	2.00	0.00	1.00	0.00
41.50	95.83	2.00	0.00	1.00	0.00	41.55	95.78	2.00	0.00	1.00	0.00
41.65	95.66	2.00	0.00	1.00	0.00	41.70	95.91	2.00	0.00	1.00	0.00
41.75	96.65	2.00	0.00	1.00	0.00	41.81	98.09	2.00	0.00	1.00	0.00
41.89	99.84	2.00	0.00	1.00	0.00	41.97	101.15	2.00	0.00	1.00	0.00
42.04	101.73	2.00	0.00	1.00	0.00	42.09	101.37	2.00	0.00	1.00	0.00
42.14	100.25	2.00	0.00	1.00	0.00	42.21	98.26	2.00	0.00	1.00	0.00
42.28	96.22	2.00	0.00	1.00	0.00	42.32	93.17	2.00	0.00	1.00	0.00
42.42	90.24	2.00	0.00	1.00	0.00	42.48	87.25	2.00	0.00	1.00	0.00
42.54	85.84	2.00	0.00	1.00	0.00	42.59	85.75	2.00	0.00	1.00	0.00
42.67	86.74	2.00	0.00	1.00	0.00	42.73	89.34	2.00	0.00	1.00	0.00
42.83	91.74	2.00	0.00	1.00	0.00	42.88	93.97	2.00	0.00	1.00	0.00
42.93	95.04	2.00	0.00	1.00	0.00	42.98	95.98	2.00	0.00	1.00	0.00
43.07	96.49	2.00	0.00	1.00	0.00	43.13	96.71	2.00	0.00	1.00	0.00
43.18	96.60	2.00	0.00	1.00	0.00	43.26	96.33	2.00	0.00	1.00	0.00
43.32	96.36	2.00	0.00	1.00	0.00	43.37	96.13	2.00	0.00	1.00	0.00
43.45	95.93	2.00	0.00	1.00	0.00	43.52	95.76	2.00	0.00	1.00	0.00
43.58	96.65	2.00	0.00	1.00	0.00	43.66	98.37	2.00	0.00	1.00	0.00
43.72	100.91	2.00	0.00	1.00	0.00	43.77	103.61	2.00	0.00	1.00	0.00
43.84	106.20	2.00	0.00	1.00	0.00	43.91	108.42	2.00	0.00	1.00	0.00
43.97	110.71	2.00	0.00	1.00	0.00	44.05	112.65	2.00	0.00	1.00	0.00
44.11	114.09	2.00	0.00	1.00	0.00	44.16	112.61	2.00	0.00	1.00	0.00
44.24	110.24	2.00	0.00	1.00	0.00	44.31	111.26	2.00	0.00	1.00	0.00
44.36	114.61	2.00	0.00	1.00	0.00	44.44	118.63	2.00	0.00	1.00	0.00
44.51	119.47	2.00	0.00	1.00	0.00	44.56	119.92	2.00	0.00	1.00	0.00
44.65	119.88	2.00	0.00	1.00	0.00	44.70	119.59	2.00	0.00	1.00	0.00
44.76	119.13	2.00	0.00	1.00	0.00	44.84	118.69	2.00	0.00	1.00	0.00
44.90	118.00	2.00	0.00	1.00	0.00	44.98	117.20	2.00	0.00	1.00	0.00
45.04	116.24	2.00	0.00	1.00	0.00	45.10	115.75	2.00	0.00	1.00	0.00
45.16	115.44	2.00	0.00	1.00	0.00	45.24	115.30	2.00	0.00	1.00	0.00
45.29	114.95	2.00	0.00	1.00	0.00	45.38	114.64	2.00	0.00	1.00	0.00
45.44	114.44	2.00	0.00	1.00	0.00	45.49	114.30	2.00	0.00	1.00	0.00
45.55	114.00	2.00	0.00	1.00	0.00	45.64	113.60	2.00	0.00	1.00	0.00
45.69	113.08	2.00	0.00	1.00	0.00	45.74	112.29	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

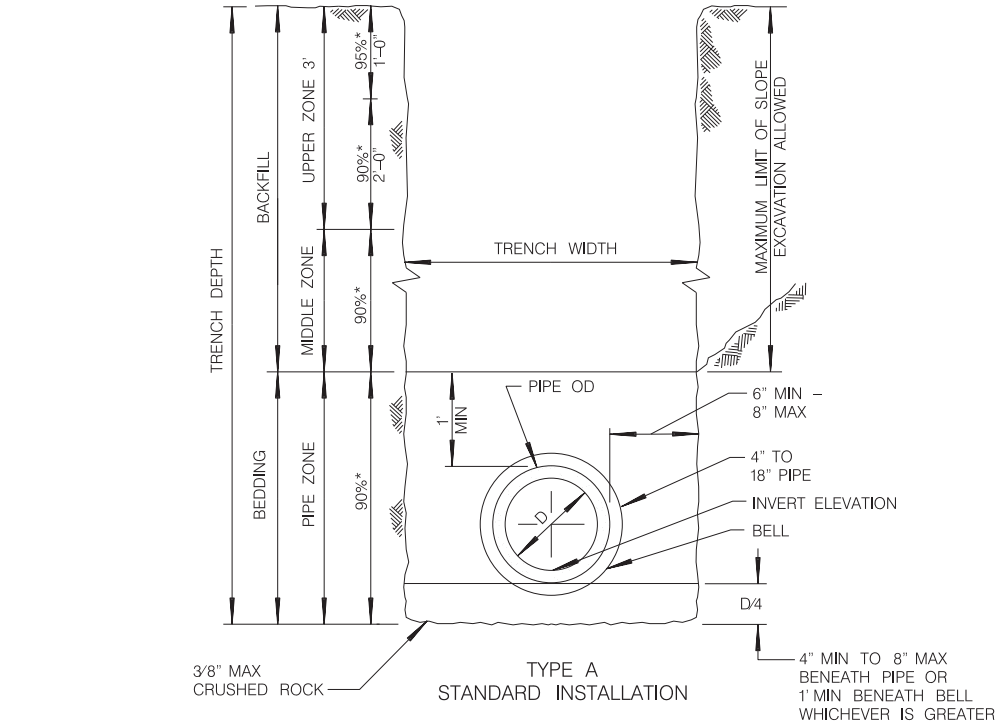
Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
45.83	111.20	2.00	0.00	1.00	0.00	45.88	109.95	2.00	0.00	1.00	0.00
45.96	109.10	2.00	0.00	1.00	0.00	46.02	108.67	2.00	0.00	1.00	0.00
46.07	108.65	2.00	0.00	1.00	0.00	46.18	108.42	2.00	0.00	1.00	0.00
46.22	108.24	2.00	0.00	1.00	0.00	46.29	108.09	2.00	0.00	1.00	0.00
46.37	108.17	2.00	0.00	1.00	0.00	46.42	108.32	2.00	0.00	1.00	0.00
46.47	108.41	2.00	0.00	1.00	0.00	46.52	108.32	2.00	0.00	1.00	0.00
46.61	108.12	2.00	0.00	1.00	0.00	46.67	107.92	2.00	0.00	1.00	0.00
46.73	108.21	2.00	0.00	1.00	0.00	46.81	108.52	2.00	0.00	1.00	0.00
46.87	108.81	2.00	0.00	1.00	0.00	46.92	108.09	2.00	0.00	1.00	0.00
47.00	106.39	2.00	0.00	1.00	0.00	47.06	103.83	2.00	0.00	1.00	0.00
47.11	100.33	2.00	0.00	1.00	0.00	47.20	96.05	2.00	0.00	1.00	0.00
47.26	90.79	2.00	0.00	1.00	0.00	47.31	84.48	2.00	0.00	1.00	0.00
47.40	77.86	2.00	0.00	1.00	0.00	47.46	71.96	2.00	0.00	1.00	0.00
47.51	68.16	2.00	0.00	1.00	0.00	47.59	66.47	2.00	0.00	1.00	0.00
47.65	65.90	2.00	0.00	1.00	0.00	47.71	65.99	2.00	0.00	1.00	0.00
47.80	65.93	2.00	0.00	1.00	0.00	47.84	66.14	2.00	0.00	1.00	0.00
47.94	66.28	2.00	0.00	1.00	0.00	48.00	66.38	2.00	0.00	1.00	0.00
48.04	66.04	2.00	0.00	1.00	0.00	48.10	65.01	2.00	0.00	1.00	0.00
48.20	63.73	2.00	0.00	1.00	0.00	48.24	62.19	2.00	0.00	1.00	0.00
48.30	60.96	2.00	0.00	1.00	0.00	48.37	60.35	2.00	0.00	1.00	0.00
48.44	59.98	2.00	0.00	1.00	0.00	48.49	60.47	2.00	0.00	1.00	0.00
48.59	61.12	2.00	0.00	1.00	0.00	48.64	63.18	2.00	0.00	1.00	0.00
48.72	65.55	2.00	0.00	1.00	0.00	48.78	67.88	2.00	0.00	1.00	0.00
48.82	70.54	2.00	0.00	1.00	0.00	48.92	72.98	2.00	0.00	1.00	0.00
48.96	75.45	2.00	0.00	1.00	0.00	49.03	77.08	2.00	0.00	1.00	0.00
49.09	80.49	2.00	0.00	1.00	0.00	49.17	84.14	2.00	0.00	1.00	0.00
49.23	88.28	2.00	0.00	1.00	0.00	49.28	91.38	2.00	0.00	1.00	0.00
49.38	94.08	2.00	0.00	1.00	0.00	49.42	95.44	2.00	0.00	1.00	0.00
49.48	95.29	2.00	0.00	1.00	0.00	49.57	94.39	2.00	0.00	1.00	0.00
49.63	93.32	2.00	0.00	1.00	0.00	49.68	91.40	2.00	0.00	1.00	0.00
49.77	88.99	2.00	0.00	1.00	0.00	49.83	86.44	2.00	0.00	1.00	0.00
49.88	84.77	2.00	0.00	1.00	0.00	49.97	83.54	2.00	0.00	1.00	0.00
50.03	82.88	2.00	0.00	1.00	0.00						

Total estimated settlement: 1.03

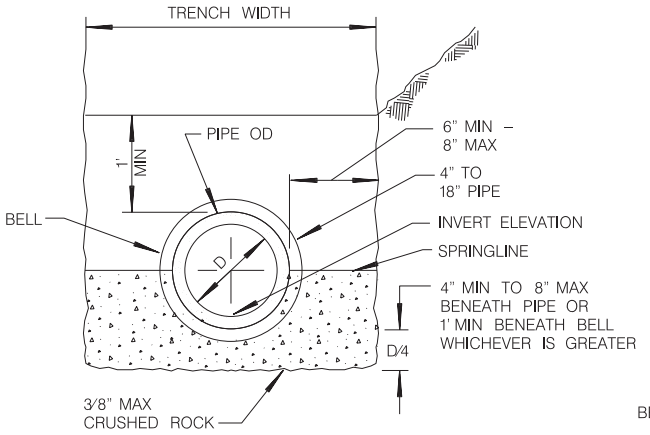
Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

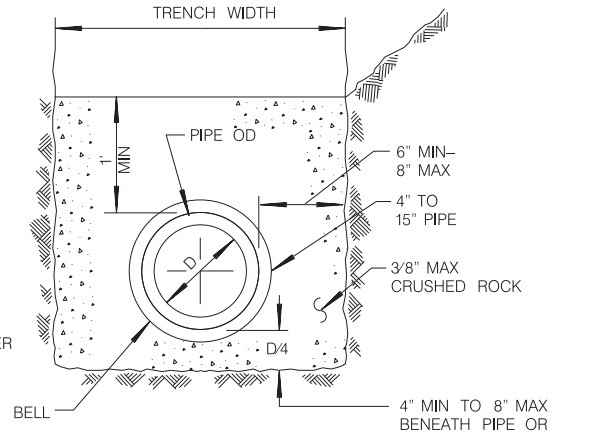
APPENDIX E



TYPE A
STANDARD INSTALLATION



TYPE B
ROCK TO SPRINGLINE



TYPE C
ROCK ENVELOPE

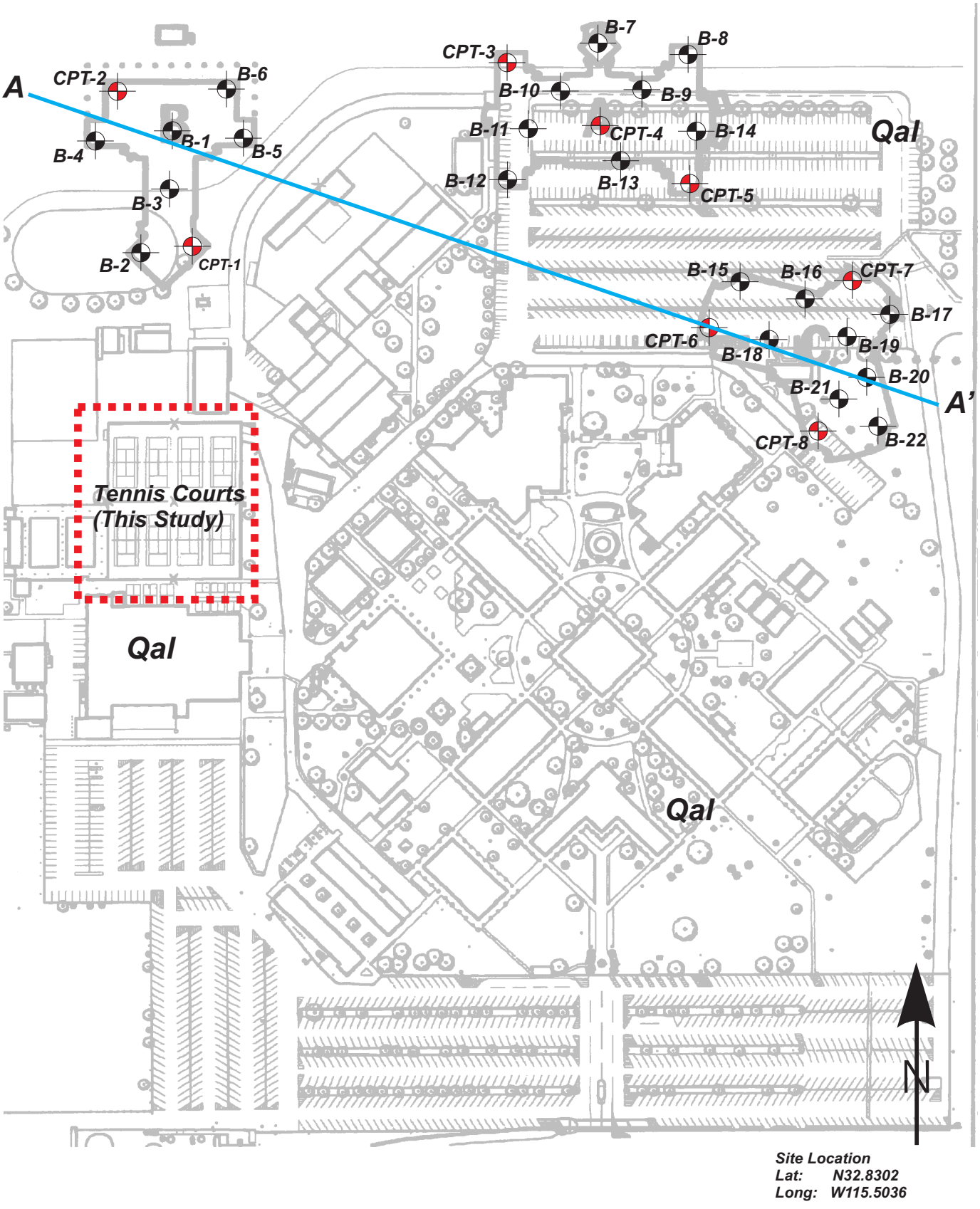
NOTES

1. FOR TRENCH RESURFACING IN IMPROVED STREETS, SEE STANDARD DRAWINGS SDG–107 AND SDG–108.
2. (*) INDICATES MINIMUM RELATIVE COMPACTION.
3. MINIMUM DEPTH OF COVER FROM THE TOP OF PIPE TO FINISH GRADE FOR PVC SDR 35 SEWER MAIN SHALL BE 5'. FOR SHALLOWER DEPTH, SPECIAL DESIGN IS REQUIRED. SEE SDS–101.
4. SEE TYPE A INSTALLATION FOR DETAILS NOT SHOWN FOR TYPES B AND C.
5. FOR PIPE SIZE ENCASEMENT LARGER THAN 15", MAXIMUM SIDE WALL CLEARANCE SHALL BE 12" OR AS SHOWN ON THE PLANS.
6. 6" METAL TAPE SHALL BE INSTALLED ABOVE PIPE 4" BELOW TRENCH CAP AND 12" BELOW FINISH GRADE IN UNIMPROVED STREETS.
7. 1' SAND CUSHION OR A 6" MINIMUM SAND CUSHION WITH 1" NEOPRENE PAD SHALL BE PLACED FOR CROSSINGS UTILITIES WHEN VERTICAL CLEARANCE IS 1' OR LESS. THE NEOPRENE PAD SHALL BE PLACED ON THE MOST FRAGILE UTILITY.

From: City of San Diego Standard Drawing SDS-110 (2016)

LANDMARK Geo-Engineers and Geologists **Project No.: LE22111**	**Pipe Bedding and Trench Backfill Recommendations**	**Plate E-1**

APPENDIX F



LANDMARK
Geo-Engineers and Geologists

Project No.: LE06360

Site and Exploration Map

Plate
A-2

CLIENT: Imperial Valley College

PROJECT: IVC Expansion -- Imperial, CA

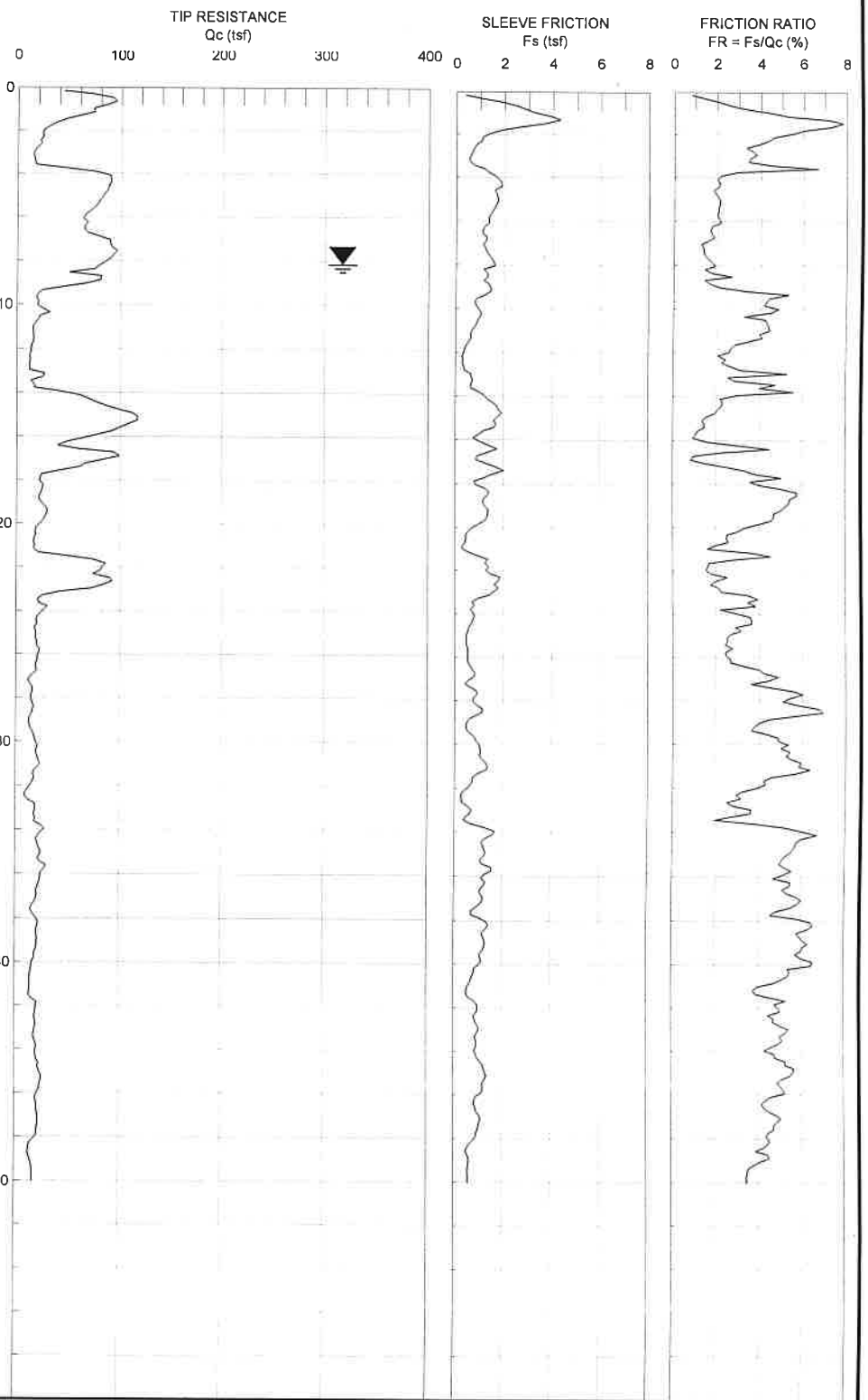
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight

DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-1

DEPTH (FEET)	INTERPRETED SOIL PROFILE From Robertson & Campanella (1989)		
	GROUND EL. +/-		
	Silty Sand to Sandy Silt	SM/ML	very dense
	Clay	CL/CH	hard
	Silty Clay to Clay	CL	very stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Silty Sand to Sandy Silt	SM/ML	dense
	Silty Sand to Sandy Silt	" "	dense
	Silty Sand to Sandy Silt	" "	dense
	Silty Sand to Sandy Silt	" "	dense
	Silty Sand to Sandy Silt	" "	dense
10	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	stiff
	Silty Clay to Clay	" "	stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Silty Sand to Sandy Silt	SM/ML	dense
	Sand to Silty Sand	SP/SM	dense
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	hard
	Clay	CL/CH	very stiff
20	Silty Clay to Clay	CL	very stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	stiff
	Clay	" "	stiff
30	Clay	" "	stiff
	Clay	" "	very stiff
	Clay	" "	stiff
	Silty Clay to Clay	CL	stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	stiff
40	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	stiff
	Clay	" "	stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	stiff
50	Silty Clay to Clay	CL	stiff



End of Sounding @ 50.0 ft.

Anticipated groundwater @ 8.0 ft.

