LACO

July 20, 2023

5376.13

Cal Poly Humboldt
1 Harpst Street,
Arcata California

Attention: Kassidy Banducci

Subject: Preliminary Geotechnical Exploration and Geohazard Report
Health, Dining, and Housing Building Project
Cal Poly Humboldt, Arcata, California

Dear Ms. Banducci:

LACO Associates is pleased to submit this report presenting the results of our Geotechnical Exploration and Geologic Hazards Evaluation for the proposed new health, dining and housing building facility on the Cal Poly Humboldt Campus, Arcata, California.

If you have any questions, please contact me at (707) 443-5054.

Sincerely,
LACO Associates

Gary L. Manhart, CEG
Senior Engineering Geologist

GLM:jrg:mal

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Preliminary Geotechnical Exploration and Geologic Hazard Report

Library Circle, Health, Dining and Housing Building Project
Cal Poly Humboldt
1 Harpst Street, Arcata, California

July 20, 2023

Prepared for:
Cal Poly Humboldt

Prepared By:
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Project No. 5376.13

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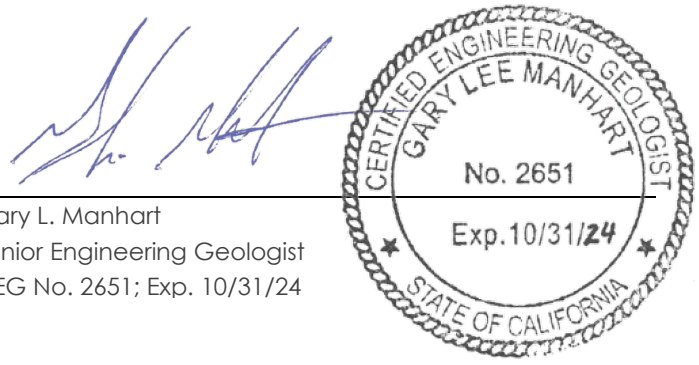

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1.0 INTRODUCTION

This Report presents the results of a Geotechnical Exploration and Geologic Hazards Evaluation performed by LACO Associates (LACO) for the proposed Cal Poly Humboldt, Library Circle, Health, Dining, and Housing Building Project at Assessor's Parcel Number (APN) 020-063-007 and -011, located on the Cal Poly Humboldt, in Arcata, California ("Site," see Figure 1 – Site Vicinity Map).

The Site is located on the western central portion of campus west of L.K. Wood Boulevard and is on a graded flat on the western edge of Fickle Hill. There are two buildings on the western third of the Site with the remaining being a parking lot with a few mature redwood trees.

2.0 PROJECT UNDERSTANDING

The project consists of a new building for student health services, dining, and housing. Our scope of services is based on correspondence with Fred Saldana of fs3 | Hodges (Client representative) on December 21, 2022, and subsequently, and our review of Cal Poly Humboldt Health, Dining, and Housing Building Project Programming and Feasibility Study Report, dated October 21, 2022, prepared by Cal Poly Humboldt. On March 2, 2023, LACO Associates (LACO) was informed that the Library Circle site had been moved from the northwest of the library to the south where the ceramics and sculpture labs and student parking is currently (Figure 2). At this time there are no specific construction details. Grading plans are not available, but we anticipate that the planned grading will be minimal to create level building pads and provide positive Site drainage, with cuts and fills less than 3 feet.

2.1 Scope of Services

The following Geotechnical Soils Exploration and Geologic Hazard Report was performed to support the design and construction of the proposed Site improvements and to satisfy the reporting requirements in the 2022 California Building Code (CBC) Chapters 16A and 18A. As described in the Client service agreement dated February 13, 2023. The scope of services consisted of the following:

- Review publicly available geotechnical and/or geologic reports, maps, and other relevant data and information regarding the Site and vicinity.
- Perform a Reconnaissance of the project Site to observe and map surface topographic and geologic conditions pertinent to the project and subsurface exploration planning.
- Explore subsurface conditions at the project Site by advancing a series of geotechnical borings. Observed by a LACO field geologist and log soils encountered in general accordance with ASTM 2488 (Visual Manual Procedures) and collect soil samples for laboratory testing.
- Perform laboratory testing on selected soil samples.
- Perform geologic and engineering evaluations to develop conclusions and recommendations regarding geologic hazards affecting the proposed improvements and geotechnical design criteria.
- Prepare the following report documenting the results of our services.

3.0 EXPLORATION

3.1 Field Exploration Program

Our initial engineering geologic reconnaissance was performed on March 23, 2023. Our subsurface exploration was performed on April 13, 2023, and April 21, 2023, and included the installation of six cone

penetration testing (CPT) soundings and drilling, sampling, and logging of three exploratory borings at the approximate locations shown on Figure 2 – Boring Location Map. CPT soundings were installed using a 25-ton CPT truck and advanced to refusal at varying depths ranging from 15.5 to 42 feet bgs.

Borings GB-1 through GB-3 were installed using track-mounted hollow stem rotary augers equipped with 8-inch augers and advanced to depths between 16 and 35 feet bgs. Our geologist logged the auger borings and obtained samples of the materials encountered. Soils were logged in general accordance with the American Society for Testing and Materials (ASTM) Test Procedure D2488 Visual-Manual Procedures. CPT and Boring logs are presented in Appendix 1.

Soil samples were collected with a 2-inch outside diameter (OD) Standard Penetration Test (SPT) sampler driven with a 140-pound auto-trip hammer falling 30 inches. The number of hammer blows required to drive the sampler was recorded during drilling and is presented on the boring logs. Fine-grained soil samples were collected by pushing a 3-inch OD Shelby tube sampler.

3.2 Laboratory Testing

Relatively undisturbed and disturbed soil samples collected during the field explorations were submitted to LACO's materials testing laboratory. Laboratory tests consisted of the following:

- Particle Size Analysis – Finer than No. 200 Sieve (ASTM D1140)
- Sieve Analysis (ASTM C-136)
- Direct Shear (ASTM D-3080
- In-Place Unit Weight and Moisture Content (Consolidation and ASTM D-2216/2937)

LACO will archive the soil samples collected for this project for 60 days following the issuance of this report. Unless directed otherwise by the Client, all samples will be discarded after the 60-day archive period. Laboratory test results are included as Appendix 2 and are summarized in Table 1.

Table 1. Summary of Laboratory Test Results

Boring	Depth (feet bgs)	Unified Soil Classification System Soil Type	ASTM D1140/D422	ASTM D2216/2937		ASTM D-4318		ASTM D-4318	
			Fines Content (percent finer than No. 200 sieve)	Dry Unit Weight (pcf)	Moisture Content (percent)	Cohesion, C (psf)	Internal Angle of Friction (phi)	Liquid Limit	Plastic Index
GB-1	15	SP-SC	30.1	-	-	-	-	-	-
GB-2	5	SP-SC	-	103.4	15.98	244	42.4	34	15
GB-2	7	SP-SC	-	108.1	17.8	-	-	-	-
GB-2	10	SC	37.7	-	-	-	-	-	-
GB-2	20	SC	31.8	-	-	-	-	-	-
GB-3	5	CL	59.2	110.5	20.7	770	28.3	-	-
GB-3	10	SP	22.2	-	-	-	-	-	-
GB-3	15	SP	7.2	-	-	-	-	-	-

pcf = pounds per cubic foot and psf = pounds per square foot

Table 1c. Summary of Laboratory Test Results

Boring	Depth (feet bgs)	Initial Void Ratio	Pre-consolidation Pressure (psf)	Compression Index (Cc)	Recompression Index (Cr)
GB-2	7	0.53	1500	0.08	0.018

psf = pounds per square foot

4.0 GEOLOGY

4.1 Geologic Setting

The Site is on the western edge of Fickle Hill and is underlain by marine and nonmarine overlap deposits. The Site is in the Coast Ranges geomorphic province of Northern California (California Geologic Survey, CGS, 2002). This marine and nonmarine terrace is bounded to the west by the Arcata Bottoms alluvial deposits, to the south and east by Humboldt Bay, to the north by the Mad River, and to the east by Fickle Hill. According to published geologic maps (McLaughlin et al., 2000), the Site is underlain by late Pleistocene to middle Miocene, thin-bedded to massive, weakly lithified siltstone, fine to medium-grained sandstone, silty to diatomaceous mudstone and locally soft, scaly mudstone. A relevant portion of the geologic map is presented as Figure 3 – Regional Geologic Map.

4.2 Seismicity

The Site is in a seismically active region where large earthquakes may be expected to occur during the economic life span (50 years) of the planned improvements. The seismicity of the area is dominated by the presence of the Cascadia subduction zone (CSZ) wherein oceanic crust of the Juan de Fuca/Gorda plate is being actively subducted beneath the leading edge of the North American plate. Plate convergence along the Gorda segment of the CSZ is occurring at a rate of about 30 to 40 millimeters per year (mm/yr) (Heaton and Kanamori, 1984). Petersen reports a convergence rate of 35 mm/yr for the entire segment of the CSZ (Petersen et al., 1996). Upper plate crustal deformation associated with the subduction of the Gorda plate is expressed as a 90-kilometer (km)-wide fold and thrust belt that comprises the accretionary complex along the North American plate margin (Carver, 1987).

Convergence within the accretionary complex is accommodated by growth of the fold and thrust belt (Carver and McCalpin, 1996). Northwest-striking thrust faults, northeast-dipping thrust faults, and fault-related folds form imbricate thrust fans that merge into sole thrusts that extend into or near the interface between the Gorda and North American plates (Clarke and Carver, 1992). Where the fold and thrust belt extends on land between Cape Mendocino and Big Lagoon, a cumulative slip of greater than 15 kilometers (km) has been estimated from measured vertical separations of lower Pleistocene sediments across faults (Kelsey and Carver, 1988). Coupled with displacements of upper Pleistocene marine terraces, these relations indicate the fold and thrust belt is accommodating at least 20 mm/yr of northeast-southwest horizontal contraction (Clarke and Carver, 1992). The apparent youthfulness of these structures indicates the subduction zone is strongly coupled and compressive deformation within the North American plate margin is active (Clarke and Carver, 1992).

The closest active fault is the Fickle Hill fault zone, located approximately 0.5 km south of the Site. Other potentially causative faults in the vicinity of the Site include the Mad River fault zone approximately 4 km to the north and the Cascadia megathrust, approximately 66.5 km west of the Site (California Division of Mines

and Geology, CDMG, 2000). The Site is not in a "Fault Rupture Hazard Zone" (Bryant and Hart, 2007), or within an area currently designated as a "Seismic Hazard Zone" by the State.

5.0 SITE AND SUBSURFACE CONDITIONS

5.1 Site Conditions

The Site is a roughly rectangular, approximately 2-acre lot east of LK Wood Boulevard in Arcata, California that is currently developed with three existing one-story buildings with landscaping and walkways. In addition to the buildings, the Site is covered with redwood trees and a paved access road with parking (Figure 2– Site Plan). The Site is flat with very low relief and is approximately 92 feet above mean sea level (msl) as measured by Google Earth. The Site is bordered to the north by campus residential housing. LK Wood Boulevard and Highway 101 to the west. Campus classroom buildings are on the west side of the study area with parking lots on the east side and to the south.

5.2 Subsurface Conditions

Our exploration indicates the Site is blanketed by between 20 to 30 feet of medium-dense clayey sand with scattered fine gravel (SC), overlying dense to very dense partially cemented sands (SW and SP) to the maximum extent explored. We encountered groundwater at a depth of approximately 20 feet bgs.

6.0 SUBSURFACE CONDITIONS

6.1 Site Exploration

Our exploration indicates the Site is blanketed by between 20 to 30 feet of medium-dense clayey sand with scattered fine gravel (SC), overlying dense to very dense partially cemented sands (SW and SP) to the maximum extent explored. The borings encountered groundwater at depths of approximately 20 feet bgs.

6.2 Groundwater Conditions

Groundwater was encountered at the time of CPT soundings and in borings at a depth of approximately 20 feet bgs. Review of groundwater data for an adjacent fuel station site on the California Geotracker website indicates that groundwater can get as high as 8 feet seasonally. Groundwater is expected to have a negligible impact on the proposed foundation and utility excavations.

7.0 GEOLOGIC HAZARD ASSESSMENT

Potential geologic and soil hazards assessed for the project Site include seismic ground shaking, surface fault rupture, liquefaction and related phenomena, settlement, high groundwater, flooding, and swelling or shrinking soils. The assessments for these potential hazards are presented below.

