Appendix C

Geotechnical Evaluation

PELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED SANTEE HOTEL SITE
TOWN CENTER PARKWAY A.P.N. 381-052-04
SANTEE, CALIFORNIA

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TABLE OF CONTENTS

1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

In accordance with your request and CTE proposal number 4820.0722.00013 dated July 21, 2022, CTE, Inc. has performed a preliminary geotechnical investigation for the proposed hotel located at the subject site. The investigation was limited to the area of the proposed hotel and associated improvements. This report presents the field and laboratory data collected, and provides preliminary conclusions and recommendations, from a geotechnical standpoint, pertinent to the proposed project.

Based on our geotechnical analysis of the data and information obtained, the project is considered to be feasible from a geotechnical standpoint, provided the recommendations herein are incorporated into the project design and construction.

1.2 Scope of Services

The scope of services provided included:

- Review of readily available geologic and geotechnical literature pertaining to the site vicinity.
- Coordination of utility mark-outs and utility location.
- Obtaining required permits from San Diego Department of Environmental Health (DEH).
- Excavation of three exploratory borings using a truck-mounted drill rig.
- Advancement of six explorations utilizing a truck-mounted 30-ton Cone Penetration Test (CPT) rig.
- Laboratory testing on selected samples of the encountered materials.
- Geotechnical engineering analysis of the collected data.
- Evaluation of potential geologic hazards within the proposed development area.
- Preparation of this geotechnical report.

2.0 PROJECT AND SITE DESCRIPTION

The subject site is located at Town Center Parkway, A.P.N. 381-052-04 in Santee, California (Figure 1). CTE understands that the proposed Santee Hotel will consist of a four-story structure with a pool, outdoor amenity area, and surface parking.

The area proposed to receive the new hotel consists of an existing parking lot, with an approximate surface elevation range of 340 feet above mean sea level (msl) in the west and 348 feet above (msl) in the east. Approximate elevation information for the development area was obtained from Google Earth satellite imagery (2022). The current site conditions and approximate location of the proposed hotel are displayed in Figure 2.

3.0 FIELD INVESTIGATION AND LABORATORY TESTING

3.1 Field Investigation

CTE performed a preliminary geotechnical investigation at the site on August 15, 2022, consisting of a site reconnaissance and a subsurface exploration program to evaluate current geotechnical conditions within the proposed hotel development area. The subsurface exploration consisted of the excavation of three exploratory borings and advancement of six CPTs to a maximum explored depth of approximately 48.5 feet below existing ground surface (bgs). The borings were excavated with a CME-75 truck-mounted drill rig equipped with eight-inch-diameter, hollow-stem augers. The CPTs were advanced using a truck-mounted 30-ton Cone Penetration Testing (CPT) rig.

The soils were logged in the field by a CTE Geologist and were visually classified in general accordance with the Unified Soil Classification System (USCS). The field descriptions have been modified, where appropriate, to reflect laboratory test results. Bulk samples were collected from the drilled cuttings, and relatively undisturbed samples were collected by driving Standard Penetration Test (SPT) and Modified California (CAL) samplers.

Boring and CPT logs, including descriptions of the soils encountered, are included in Appendix B. The approximate locations of the explorations are presented on Figure 2.

3.2 Laboratory Testing

Laboratory testing was performed on select samples of the materials obtained from the exploratory borings to aid in the material classifications and to evaluate geotechnical engineering properties of the materials encountered. The following tests were performed:

- Particle-Size Distribution Analysis (ASTM D6913)
- R-Value (ASTM D2844)
- Expansion Index (ASTM D4829)
- Laboratory Compaction Characteristics (ASTM D1557)
- Atterberg Limits (ASTM D4318)
- Corrosivity test series, including sulfate content, chloride content, pH-value, and resistivity (CTM 417, 422, and 532/643)

Testing was performed in general accordance with applicable ASTM standards and California Test Methods (CTM). A summary of the laboratory testing program and the laboratory test results are presented in Appendix C.

4.0 GEOLOGIC AND SOIL INFORMATION

4.1 Regional Geologic Setting

The site is located in the Santee area of San Diego County and is within the Peninsular Ranges physiographic province of California that is characterized by northwest-trending mountain ranges, intervening valleys, and predominantly northwest trending active regional faults. The greater San Diego Region can be further subdivided into the coastal plain area, a central mountain–valley area, and the eastern mountain valley area. The project site is located in the central mountain-valley area, which makes up the Peninsular Range Batholith (PRB), consisting predominately of Cretaceous igneous rocks. The PRB contains remnant blocks of pre-Cretaceous metamorphic rocks and is locally covered with post-Cretaceous volcanic rocks, and marine and non-marine sediments. Throughout the batholith, colluvium and alluvium locally occur on the mountainsides and in the valleys.

4.2 Site-Specific Geologic and Soil Conditions

Reference to the published regional geologic map, *Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, Southern California, Todd, 2004*, indicates that the site is underlain by Quaternary Alluvium and Colluvium, undivided (Map Symbol: Qu). Based on the recent explorations, Previously Placed Fill was observed overlying the Quaternary Alluvium and Colluvium to a maximum depth of approximately six feet in boring, B-1. Cretaceous Granitoid Rocks (Map Symbol: Kgr) were encountered as the underlying bedrock unit beneath the Quaternary Alluvium and Colluvium to the maximum depth of exploration (approximately 48.5 feet bgs).

The site geologic units encountered during the investigation and general stratigraphic sequence are depicted on Figure 2. Detailed descriptions and information concerning the geologic units encountered are provided in the following paragraphs and on the exploration logs in Appendix B.

4.2.1 Quaternary Previously Placed Fill (Qppf)

Previously placed fill was observed at all exploratory boring locations at the surface and was found to be extend to depths of approximately four to six feet. As observed in the exploratory borings, the fill soils generally consist of loose to medium dense, brown clayey fine to medium grained sand (SC) to medium stiff, sandy clay (CL).

4.2.2 Quaternary Alluvium and Colluvium, Undivided (Qu)

Undifferentiated Alluvium and Colluvium native materials were encountered at all exploratory boring locations underlying the previously placed fill materials at depths ranging from approximately four to six feet bgs. As observed in the exploratory borings, these materials generally consist of medium dense, brown silty fine-grained sand (SM) to very stiff, red-brown sandy clay (CL).

4.2.3 Cretaceous Granitoid Rocks (Kgr)

Very dense granitic bedrock was encountered at all exploratory boring locations at depths ranging from approximately 28 to 33 feet below the existing ground surface and extended to the maximum depth of borings. As observed in the exploratory borings, these materials generally consist of moderately to highly weathered granitic rock that excavates to very dense, gray to yellow-brown, silty fine to coarse grained sand (SM) with clay-infilled joints.

4.3 Site Groundwater Conditions

Groundwater was encountered in all three hollow stem auger borings at a minimum depth of approximately 28 feet below ground surface (bgs). While groundwater conditions may vary due to precipitation or irrigation, it is generally not anticipated to affect shallow construction activities, if proper site drainage is designed, constructed, and maintained in accordance with the recommendations of the project civil engineer. Although not observed in the borings, localized seepage and seasonal groundwater could be encountered during grading and construction excavations.

4.4 Geologic Hazards

Geologic hazards that were considered to have potential impacts to site development were evaluated based on field observations, literature review, and laboratory test results. The following paragraphs discuss the geologic hazards considered and their potential risk to the site development.

4.4.1 Surface Fault Rupture

In accordance with the Alquist-Priolo Earthquake Fault Zoning Act, (ACT), the State of California established Earthquake Fault Zones around known active faults. The purpose of the ACT is to regulate the development of structures intended for human occupancy near active fault traces in order to mitigate hazards associated with surface fault rupture. According to the California Geological Survey (Special Publication 42, Revised 2018), a fault that has had surface displacement within the last 11,700 years is defined as a Holocene-active fault and is either already zoned or is pending zonation in accordance with the ACT. There are several other definitions of fault activity that are used to regulate dams, power plants, and other critical facilities, and some agencies designate faults that are documented as older than Holocene (last 11,700 years) and younger than late Quaternary (1.6 million years) as potentially active faults that are subject to local jurisdictional regulations.

Based on the site reconnaissance and review of referenced literature, the site is not located within a State-designated Earthquake Fault Zone, no known active fault traces underlie or project toward the site, and no known potentially active fault traces underlie or project toward the site. Therefore, the potential for ground surface rupture occurring at the site is considered to be low.

4.4.2 Local and Regional Faulting

The United States Geological Survey (USGS), with support of State Geological Surveys, and reviewed published work by various researchers, have developed a Quaternary Fault and Fold Database of faults and associated folds that are believed to be sources of earthquakes with magnitudes greater than 6.0 that have occurred during the Quaternary (the past 1.6 million years). The faults and folds within the database have been categorized into four Classes (Class A-D) based on the level of evidence confirming that a Quaternary fault is of tectonic origin and whether the structure is exposed for mapping or inferred from fault related deformational features. Class A faults have been mapped and categorized based on age of documented activity ranging from Historical faults (activity within last 150 years), Latest Quaternary faults (activity within last 15,000 years), Late Quaternary (activity within last 130,000 years), to Middle to late Quaternary (activity within last 1.6 million years). The

Class A faults are considered to have the highest potential to generate earthquakes and/or surface rupture, and the earthquakes and surface rupture potential generally increases from oldest to youngest. The evidence for Quaternary deformation and/or tectonic activity progressively decreases for Class B and Class C faults. When geologic evidence indicates that a fault is not of tectonic origin it is considered to be a Class D structure. Such evidence includes joints, fractures, landslides, or erosional and fluvial scarps that resemble fault features, but demonstrate a non-tectonic origin.

The nearest known Class A fault is the Mission Gorge Fault (<1.6 million years), which is approximately 6.1 miles southwest of the site. The attached Figure 3 shows regional faults and seismicity with respect to their distance from the site.

4.4.3 Liquefaction and Seismic Settlement Evaluation

Liquefaction occurs when saturated fine-grained sands or silts lose their physical strengths during earthquake-induced shaking and behave like a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking. Seismic settlement can occur with or without liquefaction; it results from densification of loose soils.

Based on the noted site conditions, a quantitative evaluation of liquefaction and seismic settlement was performed as summarized herein.

Input parameters for the liquefaction evaluation were based on the Maximum Considered Earthquake (MCE, 2% probability of exceedance with a 50-year period). A code-based acceleration value (PGA_M) was obtained in accordance with ASCE 7-16 Equation 11.8-1. In order to quantify site liquefaction susceptibility, the computer programs Geologismiki CLiq v.3.0.3.4 and Geologismiki LiqSVs 2.0.2.1 were utilized. The following data were also utilized used for the analysis:

- Based on direct measurement during the recent subsurface exploration, groundwater was, at its shallowest, encountered at a depth of approximately 28 feet bgs. To be conservative, a groundwater depth of 10 feet bgs was modeled for the liquefaction analysis.

- As indicated, the PGA_M value (0.42g) obtained using ASCE 7-16 Section 11.8.3 was used for the liquefaction evaluation.

- Based on the area tectonic framework and probable seismic hazard, a contributing magnitude of 7.0 was used for the analysis.

Liquefaction evaluation was performed for CPTs C-1 through C-6 based on the PGA, magnitude, and acceleration values previously provided. The results of the liquefaction evaluation indicate that up to approximately 2.5 inches of total dynamic settlement and 1.5 inches of differential dynamic settlement should be anticipated.

Surface effects associated with liquefaction-related settlement can consist of sand boils, soil strength loss, and associated phenomena. In general, the potential for surface manifestations is related to the continuity and thickness of liquefiable layers compared to depth of overlying non-liquefiable material (Ishihara, 1985). Based on the lack of significant liquefaction potential within the upper ten feet, significant surface effects are not anticipated. The potential hazard associated with lateral spreading is also anticipated to be low, based on the liquefaction analysis and lack of significant unreinforced slopes adjacent to, the site.

The liquefaction evaluation and results are provided in Appendix E.

4.4.4 Tsunamis and Seiche Evaluation

The site is located well inland of the Pacific Ocean and is at an elevation greater than 300 feet msl. Therefore, the probability of a tsunami reaching the site is considered negligible. Additionally, the site is not located near significant confined bodies of water. Therefore, the occurrence of seiches caused by seismic or other factors is not considered likely.

4.4.5 Landsliding

The proposed hotel development area is located on relatively flat ground and no significant slopes exist near the project improvement area. Based on the noted site conditions, if the recommendations provided herein are adhered to and appropriately incorporated into the design and construction of the project, the potential for slope instability from deep-seated landsliding is generally considered low.

4.4.6 Compressible and Expansive Soils

The investigation revealed that the proposed development area is underlain by approximately four to six feet of previously placed fill that is potentially compressible in current condition. Additionally, the alluvial soils encountered below the fill are also potentially compressible given the anticipated loads for the proposed hotel. As such, site preparation recommendations regarding recompaction of the fill materials are provided herein. Based on the, recommendations are also provided for structural mat slab or similar construction in order to help mitigate the effects of the underlying alluvial materials and associated settlement potential.

Heaving from expansive soils is a leading cause of damage and damage related claims to structures in the U.S. each year. Clayey soils possess a “sponge-like” hydro-shrink/swell mechanism in which they will expand when provided a water source and will contract when drying. These shrink/swell mechanisms can cause considerable damage to structures, pavements and/or improvements when not properly treated and/or mitigated, particularly when occurring cyclically.

Laboratory testing was performed on a representative sample of the fill and native materials to assess their expansion potential characteristics. The test results indicate that these soils possess a Low to Medium expansion potential. Therefore, special care should be taken during grading activities to ensure that expansive site materials are properly moisture conditioned and compacted prior to concrete placement. Additional evaluation of exposed materials should be performed during excavation and grading to evaluate expansion potential characteristics.

4.4.7 Corrosive Soils

Testing of representative site soils was performed to evaluate the potential corrosive effects on concrete foundations and buried metallic utilities (refer to Appendix C for chemical testing results). Soil environments detrimental to concrete generally have elevated levels of soluble sulfates and/or pH levels less than 5.5. According to the American Concrete Institute (ACI) Table 318 4.3.1, specific guidelines have been provided for concrete where concentrations of soluble sulfate (SO_4) in soil exceed 0.10 percent by weight. These guidelines include low water:cement ratios, increased compressive strength, and specific cement type requirements. A minimum resistivity value less than approximately 5,000 ohm-cm and/or soluble chloride levels in excess of 200 ppm generally indicate a corrosive environment for buried metallic utilities and untreated conduits.

Chemical test results indicate that near-surface soils at the site present a low corrosion potential for Portland cement concrete. Based on resistivity and chloride testing, regional soils have been interpreted to generally have a moderate corrosivity potential to buried metallic improvements. Based on these findings, it may be prudent to utilize plastic piping and conduits where buried and feasible. CTE does not practice corrosion engineering. Therefore, if corrosion of metallic or other improvements is of more significant concern, a qualified corrosion engineer could be consulted.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Based on analysis of the presented data and geotechnical information, CTE concludes that the proposed project is feasible, from a geotechnical perspective, provided the preliminary recommendations in this report are incorporated into the design and construction of the project.

Preliminary recommendations for the proposed earthwork and improvements are included in the following sections and Appendix D. However, recommendations in the text of this report supersede those presented in Appendix D should conflicts exist. These preliminary recommendations should either be confirmed as appropriate or updated following preparation of more precise project plans and following required excavations and observations during site preparation. When final construction plans are completed, they should be made available for our review, and additional geotechnical analysis and recommendations may be warranted.

The site is potentially susceptible to up to 2.5 inches of total dynamic settlement and 1.5 inches of differential dynamic settlement. To help mitigate these effects, recommendations for a mat foundation are provided. Alternatively, and at the client's request, recommendations for ground improvement in the form of compaction grouting or similar may be provided. Compaction grouting would be anticipated to target depths of ten feet to 25 feet bgs.

5.2 Site Preparation

The following recommendations are provided to prepare the site subgrade for development of structures and other associated improvements. These recommendations are anticipated to reduce the potential adverse soils conditions at the site.

5.2.1 Stripping and Clearing

Prior to grading activities, areas to receive improvements should be cleared of any existing debris and/or deleterious materials. Any objectionable materials not suitable for structural backfill, such as construction or demolition debris and vegetation, should be properly disposed of off-site.

5.2.2 Building Pad Grading

The proposed hotel development area should be overexcavated to a minimum depth of five feet below the existing or proposed grade, to 2.5 feet beneath the bottoms of proposed foundations, or to the depth of competent native materials, whichever is deeper. Localized deeper remedial excavations may be necessary based on exposed conditions encountered during grading activities.

These overexcavations should extend horizontally at least five feet outside the perimeter of building footprint or to a distance equal to the adjacent vertical over-excavation depth, whichever is greater and where feasible. Excavation bottoms should be observed and verified for competency by a CTE geotechnical representative prior to placement of any new fill, and the excavation bottoms should be scarified to a minimum depth of eight inches, moisture conditioned, and compacted as recommended herein.

5.2.3 Pavement and Hardscape Areas Grading

In general, pavement and hardscape areas should be overexcavated to a minimum depth of two feet below existing or proposed grades, whichever is deeper. CTE should observe the exposed excavation bottom to determine if further removals are necessary.

Excavations should extend horizontally at least two feet outside the perimeter of proposed improvements, as feasible. Excavation bottoms should be observed and verified for competency by a CTE geotechnical representative prior to placement of any new fill, and the excavation bottoms should be scarified to a minimum depth of eight inches, moisture conditioned, and compacted as recommended herein.

5.3 Site Excavations

Based on CTE's observations and experience with similar materials in the area, shallow excavations at the site should generally be feasible using well-maintained heavy-duty construction equipment run by experienced operators. However, contractors should be responsible for making their own independent assessment of the site excavatability characteristics.

5.4 Cut-Fill Transitions

Although not anticipated based on the pad minimum overexcavation recommendations, foundation bottoms for proposed structures or site improvements should not span across cut-fill transitions. Should a cut-fill transition exist in improvement areas, CTE should be contacted for additional recommendations, as necessary.

5.5 Fill Placement and Compaction

Any fill or backfill placed on the site should be compacted to a minimum relative compaction of 90 percent (95 percent in the upper 12 inches of pavement soil subgrade) at a minimum three percent above optimum moisture content, as determined by ASTM D1557. The optimum lift thickness for fill depends on soil type and on the type of compaction equipment used. Generally, backfill should be placed in uniform, horizontal lifts not exceeding eight inches in loose thickness. Fill placement and compaction should be conducted in conformance with local ordinances and should be observed and tested by a CTE geotechnical representative.

5.6 Fill Materials

On-site soils are generally considered suitable for reuse on the site as structural fill if they are moisturized properly at least three percent above optimum, screened of organics and deleterious materials, and contain no irreducible lumps greater than six inches in maximum dimension. Fill within the upper three feet of planned finished grades should not contain irreducible lumps or materials greater than approximately three inches in maximum dimension. Total rock content of fill soils should adhere to the specifications provided in Appendix D. In utility trenches, granular soil without lumps or rock should be utilized surrounding pipes to ensure proper encasement during compaction.

If utilized, imported fill should have an Expansion Index of 30 or less (ASTM D4829) and be free of lumps and oversized rock (refer to Appendix D for maximum rock content criteria). Potential import sources should be observed and sampled by a representative of CTE prior to delivery on-site.

Retaining wall backfill located within a 45-degree wedge extending up from the bottom of the heel foundation of the wall should consist of soil having an Expansion Index of 20 or less (ASTM D 4829) with less than 30 percent passing the No. 200 sieve. The upper 12 to 18 inches of wall backfill should consist of lower permeability soils (fine-grained), in order to reduce surface water infiltration behind walls. The project structural engineer and/or architect should detail proper wall backdrains, including gravel drain zones, fills, filter fabric and perforated drainpipes. A conceptual wall drainage detail is provided in Figure 4.

5.7 Temporary Construction Cuts and Slopes

The following recommendations for temporary cuts and slopes should be relatively stable against deep-seated failure but may experience a degree of localized sloughing. Surcharging from material stockpiles, grading equipment, or construction materials at tops of cuts and/or slopes should be avoided within a minimum distance equal to the total vertical height of the excavation.

The following criteria should be considered for unbraced / unshored temporary excavations and/or trenches without the use of proper shoring. The on-site soils are considered Type B and C soils with recommended slope ratios as set forth in Table 5.7.

TABLE 5.7 RECOMMENDED TEMPORARY SLOPE RATIOS		
SOIL TYPE	SLOPE RATIO (Horizontal: vertical)	MAXIMUM HEIGHT
C (Quaternary Previously Placed Fill & Alluvium/Colluvium Material)	1.5:1 (OR FLATTER)	5 Feet
B (Cretaceous Granitic Rock)	1:1 (OR FLATTER)	10 Feet

Actual field conditions and soil type designations for all temporary slopes must be verified by a "competent person" while excavations exist, according to Cal-OSHA regulations. In addition, the above sloping recommendations do not allow for seepage, or surcharge loading at the top of slopes by vehicular traffic, equipment or materials. Appropriate surcharge setbacks must be maintained from the top of all unshored slopes.

5.8 Foundation and Slab Recommendations

The following recommendations are for preliminary design purposes only. These foundation recommendations should be re-evaluated after review of the project grading and foundation/building plans, and after completion of rough grading of the development area.

5.8.1 Shallow Mat Foundations

The proposed hotel may be supported on shallow foundations bearing entirely into new properly engineered fill. Foundations should be embedded at least 30 inches below lowest adjacent subgrade. A subgrade modulus of reaction of 110 pci is considered suitable for the design of a rigid mat slab foundation.

5.8.2 Minimum Steel Reinforcement

Due to expansion potential of the onsite soils, CTE recommends that continuous footings be reinforced using a minimum of four No. 6 reinforcing bars, with a minimum of two placed near the top and two near the bottom, or as specified by the structural engineer. A minimum clearance of three inches should be maintained between steel reinforcement and the bottom or sides of the footing to ensure proper concrete encasement of steel reinforcement. These reinforcing recommendations are provided as a minimum to reduce the potential for cracking and/or distress. The project structural engineer should design isolated footing reinforcement and review all steel reinforcing schedules.

5.8.3 Foundation Setback

Properly embedded footings for the proposed structure should be designed such that the horizontal distance from the face of adjacent descending slopes to the outer edge of the footing is a minimum of ten feet. In addition, foundations should bear beneath an imaginary 1:1 plane extended up from the nearest bottom edge of adjacent parallel trenches or excavations located generally within ten feet. Deepening of affected footings should be a suitable means of attaining the prescribed setbacks.

5.8.4 Bearing Values

A mat foundation placed at the recommended embedment depth bearing entirely into new engineered fill may be designed for an allowable bearing pressure of 2,000 pounds per square foot (psf) for dead loads. An additional 1/3 increment may be used for short duration live load analysis, which includes the effects of wind or seismic forces.

5.8.5 Foundation Settlement

For structures founded on properly embedded footings, the total and differential static settlements are expected to be on the order of 1-inch total and ½- inch differential over a distance of approximately 50 feet. As indicated previously, dynamic settlement is also anticipated at the site and should be incorporated into the project design.

5.8.6 Interior Concrete Slabs

Due to the expansion potential of the site soils, lightly loaded non-structural interior concrete slab-on-grade should be a minimum of five inches thick. Minimum reinforcement for lightly loaded non-traffic area slabs should consist of #4 reinforcing bars placed on maximum 12-inch centers, each way, at or above mid-slab height, but with proper cover or as per the recommendations of the project structural engineer. Slabs subjected to heavier loads or traffic will require thicker slab sections and/or increased reinforcement.

In moisture-sensitive non-traffic floor areas, a suitable vapor retarder of at least 15-mil thickness (with all laps or penetrations sealed or taped) overlying a four-inch layer of consolidated aggregate base or gravel (or sand with SE of 30 or more) should be installed.

An optional maximum two-inch layer of similar material may be placed above the vapor retarder to help protect the membrane during steel and concrete placement. This recommended protection is generally considered typical in the industry. If proposed floor areas or coverings are considered especially sensitive to moisture emissions, additional recommendations from a specialty consultant could be obtained. CTE is not an expert at preventing moisture penetration through slabs. A qualified architect or other experienced professional should be contacted if moisture penetration is a more significant concern. Subgrade materials should be maintained at a minimum of two percent above optimum moisture content until slab underlayment and concrete are placed.

As indicated, structural mat slab construction is recommended for proposed hotel improvement areas in order to help resist the effects of anticipated static and dynamic settlement potential. A 110-pci subgrade modulus is considered suitable for elastic design of slabs-on-grade.

5.9 Seismic Design Criteria

The seismic ground motion values listed in Table 5.9 below were derived in accordance with the ASCE 7-16 Standard that is incorporated into the 2019 California Building Code. This was accomplished by establishing the Site Class based on the subsurface conditions at the site and calculating site coefficients and parameters using the using the SEAOC-OSHPD U.S. Seismic Design Maps application. These values are intended for the design of structures to resist the effects of earthquake ground motions for the site coordinates 32.84194° latitude and –116.97928° longitude, as underlain by soils corresponding to site Class D – Stiff Soil. These parameters are considered suitable for building with a period T ≤ 0.5 second. If the proposed structure will exhibit a period T > 0.5 s, CTE should be contacted to assess whether a site-specific ground motion study is necessary.

TABLE 5.9
SEISMIC GROUND MOTION VALUES (CODE-BASED)
2019 CBC AND ASCE 7-16

PARAMETER	VALUE	2019 CBC/ASCE 7-16 REFERENCE
Site Class	D – Stiff Soil	ASCE 16, Chapter 20
Mapped Spectral Response Acceleration Parameter, S_S	0.770	Figure 1613.2.1 (1)
Mapped Spectral Response Acceleration Parameter, S_1	0.283	Figure 1613.2.1 (2)
Seismic Coefficient, F_a	1.192	Table 1613.2.3 (1)
Seismic Coefficient, F_v	Null – see Section 11.4.8	Table 1613.2.3 (2)
MCE Spectral Response Acceleration Parameter, S_{MS}	0.918	Section 1613.2.3
MCE Spectral Response Acceleration Parameter, S_{M1}	Null – see Section 11.4.8	Section 1613.2.3
Design Spectral Response Acceleration, Parameter S_{DS}	0.612	Section 1613.2.5(1)
Design Spectral Response Acceleration, Parameter S_{D1}	Null – see Section 11.4.8	Section 1613.2.5 (2)
Peak Ground Acceleration PGA_M	0.419	ASCE 16, Section 11.8.3

5.10 Lateral Resistance and Earth Pressures

Lateral loads acting against structures may be resisted by friction between the footings and the supporting soil or passive pressure acting against structures. If frictional resistance is used, allowable coefficients of friction of 0.30 (total frictional resistance equals the coefficient of friction multiplied by the dead load) for concrete cast directly against new engineered fill or relatively undisturbed competent natural materials is recommended. A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 2,000 pounds per square foot) may be used for structures embedded in new engineered fill materials. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

Proposed retaining walls backfilled using granular low expansion potential soils may be designed using the equivalent fluid unit weights given in Table 5.10 below.

TABLE 5.10
EQUIVALENT FLUID UNIT WEIGHTS (G_h)
(pounds per cubic foot)

WALL TYPE	LEVEL BACKFILL	SLOPE BACKFILL 2:1 (HORIZONTAL: VERTICAL)
CANTILEVER WALL (YIELDING)	50	70
RESTRAINED WALL	65	85

Lateral pressures on cantilever retaining walls (yielding walls) over six feet high due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral earth pressure against a properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

$$P_{AE} = P_A + \Delta P_{AE}$$

For non-yielding (or “restrained”) walls, the total lateral earth pressure may be similarly calculated based on work by Wood (1973):

$$P_{KE} = P_K + \Delta P_{KE}$$

Where P_A/b = Static Active Earth Pressure = $G_h H^2/2$

P_K/b = Static Restrained Wall Earth Pressure = $G_h H^2/2$

$\Delta P_{AE}/b$ = Dynamic Active Earth Pressure Increment = $(3/8)\ k_h\ \gamma H^2$

$\Delta P_{KE}/b$ = Dynamic Restrained Earth Pressure Increment = $k_h\ \gamma H^2$

b = unit length of wall (usually 1 foot)

k_h = 1/2* PGA_m (PGA_m given previously Table 5.9)

G_h = Equivalent Fluid Unit Weight (given previously Table 5.10)

H = Total Height of the retained soil

γ = Total Unit Weight of Soil ≈ 135 pounds per cubic foot

*It is anticipated that the 1/2 reduction factor will be appropriate for proposed walls that are not substantially sensitive to movement during the design seismic event. Proposed walls that are more sensitive to such movement could utilize a 2/3 reduction factor. If any proposed walls require minimal to no movement during the design seismic event, no reduction factor to the peak ground acceleration should be used. The project structural engineer of record should determine the appropriate reduction factor to use (if any) based on the specific proposed wall characteristics.

The static and increment of dynamic earth pressure in both cases may be applied with a line of action located at H/3 above the bottom of the wall (SEAOC, 2013).

These values assume non-expansive backfill and free-draining conditions. Measures should be taken to prevent moisture buildup behind all retaining walls. Drainage measures should include free-draining backfill materials and sloped, perforated drains. These drains should discharge to an appropriate off-site location. Waterproofing and proper drainage are critical components of retaining walls. critical to the anticipated large and deep retaining/basement walls. It is recommended that all wall drains be constructed low enough so that water cannot rise above the top of interior building slab or finish floor elevation, and preferably well below the bottom of slab elevations. Waterproofing should be as specified and detailed by the project architect or other specialty consultant.

5.11 Exterior Flatwork

Lightly loaded exterior for non-traffic areas should be a minimum of five inches in thickness and installed with crack-control joints at appropriate spacing as designed by the project architect to reduce the potential for cracking in exterior flatwork caused by minor movement of subgrade soils and concrete shrinkage. Additionally, it is recommended that flatwork be installed with at least #4 reinforcing bars at 16-inch centers, each way, at or above mid-height of slab, but with proper concrete cover, or with other reinforcement per the applicable project designer. Flatwork that should be installed with crack control joints, includes sidewalks, and architectural features. All subgrades should be prepared according to the earthwork recommendations previously given before placing concrete. Positive drainage should be established and maintained next to all flatwork. Subgrade materials should be maintained at a minimum of two percent above optimum moisture content until the time of concrete placement.

5.12 Vehicular Concrete Pavement

The proposed improvements include paved vehicle drive and parking areas. Presented in Table 5.11 are preliminary pavement sections utilizing assumed traffic index values and Resistance "R" Value. Actual traffic area slab sections to be provided by the structural designer based on anticipated traffic loading. Beneath proposed pavement areas, the upper 12 inches of subgrade and all base materials should be compacted to 95% relative compaction in accordance with ASTM D1557, and at a minimum of two percent above optimum moisture content.

TABLE 5.12
RECOMMENDED PAVEMENT THICKNESS

Traffic Area	Assumed Traffic Index	Preliminary Subgrade "R"-Value	Asphalt Pavements		Portland Cement Concrete Pavements, on Subgrade Soils (inches)
			AC Thickness (inches)	Class II Aggregate Base Thickness (inches)	
Drive Areas & Infrequent Emergency Vehicle Access	6.0	5+	4.0	12.0	7.5
Automobile Parking Areas	5.0	5+	3.0	10.0	7.0

* Caltrans Class 2 aggregate base
** Concrete should have a modulus of rupture of at least 600 psi

Following rough site grading, CTE laboratory testing of representative subgrade soils for as-graded "R"-Value should be performed to verify suitability of pavement sections. Asphalt paved areas should be designed, constructed, and maintained in accordance with the recommendations of the Asphalt Institute, or other widely recognized authority. Concrete paved areas should be designed and constructed in accordance with the recommendations of the American Concrete Institute or other widely recognized authority, particularly with regard to thickened edges, joints, and drainage. The Standard Specifications for Public Works construction ("Greenbook") or Caltrans Standard Specifications may be referenced for pavement materials specifications.

5.13 Drainage

Surface runoff should be collected and directed away from improvements by means of appropriate erosion-reducing devices and positive drainage should be established around the proposed improvements. Positive drainage should be directed away from improvements at a gradient of at least two percent for a distance of at least five feet. However, the project civil engineers should evaluate the on-site drainage and make necessary provisions to keep surface water from affecting the site.

Generally, CTE recommends against allowing water to infiltrate building pads or adjacent to slopes. CTE understands that some agencies are encouraging the use of storm-water cleansing devices. Use of such devices tends to increase the possibility of adverse effects associated with high groundwater.

5.14 Permanent Slopes

Any permanent cut and/or fill slopes should be constructed at a ratio of 2:1 (horizontal: vertical) or flatter. Based on anticipated soil strength characteristics slopes of the cut and/or fill materials, these 2:1 slope inclinations should exhibit factors of safety greater than 1.5.

Although properly constructed slopes on this site should be grossly stable, the soils will be somewhat erodible. Therefore, runoff water should not be permitted to drain over the edges of slopes unless that water is confined to properly designed and constructed drainage facilities. Erosion-resistant vegetation should be maintained on the face of all slopes. Typically, soils along the top portion of a fill slope face will creep laterally. CTE recommends against building distress-sensitive hardscape improvements within five feet of slope crests.

5.15 Controlled Low Strength Materials (CLSM)

Controlled Low Strength Materials (CLSM) may be used in deepened footing excavation areas, building pads, and/or adjacent to retaining walls or other structures, provided the appropriate following recommendations are also incorporated. Minimum over-excavation depths recommended herein beneath slabs, flatwork, and other areas may be applicable beneath CLSM if/where CLSM is to be used, and excavation bottoms should be observed by CTE prior to placement of CLSM. Prior to CLSM placement, the excavation should be free of debris, loose soil materials, and water. Once specific areas to utilize CLSM have been determined, CTE should review the locations to determine if additional recommendations are appropriate.

CLSM should consist of a minimum three-sack cement/sand slurry with a minimum 28-day compressive strength of 100 psi (or equal to or greater than the maximum allowable short term soil bearing pressure provided herein, whichever is higher) as determined by ASTM D4832. If re-excavation is anticipated, the compressive strength of CLSM should generally be limited to a maximum of 150 psi per ACI 229R-99. Where re-excavation is required, two-sack cement/sand slurry may be used to help limit the compressive strength. The allowable soils bearing pressure and coefficient of friction provided herein should still govern foundation design. CLSM may not be used in lieu of structural concrete where required by the structural engineer.

5.16 Plan Review

CTE should be authorized to review the project grading and/or foundation/building plans prior to commencement of earthwork in order to provide additional evaluation and recommendations, as is anticipated to be necessary.

5.17 Construction Observation

The recommendations provided in this report are based on preliminary design information for the proposed construction and the subsurface conditions observed in the subsurface explorations. The interpolated subsurface conditions should be confirmed by CTE once more precise project plans are available and during construction with respect to anticipated conditions. Upon completion of precise grading, if necessary, soil samples will be collected to evaluate as-built Expansion Index. Foundation recommendations may be revised upon completion of grading, and as-built laboratory tests results. Additionally, soil samples should be taken in pavement subgrade areas upon rough grading to refine pavement recommendations as necessary.

Recommendations provided in this report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. All earthwork should be observed and tested in accordance with recommendations contained within this report. CTE should evaluate footing excavations before reinforcing steel placement.

6.0 LIMITATIONS OF INVESTIGATION

The field evaluation, laboratory testing, and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report. Variations may exist and conditions not observed or described in this report may be encountered during construction. This report is prepared for the project as described. It is not prepared for any other property or party.

The recommendations provided herein have been developed in order to reduce the post-construction movement of site improvements related to soil settlement and expansion. However, even with the design and construction recommendations presented herein, some post-construction movement and associated distress may occur.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside CTE's involvement. Therefore, this report is subject to review and should not be relied upon after a period of three years.

CTE's conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, CTE should be notified and additional recommendations, if required, will be provided subject to CTE remaining as authorized geotechnical consultant of record. This report is for use of the project as described. It should not be utilized for any other project.

CTE appreciates this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Respectfully submitted,
CONSTRUCTION TESTING & ENGINEERING, INC.

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Senior Geotechnical Engineer

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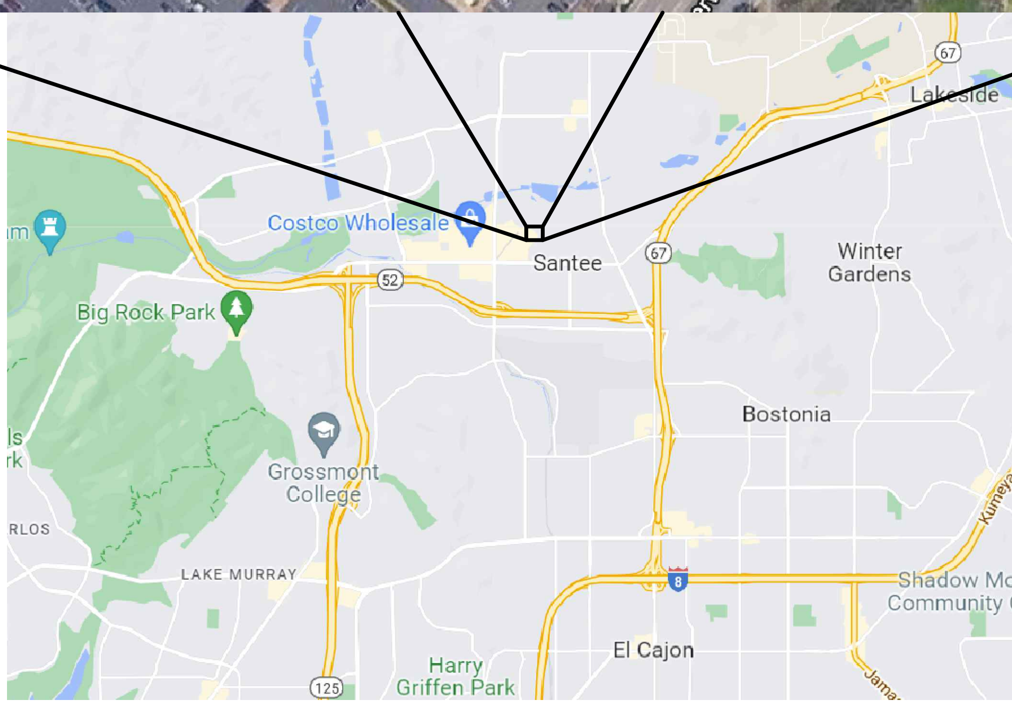

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SITE INDEX MAP SANTEE HOTEL SITE TOWN CENTER PARKWAY, A.P.N. 381-052-04-00 SANTEE, CALIFORNIA	SCALE: AS SHOWN	DATE: 08/22
	CTE JOB NO.: 4830.2200060	FIGURE: 1

50 0 50 100 150

SCALE 1" = 50'

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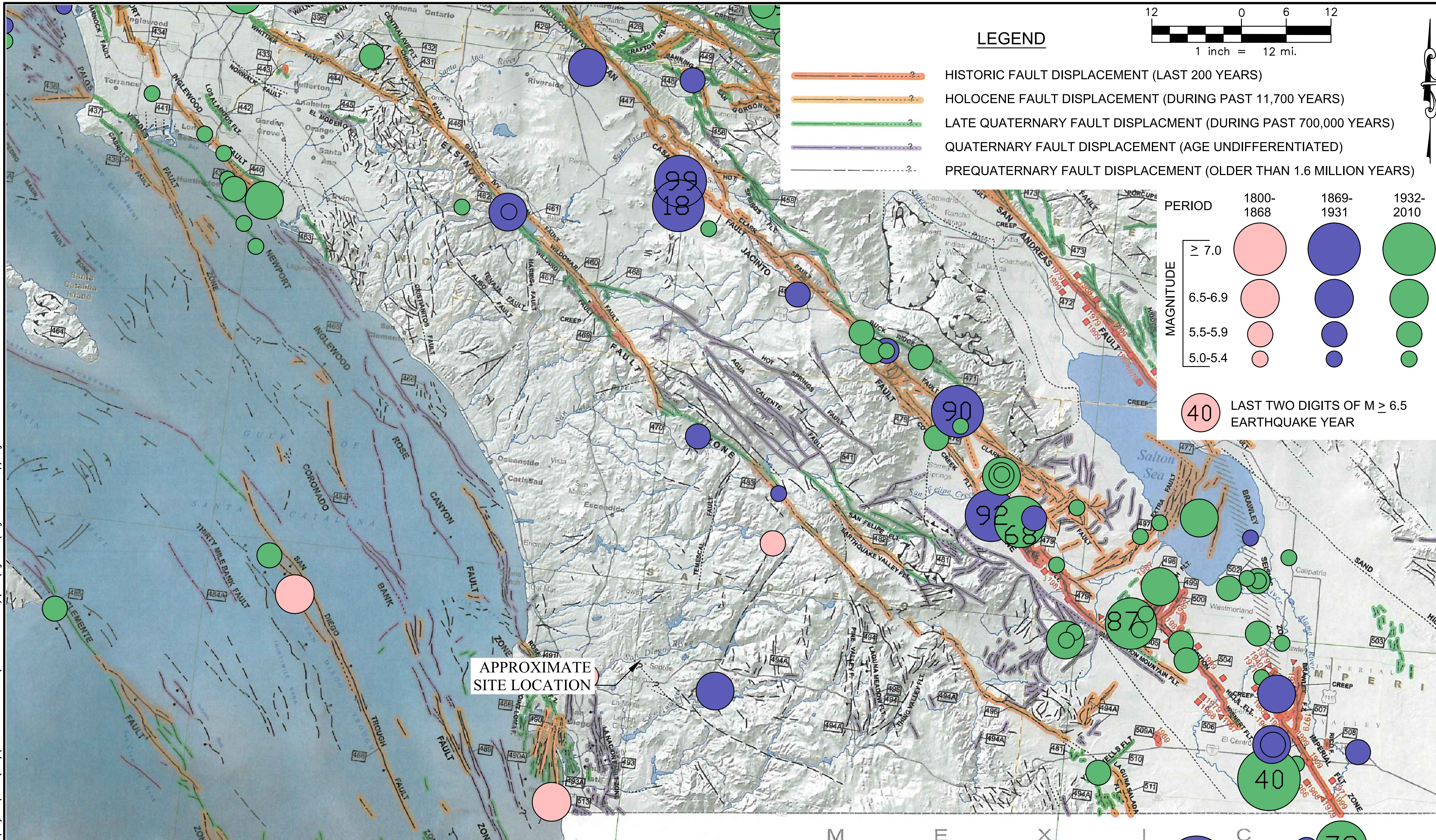
GEOTECHNICAL EXPLORATION MAP

SANTEE HOTEL SITE
TOWN CENTER PARKWAY, A.P.N. 381-052-04-00
SANTEE, CALIFORNIA

CTE JOB NO: 4830.2200060.0000	
SCALE: 1" = 50'	
DATE: 08/22	FIGURE: 2

\\file01\CTE Share\Projects\4830 (GEO)\4830.2200060.0000 (Santee Hotel Site)\Figures\Figure 2 (Exploration Map).dwg



\\file01\CTE Share\Projects\4830 (GEO)\4830.2200060.0000 (Santee Hotel Site)\DWG\Figure 3 (Regional Fault Map).dwg

NOTES: FAULT ACTIVITY MAP OF CALIFORNIA, 2010, CALIFORNIA GEOLOGIC DATA MAP SERIES MAP NO. 6;
EPICENTERS OF AND AREAS DAMAGED BY M≥5 CALIFORNIA EARTHQUAKES, 1800-1999 ADAPTED AFTER TOPPOZADA, BRANUM, PETERSEN, HALLSTORM, CRAMER, AND REICHLE, 2000, CDMG MAP SHEET 49
REFERENCE FOR ADDITIONAL EXPLANATION; MODIFIED WITH CISN AND USGS SEISMIC MAPS

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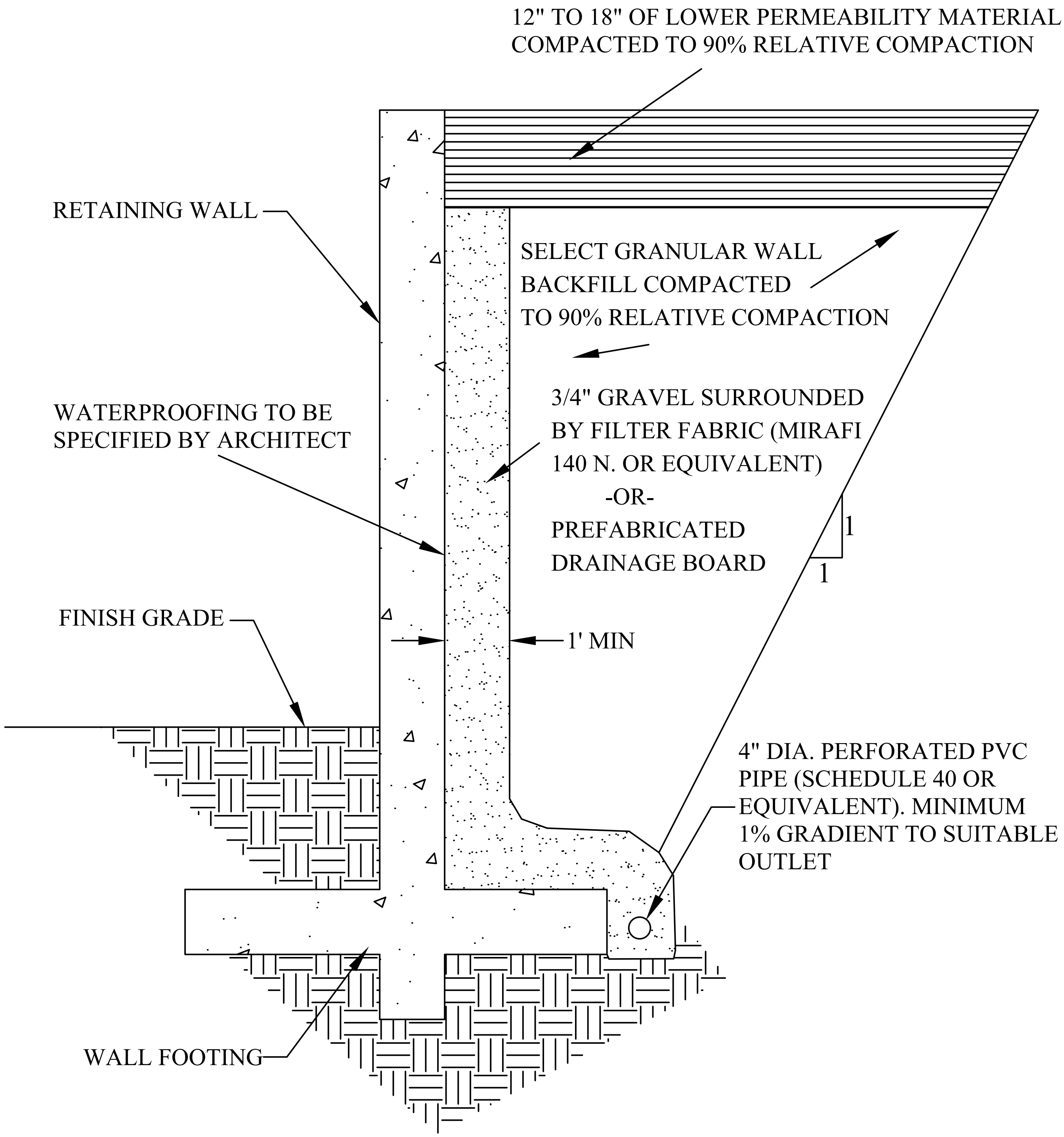
REGIONAL FAULT AND SEISMICITY MAP

SANTEE HOTEL SITE
TOWN CENTER PARKWAY, A.P.N. 381-052-04-00
SANTEE, CALIFORNIA

CTE JOB NO:	4830.2200060.0000
SCALE:	1 inch = 12 miles
DATE: 08/22	FIGURE: 3



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RETAINING WALL DRAINAGE DETAIL	SCALE: NO SCALE	DATE: 08/22
	CTE JOB NO.: 4830.2200060	FIGURE: 4

*CONCEPTUAL DRAWING

APPENDIX A

REFERENCES

REFERENCES

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APPENDIX B

FIELD EXPLORATION LOGS

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	**GRAVELS** MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS 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 < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, 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 SIZE	**SILTS AND CLAYS** LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride
Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed

PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded

PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

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PROJECT:	DRILLER:	SHEET: of
CTE JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

Depth (Feet) | Bulk Sample | Driven Type | Blows/Foot | Dry Density (pcf) | Moisture (%) | U.S.C.S. Symbol | Graphic Log

BORING LOG LEGEND

DESCRIPTION

Laboratory Tests

0

Block or Chunk Sample

Bulk Sample

5

Standard Penetration Test

10

Modified Split-Barrel Drive Sampler (Cal Sampler)

Thin Walled Army Corp. of Engineers Sample

15

Groundwater Table

Soil Type or Classification Change

20

? ? ? ? ? ? ?