Project No: LE06360

LANDMARK
Geo-Engineers and Geologists

Plate B-1

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-1

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74)) Nk: 17.0

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	69.70	1.48	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	15	2.00	131.8	25	124	45		
0.30	1.0	84.18	3.51	6	Sandy Silt to Clayey Silt	ML	very dense	115	3.5	24	2.00	159.1	40	113	44		
0.45	1.5	60.37	6.76	11	Overconsolidated Soil	??	very dense	120	1.0	60	2.00	114.1	65	95	41		
0.60	2.0	30.74	6.24	3	Clay	CL/CH	very stiff	125	1.3	25	2.00		80			1.80	>10
0.75	2.5	23.46	4.29	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	2.00		75			1.37	>10
0.93	3.0	19.25	3.57	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	2.00		75			1.12	>10
1.08	3.5	15.85	3.81	4	Silty Clay to Clay	CL	stiff	125	1.8	9	2.00		85			0.92	>10
1.23	4.0	46.29	3.91	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	19	2.00		55			2.71	>10
1.38	4.5	89.61	2.06	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	20	2.00	169.4	30	88	40		
1.53	5.0	86.04	1.93	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	19	1.92	156.5	25	86	40		
1.68	5.5	78.08	2.07	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	17	1.83	135.4	30	81	39		
1.83	6.0	65.88	2.08	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	15	1.76	109.3	35	75	39		
1.98	6.5	65.56	1.72	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	15	1.69	104.5	30	74	38		
2.13	7.0	78.85	1.57	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	18	1.63	121.1	25	78	39		
2.28	7.5	92.61	1.39	8	Sand to Silty Sand	SP/SM	dense	115	5.5	17	1.57	137.4	20	82	39		
2.45	8.0	89.15	1.75	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	20	1.52	128.0	25	80	39		
2.60	8.5	67.87	1.95	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	15	1.50	96.1	30	71	38		
2.75	9.0	76.24	1.75	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	17	1.48	106.5	30	74	38		
2.90	9.5	28.74	4.39	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	1.46		70			1.66	>10
3.05	10.0	19.49	4.44	3	Clay	CL/CH	very stiff	125	1.3	16	1.43		85			1.12	>10
3.20	10.5	25.70	3.99	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	1.41		75			1.48	>10
3.35	11.0	17.71	4.39	3	Clay	CL/CH	very stiff	125	1.3	14	1.39		90			1.01	>10
3.50	11.5	15.77	3.82	4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.37		90			0.89	>10
3.65	12.0	14.44	2.69	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.35		85			0.82	>10
3.80	12.5	12.84	2.24	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.34		85			0.72	>10
3.95	13.0	12.19	3.69	4	Silty Clay to Clay	CL	stiff	125	1.8	7	1.32		100			0.68	>10
4.13	13.5	21.49	3.37	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.31		80			1.23	>10
4.28	14.0	24.75	4.18	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.29		80			1.42	>10
4.43	14.5	68.33	2.25	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	15	1.28	82.4	40	67	37		
4.58	15.0	98.89	1.87	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	22	1.26	118.0	30	77	39		
4.73	15.5	114.14	1.43	8	Sand to Silty Sand	SP/SM	dense	115	5.5	21	1.25	134.9	25	81	39		
4.88	16.0	83.46	1.20	8	Sand to Silty Sand	SP/SM	dense	115	5.5	15	1.24	97.7	25	72	38		
5.03	16.5	48.59	3.20	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	14	1.23	56.3	55	56	36		
5.18	17.0	92.16	1.12	8	Sand to Silty Sand	SP/SM	dense	115	5.5	17	1.22	105.9	25	74	38		
5.33	17.5	55.76	3.23	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	1.20	63.5	55	59	36		
5.48	18.0	22.56	4.21	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	1.19		90			1.28	>10
5.65	18.5	24.39	5.50	3	Clay	CL/CH	very stiff	125	1.3	20	1.18		100			1.39	>10
5.80	19.0	22.29	5.34	3	Clay	CL/CH	very stiff	125	1.3	18	1.17		100			1.27	>10
5.95	19.5	28.40	4.81	3	Clay	CL/CH	very stiff	125	1.3	23	1.16		90			1.62	>10
6.10	20.0	24.65	3.95	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.15		90			1.40	>10
6.25	20.5	18.10	2.67	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.14		90			1.02	>10
6.40	21.0	16.74	2.05	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.13		85			0.94	>10
6.55	21.5	28.80	3.63	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.12		80			1.64	>10
6.70	22.0	80.68	1.63	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	18	1.11	84.4	35	67	37		
6.85	22.5	81.34	2.11	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	18	1.10	84.4	40	67	37		
7.00	23.0	82.93	2.05	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	18	1.09	85.5	40	68	37		
7.18	23.5	28.85	3.61	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.08		85			1.64	>10
7.33	24.0	25.92	2.97	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.07		85			1.47	>10
7.48	24.5	20.65	3.61	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.06		100			1.16	>10
7.63	25.0	18.75	2.90	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.06		95			1.05	>10
7.78	25.5	19.04	2.48	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.05		95			1.06	>10
7.93	26.0	21.19	2.55	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.04		90			1.19	>10
8.08	26.5	19.61	3.16	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.03		100			1.10	>10
8.23	27.0	16.54	4.50	3	Clay	CL/CH	stiff	125	1.3	13	1.03		100			0.91	5.31
8.38	27.5	13.96	4.56	3	Clay	CL/CH	stiff	125	1.3	11	1.02		100			0.76	4.00
8.53	28.0	14.93	5.51	3	Clay	CL/CH	stiff	125	1.3	12	1.01		100			0.82	4.28
8.68	28.5	16.27	6.53	3	Clay	CL/CH	stiff	125	1.3	13	1.00		100			0.90	4.78
8.85	29.0	13.54	4.66	3	Clay	CL/CH	stiff	125	1.3	11	0.99		100			0.73	3.58
9.00	29.5	13.95	3.89	4	Silty Clay to Clay	CL	stiff	125	1.8	8	0.99		100			0.76	4.57
9.15	30.0	18.13	5.02	3	Clay	CL/CH	very stiff	125	1.3	15	0.98		100			1.00	5.31
9.30	30.5	20.20	5.22	3	Clay	CL/CH	very stiff	125	1.3	16	0.97		100			1.12	6.21

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-1

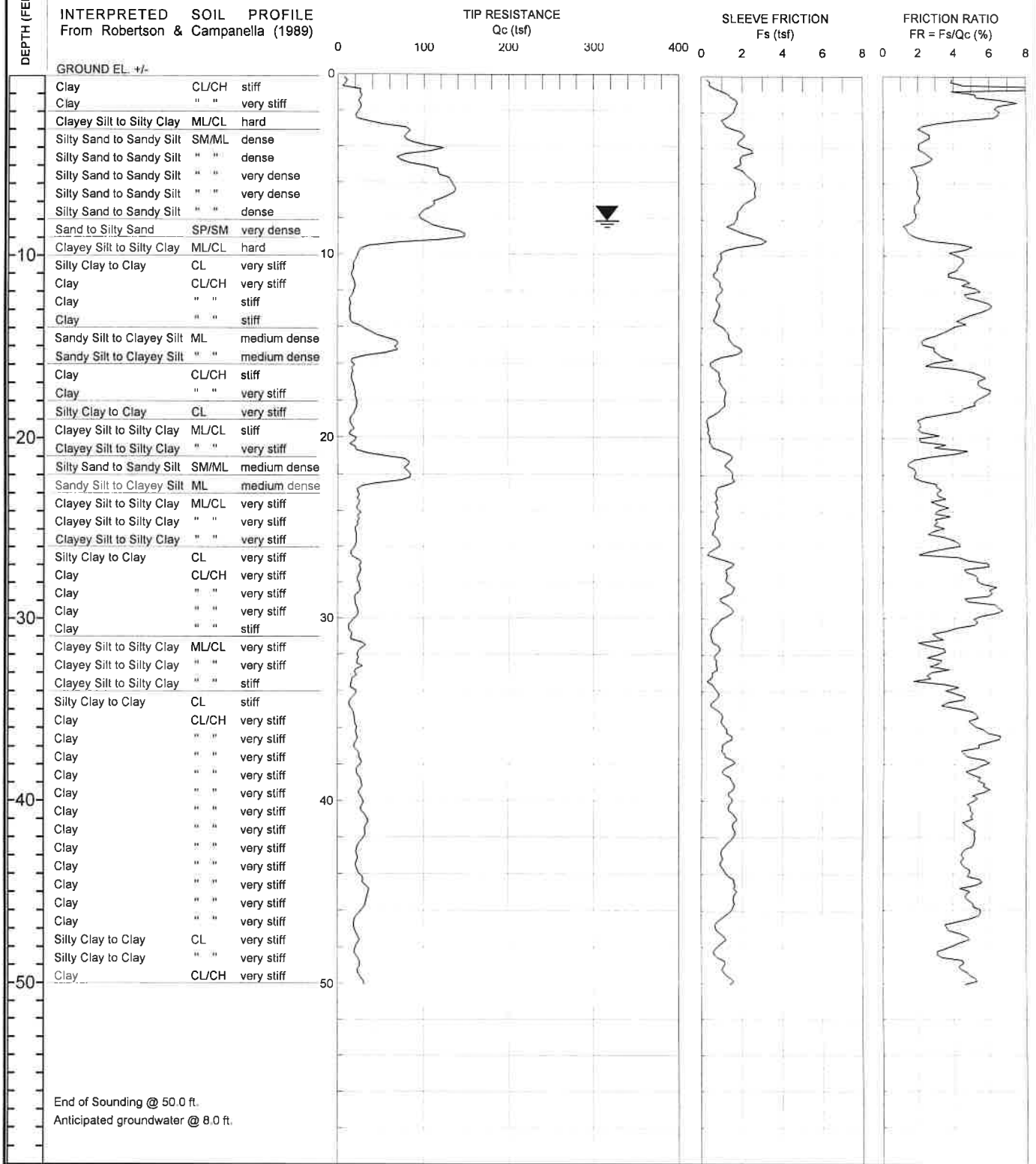
Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type		Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
9.45	31.0	21.81	5.75	3	3	Clay	CL/CH	very stiff	125	1.3	17	0.97		100			1.22	6.88
9.60	31.5	18.29	5.51	3	3	Clay	CL/CH	very stiff	125	1.3	15	0.96		100			1.01	5.10
9.75	32.0	15.94	4.11	4	4	Silty Clay to Clay	CL	stiff	125	1.8	9	0.95		100			0.87	5.10
9.90	32.5	9.85	3.08	4	4	Silty Clay to Clay	CL	stiff	125	1.8	6	0.95		100			0.51	2.41
10.05	33.0	16.66	2.97	5	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	0.94		100			0.91	7.27
10.20	33.5	18.21	2.74	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	0.94		100			1.00	8.41
10.38	34.0	23.13	5.03	3	3	Clay	CL/CH	very stiff	125	1.3	19	0.93		100			1.29	6.65
10.53	34.5	21.53	6.14	3	3	Clay	CL/CH	very stiff	125	1.3	17	0.92		100			1.19	5.88
10.68	35.0	22.42	5.57	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.92		100			1.25	6.10
10.83	35.5	22.87	5.06	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.91		100			1.27	6.21
10.98	36.0	27.35	5.30	3	3	Clay	CL/CH	very stiff	125	1.3	22	0.91		100			1.53	8.27
11.13	36.5	22.93	5.18	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.90		100			1.27	6.00
11.28	37.0	20.41	5.68	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.90		100			1.12	4.89
11.43	37.5	16.76	5.39	3	3	Clay	CL/CH	stiff	125	1.3	13	0.89		100			0.91	3.50
11.58	38.0	18.58	5.60	3	3	Clay	CL/CH	very stiff	125	1.3	15	0.89		100			1.01	4.00
11.73	38.5	21.18	6.21	3	3	Clay	CL/CH	very stiff	125	1.3	17	0.88		100			1.17	4.89
11.88	39.0	20.77	6.10	3	3	Clay	CL/CH	very stiff	125	1.3	17	0.88		100			1.14	4.68
12.05	39.5	19.86	5.95	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.87		100			1.09	4.18
12.20	40.0	17.43	6.36	3	3	Clay	CL/CH	stiff	125	1.3	14	0.87		100			0.94	3.43
12.35	40.5	15.23	5.43	3	3	Clay	CL/CH	stiff	125	1.3	12	0.86		100			0.81	2.82
12.50	41.0	14.25	4.60	3	3	Clay	CL/CH	stiff	125	1.3	11	0.86		100			0.75	2.49
12.65	41.5	13.68	4.05	3	3	Clay	CL/CH	stiff	125	1.3	11	0.85		100			0.72	2.34
12.80	42.0	18.90	5.02	3	3	Clay	CL/CH	very stiff	125	1.3	15	0.85		100			1.03	3.66
12.95	42.5	19.11	4.76	3	3	Clay	CL/CH	very stiff	125	1.3	15	0.84		100			1.04	3.66
13.10	43.0	19.51	5.06	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.84		100			1.06	3.66
13.25	43.5	18.21	5.16	3	3	Clay	CL/CH	stiff	125	1.3	15	0.83		100			0.98	3.28
13.40	44.0	19.99	4.64	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.83		100			1.09	3.74
13.58	44.5	20.17	4.97	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.83		100			1.09	3.66
13.73	45.0	22.60	5.55	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.82		100			1.24	4.28
13.88	45.5	25.03	5.19	3	3	Clay	CL/CH	very stiff	125	1.3	20	0.82		100			1.38	5.00
14.03	46.0	23.12	5.18	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.81		100			1.27	4.37
14.18	46.5	20.26	4.37	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.81		100			1.10	3.50
14.33	47.0	21.64	4.69	3	3	Clay	CL/CH	very stiff	125	1.3	17	0.81		100			1.18	3.83
14.48	47.5	21.83	4.79	3	3	Clay	CL/CH	very stiff	125	1.3	17	0.80		100			1.19	3.83
14.63	48.0	20.26	4.46	3	3	Clay	CL/CH	very stiff	125	1.3	16	0.80		100			1.09	3.35
14.78	48.5	13.89	4.22	3	3	Clay	CL/CH	stiff	125	1.3	11	0.79		100			0.72	1.92
14.93	49.0	14.13	4.36	3	3	Clay	CL/CH	stiff	125	1.3	11	0.79		100			0.73	2.00
15.09	49.5	16.62	3.62	4	4	Silty Clay to Clay	CL	stiff	125	1.8	9	0.79		100			0.88	3.07
15.25	50.0	17.17	3.48	4	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.78		100			0.91	3.21

CLIENT: Imperial Valley College
PROJECT: IVC Expansion -- Imperial, CA
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-2



Project No: LE06360	LANDMARK Geo-Engineers and Geologists	Plate B-2

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-2

Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74) Nk: 17.0

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	8.66	4.13	3	Clay	CL/CH	stiff	125	1.3	7	2.00		100			0.51	>10
0.30	1.0	18.74	7.11	3	Clay	CL/CH	very stiff	125	1.3	15	2.00		100			1.10	>10
0.45	1.5	25.57	6.45	3	Clay	CL/CH	very stiff	125	1.3	20	2.00		85			1.50	>10
0.60	2.0	25.68	6.44	3	Clay	CL/CH	very stiff	125	1.3	21	2.00		85			1.50	>10
0.75	2.5	21.55	5.72	3	Clay	CL/CH	very stiff	125	1.3	17	2.00		85			1.26	>10
0.93	3.0	55.87	2.47	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	16	2.00	105.6	40	81	39		
1.08	3.5	80.63	2.54	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	23	2.00	152.4	35	89	40		
1.23	4.0	88.77	2.14	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	20	2.00	167.8	30	90	41		
1.38	4.5	102.89	2.30	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	23	2.00	194.5	30	93	41		
1.53	5.0	74.86	2.58	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	21	1.92	136.2	35	82	39		
1.68	5.5	113.30	1.77	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	25	1.83	196.5	20	92	41		
1.83	6.0	131.54	1.95	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	29	1.76	218.3	20	96	41		
1.98	6.5	136.32	1.93	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	30	1.69	217.3	20	95	41		
2.13	7.0	120.17	2.02	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	27	1.63	184.6	25	91	41		
2.28	7.5	106.98	1.77	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	24	1.57	158.7	25	86	40		
2.45	8.0	96.10	1.81	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	21	1.52	138.0	25	82	39		
2.60	8.5	112.11	1.32	8	Sand to Silty Sand	SP/SM	dense	115	5.5	20	1.50	158.8	20	86	40		
2.75	9.0	145.62	1.64	8	Sand to Silty Sand	SP/SM	very dense	115	5.5	26	1.48	203.4	20	93	41		
2.90	9.5	74.45	3.98	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	30	1.46		45			4.35	>10
3.05	10.0	24.77	4.18	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.44		75			1.43	>10
3.20	10.5	19.82	4.47	3	Clay	CL/CH	very stiff	125	1.3	16	1.41		85			1.13	>10
3.35	11.0	17.64	4.02	4	Silty Clay to Clay	CL	very stiff	125	1.8	10	1.39		85			1.01	>10
3.50	11.5	17.52	4.37	3	Clay	CL/CH	stiff	125	1.3	14	1.37		90			1.00	>10
3.65	12.0	19.31	5.03	3	Clay	CL/CH	very stiff	125	1.3	15	1.36		95			1.10	>10
3.80	12.5	15.73	4.90	3	Clay	CL/CH	stiff	125	1.3	13	1.34		100			0.89	>10
3.95	13.0	14.45	5.98	3	Clay	CL/CH	stiff	125	1.3	12	1.32		100			0.81	>10
4.13	13.5	14.41	4.99	3	Clay	CL/CH	stiff	125	1.3	12	1.30		100			0.81	9.79
4.28	14.0	19.42	4.28	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.29		90			1.10	>10
4.43	14.5	38.56	3.35	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.27		65			2.23	>10
4.58	15.0	65.11	2.28	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	19	1.26	77.5	40	65	37		
4.73	15.5	63.87	2.98	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	18	1.25	75.3	50	64	37		
4.88	16.0	20.93	3.14	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.23		80			1.19	>10
5.03	16.5	16.72	4.85	3	Clay	CL/CH	stiff	125	1.3	13	1.22		100			0.94	>10
5.18	17.0	16.85	5.51	3	Clay	CL/CH	stiff	125	1.3	13	1.21		100			0.95	>10
5.33	17.5	19.76	5.89	3	Clay	CL/CH	very stiff	125	1.3	16	1.20		100			1.12	>10
5.48	18.0	21.34	5.43	3	Clay	CL/CH	very stiff	125	1.3	17	1.18		100			1.21	>10
5.65	18.5	21.37	4.75	3	Clay	CL/CH	very stiff	125	1.3	17	1.17		100			1.21	>10
5.80	19.0	16.38	2.61	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.16		90			0.92	>10
5.95	19.5	16.88	2.11	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.15		85			0.95	>10
6.10	20.0	16.74	2.53	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.14		90			0.94	>10
6.25	20.5	18.12	2.92	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.13		95			1.02	>10
6.40	21.0	36.87	3.95	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.12		75			2.12	>10
6.55	21.5	81.12	1.60	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	18	1.11	85.1	35	68	37		
6.70	22.0	81.17	1.84	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	18	1.10	84.5	40	68	37		
6.85	22.5	67.42	2.37	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	19	1.09	69.7	50	62	37		
7.00	23.0	24.51	3.17	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.09		85			1.39	>10
7.18	23.5	24.29	3.17	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.08		85			1.37	>10
7.33	24.0	22.94	3.37	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.07		90			1.29	>10
7.48	24.5	25.02	3.28	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.06		90			1.42	>10
7.63	25.0	22.09	3.19	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.05		95			1.24	>10
7.78	25.5	21.20	2.98	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.04		95			1.19	>10
7.93	26.0	21.11	4.23	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.04		100			1.18	>10
8.08	26.5	16.73	3.12	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.03		100			0.93	>10
8.23	27.0	25.86	5.57	3	Clay	CL/CH	very stiff	125	1.3	21	1.02		100			1.46	>10
8.38	27.5	25.67	4.85	3	Clay	CL/CH	very stiff	125	1.3	21	1.01		100			1.45	>10
8.53	28.0	23.60	5.41	3	Clay	CL/CH	very stiff	125	1.3	19	1.01		100			1.33	9.19
8.68	28.5	25.43	6.18	3	Clay	CL/CH	very stiff	125	1.3	20	1.00		100			1.43	>10
8.85	29.0	19.94	5.12	3	Clay	CL/CH	very stiff	125	1.3	16	0.99		100			1.11	6.43
9.00	29.5	21.93	6.49	3	Clay	CL/CH	very stiff	125	1.3	18	0.98		100			1.23	7.41
9.15	30.0	21.68	5.60	3	Clay	CL/CH	very stiff	125	1.3	17	0.98		100			1.21	7.13
9.30	30.5	13.95	4.86	3	Clay	CL/CH	stiff	125	1.3	11	0.97		100			0.75	3.50

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-2

Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: Phi (deg.)	17.0 Su (tsf)	OCR
9.45	31.0	15.14	3.15	5 5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	0.96		100			0.82	6.65
9.60	31.5	25.35	2.64	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.96		90			1.42	>10
9.75	32.0	24.34	3.33	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.95		100			1.36	>10
9.90	32.5	23.04	2.97	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.95		100			1.29	>10
10.05	33.0	22.86	3.02	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.94		100			1.27	>10
10.20	33.5	18.30	2.27	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	0.93		100			1.00	8.41
10.38	34.0	17.08	3.75	4 4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.93		100			0.93	5.31
10.53	34.5	17.92	4.39	3 3	Clay	CL/CH	stiff	125	1.3	14	0.92		100			0.98	4.28
10.68	35.0	14.23	3.70	4 4	Silty Clay to Clay	CL	stiff	125	1.8	8	0.92		100			0.76	3.74
10.83	35.5	18.75	5.20	3 3	Clay	CL/CH	very stiff	125	1.3	15	0.91		100			1.03	4.47
10.98	36.0	20.59	4.98	3 3	Clay	CL/CH	very stiff	125	1.3	16	0.91		100			1.14	5.10
11.13	36.5	22.11	6.12	3 3	Clay	CL/CH	very stiff	125	1.3	18	0.90		100			1.22	5.65
11.28	37.0	19.61	5.54	3 3	Clay	CL/CH	very stiff	125	1.3	16	0.89		100			1.08	4.57
11.43	37.5	23.96	4.57	3 3	Clay	CL/CH	very stiff	125	1.3	19	0.89		100			1.33	6.21
11.58	38.0	26.42	5.71	3 3	Clay	CL/CH	very stiff	125	1.3	21	0.88		100			1.47	7.13
11.73	38.5	22.15	4.95	3 3	Clay	CL/CH	very stiff	125	1.3	18	0.88		100			1.22	5.21
11.88	39.0	27.02	5.50	3 3	Clay	CL/CH	very stiff	125	1.3	22	0.87		100			1.51	7.13
12.05	39.5	26.16	5.75	3 3	Clay	CL/CH	very stiff	125	1.3	21	0.87		100			1.46	6.54
12.20	40.0	28.22	5.13	3 3	Clay	CL/CH	very stiff	125	1.3	23	0.86		100			1.58	7.41
12.35	40.5	27.62	4.86	3 3	Clay	CL/CH	very stiff	125	1.3	22	0.86		100			1.54	6.88
12.50	41.0	32.76	5.02	3 3	Clay	CL/CH	very stiff	125	1.3	26	0.86		100			1.84	9.39
12.65	41.5	33.05	4.71	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.85		100			1.86	>10
12.80	42.0	31.30	5.17	3 3	Clay	CL/CH	very stiff	125	1.3	25	0.85		100			1.75	8.27
12.95	42.5	24.93	5.11	3 3	Clay	CL/CH	very stiff	125	1.3	20	0.84		100			1.38	5.53
13.10	43.0	21.95	4.53	3 3	Clay	CL/CH	very stiff	125	1.3	18	0.84		100			1.20	4.37
13.25	43.5	21.95	4.48	3 3	Clay	CL/CH	very stiff	125	1.3	18	0.83		100			1.20	4.28
13.40	44.0	23.09	4.81	3 3	Clay	CL/CH	very stiff	125	1.3	18	0.83		100			1.27	4.57
13.58	44.5	28.79	5.27	3 3	Clay	CL/CH	very stiff	125	1.3	23	0.82		100			1.60	6.54
13.73	45.0	34.75	4.81	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	20	0.82		100			1.95	>10
13.88	45.5	33.61	4.74	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.82		100			1.88	>10
14.03	46.0	30.05	5.22	3 3	Clay	CL/CH	very stiff	125	1.3	24	0.81		100			1.67	6.65
14.18	46.5	21.86	5.28	3 3	Clay	CL/CH	very stiff	125	1.3	17	0.81		100			1.19	3.91
14.33	47.0	19.16	3.77	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	11	0.80		100			1.03	4.00
14.48	47.5	23.37	4.68	3 3	Clay	CL/CH	very stiff	125	1.3	19	0.80		100			1.28	4.18
14.63	48.0	21.41	3.96	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.80		100			1.16	4.57
14.78	48.5	20.90	3.17	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	0.79		100			1.13	6.00
14.93	49.0	25.14	4.46	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.79		100			1.38	5.88
15.09	49.5	23.67	4.69	3 3	Clay	CL/CH	very stiff	125	1.3	19	0.79		100			1.29	4.09
15.25	50.0	29.26	5.05	3 3	Clay	CL/CH	very stiff	125	1.3	23	0.78		100			1.62	5.65