7.1 Seismology and Seismic Ground Motions

As noted in Section 4.3 of this report, the Site is in a seismically active area. Given the proximity of the proposed structures to active seismic sources (Cascadia subduction zone and other active faults), there is a high probability that the Site will experience strong ground shaking during the 50-year economic lifespan of the proposed development. The spectral response accelerations for seismic analysis and design of the proposed structure, as prescribed by the 2022 California Building Code (CBC) and the American Society of Civil Engineers "Minimum Design Loads and Associated Criteria for Buildings and Other Structures" (ASCE 7-16), will be assessed by others.

7.1.1 Historic Seismicity

The project Site is in an area of historical seismic activity with a number of large earthquakes occurring during historic times. As cataloged by Toppozada and Branum (2002) and the United States Geologic Survey (USGS, 2019), the epicenters of 25 significant historical earthquakes greater than moment magnitude 6 have occurred within 100 km of the Site.

Based on mapping by Toppozada et al. (2000), the Site is within an area that has experienced one earthquake with a Modified Mercalli Intensity (MMI) of VII or greater between 1800 and 1999. This earthquake occurred on November 13, 1860, with an estimated magnitude of 5.5. The epicenter was in the Samoa area, approximately 8 km southwest of the Site. The Humboldt Times reported that the earthquake resulted in the cracking of plaster walls and the settlement of chimneys in the Site vicinity.

7.2 Co-Seismic Ground Deformation

7.2.1 Surface Fault Rupture

The Site is not located within an Alquist-Priolo earthquake fault zone and, as such, does not require a trench-based fault rupture hazard evaluation (CDMG, 2000). Based on the distance between the Site and the closest active fault, the potential for surface fault rupture to occur within the Site is low.

7.2.2 Liquefaction

The Site is located in an area considered to have a low liquefaction potential (CDMG, 1995)[1]. As discussed in Section 5.1 of this report, in general, the stratigraphy encountered consisted of approximately 20 to 30 feet of medium-dense clayey sand (SC) overlying dense to very dense, sand (SW and SP) extending to the depth explored of 42 feet bgs. The Site and nearby topography are gently flat and, therefore, lateral spreading is considered negligible. Groundwater was encountered at a depth of approximately 20 feet bgs but has been recorded as high as 8 feet at an adjacent campus site as discussed in Section 5.2.

CPT data was used to evaluate the liquefaction potential, related dynamic settlement, and lateral spreading at the Site using the liquefaction analysis program Cliq Version 1.5.1.26 by Geologismiki. Table 2 presents the method and seismic parameters used in the liquefaction analysis.

[1] A state of soil liquefaction occurs when, as a result of cyclic fluctuations in pore fluid pressure, sediment grains lose contact with one another, causing a momentary loss of effective stress and consequently of shear strength. Liquefaction is most commonly initiated by earthquake ground motions. Soils in a saturated, loose state and less than approximately 50 feet bgs are the most susceptible to liquefaction.

Table 2. Liquefaction Analysis Input Parameters

Calculation Method	Boulanger & Idriss, 2014
Maximum Moment Magnitude	9.0*
PGA_M based on SEOC/OSHPD	1.192
Depth to Groundwater	8 ft

*Maximum moment magnitude based on the Fickle Hill fault

Our liquefaction evaluations are based on soil data from CPT soundings obtained during the Site exploration with an assumed maximum future groundwater elevation of 8 feet bgs. Liquefaction analysis results are summarized in Table 3 and presented in Appendix 3.

Data discrepancies in liquefaction potential index and settlement are due to rounding errors of the presented data summary (Appendix 3) vs. our calculated totals per 2-foot interval. Cumulative totals are presented from the subtotals reported in Cliq.

Table 3. Summary Results of Liquefaction Assessment Data from CPT-1, CPT-3, and CPT-6

Boring	Depth Interval (Feet bgs)	Liquefaction potential according to Iwasaki		Estimated Vertical Settlement if Liquefaction Occurs (inches)
		Liquefaction Potential Index (LPI)* (I_L)	Overall Probability of Liquefaction* (I_L)	
CPT-1	8-10	1.33	Liquefaction Risk Low	0.18
	10-12	1.03	Liquefaction Risk Low	0.15
	12-14	0.29	Liquefaction Risk Low	0.03
	14-16	1.60	Liquefaction Risk Low	0.10
	16-18	3.37	Liquefaction Risk Low	0.31
	18-20	1.23	Liquefaction Risk Low	0.13
	20-22	1.85	Liquefaction Risk Low	0.17
	22-24	2.29	Liquefaction Risk Low	0.25
	24-26	1.62	Liquefaction Risk Low	0.17
	26-28	1.82	Liquefaction Risk Low	0.13
	28-30	1.58	Liquefaction Risk Low	0.09
	30-32	2.9	Liquefaction Risk Low	0.26
	32-34	2.10	Liquefaction Risk Low	0.20
	34-36	2.35	Liquefaction Risk Low	0.23
	36-38	2.21	Liquefaction Risk Low	0.22
	38-40	2.15	Liquefaction Risk Low	0.24
	40-42	0.51	Liquefaction Risk Low	0.04
Totals from Report	**Cumulative LPI**	**30.23**	**Cumulative Settlement**	**2.90**

Boring	Depth Interval (Feet bgs)	Liquefaction Potential Index (LPI)* (I_L)	Overall Probability of Liquefaction* (I_L) Liquefaction potential according to Iwasaki	Estimated Vertical Settlement if Liquefaction Occurs (inches)
CPT-6	8-10	2.74	Liquefaction Risk Low	0.34
	10-12	4.02	Liquefaction Risk Low	0.41
	12-14	2.71	Liquefaction Risk Low	0.24
	14-16	1.6	Liquefaction Risk Low	0.14
	16-18	0.45	Liquefaction Risk Low	0.02
	18-20	1.43	Liquefaction Risk Low	0.06
	20-22	1.49	Liquefaction Risk Low	0.11
	22-24	0.2	Liquefaction Risk Low	0.01
Totals from Report	**Cumulative LPI**	**14.64**	**Cumulative Settlement**	1.33
CPT-3	8-10	4.07	Liquefaction Risk Low	0.48
	10-12	4.40	Liquefaction Risk Low	0.52
	12-14	3.97	Liquefaction Risk Low	0.48
	14-16	3.48	Liquefaction Risk Low	0.39
	16-18	3.48	Liquefaction Risk Low	0.33
	18-20	3.21	Liquefaction Risk Low	0.29
	20-22	2.03	Liquefaction Risk Low	0.12
	22-24	0.76	Liquefaction Risk Low	0.04
	24-26	0.0	Liquefaction Risk Very Low	0.00
	26-28	1.38	Liquefaction Risk Low	0.12
	28-30	2.05	Liquefaction Risk Low	0.18
	30-32	0.06	Liquefaction Risk Low	0.00
Totals from Report	**Cumulative LPI**	**28.89**	**Cumulative Settlement**	**2.95**

* Liquefaction Potential Index (LPI)

LPI – 0 – Liquefaction Risk Very Low
LPI between 0.0 and 5.0 Liquefaction Risk Low
LPI between 5.01 and 15.0 Liquefaction Risk High
LPI greater than 15.01 Liquefaction Risk Very High

Soils to 42 feet are interpreted to be marine and non-marine terrace deposits based on mapped geology (McLaughlin et al., 2000). These deposits have been subjected to previous seismic events with ground accelerations equal to or greater than the accelerations used in the analysis. The liquefaction potential for the Site is considered Low. The potential risk for individual layers to liquefy at the Site is considered low. If liquefaction were to occur at the Site the potential liquefaction settlement could be as much as 3 inches. Potential differential settlement at the Site in the event liquefaction occurs is approximately 1.5 inches in 100 feet based on the CPT location used in the analysis.

7.3 Slope Instability/Landsliding

Given the relatively flat natural slopes on and in the vicinity of the Site, we consider the potential for conventional (non-liquefaction induced lateral spreading) slope instability to adversely affect most of the proposed improvements is considered to be negligible.

7.4 Flood and Dam Failure Inundation

According to FEMA Flood Insurance Rate Maps, Map Number 06023C0689F, effective November 4, 2016, the proposed residences are outside of the Special Flood Hazard Area. Based on this FEMA flood hazard mapping and the Site elevation, the risk of flooding impacting the study area is low.

The Dam Failure Inundation map presented by the California Department of Water Resources indicates that in the event of a catastrophic failure of the Matthews Dam, the Site is not subject to Mad River flood inundation in a rainy-day scenario. The Matthews Dam is located across the Mad River at Ruth Lake Reservoir approximately 75 km from the Site.

7.5 Tsunami Inundation

According to the CGS Tsunami Inundation Map for Emergency Planning: Arcata North Quadrangle (CGS, 2021), the Site is not located in an area anticipated to experience inundation. On the basis of this mapping and the Site elevation, the risk of tsunami inundation is considered to be low.

7.6 Expansive Soils

Expansive soils represent a significant structural hazard to buildings where site and/or climatic conditions lead to seasonal or local fluctuations in soil moisture content. In general, in the vicinity of the Site, these fluctuations in moisture content can be expected to affect no more than the upper 3 to 4 feet bgs. Based on our subsurface exploration, the Site material is generally clayey sands in the anticipated foundation zone. The underlying alluvial deposits are dominated by sand. Laboratory Atterberg limits testing of clayey alluvium encountered indicate plasticity indices ranging from non-plastic to 15 percent indicating low plasticity. Clays in this range have a low potential for expansion.

7.7 Shallow Groundwater

As noted in Section 5.2 of this Report, groundwater has been recorded at an adjacent site with a seasonal high of approximately 8 feet bgs.

7.8 Settlement Due to Static Loading

No preliminary structural loads for the proposed buildings were provided. No building height has been provided either. Settlement calculations are based on assuming a relatively moderately loaded wood/steel-frame construction building underlain by predominantly coarse-grained soils of medium-dense to dense consistency with a building load of an estimated 3,000 pounds per square foot (psf). Bearing pressure of 3,000 psi yields foundation settlements of less than 0.36 inch, which will occur relatively quickly over the course of the project construction. Once building plans have been developed LOCO should review them and amend this section as necessary.

8.0 CONCLUSIONS

Based on the results of our exploration program, we conclude the project is feasible from a geotechnical standpoint, provided the recommendations of this report are incorporated into the project design and construction. The primary geologic and geotechnical considerations affecting the planned improvements are as follows:

- The potential for strong seismic ground shaking at the Site,
- The potential for liquefaction differential settlement; and,
- The potential for static settlement depends on building loads and design.

The potential for strong ground shaking can be addressed by designing the planned improvements utilizing the seismic design parameters presented in Section 8.3 of this report. As described in Section 7.8 of this report, approximately one-third of an inch of static settlement may occur at the Site vicinity due to light loading (for an assumed two-story building), with differential settlement estimated at approximately one-half this value over 50 feet. Static settlement could be an issue depending on building design and/or column loads. The preliminary evaluation of the settlement is based on a lightly loaded perimeter or thickened edge slab on grade. Up to 3 inches of dynamic settlement could occur at the Site in the upper 30 to 35 feet. The structure should be designed to resist/accommodate the estimated total and differential static and dynamic settlement.

9.0 RECOMMENDATIONS

9.1 Site Preparation and Grading

At the locations of the proposed new buildings and exterior flatwork and extending at least 5 feet beyond, existing pavement, foundations, irrigation lines, tree root balls, and underground utilities not designated to remain should be properly demolished and removed from the Site. Areas should then be stripped of any vegetation and topsoil containing organic material. We estimate the depth of stripping will be approximately 6 to 12 inches. Fill and loose soil should then be removed to expose firm natural soil. The resulting subgrade should then be scarified to a depth of 6 inches, moisture conditioned, and compacted as described in Table 4.

9.1.1 Utility Trench Backfill

Trench backfill quality and compaction should generally conform to the requirements of Section 8.1.2 (Table 4) of this report. Where trenches closely parallel a shallow foundation and the trench bottom is within a two horizontal to one vertical plane projected outward and downward from the foundation, concrete slurry (two-sack minimum) should be used to backfill that portion of the trench below this plane. The use of slurry backfill is not required where a narrow trench crosses a footing at or near a right angle.