Formation Change [(Approximate boundaries queried (?)]

"SM"

Quotes are placed around classifications where the soils exist in situ as bedrock

25

FIGURE: BL2

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PROJECT:	SANTEE HOTEL SITE	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 2
CTE JOB NO:	4830.2200060.0000	DRILL METHOD:	CME-75: 8" AUGER	DRILLING DATE:	8/15/2022
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~339'

BORING: B-1

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								AC: 0-3" AB: 3"-15"	
	X					SC		**PREVIOUSLY-PLACED FILL (Qppf):** Loose to medium dense, slighlty moist, brown, clayey fine to medium-grained SAND.	EI, CHEM, MAX
	X					CL		Medium stiff, slightly moist, dark brown, sandy CLAY, with gravel.	
5		X	13 12 10						
						SM		**QUATERNARY ALLUVIUM AND COLLUVIUM, UNDIVIDED (** Medium dense, slightly moist, brown, silty fine grained SAND.	
10		X	8 11 9						AL, GS
						CL		Medium stiff to stiff, slightly moist, brown, sandy CLAY.	
15		X	9 3 5						AL, GS
20		X	4 5 6						AL, GS
								Perched groundwater at 23 feet.	
						SM-CL		Medium dense, moist, red-brown, silty fine to coarse grained SAND, with CLAY and coarse gravel.	
25									AL, GS

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PROJECT:	SANTEE HOTEL SITE	DRILLER:	BAJA EXPLORATION	SHEET:	2 of 2
CTE JOB NO:	4830.2200060.0000	DRILL METHOD:	CME-75: 8" AUGER	DRILLING DATE:	8/15/2022
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~339'

BORING: B-1

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
25			21 22 21			SM-CL		Medium dense, moist, red-brown, silty fine to coarse grained SAND, with CLAY and coarse gravel.	AL, GS
30			20 10 9						AL, GS
						"SM"-CL		**CRETACEOUS GRANITOID ROCKS (Kgr):** Highly weathered granitic rock. Excavates as dense to very dense, slightly moist, gray to yellow-brown, silty fine to coarse grained SAND, with CLAY.	
35			10 15 27						
40			19 25 26						
								Groundwater encountered at 43'	
						"SM"		Slightly weathered granitic rock. Excavates as very dense, slightly moist, light gray to yellow-brown, silty fine to coarse grained SAND.	
45			18 26 18						
			32 25 27						
50								Total Depth: 48.5' (Refusal) Groundwater Encountered at 43' Backfilled with Concrete/Bentonite Mix	

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PROJECT:	SANTEE HOTEL SITE	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 2
CTE JOB NO:	4830.2200060.0000	DRILL METHOD:	CME-75: 8" AUGER	DRILLING DATE:	8/15/2022
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~336'

BORING: B-2

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								AC: 0-3" AB: 3"-15"	
						SC/CL		**PREVIOUSLY-PLACED FILL (Qppf):** Loose to medium dense, slighlty moist, brown, clayey fine to medium-grained SAND to medium stiff sandy CLAY.	
						SM		**QUATERNARY ALLUVIUM AND COLLUVIUM, UNDIVIDED (** Medium dense, slightly moist, brown, silty fine grained SAND.	
5			7 7 8						
10			6 5 7						
						CL		Very stiff, slightly moist, red-brown, sandy CLAY	
15			5 9 23						
20			5 8 14						
25								Becomes stiff and moist.	

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PROJECT:	SANTEE HOTEL SITE	DRILLER:	BAJA EXPLORATION	SHEET:	2 of 2
CTE JOB NO:	4830.2200060.0000	DRILL METHOD:	CME-75: 8" AUGER	DRILLING DATE:	8/15/2022
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~336'

BORING: B-2

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
25			4 6 8			CL		Stiff, moist, red-brown, sandy CLAY.	
								Groundwater encountered at 28'	
						SM-CL		**CRETACEOUS GRANITOID ROCKS (Kgr):** Highly weathered granitic rock. Excavates as: Very dense, moist, gray to yellow-brown, silty fine to coarse grained SAND with CLAY and coarse gravel	
30			17 34 34						
						"SM"		Slightly weathered granitic rock. Excavates as very dense, slightly moist, light gray to yellow-brown, silty fine to coarse grained SAND.	
35			8 25 50/3"						
								Total Depth: 37' (Refusal) Groundwater Encountered at 28' Backfilled with Concrete/Bentonite Mix	
40									
45									
50									

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PROJECT:	SANTEE HOTEL SITE	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 2
CTE JOB NO:	4830.2200060.0000	DRILL METHOD:	CME-75: 8" AUGER	DRILLING DATE:	8/15/2022
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~336'

BORING: B-3

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								AC: 0-3" AB: 3"-15"	
	X					SC/CL		**PREVIOUSLY-PLACED FILL (Qppf):** Loose to medium dense, slighlty moist, brown, clayey fine to medium-grained SAND to medium stiff sandy CLAY.	EI, RV
						SM		**QUATERNARY ALLUVIUM AND COLLUVIUM, UNDIVIDED (** Medium dense, slightly moist, brown, silty fine grained SAND.	
5		X	8 12 11						
10		X	1 2 3						AL, GS
						CL		Very stiff, slightly moist, red-brown, sandy CLAY	
15		X	4 8 8						AL, GS
20		X	2 2 5						AL, GS
25								Becomes stiff and moist.	AL, GS

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PROJECT:	SANTEE HOTEL SITE	DRILLER:	BAJA EXPLORATION	SHEET:	2 of 2
CTE JOB NO:	4830.2200060.0000	DRILL METHOD:	CME-75: 8" AUGER	DRILLING DATE:	8/15/2022
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~336'

BORING: B-3

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
25			7 10 11			CL		Stiff, moist, red-brown, sandy CLAY.	
								Groundwater encountered at 28'	
						SP		Very dense, wet, yellow-brown, poorly-graded, medium grained SAND, with gravel.	
30			8 31 34						AL, GS
						"SM"		**CRETACEOUS GRANITOID ROCKS (Kgr):** Slightly weathered granitic rock. Excavates as very dense, slightly moist, light gray to yellow-brown, silty fine to coarse grained SAND.	
35			10 30 50/3"						
40			50/2"					No Recovery	
								Total Depth: 40.2' (Refusal) Groundwater Encountered at 30' Backfilled with Concrete/Bentonite Mix	
45									
50									

Kehoe Testing and Engineering
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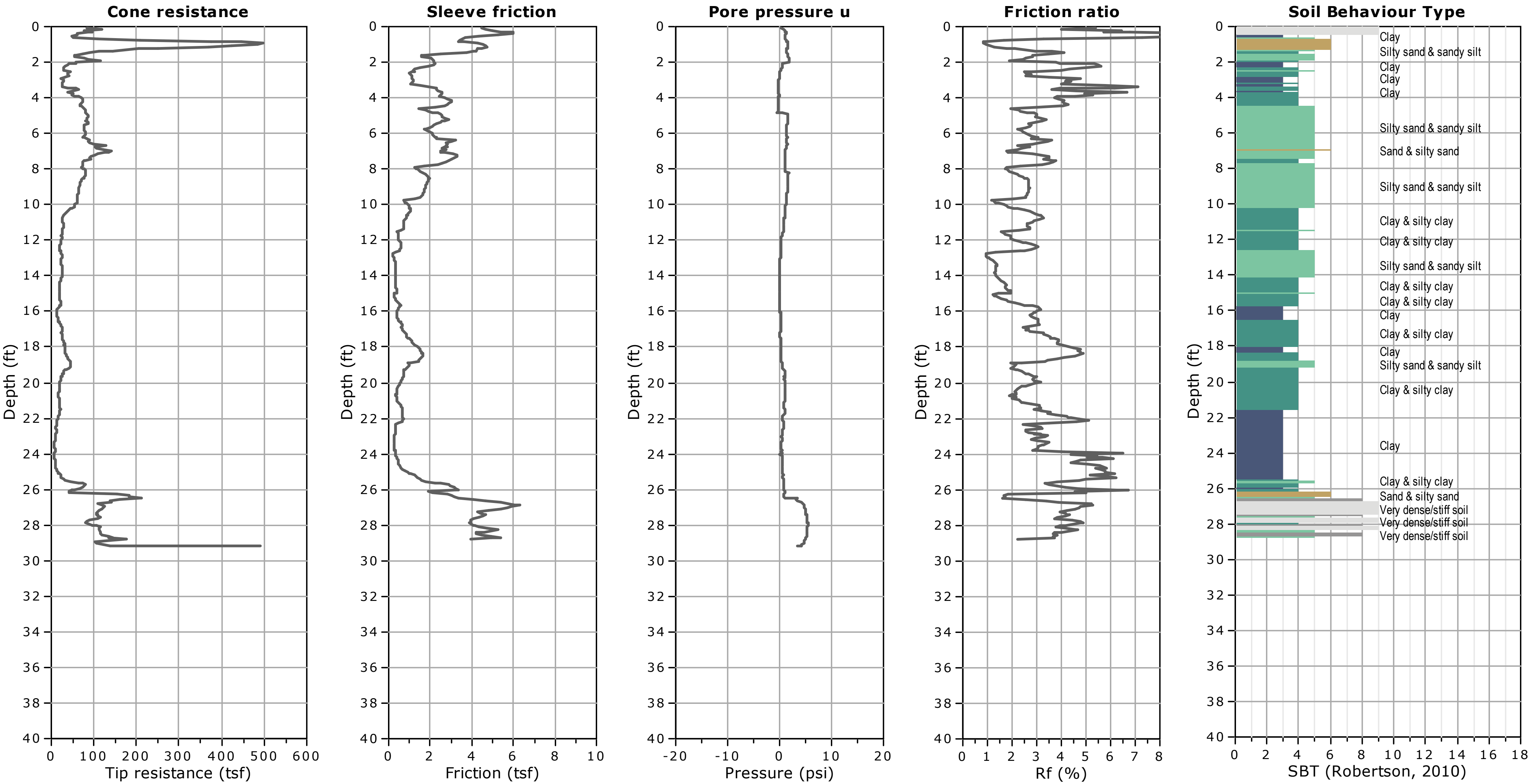
steve@kehoetesting.com
www.kehoetesting.com

Project: CTE / Santee Hotel

Location: Towne Center Pkwy, Santee, CA

C-1

Total depth: 29.20 ft, Date: 8/15/2022



Kehoe Testing and Engineering
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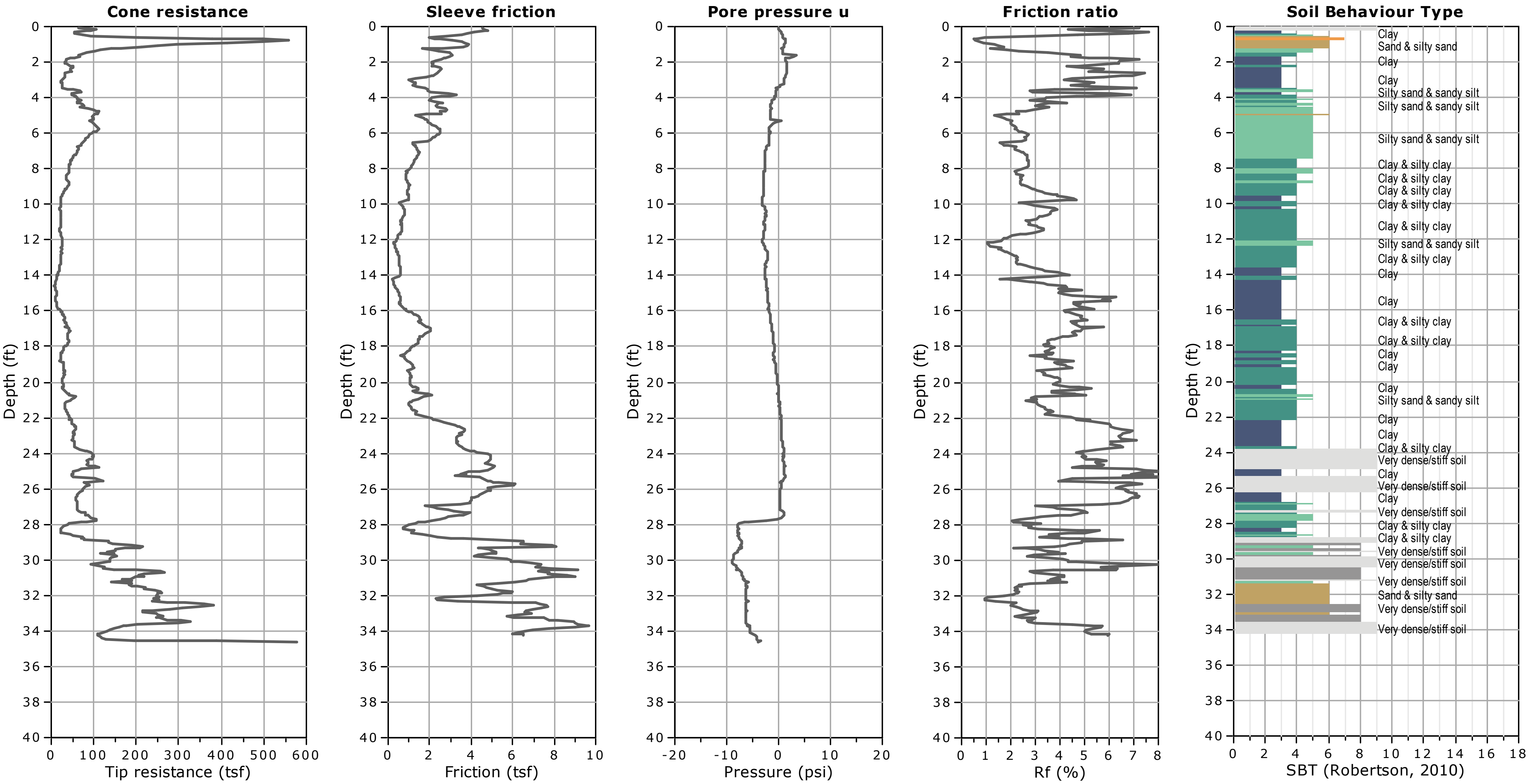
Project: CTE / Santee Hotel
Location: Towne Center Pkwy, Santee, CA

C-2
Total depth: 34.66 ft, Date: 8/18/2022



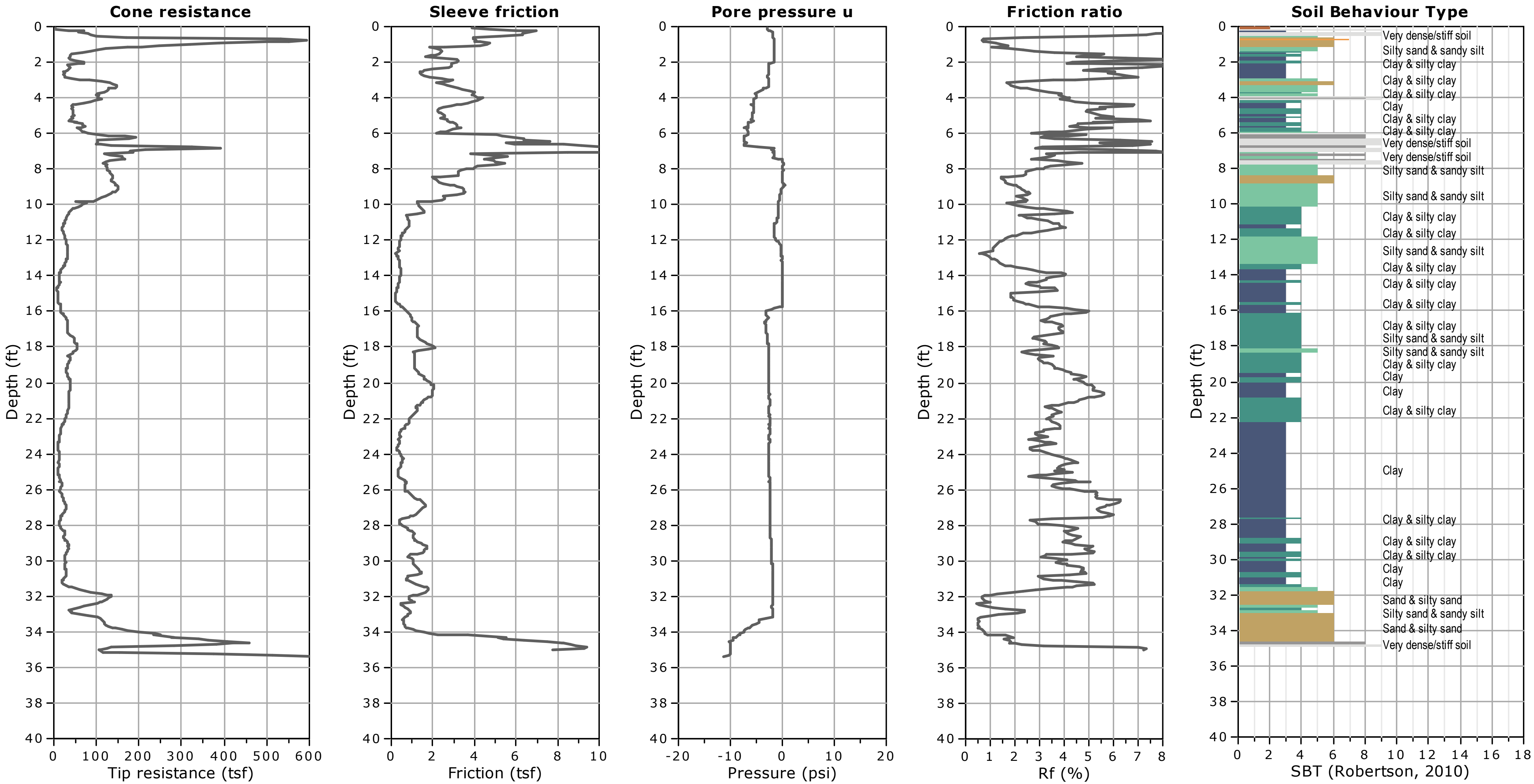
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: CTE / Santee Hotel

Location: Towne Center Pkwy, Santee, CA

C-3

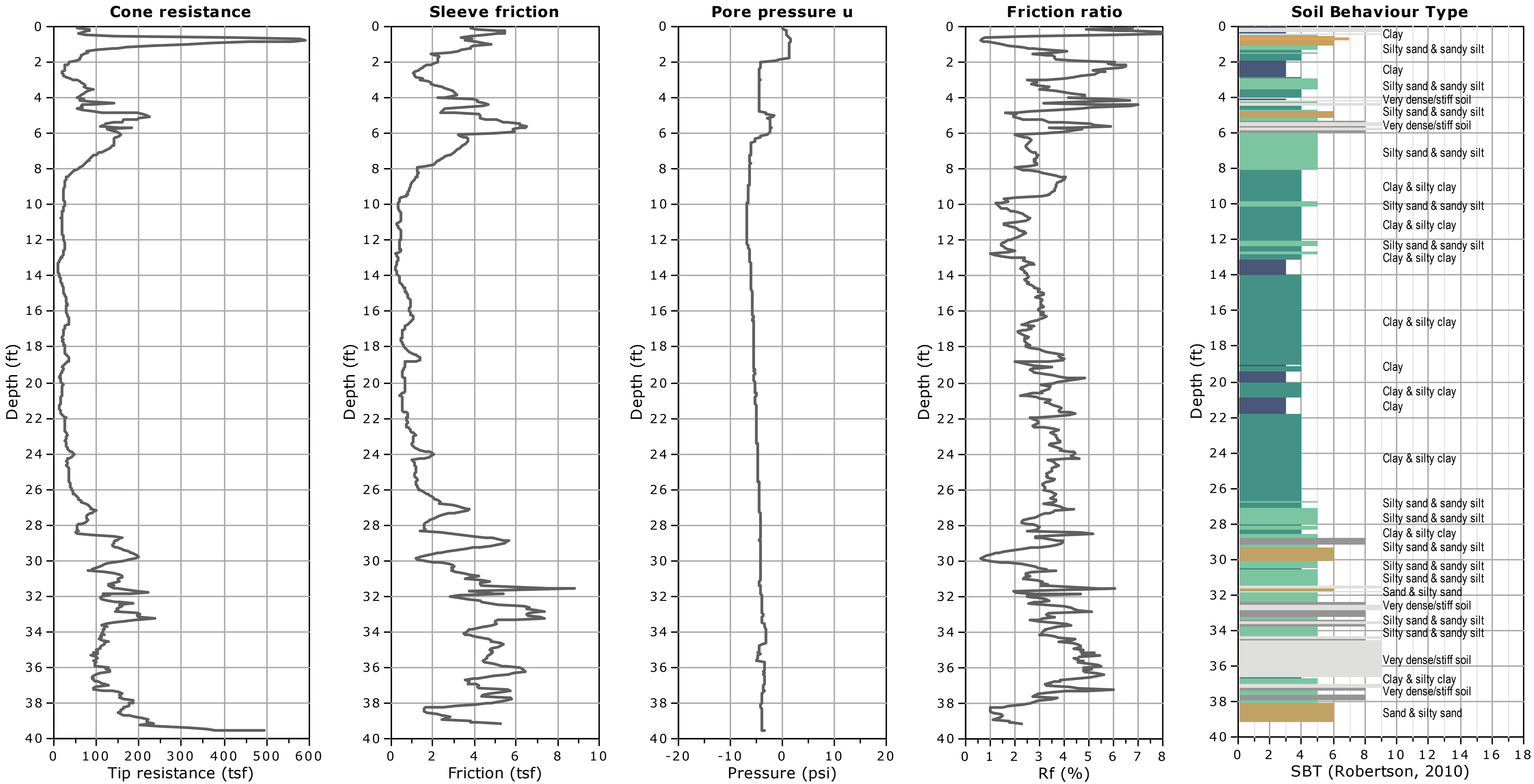
Total depth: 35.37 ft, Date: 8/15/2022



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

Project: CTE / Santee Hotel **C-4**

Location: Towne Center Pkwy, Santee, CA Total depth: 39.57 ft, Date: 8/15/2022



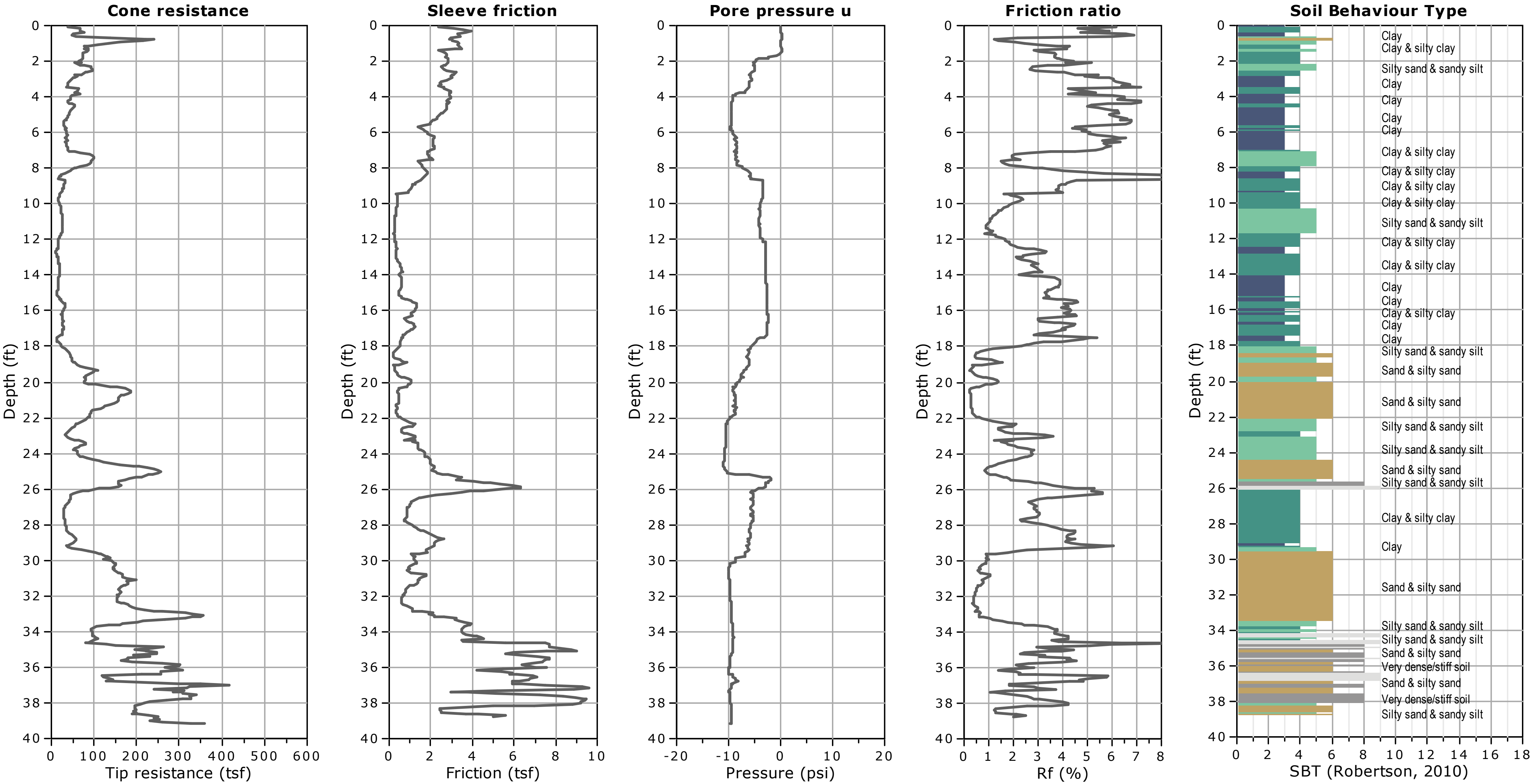
Kehoe Testing and Engineering
714-901-7270
steve@kehoetesting.com
www.kehoetesting.com

Project: CTE / Santee Hotel

Location: Towne Center Pkwy, Santee, CA

C-5

Total depth: 39.18 ft, Date: 8/15/2022



Kehoe Testing and Engineering
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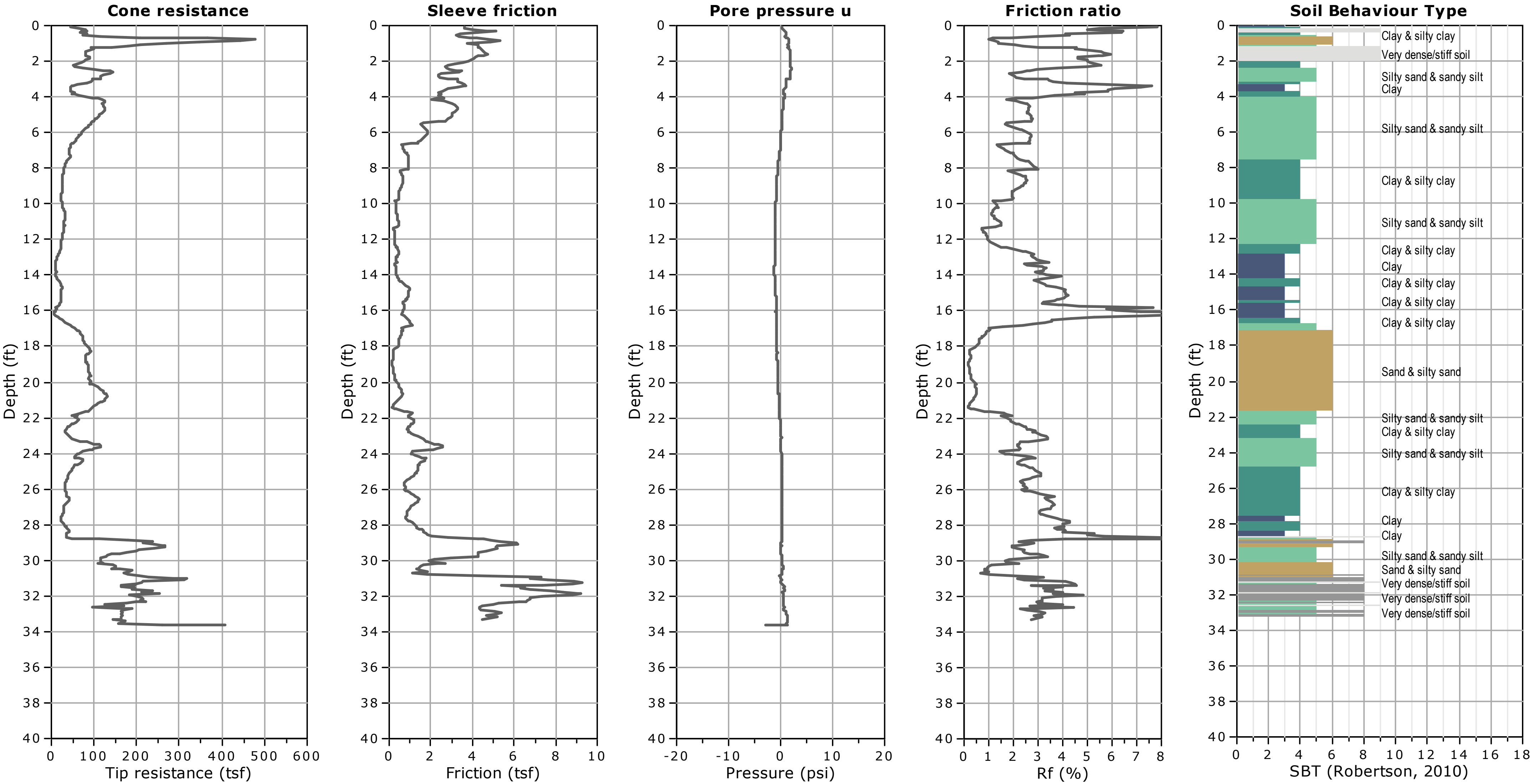
Project: CTE / Santee Hotel
Location: Towne Center Pkwy, Santee, CA

C-6
Total depth: 33.66 ft, Date: 8/15/2022



APPENDIX C

LABORATORY METHODS AND RESULTS

LABORATORY TEST METHODS

Classification (ASTM D2487)

Earth materials encountered were visually and texturally classified in accordance with the Unified Soil Classification System (USCS/ASTM D2487) and ASTM D2488. Material classifications are indicated on the logs of the exploratory borings presented in Appendix B.

Particle-size Distribution Tests (ASTM D6913)

Particle-size distribution (gradation) testing was performed on selected samples of the materials encountered in general accordance with the latest version of the ASTM D6913 test method. The test results were utilized in evaluating the soil classifications in accordance with the Unified Soil Classification System and to evaluate the geotechnical engineering characteristics of the tested material. The test results are plotted on grain-size distribution graphs and are presented in the following section of this appendix.

Atterberg Limits Test (ASTM D4318)

The Atterberg limits test was performed on selected samples of the materials encountered in general accordance with the ASTM D4318 test method. The test obtains the liquid limit and plastic index of the soil and the results are used to aid in classification of soils. The test data is also useful for purposes of evaluating expansion potential and strength characteristics of the soil. The test results are presented in the following section of this appendix.

Expansion Index Test (ASTM D4829)

Expansion index testing was performed on selected samples of the earth materials encountered in general accordance with the ASTM D4829 test method. The test determines the expansion potential of the materials encountered. The test results are presented in the following section of this appendix.

Laboratory Compaction Characteristics Test (ASTM D1557)

Laboratory compaction characteristics testing was performed on selected samples of the earth materials encountered in general accordance with the ASTM D1557 test method. The test establishes the laboratory maximum dry density and optimum moisture content of the tested materials and are also used to aid in evaluating the strength characteristics of the materials.

Resistance "R" Value Test (CTM 301/ ASTM D2844)

R-Value testing was performed on selected samples of the earth materials encountered in general accordance with the California Test Method 301/ ASTM D2844. The test results are presented in the following section of this appendix.

Soil Corrosivity Tests

The water-soluble sulfate and chloride content, the resistivity, and pH of selected samples were performed by a third-party laboratory in general accordance with California Test Methods. The tests results are useful in the assessment of the degree of corrosivity of the earth materials encountered with regard to concrete and normal grade steel.

ATTERBERG LIMITS
(ASTM D4318)

Sample Location / Depth (feet)	Liquid Limit	Plasticity Index	Classification
B-1 @ 10	26	6	SM
B-1 @ 15	31	16	CL
B-1 @ 20	28	12	CL
B-1 @ 25	24	8	SM-CL
B-1 @ 30	29	10	SM-CL
B-3 @ 10	Non-Plastic	Non-Plastic	SM
B-3 @ 15	27	10	CL
B-3 @ 20	Non-Plastic	Non-Plastic	CL
B-3 @ 25	33	15	CL
B-3 @ 30	Non-Plastic	Non-Plastic	SP

EXPANSION INDEX
(ASTM D4829)

Sample Location / Depth (feet)	Expansion Index	Expansion Potential
B-1 @ 1-5	11	VERY LOW
B-3 @ 1-5	53	MEDIUM

LABORATORY COMPACTION CHARACTERISTICS
(ASTM D1557)

Sample Location / Depth (feet)	Maximum Dry Density (pounds per cubic foot)	Optimum Moisture (percent)
B-1 @ 1-5	126.3 (128.9)	10.6 (9.8)

R-VALUE
(CTM 301/ASTM D2844)

Sample Location / Depth	Material Type (USCS)	R-Value
B-3 @ 1-5	Moderate Brown (CL)	Less than 5

CHEMICAL ANALYSIS FOR SULFATE
(CALIFORNIA TEST 422)

Sample Location	Depth (feet)	Results ppm
B-1	1-5	229.4

CHEMICAL ANALYSIS FOR CHLORIDE
(CALIFORNIA TEST 422)

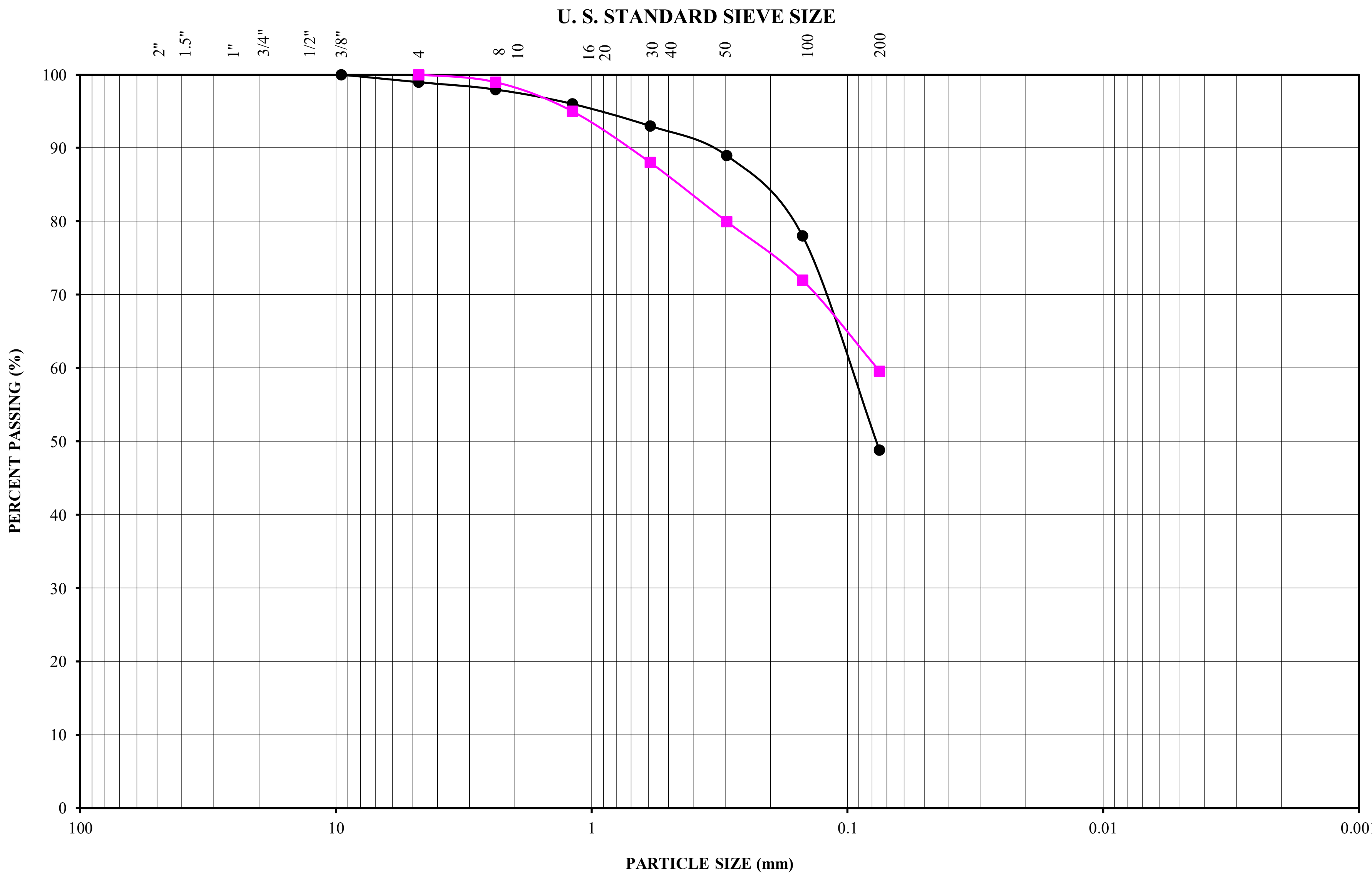
Sample Location	Depth (feet)	Results ppm
B-1	1-5	34.3

CHEMICAL ANALYSIS FOR p.H.

Sample Location	Depth (feet)	Results
B-1	1-5	9.80

CHEMICAL ANALYSIS FOR RESISTIVITY
(CALIFORNIA TEST 643)

Sample Location	Depth (feet)	Results ohms-cm
B-1	1-5	3160



PARTICLE SIZE ANALYSIS

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	10	●	26	6	SM
B-1	15	■	31	16	CL
CTE JOB NUMBER:		4830.2200060.0000		FIGURE:	C-1

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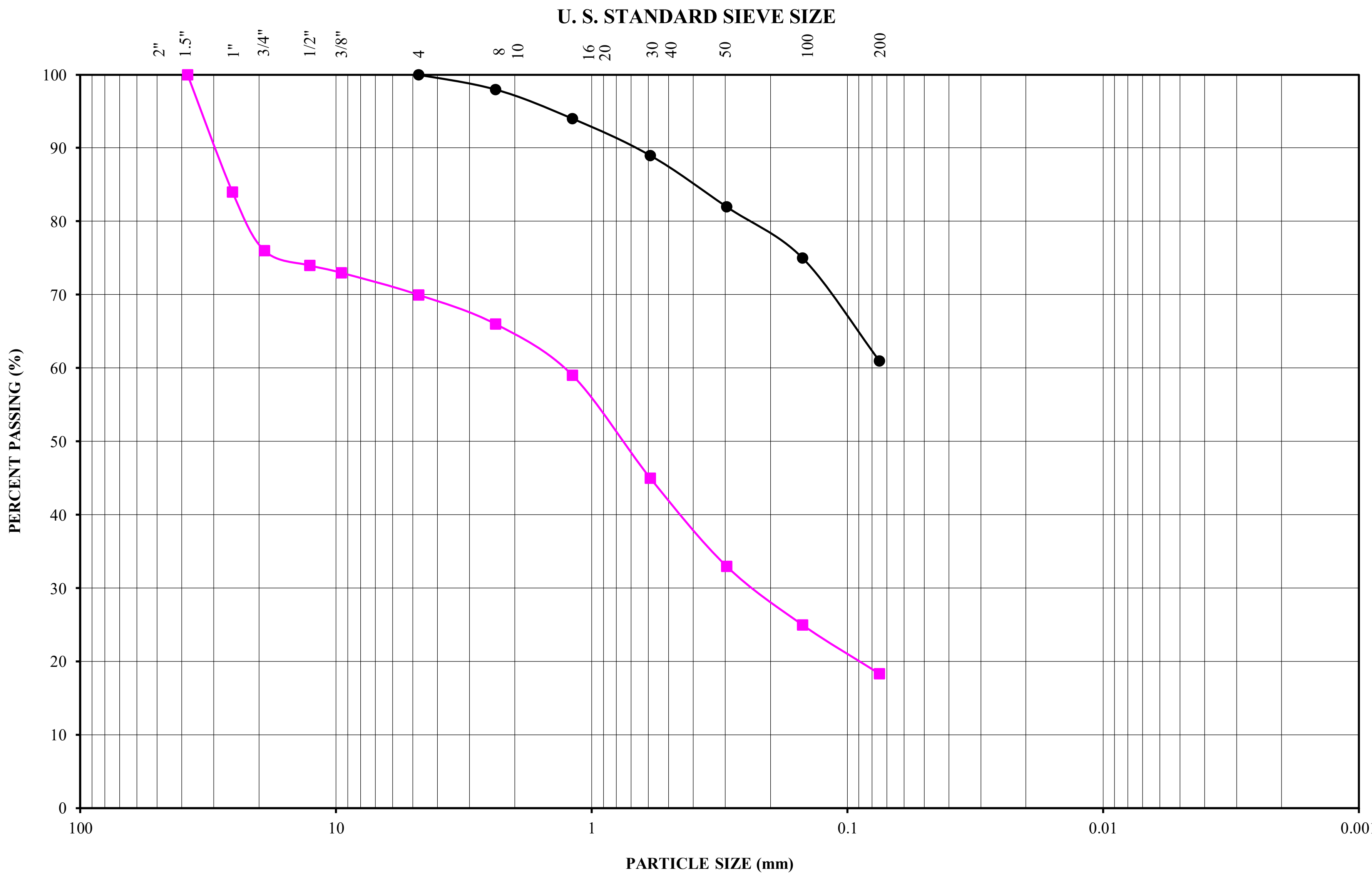
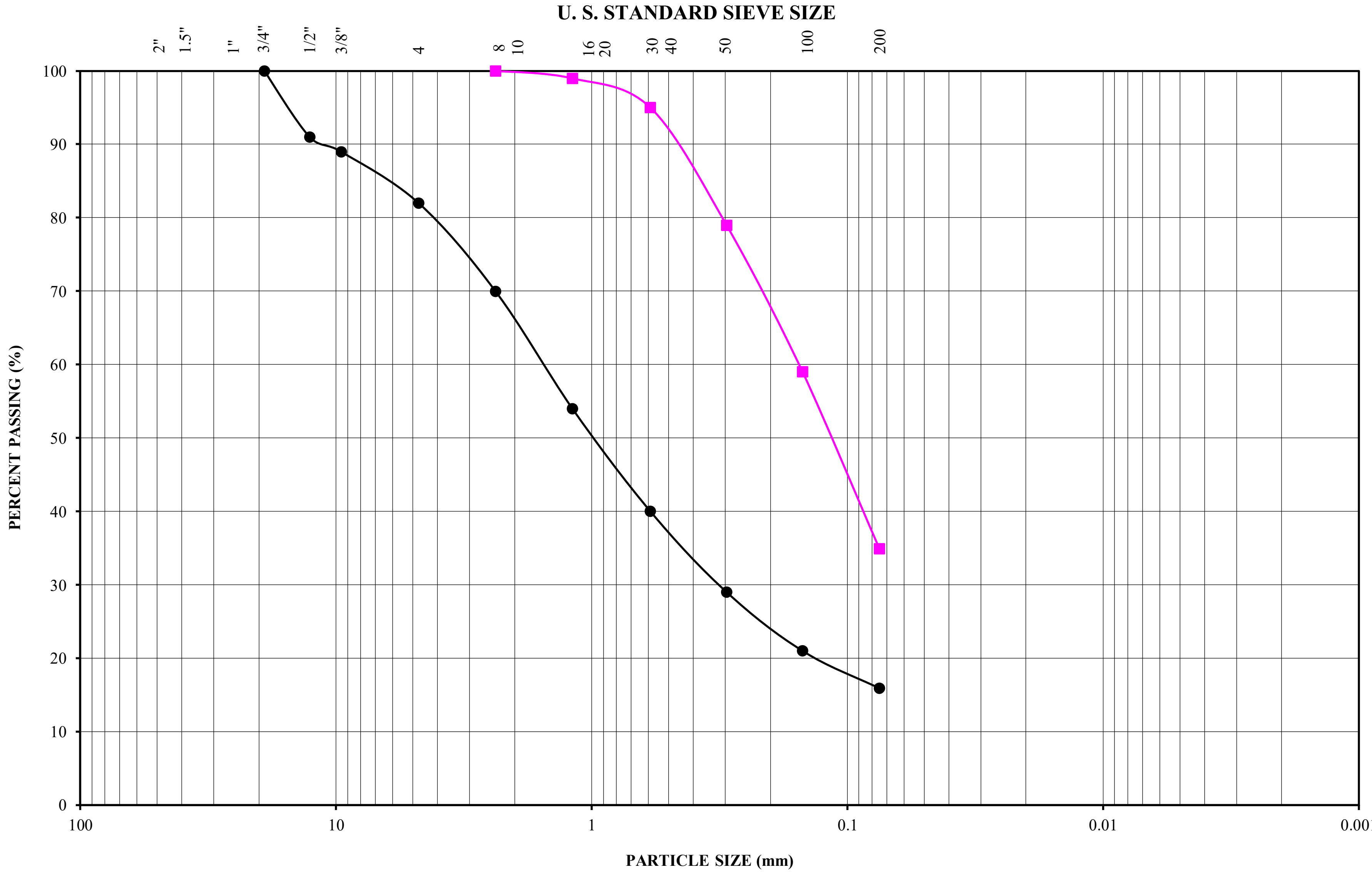


PARTICLE SIZE ANALYSIS

A Universal Engineering Sciences Company
Construction Testing & Engineering, Inc.
Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	20	●	28	12	CL
B-1	25	■	24	8	SM
CTE JOB NUMBER:	4830.2200060.0000			FIGURE:	C-2



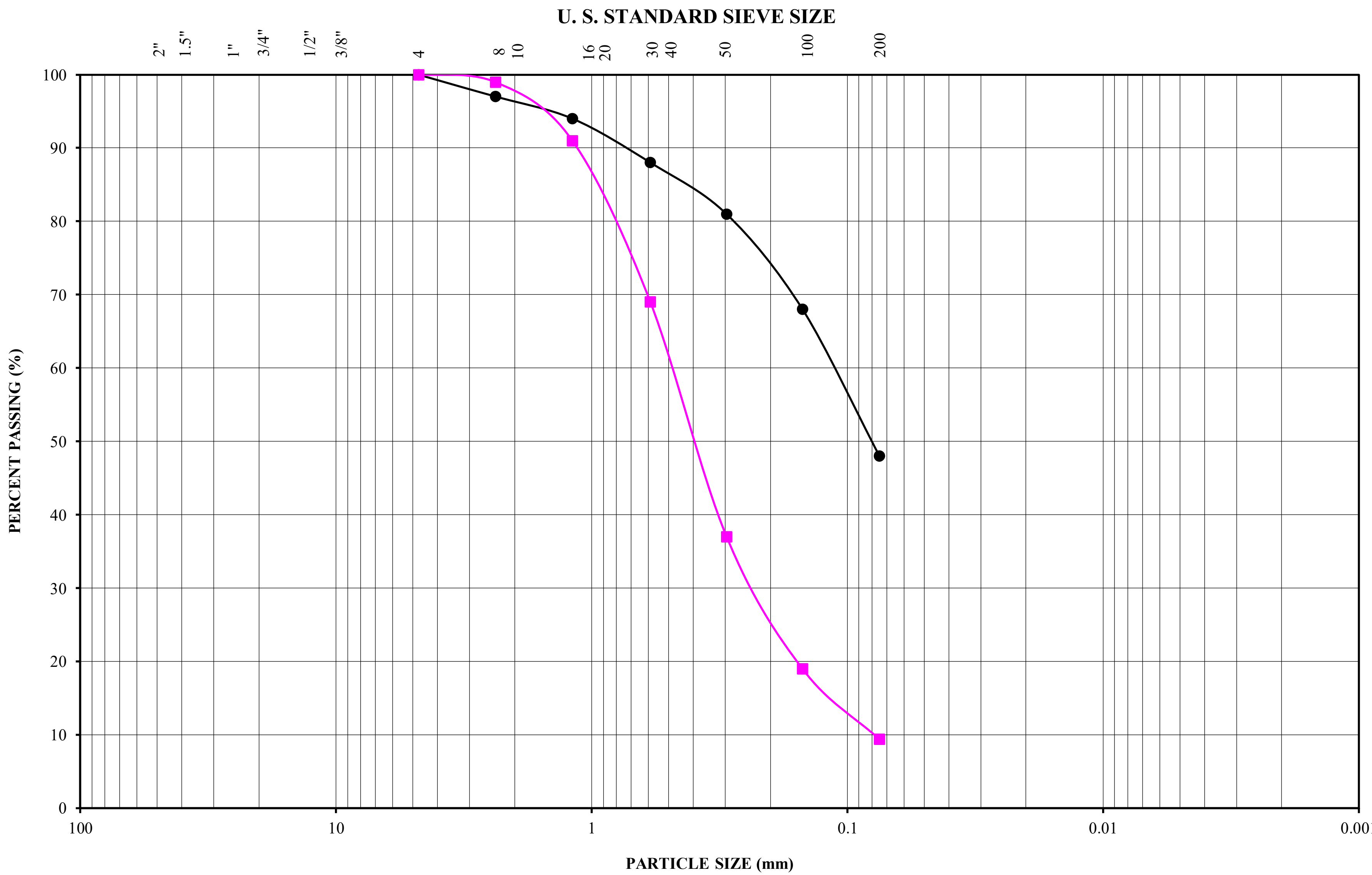
PARTICLE SIZE ANALYSIS

A Universal Engineering Sciences Company

Construction Testing & Engineering, Inc.

Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	30	●	29	10	SM
B-3	10	■	Non-Plastic	Non-Plastic	SM
CTE JOB NUMBER:	4830.2200060.0000			FIGURE:	C-3



PARTICLE SIZE ANALYSIS

A Universal Engineering Sciences Company

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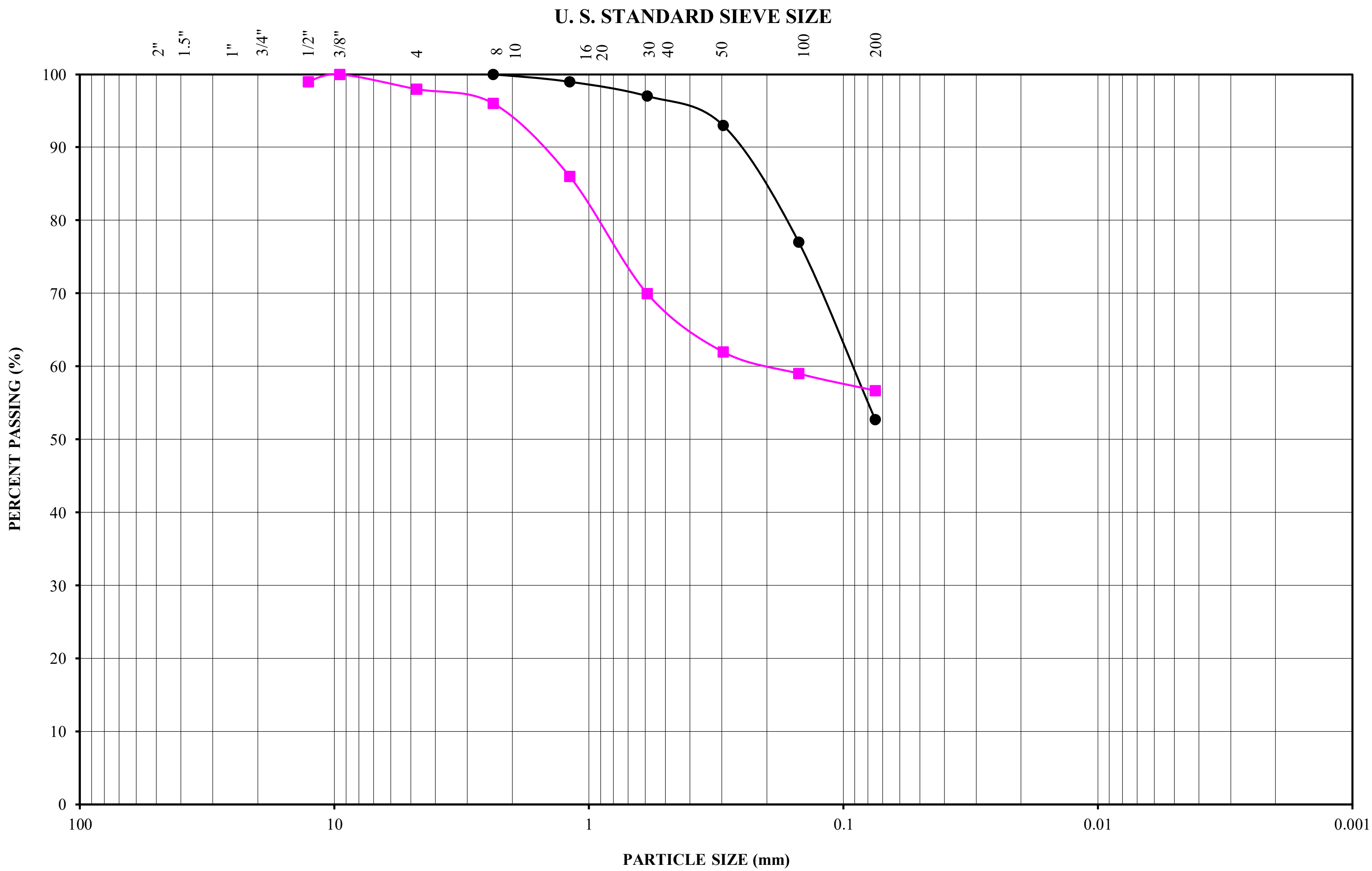
Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-3	15	●	27	10	SC
B-3	20	■	Non-Plastic	Non-Plastic	SC
CTE JOB NUMBER:	4830.2200060.0000			FIGURE:	C-4



PARTICLE SIZE ANALYSIS

CTE
A Universal Engineering Sciences Company
Construction Testing & Engineering, Inc.
Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-3	25	●	33	15	CL
B-3	30	■	Non-Plastic	Non-Plastic	CL
CTE JOB NUMBER:		4830.2200060.0000		FIGURE:	C-5

APPENDIX D

STANDARD GRADING SPECIFICATIONS

Section 1 - General

Construction Testing & Engineering, Inc. presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner's representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas

All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality

Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE’s recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair

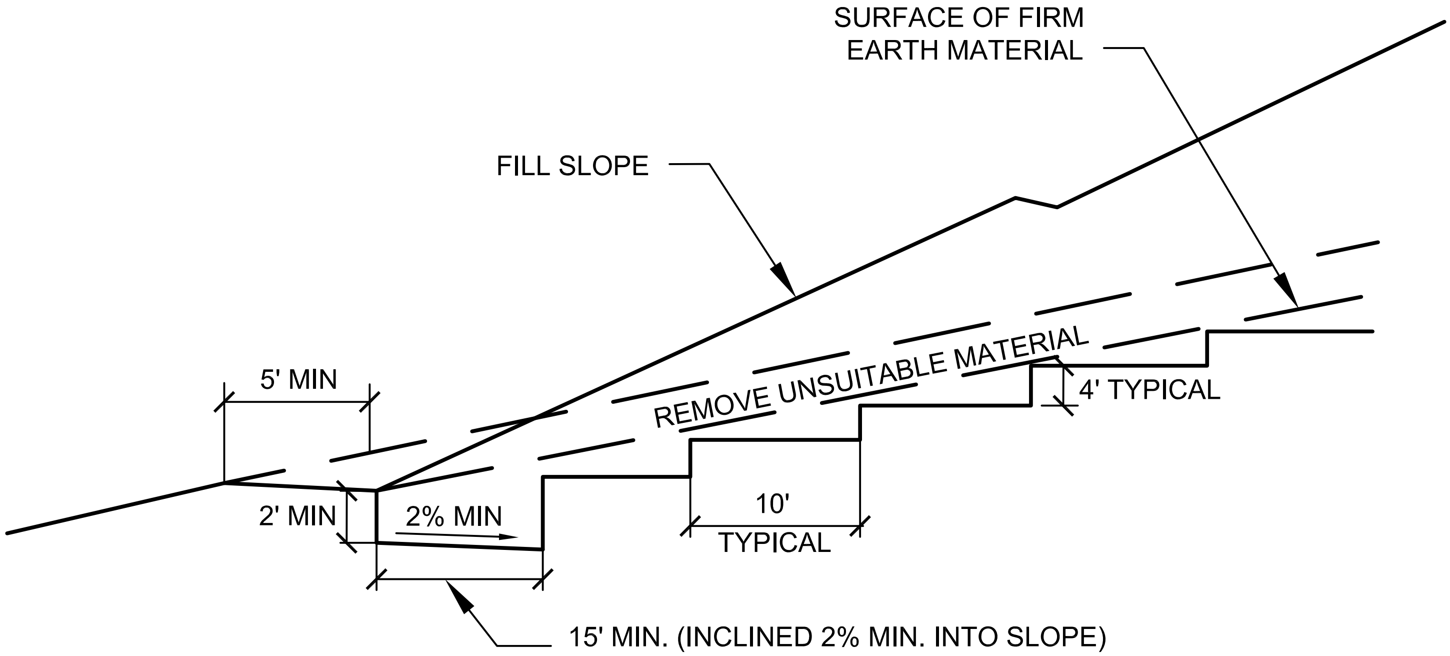
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

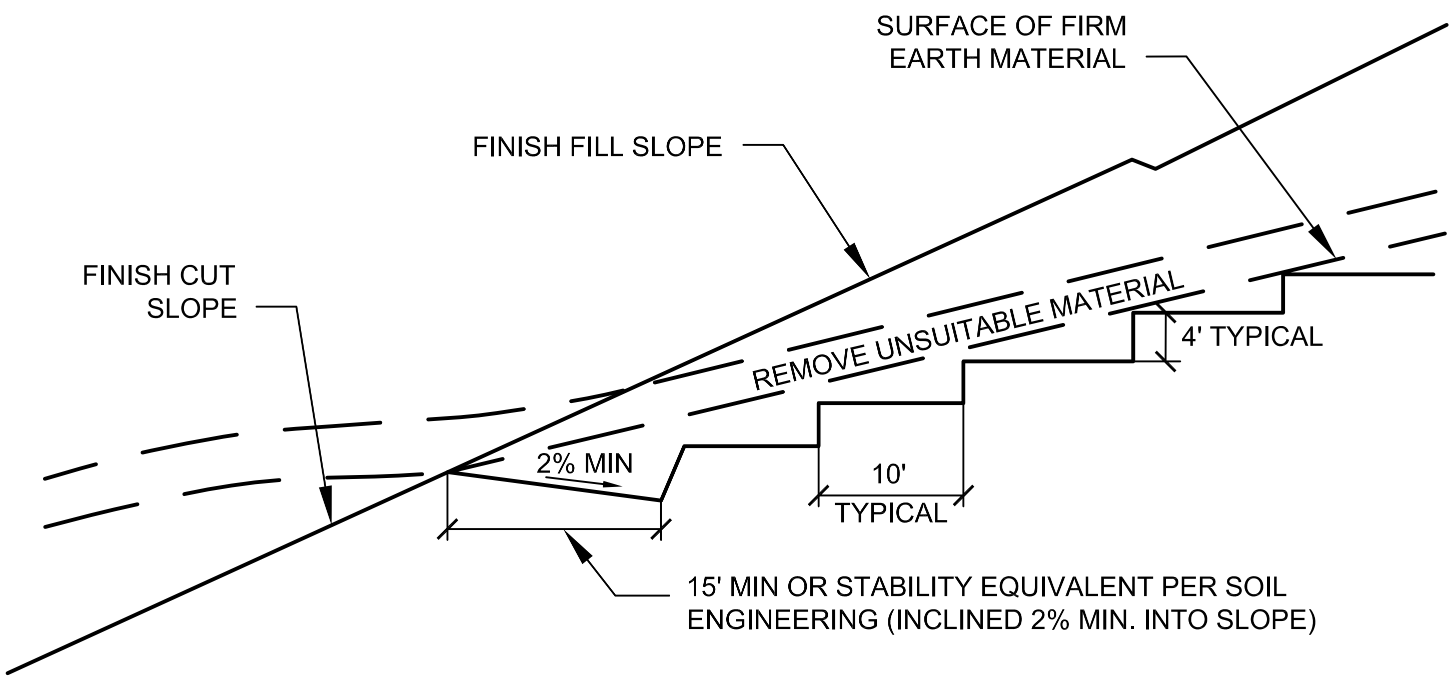
If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).

BENCHING FILL OVER NATURAL

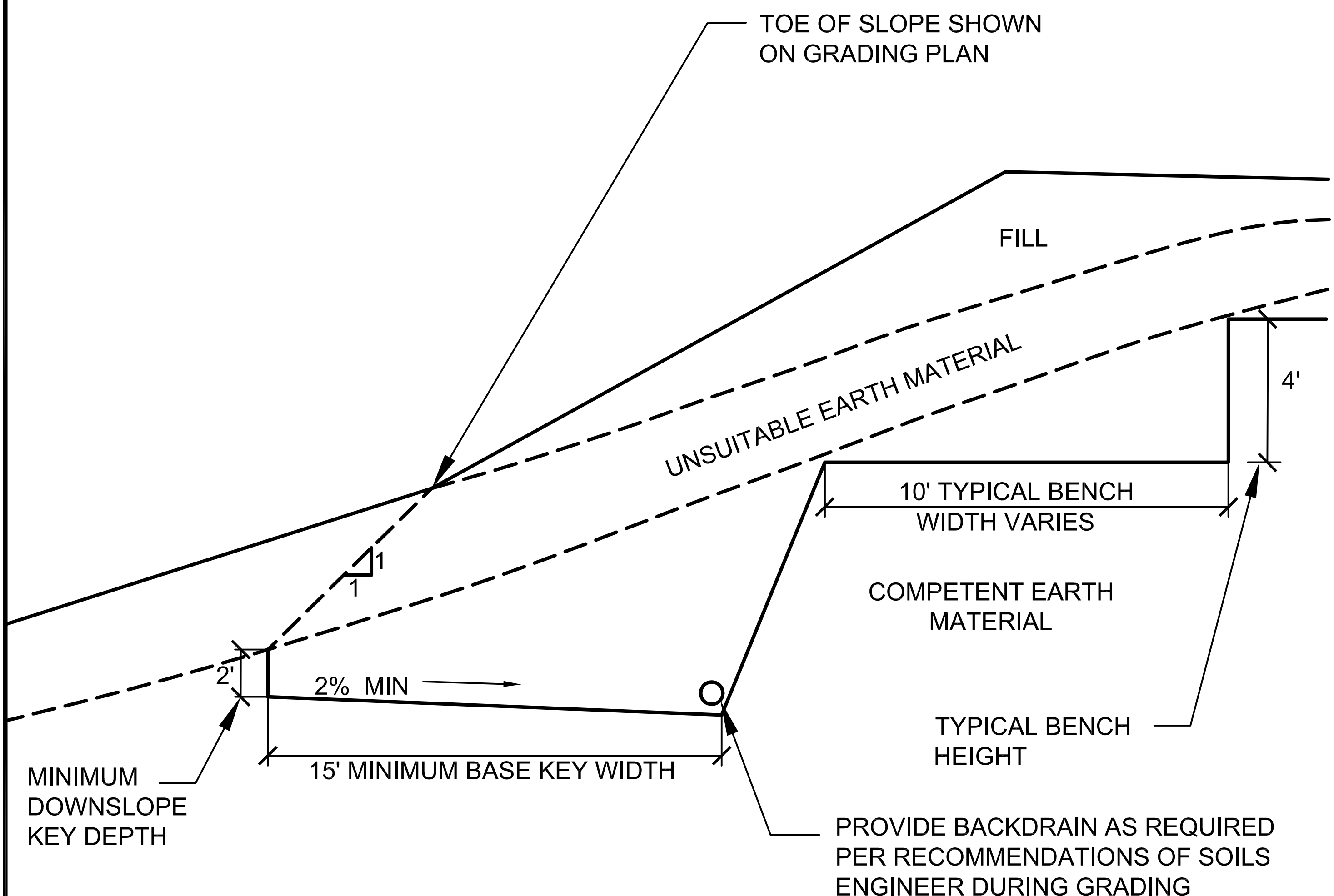


BENCHING FILL OVER CUT



NOT TO SCALE

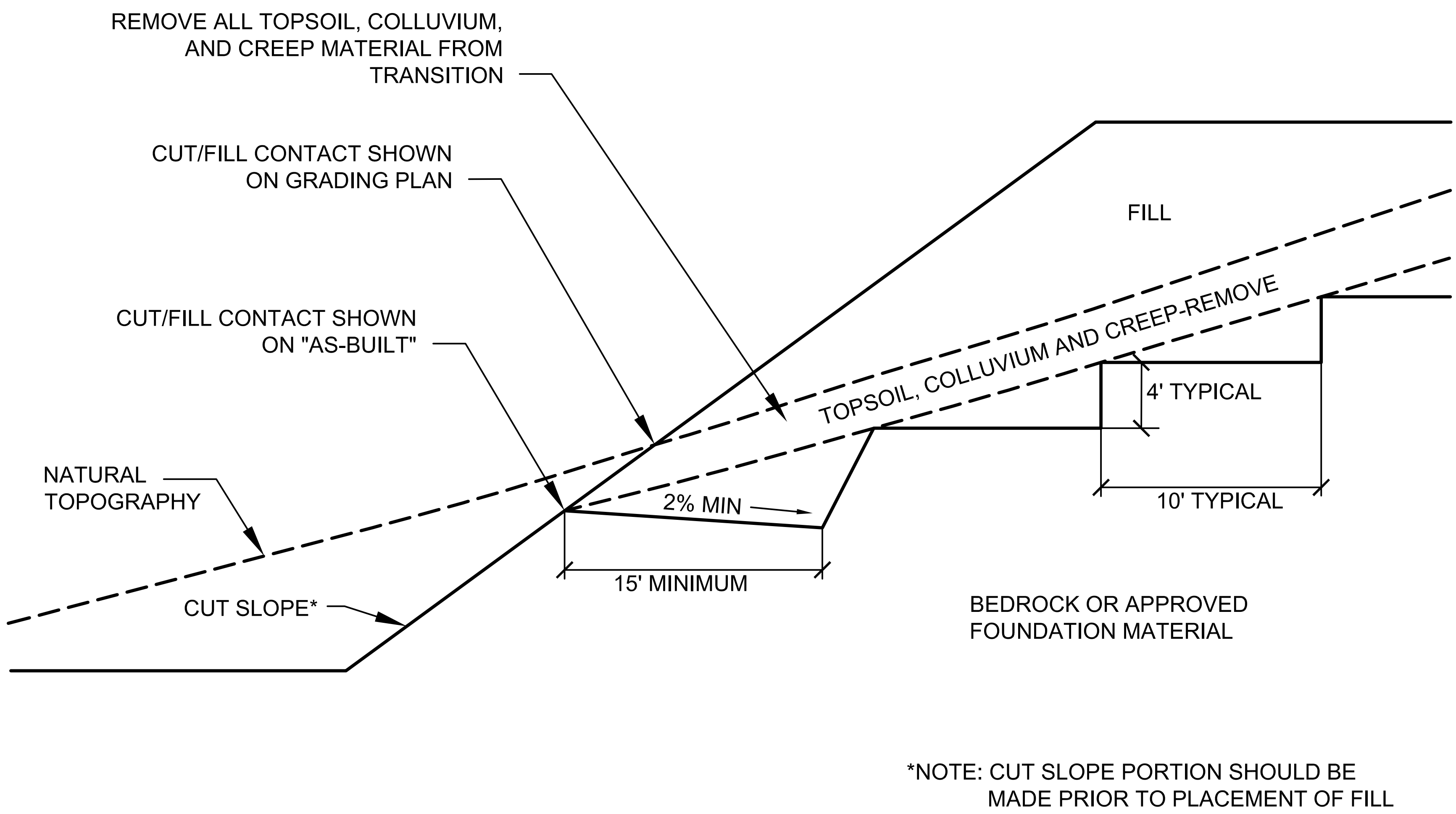
BENCHING FOR COMPACTED FILL DETAIL



WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

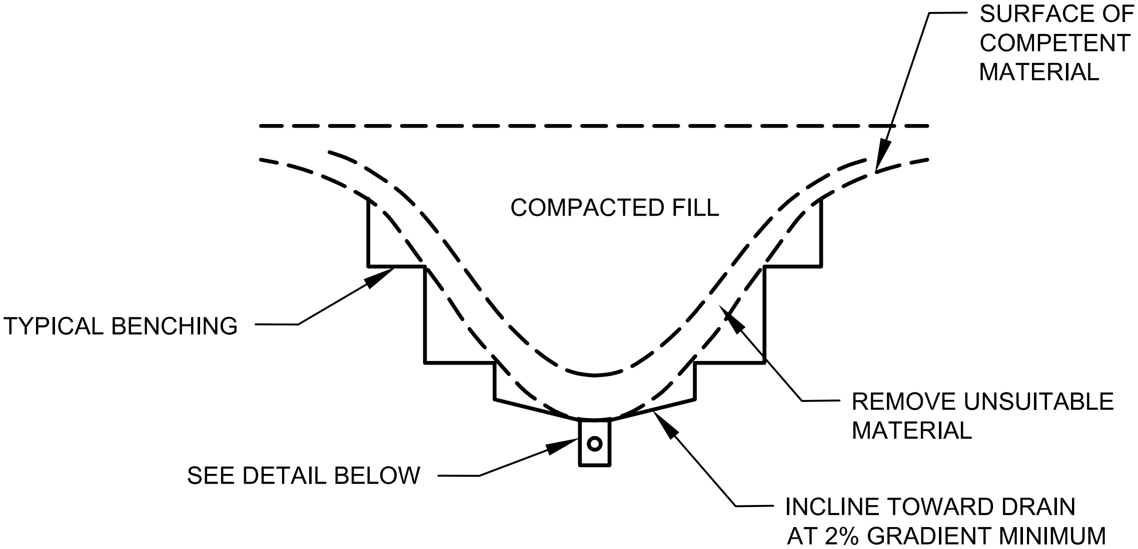
NOT TO SCALE

FILL SLOPE ABOVE NATURAL GROUND DETAIL

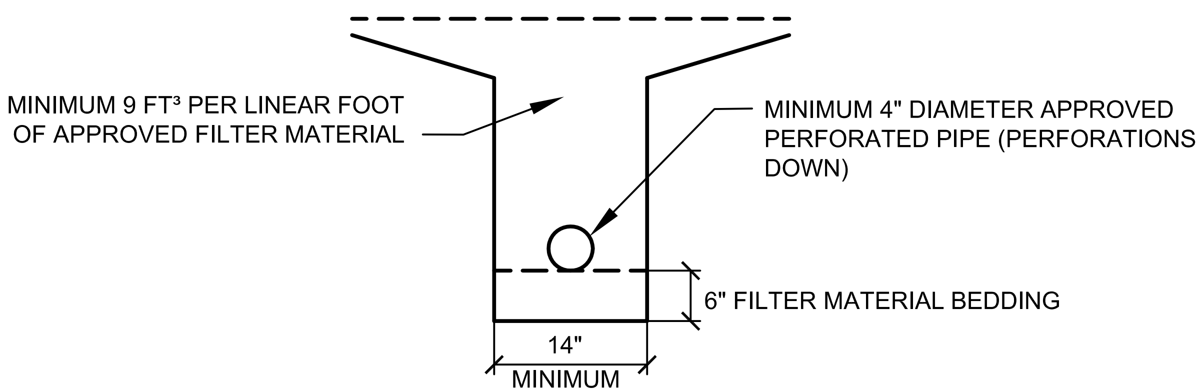


NOT TO SCALE

FILL SLOPE ABOVE CUT SLOPE DETAIL



DETAIL



CALTRANS CLASS 2 PERMEABLE MATERIAL
FILTER MATERIAL TO MEET FOLLOWING
SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

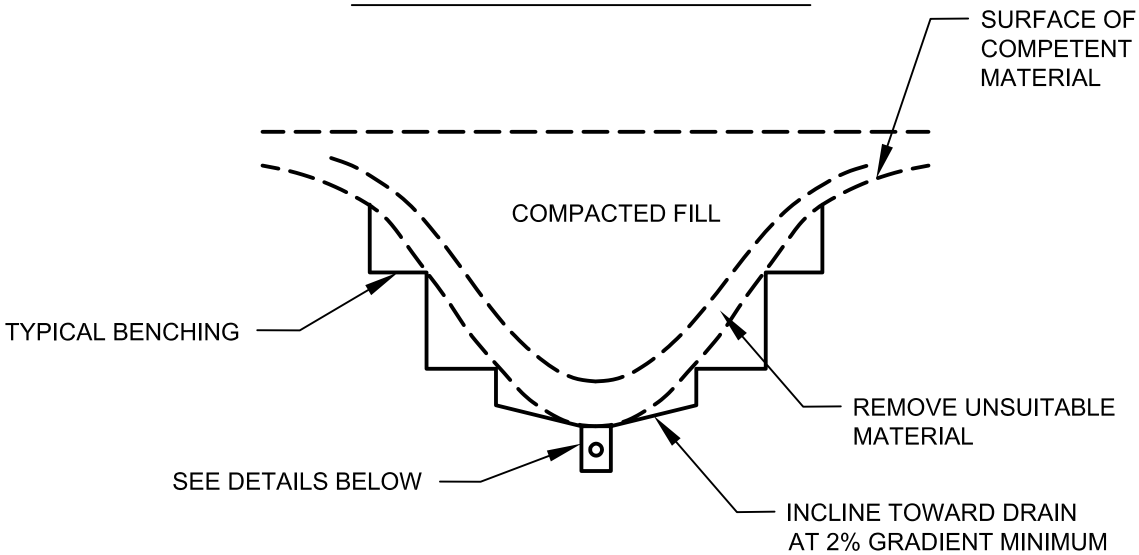
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

NOT TO SCALE

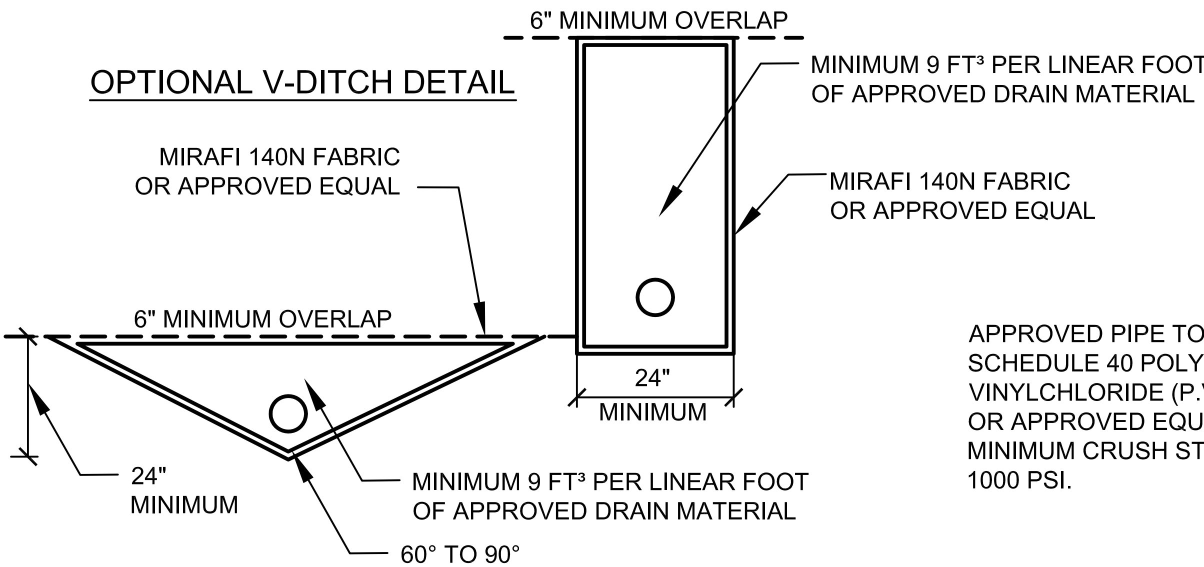
TYPICAL CANYON SUBDRAIN DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAILS

OPTIONAL V-DITCH DETAIL



APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	88-100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

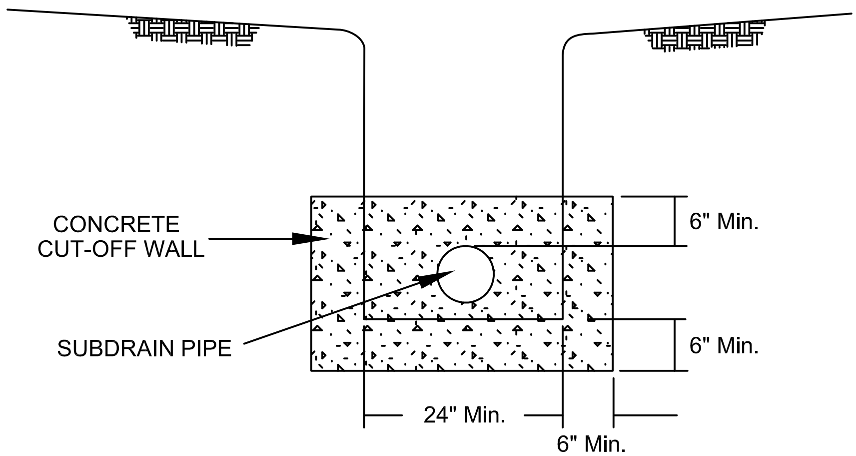
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

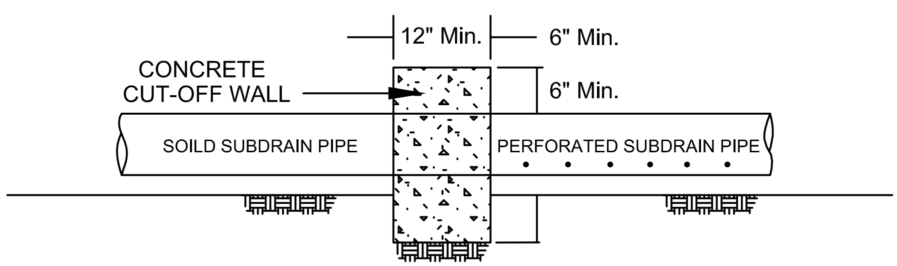
NOT TO SCALE

GEOFABRIC SUBDRAIN

FRONT VIEW



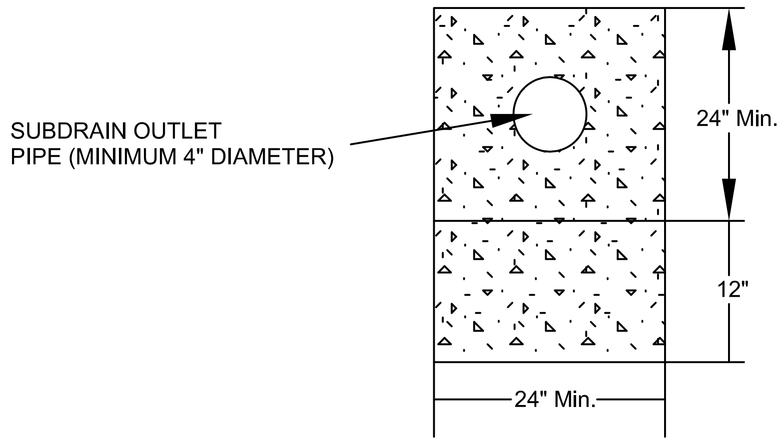
SIDE VIEW



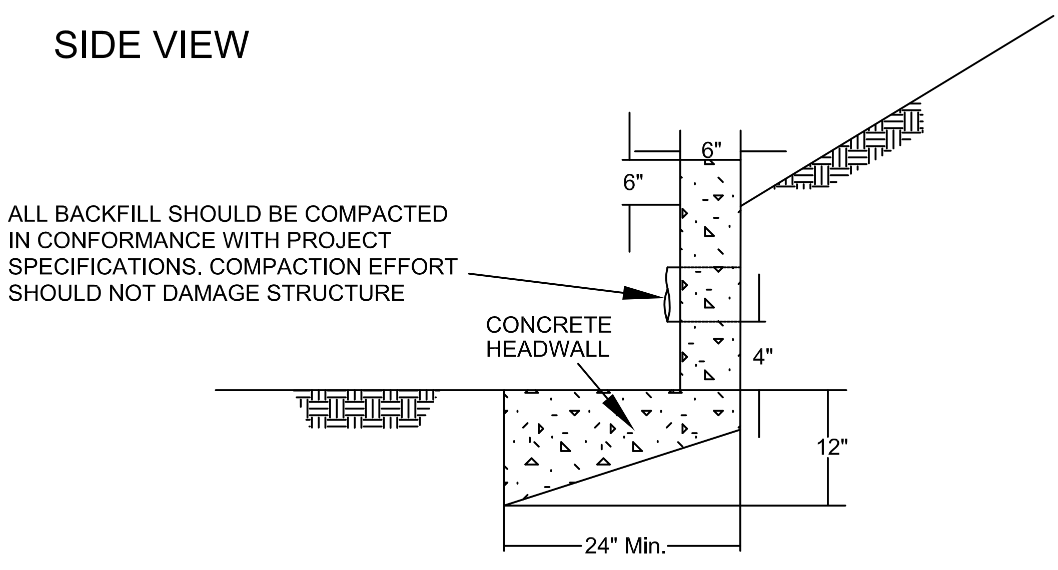
NOT TO SCALE

RECOMMENDED SUBDRAIN CUT-OFF WALL

FRONT VIEW



SIDE VIEW



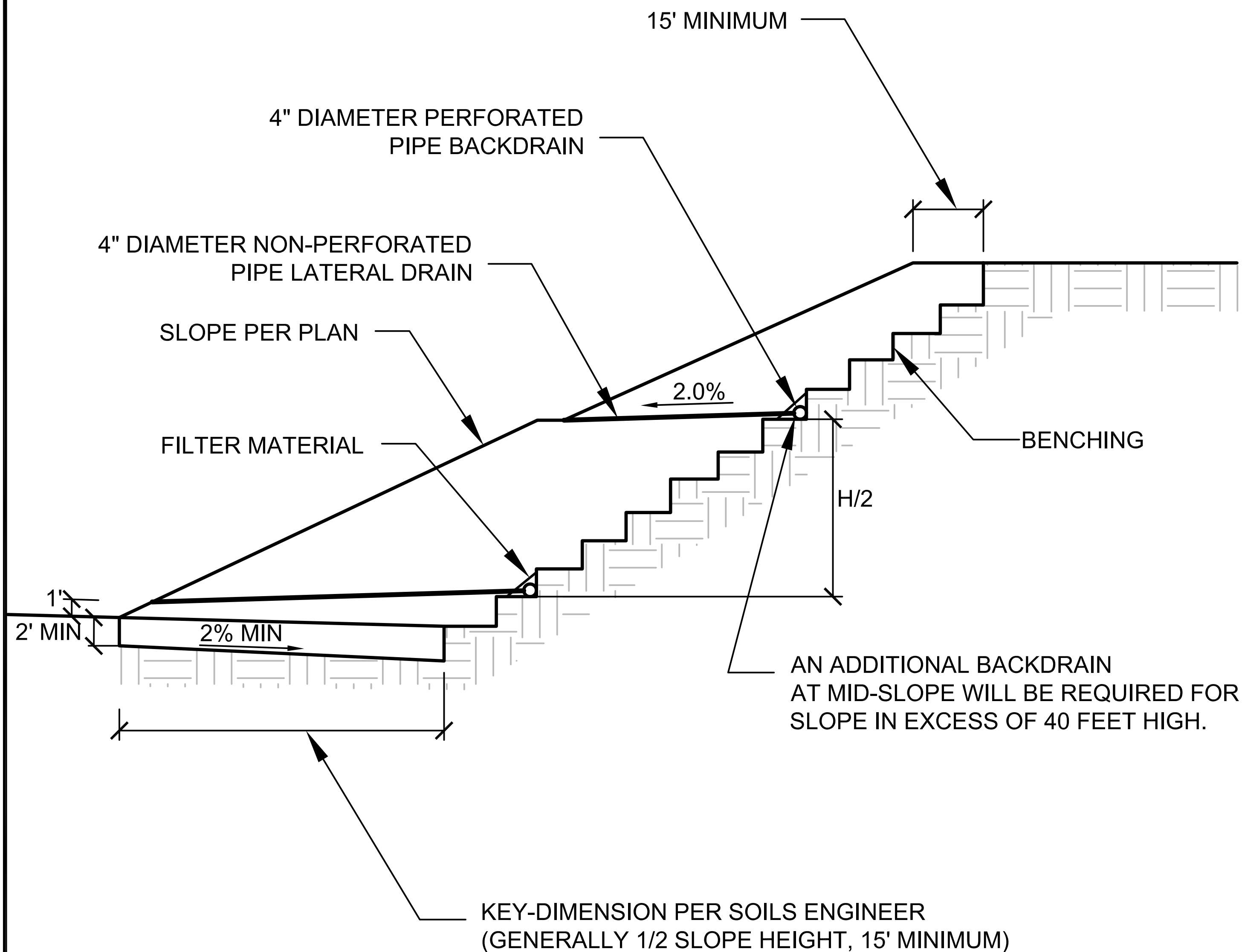
NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE OR INTO CONTROLLED SURFACE DRAINAGE DEVICE

ALL DISCHARGE SHOULD BE CONTROLLED

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE MODIFIED DEPENDING UPON ENCOUNTERED CONDITIONS AND LOCAL REQUIREMENTS

NOT TO SCALE

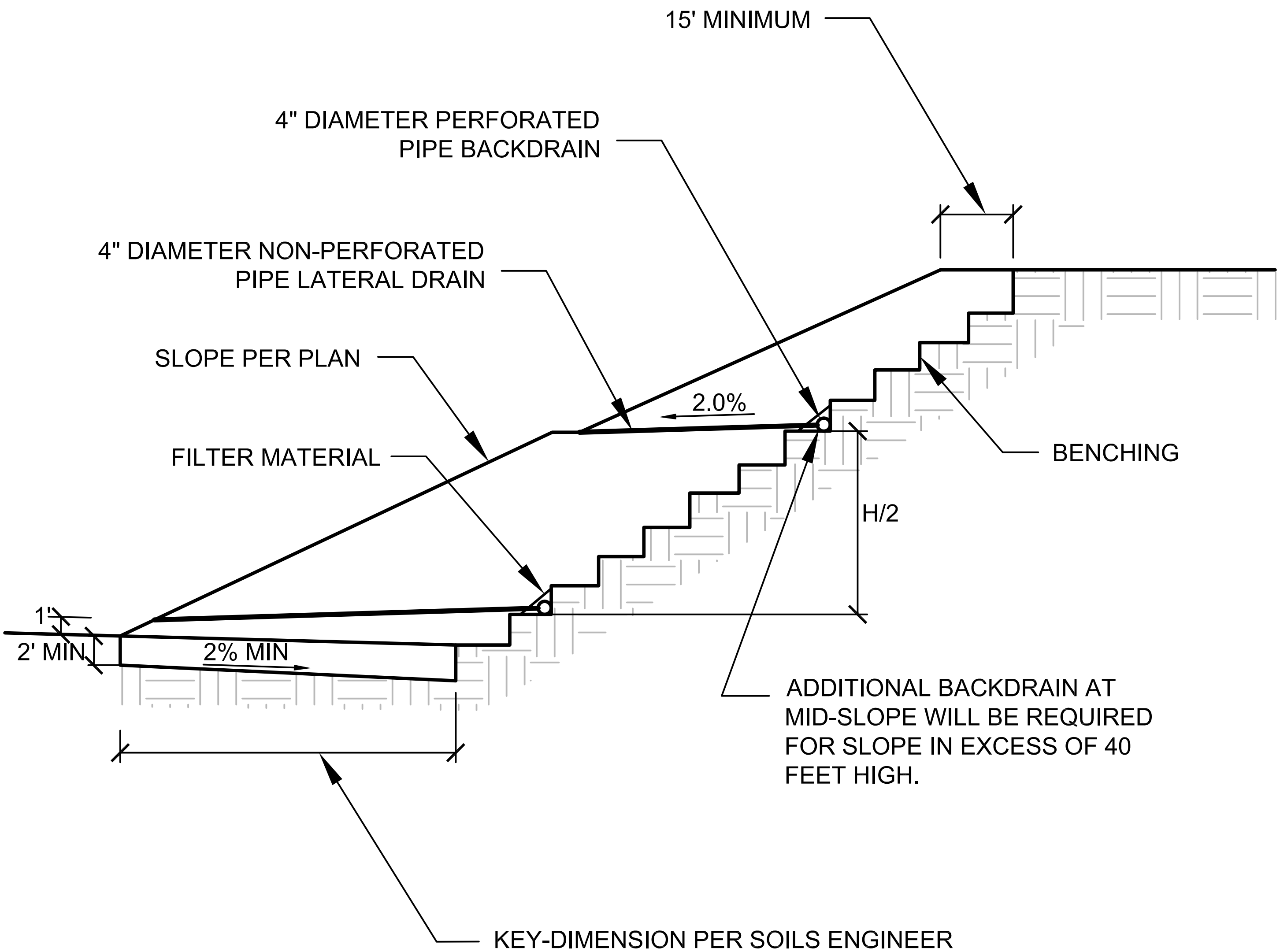
TYPICAL SUBDRAIN OUTLET HEADWALL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

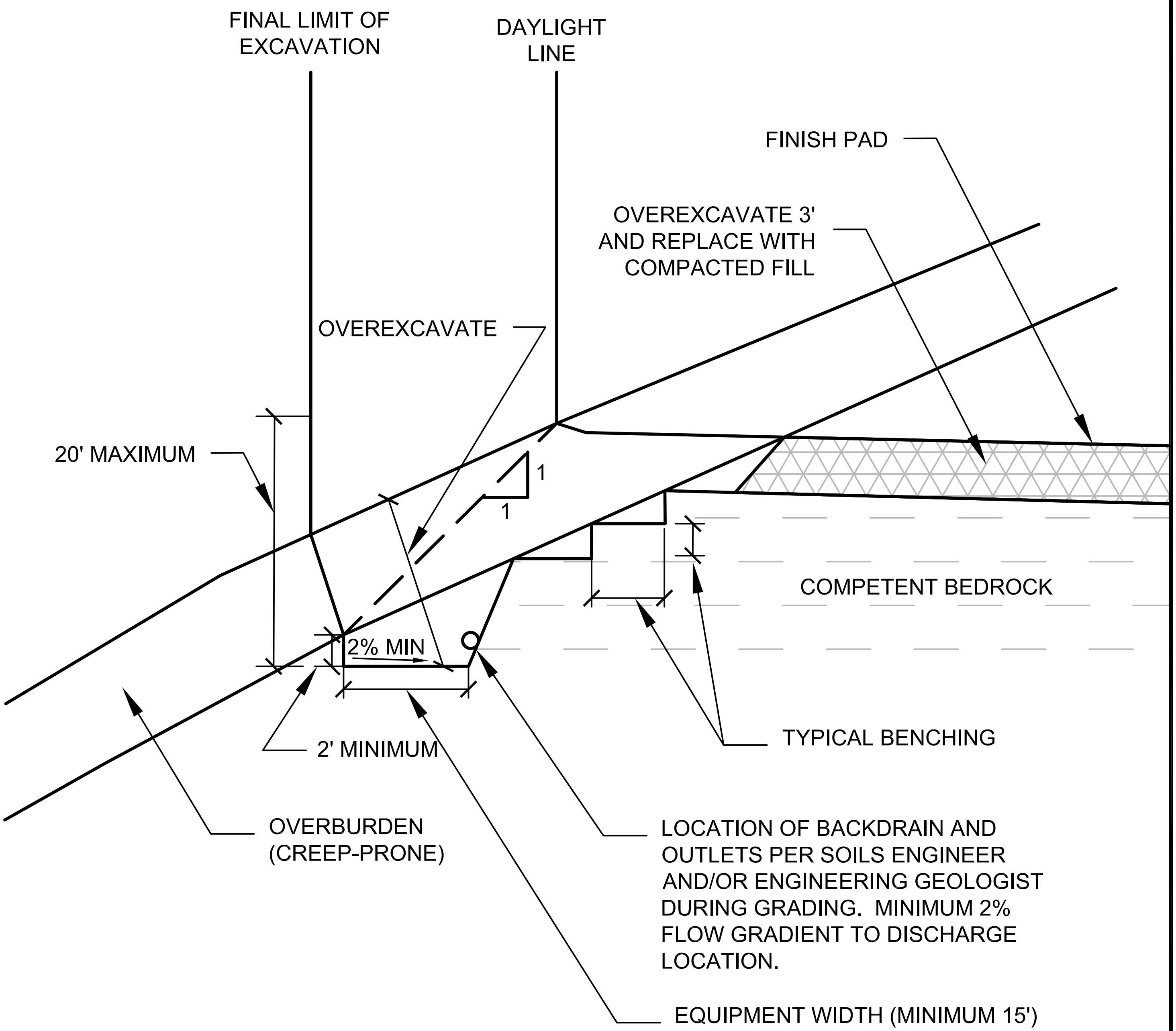
TYPICAL SLOPE STABILIZATION FILL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

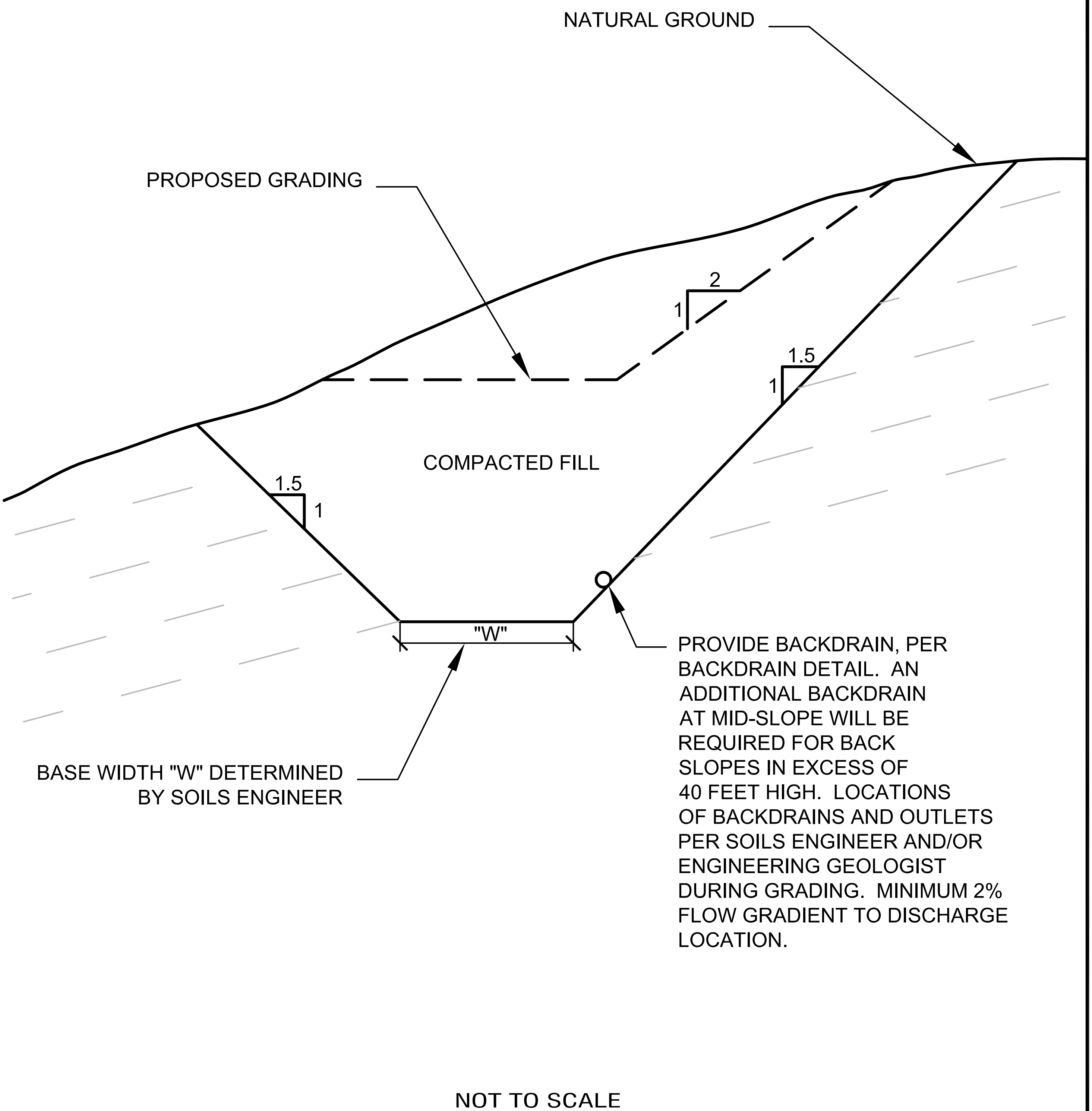
NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL

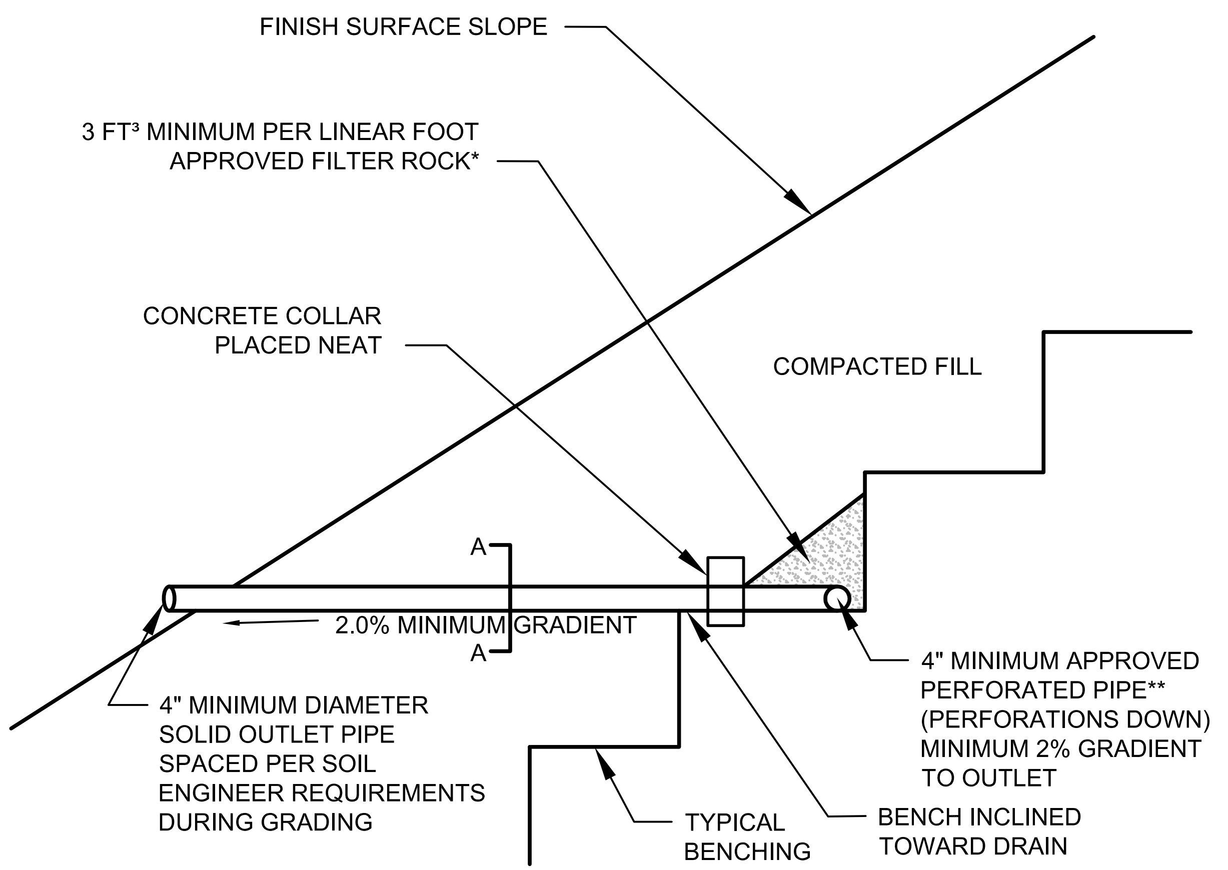


NOT TO SCALE

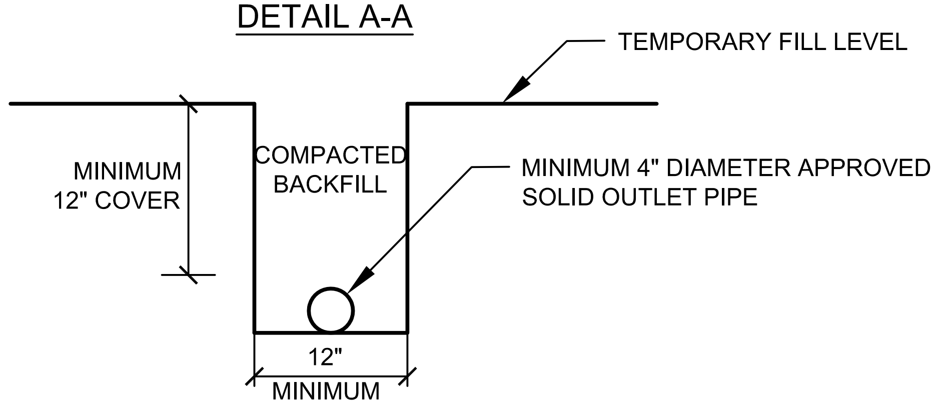
DAYLIGHT SHEAR KEY DETAIL



TYPICAL SHEAR KEY DETAIL



DETAIL A-A



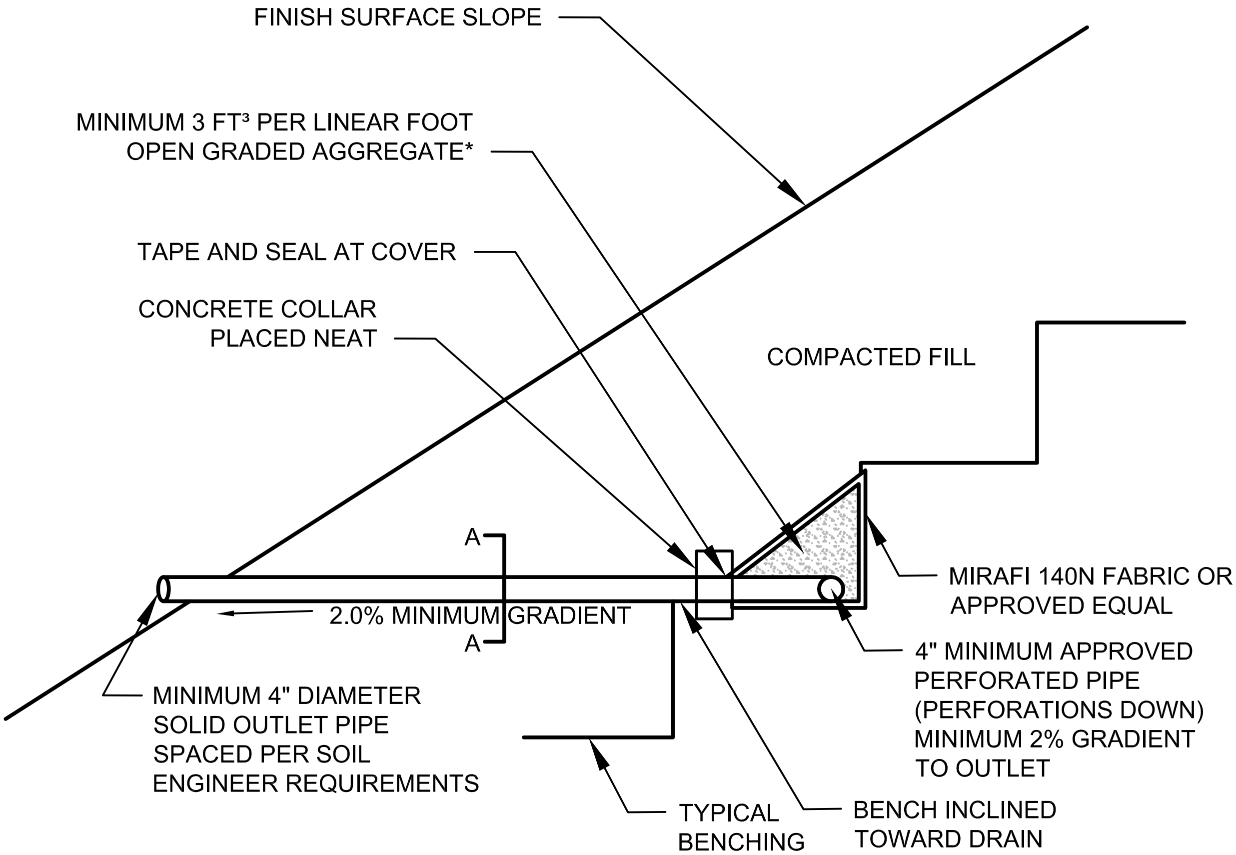
**APPROVED PIPE TYPE:
SCHEDULE 40 POLYVINYL CHLORIDE
(P.V.C.) OR APPROVED EQUAL.
MINIMUM CRUSH STRENGTH 1000 PSI

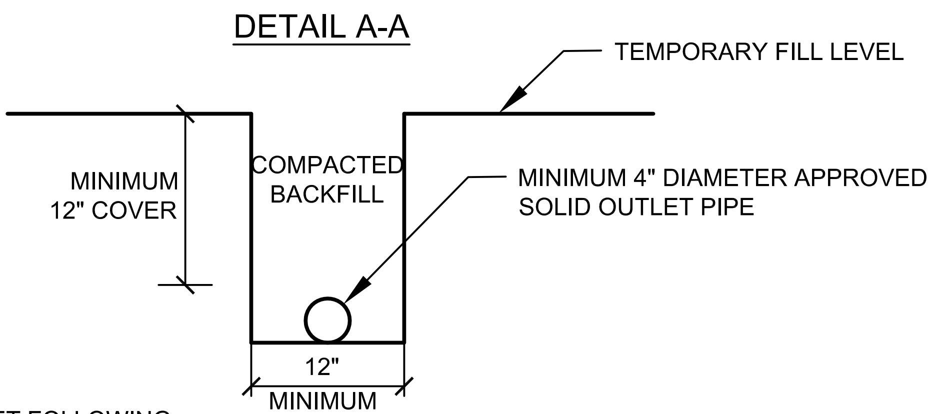
*FILTER ROCK TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOT TO SCALE

TYPICAL BACKDRAIN DETAIL



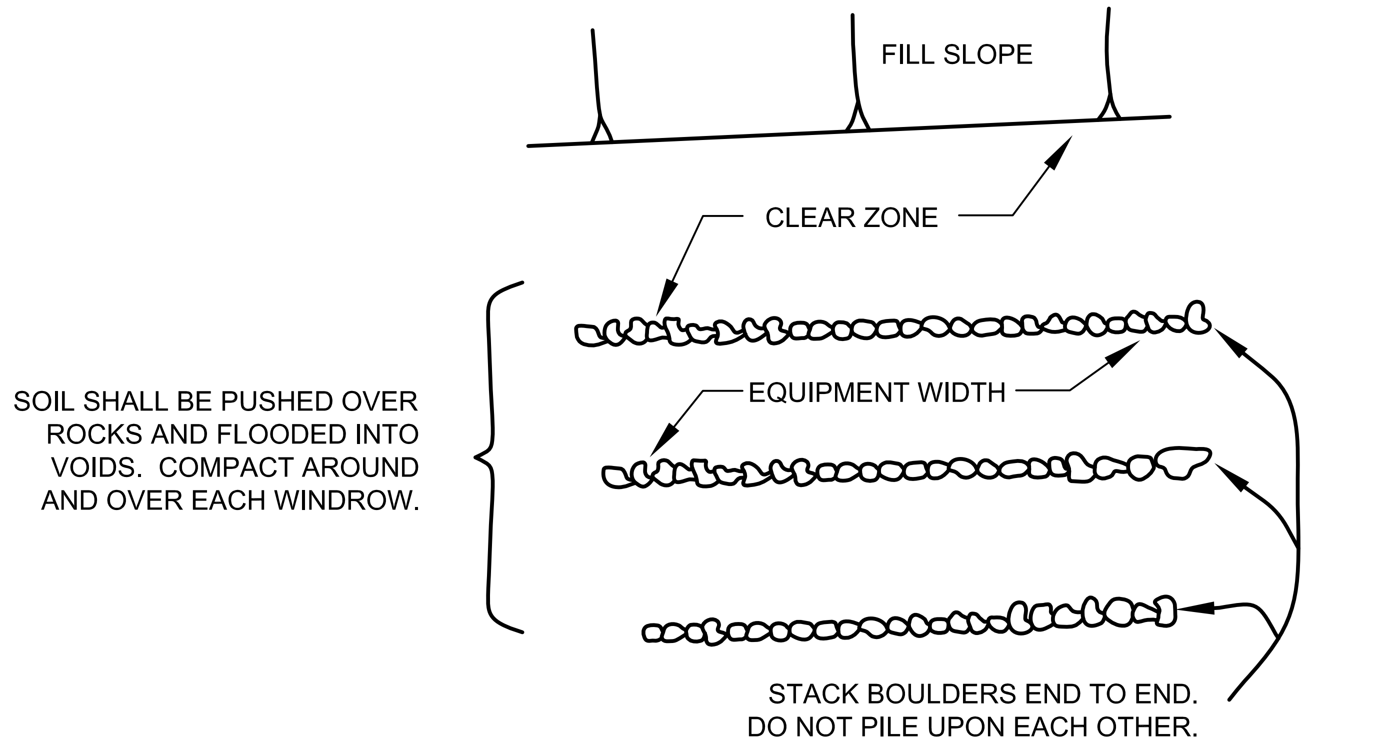


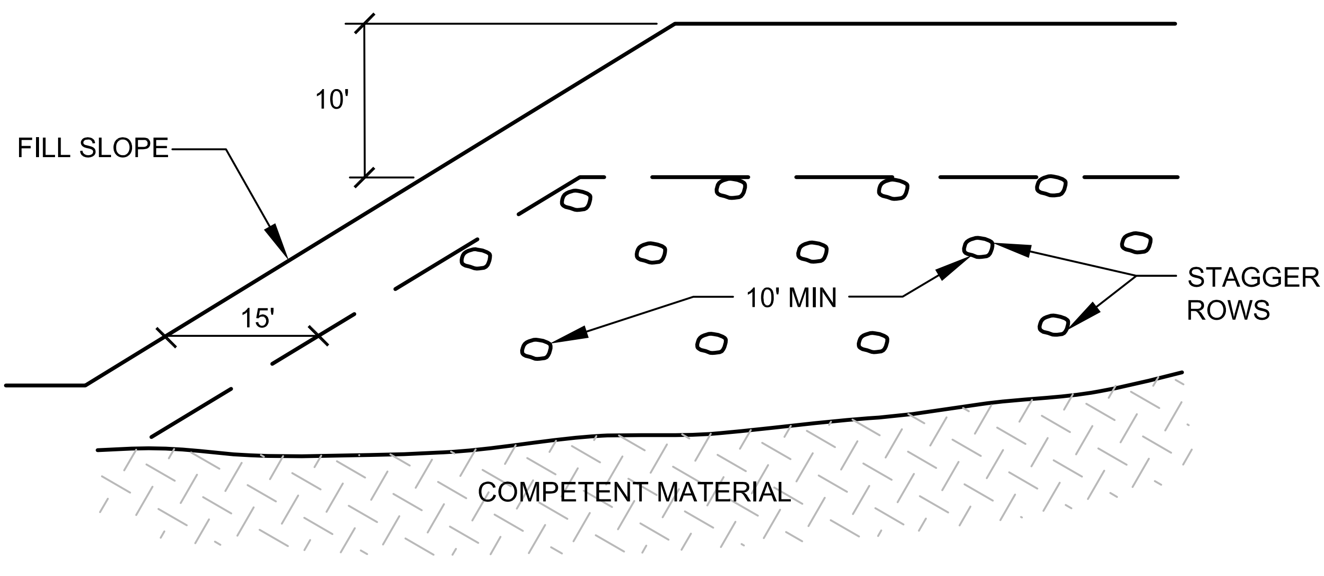
*NOTE: AGGREGATE TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

NOT TO SCALE

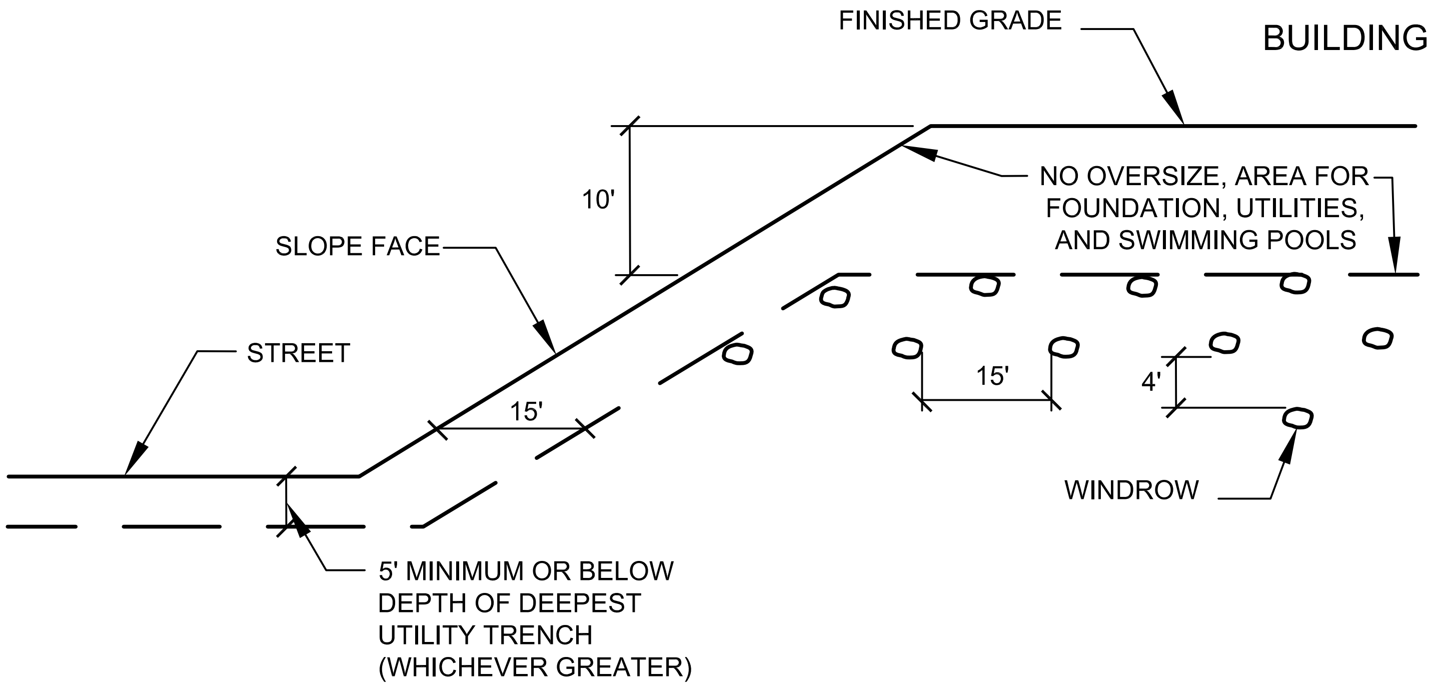
BACKDRAIN DETAIL (GEOFRABIC)



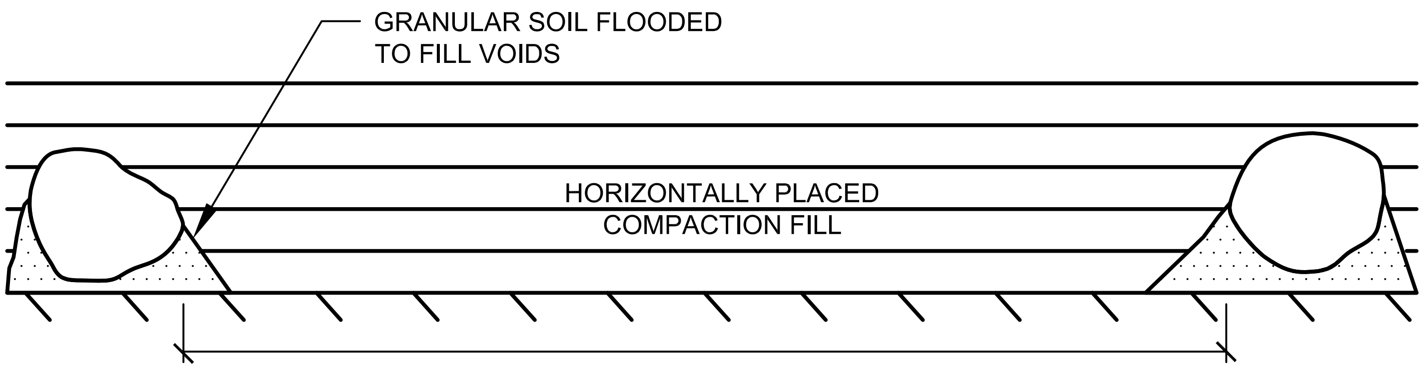


NOT TO SCALE

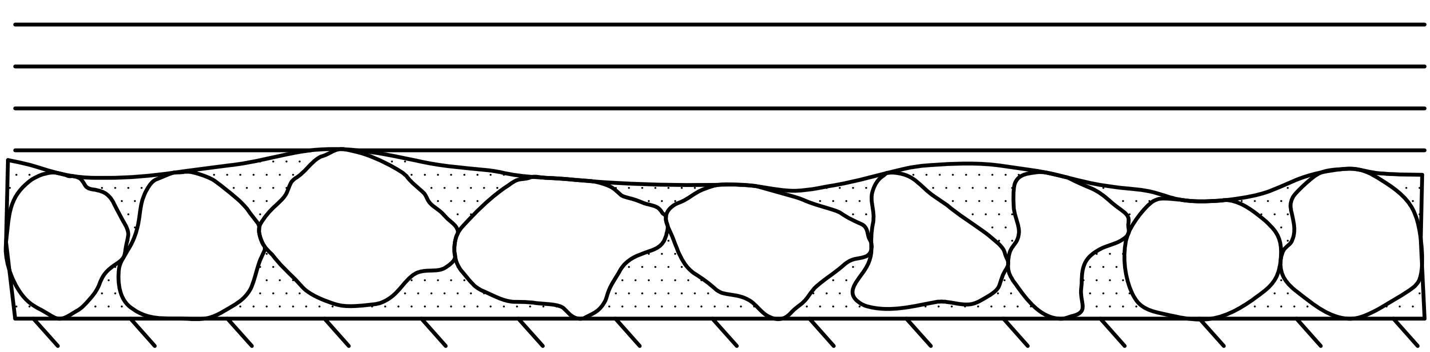
ROCK DISPOSAL DETAIL



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW

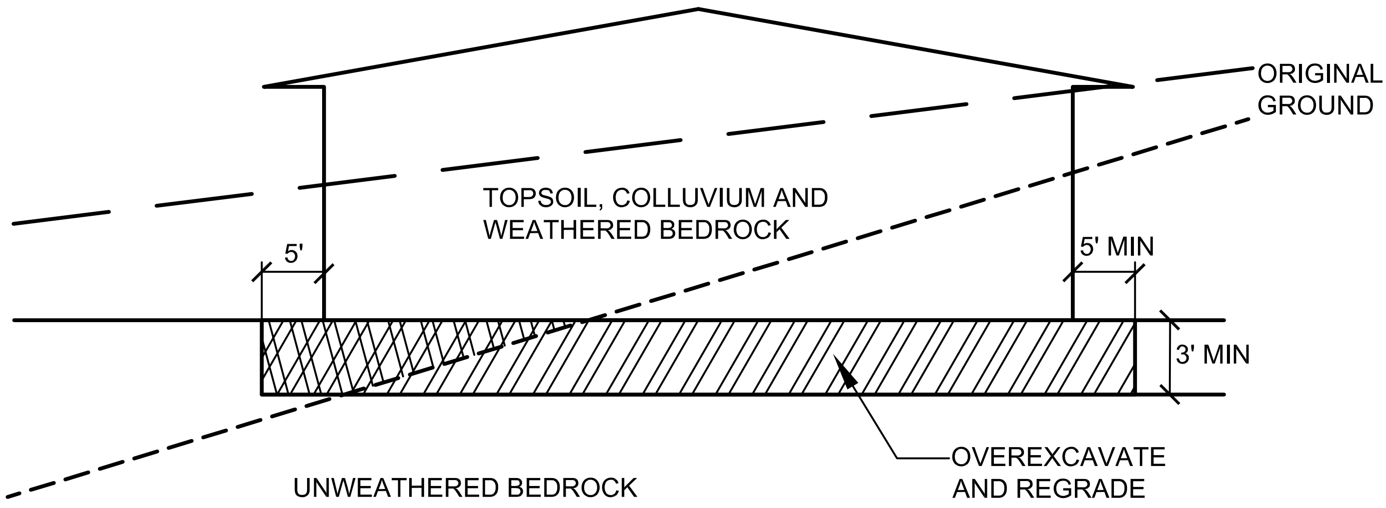


NOT TO SCALE

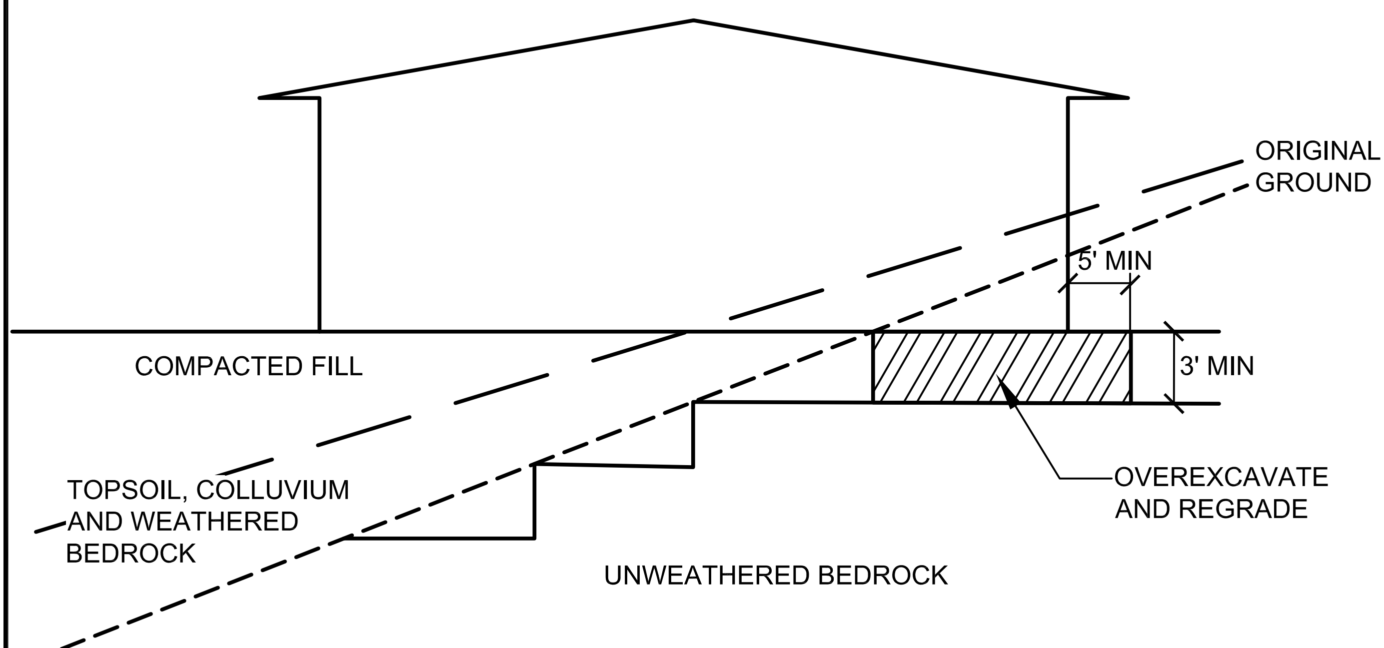
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



NOT TO SCALE

TRANSITION LOT DETAIL

<u>APPENDIX E</u>

LIQUEFACTION EVALUATION

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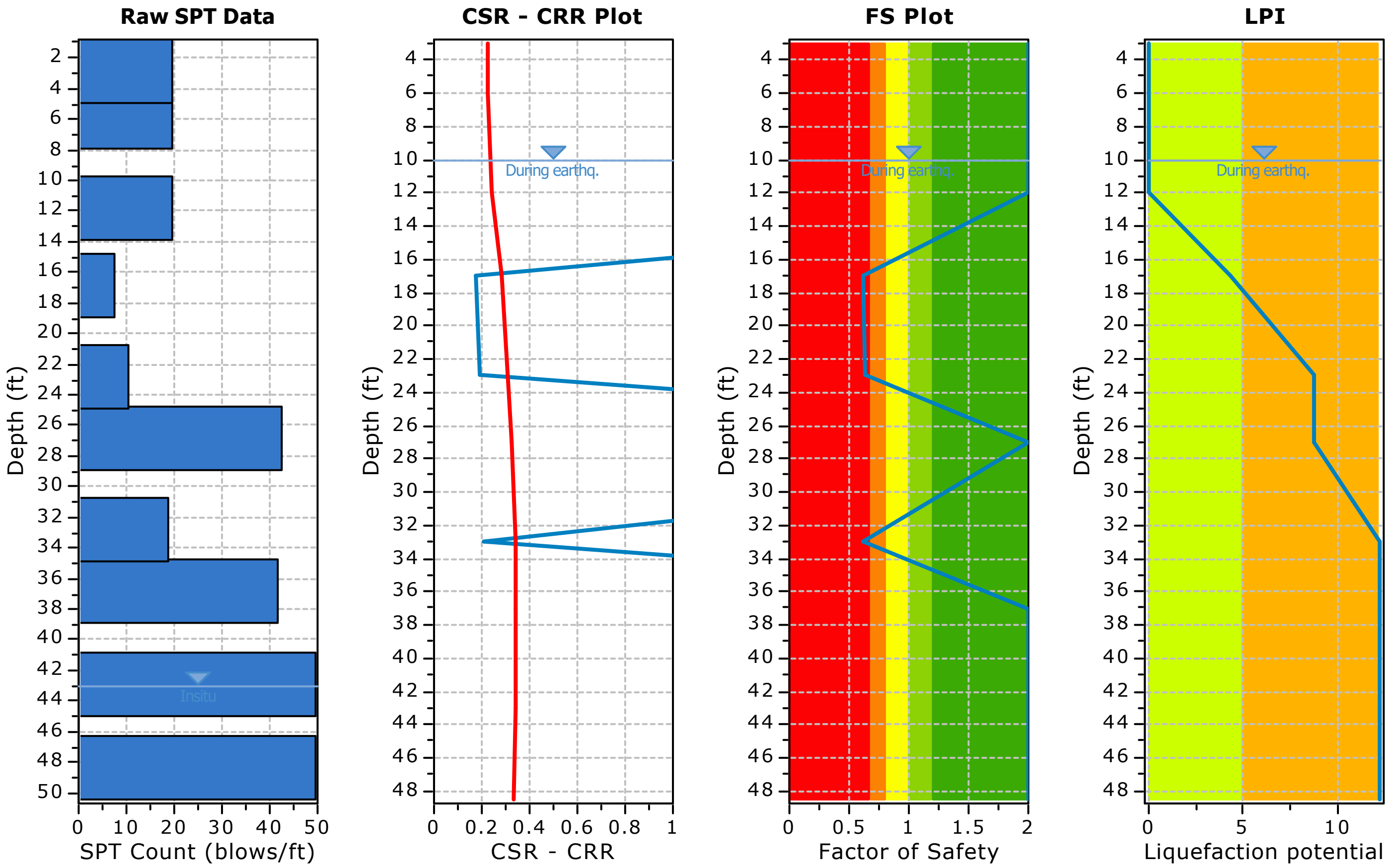
SPT BASED LIQUEFACTION ANALYSIS REPORT

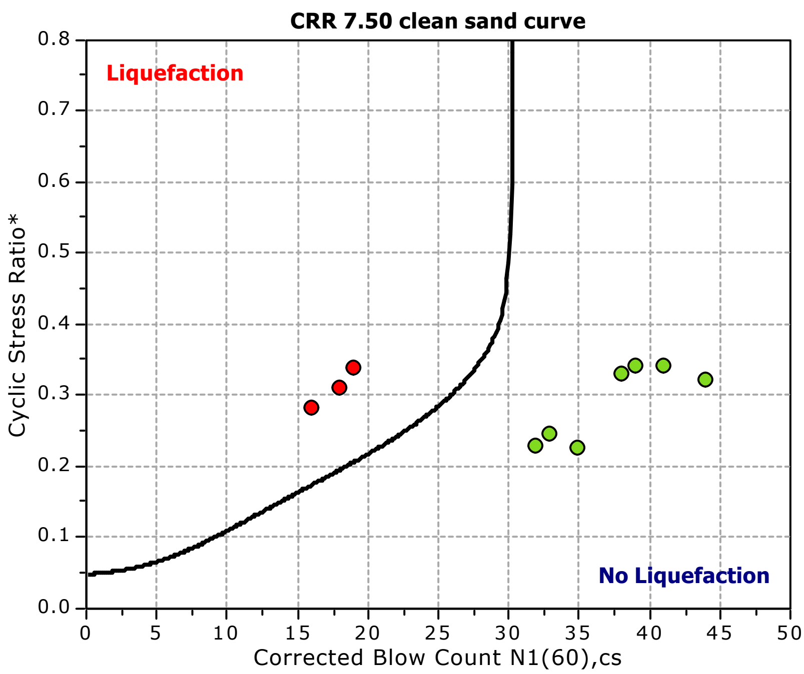
Project title : Santee Hotel **SPT Name: B-1**

Location : Town Center Parkway

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	43.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.00
Borehole diameter:	200mm	Peak ground acceleration:	0.42 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.00		





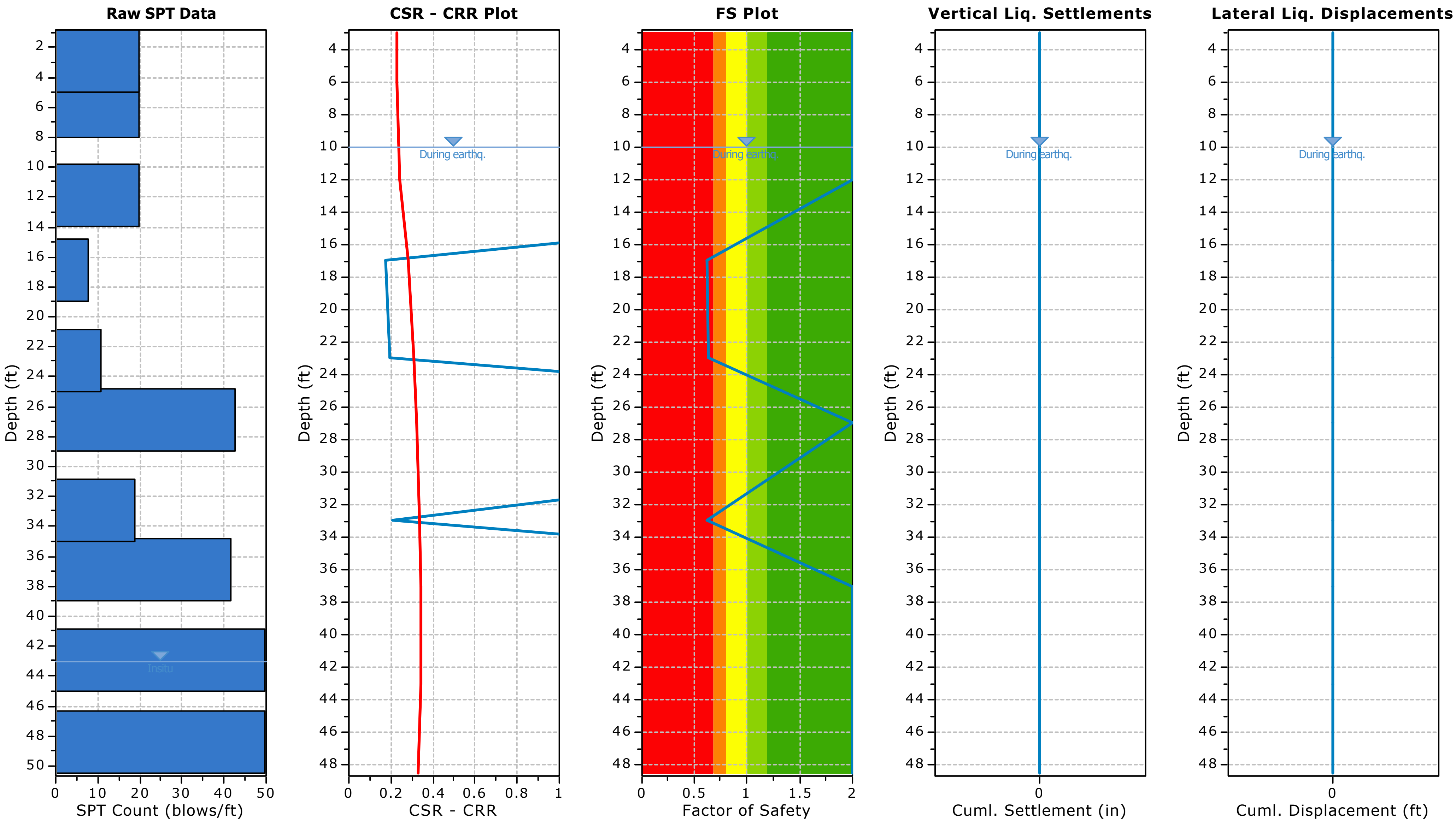
F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
3.00	20	15.00	120.00	0.00	Yes
6.00	20	50.00	115.00	0.00	Yes
12.00	20	48.00	120.00	0.00	Yes
17.00	8	60.00	115.00	0.00	Yes
23.00	11	62.00	115.00	0.00	Yes
27.00	43	18.00	120.00	0.00	Yes
33.00	19	15.00	120.00	0.00	Yes
37.00	42	20.00	120.00	0.00	Yes
43.00	50	20.00	120.00	0.00	Yes
48.50	50	15.00	120.00	0.00	Yes

Abbreviations

Depth:	Depth at which test was performed (ft)
SPT Field Value:	Number of blows per foot
Fines Content:	Fines content at test depth (%)
Unit Weight:	Unit weight at test depth (pcf)
Infl. Thickness:	Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy:	User defined switch for excluding/including test depth from the analysis procedure

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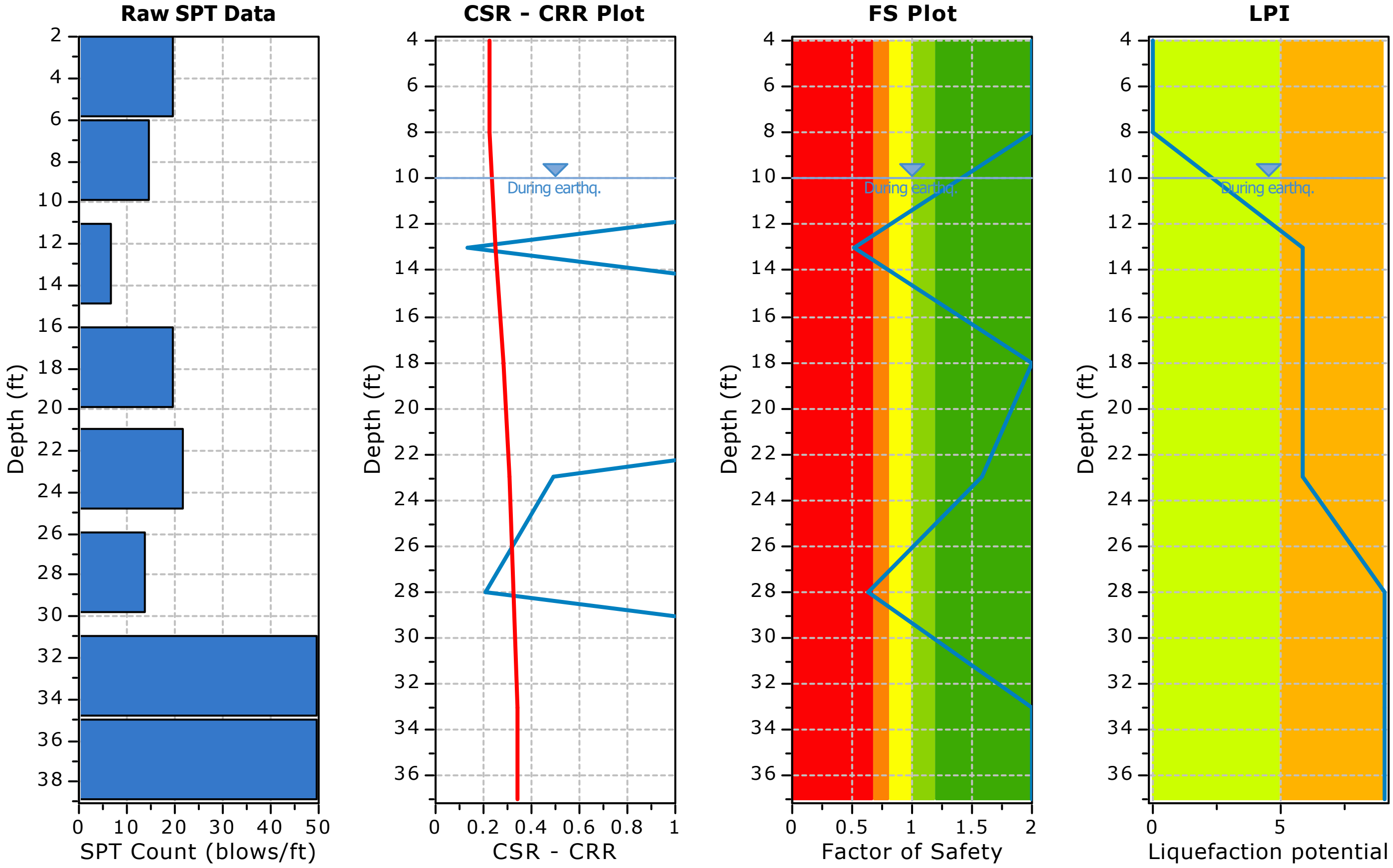
SPT BASED LIQUEFACTION ANALYSIS REPORT

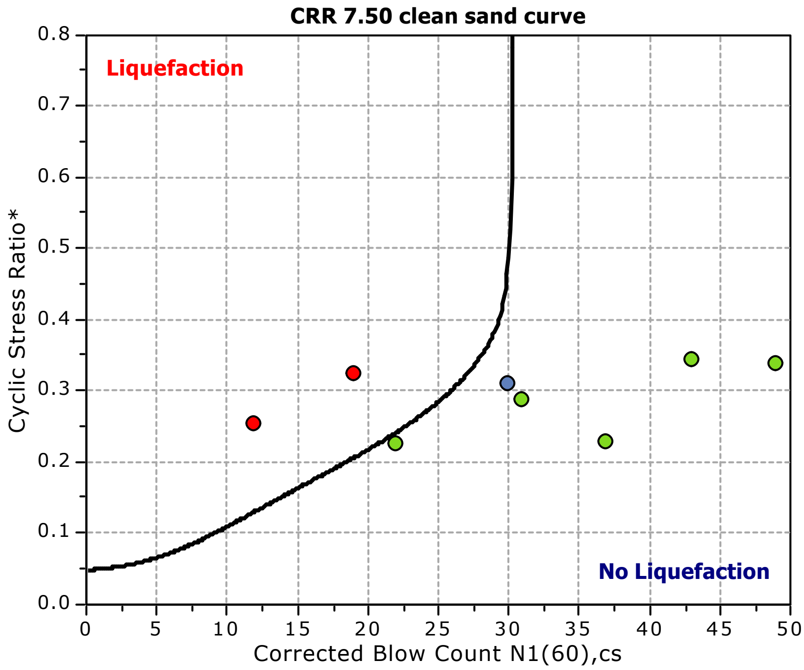
Project title : Santee Hotel **SPT Name: B-2**

Location : Town Center Parkway

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	43.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.00
Borehole diameter:	200mm	Peak ground acceleration:	0.42 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.00		

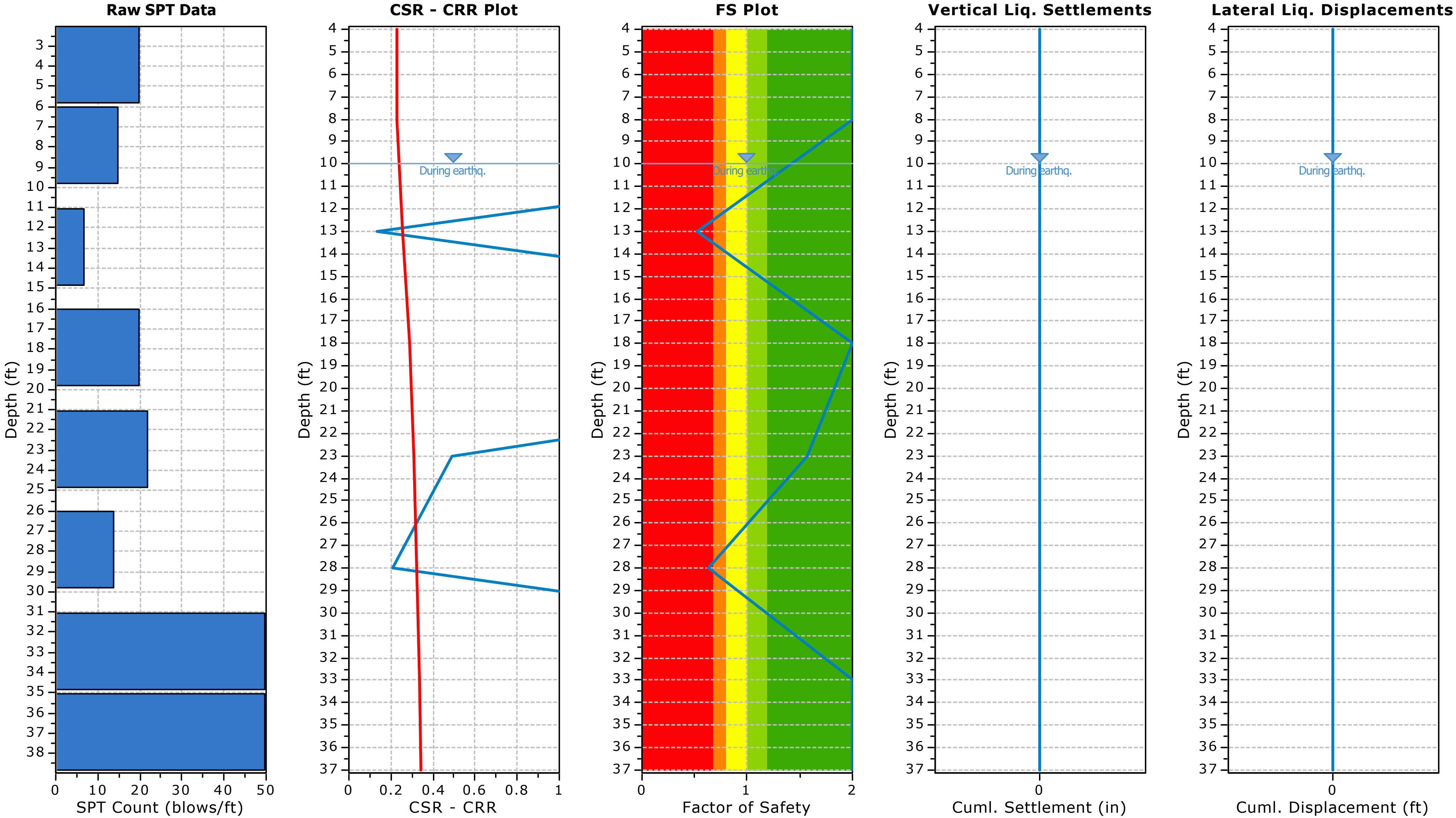




F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
4.00	20	50.00	120.00	0.00	Yes
8.00	15	20.00	120.00	0.00	Yes
13.00	7	20.00	120.00	0.00	Yes
18.00	20	60.00	115.00	0.00	Yes
23.00	22	60.00	115.00	0.00	Yes
28.00	14	60.00	115.00	0.00	Yes
33.00	50	20.00	120.00	0.00	Yes
37.00	50	15.00	120.00	0.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