CLIENT: Imperial Valley College

PROJECT: IVC Expansion -- Imperial, CA

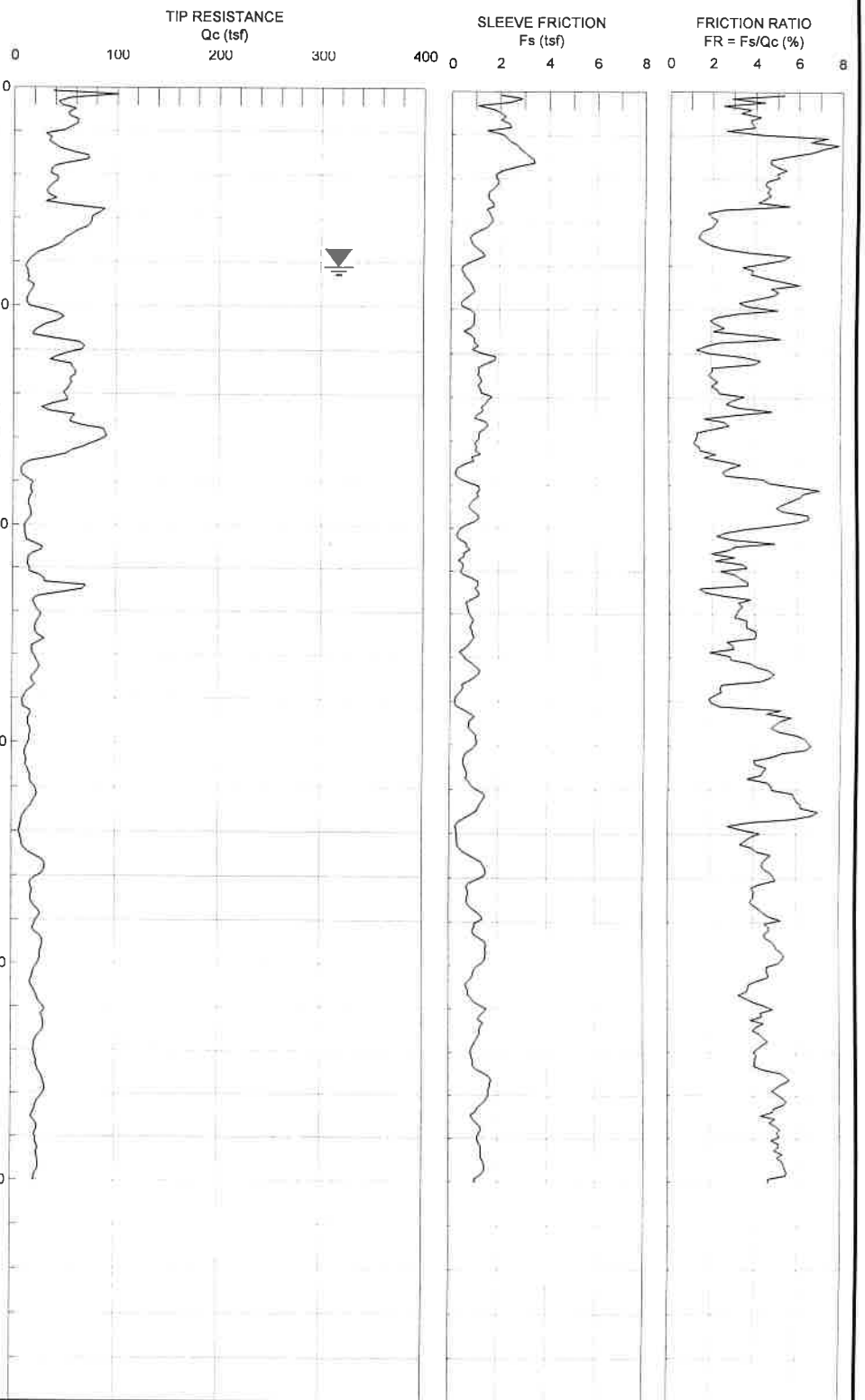
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight

DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-3

DEPTH (FEET)	INTERPRETED SOIL PROFILE From Robertson & Campanella (1989)		
	GROUND EL. +/-		
	Clayey Silt to Silty Clay	ML/CL	hard
	Clayey Silt to Silty Clay	" "	hard
	Clay	CL/CH	hard
	Silty Clay to Clay	CL	hard
	Silty Clay to Clay	" "	hard
	Sandy Silt to Clayey Silt	ML	dense
	Silty Sand to Sandy Silt	SM/ML	dense
	Silty Clay to Clay	CL	very stiff
	Clay	CL/CH	stiff
	Clay	" "	stiff
10	Sandy Silt to Clayey Silt	ML	medium dense
	Sandy Silt to Clayey Silt	" "	medium dense
	Sandy Silt to Clayey Silt	" "	medium dense
	Sandy Silt to Clayey Silt	" "	medium dense
	Sandy Silt to Clayey Silt	" "	medium dense
	Silty Sand to Sandy Silt	SM/ML	medium dense
	Sandy Silt to Clayey Silt	ML	medium dense
	Clay	CL/CH	stiff
	Clay	" "	stiff
20	Clay	" "	stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clayey Silt to Silty Clay	" "	stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clay	CL/CH	stiff
30	Clay	" "	stiff
	Clay	" "	stiff
	Clay	" "	stiff
	Clay	" "	very stiff
	Clay	" "	firm
	Clay	" "	stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
40	Clay	" "	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Clay	CL/CH	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
	Clay	" "	very stiff
50	Clay	" "	very stiff



End of Sounding @ 50.0 ft.

Anticipated groundwater @ 8.0 ft.

Project No: LE06360

LANDMARK
Geo-Engineers and Geologists

Plate B-3

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-3

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74)) Nk: 17.0

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	64.29	4.19	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	26	2.00		50			3.78	>10
0.30	1.0	49.82	3.19	6	Sandy Silt to Clayey Silt	ML	very dense	115	3.5	14	2.00	94.2	50	97	42		
0.45	1.5	56.23	3.92	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	22	2.00		50			3.30	>10
0.60	2.0	55.51	3.62	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	22	2.00		50			3.26	>10
0.75	2.5	34.01	7.23	3	Clay	CL/CH	very stiff	125	1.3	27	2.00		80			1.99	>10
0.93	3.0	47.06	6.44	3	Clay	CL/CH	hard	125	1.3	38	2.00		70			2.76	>10
1.08	3.5	66.12	4.79	11	Overconsolidated Soil	??	dense	120	1.0	66	2.00	125.0	55	83	40		
1.23	4.0	37.39	5.17	3	Clay	CL/CH	hard	125	1.3	30	2.00		70			2.19	>10
1.38	4.5	41.14	4.54	4	Silty Clay to Clay	CL	hard	125	1.8	24	2.00		60			2.40	>10
1.53	5.0	33.65	4.54	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	1.91		65			1.96	>10
1.68	5.5	54.58	3.50	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	22	1.82		50			3.19	>10
1.83	6.0	78.62	2.10	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	17	1.74	129.3	30	80	39		
1.98	6.5	69.49	1.65	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	15	1.67	109.9	30	75	39		
2.13	7.0	51.61	1.66	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	11	1.61	78.7	35	65	37		
2.28	7.5	33.89	3.99	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	14	1.56		65			1.97	>10
2.45	8.0	16.47	4.38	3	Clay	CL/CH	stiff	125	1.3	13	1.51		85			0.94	>10
2.60	8.5	13.14	4.06	3	Clay	CL/CH	stiff	125	1.3	11	1.48		95			0.74	>10
2.75	9.0	16.12	5.36	3	Clay	CL/CH	stiff	125	1.3	13	1.46		95			0.92	>10
2.90	9.5	16.68	4.68	3	Clay	CL/CH	stiff	125	1.3	13	1.43		90			0.95	>10
3.05	10.0	13.82	4.00	3	Clay	CL/CH	stiff	125	1.3	11	1.41		95			0.78	>10
3.20	10.5	41.13	2.47	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.39	54.2	50	54	36		
3.35	11.0	33.77	2.30	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	10	1.38	44.0	50	48	35		
3.50	11.5	26.59	3.92	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	1.36		75			1.53	>10
3.65	12.0	66.43	1.67	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	15	1.34	84.4	30	67	37		
3.80	12.5	44.07	3.92	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	18	1.33		60			2.56	>10
3.95	13.0	57.95	1.99	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	13	1.31	71.9	40	63	37		
4.13	13.5	57.11	2.13	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	13	1.30	70.1	40	62	37		
4.28	14.0	51.87	2.74	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	15	1.29	63.1	50	59	36		
4.43	14.5	47.70	2.99	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	14	1.27	57.4	55	56	36		
4.58	15.0	40.89	3.22	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	1.26		60			2.37	>10
4.73	15.5	59.18	2.50	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	1.25	69.7	45	62	37		
4.88	16.0	87.88	1.28	8	Sand to Silty Sand	SP/SM	dense	115	5.5	16	1.24	102.6	25	73	38		
5.03	16.5	66.57	1.71	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	15	1.22	77.0	35	65	37		
5.18	17.0	34.86	2.56	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	10	1.21	39.9	60	45	34		
5.33	17.5	8.65	2.66	4	Silty Clay to Clay	CL	firm	125	1.8	5	1.20		100			0.47	4.00
5.48	18.0	14.59	4.97	3	Clay	CL/CH	stiff	125	1.3	12	1.19		100			0.81	7.00
5.65	18.5	17.73	6.48	3	Clay	CL/CH	stiff	125	1.3	14	1.18		100			1.00	9.79
5.80	19.0	15.55	5.34	3	Clay	CL/CH	stiff	125	1.3	12	1.16		100			0.87	7.27
5.95	19.5	17.38	6.12	3	Clay	CL/CH	stiff	125	1.3	14	1.15		100			0.98	8.70
6.10	20.0	13.46	4.87	3	Clay	CL/CH	stiff	125	1.3	11	1.14		100			0.74	5.42
6.25	20.5	11.80	2.60	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.13		100			0.65	7.56
6.40	21.0	20.91	3.61	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.12		95			1.18	>10
6.55	21.5	20.20	2.40	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.11		85			1.14	>10
6.70	22.0	15.19	3.16	4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.10		100			0.84	7.70
6.85	22.5	24.32	3.36	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.09		90			1.38	>10
7.00	23.0	56.51	2.28	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	1.08	57.9	50	56	36		
7.18	23.5	30.45	3.18	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.08		80			1.74	>10
7.33	24.0	22.32	3.28	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.07		95			1.26	>10
7.48	24.5	26.07	3.42	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.06		90			1.48	>10
7.63	25.0	22.20	3.90	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	1.05		100			1.25	>10
7.78	25.5	27.05	3.22	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.04		85			1.53	>10
7.93	26.0	19.02	2.60	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.04		95			1.06	>10
8.08	26.5	24.25	3.85	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.03		95			1.37	>10
8.23	27.0	21.21	4.63	3	Clay	CL/CH	very stiff	125	1.3	17	1.02		100			1.19	8.00
8.38	27.5	19.83	2.44	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.01		95			1.11	>10
8.53	28.0	11.60	2.00	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.01		100			0.62	4.89
8.68	28.5	12.75	4.05	3	Clay	CL/CH	stiff	125	1.3	10	1.00		100			0.69	3.35
8.85	29.0	16.31	5.31	3	Clay	CL/CH	stiff	125	1.3	13	0.99		100			0.90	4.68
9.00	29.5	17.13	5.30	3	Clay	CL/CH	stiff	125	1.3	14	0.98		100			0.94	5.00
9.15	30.0	16.67	6.50	3	Clay	CL/CH	stiff	125	1.3	13	0.98		100			0.92	4.57
9.30	30.5	13.08	5.49	3	Clay	CL/CH	stiff	125	1.3	10	0.97		100			0.70	3.21

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-3

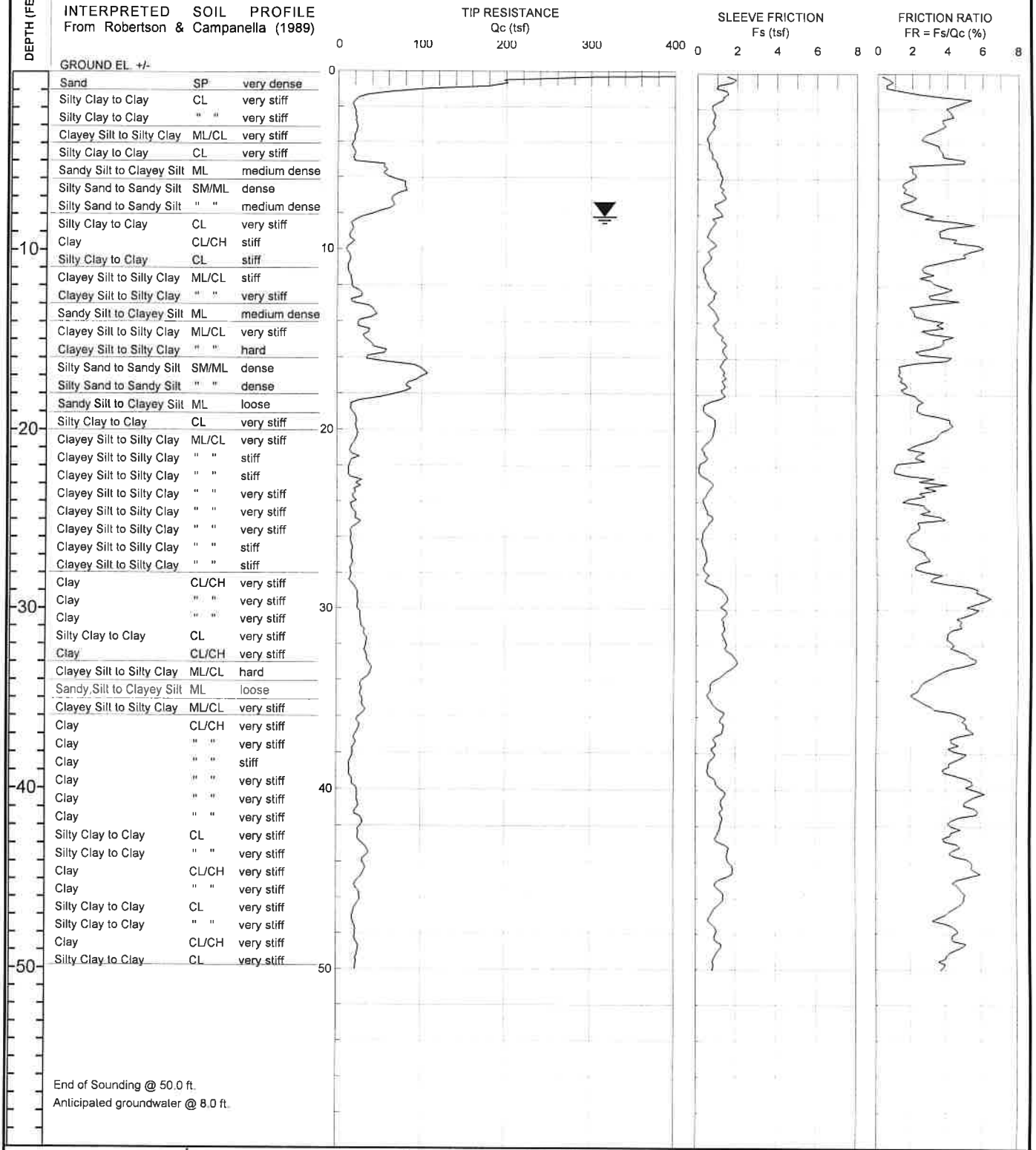
Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
9.45	31.0	13.68	4.21	3	Clay	CL/CH	stiff	125	1.3	11	0.96		100			0.74	3.35
9.60	31.5	16.59	4.16	3	Clay	CL/CH	stiff	125	1.3	13	0.96		100			0.91	4.28
9.75	32.0	19.70	4.75	3	Clay	CL/CH	very stiff	125	1.3	16	0.95		100			1.09	5.53
9.90	32.5	23.84	5.88	3	Clay	CL/CH	very stiff	125	1.3	19	0.94		100			1.33	7.41
10.05	33.0	18.47	6.46	3	Clay	CL/CH	very stiff	125	1.3	15	0.94		100			1.02	4.78
10.20	33.5	10.93	5.45	3	Clay	CL/CH	stiff	125	1.3	9	0.93		100			0.57	2.20
10.38	34.0	8.12	3.51	3	Clay	CL/CH	firm	125	1.3	6	0.93		100			0.41	1.37
10.53	34.5	8.87	3.62	3	Clay	CL/CH	firm	125	1.3	7	0.92		100			0.45	1.50
10.68	35.0	12.86	4.29	3	Clay	CL/CH	stiff	125	1.3	10	0.91		100			0.68	2.57
10.83	35.5	28.38	4.47	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.91		100			1.59	>10
10.98	36.0	31.03	4.77	3	Clay	CL/CH	very stiff	125	1.3	25	0.90		100			1.75	>10
11.13	36.5	19.45	4.33	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	0.90		100			1.07	5.88
11.28	37.0	18.88	3.96	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	0.89		100			1.03	5.42
11.43	37.5	22.74	4.28	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	0.89		100			1.26	7.27
11.58	38.0	25.68	4.87	3	Clay	CL/CH	very stiff	125	1.3	21	0.88		100			1.43	6.65
11.73	38.5	21.68	4.66	3	Clay	CL/CH	very stiff	125	1.3	17	0.88		100			1.19	5.00
11.88	39.0	29.11	4.84	3	Clay	CL/CH	very stiff	125	1.3	23	0.87		100			1.63	8.00
12.05	39.5	28.50	5.29	3	Clay	CL/CH	very stiff	125	1.3	23	0.87		100			1.59	7.56
12.20	40.0	26.69	5.06	3	Clay	CL/CH	very stiff	125	1.3	21	0.86		100			1.49	6.65
12.35	40.5	21.42	4.67	3	Clay	CL/CH	very stiff	125	1.3	17	0.86		100			1.18	4.57
12.50	41.0	18.93	3.94	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	0.85		100			1.03	4.68
12.65	41.5	23.25	3.56	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.85		100			1.28	9.19
12.80	42.0	28.44	4.49	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.84		100			1.59	9.19
12.95	42.5	30.72	4.21	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.84		100			1.72	>10
13.10	43.0	31.38	4.21	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.84		100			1.76	>10
13.25	43.5	26.45	4.49	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.83		100			1.47	7.56
13.40	44.0	22.38	4.24	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	0.83		100			1.23	5.65
13.58	44.5	23.48	4.11	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	0.82		100			1.29	6.00
13.73	45.0	25.43	4.60	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.82		100			1.40	6.65
13.88	45.5	30.62	5.52	3	Clay	CL/CH	very stiff	125	1.3	24	0.81		100			1.71	6.88
14.03	46.0	32.69	5.02	3	Clay	CL/CH	very stiff	125	1.3	26	0.81		100			1.83	7.56
14.18	46.5	26.93	5.43	3	Clay	CL/CH	very stiff	125	1.3	22	0.81		100			1.49	5.42
14.33	47.0	21.73	4.78	3	Clay	CL/CH	very stiff	125	1.3	17	0.80		100			1.18	3.83
14.48	47.5	24.66	4.99	3	Clay	CL/CH	very stiff	125	1.3	20	0.80		100			1.35	4.57
14.63	48.0	23.87	5.04	3	Clay	CL/CH	very stiff	125	1.3	19	0.80		100			1.31	4.28
14.78	48.5	25.46	5.07	3	Clay	CL/CH	very stiff	125	1.3	20	0.79		100			1.40	4.68
14.93	49.0	25.63	5.24	3	Clay	CL/CH	very stiff	125	1.3	21	0.79		100			1.41	4.68
15.09	49.5	26.52	5.45	3	Clay	CL/CH	very stiff	125	1.3	21	0.78		100			1.46	4.78
15.25	50.0	23.06	4.94	3	Clay	CL/CH	very stiff	125	1.3	18	0.78		100			1.25	3.83

CLIENT: Imperial Valley College
PROJECT: IVC Expansion -- Imperial, CA
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-4



Project No: LE06360	LANDMARK Geo-Engineers and Geologists	Plate B-4

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-4

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74))

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
0.15	0.5	357.72	0.60	10	Gravelly Sand to Sand	SW	very dense	115	7.5	48	2.00	676.2	0	172	52		
0.30	1.0	163.51	0.81	9	Sand	SP	very dense	110	6.5	25	2.00	309.1	10	133	47		
0.45	1.5	41.25	3.83	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	17	2.00		55			2.42	>10
0.60	2.0	18.70	4.43	3	Clay	CL/CH	very stiff	125	1.3	15	2.00		85			1.09	>10
0.75	2.5	20.44	4.24	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	2.00		80			1.19	>10
0.93	3.0	21.69	3.80	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	2.00		75			1.27	>10
1.08	3.5	22.20	3.22	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	2.00		70			1.29	>10
1.23	4.0	19.44	2.74	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	2.00		70			1.13	>10
1.38	4.5	17.55	3.57	4	Silty Clay to Clay	CL	very stiff	125	1.8	10	2.00		80			1.02	>10
1.53	5.0	19.43	4.16	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.92		80			1.13	>10
1.68	5.5	47.15	2.68	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.83	81.4	45	66	37		
1.83	6.0	59.77	2.07	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	13	1.75	98.8	35	72	38		
1.98	6.5	79.95	1.53	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	18	1.68	127.0	25	80	39		
2.13	7.0	72.88	1.87	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	16	1.62	111.6	30	76	39		
2.28	7.5	65.34	1.54	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	15	1.57	96.7	30	71	38		
2.45	8.0	50.77	2.43	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	15	1.52	72.7	40	63	37		
2.60	8.5	21.65	4.23	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.49		75			1.25	>10
2.75	9.0	17.37	3.73	4	Silty Clay to Clay	CL	stiff	125	1.8	10	1.47		80			0.99	>10
2.90	9.5	15.95	4.15	4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.45		90			0.91	>10
3.05	10.0	13.28	5.71	3	Clay	CL/CH	stiff	125	1.3	11	1.42		100			0.75	>10
3.20	10.5	14.30	4.71	3	Clay	CL/CH	stiff	125	1.3	11	1.40		100			0.81	>10
3.35	11.0	13.31	2.93	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.38		90			0.75	>10
3.50	11.5	14.21	2.79	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.37		85			0.80	>10
3.65	12.0	17.06	3.35	4	Silty Clay to Clay	CL	stiff	125	1.8	10	1.35		85			0.97	>10
3.80	12.5	24.62	3.68	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.33		75			1.41	>10
3.95	13.0	21.08	3.61	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.32		80			1.20	>10
4.13	13.5	40.99	2.03	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.30	50.4	50	52	35		
4.28	14.0	37.61	2.94	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.29	45.8	60	49	35		
4.43	14.5	29.09	3.29	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.27		70			1.67	>10
4.58	15.0	33.47	3.77	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	1.26		70			1.93	>10
4.73	15.5	40.63	3.56	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	1.25		65			2.35	>10
4.88	16.0	46.19	3.28	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	18	1.23		60			2.68	>10
5.03	16.5	83.00	1.63	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	18	1.22	95.8	30	71	38		
5.18	17.0	103.49	1.38	8	Sand to Silty Sand	SP/SM	dense	115	5.5	19	1.21	118.4	25	77	39		
5.33	17.5	86.43	1.61	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	19	1.20	98.0	30	72	38		
5.48	18.0	77.11	1.79	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	17	1.19	86.6	35	68	38		
5.65	18.5	30.89	2.49	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	9	1.18	34.4	65	41	34		
5.80	19.0	16.72	2.45	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.17		90			0.94	>10
5.95	19.5	22.18	4.02	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	1.16		90			1.26	>10
6.10	20.0	22.36	4.11	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	1.15		95			1.27	>10
6.25	20.5	23.09	3.40	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.14		85			1.31	>10
6.40	21.0	17.63	2.17	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.13		85			0.99	>10
6.55	21.5	19.34	2.47	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.12		85			1.09	>10
6.70	22.0	15.49	1.70	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	4	1.11	16.2	85	19	31		
6.85	22.5	13.39	1.28	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	4	1.10	13.9	85	14	30		
7.00	23.0	22.33	3.28	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.09		90			1.26	>10
7.18	23.5	23.02	2.88	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.08		85			1.30	>10
7.33	24.0	20.16	2.04	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	6	1.07	20.4	85	26	32		
7.48	24.5	17.06	2.86	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.07		100			0.95	>10
7.63	25.0	21.83	3.37	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.06		95			1.23	>10
7.78	25.5	23.51	2.43	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	7	1.05	23.3	85	29	32		
7.93	26.0	16.21	2.03	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.04		95			0.90	>10
8.08	26.5	17.09	1.96	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.03		90			0.95	>10
8.23	27.0	17.49	2.81	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.03		100			0.97	>10
8.38	27.5	17.95	2.57	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.02		100			1.00	>10
8.53	28.0	16.18	2.94	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.01		100			0.89	9.00
8.68	28.5	15.72	3.42	4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.01		100			0.86	6.00
8.85	29.0	22.21	5.59	3	Clay	CL/CH	very stiff	125	1.3	18	1.00		100			1.24	8.00
9.00	29.5	24.62	6.26	3	Clay	CL/CH	very stiff	125	1.3	20	0.99		100			1.38	9.59
9.15	30.0	24.50	5.53	3	Clay	CL/CH	very stiff	125	1.3	20	0.98		100			1.38	9.19
9.30	30.5	27.74	5.08	3	Clay	CL/CH	very stiff	125	1.3	22	0.98		100			1.57	>10