9.1.2 Structural Fill

Material used as fill should be free of organic material and rocks larger than 3 inches in greatest dimension, and conform to the following requirements:

Plasticity Index:	15 percent or less
Liquid Limit:	40 percent or less
Percent passing No. 200 sieve:	50 maximum; 10 minimum

Our exploration indicates the majority of on-site materials are not suitable for use as fill.

Table 4. Soil Compaction Recommendations

Fill Element	Relative Compaction*	Moisture Content*
General fill – raising of site grades	90 percent	Near Optimum
Upper 6 inches of subgrade beneath hardscape	90 percent	Wet of Optimum
Upper 6 inches of subgrade in pavement areas	95 percent	Wet of Optimum
Aggregate base rock beneath hardscape	95 percent	Near Optimum
Pipe bedding and utility trench backfill	90 percent	Near Optimum

*****Relative compaction refers to the ratio of the in place dry density of the soil to the maximum dry density as described in the latest edition of the ASTM D1557 compaction test procedure. Optimum moisture content is the water content as a percentage of the dry weight of the soil corresponding to the maximum dry density.

9.1.3 Surface Drainage

The Site should be graded to provide positive drainage away from foundations. A minimum gradient of 3 percent should be maintained for hardscape areas within 5 feet of a structure where this does not conflict with Americans with Disabilities Act (ADA) design requirements. A 5 percent gradient should be maintained for landscaped areas not designed to receive foot traffic within 5 feet of a structure. The grading or landscaping design and construction should not allow water to pond on the Site within a minimum of 10 feet from any engineered structure, nor to migrate beneath any structure. Runoff from hardscaped areas, roofs, patios, and other impermeable surfaces should be contained, controlled, and collected in a tight-line pipe that outlets into the Site storm drainage or infiltration system.

9.2 Foundations

It is unknown at this time what type of foundation will be designed. However generally, perimeter footings should bear directly on either the undisturbed silty sand, soils, or compacted fill. Perimeter footings should be designed using the maximum allowable bearing pressures presented in Table 5.

Non-structural reinforced slab-on-grade floors may be constructed between the perimeter foundations. The slabs-on-grade should be placed on undisturbed native subgrade, scarified, and compacted as described in Section 8.1 (Site Preparation and Grading) above and overlain by at least 12 inches of 0.75-inch gravel (termed "slab base rock") to act as a capillary moisture break. The gravel should be overlain by a vapor retarder (Stego™ wrap or equivalent) to reduce the possibility of moisture migration through the concrete floor. Joints between membrane sheets and utility piping openings should be lapped and taped. Care should be taken during slab construction to protect the plastic membrane against punctures.

Deeper foundation systems may need to be considered depending on building and column loads and the potential for up to 3 inches of liquefiable settlement at the Site.

Table 5. Maximum Allowable Bearing Pressures for foundations

Loading Condition	Maximum Allowable Bearing Pressure (psf)
Dead plus long-term live loads	2,000
Total, including Wind or Seismic	2,667

Lateral load resistance may be developed via: (1) skin friction between the footing bottoms and underlying soil; and (2) passive resistance between the vertical faces of footings. For design, use an allowable friction coefficient of 0.30 and a passive lateral bearing pressure of 150 pounds per cubic foot (pcf) equivalent to fluid pressure. Passive pressure should be neglected in the upper 1 foot of soil unless confined by concrete slabs or pavements. If friction and passive resistances are to be combined, reduce the lesser value by 50 percent.

Footings adjacent to existing utility trenches or other footings should be deepened enough to bear below a 1:1 (horizontal to vertical) plane extending upwards from the bottom edge of the utility trench or footing excavation. A representative of the project geotechnical engineer should observe the footing excavations prior to the placement of reinforcing steel and concrete forms to check that they are founded in suitable bearing materials and have been properly cleaned of loose soil.

We recommend the foundation design assume a settlement resulting from imposed foundation loads and liquefaction-induced ground deformation of approximately 1 inch and differential settlement over distances of 40 feet will be 0.5 inches or less.

9.3 Seismic Design Parameters

Earthquake design parameters presented herein are based on the CBC and the standard "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," (ASCE 7-16), which, in turn, is based on a maximum considered earthquake ground motion, defined as the motion caused by an event with a 2-percent probability of exceedance within a 50-year period (recurrence interval of approximately 2,500 years). We used site parameters of location (40.8752079, -124.08016848), site class D, and risk level III as project input to Seismic Design Maps tool co-developed by the Structural Engineers Association of California (SEAOC) and California's Office of Statewide Health Planning and Development (OSHPD) (2023). Values of those inputs and model outputs are presented in Table 6.

We refer the building designer to the exemptions listed in ASCE 7-16 to determine whether a site-specific ground motion analysis is required.

Table 6. Seismic Design Parameters

Site Class	F_a	F_v	S_S	S_1	S_{MS}	S_{M1}	S_{DS}	S_{D1}	Ts
D	1.0	1.7	2.448	1.074	2.448	1.826	1.632	1.217	0.746

* F_v, S_{M1}, and S_{D1} may only be used for calculation of T_s.

F_a – Short period coefficient to modify 0.2-second period of mapped spectral response accelerations for Site Class.

F_v – Long period coefficient to modify 1.0-second period of mapped spectral response accelerations for Site Class.

S_S – Mapped spectral response acceleration, 5 percent damped, at 0.2-second period for Site Class.
S_1 – Mapped spectral response acceleration, 5 percent damped, at 1.0-second period for Site Class (in %g).
S_{MS} – Maximum considered earthquake spectral response acceleration, 5 percent damped, at 0.2-second for Site Class effects (in %g).
S_{M1} – Maximum considered earthquake spectral response acceleration, 5 percent damped, at 1.0-second period for Site Class effects (in %g).
S_{DS} – Design spectral response acceleration, 5 percent damped, at 0.2-second period (in %g).
S_{D1} – Design spectral response acceleration, 5 percent damped, at 1.0-second period (in %g).
Ts – Transition period, ratio S_{D1}/S_{DS}.

9.4 Construction Considerations

9.4.1 Temporary Slopes and Trench Excavations

The contractor is responsible for the stability of temporary slopes and trenches excavated at the Site and the design and construction of any required shoring. Shoring and bracing should be provided in accordance with all applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) excavation and trench safety standards. Because of the potential for variable soil conditions, field modifications of temporary cut slopes may be required. Unstable materials encountered on the slopes during the excavation should be trimmed off, even if this requires cutting the slope back at flatter inclinations.

10.0 FUTURE GEOTECHNICAL SERVICES

10.1 Finalized Foundation Recommendations

Once plans have been determined for the proposed Health, Dining, and Housing Building, LACO should review the proposed building along with the estimated structural loads so that we can give specific foundation recommendations prior to finalizing building plans.

10.2 Plan Review

To better assure conformance of the final design documents with the recommendations contained in this Report, LACO's geotechnical department should review the completed project plans prior to construction. The plans should be made available for our review as soon as possible after completion so we can better assist in keeping your project schedule on track.

10.3 Construction Observation and Testing

LACO should be retained to observe and test the earthwork and foundation installation phases of construction in order to: (1) check that subsurface conditions exposed during construction are substantially the same as those interpolated from our limited subsurface exploration, on which the analysis and design were based; (2) observe compliance with the geotechnical aspects and specifications presented in the approved plans; and (3) allow design changes in the event that subsurface conditions differ from those anticipated. The recommendations in this report are based on limited subsurface information. The nature and extent of variation across the Site may not become evident until construction. If variations are then exposed, it will be necessary to re-evaluate our recommendations.

11.0 LIMITATIONS

This Report has been prepared for the exclusive use of the Client, its design team, contractors and consultants, and appropriate public authorities for specific application to the proposed Site improvements. LACO has exercised a standard of care equal to that generated for this industry to ensure the information contained in this Report is current and accurate. The opinions presented in this Report are based upon information obtained from subsurface excavations, a Site Reconnaissance, review of geologic maps and data available to us, and upon local experience and engineering judgment, and have been formulated in accordance with generally accepted geotechnical engineering practices that exist in California at the time this Report was prepared. In addition, geotechnical issues may arise that are not apparent at this time. No other warranty, expressed or implied, is made or should be inferred. A brochure prepared by ASFE (Association of Firms Practicing in the Geosciences) has been included in Appendix 4 of this report. We recommend that all individuals reading this report also read this brochure.

Data generated for this Report represents information gathered at that time and at the widely spaced locations indicated. Subsurface conditions may be highly variable and difficult to predict. As such, the recommendations included in this Report are based, in part, on assumptions about subsurface conditions that may only be observed and/or tested during subsequent project earthwork. Accordingly, the validity of these recommendations is contingent upon review of the subsurface conditions exposed during construction in order to check that they are consistent with those characterized in this Report. Upon request, LACO can discuss the extent of (and fee for) observations and tests required to check the validity of the recommendations presented herein.

The opinions presented in this Report are valid as of the present date for the property evaluated. Changes in the condition of the property can occur over time, whether due to natural processes or the works of man, on this or adjacent properties. In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in this report may be invalidated, wholly or partially, by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years, nor should it be used, or is it applicable, for any property other than that evaluated. This Report is valid solely for the purpose, site, and project described in this document. Any alteration, unauthorized distribution, or deviation from this description will invalidate this Report. LACO assumes no responsibility for any third-party reliance on the data presented. Additionally, the data presented should not be utilized by any third-party to represent data for any other time or location.