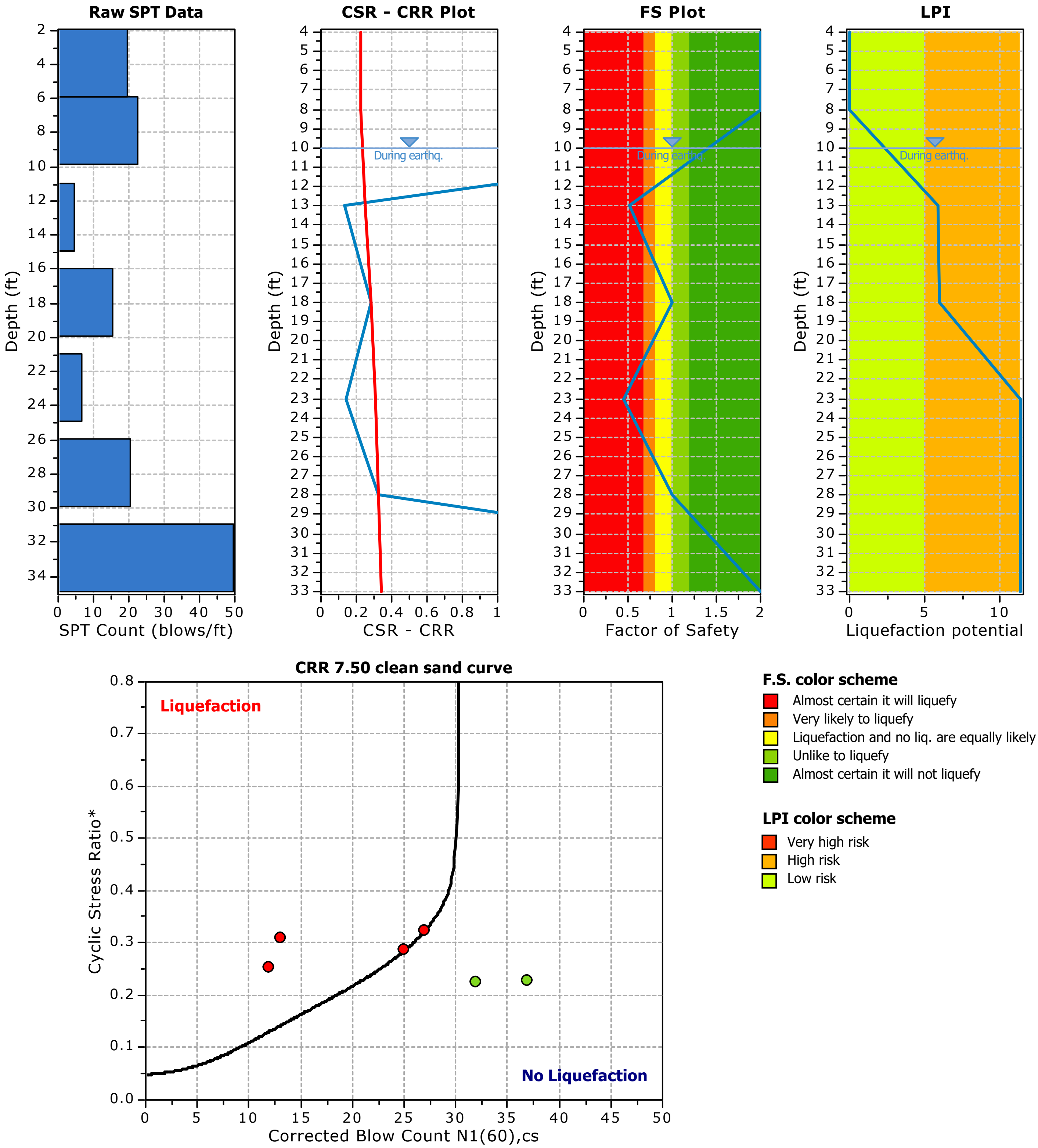
SPT BASED LIQUEFACTION ANALYSIS REPORT

Project title : Santee Hotel **SPT Name: B-3**

Location : Town Center Parkway

:: Input parameters and analysis properties ::

Analysis method:	NCEER 1998	G.W.T. (in-situ):	43.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.00
Borehole diameter:	200mm	Peak ground acceleration:	0.42 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.00		



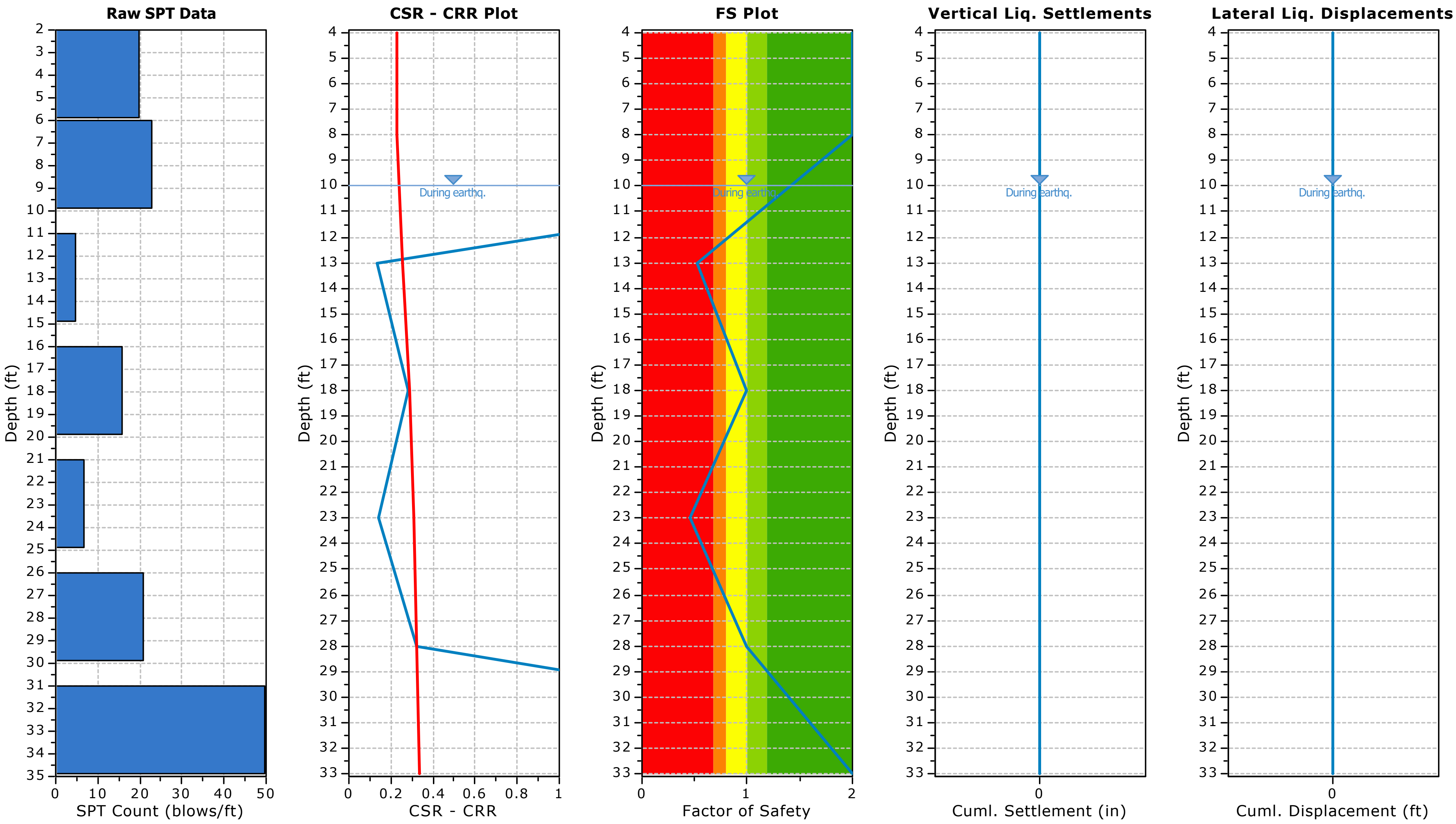
F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
4.00	20	50.00	120.00	0.00	Yes
8.00	23	20.00	120.00	0.00	Yes
13.00	5	35.00	120.00	0.00	Yes
18.00	16	50.00	115.00	0.00	Yes
23.00	7	50.00	115.00	0.00	Yes
28.00	21	53.00	115.00	0.00	Yes
33.00	50	50.00	120.00	0.00	Yes

Abbreviations

Depth:	Depth at which test was performed (ft)
SPT Field Value:	Number of blows per foot
Fines Content:	Fines content at test depth (%)
Unit Weight:	Unit weight at test depth (pcf)
Infl. Thickness:	Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy:	User defined switch for excluding/including test depth from the analysis procedure

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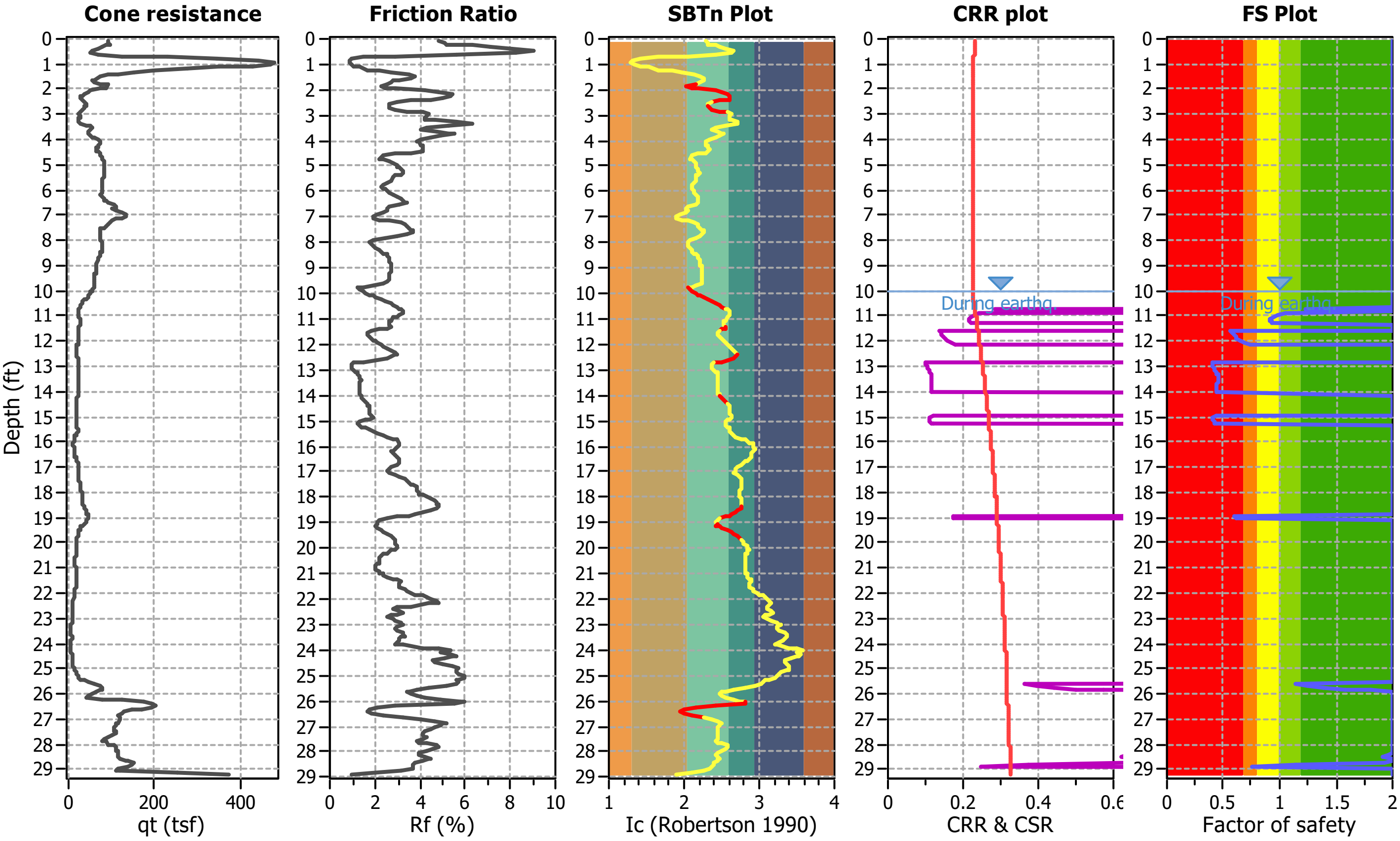
LIQUEFACTION ANALYSIS REPORT

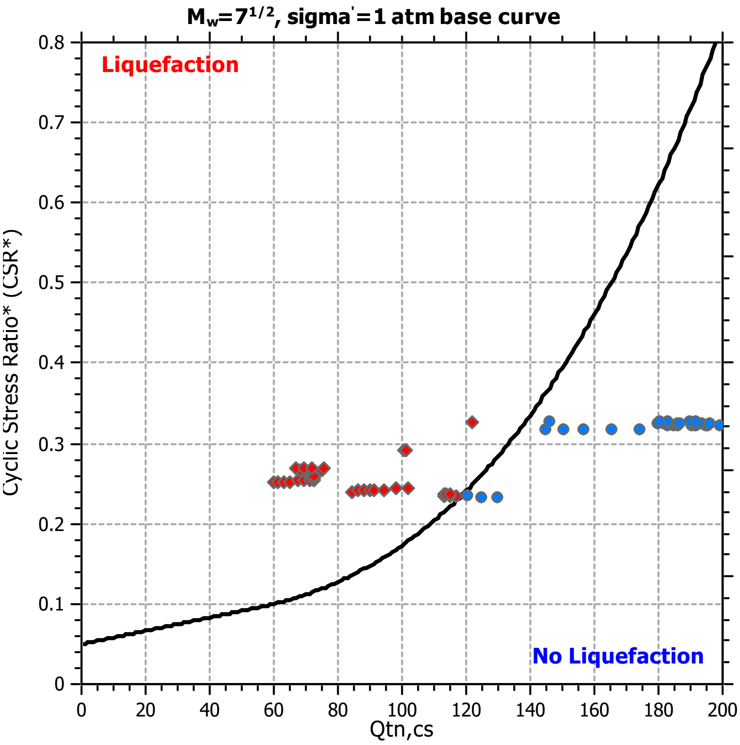
Project title : **Location :**

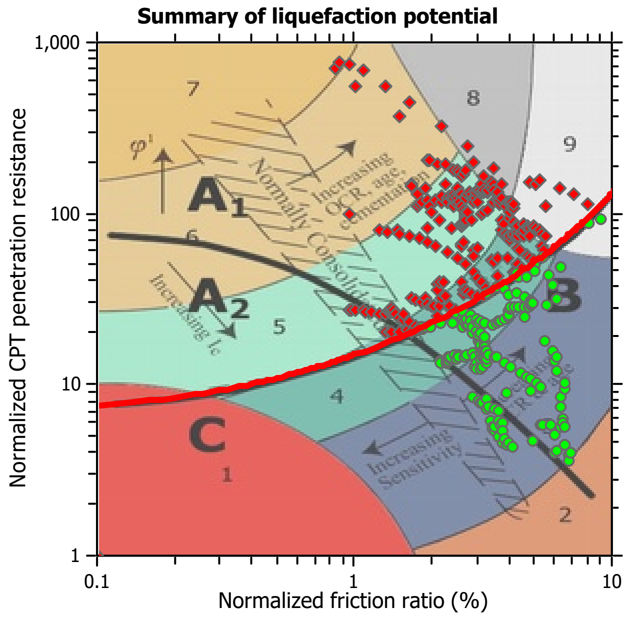
CPT file : C-1

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	43.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	10.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	33.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

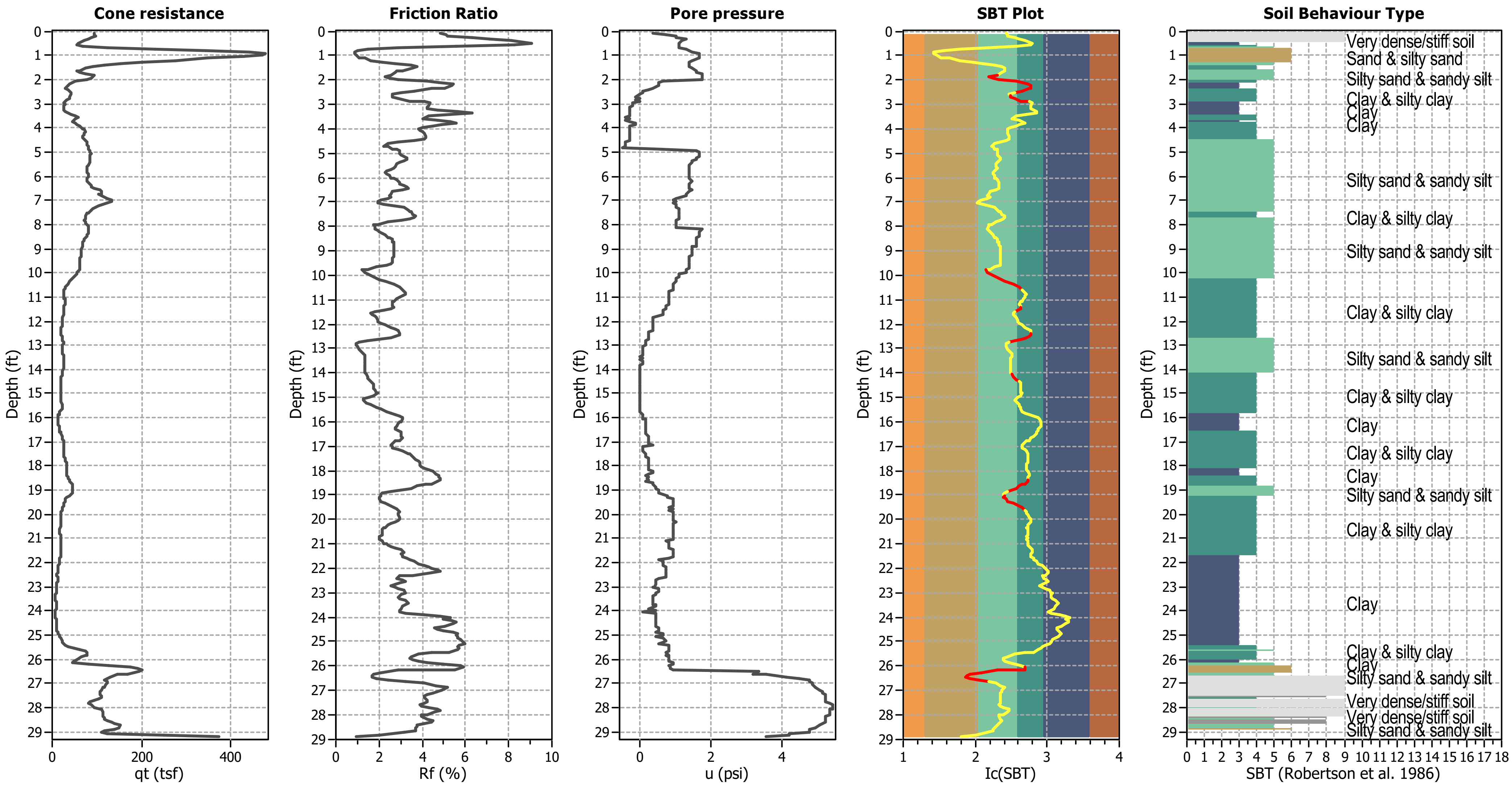






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



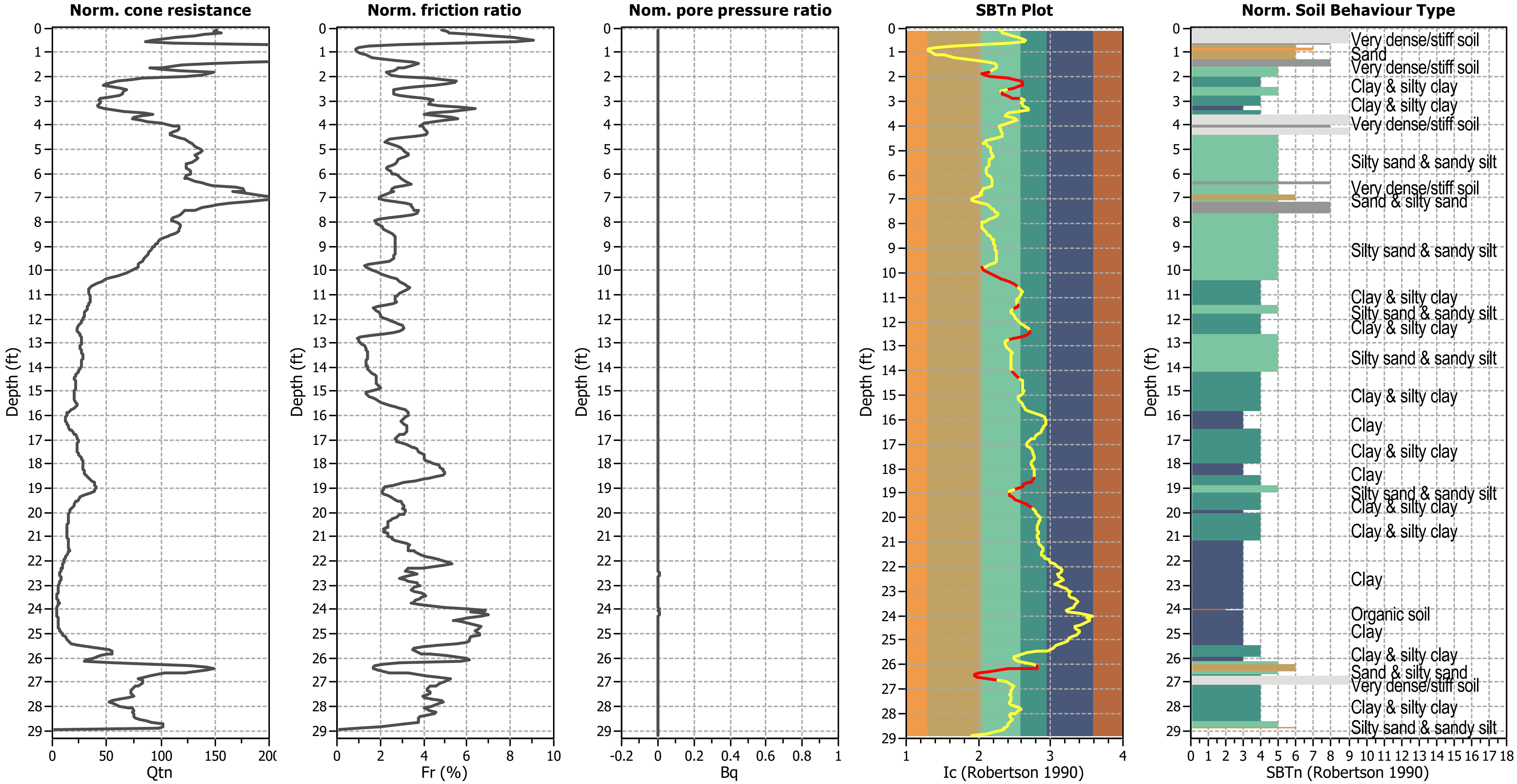
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBT legend

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

CPT basic interpretation plots (normalized)



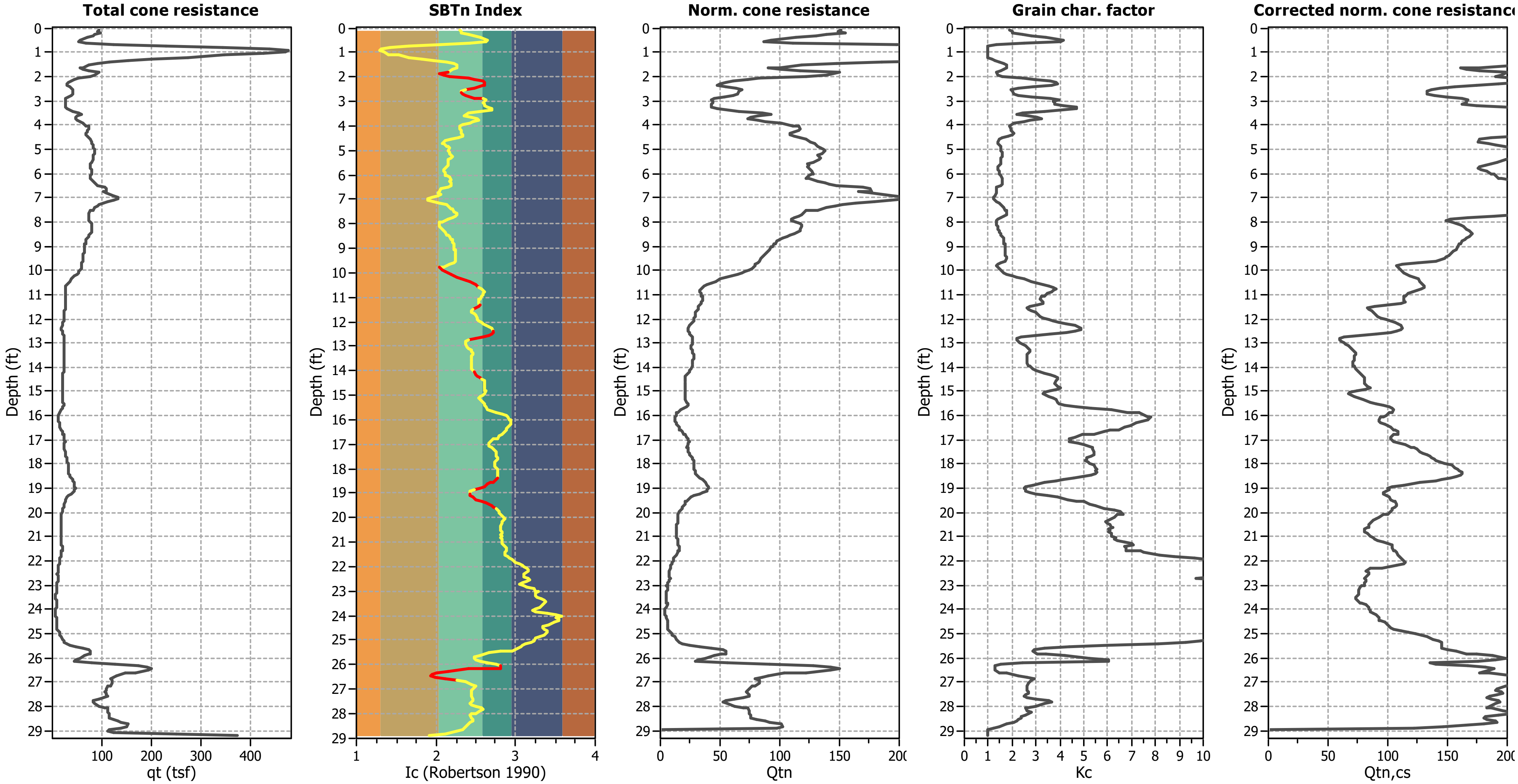
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBTn legend

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

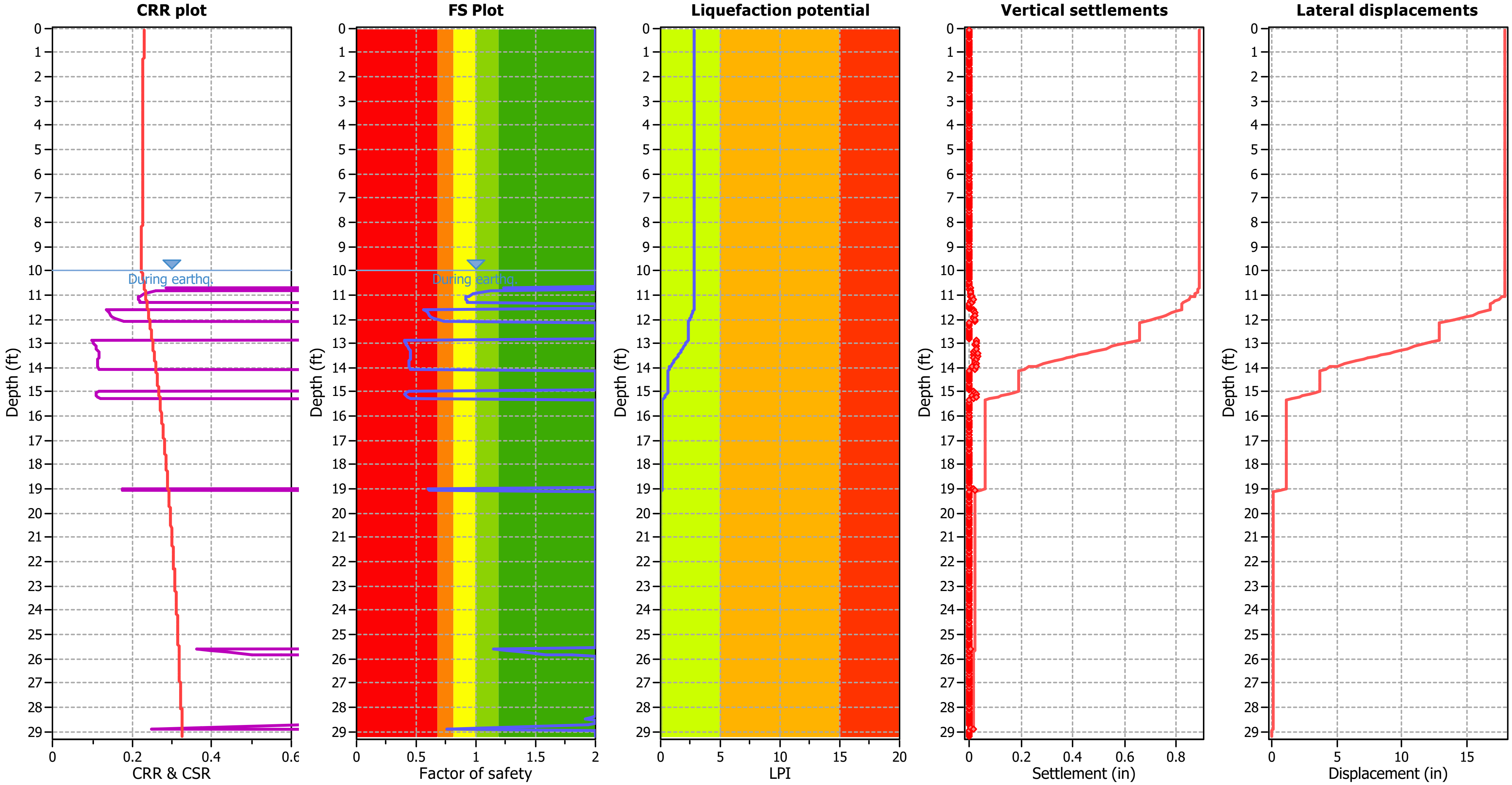
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

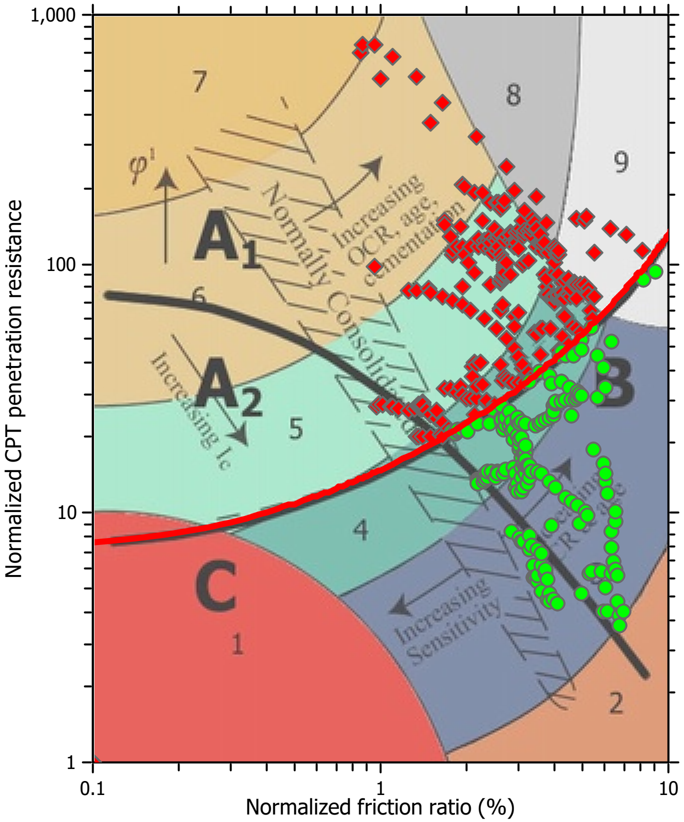
F.S. color scheme

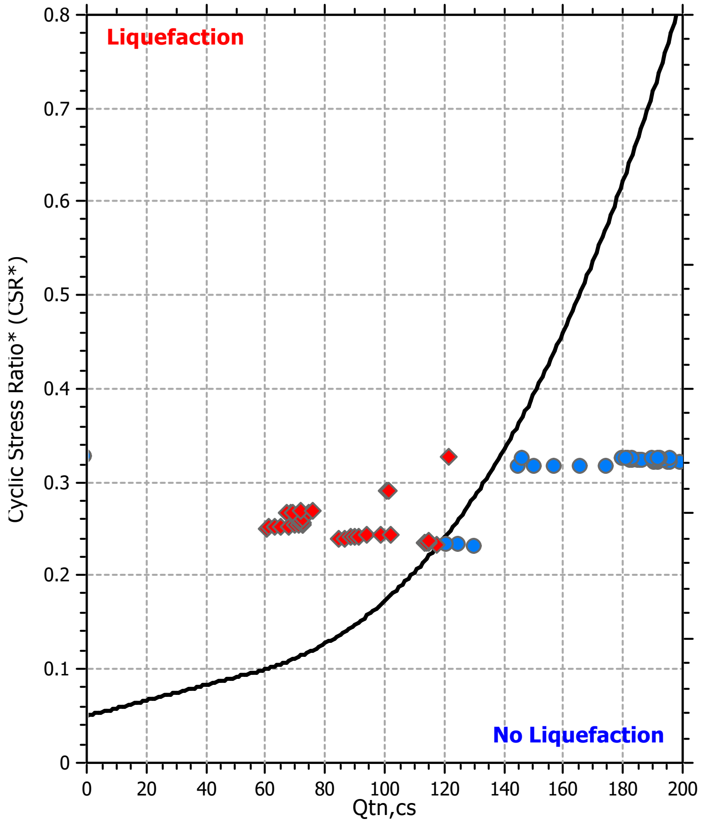
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

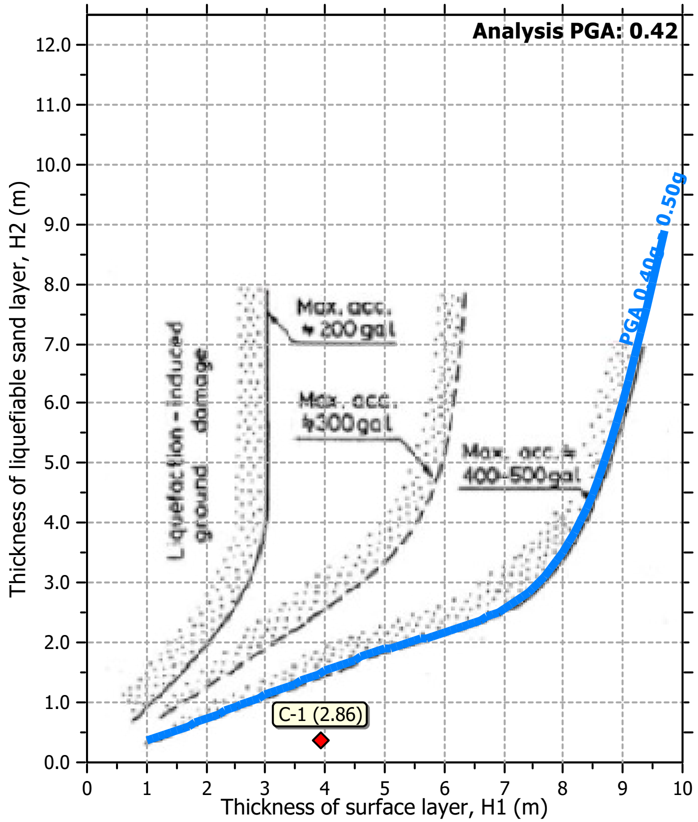
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



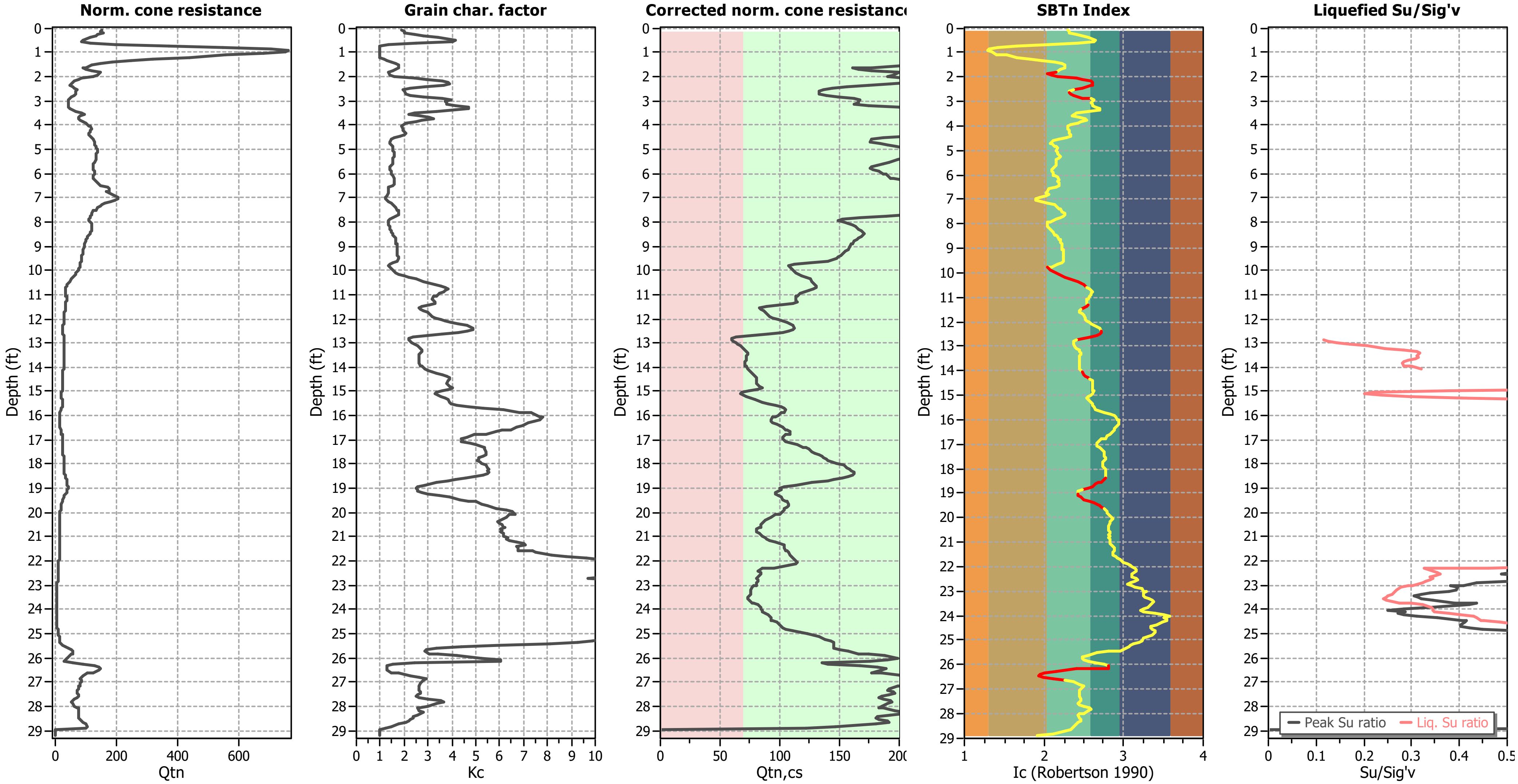




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

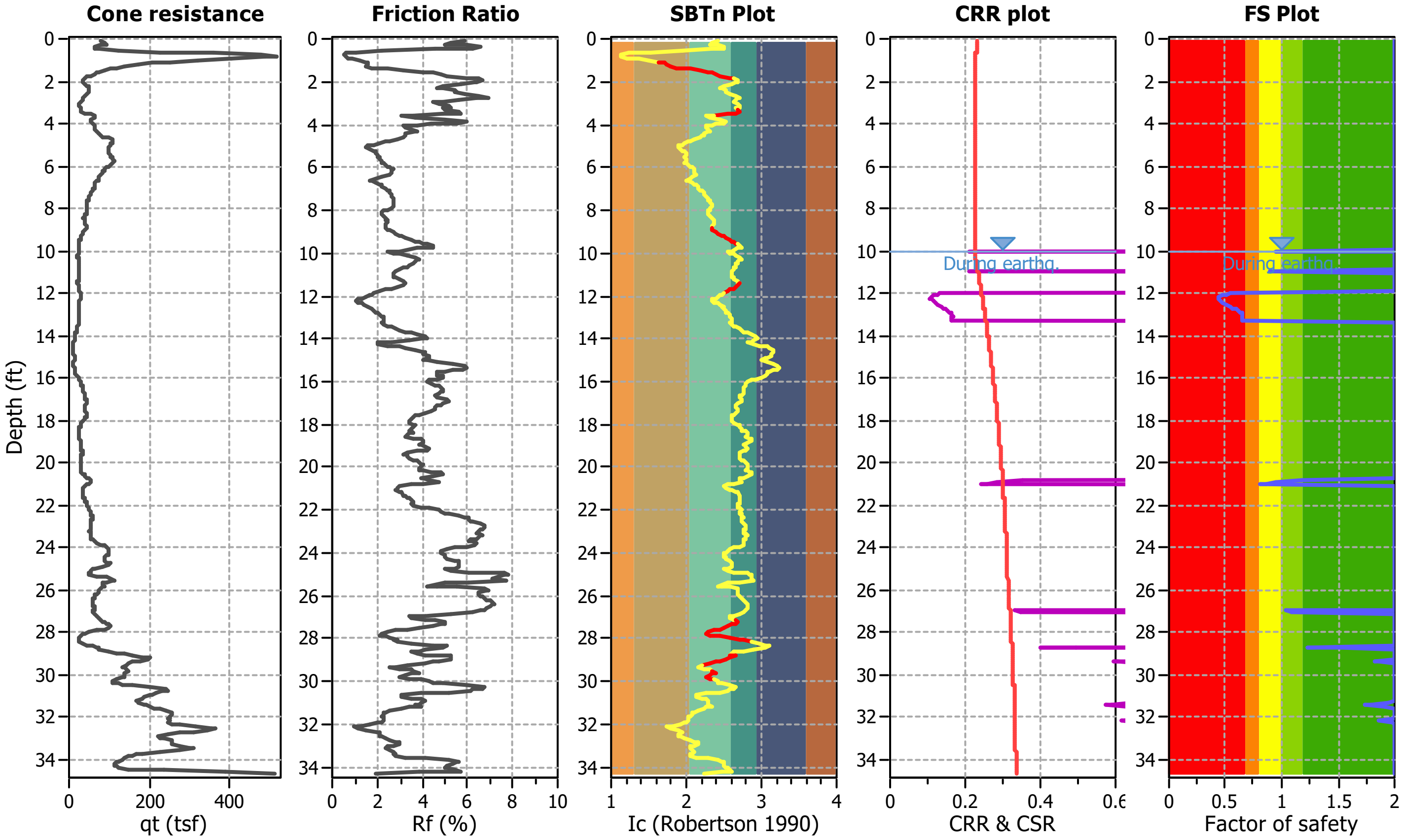
LIQUEFACTION ANALYSIS REPORT

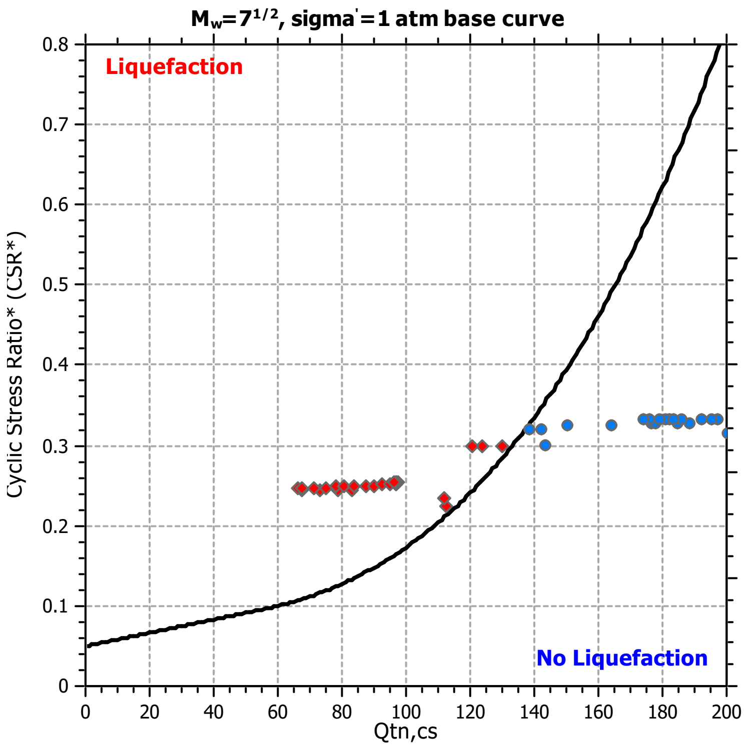
Project title : **Location :**

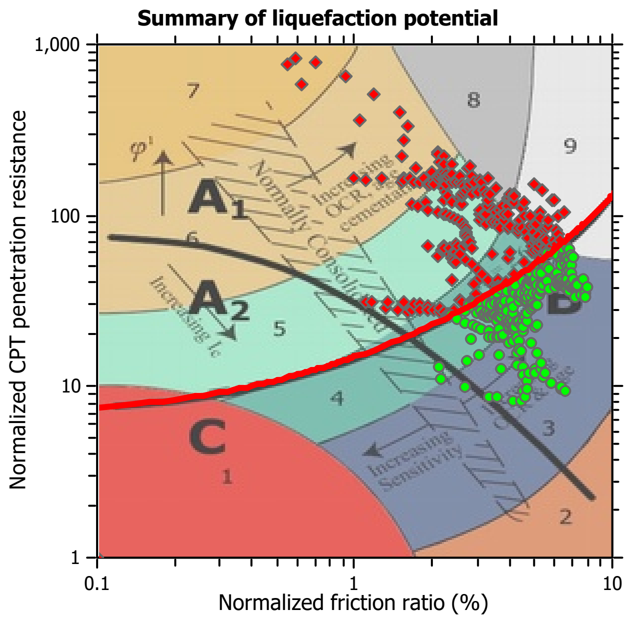
CPT file : C-2

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	43.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	10.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	33.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