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-4

Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74) Nk: 17.0

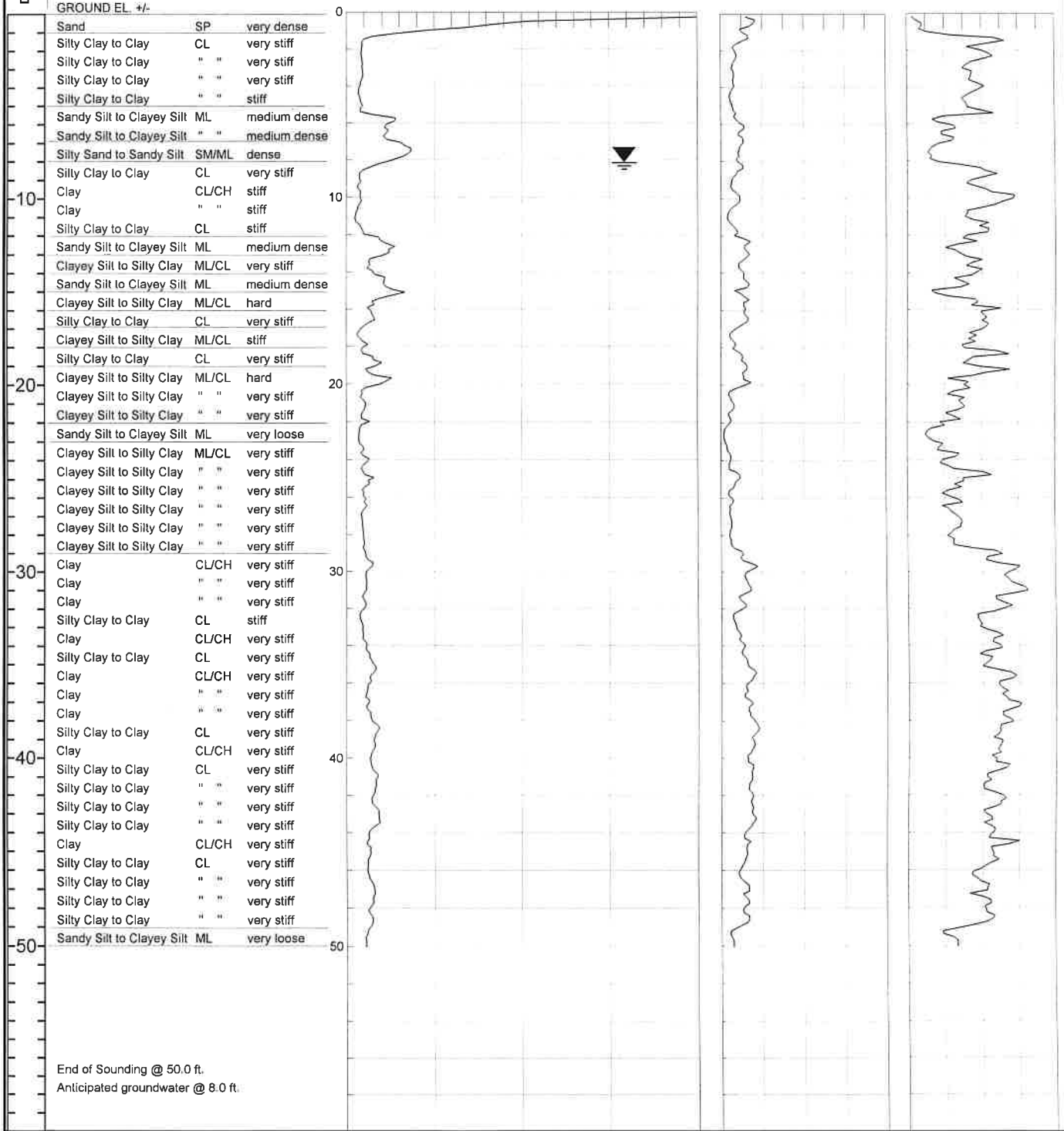
Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1	Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
9.45	31.0	28.73	4.81	3	3	Clay	CL/CH	very stiff	125	1.3	23	0.97		100			1.62	>10
9.60	31.5	32.62	4.14	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.96		95			1.85	>10
9.75	32.0	35.06	4.23	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	20	0.96		90			1.99	>10
9.90	32.5	33.61	4.68	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.95		95			1.91	>10
10.05	33.0	35.89	5.52	3	3	Clay	CL/CH	hard	125	1.3	29	0.94		100			2.04	>10
10.20	33.5	40.34	4.34	4	4	Silty Clay to Clay	CL	hard	125	1.8	23	0.94		90			2.30	>10
10.38	34.0	35.69	3.22	5	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	14	0.93		85			2.03	>10
10.53	34.5	28.72	2.52	6	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	8	0.93	25.1	85	32	32		
10.68	35.0	28.61	2.13	6	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	8	0.92	24.9	85	31	32		
10.83	35.5	30.54	2.77	5	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	0.92		90			1.72	>10
10.98	36.0	31.61	4.15	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.91		100			1.78	>10
11.13	36.5	25.60	5.06	3	3	Clay	CL/CH	very stiff	125	1.3	20	0.91		100			1.43	7.27
11.28	37.0	23.12	5.19	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.90		100			1.28	6.10
11.43	37.5	21.67	4.41	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.89		100			1.20	6.88
11.58	38.0	18.97	4.58	3	3	Clay	CL/CH	very stiff	125	1.3	15	0.89		100			1.04	4.18
11.73	38.5	16.50	4.55	3	3	Clay	CL/CH	stiff	125	1.3	13	0.88		100			0.89	3.35
11.88	39.0	15.19	3.96	4	4	Silty Clay to Clay	CL	stiff	125	1.8	9	0.88		100			0.81	3.66
12.05	39.5	17.22	5.01	3	3	Clay	CL/CH	stiff	125	1.3	14	0.87		100			0.93	3.50
12.20	40.0	21.89	5.48	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.87		100			1.21	4.89
12.35	40.5	24.34	5.78	3	3	Clay	CL/CH	very stiff	125	1.3	19	0.86		100			1.35	5.76
12.50	41.0	25.11	5.26	3	3	Clay	CL/CH	very stiff	125	1.3	20	0.86		100			1.39	6.00
12.65	41.5	23.68	5.45	3	3	Clay	CL/CH	very stiff	125	1.3	19	0.86		100			1.31	5.31
12.80	42.0	29.83	4.28	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	0.85		100			1.67	>10
12.95	42.5	25.50	4.48	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.85		100			1.41	7.56
13.10	43.0	27.88	4.15	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.84		100			1.55	8.70
13.25	43.5	36.45	4.48	4	4	Silty Clay to Clay	CL	hard	125	1.8	21	0.84		100			2.06	>10
13.40	44.0	31.81	5.07	3	3	Clay	CL/CH	very stiff	125	1.3	25	0.83		100			1.78	8.00
13.58	44.5	33.23	5.56	3	3	Clay	CL/CH	very stiff	125	1.3	27	0.83		100			1.86	8.56
13.73	45.0	28.65	5.34	3	3	Clay	CL/CH	very stiff	125	1.3	23	0.82		100			1.59	6.43
13.88	45.5	22.21	4.61	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.82		100			1.21	4.18
14.03	46.0	27.05	5.02	3	3	Clay	CL/CH	very stiff	125	1.3	22	0.82		100			1.50	5.65
14.18	46.5	25.26	4.90	3	3	Clay	CL/CH	very stiff	125	1.3	20	0.81		100			1.39	5.00
14.33	47.0	19.71	4.06	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	0.81		100			1.06	4.18
14.48	47.5	20.34	3.85	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.80		100			1.10	4.37
14.63	48.0	22.35	4.57	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.80		100			1.22	3.91
14.78	48.5	23.08	4.66	3	3	Clay	CL/CH	very stiff	125	1.3	18	0.80		100			1.26	4.09
14.93	49.0	25.55	4.60	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.79		100			1.40	6.10
15.09	49.5	23.68	3.90	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.79		100			1.29	5.31
15.25	50.0	22.59	3.86	4	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	0.79		100			1.23	4.78

CLIENT: Imperial Valley College
PROJECT: IVC Expansion -- Imperial, CA
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-5

INTERPRETED SOIL PROFILE From Robertson & Campanella (1989)		
GROUND EL. +/-		
Sand	SP	very dense
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	stiff
Sandy Silt to Clayey Silt	ML	medium dense
Sandy Silt to Clayey Silt	" "	medium dense
Silty Sand to Sandy Silt	SM/ML	dense
Silty Clay to Clay	CL	very stiff
Clay	CL/CH	stiff
Clay	" "	stiff
Silty Clay to Clay	CL	stiff
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	very stiff
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	hard
Silty Clay to Clay	CL	very stiff
Clayey Silt to Silty Clay	ML/CL	stiff
Silty Clay to Clay	CL	very stiff
Clayey Silt to Silty Clay	ML/CL	hard
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Sandy Silt to Clayey Silt	ML	very loose
Clayey Silt to Silty Clay	ML/CL	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clay	CL/CH	very stiff
Clay	" "	very stiff
Clay	" "	very stiff
Silty Clay to Clay	CL	stiff
Clay	CL/CH	very stiff
Silty Clay to Clay	CL	very stiff
Clay	CL/CH	very stiff
Clay	" "	very stiff
Clay	" "	very stiff
Silty Clay to Clay	CL	very stiff
Clay	CL/CH	very stiff
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Clay	CL/CH	very stiff
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Silty Clay to Clay	" "	very stiff
Sandy Silt to Clayey Silt	ML	very loose



End of Sounding @ 50.0 ft.
Anticipated groundwater @ 8.0 ft.

Project No: LE06360

LANDMARK
Geo-Engineers and Geologists

Plate B-5

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-5

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74)) Nk: 17.0

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Phi (deg.)	Su (tsf)	OCR
0.15	0.5	339.85	0.50	10	Gravelly Sand to Sand	SW	very dense	115	7.5	45	2.00	642.4	0	170	52		
0.30	1.0	133.00	0.88	9	Sand	SP	very dense	110	6.5	20	2.00	251.4	10	127	46		
0.45	1.5	34.41	4.12	4	Silty Clay to Clay	CL	hard	125	1.8	20	2.00		65			2.02	>10
0.60	2.0	17.47	3.80	4	Silty Clay to Clay	CL	very stiff	125	1.8	10	2.00		80			1.02	>10
0.75	2.5	16.90	4.37	3	Clay	CL/CH	stiff	125	1.3	14	2.00		85			0.99	>10
0.93	3.0	17.75	3.20	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	2.00		75			1.03	>10
1.08	3.5	18.26	3.46	4	Silty Clay to Clay	CL	very stiff	125	1.8	10	2.00		75			1.06	>10
1.23	4.0	16.49	3.76	4	Silty Clay to Clay	CL	stiff	125	1.8	9	2.00		80			0.96	>10
1.38	4.5	13.74	3.53	4	Silty Clay to Clay	CL	stiff	125	1.8	8	2.00		85			0.79	>10
1.53	5.0	15.89	3.09	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.91		80			0.92	>10
1.68	5.5	20.46	3.45	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.82		75			1.18	>10
1.83	6.0	51.86	1.83	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	12	1.74	85.5	35	68	37		
1.98	6.5	45.05	2.11	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.68	71.3	40	63	37		
2.13	7.0	49.35	2.21	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	14	1.62	75.3	40	64	37		
2.28	7.5	71.02	1.23	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	16	1.56	104.8	25	74	38		
2.45	8.0	59.60	1.41	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	13	1.51	85.1	30	68	37		
2.60	8.5	28.01	3.65	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.49		65			1.62	>10
2.75	9.0	15.04	4.14	3	Clay	CL/CH	stiff	125	1.3	12	1.47		90			0.86	>10
2.90	9.5	13.91	3.69	4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.44		90			0.79	>10
3.05	10.0	15.94	5.36	3	Clay	CL/CH	stiff	125	1.3	13	1.42		100			0.91	>10
3.20	10.5	15.32	4.68	3	Clay	CL/CH	stiff	125	1.3	12	1.40		95			0.87	>10
3.35	11.0	11.29	3.17	4	Silty Clay to Clay	CL	stiff	125	1.8	6	1.38		95			0.63	>10
3.50	11.5	12.00	3.91	3	Clay	CL/CH	stiff	125	1.3	10	1.36		100			0.67	8.14
3.65	12.0	18.70	3.97	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.34		85			1.07	>10
3.80	12.5	39.55	3.12	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	1.33		60			2.29	>10
3.95	13.0	50.32	2.48	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	14	1.31	62.4	45	59	36		
4.13	13.5	30.69	3.55	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	1.30		70			1.77	>10
4.28	14.0	26.55	3.63	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.28		75			1.52	>10
4.43	14.5	39.20	2.95	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.27	47.0	60	50	35		
4.58	15.0	45.83	2.47	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.26	54.4	50	55	36		
4.73	15.5	51.77	2.43	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	15	1.24	60.9	50	58	36		
4.88	16.0	28.04	4.05	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	1.23		80			1.61	>10
5.03	16.5	30.53	4.11	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	1.22		80			1.75	>10
5.18	17.0	20.45	4.18	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.21		95			1.16	>10
5.33	17.5	13.79	3.44	4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.19		100			0.77	8.56
5.48	18.0	20.54	3.22	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.18		85			1.16	>10
5.65	18.5	21.73	4.62	3	Clay	CL/CH	very stiff	125	1.3	17	1.17		95			1.23	>10
5.80	19.0	34.56	3.39	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	14	1.16		70			1.99	>10
5.95	19.5	26.09	4.43	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	1.15		90			1.49	>10
6.10	20.0	44.50	2.84	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.14	47.8	60	51	35		
6.25	20.5	18.83	2.67	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.13		90			1.06	>10
6.40	21.0	18.75	2.93	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.12		90			1.05	>10
6.55	21.5	19.89	2.63	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.11		90			1.12	>10
6.70	22.0	19.89	2.36	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.10		85			1.12	>10
6.85	22.5	15.39	1.44	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	4	1.09	15.9	85	18	31		
7.00	23.0	13.89	1.18	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	4	1.08	14.2	85	15	30		
7.18	23.5	17.50	1.76	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	5	1.07	17.8	85	21	31		
7.33	24.0	20.04	2.45	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.07		90			1.12	>10
7.48	24.5	19.38	2.15	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	6	1.06	19.4	85	24	31		
7.63	25.0	23.12	3.87	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	1.05		100			1.30	>10
7.78	25.5	23.80	2.82	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.04		85			1.34	>10
7.93	26.0	18.61	2.12	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.04		90			1.04	>10
8.08	26.5	21.09	2.45	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.03		90			1.18	>10
8.23	27.0	17.09	2.59	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.02		100			0.95	>10
8.38	27.5	17.65	2.88	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.01		100			0.98	>10
8.53	28.0	18.66	2.33	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.01		95			1.04	>10
8.68	28.5	19.66	2.48	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.00		95			1.09	>10
8.85	29.0	19.96	4.45	3	Clay	CL/CH	very stiff	125	1.3	16	0.99		100			1.11	6.54
9.00	29.5	25.20	4.46	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.99		100			1.42	>10
9.15	30.0	25.47	5.80	3	Clay	CL/CH	very stiff	125	1.3	20	0.98		100			1.43	9.79
9.30	30.5	21.95	5.40	3	Clay	CL/CH	very stiff	125	1.3	18	0.97		100			1.23	7.13

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-5

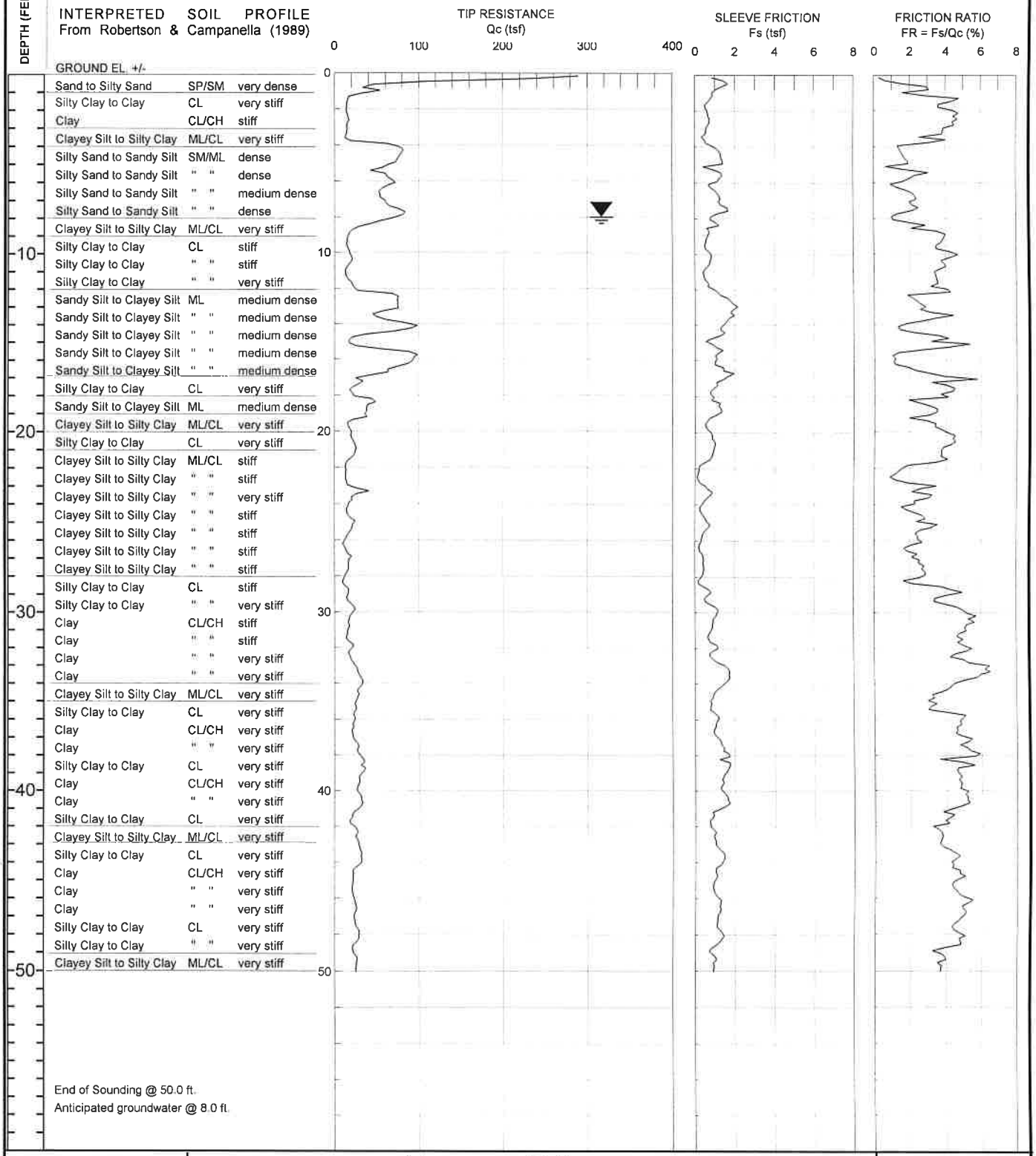
Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74))

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
9.45	31.0	22.16	6.26	3	Clay	CL/CH	very stiff	125	1.3	18	0.96		100			1.24	7.00
9.60	31.5	18.88	5.09	3	Clay	CL/CH	very stiff	125	1.3	15	0.96		100			1.04	5.31
9.75	32.0	20.88	5.31	3	Clay	CL/CH	very stiff	125	1.3	17	0.95		100			1.16	6.10
9.90	32.5	15.36	4.02	4	Silty Clay to Clay	CL	stiff	125	1.8	9	0.95		100			0.83	4.68
10.05	33.0	17.28	3.88	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.94		100			0.95	5.53
10.20	33.5	18.23	4.74	3	Clay	CL/CH	very stiff	125	1.3	15	0.93		100			1.00	4.57
10.38	34.0	20.72	4.69	3	Clay	CL/CH	very stiff	125	1.3	17	0.93		100			1.15	5.53
10.53	34.5	23.43	4.35	4	Silty Clay to Clay	CL	very stiff	125	1.8	13	0.92		100			1.31	8.85
10.68	35.0	27.68	4.36	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.92		100			1.55	>10
10.83	35.5	31.86	4.73	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.91		100			1.80	>10
10.98	36.0	26.80	5.45	3	Clay	CL/CH	very stiff	125	1.3	21	0.90		100			1.50	7.85
11.13	36.5	23.29	5.07	3	Clay	CL/CH	very stiff	125	1.3	19	0.90		100			1.29	6.10
11.28	37.0	23.72	5.59	3	Clay	CL/CH	very stiff	125	1.3	19	0.89		100			1.32	6.21
11.43	37.5	24.17	5.51	3	Clay	CL/CH	very stiff	125	1.3	19	0.89		100			1.34	6.21
11.58	38.0	27.84	5.43	3	Clay	CL/CH	very stiff	125	1.3	22	0.88		100			1.56	7.70
11.73	38.5	35.42	4.96	3	Clay	CL/CH	hard	125	1.3	28	0.88		100			2.00	>10
11.88	39.0	31.56	4.83	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.87		100			1.77	>10
12.05	39.5	31.31	4.91	3	Clay	CL/CH	very stiff	125	1.3	25	0.87		100			1.76	9.00
12.20	40.0	27.42	4.74	3	Clay	CL/CH	very stiff	125	1.3	22	0.86		100			1.53	7.00
12.35	40.5	27.79	5.16	3	Clay	CL/CH	very stiff	125	1.3	22	0.86		100			1.55	7.00
12.50	41.0	33.38	4.42	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.85		100			1.88	>10
12.65	41.5	32.87	4.19	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.85		100			1.85	>10
12.80	42.0	31.10	4.60	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.85		100			1.74	>10
12.95	42.5	28.62	5.09	3	Clay	CL/CH	very stiff	125	1.3	23	0.84		100			1.60	6.88
13.10	43.0	35.05	4.28	4	Silty Clay to Clay	CL	very stiff	125	1.8	20	0.84		100			1.97	>10
13.25	43.5	36.72	4.37	4	Silty Clay to Clay	CL	hard	125	1.8	21	0.83		100			2.07	>10
13.40	44.0	28.32	4.59	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.83		100			1.57	8.41
13.58	44.5	24.43	4.93	3	Clay	CL/CH	very stiff	125	1.3	20	0.82		100			1.35	5.00
13.73	45.0	25.48	4.82	3	Clay	CL/CH	very stiff	125	1.3	20	0.82		100			1.41	5.21
13.88	45.5	25.43	4.70	3	Clay	CL/CH	very stiff	125	1.3	20	0.82		100			1.40	5.10
14.03	46.0	23.73	4.20	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.81		100			1.30	5.88
14.18	46.5	24.76	3.53	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.81		100			1.36	8.56
14.33	47.0	29.98	4.20	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	0.80		100			1.67	8.41
14.48	47.5	30.15	3.92	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	0.80		100			1.68	>10
14.63	48.0	27.03	4.27	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.80		100			1.49	6.76
14.78	48.5	27.55	4.49	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.79		100			1.52	6.88
14.93	49.0	27.20	3.51	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.79		100			1.50	9.39
15.09	49.5	22.51	2.05	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	6	0.79	16.7	100	20	31		
15.25	50.0	21.56	2.65	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.78		100			1.17	6.00

CLIENT: Imperial Valley College
PROJECT: IVC Expansion -- Imperial, CA
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-6



Project No: LE06360

LANDMARK
Geo-Engineers and Geologists

Plate B-6

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-6

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78), 1-R&C(83), 2-PHT(74))