12.0 REFERENCES

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FIGURES

Figure 1 **Site Vicinity Map**

Figure 2 **Site Plan**

Figure 3 **Regional Geologic Map**

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EUREKA UKIAH SANTA ROSA
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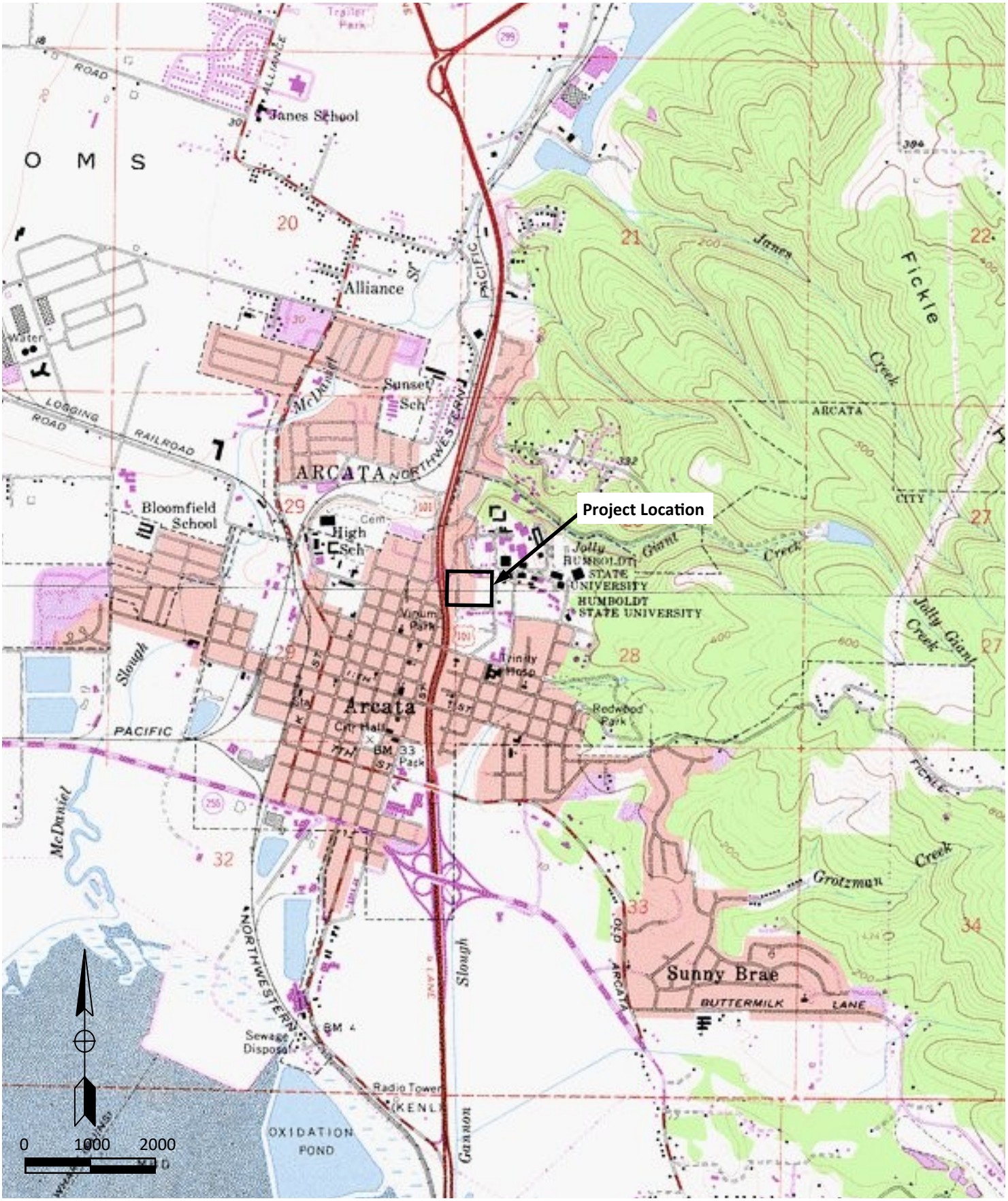
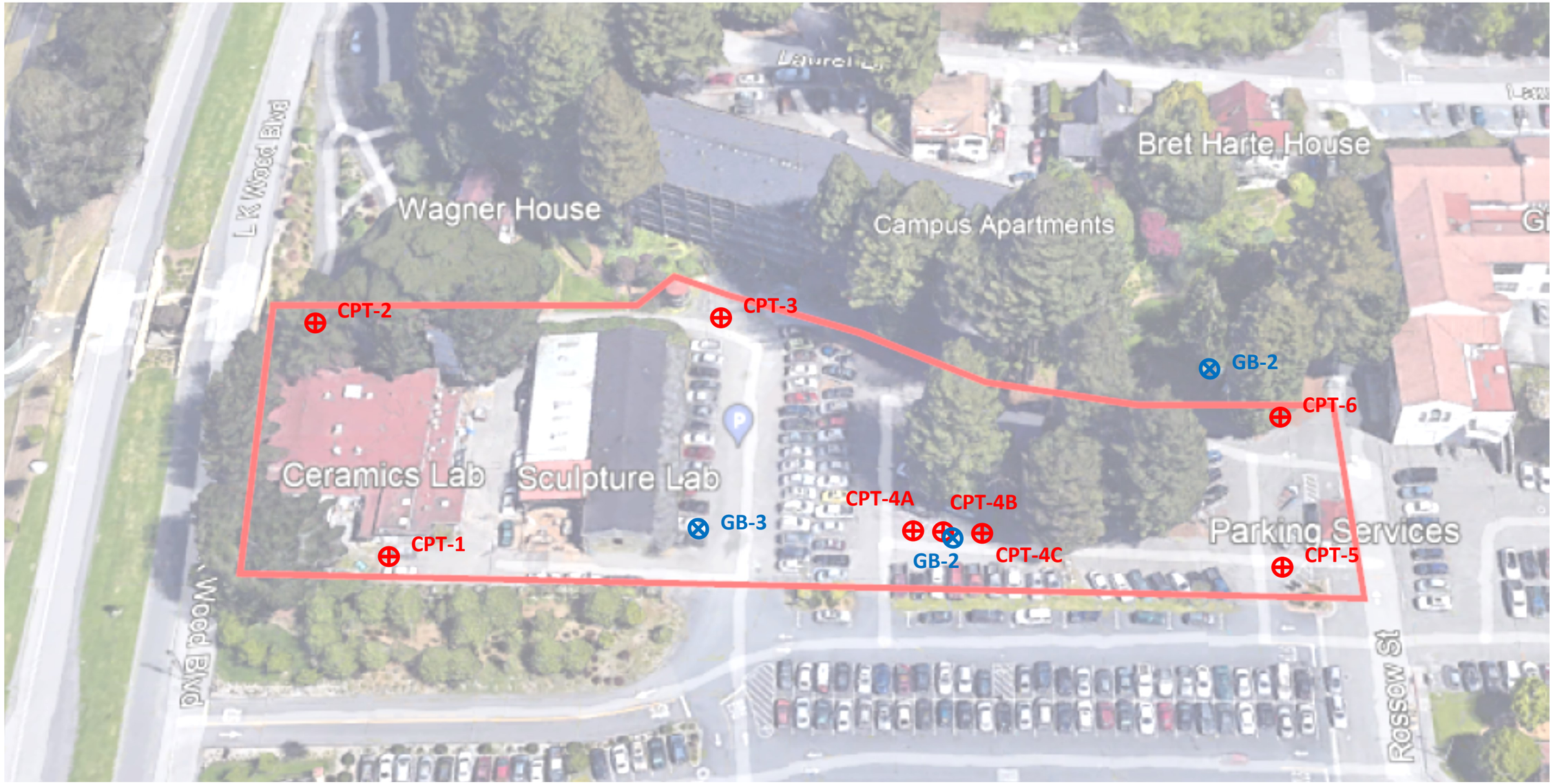
PROJECT	Geotechnical Soils Report	BY GLM	FIGURE 21 of 268
CLIENT	Cal Poly Humboldt	DATE 5/24/23	1
LOCATION	1 Harpst Street, Arcata , CA	CHECK	JOB NO.
	Location Map	SCALE 1" = 2000'	5376.13





Legend

- CPTB-1 Approximate CPT Boring Location (Middle Earth Geo CPT)
- GB-1 Approximate Geotech Auger Boring Location (Fisch Drilling)

Not to Scale

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BY GLM
DATE 11/30/22
CHECK
SCALE NTS

Cal Poly Humboldt, Housing Health Dining: Geotechnical Soils Report
1 Harpst Street Arcata, California

Boring Location Map

FIGURE 2

JOB NO. 5376.13

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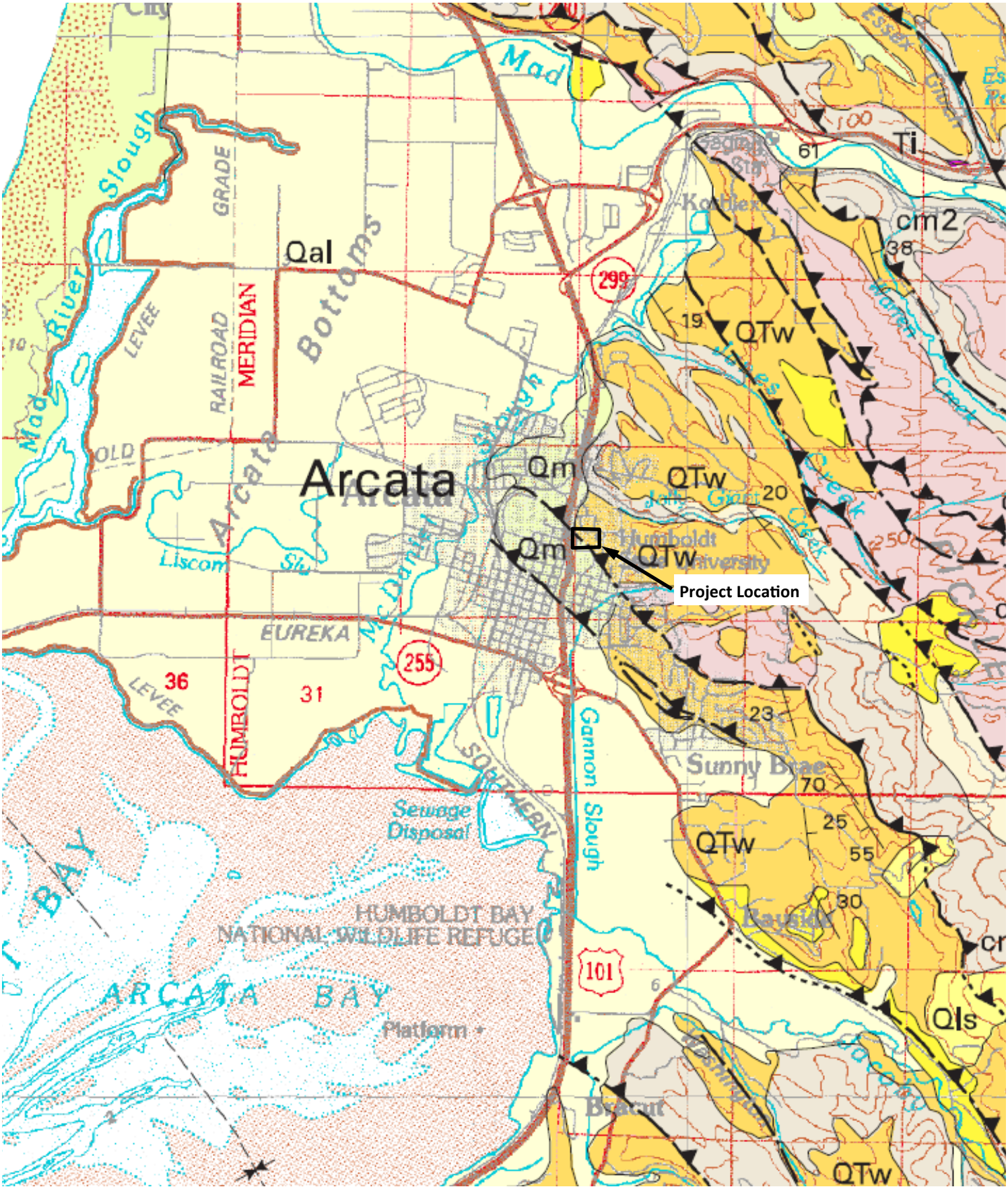
PROJECT	Geotechnical Soils Report	BY GLM	FIGURE 23 of 268
CLIENT	Cal Poly Humboldt	DATE 5/24/21	3a
LOCATION	1 Harpst Street, Arcata , CA	CHECK	JOB NO.
	Geologic Map	SCALE 1" = 4000'	5376.13



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PROJECT	Geotechnical Soils Report	BY GLM	FIGURE 24 of 268
CLIENT	Cal Poly Humboldt	DATE 5/24/23	3b
LOCATION	1 Harpst Street, Arcata , CA	CHECK	JOB NO.
	Geologic Map Legend	SCALE None	5376.13

DESCRIPTION OF MAP UNITS

QUATERNARY AND TERTIARY OVERLAP DEPOSITS

- Qal — Alluvial deposits (Holocene and late Pleistocene?)
- Qm — Undeformed marine shoreline and aolian deposits (Holocene and late Pleistocene)
- Qt — Undifferentiated nonmarine terrace deposits (Holocene and Pleistocene)
- Qls — Landslide deposits (Holocene and Pleistocene)
- QTog — Older alluvium (Pleistocene and [or] Pliocene)
- QTw — Marine and nonmarine overlap deposits (late Pleistocene to middle Miocene)
- Ti — Volcanic rocks of Fickle Hill (Oligocene)

COAST RANGES PROVINCE

FRANCISCAN COMPLEX

-- Coastal Belt --

Coastal terrane(Pliocene to Late Cretaceous)

Sedimentary, igneous, and metamorphic rocks of the Coastal terrane (Pliocene to Late Cretaceous):

- co1 — Melange
- co2 — Melange
- co3 — Broken sandstone and argillite
- co4 — Intact sandstone and argillite
- cob — Basaltic Rocks (Late Cretaceous)
- cols — Limestone (Late Cretaceous)
- m — Undivided blueschist (Jurassic?)

King Range terrane (Miocene to Late Cretaceous)

- Krp — Igneous and sedimentary rocks of Point Delgada (Late Cretaceous)
- m — Undivided blueschist blocks (Jurassic?)

Sandstone and argillite of King Peak (middle Miocene to Paleocene[?]):

- krk1 — Melange and (or) folded argillite
- krk2 — Highly folded broken formation
- krk3 — Highly folded, largely unbroken rocks
- krl — Limestone
- krc — Chert
- krb — Basalt

False Cape terrane (Miocene? to Oligocene?)

- fc — Sedimentary rocks of the False Cape terrane (Miocene? to Oligocene?)

Yager terrane (Eocene to Paleocene?)