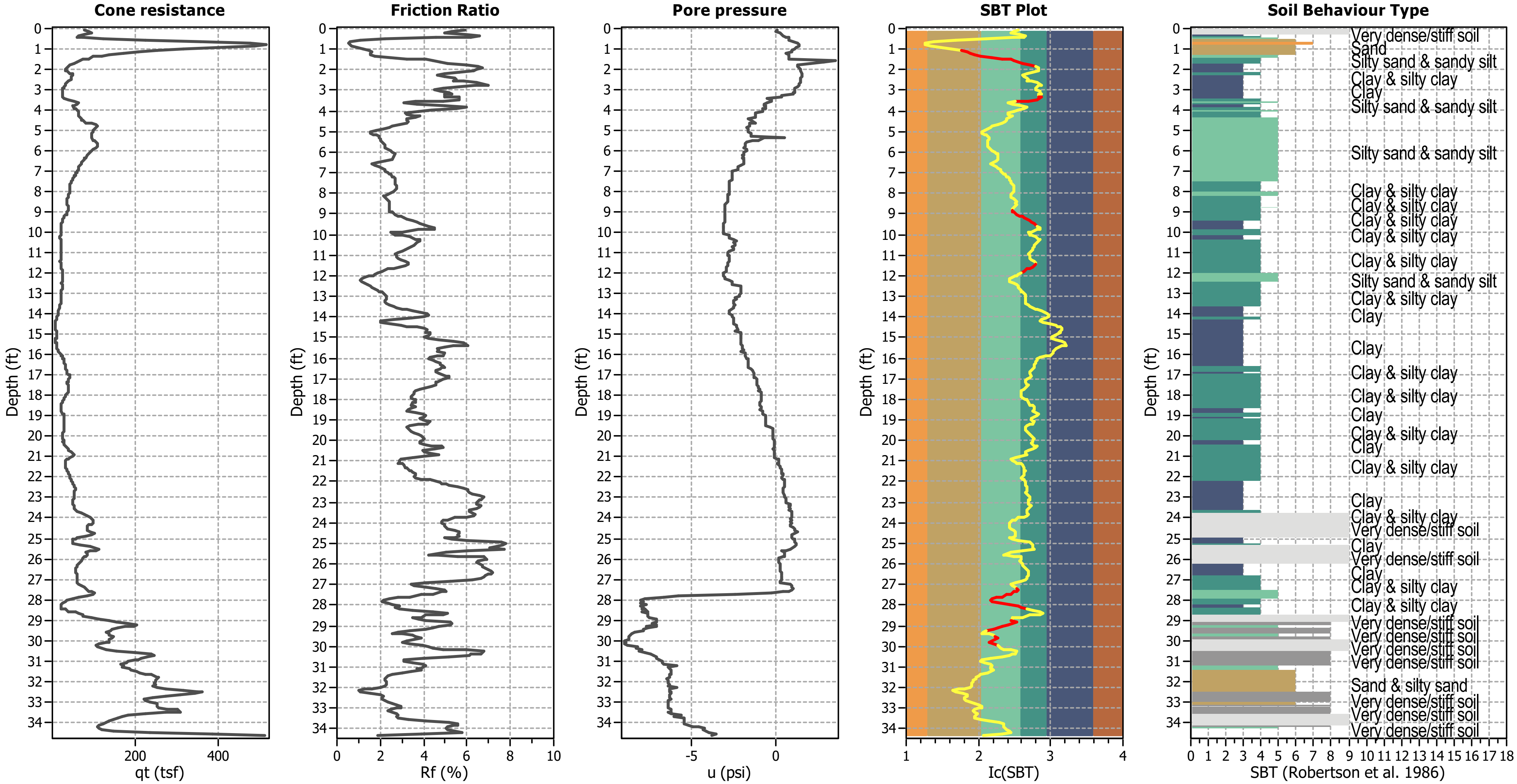






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



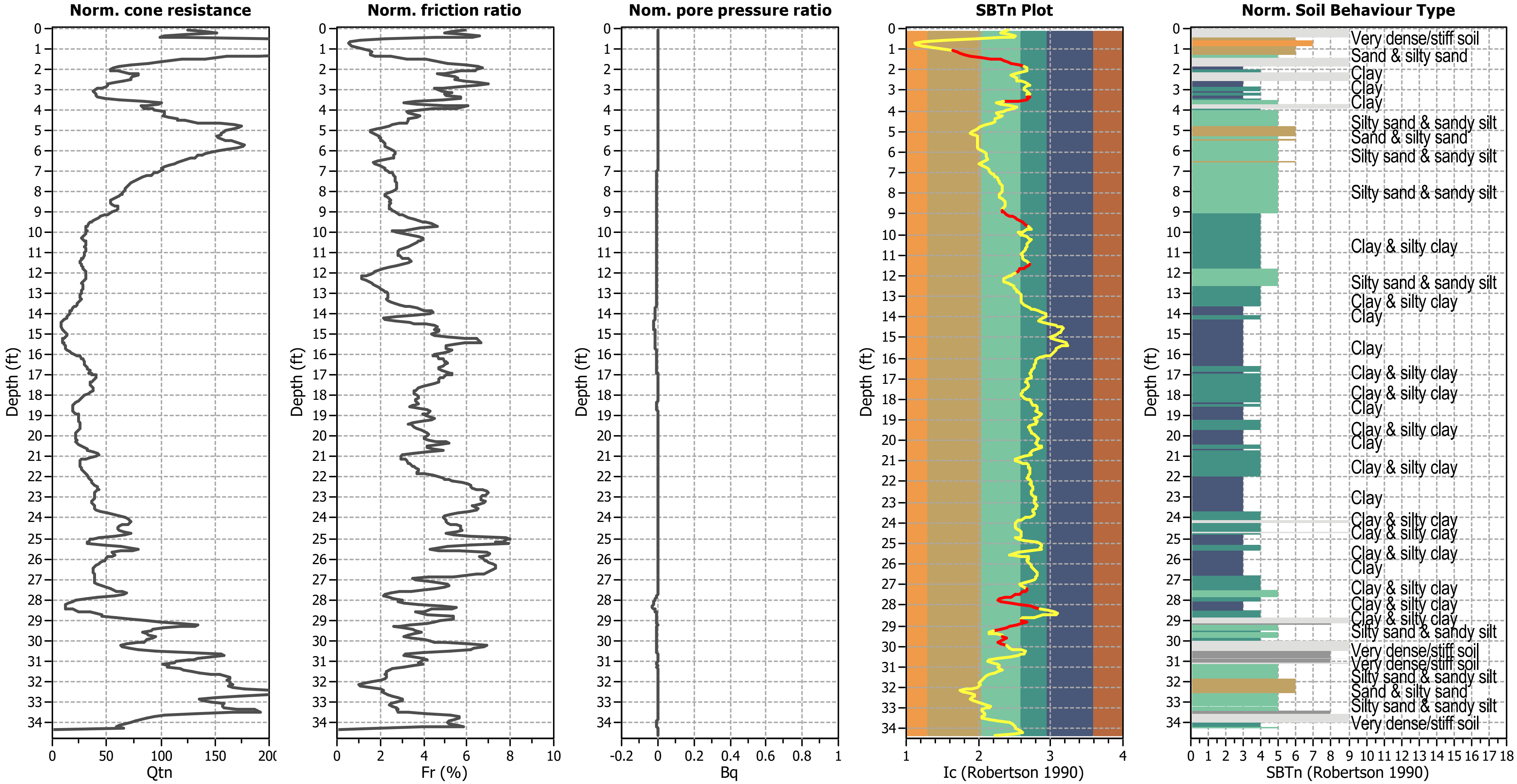
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBT legend

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

CPT basic interpretation plots (normalized)



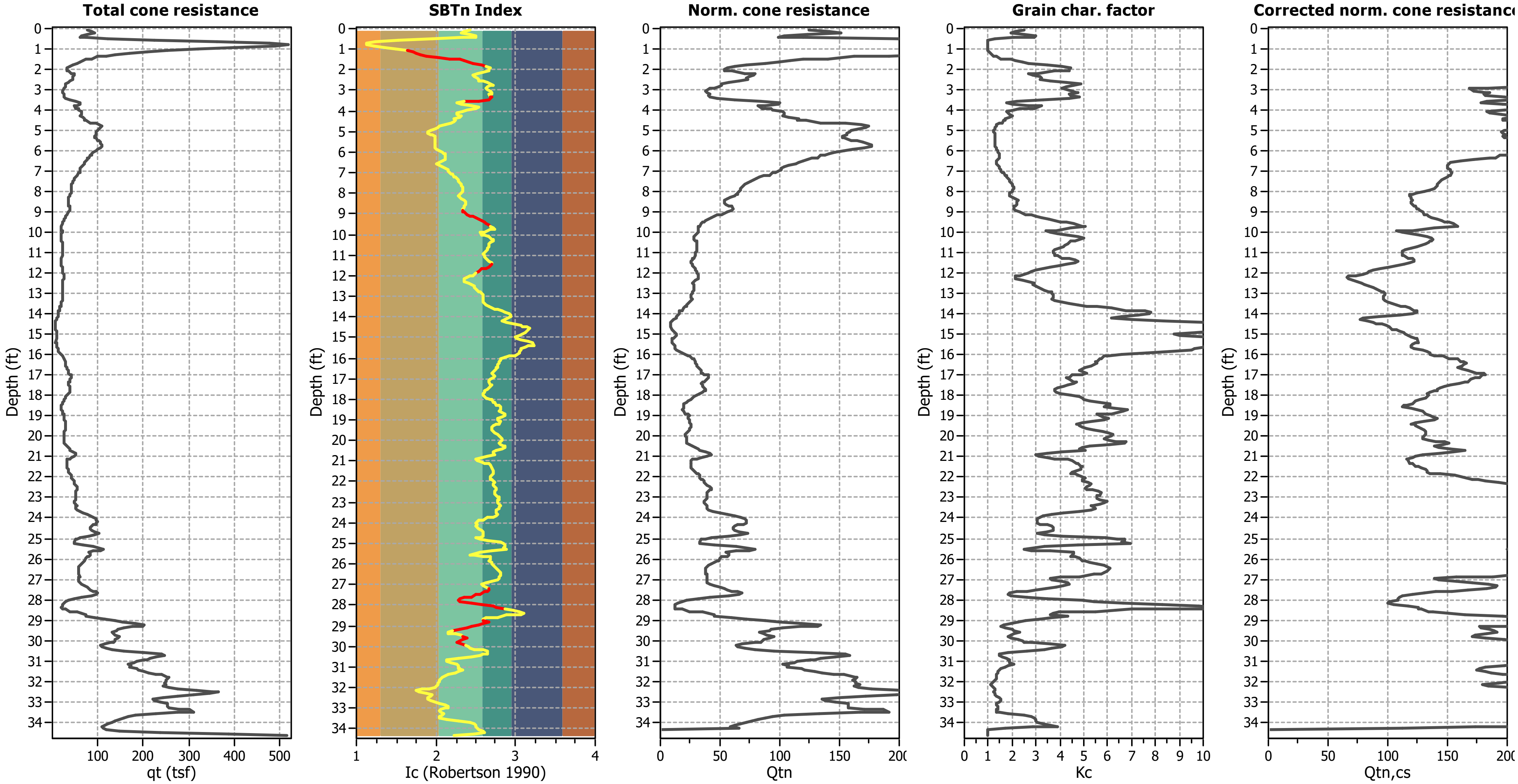
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBTn legend

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

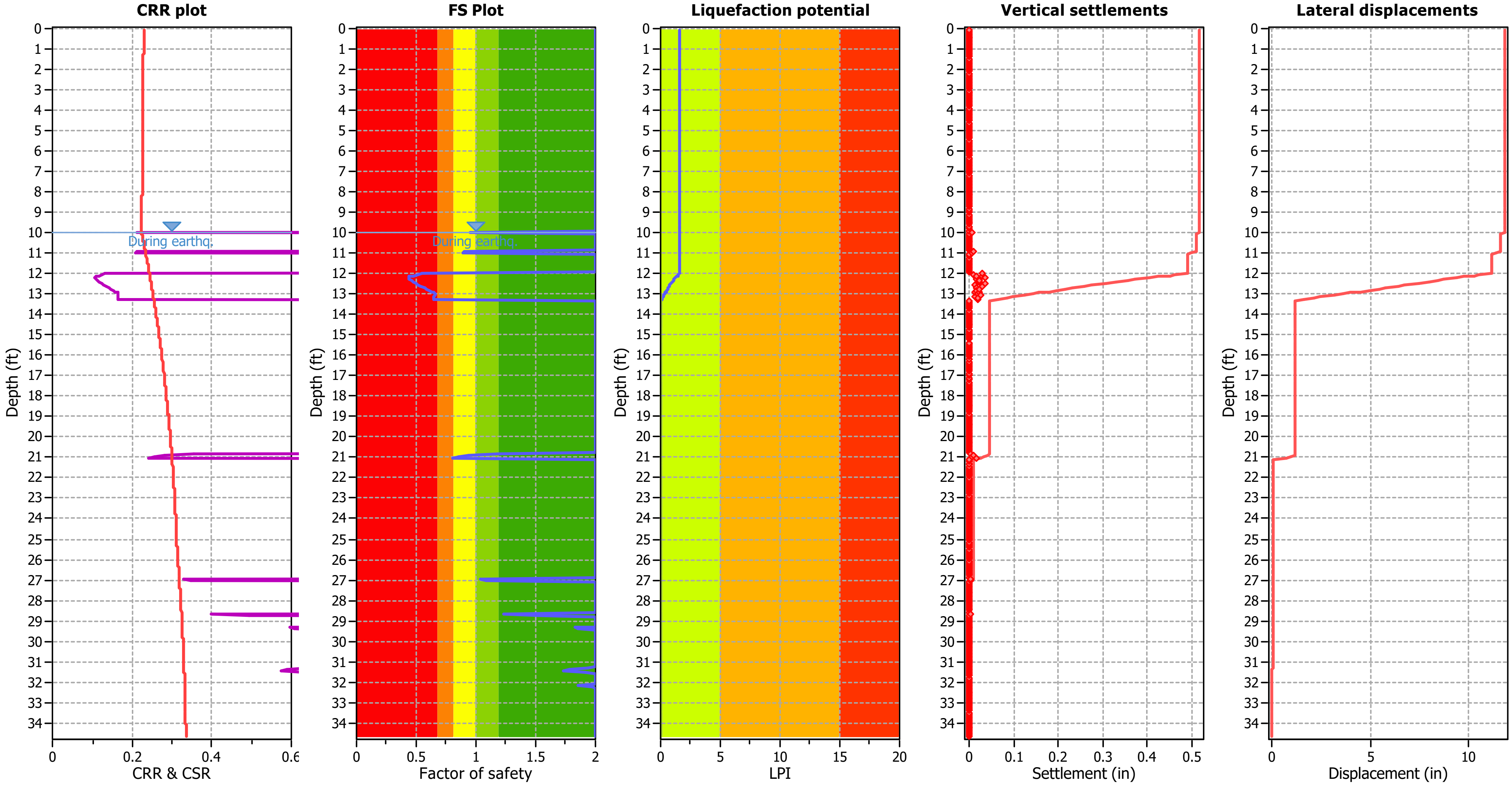
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

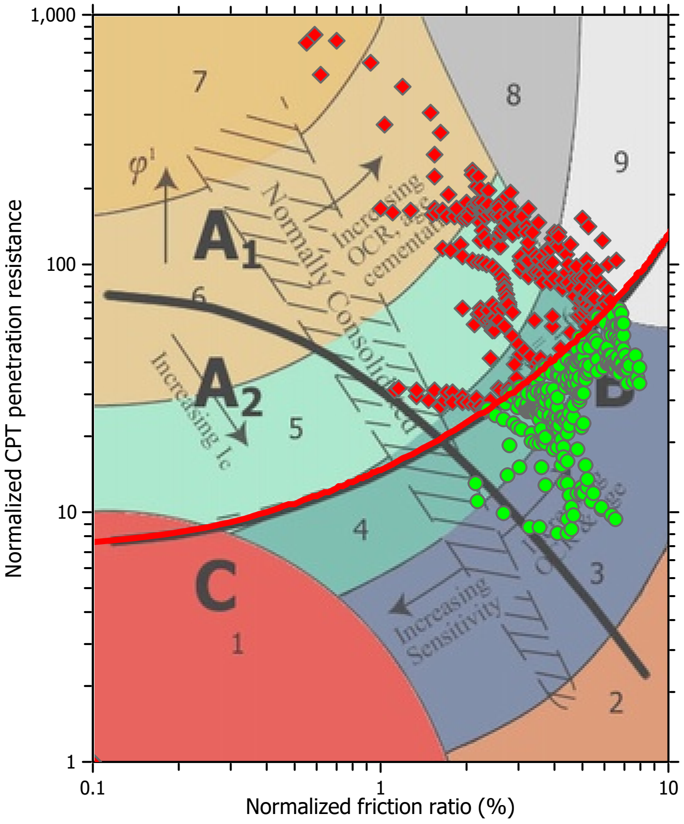
F.S. color scheme

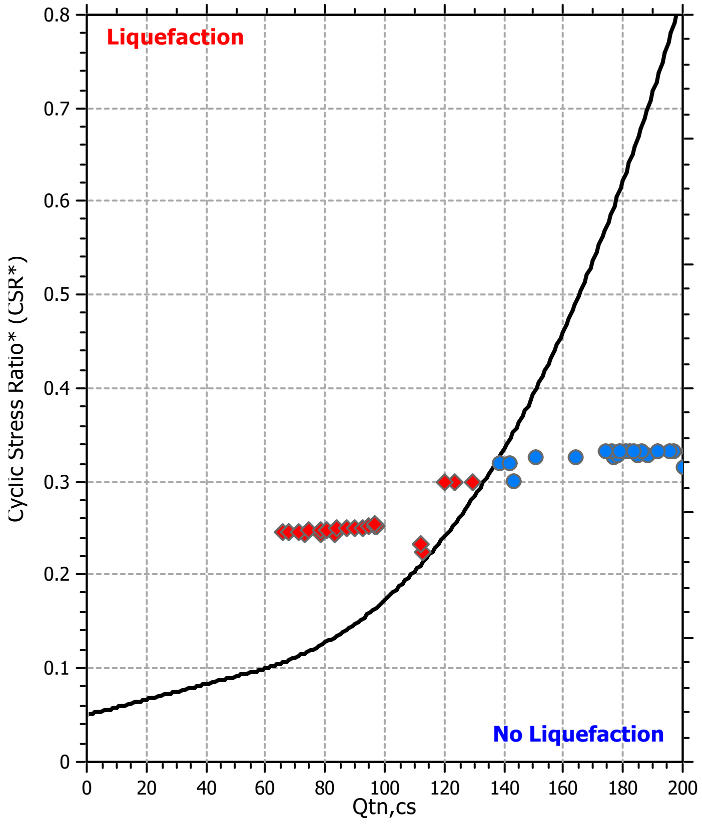
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

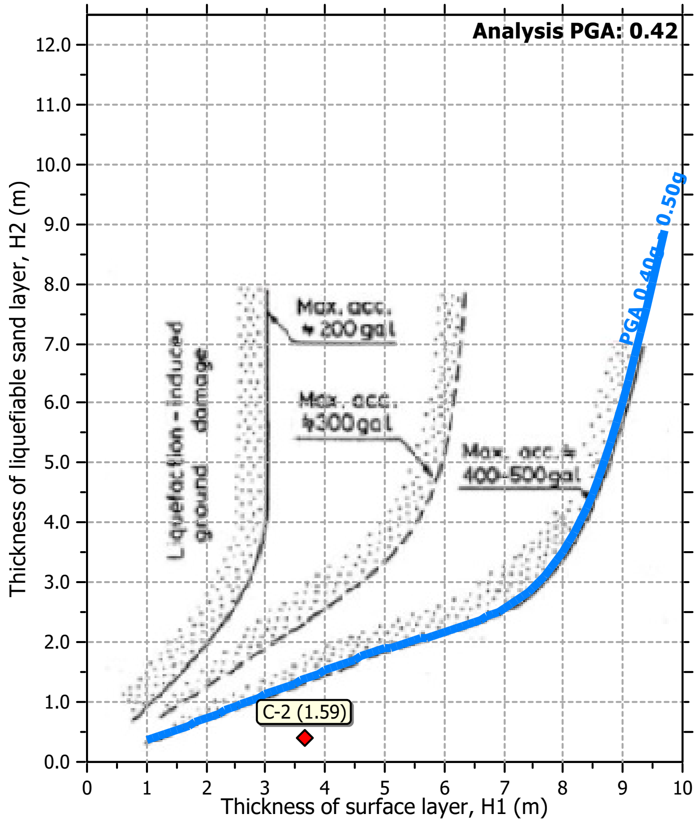
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



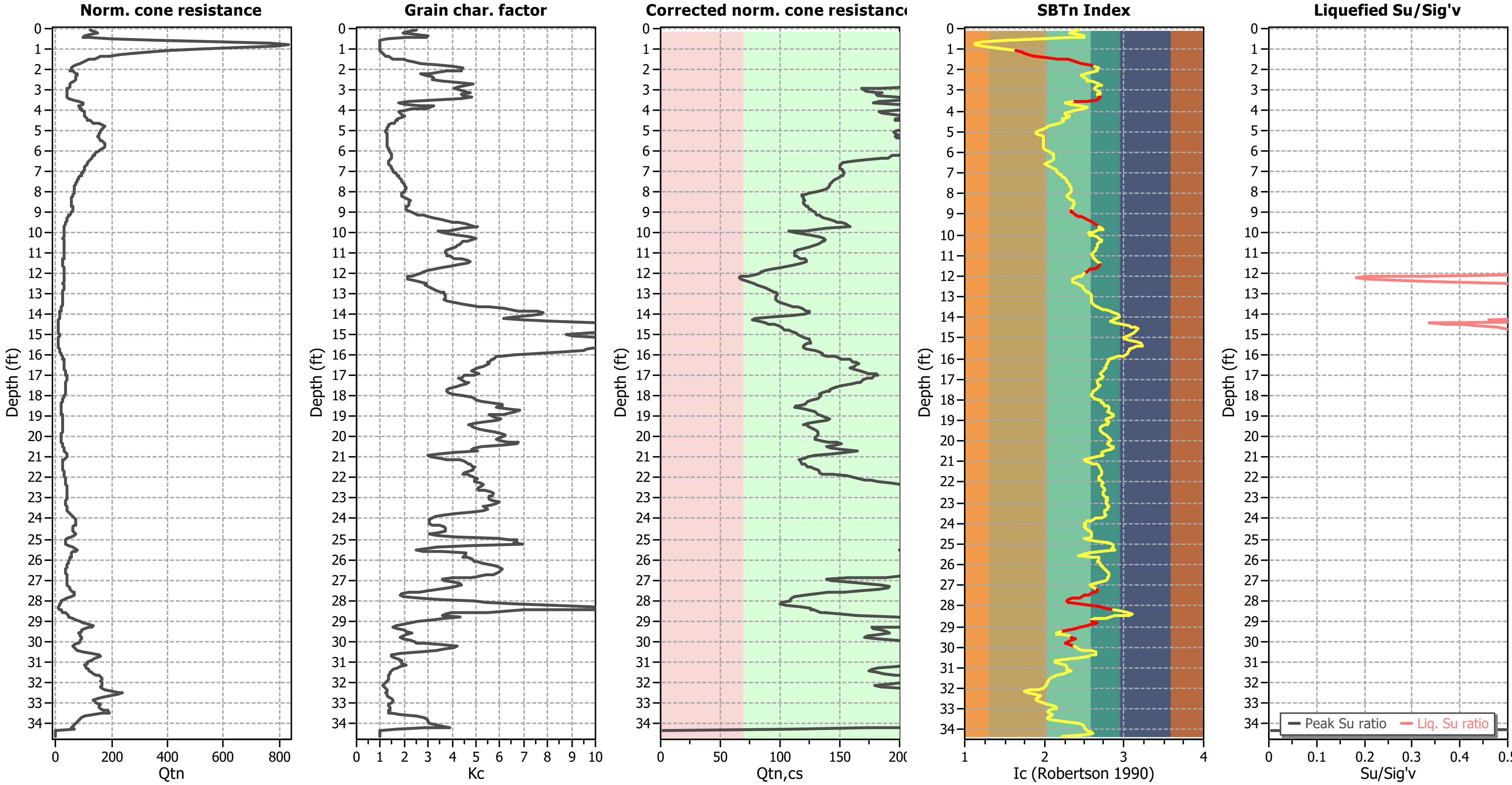




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

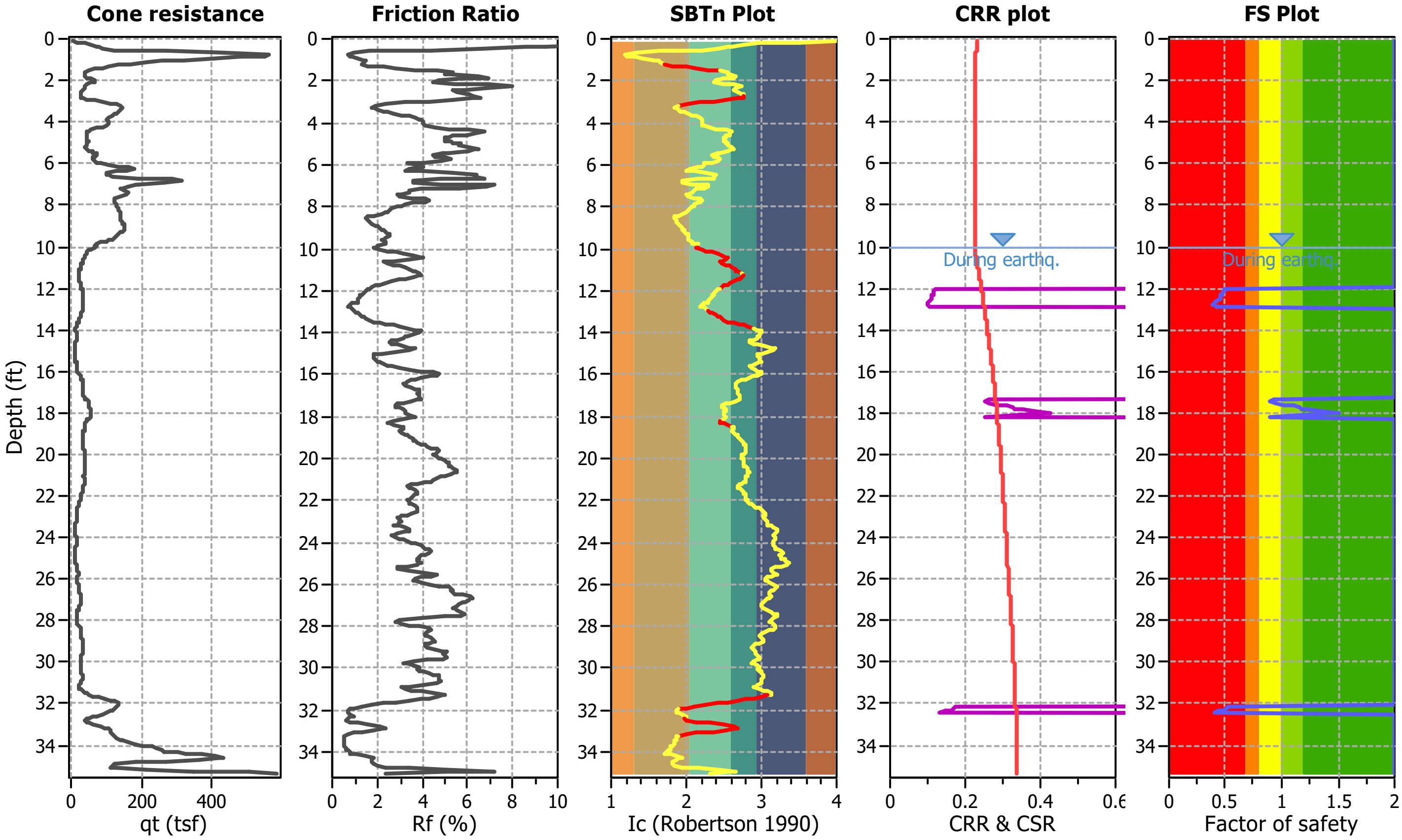
LIQUEFACTION ANALYSIS REPORT

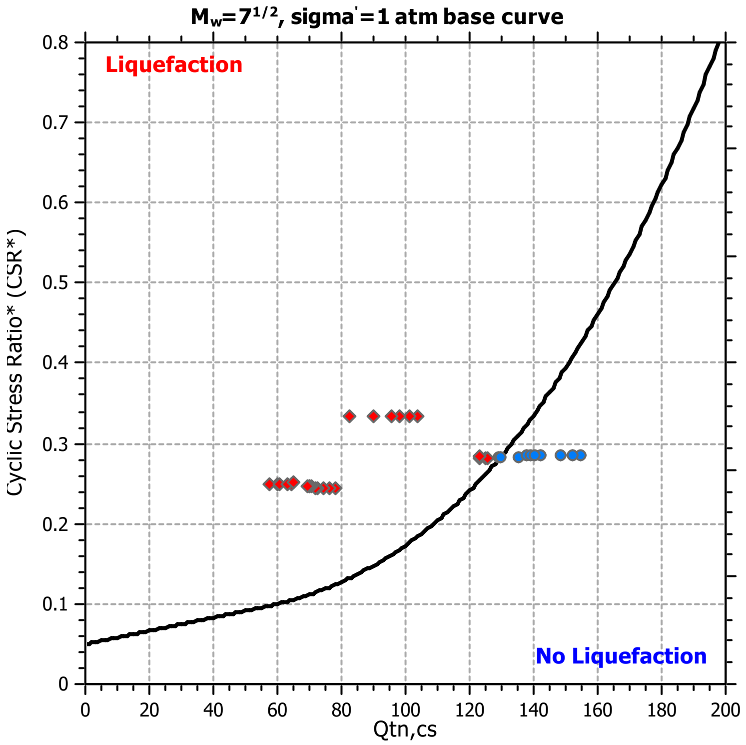
Project title : **Location :**

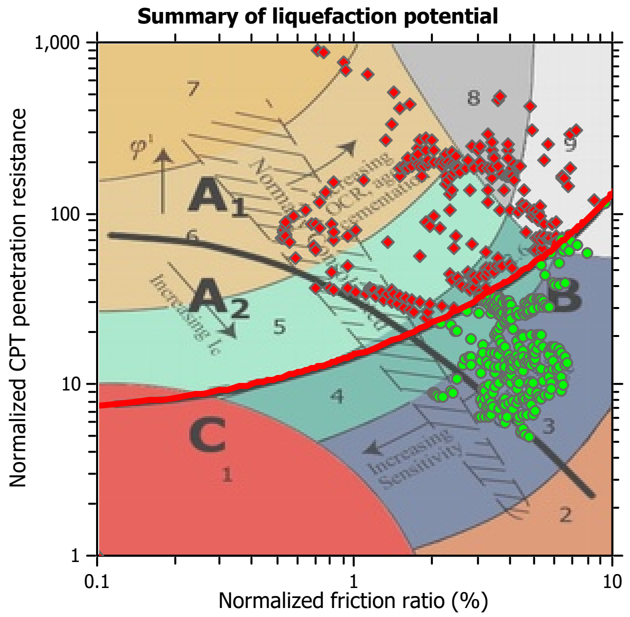
CPT file : C-3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	43.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	10.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	33.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

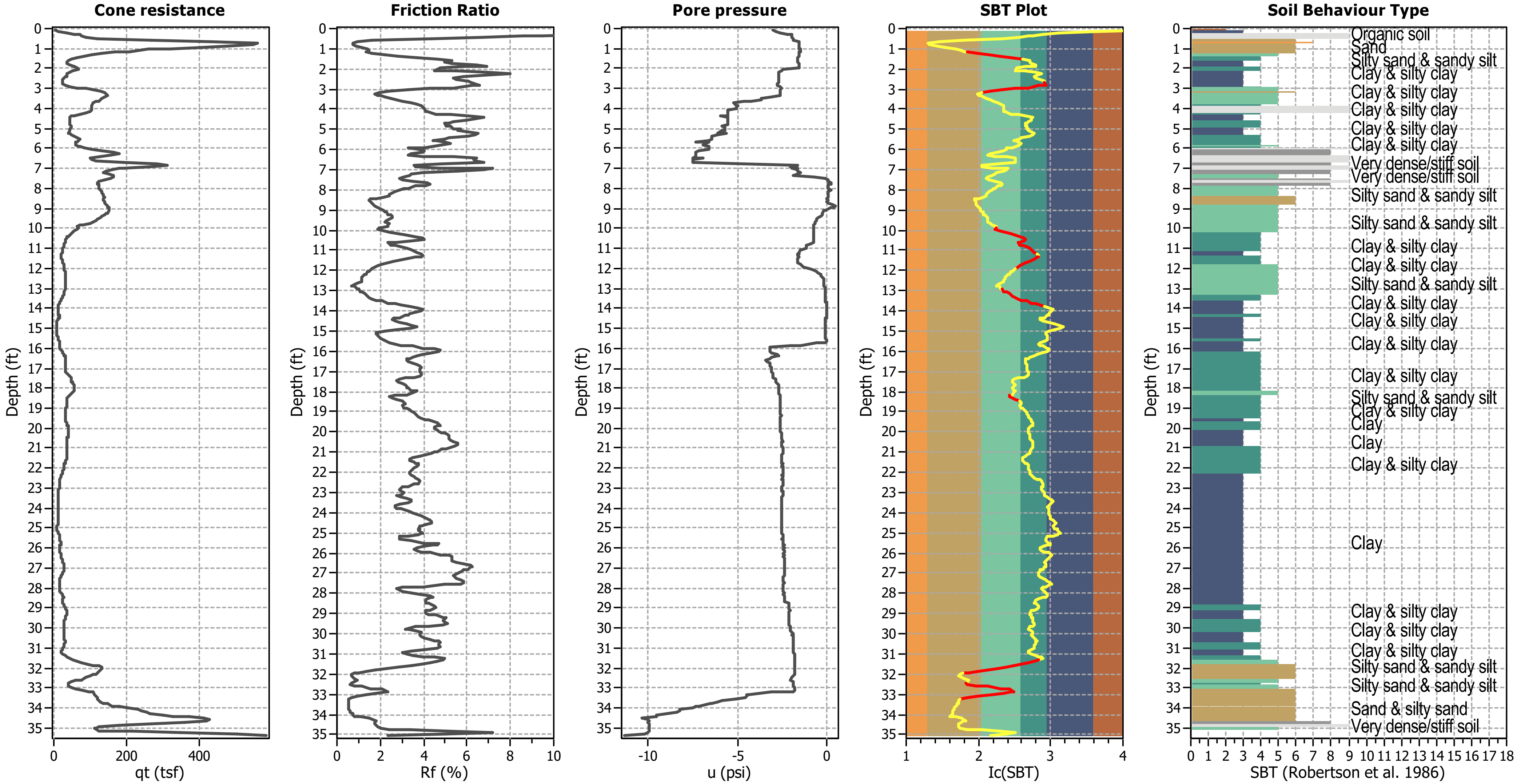






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



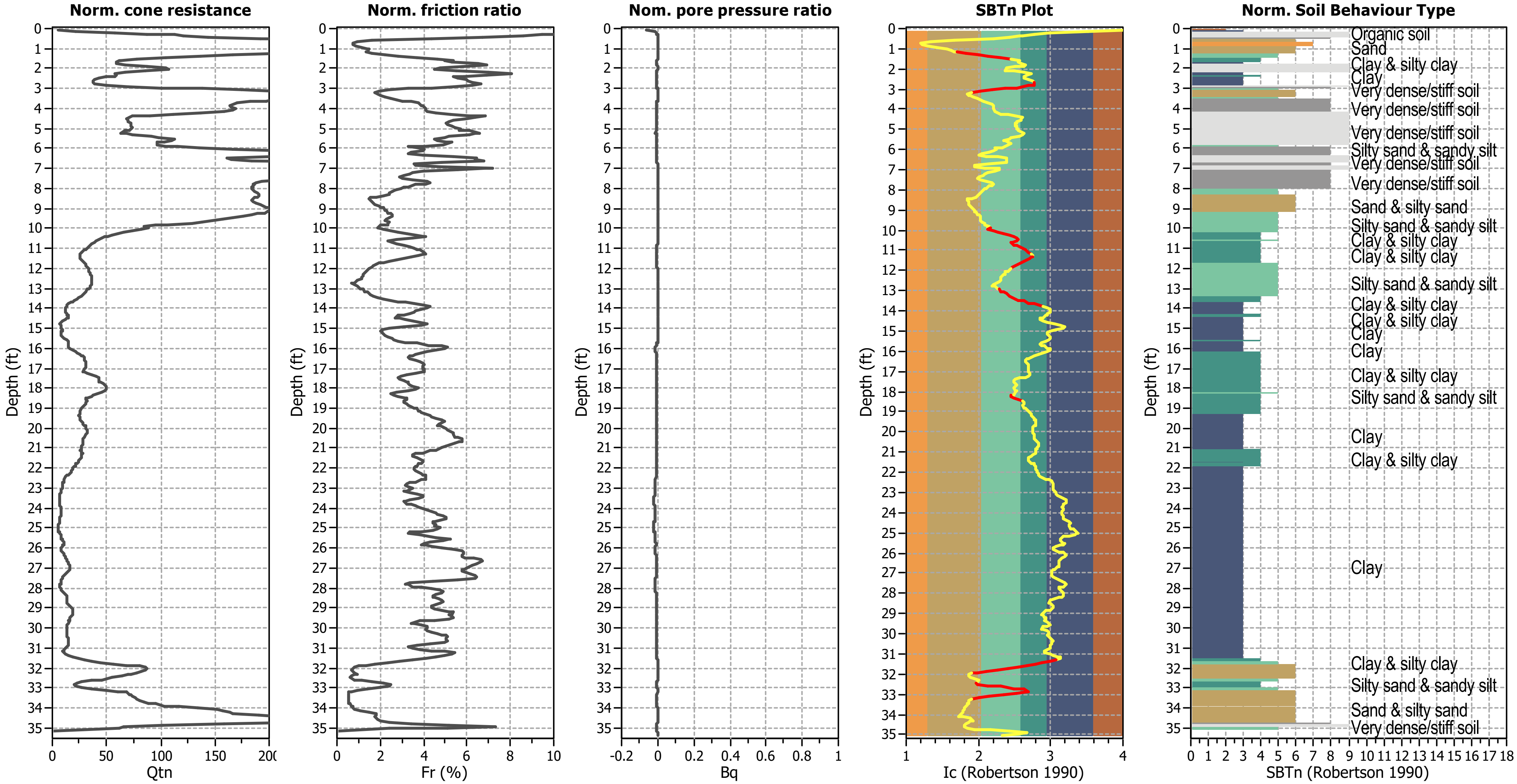
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBT legend

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

CPT basic interpretation plots (normalized)



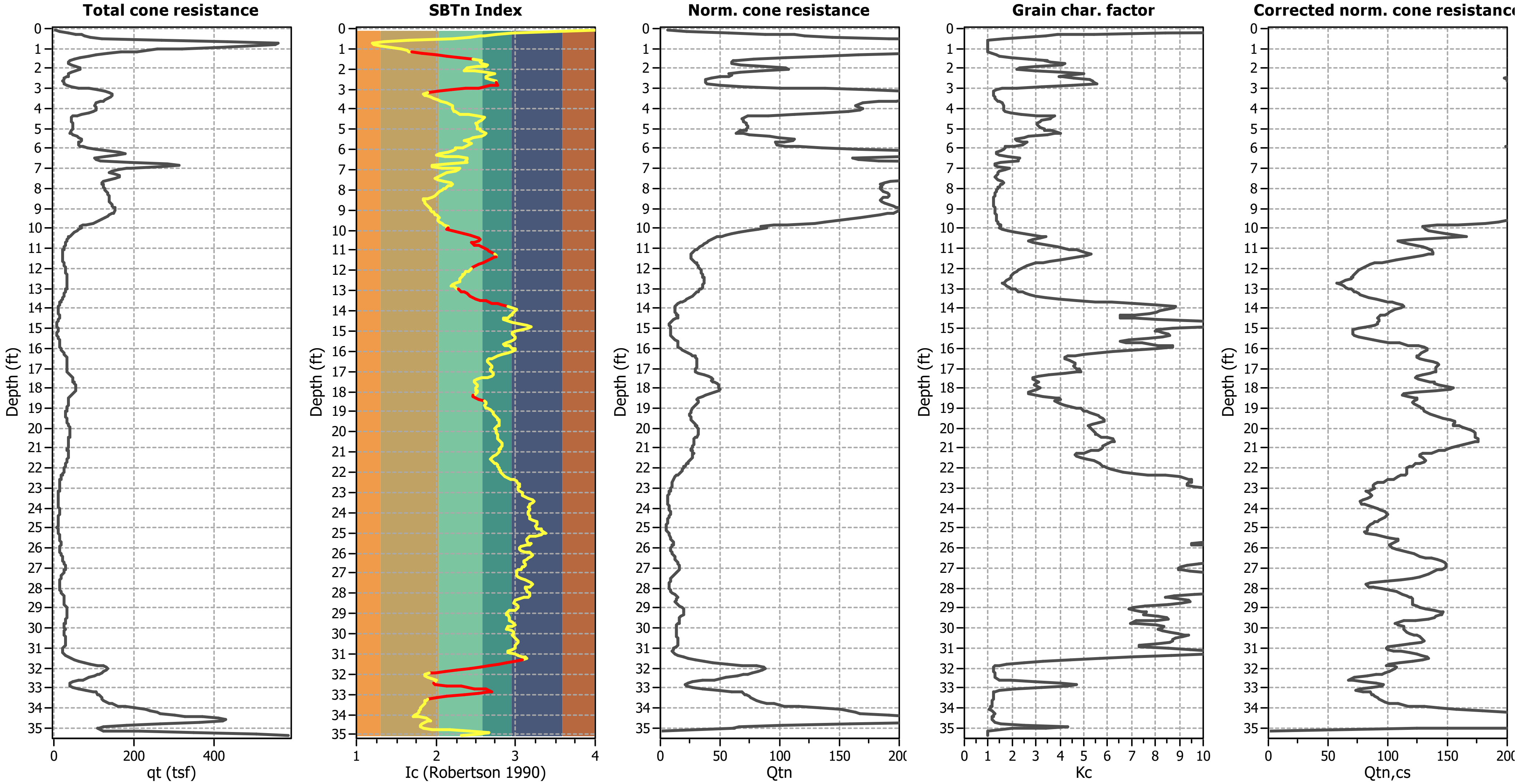
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBTn legend

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

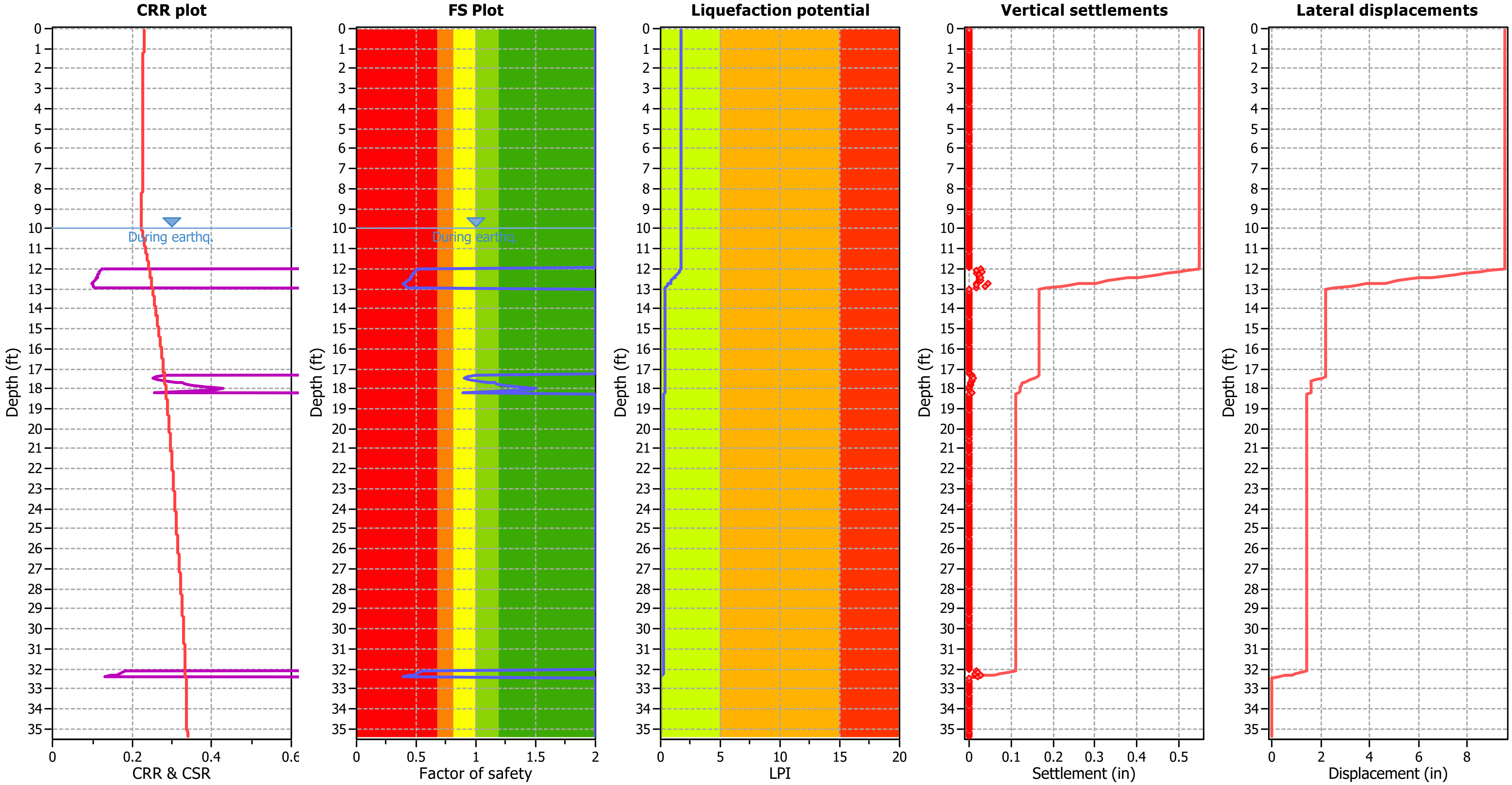
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
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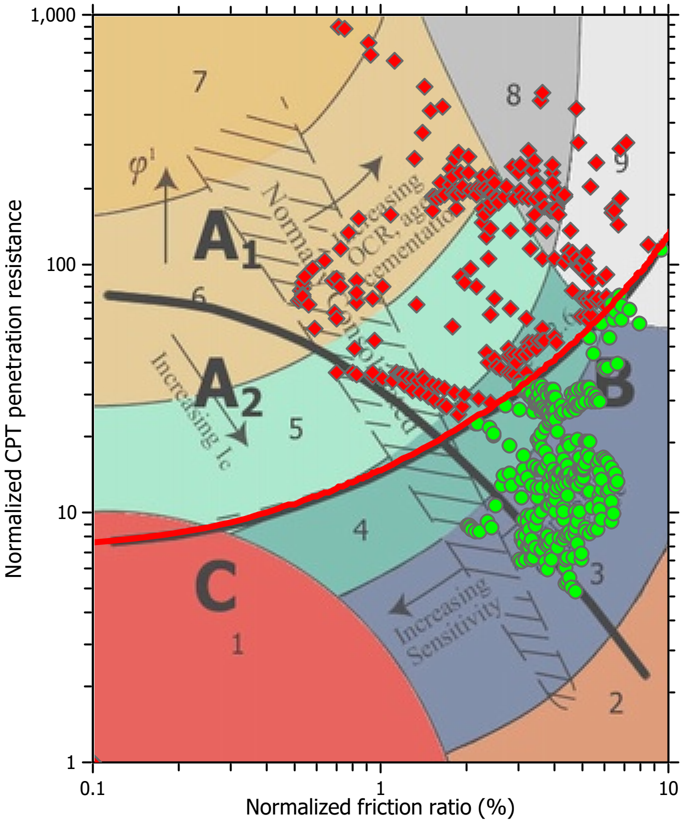
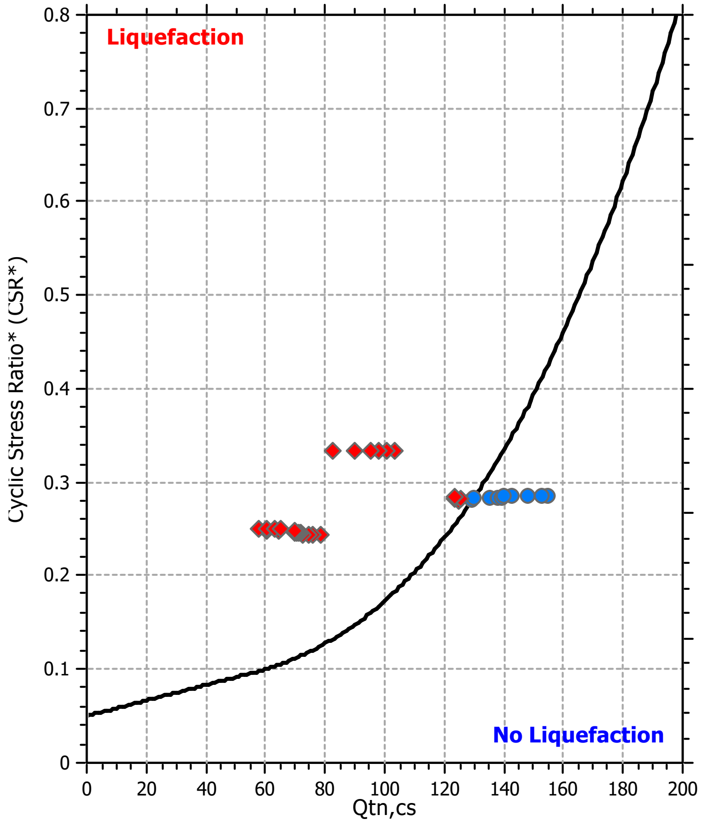
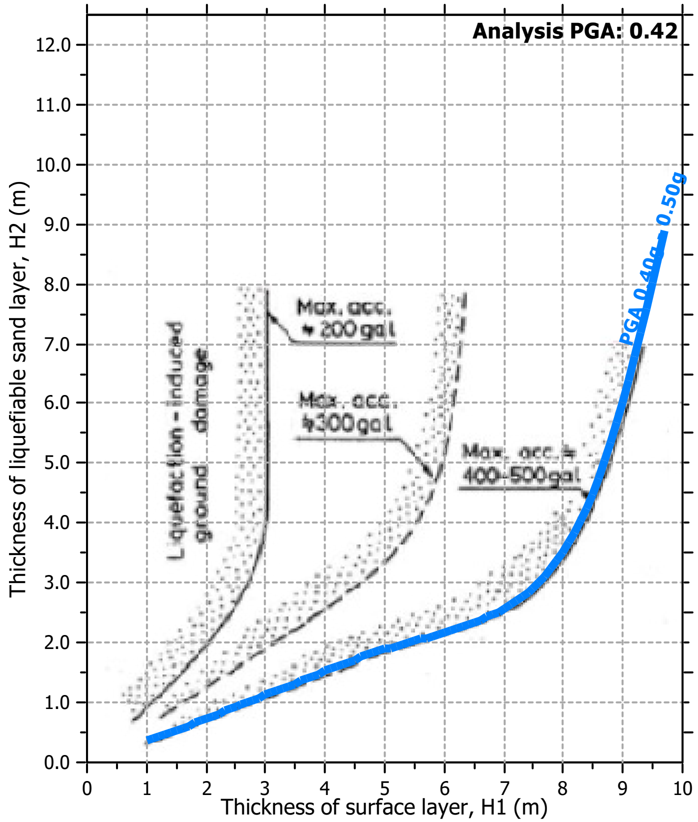
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