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
0.15	0.5	208.90	0.84	9	Sand	SP	very dense	110	6.5	32	2.00	394.9	5	157	50		
0.30	1.0	44.25	2.55	6	Sandy Silt to Clayey Silt	ML	very dense	115	3.5	13	2.00	83.6	45	94	41		
0.45	1.5	20.82	4.02	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	2.00		75			1.22	>10
0.60	2.0	14.17	3.88	4	Silty Clay to Clay	CL	stiff	125	1.8	8	2.00		90			0.83	>10
0.75	2.5	14.76	4.63	3	Clay	CL/CH	stiff	125	1.3	12	2.00		90			0.86	>10
0.93	3.0	15.24	4.27	3	Clay	CL/CH	stiff	125	1.3	12	2.00		90			0.89	>10
1.08	3.5	13.97	3.41	4	Silty Clay to Clay	CL	stiff	125	1.8	8	2.00		85			0.81	>10
1.23	4.0	30.91	2.82	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	2.00		55			1.80	>10
1.38	4.5	78.99	1.54	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	18	2.00	149.3	25	85	40		
1.53	5.0	74.36	1.85	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	17	1.92	135.3	30	81	39		
1.68	5.5	55.50	1.94	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	12	1.83	96.2	35	71	38		
1.83	6.0	66.88	1.55	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	15	1.76	111.0	30	76	39		
1.98	6.5	56.90	1.74	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	13	1.69	90.7	30	70	38		
2.13	7.0	55.50	2.24	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	1.63	85.2	40	68	37		
2.28	7.5	67.45	2.27	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	19	1.57	100.1	35	73	38		
2.45	8.0	77.79	1.16	8	Sand to Silty Sand	SP/SM	dense	115	5.5	14	1.52	111.7	20	76	39		
2.60	8.5	41.62	2.31	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.50	58.9	45	57	36		
2.75	9.0	18.10	3.80	4	Silty Clay to Clay	CL	very stiff	125	1.8	10	1.48		80			1.04	>10
2.90	9.5	14.48	3.67	4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.45		90			0.82	>10
3.05	10.0	16.53	4.12	4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.43		90			0.94	>10
3.20	10.5	19.74	3.98	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.41		80			1.13	>10
3.35	11.0	14.25	3.70	4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.39		90			0.81	>10
3.50	11.5	14.11	3.49	4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.37		90			0.80	>10
3.65	12.0	21.28	3.61	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.35		80			1.22	>10
3.80	12.5	56.82	2.76	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	1.34	71.8	45	63	37		
3.95	13.0	74.35	2.61	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	21	1.32	92.9	40	70	38		
4.13	13.5	59.00	3.38	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	1.31	72.9	50	63	37		
4.28	14.0	63.91	2.63	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	18	1.29	78.2	45	65	37		
4.43	14.5	85.82	1.64	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	19	1.28	103.9	30	74	38		
4.58	15.0	24.51	3.64	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.27		80			1.40	>10
4.73	15.5	31.38	4.07	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	1.25		75			1.81	>10
4.88	16.0	92.92	1.17	8	Sand to Silty Sand	SP/SM	dense	115	5.5	17	1.24	108.9	25	75	38		
5.03	16.5	74.93	1.78	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	17	1.23	87.0	35	68	38		
5.18	17.0	43.44	4.24	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	17	1.22		70			2.51	>10
5.33	17.5	27.55	3.89	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	1.20		80			1.58	>10
5.48	18.0	20.57	4.08	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.19		95			1.17	>10
5.65	18.5	43.55	2.52	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.18	48.5	55	51	35		
5.80	19.0	37.00	3.36	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.17		70			2.13	>10
5.95	19.5	24.93	2.78	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.16		75			1.42	>10
6.10	20.0	17.92	3.73	4	Silty Clay to Clay	CL	very stiff	125	1.8	10	1.15		100			1.01	>10
6.25	20.5	20.18	4.47	3	Clay	CL/CH	very stiff	125	1.3	16	1.14		100			1.14	>10
6.40	21.0	24.58	3.95	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.13		90			1.40	>10
6.55	21.5	21.71	3.84	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.12		95			1.23	>10
6.70	22.0	13.34	2.32	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.11		100			0.73	8.70
6.85	22.5	13.24	1.14	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	4	1.10	13.7	85	14	30		
7.00	23.0	14.19	2.17	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.09		100			0.78	9.19
7.18	23.5	30.09	2.63	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	9	1.08	30.7	75	38	33		
7.33	24.0	19.12	2.53	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.07		90			1.07	>10
7.48	24.5	14.72	1.85	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.06		95			0.81	9.00
7.63	25.0	19.32	2.65	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.06		95			1.08	>10
7.78	25.5	20.56	3.10	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	1.05		95			1.15	>10
7.93	26.0	15.02	2.40	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.04		100			0.83	8.56
8.08	26.5	11.56	2.07	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.03		100			0.62	5.31
8.23	27.0	17.39	2.36	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.02		95			0.96	>10
8.38	27.5	16.21	2.65	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.02		100			0.89	9.19
8.53	28.0	13.16	2.76	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.01		100			0.71	6.21
8.68	28.5	10.40	2.50	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	4	1.00		100			0.55	4.09
8.85	29.0	16.13	4.42	3	Clay	CL/CH	stiff	125	1.3	13	1.00		100			0.89	4.68
9.00	29.5	16.07	3.59	4	Silty Clay to Clay	CL	stiff	125	1.8	9	0.99		100			0.88	5.88
9.15	30.0	22.58	4.93	3	Clay	CL/CH	very stiff	125	1.3	18	0.98		100			1.26	7.85
9.30	30.5	17.29	5.54	3	Clay	CL/CH	stiff	125	1.3	14	0.98		100			0.95	4.89

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-6

Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

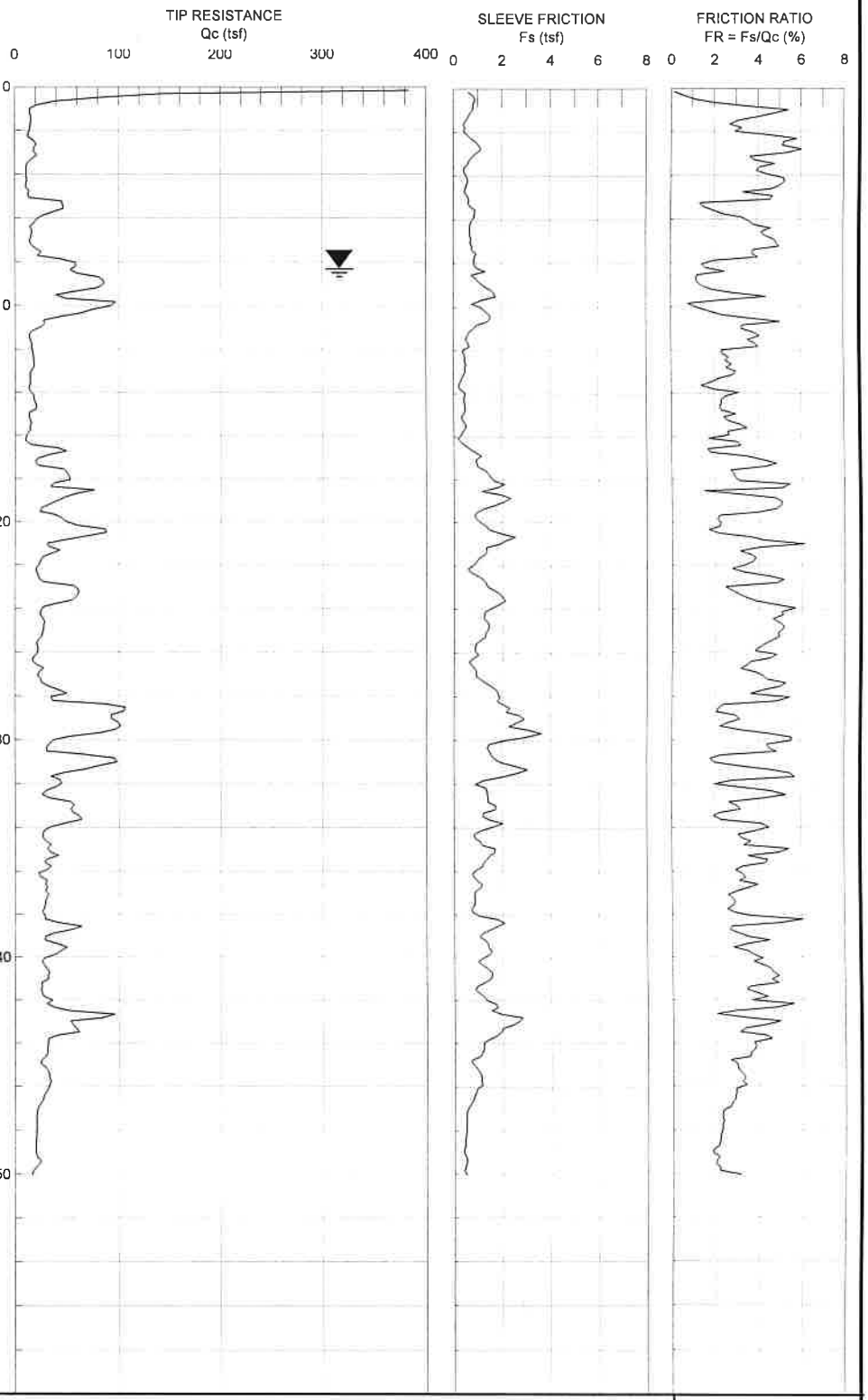
Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
9.45	31.0	16.44	5.15	3	Clay	CL/CH	stiff	125	1.3	13	0.97		100			0.90	4.37
9.60	31.5	14.25	4.79	3	Clay	CL/CH	stiff	125	1.3	11	0.96		100			0.77	3.50
9.75	32.0	19.93	5.04	3	Clay	CL/CH	very stiff	125	1.3	16	0.96		100			1.10	5.76
9.90	32.5	17.12	4.65	3	Clay	CL/CH	stiff	125	1.3	14	0.95		100			0.94	4.37
10.05	33.0	21.32	5.59	3	Clay	CL/CH	very stiff	125	1.3	17	0.94		100			1.18	6.21
10.20	33.5	27.25	6.23	3	Clay	CL/CH	very stiff	125	1.3	22	0.94		100			1.53	9.39
10.38	34.0	31.85	5.12	3	Clay	CL/CH	very stiff	125	1.3	25	0.93		100			1.80	>10
10.53	34.5	28.61	4.04	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.92		100			1.61	>10
10.68	35.0	27.12	3.20	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.92		95			1.52	>10
10.83	35.5	24.79	3.22	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.91		100			1.38	>10
10.98	36.0	23.18	4.72	3	Clay	CL/CH	very stiff	125	1.3	19	0.91		100			1.29	6.21
11.13	36.5	21.87	4.71	3	Clay	CL/CH	very stiff	125	1.3	17	0.90		100			1.21	5.53
11.28	37.0	21.61	4.94	3	Clay	CL/CH	very stiff	125	1.3	17	0.90		100			1.19	5.31
11.43	37.5	26.85	5.07	3	Clay	CL/CH	very stiff	125	1.3	21	0.89		100			1.50	7.56
11.58	38.0	28.44	5.62	3	Clay	CL/CH	very stiff	125	1.3	23	0.89		100			1.59	8.14
11.73	38.5	33.38	4.70	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.88		100			1.88	>10
11.88	39.0	34.12	4.65	4	Silty Clay to Clay	CL	very stiff	125	1.8	19	0.88		100			1.93	>10
12.05	39.5	29.10	4.79	3	Clay	CL/CH	very stiff	125	1.3	23	0.87		100			1.63	8.00
12.20	40.0	26.96	4.94	3	Clay	CL/CH	very stiff	125	1.3	22	0.87		100			1.50	6.88
12.35	40.5	31.07	5.13	3	Clay	CL/CH	very stiff	125	1.3	25	0.86		100			1.74	8.70
12.50	41.0	30.86	4.82	3	Clay	CL/CH	very stiff	125	1.3	25	0.86		100			1.73	8.41
12.65	41.5	21.73	4.14	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.85		100			1.19	6.00
12.80	42.0	19.99	3.77	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	0.85		100			1.09	5.10
12.95	42.5	26.33	3.67	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.84		100			1.46	>10
13.10	43.0	27.32	3.68	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.84		100			1.52	>10
13.25	43.5	30.46	4.16	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	0.84		100			1.70	>10
13.40	44.0	31.65	4.51	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.83		100			1.77	>10
13.58	44.5	24.93	4.47	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.83		100			1.38	6.65
13.73	45.0	21.91	4.80	3	Clay	CL/CH	very stiff	125	1.3	18	0.82		100			1.20	4.18
13.88	45.5	20.84	4.35	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	0.82		100			1.13	4.78
14.03	46.0	21.52	4.75	3	Clay	CL/CH	very stiff	125	1.3	17	0.82		100			1.17	3.91
14.18	46.5	24.41	5.19	3	Clay	CL/CH	very stiff	125	1.3	20	0.81		100			1.34	4.68
14.33	47.0	24.03	4.95	3	Clay	CL/CH	very stiff	125	1.3	19	0.81		100			1.32	4.47
14.48	47.5	24.55	4.46	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.80		100			1.35	6.00
14.63	48.0	28.49	4.71	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.80		100			1.58	7.56
14.78	48.5	25.23	4.75	3	Clay	CL/CH	very stiff	125	1.3	20	0.80		100			1.39	4.68
14.93	49.0	21.52	3.61	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.79		100			1.17	6.21
15.09	49.5	26.05	3.78	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.79		100			1.43	8.56
15.25	50.0	25.12	3.68	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.79		100			1.38	8.00

CLIENT: Imperial Valley College
PROJECT: IVC Expansion -- Imperial, CA
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight
DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-7

DEPTH (FEET)	INTERPRETED SOIL PROFILE From Robertson & Campanella (1989)		
	GROUND EL. +/-		
	Silty Sand to Sandy Silt	SM/ML	very dense
	Silty Clay to Clay	CL	stiff
	Clay	CL/CH	stiff
	Clay	" "	stiff
	Clay	" "	stiff
	Sandy Silt to Clayey Silt	ML	medium dense
	Clay	CL/CH	stiff
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Silty Sand to Sandy Silt	SM/ML	dense
	Silty Sand to Sandy Silt	" "	dense
10	Sandy Silt to Clayey Silt	ML	medium dense
	Silty Clay to Clay	CL	stiff
	Clayey Silt to Silty Clay	ML/CL	stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	hard
	Clayey Silt to Silty Clay	" "	hard
20	Clayey Silt to Silty Clay	" "	hard
	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	hard
	Clay	CL/CH	very stiff
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Silty Clay to Clay	" "	very stiff
	Sandy Silt to Clayey Silt	ML	medium dense
30	Clayey Silt to Silty Clay	ML/CL	hard
	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	hard
	Clayey Silt to Silty Clay	" "	hard
	Sandy Silt to Clayey Silt	ML	medium dense
	Clayey Silt to Silty Clay	ML/CL	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	hard
40	Clayey Silt to Silty Clay	" "	hard
	Silty Clay to Clay	CL	very stiff
	Silty Clay to Clay	" "	very stiff
	Clayey Silt to Silty Clay	ML/CL	hard
	Clayey Silt to Silty Clay	" "	hard
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Clayey Silt to Silty Clay	" "	very stiff
	Sandy Silt to Clayey Silt	ML	very loose
	Sandy Silt to Clayey Silt	" "	very loose
50	Sandy Silt to Clayey Silt	" "	very loose



End of Sounding @ 50.0 ft.
Anticipated groundwater @ 8.0 ft.

Project No: LE06360

LANDMARK
Geo-Engineers and Geologists

Plate B-7

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-7

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74))

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk Phi (deg.)	17.0 Su (tsf)	OCR
0.15	0.5	202.21	0.61	9	Sand	SP	very dense	110	6.5	31	2.00	382.2	5	156	50		
0.30	1.0	25.63	3.70	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	2.00		70			1.50	>10
0.45	1.5	15.00	3.90	4	Silty Clay to Clay	CL	stiff	125	1.8	9	2.00		85			0.88	>10
0.60	2.0	14.62	2.98	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	2.00		80			0.85	>10
0.75	2.5	14.38	5.18	3	Clay	CL/CH	stiff	125	1.3	12	2.00		95			0.84	>10
0.93	3.0	19.02	5.54	3	Clay	CL/CH	very stiff	125	1.3	15	2.00		90			1.11	>10
1.08	3.5	17.10	4.09	4	Silty Clay to Clay	CL	stiff	125	1.8	10	2.00		85			0.99	>10
1.23	4.0	11.03	4.17	3	Clay	CL/CH	stiff	125	1.3	9	2.00		100			0.64	>10
1.38	4.5	11.04	5.17	3	Clay	CL/CH	stiff	125	1.3	9	2.00		100			0.63	>10
1.53	5.0	12.27	4.23	3	Clay	CL/CH	stiff	125	1.3	10	1.91		95			0.70	>10
1.68	5.5	38.09	2.35	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	11	1.82	65.4	45	60	36		
1.83	6.0	27.55	3.11	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	1.74		60			1.60	>10
1.98	6.5	16.46	4.20	3	Clay	CL/CH	stiff	125	1.3	13	1.67		85			0.95	>10
2.13	7.0	15.13	4.67	3	Clay	CL/CH	stiff	125	1.3	12	1.60		90			0.87	>10
2.28	7.5	20.26	4.20	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.55		80			1.17	>10
2.45	8.0	40.95	2.49	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	12	1.50	57.9	45	56	36		
2.60	8.5	57.43	1.77	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	13	1.48	80.1	35	66	37		
2.75	9.0	83.84	1.28	8	Sand to Silty Sand	SP/SM	dense	115	5.5	15	1.46	115.3	20	77	39		
2.90	9.5	59.05	3.05	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	1.44	80.2	45	66	37		
3.05	10.0	79.37	1.47	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	18	1.42	106.4	25	74	38		
3.20	10.5	60.98	2.52	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	1.40	80.8	40	66	37		
3.35	11.0	27.09	3.87	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	1.38		70			1.56	>10
3.50	11.5	14.78	3.83	4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.36		95			0.84	>10
3.65	12.0	16.07	3.40	4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.35		85			0.91	>10
3.80	12.5	17.52	2.52	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.33		75			1.00	>10
3.95	13.0	17.51	2.78	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	1.31		80			0.99	>10
4.13	13.5	14.58	2.32	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.30		85			0.82	>10
4.28	14.0	14.19	2.16	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.28		85			0.80	>10
4.43	14.5	18.43	2.39	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.27		75			1.05	>10
4.58	15.0	18.40	2.51	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	1.26		80			1.04	>10
4.73	15.5	14.68	2.74	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	1.24		90			0.82	>10
4.88	16.0	12.95	2.63	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.23		95			0.72	>10
5.03	16.5	22.28	2.65	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.22		75			1.27	>10
5.18	17.0	34.75	3.15	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	14	1.20		65			2.00	>10
5.33	17.5	29.93	3.97	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	1.19		80			1.72	>10
5.48	18.0	51.88	2.97	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	15	1.18	57.9	55	56	36		
5.65	18.5	49.57	4.03	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	20	1.17		65			2.87	>10
5.80	19.0	49.17	4.43	4	Silty Clay to Clay	CL	hard	125	1.8	28	1.16		70			2.85	>10
5.95	19.5	27.63	4.61	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	1.15		90			1.58	>10
6.10	20.0	44.60	2.19	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	13	1.14	48.0	55	51	35		
6.25	20.5	78.32	2.03	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	17	1.13	83.5	40	67	37		
6.40	21.0	50.04	4.67	4	Silty Clay to Clay	CL	hard	125	1.8	29	1.12		70			2.89	>10
6.55	21.5	36.78	3.62	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	1.11		75			2.11	>10
6.70	22.0	24.89	3.66	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	1.10		90			1.41	>10
6.85	22.5	21.26	3.52	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	1.09		95			1.20	>10
7.00	23.0	35.70	4.16	4	Silty Clay to Clay	CL	hard	125	1.8	20	1.08		80			2.05	>10
7.18	23.5	60.66	3.04	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	17	1.07	61.5	55	58	36		
7.33	24.0	40.45	4.76	4	Silty Clay to Clay	CL	hard	125	1.8	23	1.07		80			2.32	>10
7.48	24.5	25.49	4.95	3	Clay	CL/CH	very stiff	125	1.3	20	1.06		100			1.44	>10
7.63	25.0	28.02	5.07	3	Clay	CL/CH	very stiff	125	1.3	22	1.05		100			1.59	>10
7.78	25.5	25.44	4.83	3	Clay	CL/CH	very stiff	125	1.3	20	1.04		100			1.44	>10
7.93	26.0	21.74	4.05	4	Silty Clay to Clay	CL	very stiff	125	1.8	12	1.03		100			1.22	>10
8.08	26.5	19.15	4.13	4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.02		100			1.07	9.00
8.23	27.0	24.49	3.75	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.02		95			1.38	>10
8.38	27.5	27.50	4.88	3	Clay	CL/CH	very stiff	125	1.3	22	1.01		100			1.56	>10
8.53	28.0	42.03	4.44	4	Silty Clay to Clay	CL	hard	125	1.8	24	1.00		85			2.41	>10
8.68	28.5	76.71	3.12	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	22	0.99	72.0	55	63	37		
8.85	29.0	96.70	2.70	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	28	0.99	90.2	45	69	38		
9.00	29.5	99.20	2.67	6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	28	0.98	92.0	45	70	38		
9.15	30.0	57.33	5.17	3	Clay	CL/CH	hard	125	1.3	46	0.97		80			3.31	>10
9.30	30.5	31.44	4.58	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.97		95			1.78	>10

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-7

Est. GWT (ft): 8.0 Phi Correlation: 0 0-Schm(78),1-R&C(83),2-PHT(74)

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
9.45	31.0	87.22	2.01	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	19	0.96	79.3	45	66	37		
9.60	31.5	65.83	4.33	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	26	0.96		70			3.80	>10
9.75	32.0	40.88	3.49	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	0.95		80			2.34	>10
9.90	32.5	31.62	4.41	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.94		100			1.79	>10
10.05	33.0	47.88	3.29	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	19	0.94		75			2.75	>10
10.20	33.5	56.96	2.45	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	16	0.93	50.2	60	52	35		
10.38	34.0	49.27	3.65	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	20	0.93		75			2.83	>10
10.53	34.5	27.20	3.41	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.92		100			1.53	>10
10.68	35.0	31.88	4.14	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.92		100			1.80	>10
10.83	35.5	35.37	4.32	4	Silty Clay to Clay	CL	hard	125	1.8	20	0.91		95			2.01	>10
10.98	36.0	31.42	3.53	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	0.91		95			1.77	>10
11.13	36.5	26.71	3.44	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.90		100			1.49	>10
11.28	37.0	30.82	3.06	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	0.90		90			1.74	>10
11.43	37.5	29.53	2.86	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	0.89		90			1.66	>10
11.58	38.0	27.62	3.02	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.89		95			1.55	>10
11.73	38.5	44.89	4.62	4	Silty Clay to Clay	CL	hard	125	1.8	26	0.88		90			2.56	>10
11.88	39.0	40.58	3.14	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	0.88		85			2.31	>10
12.05	39.5	39.53	3.61	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	16	0.87		90			2.24	>10
12.20	40.0	37.03	3.82	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	15	0.87		95			2.10	>10
12.35	40.5	27.99	4.18	4	Silty Clay to Clay	CL	very stiff	125	1.8	16	0.86		100			1.56	9.79
12.50	41.0	32.29	4.73	4	Silty Clay to Clay	CL	very stiff	125	1.8	18	0.86		100			1.81	>10
12.65	41.5	25.48	3.99	4	Silty Clay to Clay	CL	very stiff	125	1.8	15	0.85		100			1.41	7.85
12.80	42.0	30.09	4.00	4	Silty Clay to Clay	CL	very stiff	125	1.8	17	0.85		100			1.68	>10
12.95	42.5	40.01	4.45	4	Silty Clay to Clay	CL	hard	125	1.8	23	0.84		100			2.27	>10
13.10	43.0	77.38	3.47	6	Sandy Silt to Clayey Silt	ML	medium dense	115	3.5	22	0.84	61.5	70	58	36		
13.25	43.5	58.64	3.60	5	Clayey Silt to Silty Clay	ML/CL	hard	120	2.5	23	0.84		80			3.36	>10
13.40	44.0	34.87	4.22	4	Silty Clay to Clay	CL	very stiff	125	1.8	20	0.83		100			1.96	>10
13.58	44.5	31.41	3.74	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	0.83		100			1.76	>10
13.73	45.0	26.53	3.07	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	11	0.82		100			1.47	>10
13.88	45.5	31.55	3.11	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	0.82		100			1.76	>10
14.03	46.0	33.66	3.32	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	13	0.82		100			1.89	>10
14.18	46.5	29.90	2.91	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	12	0.81		100			1.66	>10
14.33	47.0	24.06	2.66	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.81		100			1.32	8.14
14.48	47.5	21.02	2.31	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	0.81		100			1.14	6.32
14.63	48.0	20.96	2.27	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	0.80		100			1.14	6.21
14.78	48.5	20.46	2.19	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	6	0.80	15.5	100	17	30		
14.93	49.0	20.23	1.94	6	Sandy Silt to Clayey Silt	ML	very loose	115	3.5	6	0.80	15.2	100	17	30		
15.09	49.5	23.39	2.06	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	7	0.79	17.5	100	21	31		
15.25	50.0	18.28	2.50	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	0.79		100			0.98	4.68