Sedimentary rocks of the Yager terrane (Eocene to Paleocene?):

- y1 — Sheared and highly folded mudstone
- y2 — Highly folded broken mudstone, sandstone, and conglomeratic sandstone
- y3 — Highly folded, little-broken sandstone, conglomerate, and mudstone
- Ycgl — Conglomerate

-- Central belt --

Melange of the Central belt (early Tertiary to Late Cretaceous):

Unnamed Metasandstone and meta-argillite (Late Cretaceous to Late Jurassic):

- cm1 — Melange
- cm2 — Melange
- cb1 — Broken formation
- cb2 — Broken formation
- cwr — White Rock metasandstone of Jayko and others (1989) (Paleogene and [or] Late Cretaceous)
- chr — Haman Ridge graywacke of Jayko and others (1989) (Cretaceous?)
- cfs — Fort Seward metasandstone (age unknown)
- cls — Limestone (Late to Early Cretaceous)
- cc — Chert (Late Cretaceous to Early Jurassic)
- bs — Basaltic rocks (Cretaceous and Jurassic)
- m — Undivided blueschist blocks (Jurassic?)
- gs — Greenstone
- c — Metachert
- yb — Metasandstone of Yolla Bolly terrane, undivided
- b — Melange block, lithology unknown

-- Eastern Belt --

Pickett Peak terrane (Early Cretaceous or older)

Metasedimentary and metavolcanic rocks of the Pickett Peak terrane (Early Cretaceous or older):

- ppsm — South Fork Mountain Schist
- mb — Chinquapin Metabasalt Member (Irwin and others, 1974)
- ppv — Valentine Springs Formation
- mv — Metabasalt and minor metachert

Yolla Bolly terrane (Early Cretaceous to Middle Jurassic?)

Metasedimentary and metaigneous rocks of the Yolla Bolly terrane (Early Cretaceous to Middle Jurassic?):

- ybt — Taliaferro Metamorphic Complex of Suppe and Armstrong (1972) (Early Cretaceous to Middle Jurassic?)
- ybc — Chicago Rock melange of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- gs — Greenstone
- c — Metachert
- ybh — Metagraywacke of Hammerhorn Ridge (Late Jurassic to Middle Jurassic)
- c — Metachert
- gs — Greenstone
- sp — Serpentinite
- ybd — Devils Hole Ridge broken formation of Blake and Jayko (1983) (Early Cretaceous to Middle Jurassic)
- c — Radiolarian chert
- ybi — Little Indian Valley argillite of McLaughlin and Ohlin (1984) (Early Cretaceous to Late Jurassic)

Yolla Bolly terrane

- yb — Rocks of the Yolla Bolly terrane, undivided

GREAT VALLEY SEQUENCE AND COAST RANGE OPHIOLITE

Elder Creek(?) terrane

- ecms — Mudstone (Early Cretaceous)

Coast Range ophiolite (Middle and Late Jurassic):

- ecg — Layered gabbro
- ecsp — Serpentinite melange

Del Puerto(?) terrane

Rocks of the Del Puerto(?) terrane:

- dpms — Mudstone (Late Jurassic)

Coast Range ophiolite (Middle and Late Jurassic):

- dpt — Tuffaceous chert (Late Jurassic)
- dpb — Basaltic flows and keratophyric tuff (Jurassic?)
- dpd — Diabase (Jurassic?)
- dpsp — Serpentinite melange (Jurassic?)
- sp — Undivided Serpentinized peridotite (Jurassic?)

KLAMATH MOUNTAINS PROVINCE

Undivided Great Valley Sequence:

- Ks — Sedimentary rocks (Lower Cretaceous)

Hayfork terrane

Eastern Hayfork subterrane:

- eh — Melange and broken formation (early? Middle Jurassic)
- ehls — Limestone
- ehsp — Serpentinite

Western Hayfork subterrane:

- whu — Hayfork Bally Meta-andesite of Irwin (1985), undivided (Middle Jurassic)
- whwg — Wildwood (Chanchelulla Peak of Wright and Fahan, 1988) pluton (Middle Jurassic)
- whwp — Clinopyroxenite
- whji — Diorite and gabbro plutons (Middle? Jurassic)

Rattlesnake Creek terrane

- rcm — Melange (Jurassic and older)
- rcls — Limestone
- rcc — Radiolarian chert
- rcis — Volcanic Rocks (Jurassic or Triassic)
- rcic — Intrusive complex (Early Jurassic or Late Triassic)
- rcp — Plutonic rocks (Early Jurassic or Late Triassic)
- rcum — Ultramafic rocks (age uncertain)
- rcpd — Blocky peridotite

Western Klamath terrane

Smith River subterrane:

- srs — Galice? formation (Late Jurassic)
- srv — Pyroclastic andesite
- srgb — Glen Creek gabbro-ultramafic complex of Irwin and others (1974)
- srpd — Serpentinized peridotite

MAP SYMBOLS

- Contact
- Fault
- Thrust fault
- Trace of the San Andreas fault associated with 1906 earthquake rupture

Strike and dip of bedding:

- Inclined (10/, 20/)
- Vertical
- Horizontal
- Overturned (10/, 20/)
- Approximate (20)
- Joint (10/)
- Strike and dip of cleavage (10/)

Shear foliation:

- Inclined (10/)
- Vertical

Folds:

- Synclinal or synformal axis
- Anticlinal or antiformal axis
- Overturned syncline
- Landslide (Qls)

Melange Blocks:

- Serpentinite
- Chert
- Blueschist
- Greenstone
- Fossil locality and number (10)

GEOLOGY OF THE CAPE MENDOCINO, EUREKA, GARBERVILLE, AND SOUTHWESTERN PART OF THE HAYFORK 30 X 60 MINUTE QUADRANGLES AND ADJACENT OFFSHORE AREA, NORTHERN CALIFORNIA (McLaughlin et al., 2000)

APPENDIX 1

Boring and CPT Logs

BORING NUMBER GB-1

PAGE 1 OF 1

LACO

CLIENT Cal Poly Humboldt
PROJECT NAME CPH: Library Circle and Sustainability Center Geotech Eval
PROJECT NUMBER 5376.13
PROJECT LOCATION Arcata, California
DATE STARTED 4/21/23 **COMPLETED** 4/21/23
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- Groundwater not encountered
LOGGED BY SLF **CHECKED BY** GLM
AT END OF DRILLING ---
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	Pocket Penetrometer (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%) LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0.0		Asphalt											
		Aggregate base, dark brown											
		(SP-SC) Poorly-graded clayey sand with <15% gravel, pale olive, dry, medium dense											
2.5		Logged from drill cuttings											
5.0													
7.5													
10.0		Changes color, brownish-yellow											
12.5													
15.0		(SC) Sand with Clay, reddish brown, moist, very dense	SPT 1	88	22-50								30

Refusal at 16.0 feet.
Bottom of borehole at 16.0 feet.

BORING NUMBER GB-2

LACO

CLIENT Cal Poly Humboldt
PROJECT NAME CPH: Library Circle and Sustainability Center Geotech Eval
PROJECT NUMBER 5376.13
PROJECT LOCATION Arcata, California
DATE STARTED 4/21/23 **COMPLETED** 4/21/23
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 23.00 feet
LOGGED BY SLF **CHECKED BY** GLM
AT END OF DRILLING ---
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	Pocket Penetrometer (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%) LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		Asphalt											
		Aggregate base, dark brown											
		(SC) Clayey sand, moist, medium dense											
5			SH 1			Direct Shear C=244 phi=42.4		103	16				
		(SC) Clayey sand, gray, dry to moist						108	18				
		Changes color, yellow-brown											
10		(SC) Clayey sand, red-brown, dry to moist, medium dense	SPT 1	83	3-6-6 (12)								38
15		Continues, with mottling, medium dense	SPT 2	72	4-9-16 (25)								
20		Continues	SPT 3	72	8-19-16 (35)								32
		▽ (SC) Clayey sand with fine gravel, yellow brown, moist, dense to very dense, iron and manganeese staining											
25			SPT 4	72	17-22-28 (50)								

Bottom of borehole at 26.5 feet.

BORING NUMBER GB-3

LACO

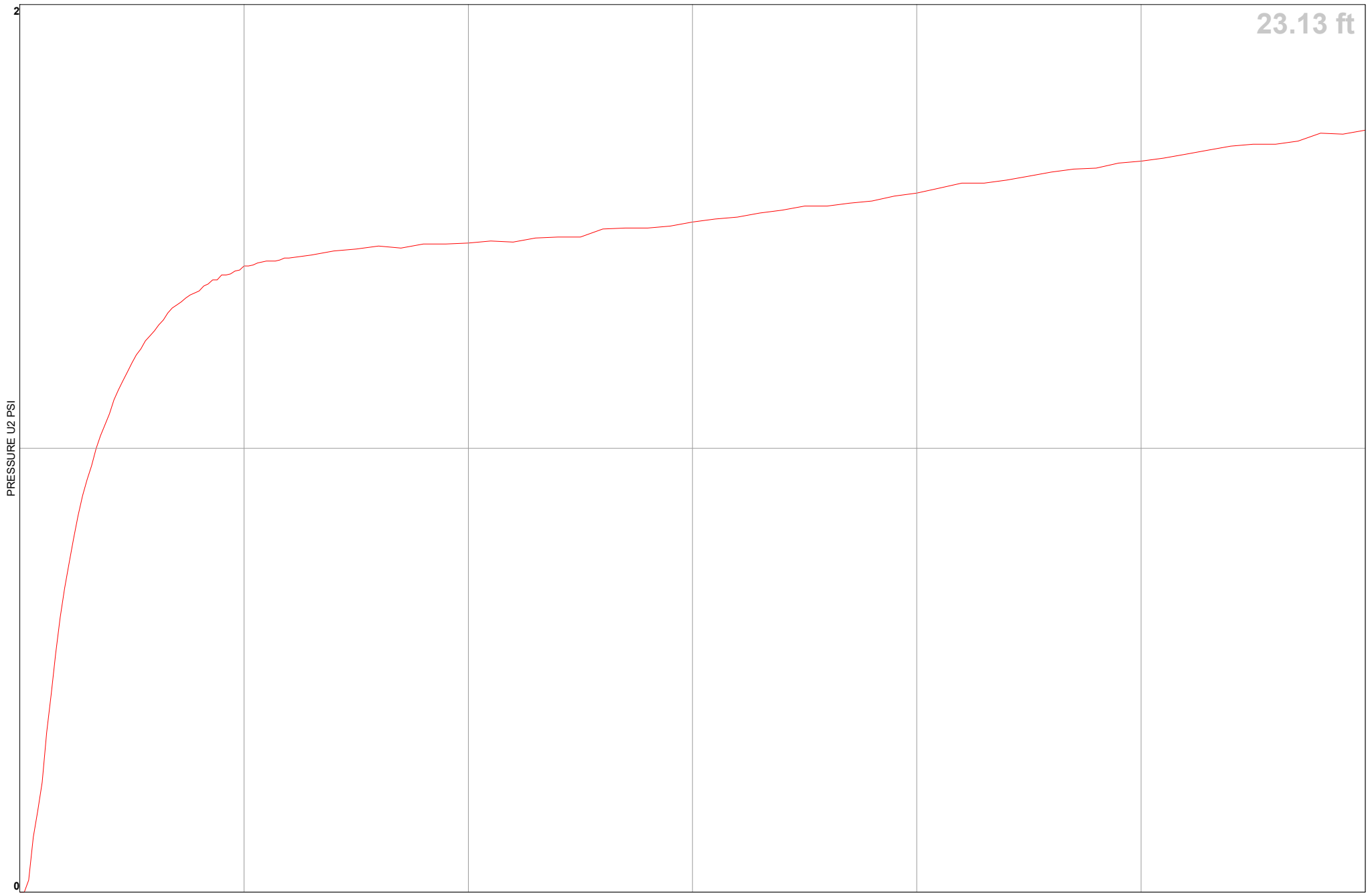
CLIENT Cal Poly Humboldt
PROJECT NAME CPH: Library Circle and Sustainability Center Geotech Eval
PROJECT NUMBER 5376.13
PROJECT LOCATION Arcata, California
DATE STARTED 4/21/23 **COMPLETED** 4/21/23
GROUND ELEVATION _____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY SLF **CHECKED BY** GLM
AT END OF DRILLING 20.00 feet
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	TESTS AND REMARKS	Pocket Penetrometer (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%) LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		Asphalt											
5		(ML) Low plasticity clayey silt with sand, dark brown, moist											
10		(CL) Clay with fine sand, olive gray, dry to moist, firm to stiff Changes color, light yellow-brown	SH 1			Direct Shear C=770 phi=28.3		111	21	34	19	15	59
15		(SP) Medium coarse sand, olive gray, dry to moist, medium dense	SPT 1	83	4-5-6 (11)								22
20		(SP) Sand, yellow-brown, dry to moist, medium dense	SPT 2	83	5-8-9 (17)								7
25		Continues, wet	SPT 3	67	4-5-7 (12)								
30		(SW) Well-graded sand with fine gravel, yellowish-brown, wet, medium dense	SPT 4	78	5-7-8 (15)								
35		(SW-SM) Silty sand with gravel, reddish-brown, wet, medium dense	SPT 5	67	7-10-9 (19)								
			SPT 6	67	50								

Refusal at 35.0 feet.
Bottom of borehole at 35.0 feet.