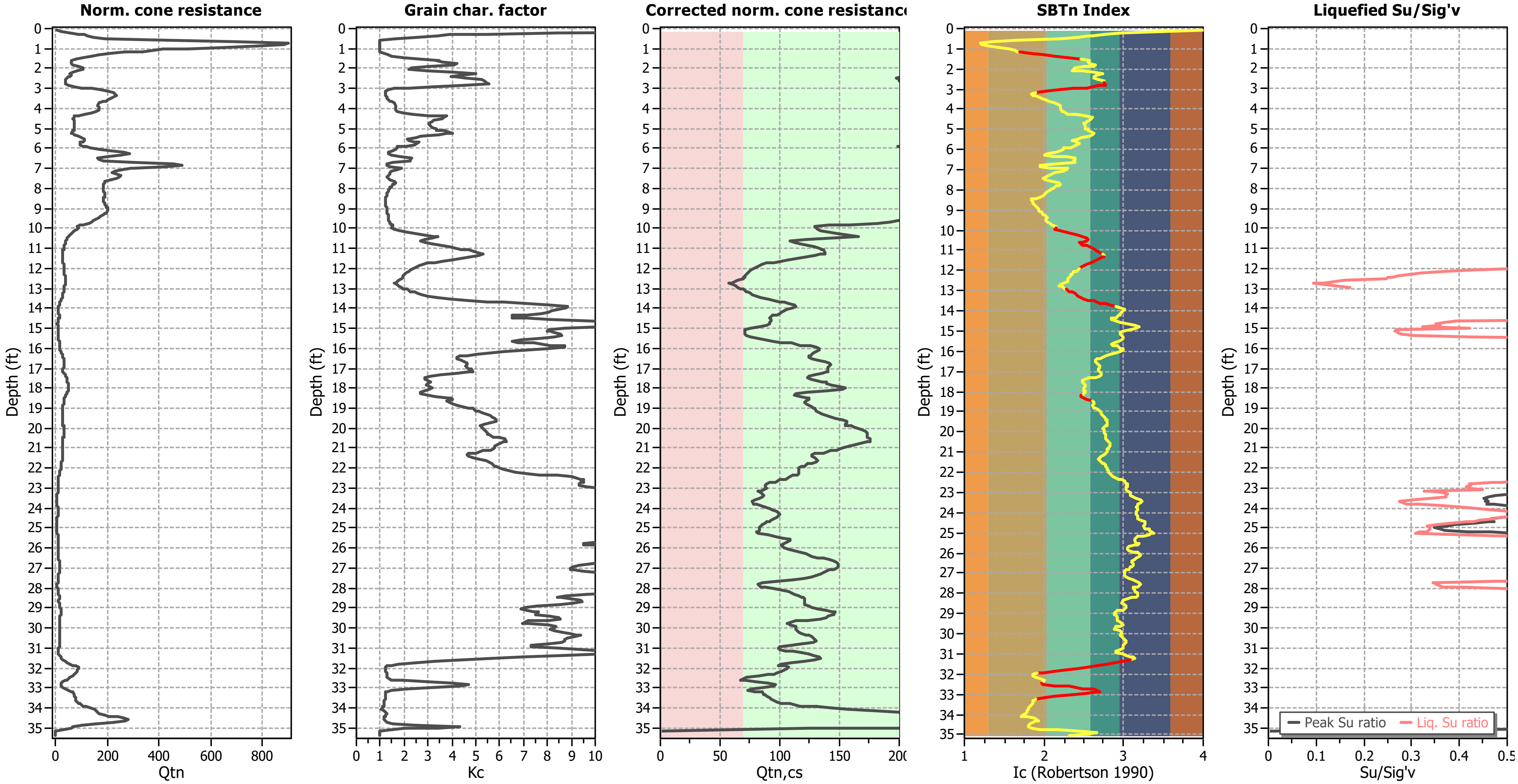




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

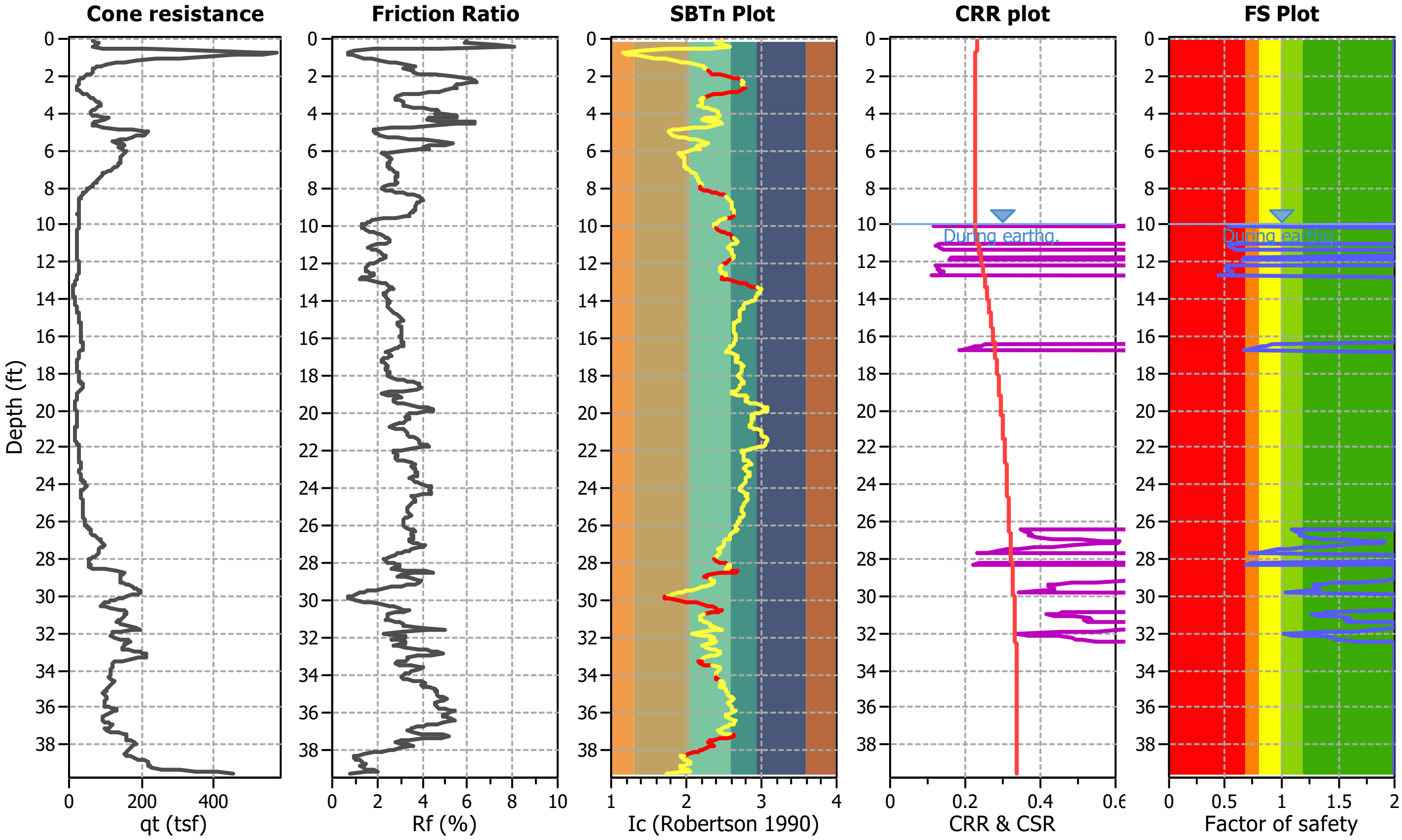
LIQUEFACTION ANALYSIS REPORT

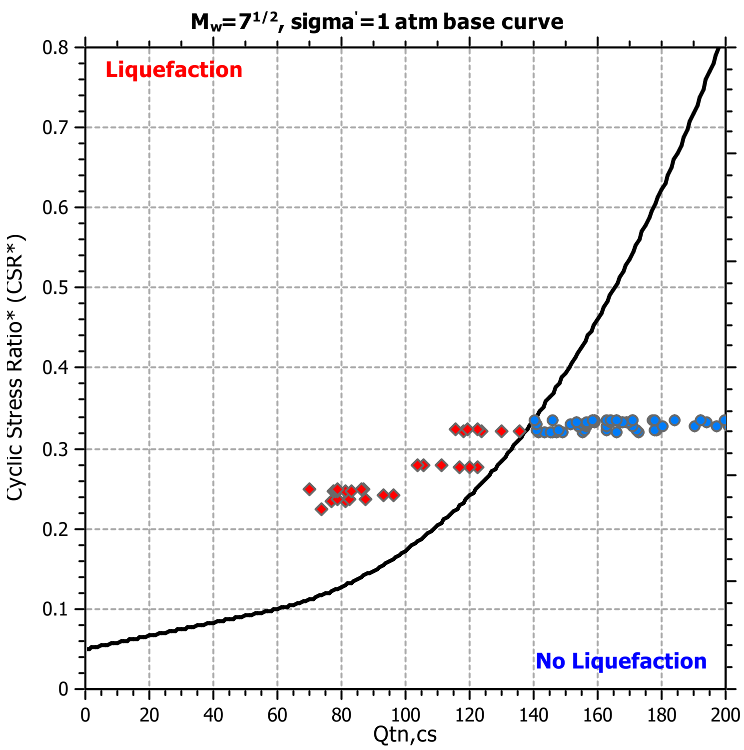
Project title : **Location :**

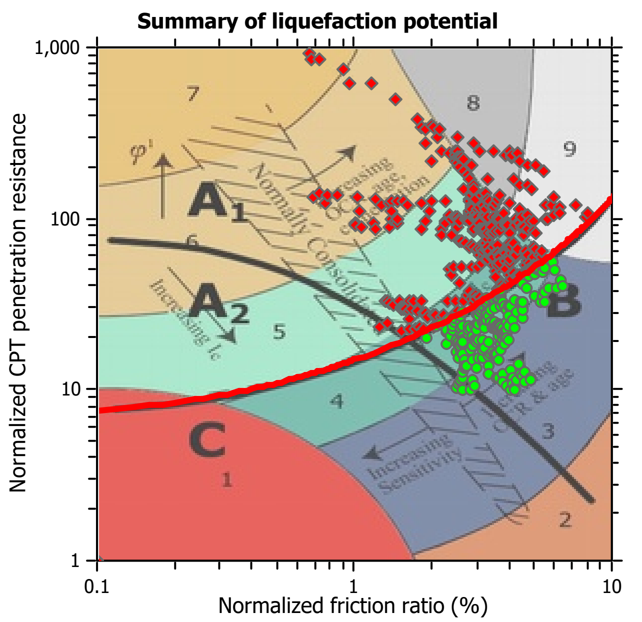
CPT file : C-4

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	43.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	10.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	33.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	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
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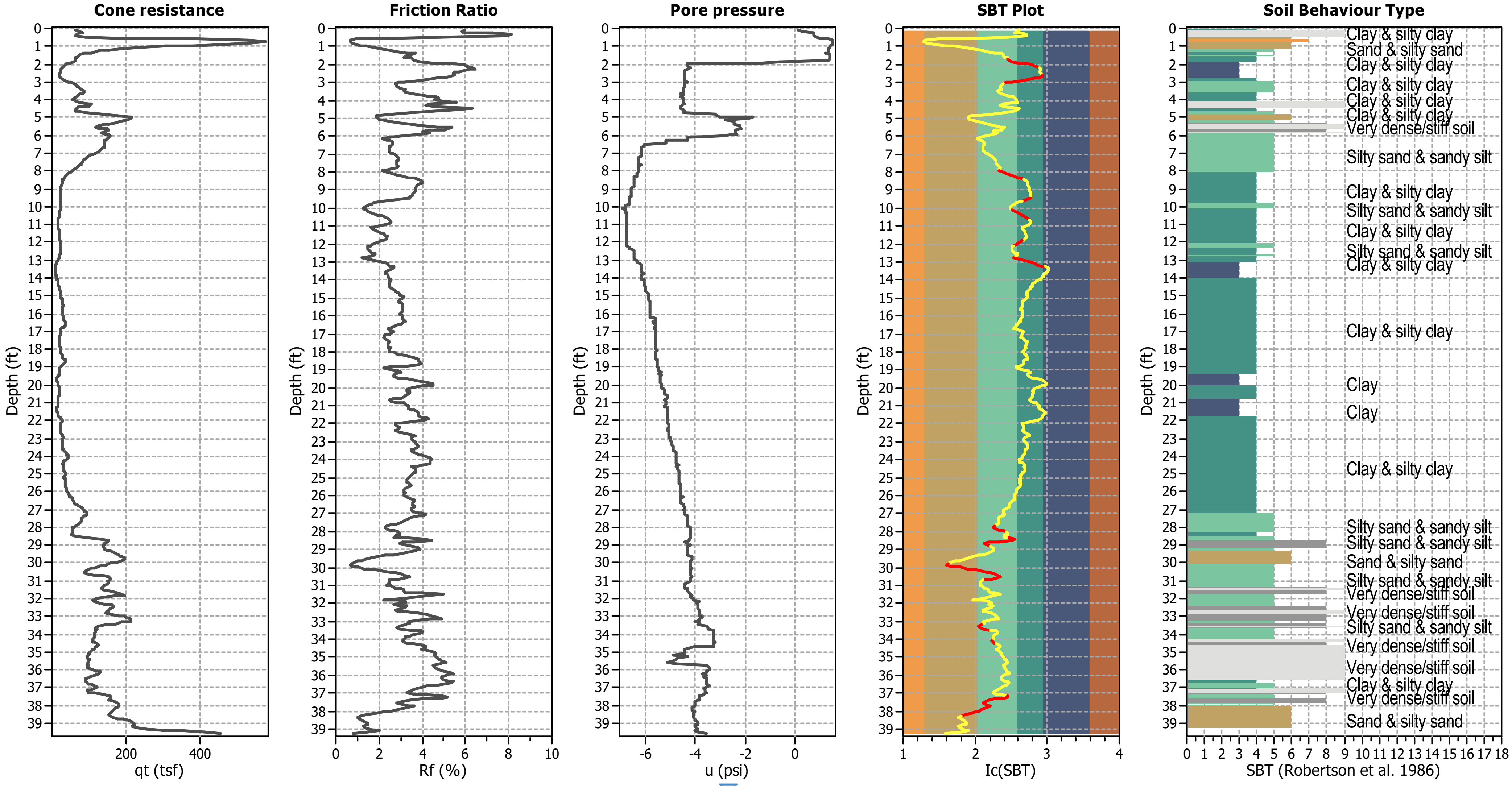
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



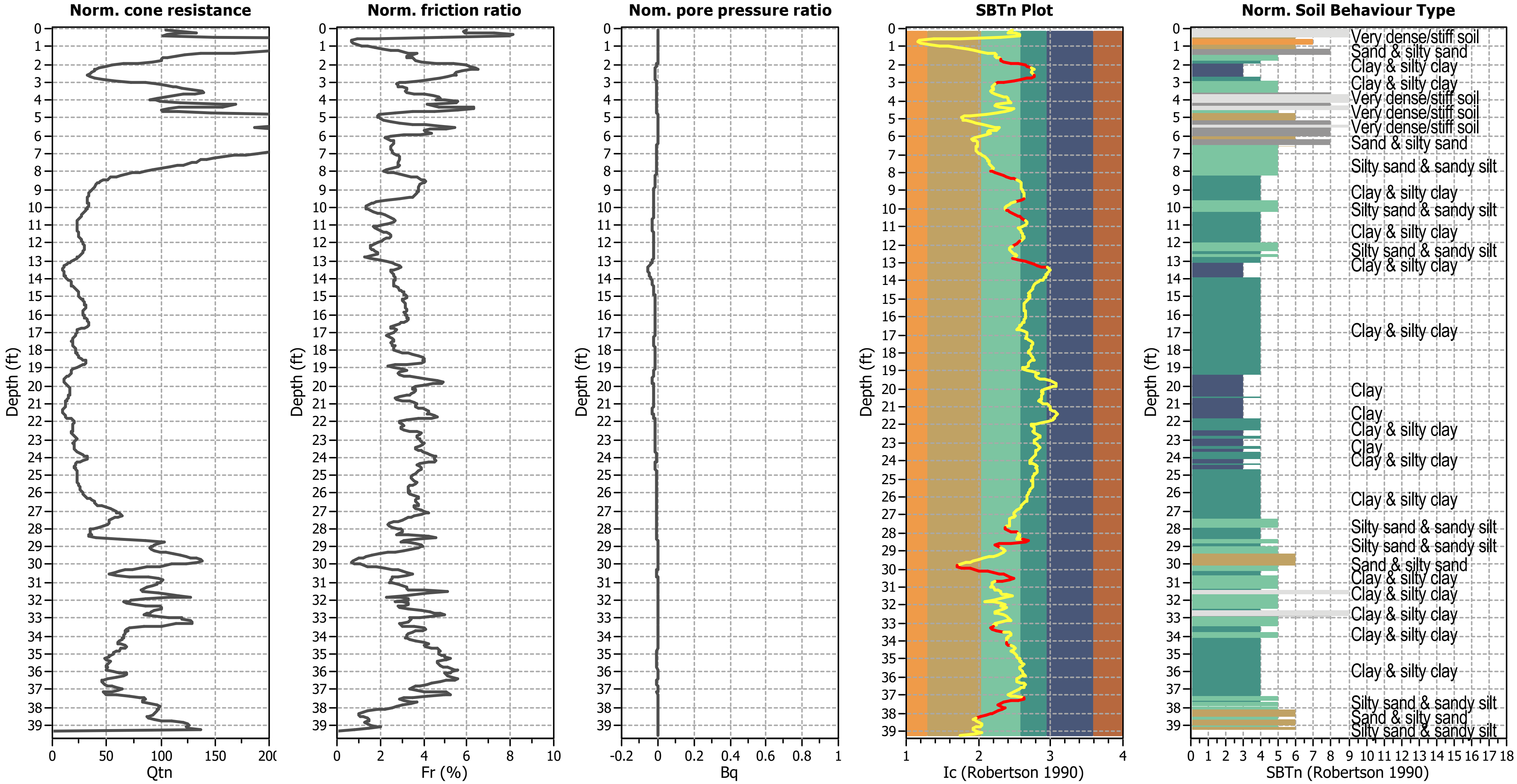
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBT legend

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

CPT basic interpretation plots (normalized)



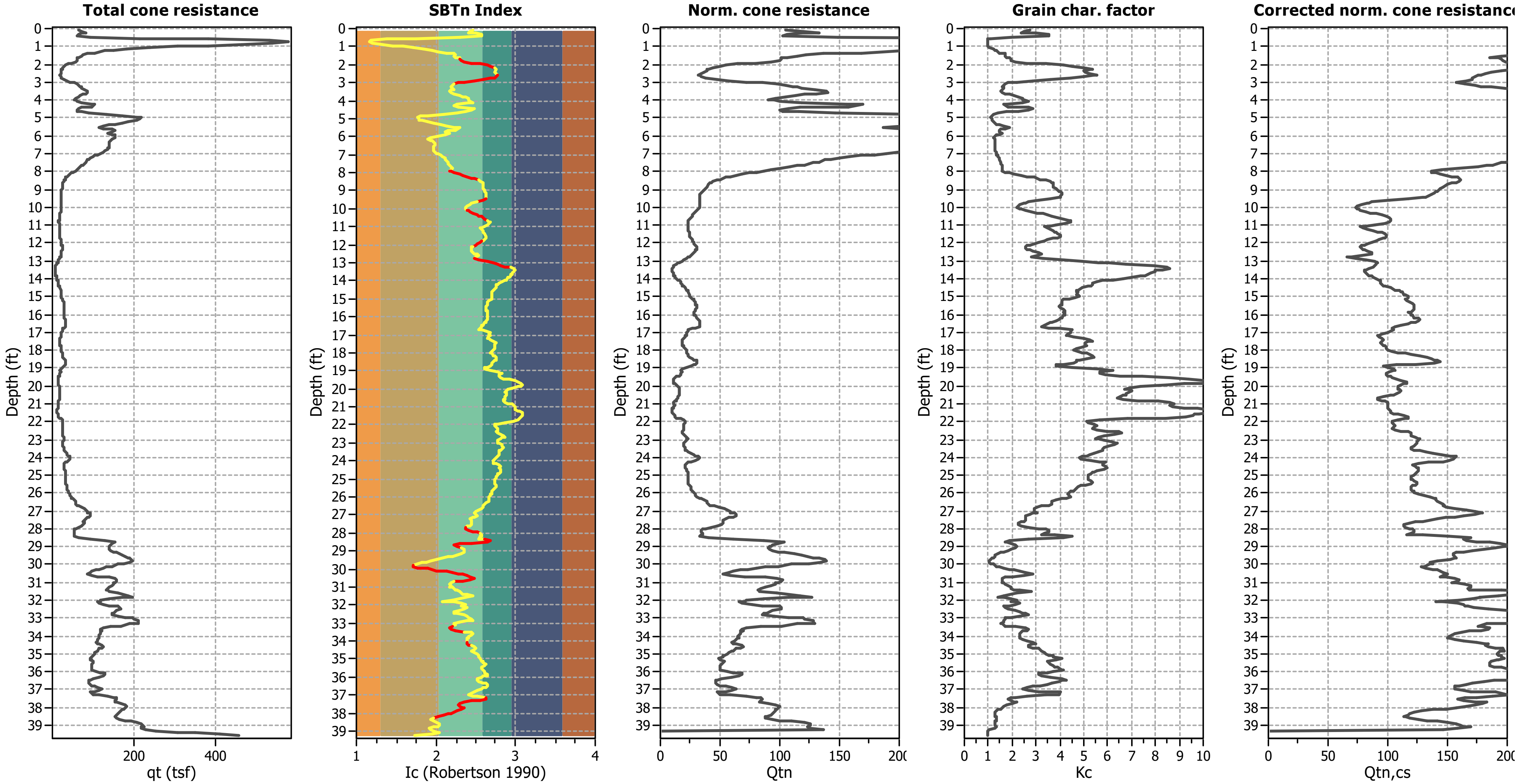
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBTn legend

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

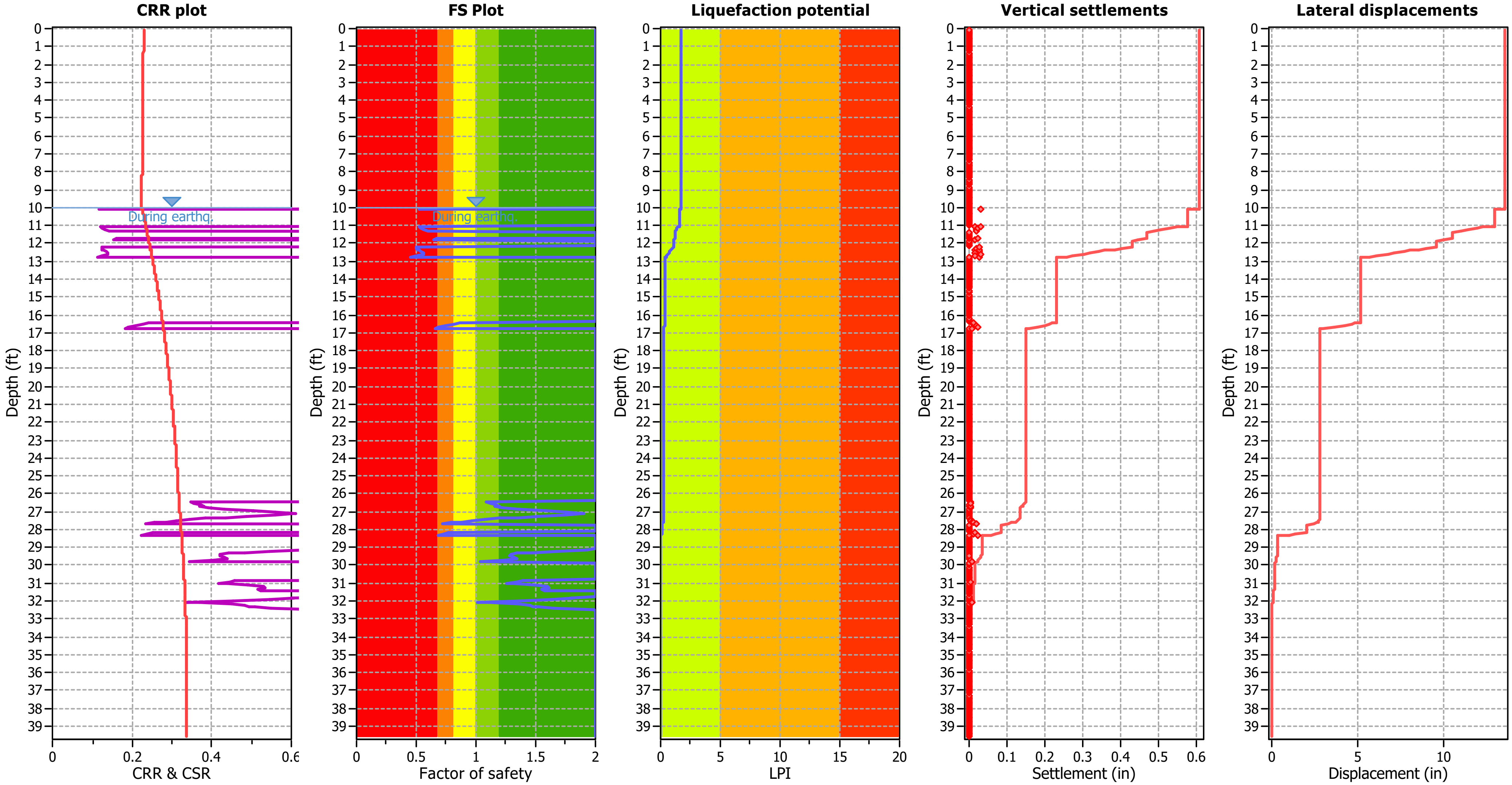
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

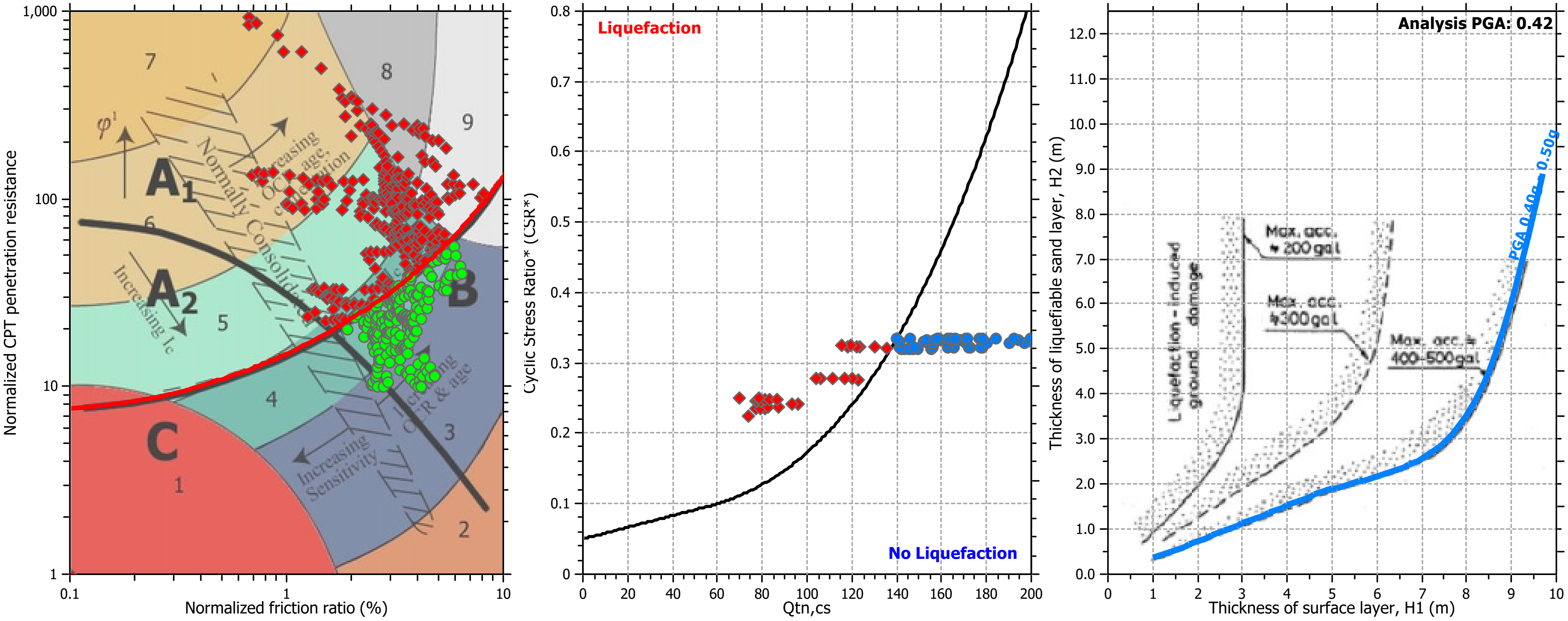
F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

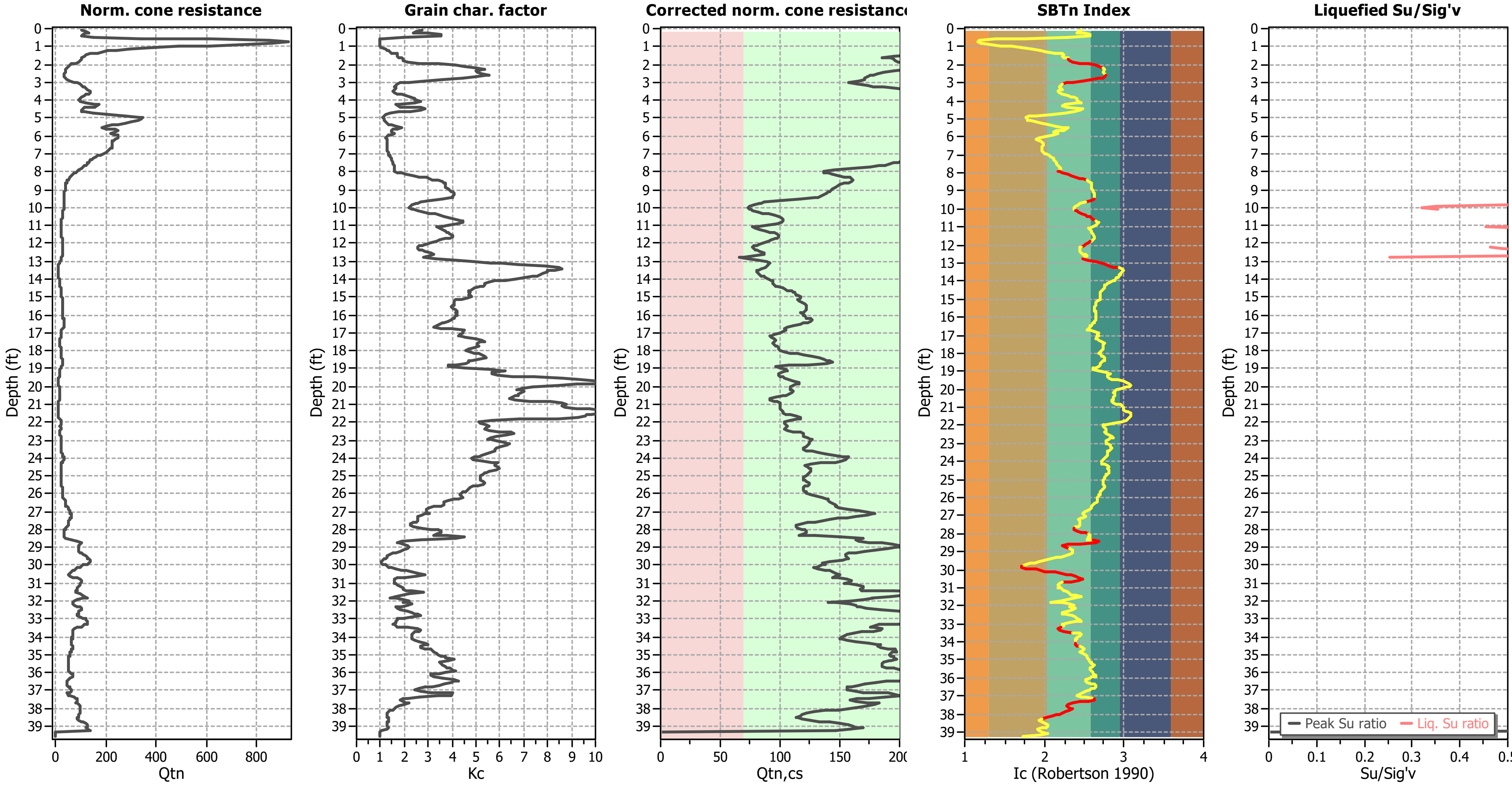
Liquefaction analysis summary plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

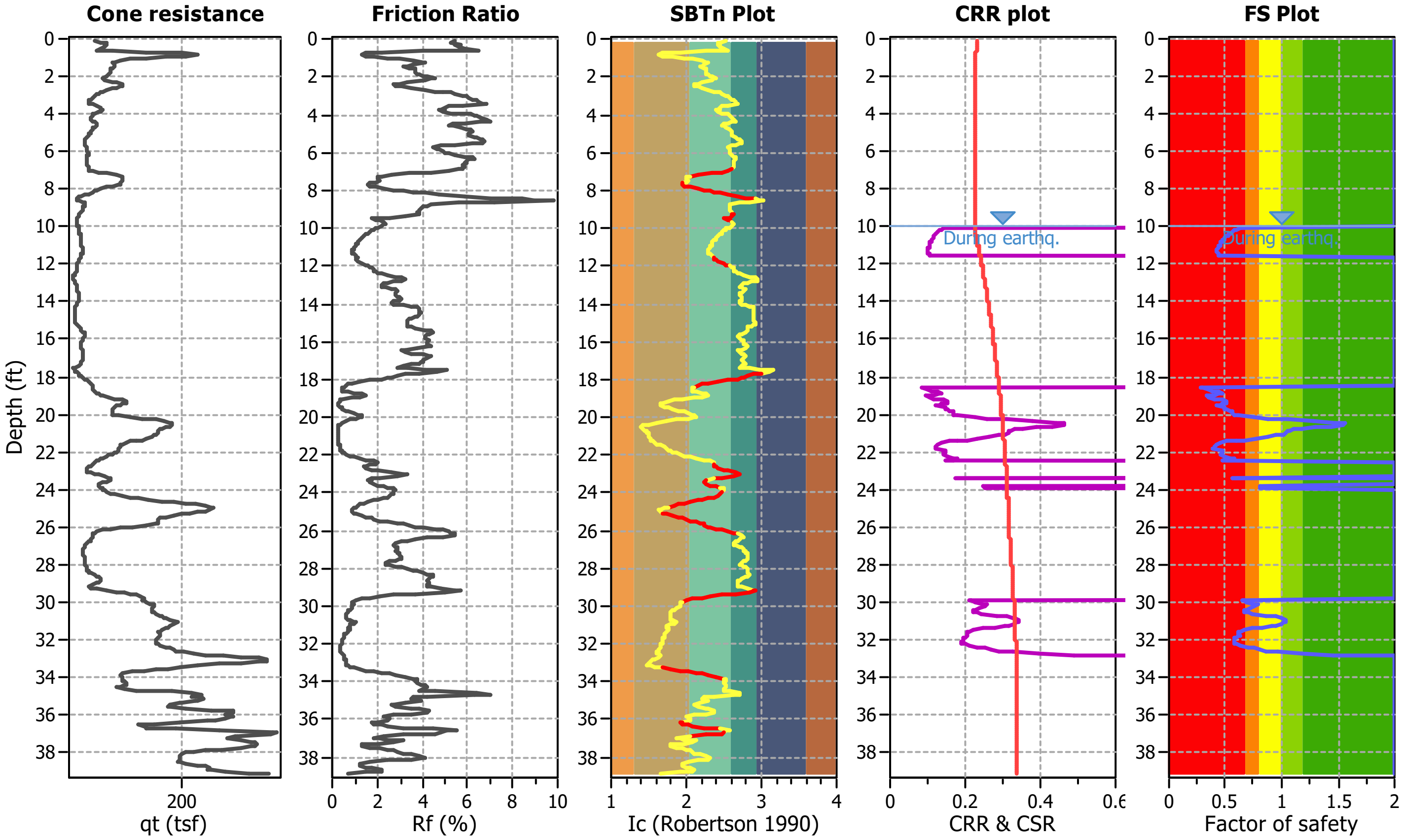
LIQUEFACTION ANALYSIS REPORT

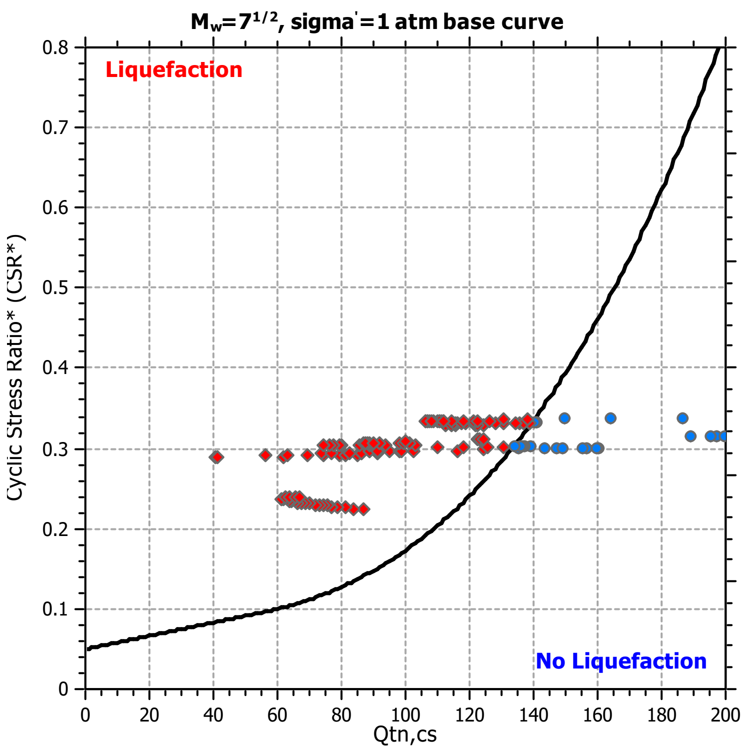
Project title : **Location :**

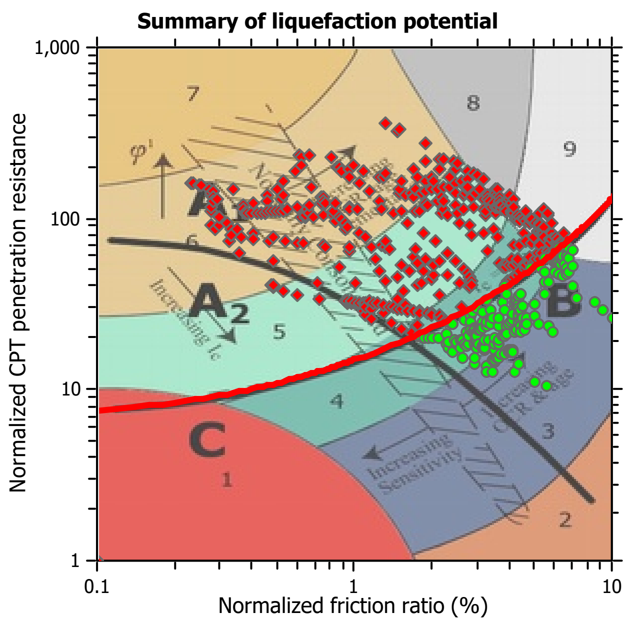
CPT file : C-5

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	43.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	10.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	33.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

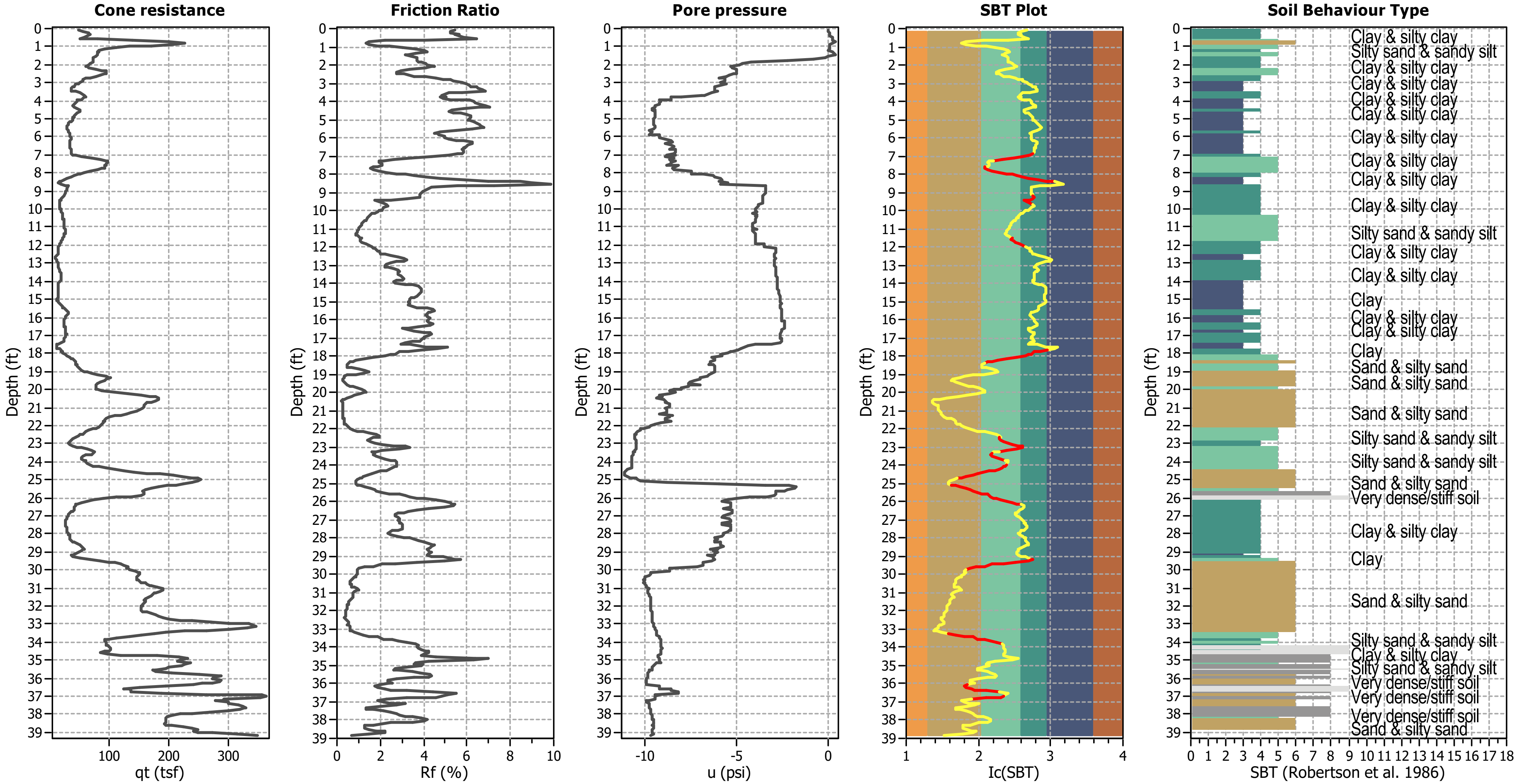






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



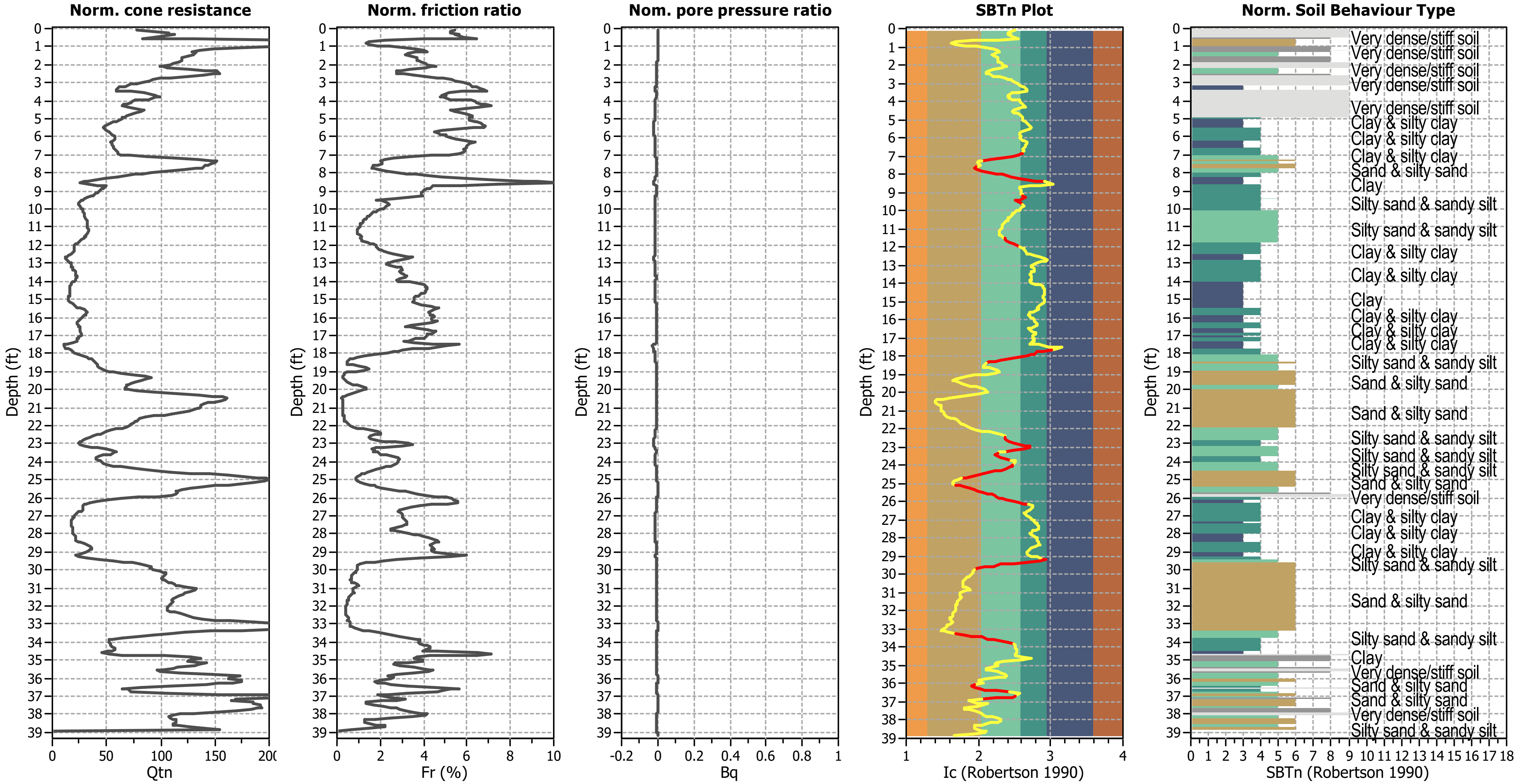
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBT legend