CLIENT: Imperial Valley College

PROJECT: IVC Expansion -- Imperial, CA

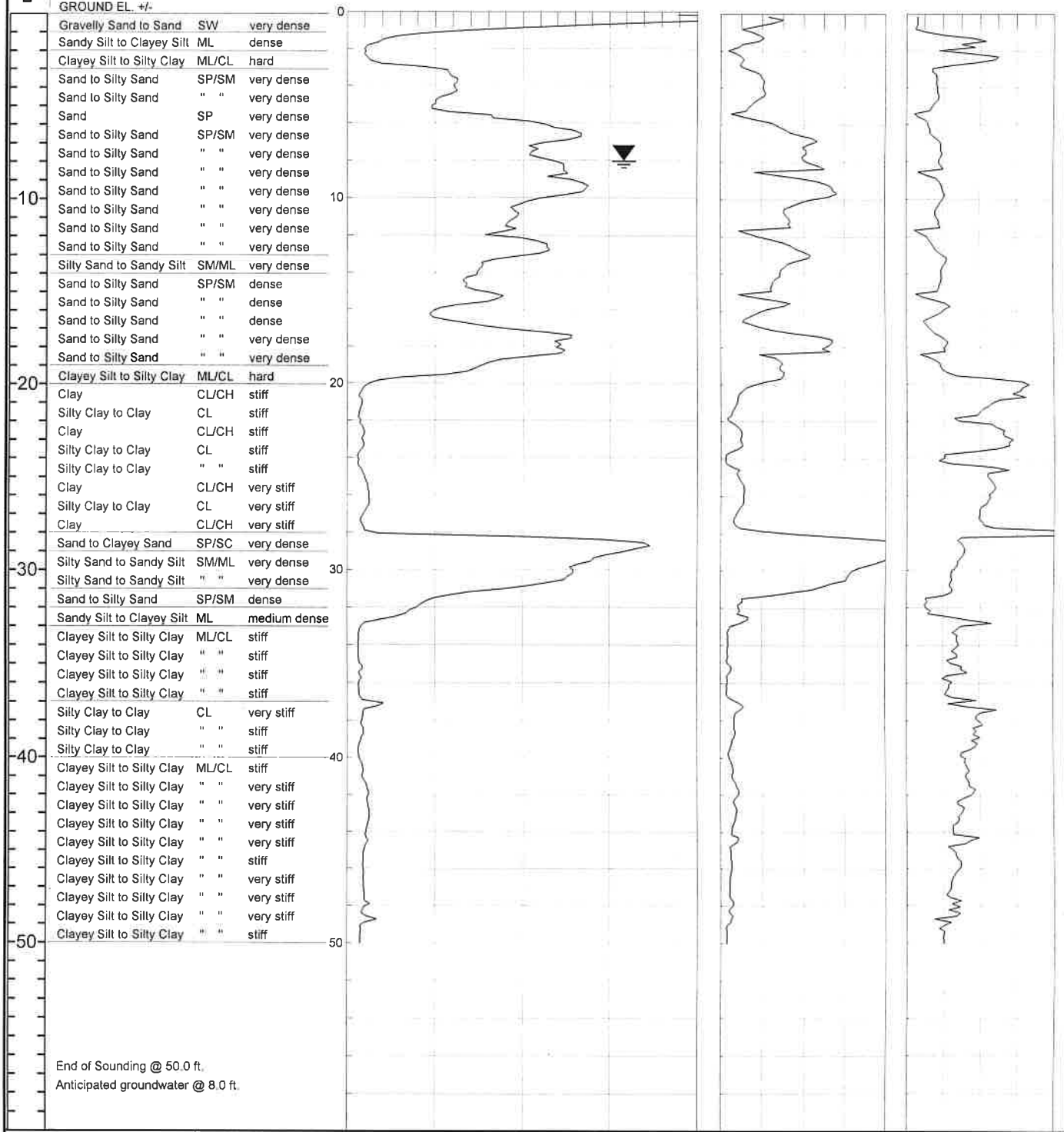
LOCATION: See Site and Boring Location Plan

CONE PENETROMETER: HOLGUIN, FAHAN & ASSC. Truck Mounted Electric Cone with 23 ton reaction weight

DATE: 09/29/06

LOG OF CONE SOUNDING DATA CPT-8

INTERPRETED SOIL PROFILE From Robertson & Campanella (1989)		
GROUND EL. +/-		
Gravelly Sand to Sand	SW	very dense
Sandy Silt to Clayey Silt	ML	dense
Clayey Silt to Silty Clay	ML/CL	hard
Sand to Silty Sand	SP/SM	very dense
Sand to Silty Sand	" "	very dense
Sand	SP	very dense
Sand to Silty Sand	SP/SM	very dense
Sand to Silty Sand	" "	very dense
Sand to Silty Sand	" "	very dense
Sand to Silty Sand	" "	very dense
Sand to Silty Sand	" "	very dense
Sand to Silty Sand	" "	very dense
Sand to Silty Sand	" "	very dense
Silty Sand to Sandy Silt	SM/ML	very dense
Sand to Silty Sand	SP/SM	dense
Sand to Silty Sand	" "	dense
Sand to Silty Sand	" "	dense
Sand to Silty Sand	" "	very dense
Sand to Silty Sand	" "	very dense
Clayey Silt to Silty Clay	ML/CL	hard
Clay	CL/CH	stiff
Silty Clay to Clay	CL	stiff
Clay	CL/CH	stiff
Silty Clay to Clay	CL	stiff
Silty Clay to Clay	" "	stiff
Clay	CL/CH	very stiff
Silty Clay to Clay	CL	very stiff
Clay	CL/CH	very stiff
Sand to Clayey Sand	SP/SC	very dense
Silty Sand to Sandy Silt	SM/ML	very dense
Silty Sand to Sandy Silt	" "	very dense
Sand to Silty Sand	SP/SM	dense
Sandy Silt to Clayey Silt	ML	medium dense
Clayey Silt to Silty Clay	ML/CL	stiff
Clayey Silt to Silty Clay	" "	stiff
Clayey Silt to Silty Clay	" "	stiff
Clayey Silt to Silty Clay	" "	stiff
Silty Clay to Clay	CL	very stiff
Silty Clay to Clay	" "	stiff
Silty Clay to Clay	" "	stiff
Clayey Silt to Silty Clay	ML/CL	stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	very stiff
Clayey Silt to Silty Clay	" "	stiff



End of Sounding @ 50.0 ft.

Anticipated groundwater @ 8.0 ft.

Project No: LE06360

LANDMARK
Geo-Engineers and Geologists

Plate B-8

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-8

Est. GWT (ft): 8.0

Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74))

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: Phi (deg.)	17.0 Su (tsf)	OCR
0.15	0.5	428.56	0.60	10 10	Gravelly Sand to Sand	SW	very dense	115	7.5	57	2.00	810.1	0	177	53		
0.30	1.0	220.02	0.71	9 9	Sand	SP	very dense	110	6.5	34	2.00	415.9	5	142	48		
0.45	1.5	61.87	3.37	6 6	Sandy Silt to Clayey Silt	ML	very dense	115	3.5	18	2.00	117.0	45	97	42		
0.60	2.0	25.82	2.83	5 5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	2.00		60			1.51	>10
0.75	2.5	21.28	4.44	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	12	2.00		80			1.24	>10
0.93	3.0	49.74	2.55	6 6	Sandy Silt to Clayey Silt	ML	dense	115	3.5	14	2.00	94.0	45	78	39		
1.08	3.5	115.80	1.57	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	21	2.00	218.9	20	101	42		
1.23	4.0	123.84	1.66	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	23	2.00	234.1	20	100	42		
1.38	4.5	121.71	1.73	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	22	2.00	230.1	20	98	42		
1.53	5.0	102.57	1.62	7 7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	23	1.96	189.9	20	91	41		
1.68	5.5	118.06	0.93	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	21	1.86	208.0	10	94	41		
1.83	6.0	199.88	1.15	9 9	Sand	SP	very dense	110	6.5	31	1.78	337.0	10	108	43		
1.98	6.5	253.54	1.33	9 9	Sand	SP	very dense	110	6.5	39	1.71	410.8	10	114	44		
2.13	7.0	247.95	1.79	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	45	1.65	386.9	15	112	44		
2.28	7.5	211.18	1.92	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	38	1.59	318.0	15	107	43		
2.45	8.0	221.24	1.83	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	40	1.54	322.2	15	107	43		
2.60	8.5	247.10	1.53	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	45	1.52	354.7	10	110	43		
2.75	9.0	245.37	1.51	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	45	1.50	347.3	10	109	43		
2.90	9.5	272.09	1.95	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	49	1.48	379.8	15	112	44		
3.05	10.0	245.70	2.06	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	45	1.46	338.4	15	108	43		
3.20	10.5	195.75	1.76	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	36	1.44	266.1	15	101	42		
3.35	11.0	192.87	1.63	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	35	1.42	258.9	15	101	42		
3.50	11.5	183.09	1.82	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	33	1.40	242.8	20	99	42		
3.65	12.0	174.37	0.79	9 9	Sand	SP	very dense	110	6.5	27	1.39	228.5	10	97	42		
3.80	12.5	213.57	1.37	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	39	1.37	276.8	15	103	42		
3.95	13.0	225.77	1.76	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	41	1.36	289.2	15	104	43		
4.13	13.5	170.57	2.18	7 7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	38	1.34	216.1	25	95	41		
4.28	14.0	150.79	1.94	7 7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	34	1.33	188.9	25	91	41		
4.43	14.5	137.84	1.92	7 7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	31	1.31	170.8	25	88	40		
4.58	15.0	138.34	1.77	8 8	Sand to Silty Sand	SP/SM	dense	115	5.5	25	1.30	169.7	25	88	40		
4.73	15.5	170.03	1.00	9 9	Sand	SP	very dense	110	6.5	26	1.28	206.5	10	94	41		
4.88	16.0	121.90	2.13	7 7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	27	1.27	146.6	30	84	40		
5.03	16.5	101.19	1.27	8 8	Sand to Silty Sand	SP/SM	dense	115	5.5	18	1.26	120.5	25	78	39		
5.18	17.0	157.55	1.23	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	29	1.25	185.8	15	91	41		
5.33	17.5	245.35	1.84	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	45	1.24	286.5	20	104	42		
5.48	18.0	239.33	2.16	7 7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	53	1.22	276.9	20	103	42		
5.65	18.5	233.64	1.38	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	42	1.21	267.8	15	102	42		
5.80	19.0	162.27	1.78	8 8	Sand to Silty Sand	SP/SM	very dense	115	5.5	30	1.20	184.3	25	91	41		
5.95	19.5	130.12	2.31	7 7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	29	1.19	146.5	30	84	40		
6.10	20.0	40.15	5.87	3 3	Clay	CL/CH	hard	125	1.3	32	1.18		85			2.32	>10
6.25	20.5	17.33	6.08	3 3	Clay	CL/CH	stiff	125	1.3	14	1.17		100			0.97	9.00
6.40	21.0	15.44	5.41	3 3	Clay	CL/CH	stiff	125	1.3	12	1.16		100			0.86	7.00
6.55	21.5	15.10	4.20	3 3	Clay	CL/CH	stiff	125	1.3	12	1.15		100			0.84	6.65
6.70	22.0	13.91	3.09	4 4	Silty Clay to Clay	CL	stiff	125	1.8	8	1.13		100			0.77	7.27
6.85	22.5	16.68	4.94	3 3	Clay	CL/CH	stiff	125	1.3	13	1.12		100			0.93	7.27
7.00	23.0	18.34	5.46	3 3	Clay	CL/CH	very stiff	125	1.3	15	1.11		100			1.03	8.41
7.18	23.5	18.30	5.41	3 3	Clay	CL/CH	very stiff	125	1.3	15	1.10		100			1.03	8.14
7.33	24.0	13.00	2.60	5 5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.09		100			0.71	8.00
7.48	24.5	12.74	2.92	5 5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	1.08		100			0.70	7.41
7.63	25.0	17.76	4.78	3 3	Clay	CL/CH	stiff	125	1.3	14	1.08		100			0.99	7.00
7.78	25.5	21.71	4.65	3 3	Clay	CL/CH	very stiff	125	1.3	17	1.07		100			1.22	>10
7.93	26.0	24.16	4.66	3 3	Clay	CL/CH	very stiff	125	1.3	19	1.06		100			1.37	>10
8.08	26.5	24.65	4.34	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	14	1.05		100			1.39	>10
8.23	27.0	19.81	3.96	4 4	Silty Clay to Clay	CL	very stiff	125	1.8	11	1.04		100			1.11	>10
8.38	27.5	16.05	4.08	4 4	Silty Clay to Clay	CL	stiff	125	1.8	9	1.03		100			0.89	6.76
8.53	28.0	24.59	8.45	3 3	Clay	CL/CH	very stiff	125	1.3	20	1.02		100			1.39	>10
8.68	28.5	279.20	2.90	12 12	Sand to Clayey Sand	SP/SC	very dense	115	2.0	140	1.02	268.5	30	102	42		
8.85	29.0	330.56	3.13	12 12	Sand to Clayey Sand	SP/SC	very dense	115	2.0	165	1.01	315.8	30	106	43		
9.00	29.5	285.07	2.91	12 12	Sand to Clayey Sand	SP/SC	very dense	115	2.0	143	1.00	270.7	30	102	42		
9.15	30.0	258.40	2.61	7 7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	57	1.00	243.8	30	99	42		
9.30	30.5	251.90	2.43	7 7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	56	0.99	236.2	30	98	42		

LANDMARK CONSULTANTS, INC.

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989, refer to Key to CPT logs)

Project: IVC Expansion -- Imperial, CA Project No: LE06360 Date: 09/29/06

CONE SOUNDING: CPT-8

Est. GWT (ft): 8.0 Phi Correlation: 0 (0-Schm(78),1-R&C(83),2-PHT(74))

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	1 Soil Type	Soil Classification	USC	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Cn or Cq	Norm. Qc1n	Est. % Fines	Rel. Dens. Dr (%)	Nk: 17.0 Phi (deg.)	Su (tsf)	OCR
9.45	31.0	204.03	2.40	7	Silty Sand to Sandy Silt	SM/ML	very dense	115	4.5	45	0.99	190.2	30	91	41		
9.60	31.5	118.54	1.84	7	Silty Sand to Sandy Silt	SM/ML	dense	115	4.5	26	0.98	109.8	35	75	39		
9.75	32.0	84.73	1.09	8	Sand to Silty Sand	SP/SM	medium dense	115	5.5	15	0.97	78.0	35	65	37		
9.90	32.5	64.60	1.65	7	Silty Sand to Sandy Silt	SM/ML	medium dense	115	4.5	14	0.97	59.1	45	57	36		
10.05	33.0	24.74	3.66	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.96		100			1.39	>10
10.20	33.5	13.67	2.69	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	0.96		100			0.74	5.42
10.38	34.0	13.08	2.80	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	0.95		100			0.70	5.00
10.53	34.5	12.98	2.64	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	0.95		100			0.69	4.78
10.68	35.0	13.27	2.48	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	0.94		100			0.71	4.89
10.83	35.5	15.90	3.11	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	0.93		100			0.86	6.54
10.98	36.0	14.83	2.23	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	0.93		100			0.80	5.65
11.13	36.5	13.24	2.25	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	5	0.92		100			0.71	4.57
11.28	37.0	24.51	2.89	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.92		100			1.37	>10
11.43	37.5	24.18	4.07	4	Silty Clay to Clay	CL	very stiff	125	1.8	14	0.91		100			1.35	9.00
11.58	38.0	17.21	3.87	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.91		100			0.94	4.89
11.73	38.5	17.62	3.89	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.90		100			0.96	5.00
11.88	39.0	16.99	3.73	4	Silty Clay to Clay	CL	stiff	125	1.8	10	0.90		100			0.92	4.68
12.05	39.5	13.29	3.72	4	Silty Clay to Clay	CL	stiff	125	1.8	8	0.89		100			0.70	3.21
12.20	40.0	13.25	3.06	4	Silty Clay to Clay	CL	stiff	125	1.8	8	0.89		100			0.70	3.14
12.35	40.5	16.93	3.25	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	0.88		100			0.92	6.00
12.50	41.0	17.72	3.31	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	0.88		100			0.96	6.32
12.65	41.5	20.85	3.40	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	0.87		100			1.14	8.27
12.80	42.0	23.91	3.65	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.87		100			1.32	>10
12.95	42.5	22.98	2.91	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.86		100			1.27	9.59
13.10	43.0	24.96	3.08	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.86		100			1.38	>10
13.25	43.5	24.68	2.82	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	10	0.85		100			1.37	>10
13.40	44.0	22.36	2.54	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.85		100			1.23	8.56
13.58	44.5	22.17	3.33	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.85		100			1.22	8.27
13.73	45.0	20.55	2.65	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	0.84		100			1.12	7.00
13.88	45.5	18.44	2.71	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	0.84		100			1.00	5.76
14.03	46.0	18.19	2.95	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	7	0.83		100			0.98	5.53
14.18	46.5	18.69	2.66	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	0.83		100			1.01	5.76
14.33	47.0	18.75	2.42	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	0.83		100			1.01	5.65
14.48	47.5	19.64	2.28	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	8	0.82		100			1.06	6.10
14.63	48.0	21.72	2.76	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	9	0.82		100			1.18	7.00
14.78	48.5	18.69	2.62	5	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.5	7	0.81		100			1.01	5.42
14.93	49.0	23.03	1.99	6	Sandy Silt to Clayey Silt	ML	loose	115	3.5	7	0.81	17.7	100	21	31		
15.09	49.5	15.27	1.94	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	0.81		100			0.80	3.74
15.25	50.0	14.94	2.01	5	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.5	6	0.80		100			0.78	3.58

LOG OF BORING NO. B-1

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
			3	2.0	SILTY CLAY/CLAY (CL): Light brown, dry, mediumplasticity SILTY CLAY/CLAY (CL-CH): Light brown, moist, stiff consistency, medium to high plasticity.			LL=43 PI=29
5			35		SILTY SAND (SM): Brown, very moist, medium dense to dense fine grained sand Anticipated GWT @ 8.9 ft	101.3	24.5	Minus 200=23%
10			6	3.5	CLAY (CH): Brown, very moist, very stiff consistency, high plasticity.			
			12	0.75	CLAYEY SILT (ML): Brown, saturated, stiff, low plasticity	94.6	28.5	
15								
20								
25					Total Depth = 14.0 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED: 10/06/06 TOTAL DEPTH: 14.0 Feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-9

LOG OF BORING NO. B-2

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			27		SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand			
			8	2.5	SILTY CLAY (CL): Brown, very moist, stiff to very stiff consistency, low to medium plasticity. Anticipated GWT @ 8.9 ft			
10			18	2.5		101.1	24.9	qu = 0.58 tsf c = 0.29
15			8		SANDY SILT (ML): Brown, saturated, loose, with fine grained sand			Minus 200=67.7%
20			9	0.75	SILTY CLAY/CLAYEY SILT (CL): Brown, very moist, stiff consistency, low to medium plasticity.			
25			4	0.5	CLAY (CL-CH): Brown, very moist, soft consistency, medium to high plasticity.			
30					Total Depth = 26.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED: 10/06/06 TOTAL DEPTH: 26.5 Feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-10

LOG OF BORING NO. B-3

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			32		SILTY SAND (SM): Brown, very moist, medium dense to dense fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			9	1.5	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff consistency, medium to high plasticity.			
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED: 10/06/06 TOTAL DEPTH: 11.5 Feet DEPTH TO WATER: 8.9'

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-11

LOG OF BORING NO. B-4

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			19		SILTY SAND (SM): Brown, very moist, dense, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			17	1.5	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff to very consistency, medium to high plasticity.			
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED: 10/06/06 TOTAL DEPTH: 11.5 Feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-12

LOG OF BORING NO. B-5

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			7		CLAYEY SILT (ML): Brown, very moist, firm consistency, low plasticity, some fine grained sand			
			21		SANDY SILT (ML): Brown, very moist, medium dense, with fine grained sand GWT @ 8.9 ft	98.6	26.8	Minus 200=66%
10			11	2.5	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff to very stiff consistency, medium to high plasticity.			
15					SILTY SAND (SM): Brown, saturated, medium dense, fine grained sand			Minus 200=67.7%
			24	3.5	CLAY (CL-CH): Brown, very moist, stiff to very stiff consistency, medium to high plasticity			
20			6	2.5				
25			7	3.5				
30					Total Depth = 26.5 feet Groundwater Encountered at 8.9 feet Backfilled with excavated soil			

DATE DRILLED:	10/06/06	TOTAL DEPTH:	26.5 Feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

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LANDMARK Geo-Engineers and Geologists

PLATE B-13

LOG OF BORING NO. B-6

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			26		SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			18	2.0	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff to very stiff consistency, medium to high plasticity.			
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED: 10/06/06 TOTAL DEPTH: 11.5 Feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-14

LOG OF BORING NO. B-7

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
			8	1.5	SILTY CLAY/CLAY (CL-CH): Brown, moist, stiff consistency, medium to high plasticity			
5								
			13	2.0	GWT @ 8.9 ft			
10								
			3	0.5	SILTY CLAY/CLAYEY SILT (CL-ML): Brown, very moist/saturated, soft consistency, medium plasticity.		28.2%	
15								
			18	3.5	CLAY (CH): Reddish brown, very moist, very stiff consistency, high plasticity			
20								
25					Total Depth = 19.0 feet Groundwater Encountered at 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED: 10/06/06 TOTAL DEPTH: 19.0 Feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

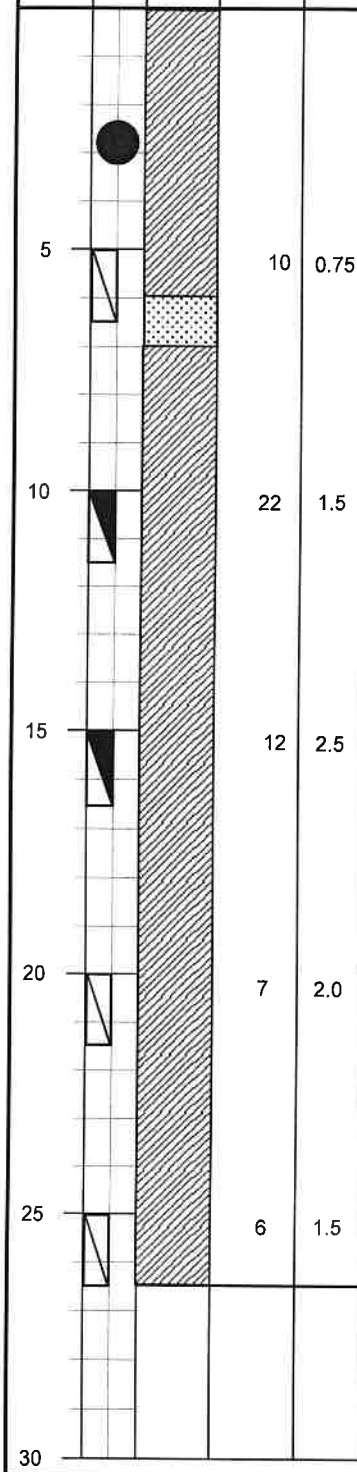
PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-15

LOG OF BORING NO. B-8

SHEET 1 OF 1



DEPTH	SAMPLE	USCS CLASS.	BLOW COUNT	POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	DRY DENSITY (pcf)	MOISTURE CONTENT (% dry wt.)	OTHER TESTS
					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			LL = 42 PI = 28
5			10	0.75	CLAY/SILTY CLAY (CH-CL): Brown, very moist, stiff consistency, medium to high plasticity SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			22	1.5	Stiff to very consistency	98.3	27.9	qu = 1.17 tsf c = 0.85
15			12	2.5				
20			7	2.0				
25			6	1.5				
30					Total Depth = 26.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED: 10/06/06 TOTAL DEPTH: 26.5 feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

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LANDMARK Geo-Engineers and Geologists

PLATE B-16

LOG OF BORING NO. B-9

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			24	0.75	CLAY/SILTY CLAY (CH-CL): Brown, very moist, stiff consistency, medium to high plasticity			
					SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			18	2.5	CLAY (CH): Dark brown, very moist, stiff to very stiff consistency, high plasticity			
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/06/06	TOTAL DEPTH:	11.5 Feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

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PLATE B-17

LOG OF BORING NO. B-10

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SILTY CLAY/CLAY (CL): Light brown, dry, medium plasticity			
5			35		SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			25	2.5	CLAY/SILTY CLAY (CL-CH): Brown, very moist, stiff to very stiff consistency, medium to high plasticity	97.3	27.9	
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/06/06	TOTAL DEPTH:	11.5 Feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

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PLATE B-18

LOG OF BORING NO. B-11

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 4-inches Granular Base = 12-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
			8	1.0	SILTY CLAY (CL): Brown, moist, stiff consistency, medium plasticity			
5			6		SILT (ML): Brown, very moist, loose, some fine grained sand			
				0.5	GWT @ 8.9 ft SILTY CLAY (CL): Brown, very moist, firm consistency, medium plasticity			
10			16	0.5	CLAYEY SILT (ML): Brown, saturated, medium dense, low plasticity.			Minus 200=97%
15			4	0.5	Loose		28.9%	
20								
25					Total Depth = 19.0 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/07/06	TOTAL DEPTH:	19.0 Feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

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LANDMARK Geo-Engineers and Geologists

PLATE B-19

LOG OF BORING NO. B-12

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 5.5-inches Sand = 1.5-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			22	1.5	CLAY/SILTY CLAY (CH-CL): Brown, very moist, stiff consistency, medium to high plasticity			
					Anticipated GWT @ 8.9 ft			
10			14	1.0		92.0	34.9	qu = 0.71 tsf c = 0.35
15			21		CLAYEY SILTY/SILT (ML): Brown, saturated, medium dense, with fine grained sand			Minus 200=86%
20			9	1.0	CLAY/SILTY CLAY (CH-CL): Brown, very moist, stiff consistency, medium to high plasticity			
25			6	1.0				
30					Total Depth = 26.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED: 10/07/06 TOTAL DEPTH: 26.5 feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-20