LACO Associates

Location	Liberty Circle Geo Evaluation	Operator	JM-GM	GPS
Job Number	5376.13	Cone Number	DDG1596	
Hole Number	CPT-01	Date and Time	4/13/2023 8:23:21 AM	
Equilized Pressure	1.7	EST GW Depth During Test	19.1	



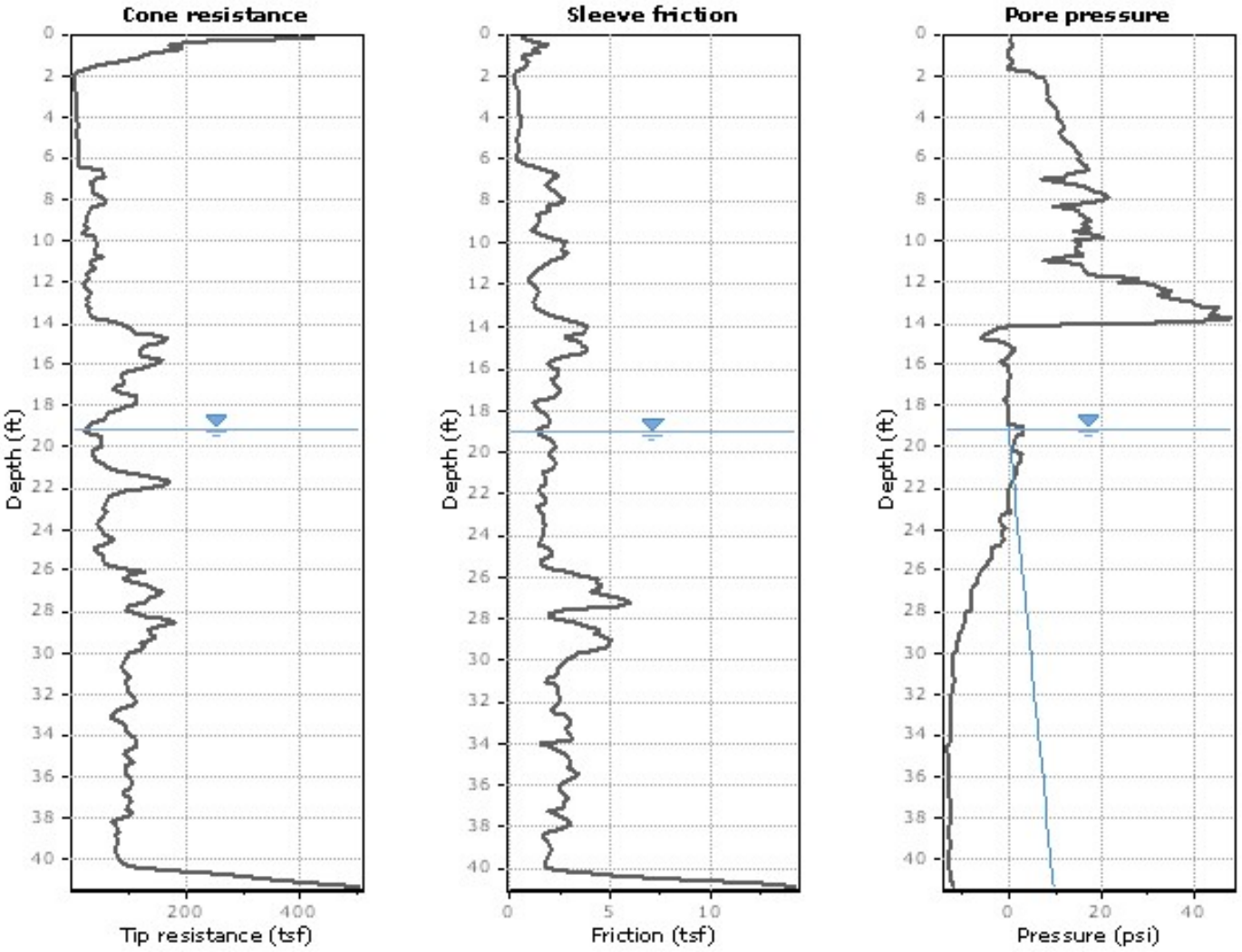
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

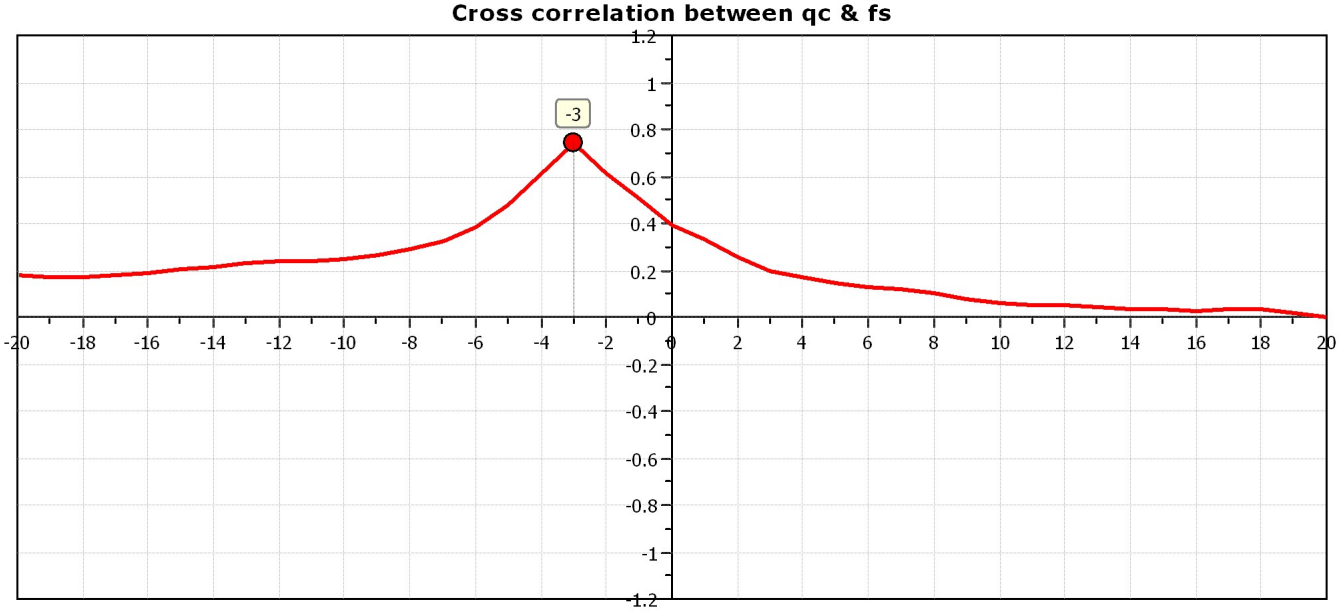
CPT: CPT-01

Total depth: 41.34 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



Middle Earth Geo Testing, Inc.

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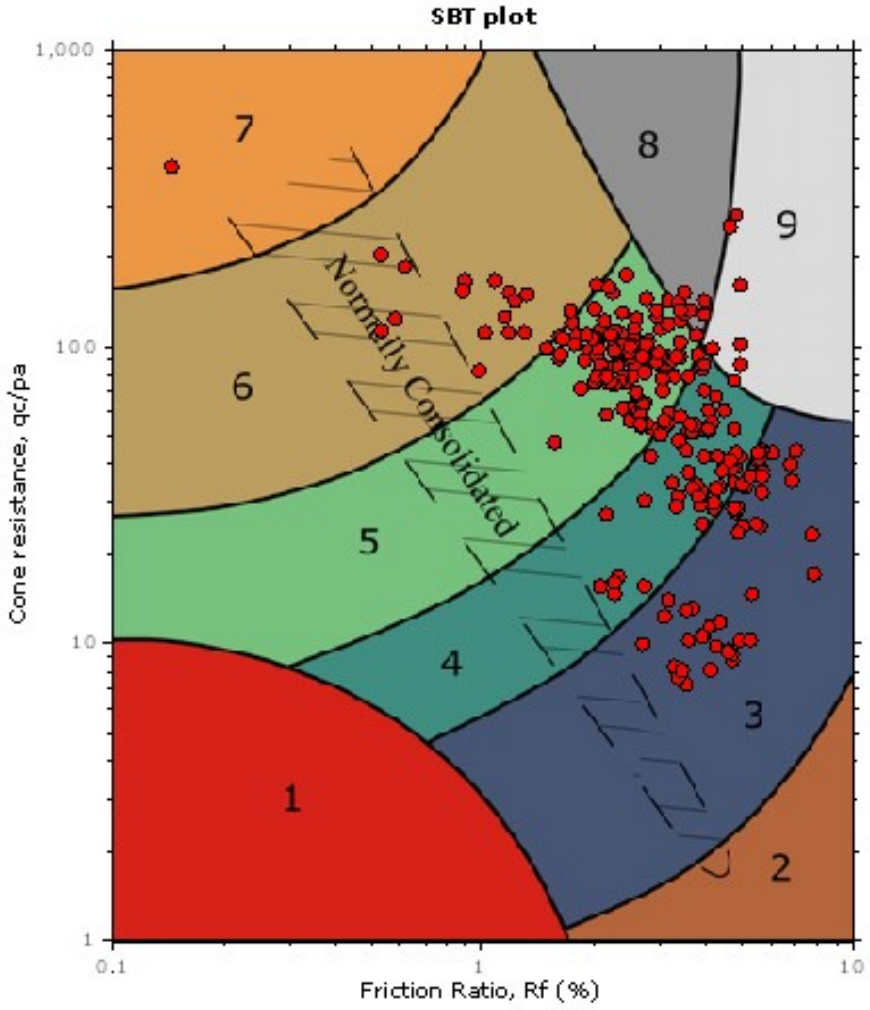
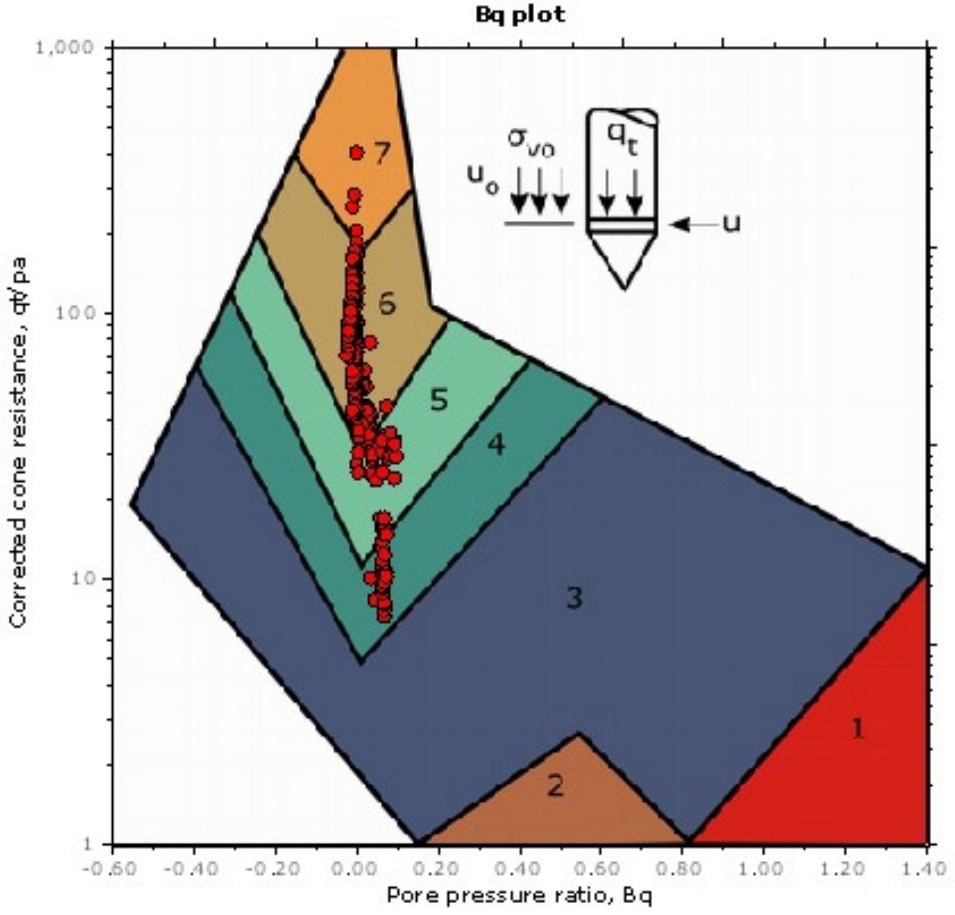
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-01
Total depth: 41.34 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