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

CPT basic interpretation plots (normalized)



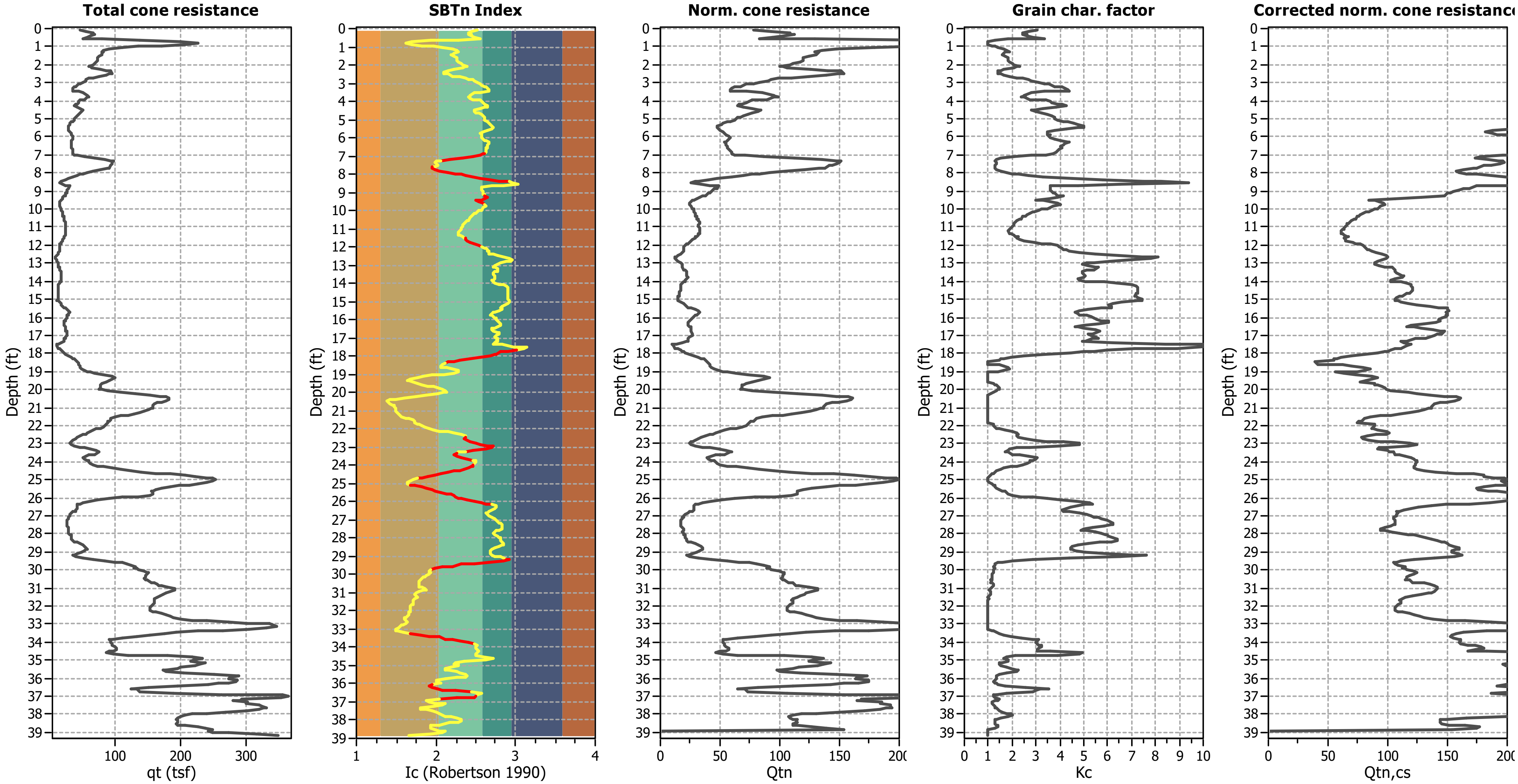
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBTn legend

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

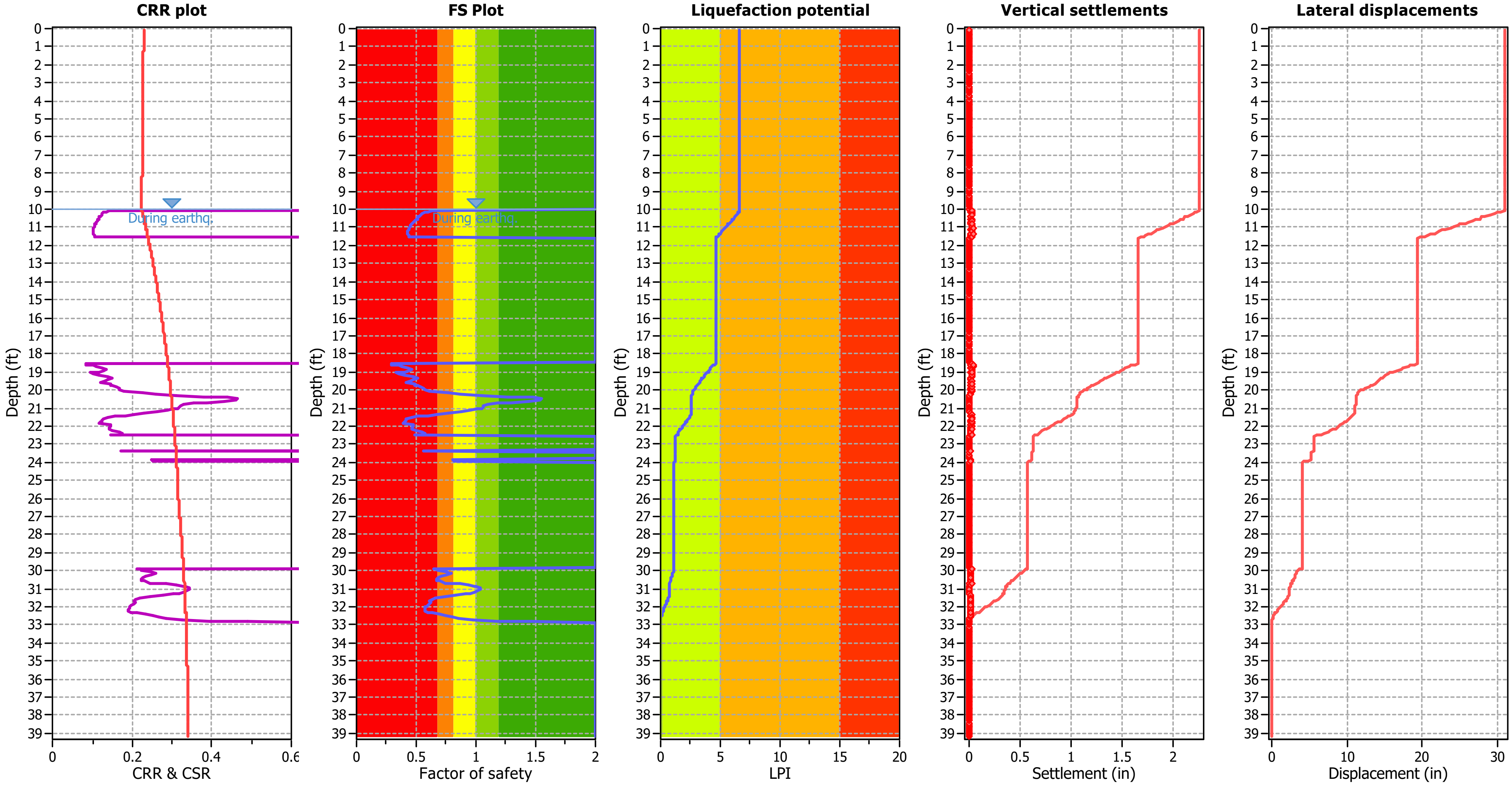
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

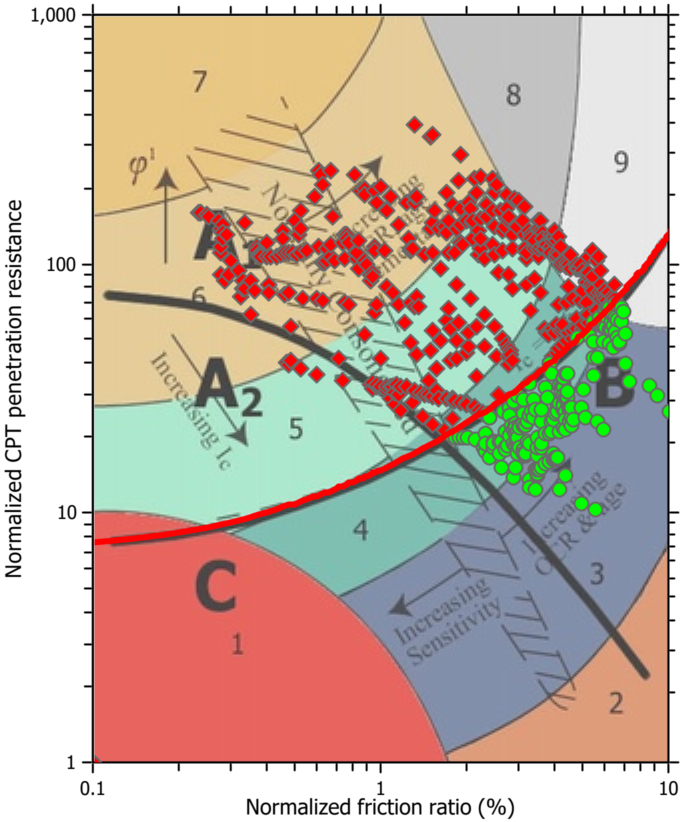
F.S. color scheme

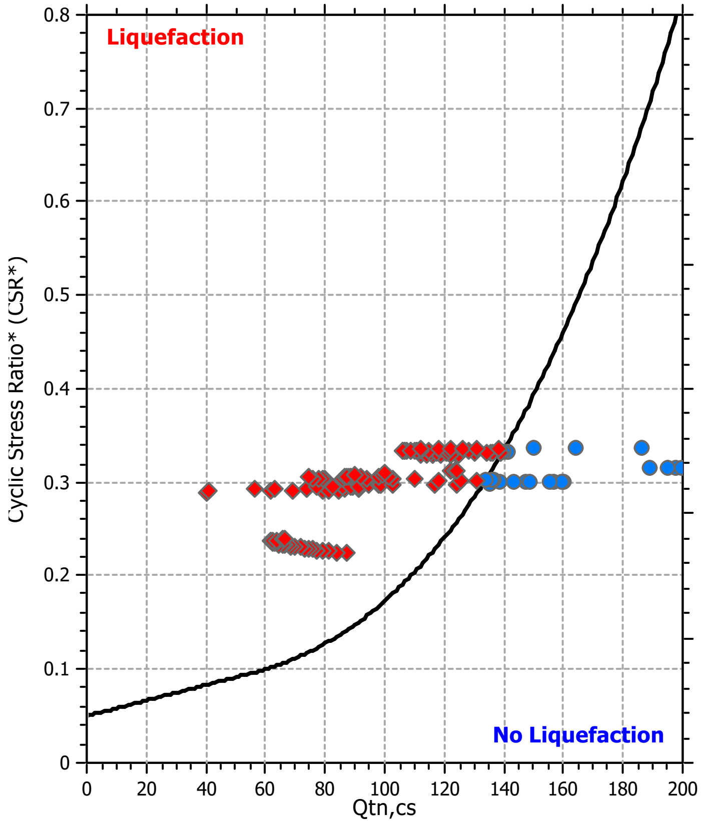
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

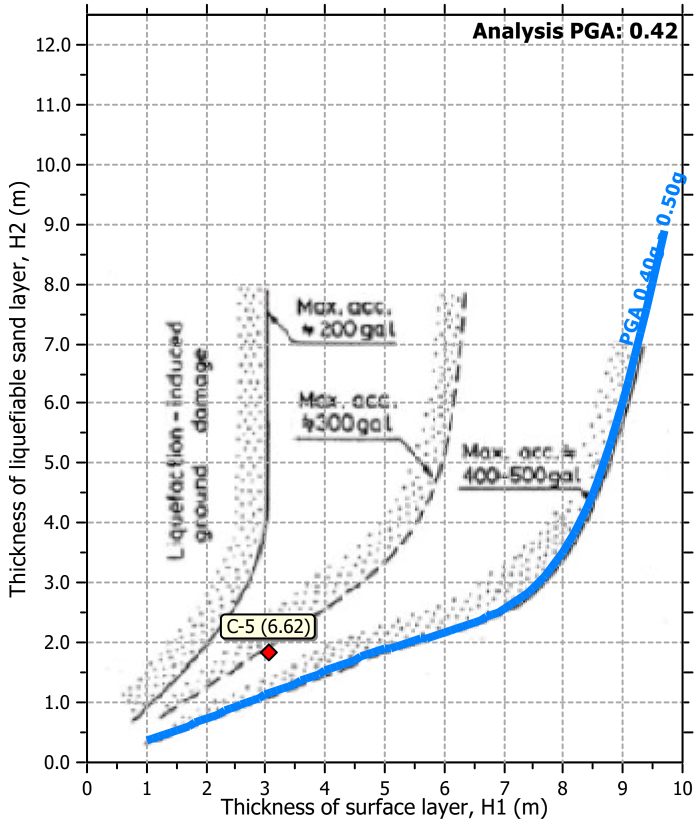
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



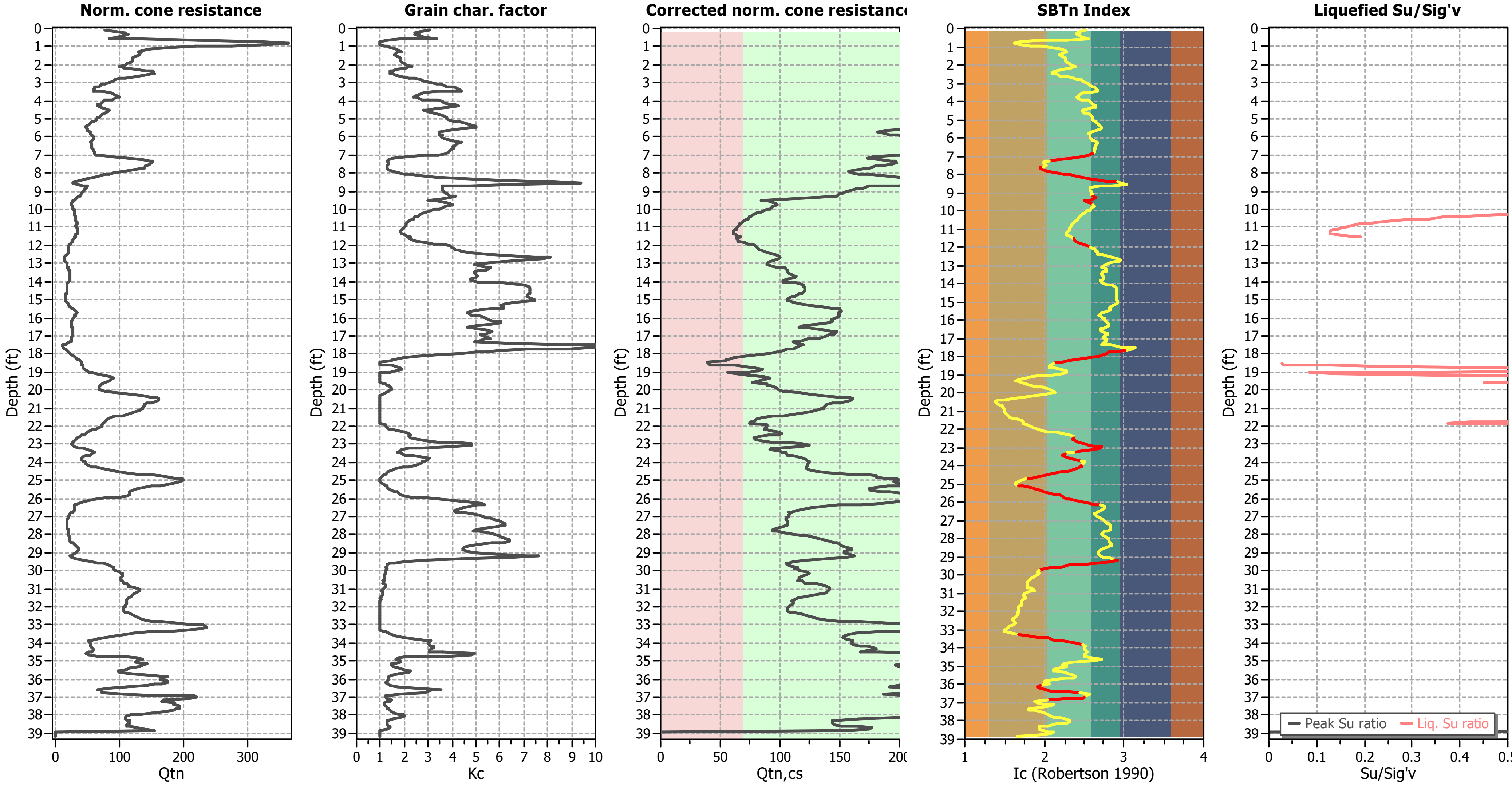




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

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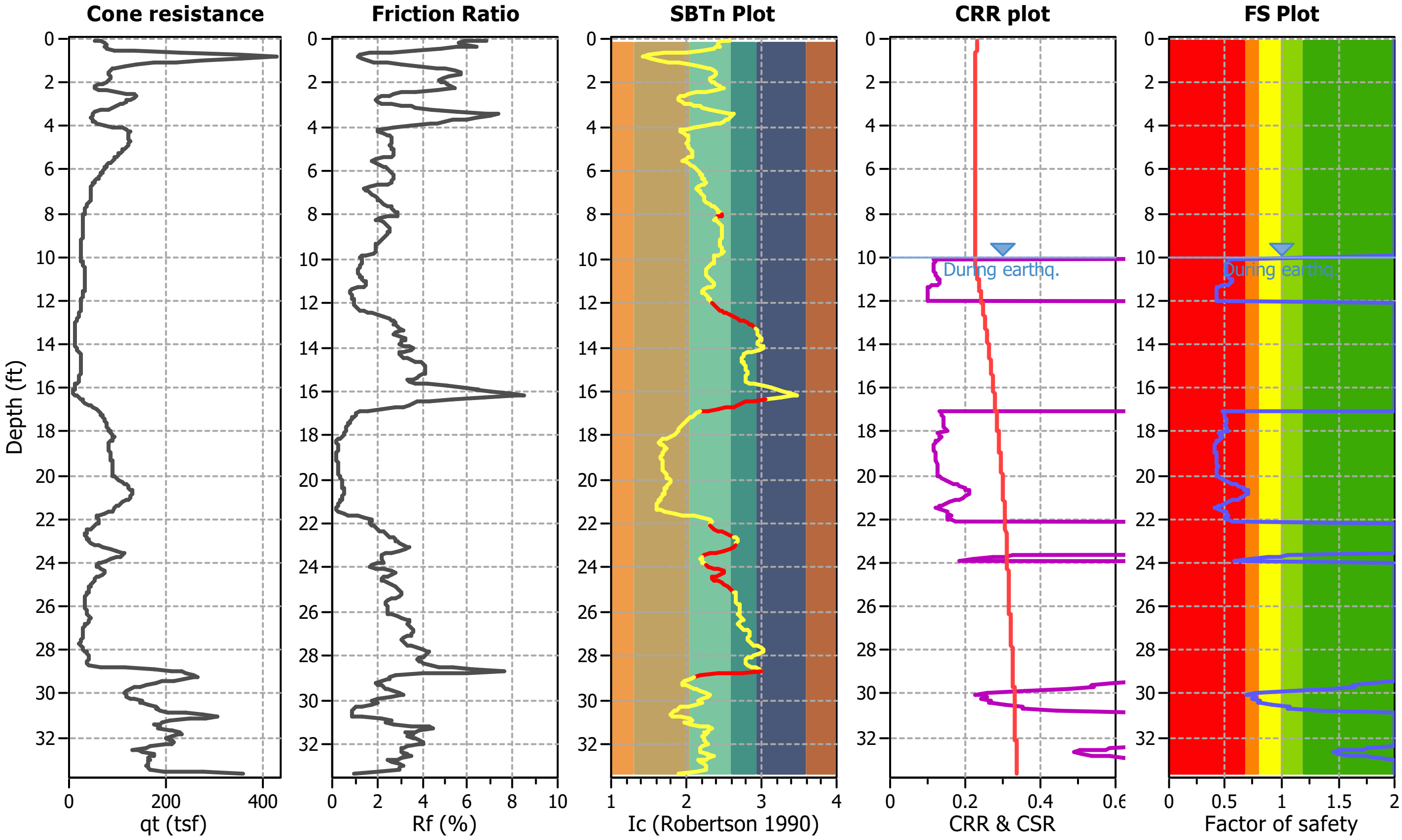
LIQUEFACTION ANALYSIS REPORT

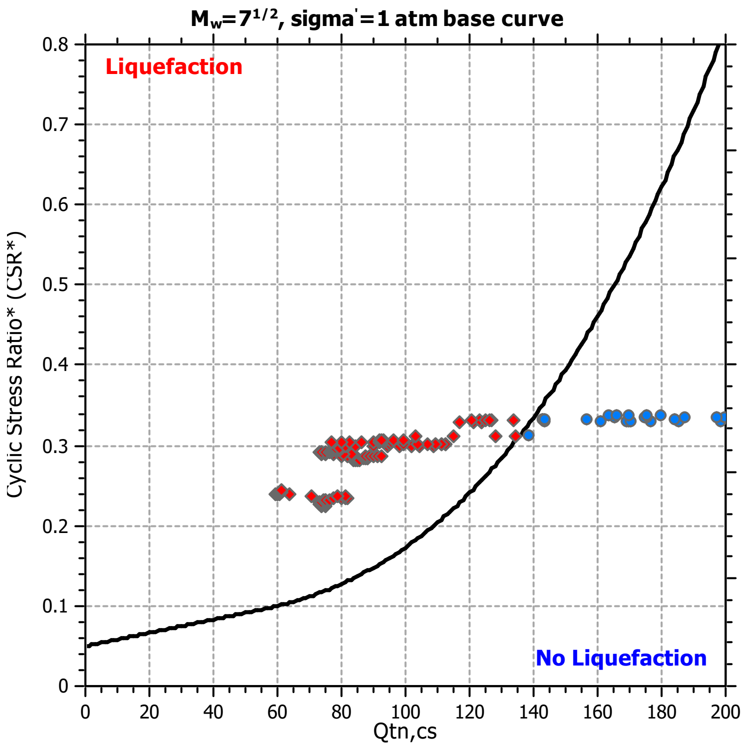
Project title : **Location :**

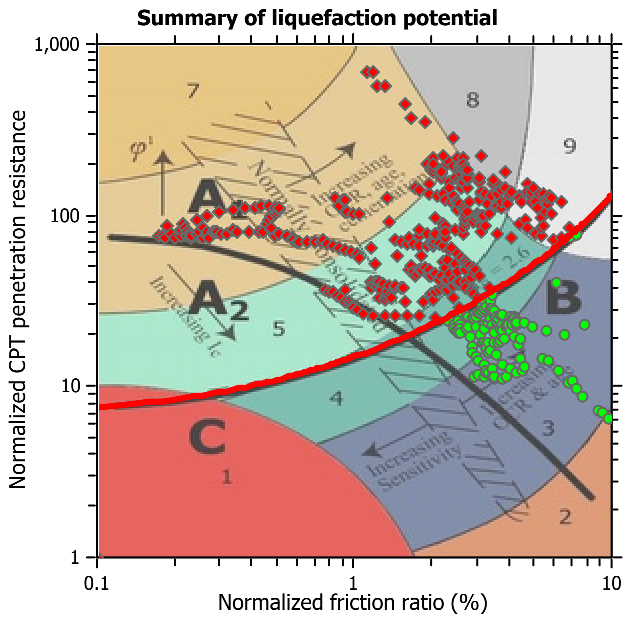
CPT file : C-6

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	43.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	10.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	33.00 ft
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.42	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

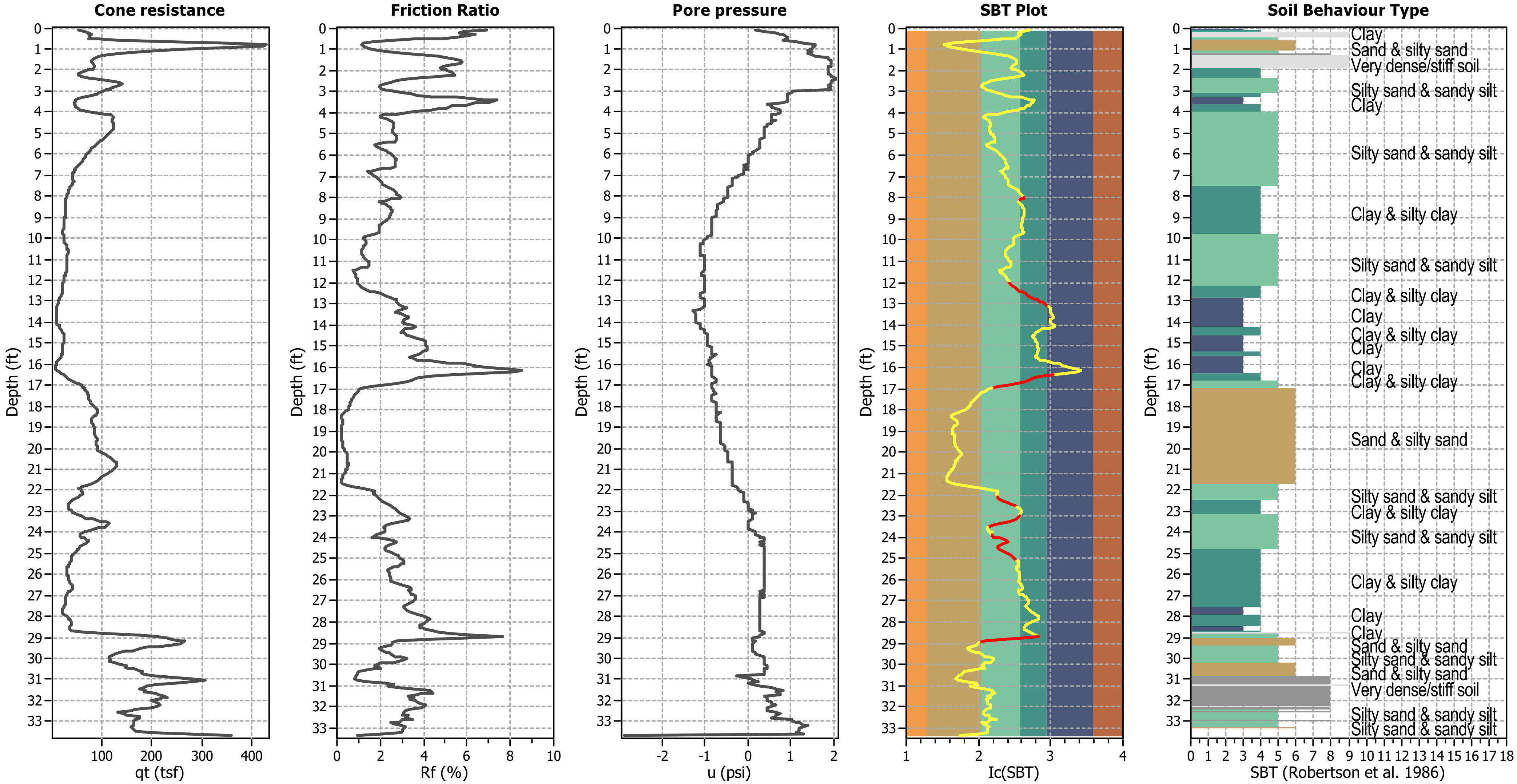






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



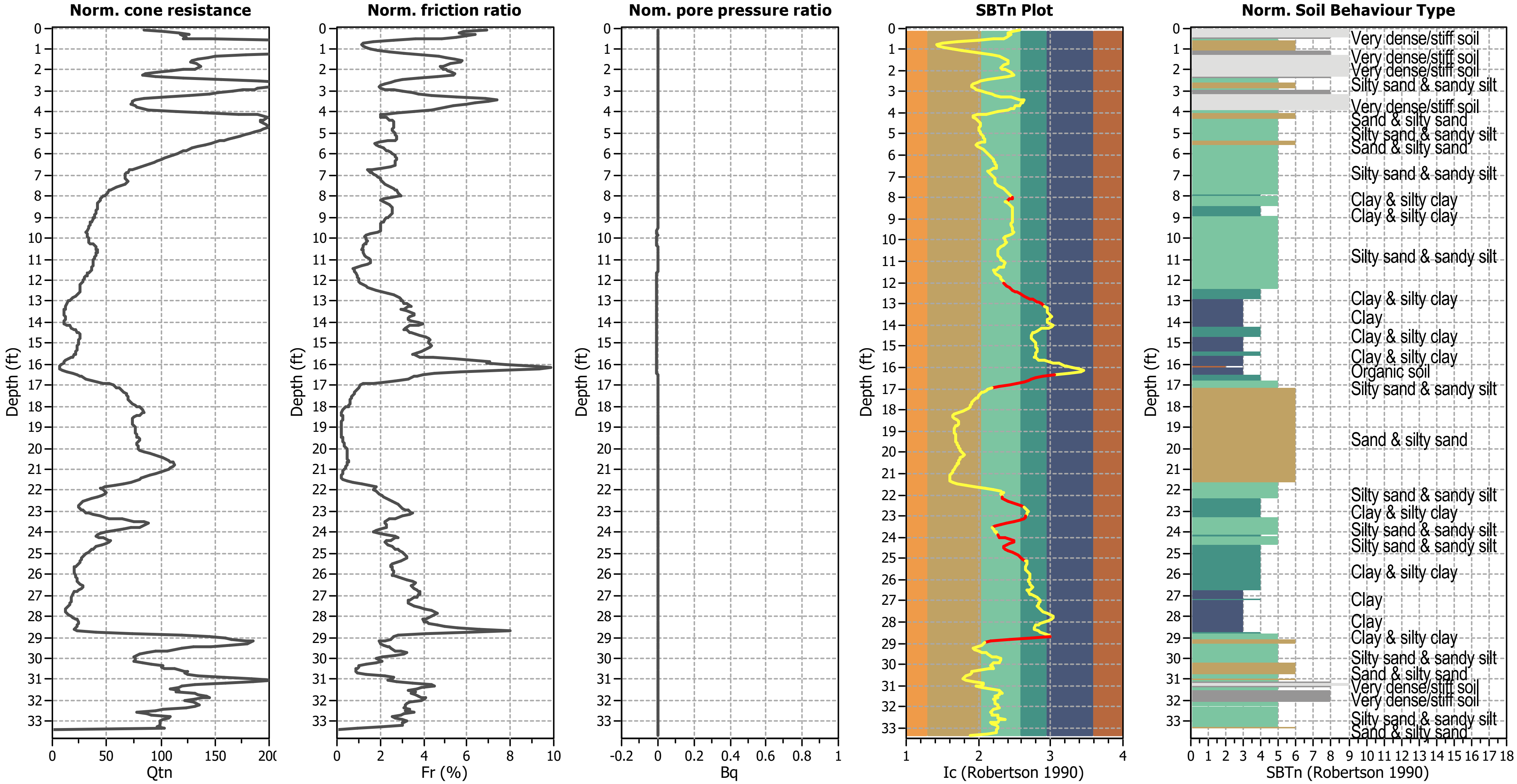
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBT legend

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

CPT basic interpretation plots (normalized)



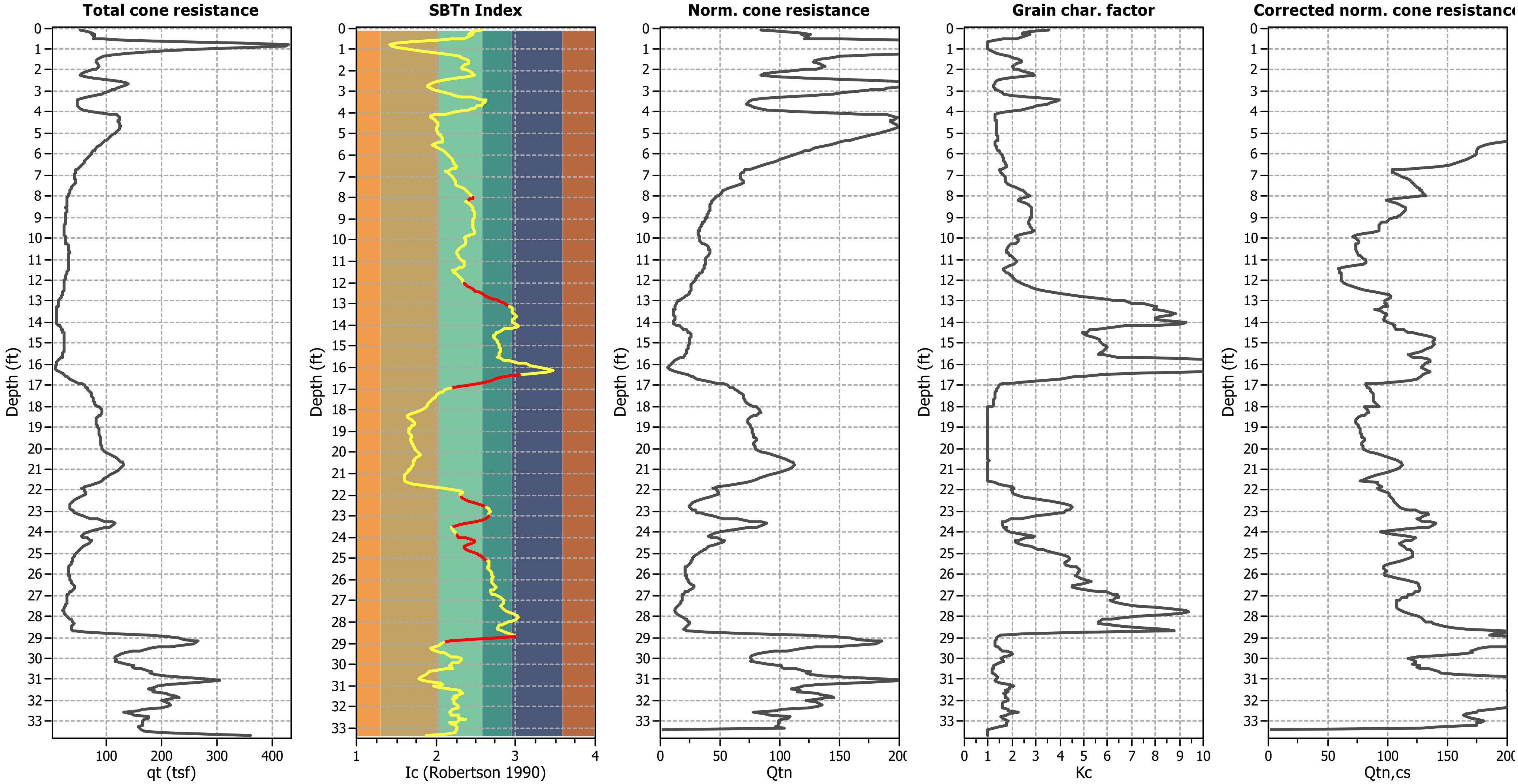
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

SBTn legend

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

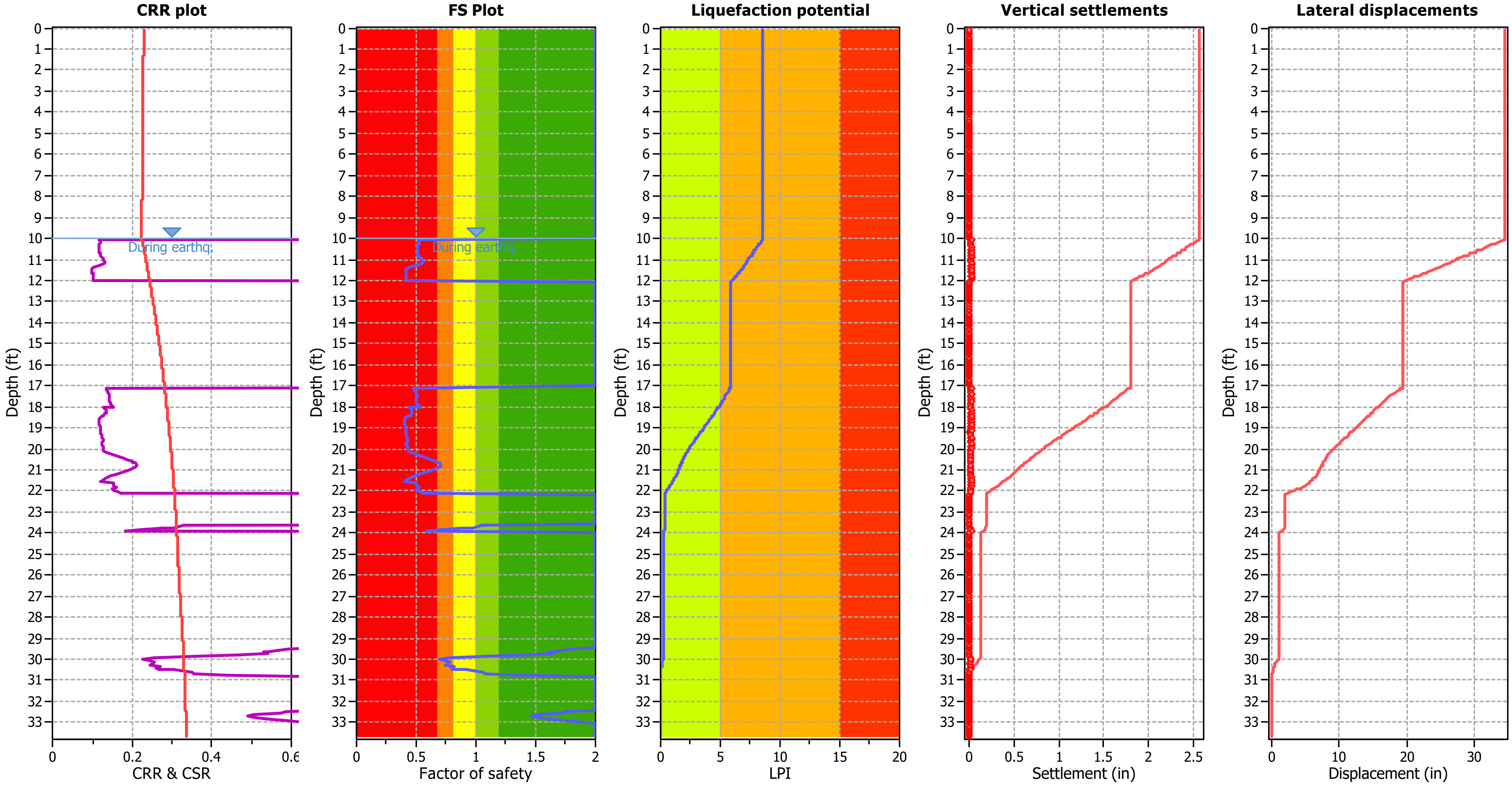
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

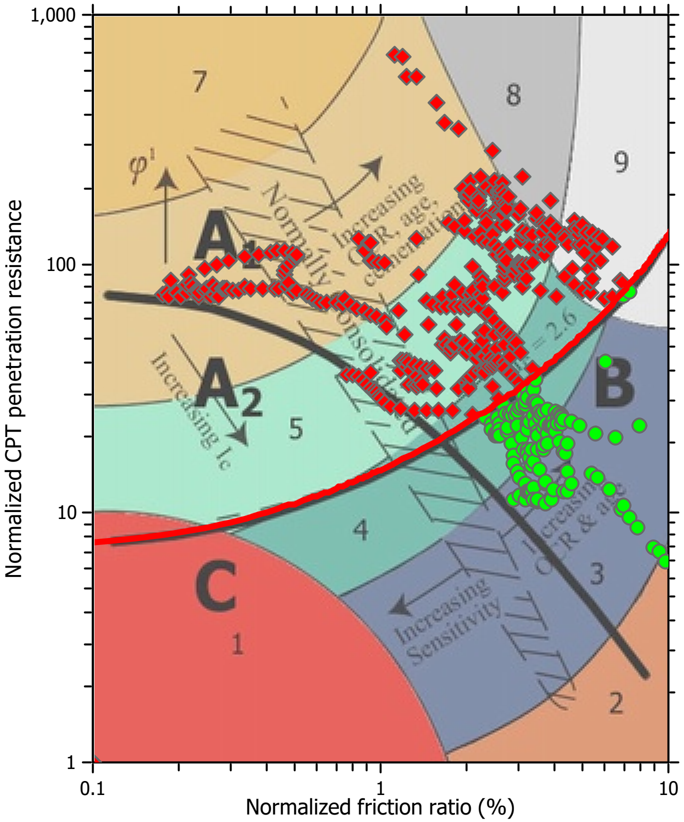
F.S. color scheme

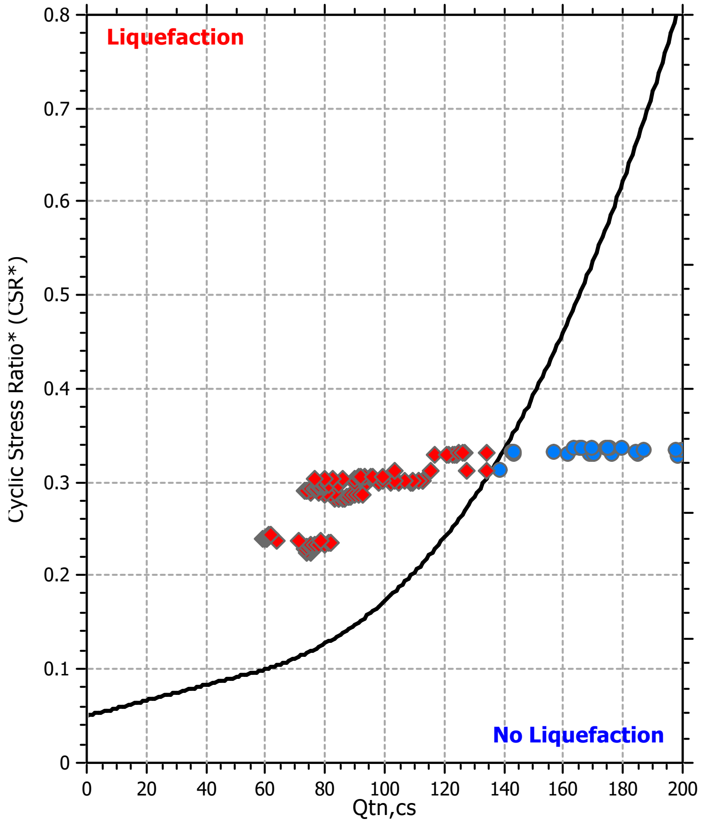
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

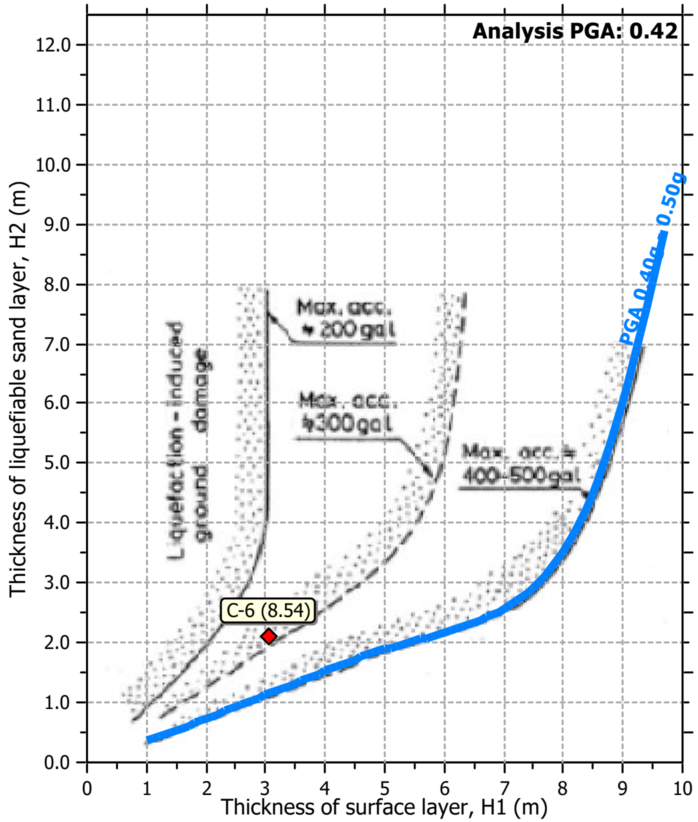
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



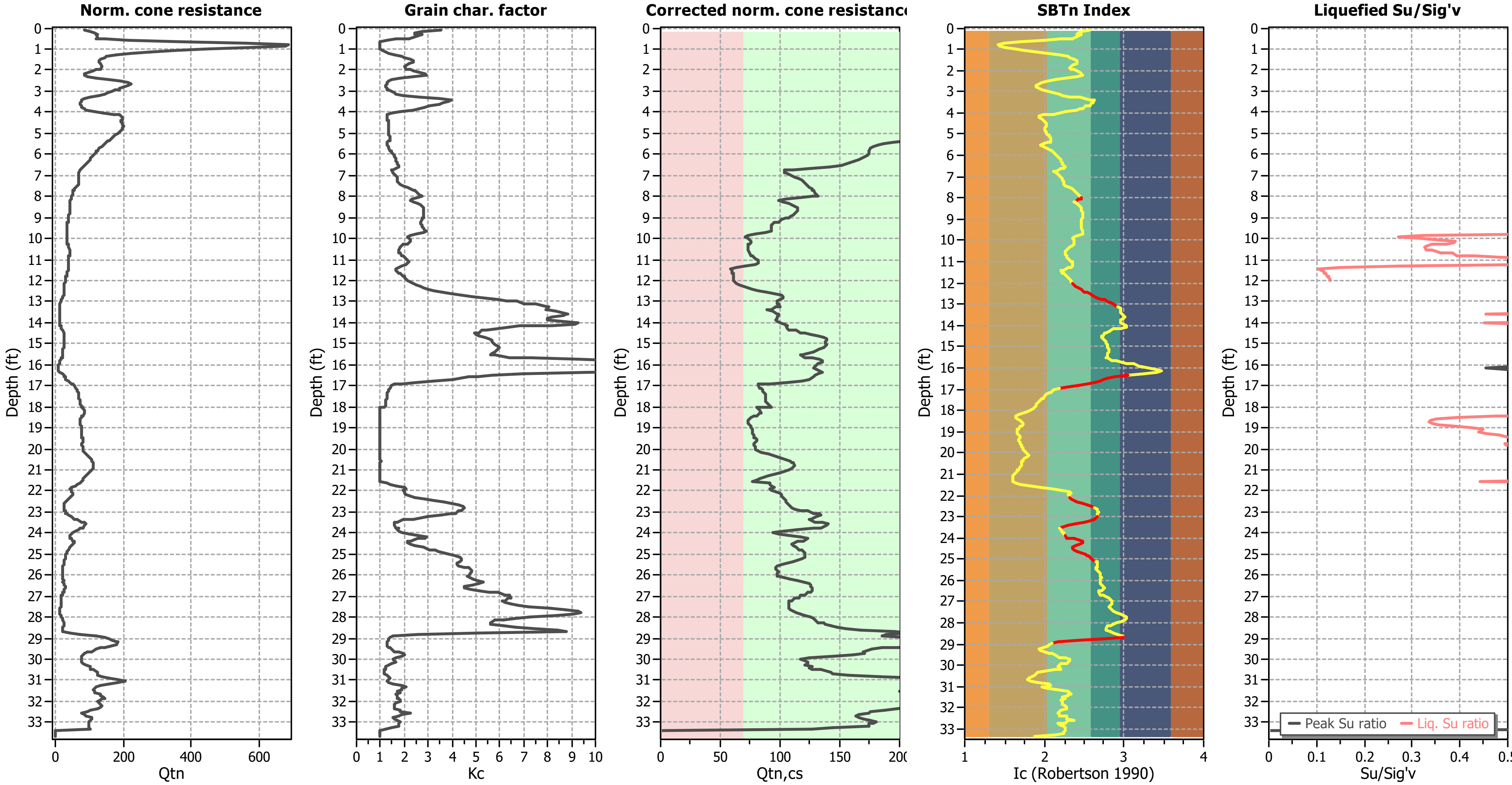




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	10.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.42	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	43.00 ft	Fill height:	N/A	Limit depth:	33.00 ft