LOG OF BORING NO. B-13

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 4.5-inches Granular Base = 11-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			9	2.0	CLAY/SILTY CLAY (CH-CL): Brown, very moist, stiff to very stiff consistency, medium to high plasticity.			
					Anticipated GWT @ 8.9 ft			
10			14	1.0				
15								
20								
25								
					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/07/06	TOTAL DEPTH:	11.5 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
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PLATE B-21

LOG OF BORING NO. B-14

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 4-inches Granular Base = 9-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			25	2.5	CLAY/SILTY CLAY (CH-CL): Brown, very moist, stiff to very stiff consistency, medium to high plasticity.			
					Anticipated GWT @ 8.9 ft			
10			20	3.5				
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/07/06	TOTAL DEPTH:	11.5 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
Geo-Engineers and Geologists

PLATE B-22

LOG OF BORING NO. B-15

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 3.5-inches Granular Base = 5.5-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			11 22		SILT/SANDY SILT (ML): Brown, very moist, medium dense, with fine grained sand Anticipated GWT @ 8.9 ft	101.6	25.4	
10			9	2.0	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff consistency, medium to high plasticity			
15			21 7	1.5	CLAYEY SILT (ML): Brown, saturated, stiff to to very stiff, low plasticity		28.7%	
			18	1.0	SILTY CLAY (CL): Brown, very moist, stiff consistency, medium plasticity			
20			5	1.5	CLAY (CH): Brown, very moist, stiff consistency, high plasticity			
25					Total Depth = 21.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED: 10/07/06 TOTAL DEPTH: 21.5 feet DEPTH TO WATER: 8.9'

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-23

LOG OF BORING NO. B-16

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 4-inches Granular Base = 5-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			15	1.5	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff to very stiff consistency, medium to high plasticity.	102.7	24.0	qu = 0.92 tsf c = 0.46
					Anticipated GWT @ 8.9 ft			
10			27		SILTY SAND (SM): Brown,saturated, medium dense, fine grained sand			
15								
20								
25					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/07/06	TOTAL DEPTH:	11.5 Feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
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PLATE B-24

LOG OF BORING NO. B-17

SHEET 1 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 3.5-inches Granular Base = 5-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			65		SILTY SAND (SM): Brown, very moist, dense to very dense, fine grained sand Anticipated GWT @ 8.9 ft			
10			8	1.5	SILTY CLAY/CLAY (CL-CH): Brown, very moist, stiff to very stiff consistency, medium to high plasticity			
15			19	2.0				
			19		CLAYEY SILT/SANDY SILT (ML): Brown, saturated, medium dense, with fine grained sand and thin interbedded silty clay layers (CL)			MINUS 200=72.7%
20			11					
			14	3.0	SILTY CLAY (CL): Brown, very moist, stiff to very stiff consistency, medium plasticity, with thin interbedded silt/clayey silt layers (ML)			
25			8	2.0			29.2%	
			9		SANDY SILT (ML): Brown, saturated, loose, with fine grained sand and thin interbedded silty clay layers (CL) Total Depth = 41.5 feet Anticipated Groundwater 8.9 feet			
30								

DATE DRILLED: 10/07/06 TOTAL DEPTH: 41.5 feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-25a

LOG OF BORING NO. B-17

SHEET 2 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
			6		SANDY SILT (ML): Brown, saturated, loose, with fine grained sand and thin interbedded silty clay layers (CL)			
			7	2.0	SILTY CLAY (CL): Brown, very moist, stiff to very stiff consistency, medium plasticity			
35			9	2.5				
			7	2.5	Thin Interbedded clayey silt layers (ML)			
40			8	2.5				
45								
50								
55								
60					Total Depth = 41.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED:	10/07/06	TOTAL DEPTH:	41.5 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
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PLATE B-25b

LOG OF BORING NO. B-18

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 3.5-inches Granular Base = 4-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			14	1.0	Stiff to very consistency			
					Anticipated GWT @ 8.9 ft			
10			10	1.0				
15								
20								
25								
					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
30								

DATE DRILLED:	10/07/06	TOTAL DEPTH:	11.5 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
Geo-Engineers and Geologists

PLATE B-26

LOG OF BORING NO. B-19

SHEET 1 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					Asphalt = 3-inches Granular Base = 5.5-inches SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			12		SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand Anticipated GWT @ 8.9 ft			MINUS 200=16%
10			19		SILT/CLAYEY SILT (ML): Brown, saturated, medium dense, some fine grained sand	95.3	28.4	
15			9	1.0	SILTY CLAY (CL): Brown, very moist, stiff consistency, medium plasticity			
20			14		CLAYEY SILT (ML): Brown, saturated, soft, low plasticity	100.2	26.4	
25			11	1.5	SILTY CLAY (CL): Brown, very moist, stiff to very stiff consistency, medium plasticity, with thin interbedded silt/clayey silt layers (ML)			
30					Total Depth = 36.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED: 10/07/06 TOTAL DEPTH: 36.5 feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-27a

LOG OF BORING NO. B-19

SHEET 2 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
			17	2.0	SILTY CLAY (CL): Brown, very moist, stiff to very stiff consistency, medium plasticity, with thin interbedded silt/clayey silt layers (ML)		29.4%	
35			12	3.5	CLAY (CH): Gray Brown, very moist, very stiff consistency, high plasticity			
40								
45								
50								
55								
60					Total Depth = 36.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED:	10/07/06	TOTAL DEPTH:	36.5 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
Geo-Engineers and Geologists

PLATE B-27b

LOG OF BORING NO. B-20

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			13		SILTY SAND (SM): Brown, very moist, medium dense, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			12		Saturated			
15								
20								
25								
30					Total Depth = 11.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED:	10/06/06	TOTAL DEPTH:	11.5 feet	DEPTH TO WATER:	8.9'
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
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PLATE B-28

LOG OF BORING NO. B-21

SHEET 1 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
			6	0.5	SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity Firm consistency			LL=44% PI=29%
5			71		SILTY SAND/SAND (SM): Brown, saturated, very dense, fine grained sand Anticipated GWT @ 8.9 ft	105.9	22.2	
10			29		Medium dense			MINUS 200=6%
15			10		Loose to medium dense			
				4.0	CLAY (CH): Reddish Brown, very moist, very stiff, high plasticity			
20			20	1.5	SILTY CLAY (CL): Reddish brown, very moist, stiff to very stiff consistency, medium plasticity			
25			6		SILTY SAND (SM): Brown, saturated, loose, fine grained sand			MINUS 200=9%
30					Total Depth = 34 feet Anticipated Groundwater 8.9 feet			

DATE DRILLED: 10/06/06 TOTAL DEPTH: 34 feet DEPTH TO WATER: 8.9'.

LOGGED BY: J. Avalos TYPE OF BIT: CME 55 w/autohammer DIAMETER: 8-inch

SURFACE ELEVATION: HAMMER WT.: 140 lbs. DROP: 30 inches

PROJECT NO. LE06360

LANDMARK Geo-Engineers and Geologists

PLATE B-29a

LOG OF BORING NO. B-21

SHEET 2 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
			12		SILTY SAND (SM): Brown, saturated, medium dense, fine grained sand			
					CLAY (CH): Reddish brown, very moist, high plasticity			
35								
40								
45								
50								
55								
60					Total Depth = 34 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED:	10/06/06	TOTAL DEPTH:	34 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
Geo-Engineers and Geologists

PLATE B-29b

LOG OF BORING NO. B-22

SHEET 1 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SILTY CLAY/CLAY (CL): Brown, very moist, medium plasticity			
5			9	0.5	Firm consistency			
					SILTY SAND (SM): Brown, very moist, loose, fine grained sand			
					Anticipated GWT @ 8.9 ft			
10			66		Very dense, saturated			
15			87					
20			53		Dense			
25			17		Medium dense			MINUS 200=9.7%
30					Total Depth = 36.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			

DATE DRILLED:	10/06/06	TOTAL DEPTH:	36.5 feet	DEPTH TO WATER:	8.9'.
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

PROJECT NO. LE06360

LANDMARK
Geo-Engineers and Geologists

PLATE B-30a

LOG OF BORING NO. B-22

SHEET 2 OF 2

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
			45		SILTY SAND (SM): Brown, saturated, dense, fine grained sand			
35			5		Loose			
				0.5	SILTY CLAY/CLAY (CL-CH): Gray brown, very moist, firm consistency, medium to high plasticity			
40								
45								
50								
55								
					Total Depth = 36.5 feet Anticipated Groundwater 8.9 feet Backfilled with excavated soil			
60								

DATE DRILLED:	10/06/06	TOTAL DEPTH:	36.5 feet	DEPTH TO WATER:	8.9'
LOGGED BY:	J. Avalos	TYPE OF BIT:	CME 55 w/autohammer	DIAMETER:	8-inch
SURFACE ELEVATION:		HAMMER WT.:	140 lbs.	DROP:	30 inches

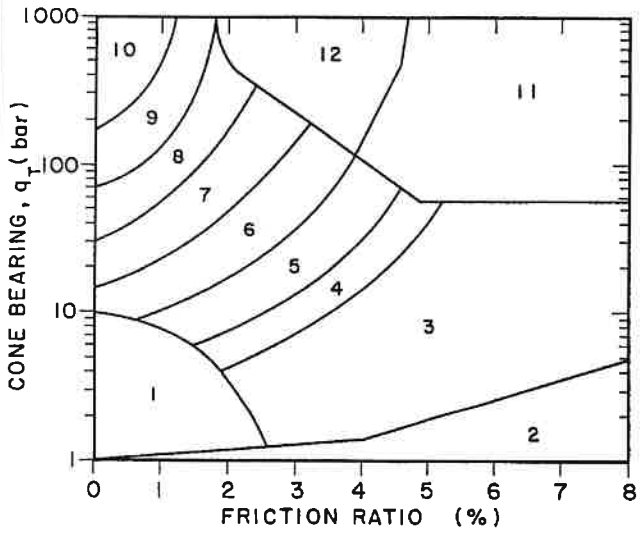
PROJECT NO. LE06360

LANDMARK
Geo-Engineers and Geologists

PLATE B-30b

Simplified Soil Classification Chart

After Robertson & Campanella (1989)



Geotechnical Parameters from CPT Data:

Equivalent SPT N(60) blow count = Qc/(Qc/N Ratio)

N1(60) = Cn*N(60) Normalized SPT blow count

Cn = 1/(p'o)^0.5 < 1.6 max. from Liao & Whitman (1986)

p'o = effective overburden pressure (tsf) using unit densities given below and estimated groundwater table.

Dr = Relative density (%) from Jamiolkowski et. al. (1986) relationship

= -98 +68*log(Qc/p'o^0.5) where Qc, p'o in tonne/sqm

Note: 1 tonne/sqm = 0.1024 tsf, 1 bar =1.0443 tsf

Phi = Friction Angle estimated from either:

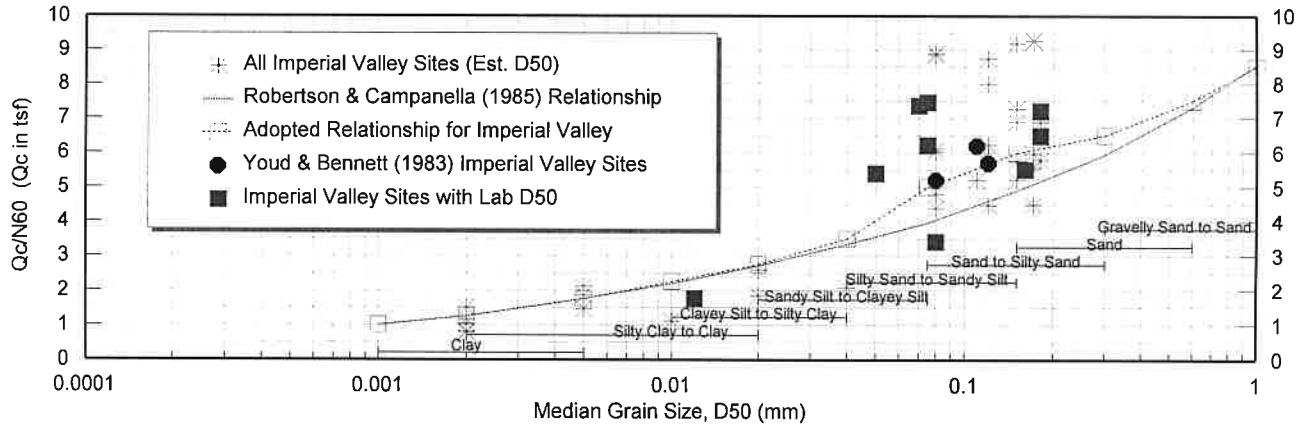
1. Roberton & Campanella (1983) chart:
   Phi = 5.3 + 24*(log(Qc/p'o))+3(log(Qc/p'o))^2
2. Peck, Hansen & Thornburn (1974) N-Phi Correlation
3. Schmertman (1978) chart [Phi = 28+0.14*Dr for fine uniform sands]

Su = undrained shear strength (tsf)

= (Qc-p'o)/Nk where Nk varies from 10 to 22, 17 for OC clays

OCR = Overconsolidation Ratio estimated from Schmertman (1978) chart using Su/p'o ratio and estimated normal consolidated Su/p'o

Variation of Qc/N Ratio with Grain Size



Note: Assumed Properties and Adopted Qc/N Ratio based on correlations from Imperial Valley, California soils

Table of Soil Types and Assumed Properties

Zone	Soil Classification	UCS	Density (pcf)	R&C Qc/N	Adopted Qc/N	Est. PI	Fines (%)	D50 (mm)	Su (tsf)	Consistency
1	Sensitive fine grained	ML	120	2	2	NP-15	65-100	0.020	0-0.13	very soft
2	Organic Material	OL/OH	120	1	1	--	--	--	0.13-.25	soft
3	Clay	CL/CH	125	1	1.25	25-40+	90-100	0.002	0.25-0.5	firm
4	Silty Clay to Clay	CL	125	1.5	2	15-40	90-100	0.010	0.5-1.0	stiff
5	Clayey Silt to Silty Clay	ML/CL	120	2	2.75	5-25	90-100	0.020	1.0-2.0	very stiff
6	Sandy Silt to Clayey Silt	ML	115	2.5	3.5	NP-10	65-100	0.040	>2.0	hard
7	Silty Sand to Sandy Silt	SM/ML	115	3	5	NP	35-75	0.075	Dr (%)	Relative Density
8	Sand to Silty Sand	SP/SM	115	4	6	NP	5-35	0.150	0-15	very loose
9	Sand	SP	110	5	6.5	NP	0-5	0.300	15-35	loose
10	Gravelly Sand to Sand	SW	115	6	7.5	NP	0-5	0.600	35-65	medium dense
11	Overconsolidated Soil	--	120	1	1	NP	90-100	0.010	65-85	dense
12	Sand to Clayey Sand	SP/SC	115	2	2	NP-5	--	---	>85	very dense

LANDMARK
Geo-Engineers and Geologists

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Key to CPT Interpretation of Logs

Plate B-31

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS		SECONDARY DIVISIONS
Coarse grained soils More than half of material is larger than No. 200 sieve	**Gravels** More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (less than 5% fines)		**GW**	Well graded gravels, gravel-sand mixtures, little or no fines
				GP	Poorly graded gravels, or gravel-sand mixtures, little or no fines
		Gravel with fines		**GM**	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
				GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	Sands More than half of coarse fraction is smaller than No. 4 sieve	Clean sands (less than 5% fines)		**SW**	Well graded sands, gravelly sands, little or no fines
				SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines		**SM**	Silty sands, sand-silt mixtures, non-plastic fines
				SC	Clayey sands, sand-clay mixtures, plastic fines
Fine grained soils More than half of material is smaller than No. 200 sieve	**Silts and clays** Liquid limit is less than 50%			**ML**	Inorganic silts, clayey silts with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravely, sandy, or lean clays
				OL	Organic silts and organic clays of low plasticity
	Silts and clays Liquid limit is more than 50%			**MH**	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils				**PT**	Peat and other highly organic soils

GRAIN SIZES

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

200 4 10 4 3/4" 3" 12"

US Standard Series Sieve — Clear Square Openings

Sands, Gravels, etc.	Blows/ft. *
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Clays & Plastic Silts	Strength **	Blows/ft. *
Very Soft	0-0.25	0-2
Soft	0.25-0.5	2-4
Firm	0.5-1.0	4-8
Stiff	1.0-2.0	8-16
Very Stiff	2.0-4.0	16-32
Hard	Over 4.0	Over 32

* Number of blows of 140 lb. hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 in. I.D.) split spoon (ASTM D1586).

** Unconfined compressive strength in tons/s.f. as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D1586), Pocket Penetrometer, Torvane, or visual observation.

Type of Samples:

Ring Sample — Standard Penetration Test — Shelby Tube — Bulk (Bag) Sample

Drilling Notes:

1. Sampling and Blow Counts
   Ring Sampler - Number of blows per foot of a 140 lb. hammer falling 30 inches.
   Standard Penetration Test - Number of blows per foot.
   Shelby Tube - Three (3) inch nominal diameter tube hydraulically pushed.
2. P. P. = Pocket Penetrometer (tons/s.f.).
3. NR = No recovery.
4. GWT ▽ = Ground Water Table observed @ specified time.

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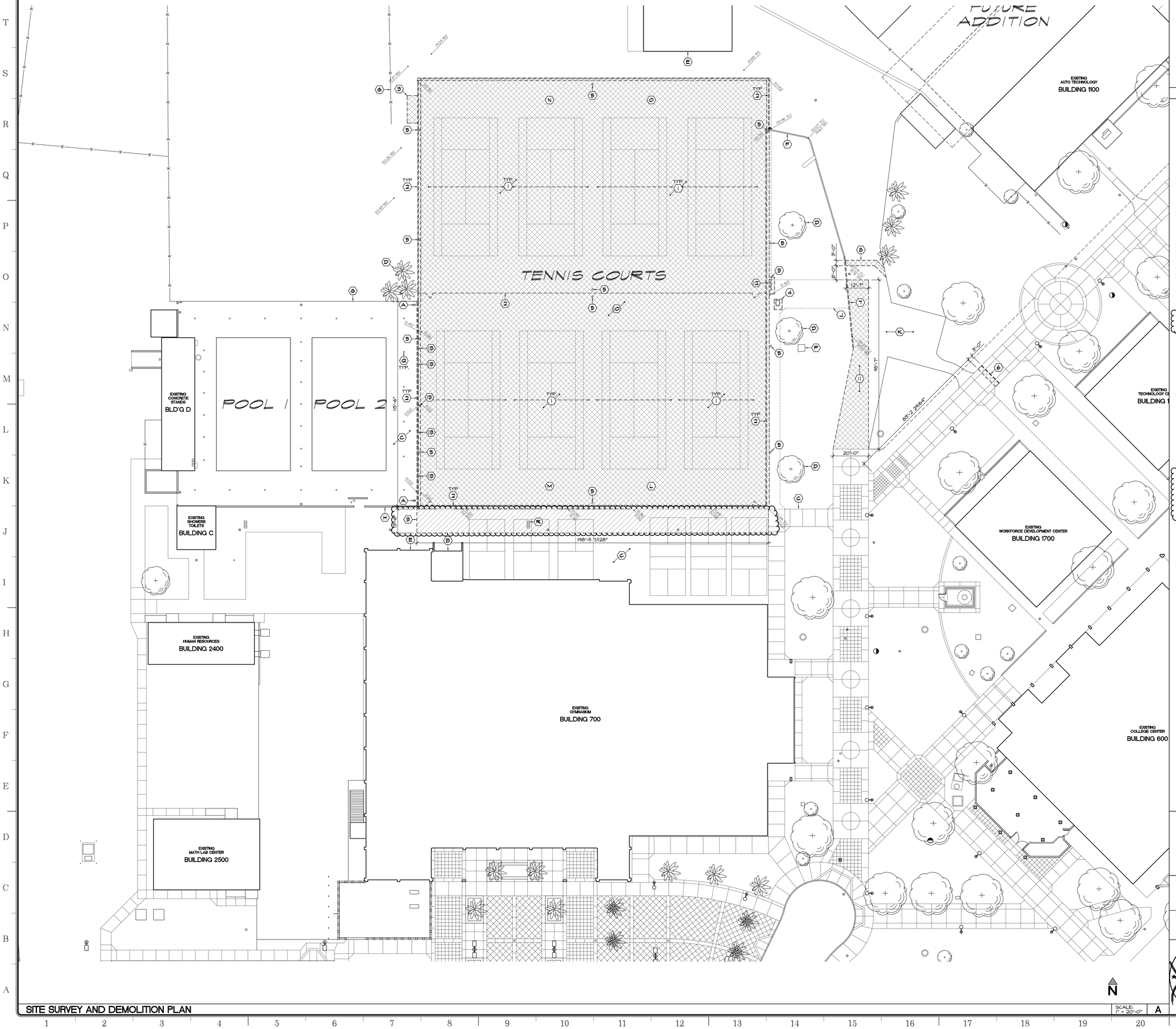
Project No: LE06360

Key to Logs

Plate B-32



APPROVALS

KEYNOTES:

- (A) EXISTING LIGHTING POLE - PROTECT
- (B) EXISTING STRUCTURE - PROTECT
- (C) EXISTING SITE CONCRETE - PROTECT
- (D) EXISTING TREE / SHRUB - PROTECT
- (E) EXISTING BUILDING - PROTECT
- (F) EXISTING CONCRETE CURB - PROTECT
- (G) EXISTING CHAINLINK FENCE - PROTECT
- (H) EXISTING CMU WALL - PROTECT
- (J) PROPOSED TENNIS COURTS AND CONCRETE WALK
- (K) EXISTING ASPHALT PAVING - PROTECT
- (L) CORE SAMPLE #1 = 8" AC OVER 2" BASE
- (M) CORE SAMPLE #2 = 7" AC OVER 0" BASE
- (N) CORE SAMPLE #3 = 7" AC OVER 6" BASE
- (O) CORE SAMPLE #4 = 6" AC OVER 6" BASE
- (P) EXISTING STORM DRAIN GRATE TO REMAIN - PROTECT
- (Q) EXISTING FLOOR DRAIN TO REMAIN - PROTECT
- (R) EXISTING UTILITY VAULT TO REMAIN - PROTECT

DEMOLITION KEYNOTES:

- (1) REMOVE EXISTING TENNIS COURT EQUIPMENT, LIGHT POSTS, ASPHALT HARDSCAPE AND BASE TO ACCOMMODATE NEW CONCRETE SURFACE AS PER PLANS
- (2) REMOVE EXISTING CHAINLINK FENCE, GATES AND FOOTINGS
- (3) REMOVE EXISTING CONCRETE HARDSCAPE
- (4) REMOVE EXISTING ELECTRICAL EQUIPMENT PROVIDE NEW SWITCHBOARD SEE ELECTRICAL SHEETS
- (5) REMOVE EXISTING LIGHT POLE AND CONCRETE BASE
- (6) SAWCUT EXISTING CONCRETE, TO RUN NEW UTILITIES - SEE UTILITY PLAN
- (7) REMOVE PORTION OF EXISTING CONCRETE CURB
- (8) REMOVE PORTION OF ASPHALT PAVING TO RUN NEW UTILITIES - SEE UTILITY PLAN
- (9) NOT USED
- (10) REMOVE EXISTING BASE BELOW AC PAVING. STOCKPILE ON SITE AND REUSE
- (11) REMOVE EXISTING ASPHALT TO RECEIVE NEW WORK
- (12) REMOVE EXISTING ELECTRICAL EQUIPMENT
- (13) REMOVE EXISTING GFCI OUTLETS

LEGEND:

- REMOVE EXISTING ASPHALT AS REQUIRED
- REMOVE AND REPLACE EXISTING CONCRETE HARDSCAPE - SEE HARDSCAPE PLAN

LEGEND:

- BENCH MARK:
- (88.40) / 88.50 EXISTING — EXISTING NATURAL SOIL ELEVATION (UNO)
- 88.50 EXISTING — EXISTING ELEVATION (SITE CONCRETE UNO)
- FIRE HYDRANT
- ø POWER POLE
- NS NATURAL SOIL
- TC TOP OF CURB
- FL FLOW LINE
- AC ASPHALT PAVING

NOTES:

1. DEMOLITION KEYNOTES ARE NOT INTENDED TO SHOW ALL DEMOLITION REQUIRED FOR PROPOSED IMPROVEMENTS. CONTRACTOR IS RESPONSIBLE TO REMOVE ALL EXISTING IMPROVEMENTS/CONDITIONS REQUIRED TO COMPLETE WORK FOR PROPOSED IMPROVEMENTS.
2. CONTRACTOR SHALL ENCOUNTER EXISTING IRRIGATION LINES DURING DEMOLITION. CONTRACTOR SHALL CAP LINE, AWAY FROM PROPOSED IMPROVEMENTS, AND NOTIFY ARCHITECT/SCHOOL DISTRICT. TYP.