SBT - Bq plots





SBT legend

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

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Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-01
Total depth: 41.34 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
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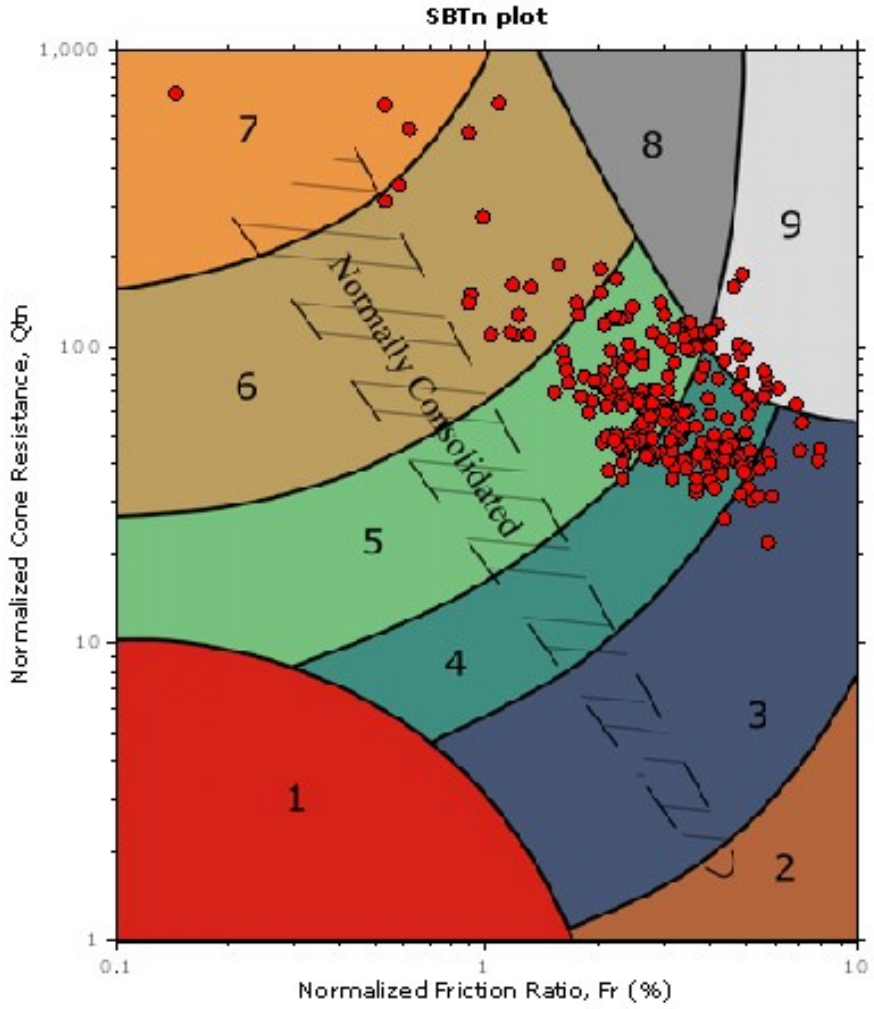
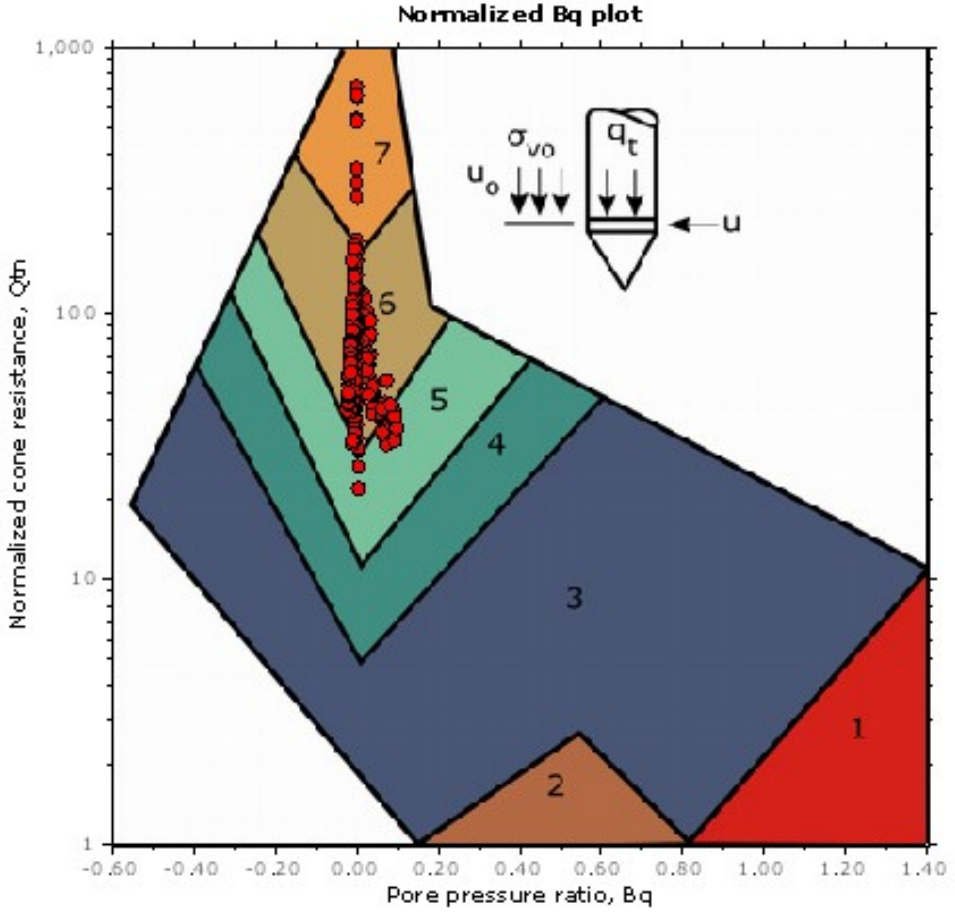
Cone Type: 15cm
Cone Operator: JM-GM

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravelly sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
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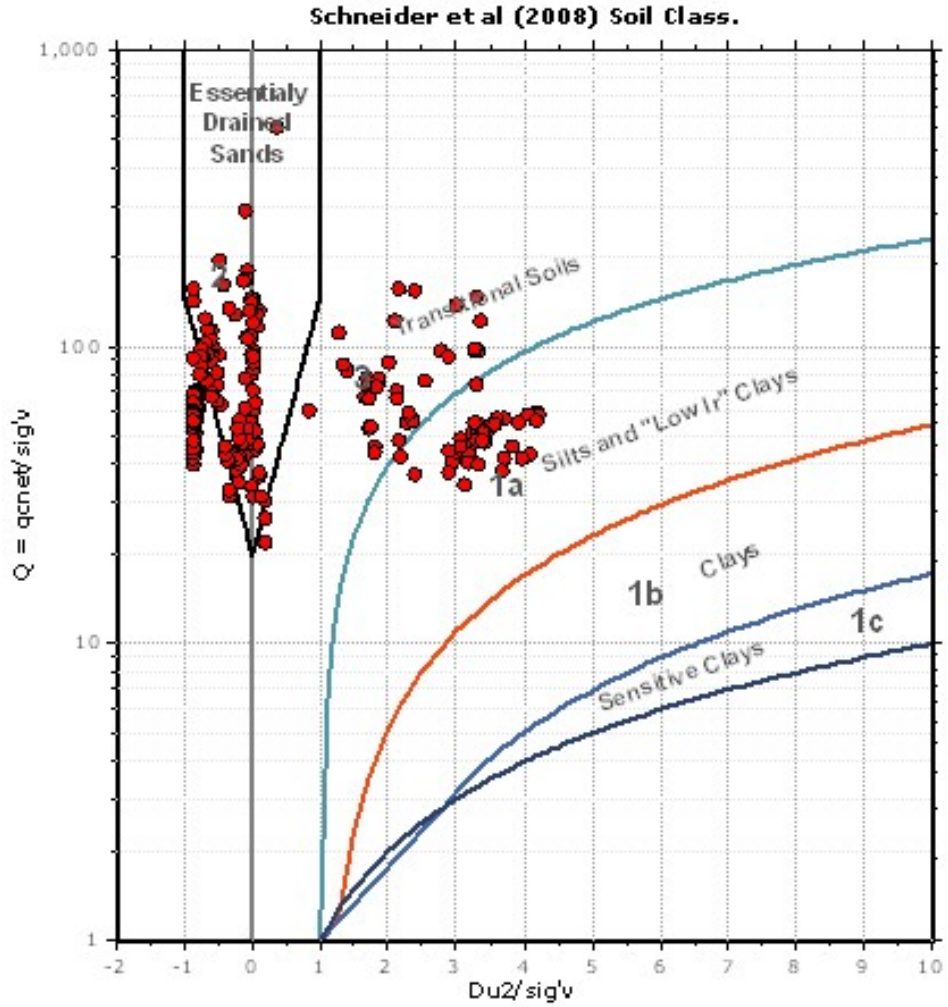
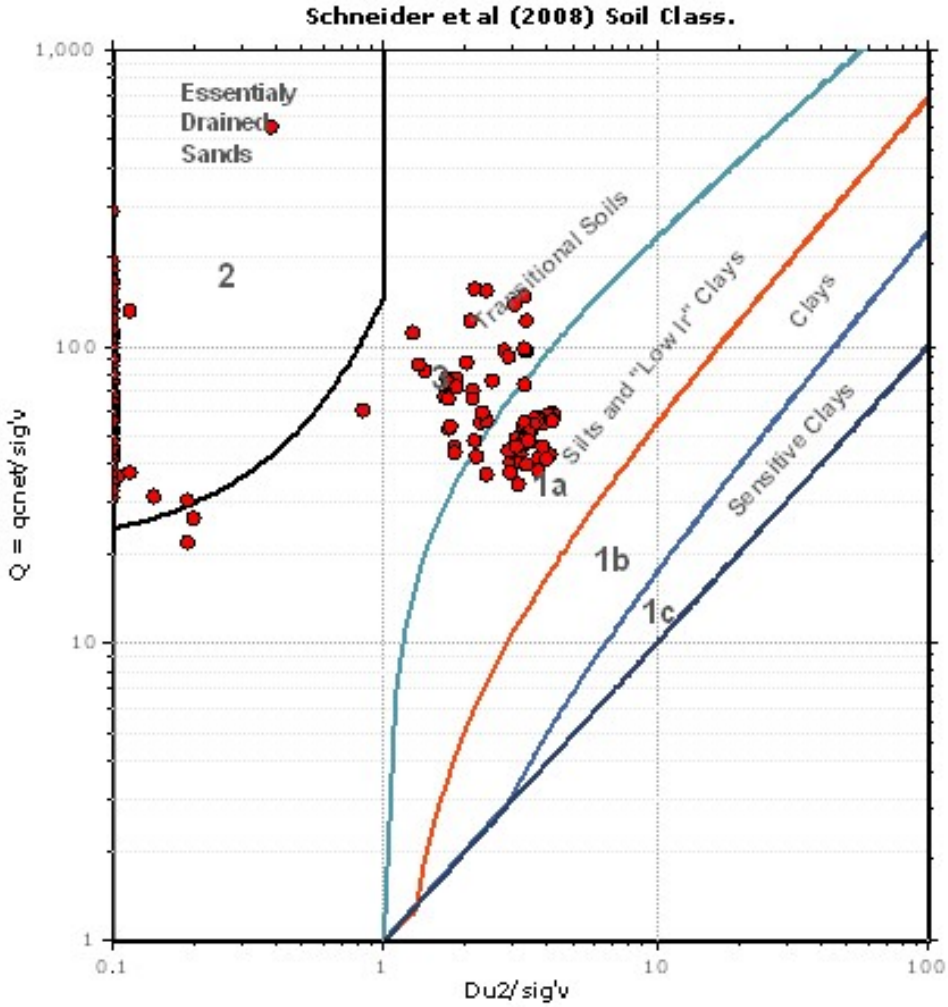
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