Sanders, INC.
Architecture/Engineering
1102 INDUSTRY WAY, SUITE A
EL CENTRO, CA 92243
760 353 5440 FAX 760 353 5442

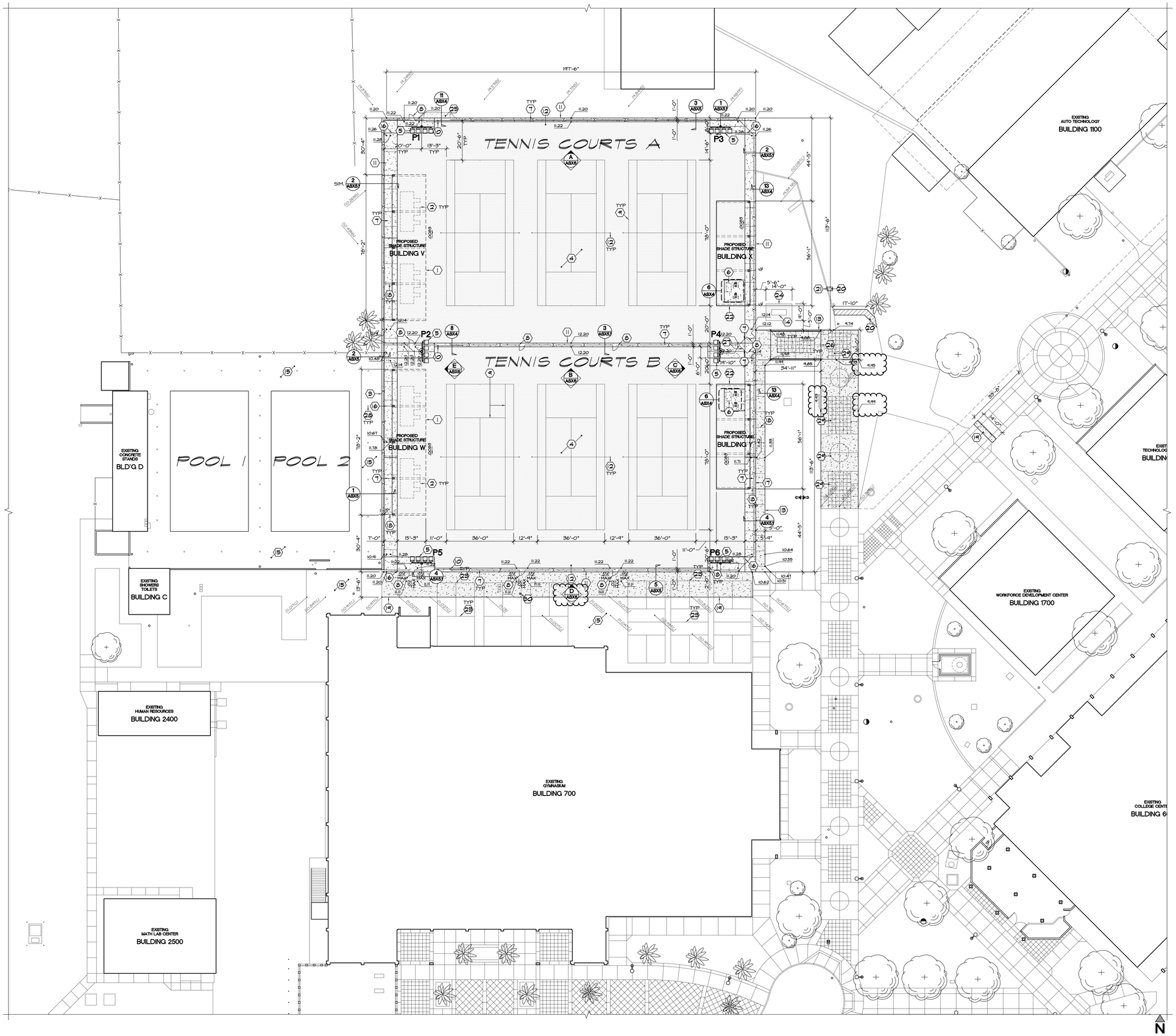
Project Title
IMPERIAL VALLEY COLLEGE
TENNIS COURT RENOVATION - SHADES AND NEW LIGHTING

Sheet Title
SITE SURVEY AND DEMOLITION PLAN

LICENSED ARCHITECT JIMMIE L. SANDERS No. C-17644 RENEWAL DATE 7-31-23 STATE OF CALIFORNIA

Document Date	Project Number
06-29-22	22-08IV
Date Last Revised	Reference Sheet
11-18-22	AS3
	Sheet Number
	AD-02_AS3

SITE SURVEY AND DEMOLITION PLAN — SCALE: 1" = 20'-0" — A



APPROVALS

KEYNOTES:

1. PROVIDE NEW 18'x18' SHADE STRUCTURE (A/A10.4) FURNISHED BY PARKED PLANET
2. PROVIDE NEW 5 TIER MOVABLE BLEACHERS (A/A12) FURNISHED BY OWNER
3. PROVIDE NEW 6" CONCRETE CURB (7/AS.X2)
4. PROVIDE NEW TENNIS COURTS POST TENSION SLAB - SEE STRUCTURAL DRAWINGS
5. INSTALL NEW SPORTS FIELD LIGHTING - SEE MONOPOLE DRAWINGS FURNISHED BY MUSCO
6. PROVIDE NEW WATER STATION w/ CHILLER (7/AS.X4)
7. PROVIDE NEW CHAIN LINK FENCE AND SCREEN, TYPICAL (5/AS.X4)
8. PROVIDE 3'-0" CHAIN LINK SWING GATE (5/AS.X4)
9. PROVIDE NEW TENNIS COURT STRIPPING (1/AS.X4)
10. PROVIDE 14'-0" CHAIN LINK ROLLING GATE (5/AS.X4)
11. PROVIDE NEW CONCRETE CURB (4/AS.X4)
12. PROVIDE NEW TENNIS POST AND FOOTING (3/AS.X4)
13. 6" THICK CONCRETE WALK (1/AS.X2)
14. NEW PANEL "T" AND MUSCO CONTROL PANEL - SEE ELECTRICAL DRAWINGS
15. EXISTING CONCRETE HARDSCAPE - PROTECT
16. EXPANSION JOINT (5/AS.X2)
17. CONSTRUCTION JOINT (6/AS.X2)
18. CONTROL JOINT (7/AS.X2)
19. NEW TO EXISTING CONCRETE - MATCH EXISTING ELEVATION (8/AS.X2)
20. NEW ASPHALT PAVING TO EXISTING PAVING - MATCH EXISTING ELEVATION (3/AS.X2)
21. NEW CONCRETE CURB (9/AS.X2)
22. PROVIDE NEW 18'x56' SHADE STRUCTURE (A/A11) FURNISHED BY PARKED PLANET
23. RESTRIPE EXISTING COURTS
24. PROVIDE NEW CONCRETE PAD FOR NEW SWITCHGEAR (A/AS.X2)
25. PROVIDE NEW HARDSCAPE
26. ACCESSIBLE RAMP (A/AS.X7)
27. ASSITIVE LISTENING SYSTEM SIGNAGE (C/A12)
28. EXISTING FLOOR DRAIN TO REMAIN - PROTECT
29. 6" THICK COLORED CONCRETE WALK (1/AS.X2)
30. EXISTING CLEAN OUT TO REMAIN - PROTECT

LEGEND:

- 436.55 — BENCH MARK: TOP OF FIRE HYDRANT ADJACENT TO NORTHEAST CORNER OF LIBRARY MEDIA CENTER BLD'G 1500
- 933.4 — EXISTING ELEVATION FROM AERIAL SURVEY
- 935.50 (EXISTING) — EXISTING ELEVATION (SITE CONCRETE U.N.O.)
- 38.80 — PROPOSED ELEVATION (SITE CONCRETE U.N.O.)
- .02 — DIRECTION OF SLOPE W/ SLOPE NOTED
- (R) — RADIUS - NOTED IN DECIMAL FEET
- GB — GRADE BREAK
- SD — STORM DRAIN
- FIRE HYDRANT
- IRRIGATION HYDRANT
- POWER POLE
- LIGHT STANDARDS - SEE ELECTRICAL DRAWINGS
- MANHOLE
- STORM DRAIN CATCH BASIN
- EXISTING CHAIN LINK FENCE
- TC — TOP OF CONCRETE
- TOC — TOP OF CURB
- TB — TOP OF BENCH
- TP — TOP OF PLANTER
- PB — POLE BASE
- D — DRAIN

NOTES:

1. ALL DIMENSIONS ARE TO FACE OF CURB AND FACE OF STUD/CMU (U.N.O.).
2. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY DRAINAGE OF SITE. CONTRACTOR SHALL NOTIFY ARCHITECT, PRIOR TO CONSTRUCTION, ANY SITE CONCRETE WHICH WILL NOT PROPERLY DRAIN.
3. ALL CONTROL JOINTS TO BE SAW CUT.
4. ALL NATIVE SOIL REMOVED FOR CONSTRUCTION HARDSCAPE SHALL REMAIN ON SITE. CONTRACTOR SHALL USE NATIVE SOIL FOR FINISH GRADING.
5. MAXIMUM CROSS SLOPE AT ALL ACCESSIBLE PATHS OF TRAVEL IS 2%.
6. PROVIDE 1'-0" MIN. TOP SOIL AT ALL PLANTING AREAS.
7. PROVIDE TOP SOIL SLOPED AWAY FROM SITE CONCRETE AT 4:1 MAX. SLOPE, TYP. FOR ENTIRE PROJECT
8. ALL PROPOSED GRADES +100.1 HUNDREDS POSITION NOT SHOWN FOR CLARITY.

Sanders, INC.
Architecture/Engineering
1102 INDUSTRY WAY, SUITE A
EL CENTRO, CA 92243
760 353 5440 FAX 760 353 5442

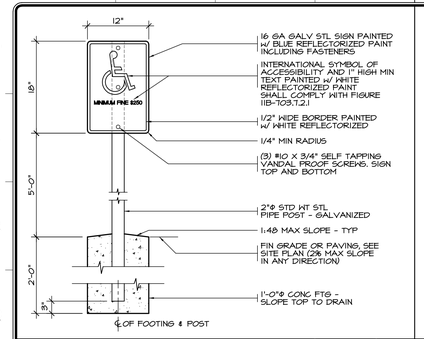
Project Title
IMPERIAL VALLEY COLLEGE
TENNIS COURT RENOVATION - SHADES AND NEW LIGHTING

Sheet Title
HARDSCAPE PLAN

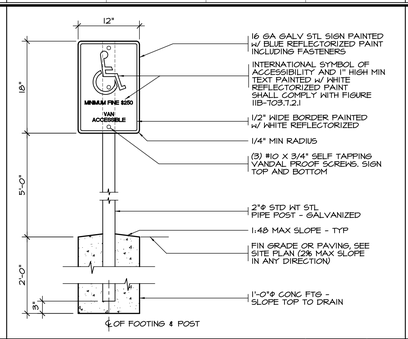
LICENSED ARCHITECT JIMMIE D. SANDERS No. 7644 RENEWAL 08/31/23 STATE OF CALIFORNIA

Document Date	Project Number
06-29-22	22-08IV
Date Last Revised	Reference Sheet
11-18-22	AS5
	Sheet Number
	AD-02_AS5

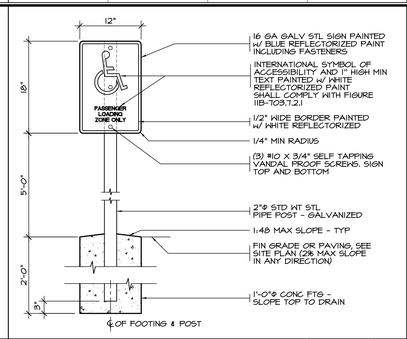
HARDSCAPE PLAN — SCALE: 1" = 20'-0" — A



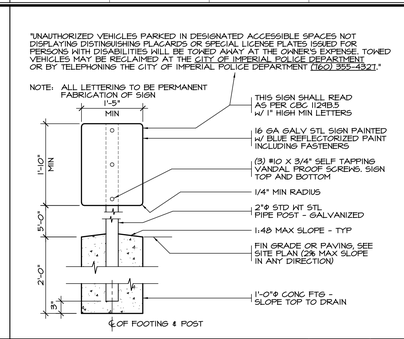
STANDARD PARKING SIGN | SCALE: | 1



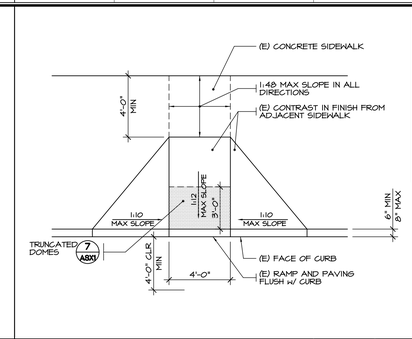
VAN PARKING SIGN | SCALE: 1" = 1'-0" | 2



ACCESSIBLE LOADING ZONE | SCALE: 1" = 1'-0" | 3



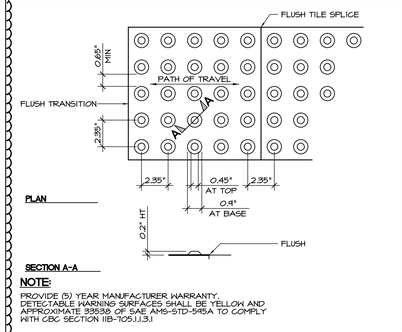
TOW AWAY SIGN | SCALE: 1" = 1'-0" | 4



ACCESSIBLE CURB RAMP | SCALE: 1/4" = 1'-0" | 5

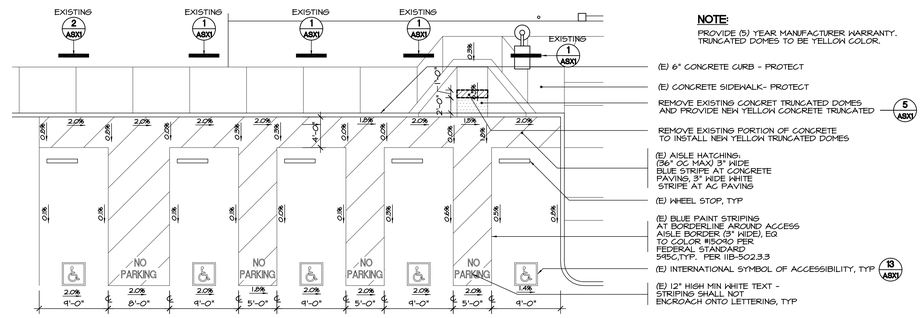
APPROVALS

NOT USED | 6



NOTE:
PROVIDE (5) YEAR MANUFACTURER WARRANTY. DETECTABLE WARNING SURFACES SHALL BE YELLOW AND APPROXIMATE 33538 OF SAE AMS-STD-595A TO COMPLY WITH CBC SECTION 11B-705.1.1.3.1

TRUNCATED DOMES | SCALE: 1/4" = 1'-0" | 7



NOTE:
PROVIDE (5) YEAR MANUFACTURER WARRANTY. TRUNCATED DOMES TO BE YELLOW COLOR.

EXISTING ACCESSIBLE PARKING DETAIL | SCALE: 1/8" = 1'-0" | 8

EXISTING ACCESSIBLE PARKING DETAIL | SCALE: 1/8" = 1'-0" | 11

EXISTING ACCESSIBLE PARKING DETAIL | SCALE: 1/8" = 1'-0" | 9

EXISTING ACCESSIBLE PARKING DETAIL | SCALE: 1/8" = 1'-0" | 10

EXISTING ACCESSIBLE PARKING DETAIL | SCALE: 1/8" = 1'-0" | 12

NOTES:
1) ALL STROKES TO BE 2" WIDE.
2) PROVIDE TWO (2) COATS OF TRAFFIC-PAINT BLUE.
3) LOCATE SYMBOL AT CENTER OF STALL AS SHOWN ON DETAIL.
4) INTERNATIONAL SYMBOL OF ACCESSIBILITY PER CBC FIGURE 11B-703.7.2.1

INTL SYMBOL OF ACCESSIBILITY | SCALE: 3/4" = 1'-0" | 13

Sanders, INC.
Architecture/Engineering
1102 INDUSTRY WAY, SUITE A
EL CENTRO, CA 92243
760 353 5440 FAX 760 353 5442

Project Title
IMPERIAL VALLEY COLLEGE
TENNIS COURT RENOVATION - SHADES AND NEW LIGHTING

Sheet Title
SITE ACCESIBILITY DETAILS

LICENSED ARCHITECT JIMMIE D. SANDERS No. 17644 RENEWAL 08/31/23 STATE OF CALIFORNIA

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Date Last Revised: 11-18-22	Reference Sheet: ASX1
	Sheet Number: AD-02_ASX1

APPROVALS

LIGHT FIXTURE SCHEDULE

FIXTURE		MANUFACTURER	CATALOG NUMBER	WATTS	VOLTS	MTG	LAMP TYPE	BUG	REMARKS
TYPE	SYMBOL								
A	▭	KIM LIGHTING	PVNT-2-40-40KV-NDM-UNV-D-PSS	40	120	CS	40W LED	-	

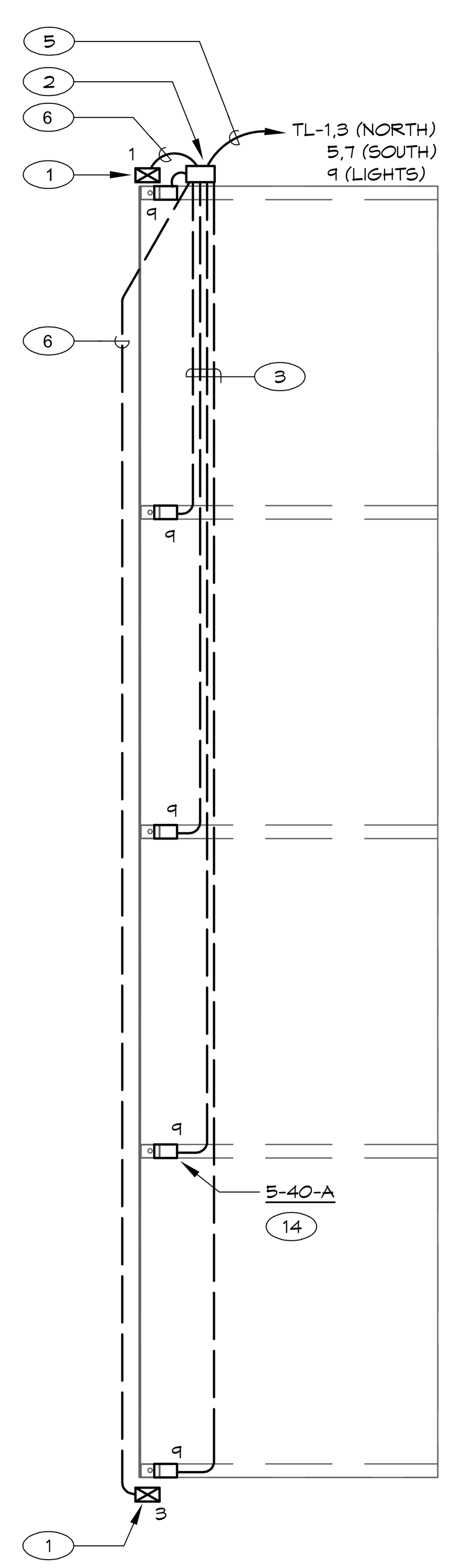
MOUNTING TYPES:

WS-WALL SURFACE, WR-WALL RECESSED, CS-CEILING SURFACE, CR-CEILING RECESSED, CH-CHAIN, PN-PENDANT, U-UNIVERSAL, G-GROUND, P-POLE, UC-UNDER CABINET, T-TRACK, CB-CABLE, TR-TRELLIS, C-COVE

FIXTURE TYPE "A"

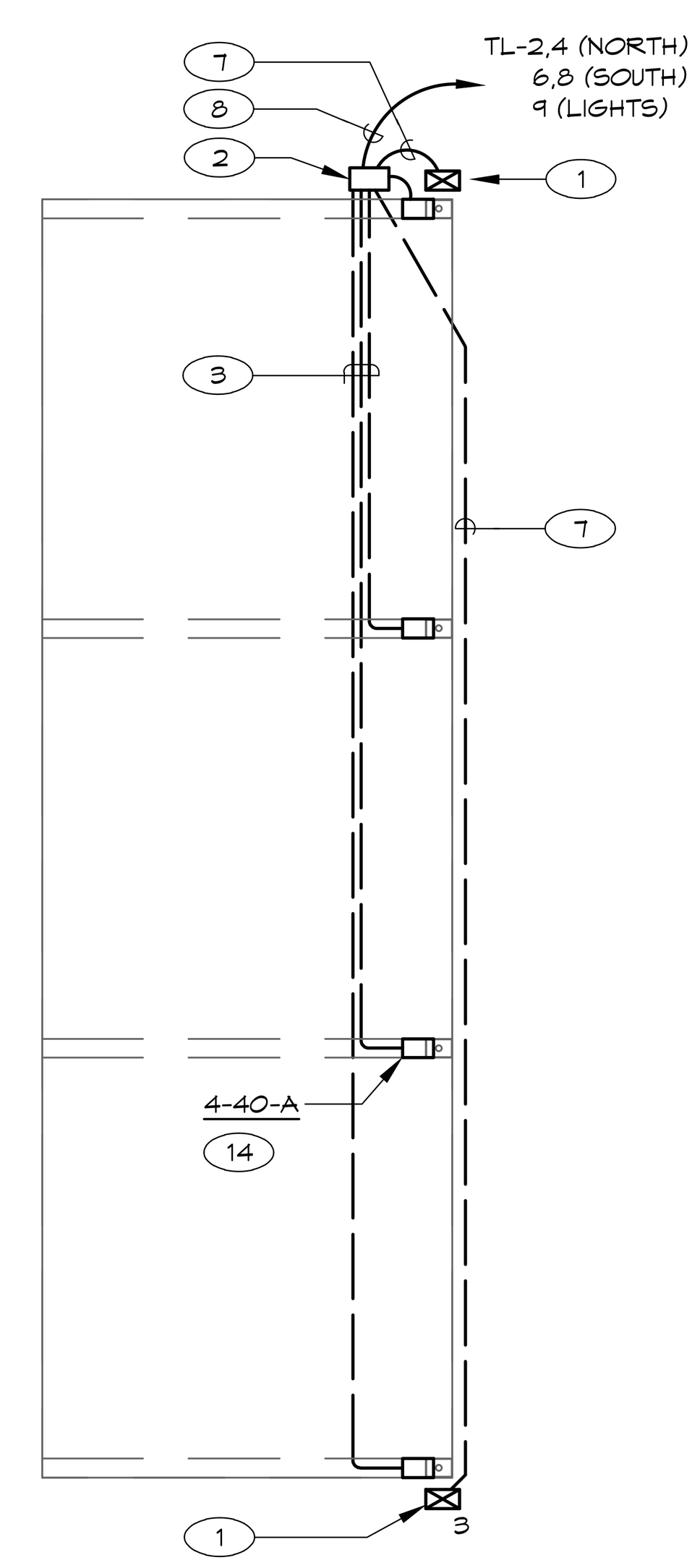
NOTES

1. RECEPTACLE BOX, COLD #TL210-WCS-PEN-GFCI
2. 12" x 18" x 12" DEEP CONCRETE PULLBOX, NORTH SIDE FOR BUILDING10, SOUTH SIDE FOR BULIDNG 6
3. 3/4" PVC. C., 2#12 CU, 1#12 CU GND, FEED UP COLUMN AND INTO END OF FIXTURE
4. MOUNT FIXTURES AT TOP OF HORIZONTAL FRAMING MEMBER
5. 1 1/2" PVC. C., #36 CU, 1#10 CU GND (RECEPTACLES), 2#12 CU, 1#12 CU GND (LIGHTS)
6. 3/4" PVC. C., 2#120 CU, 1#12 CU GND
7. 3/4" PVC. C., 2#12 CU, 1#12 CU GND
8. 1" PVC. C., 5#12 CU, 1#12 CU GND



ELECTRICAL FLOOR PLAN - 18' x 78' SHADE

SCALE: 1/8" = 1'-0"



ELECTRICAL FLOOR PLAN - 18' x 58' SHADE

SCALE: 1/8" = 1'-0"

KRUSE & ASSOCIATES
LIGHTING AND ELECTRICAL DESIGN
12255 PARKWAY CENTRE DR. P. 858.676.9776
POWAY, CA. 92064 WWW.KRUSEASSOC.NET

Sanders, INC.
Architecture/Engineering
1102 INDUSTRY WAY, SUITE A
EL CENTRO, CA 92243
760 353 5440 FAX 760 353 5442

Project Title
IMPERIAL VALLEY COLLEGE
TENNIS COURT SHADE AND LIGHTING

Sheet Title
ELECTRICAL SHADE STRUCTURE PLAN

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