Bq plots (Schneider)





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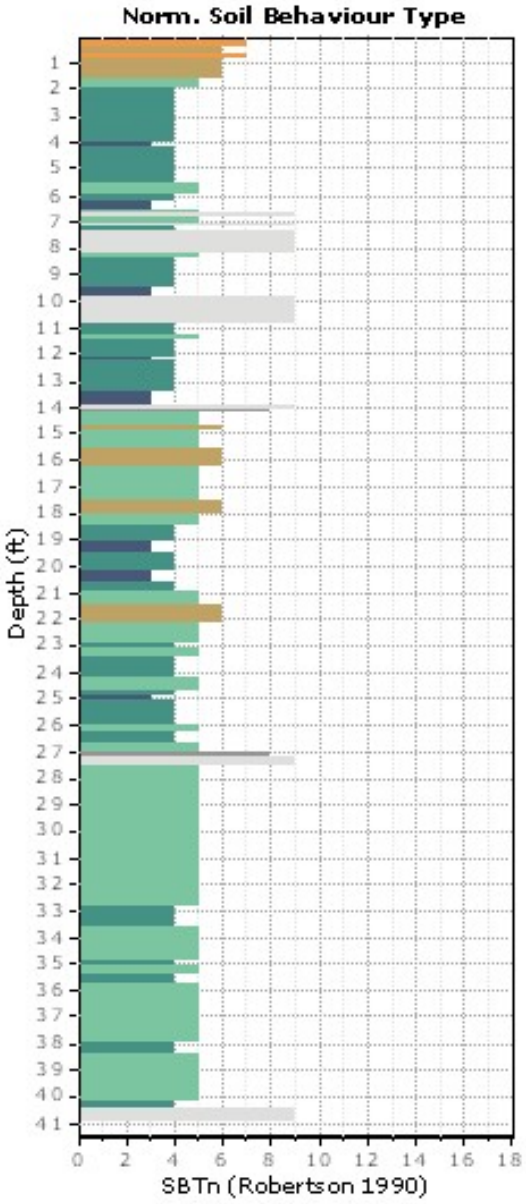

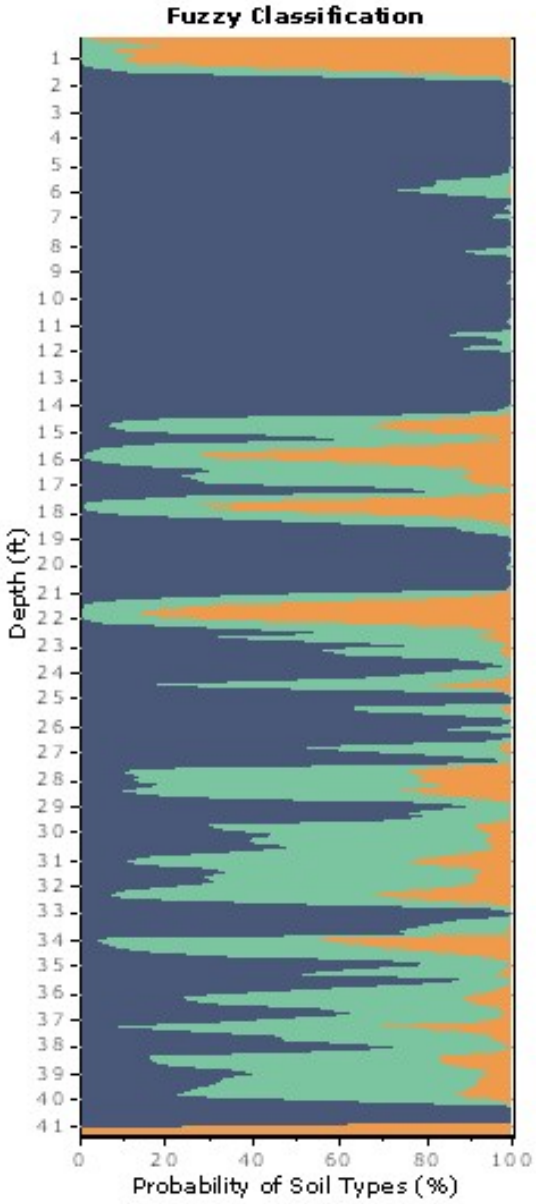

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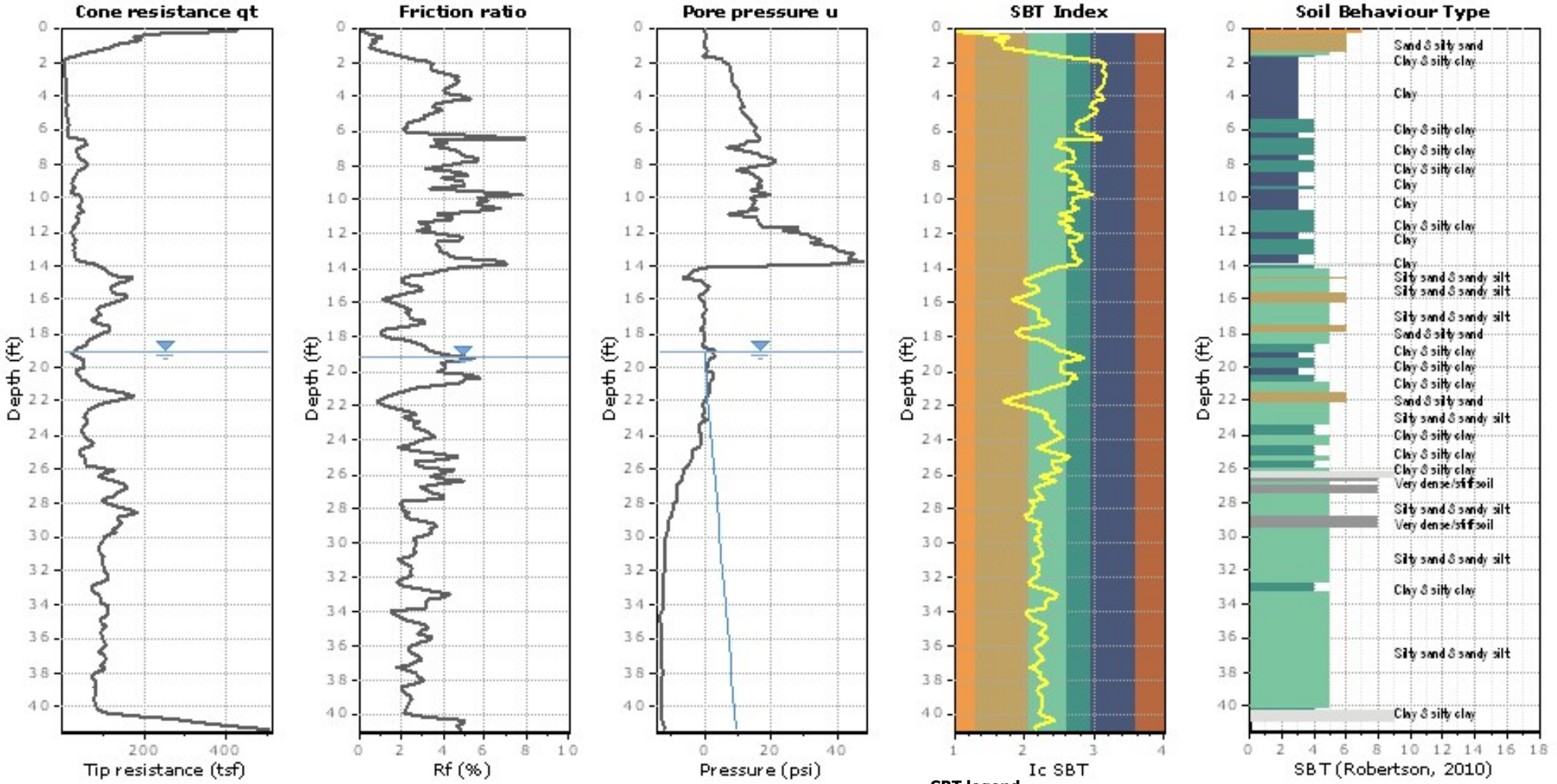

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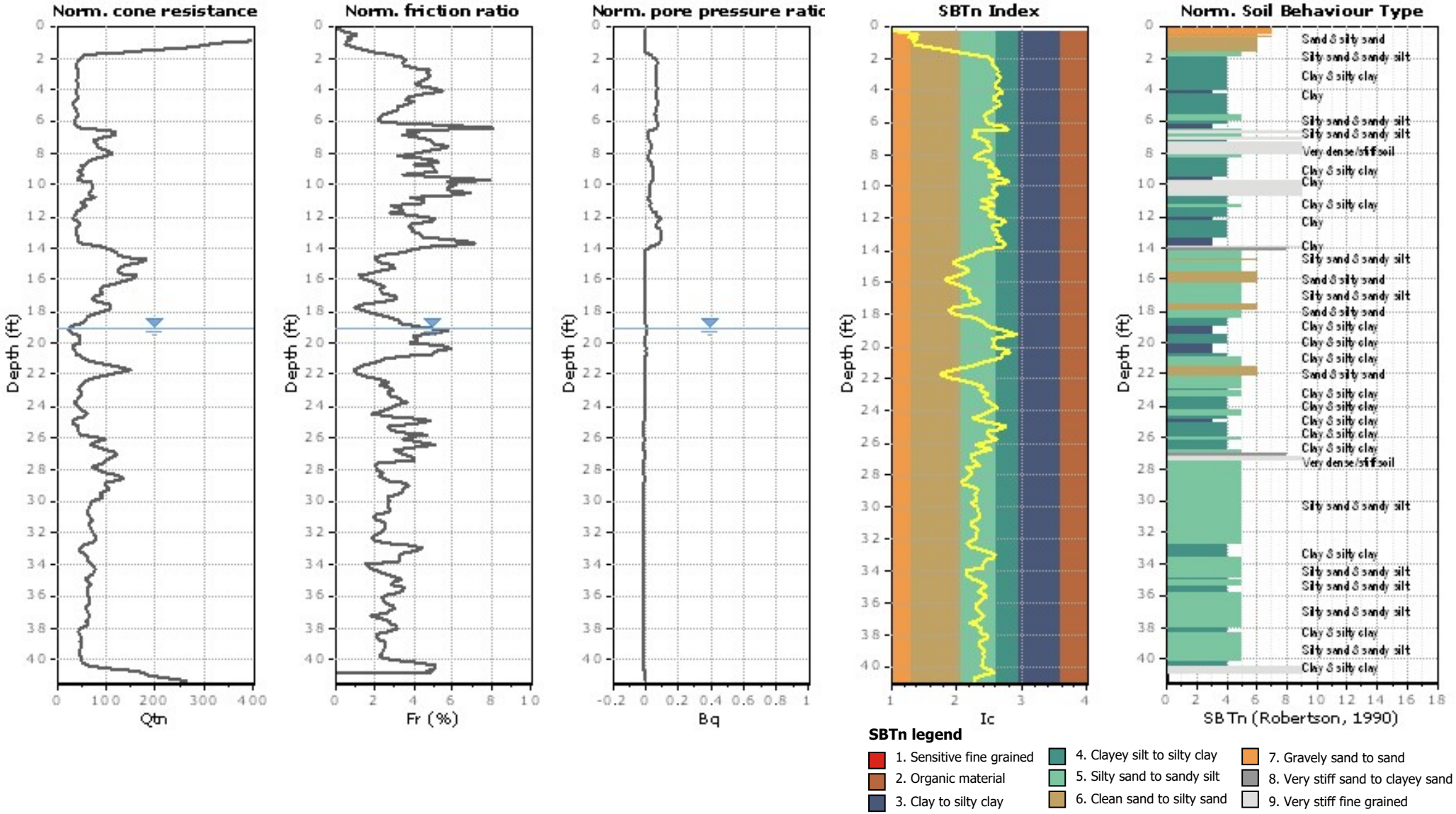

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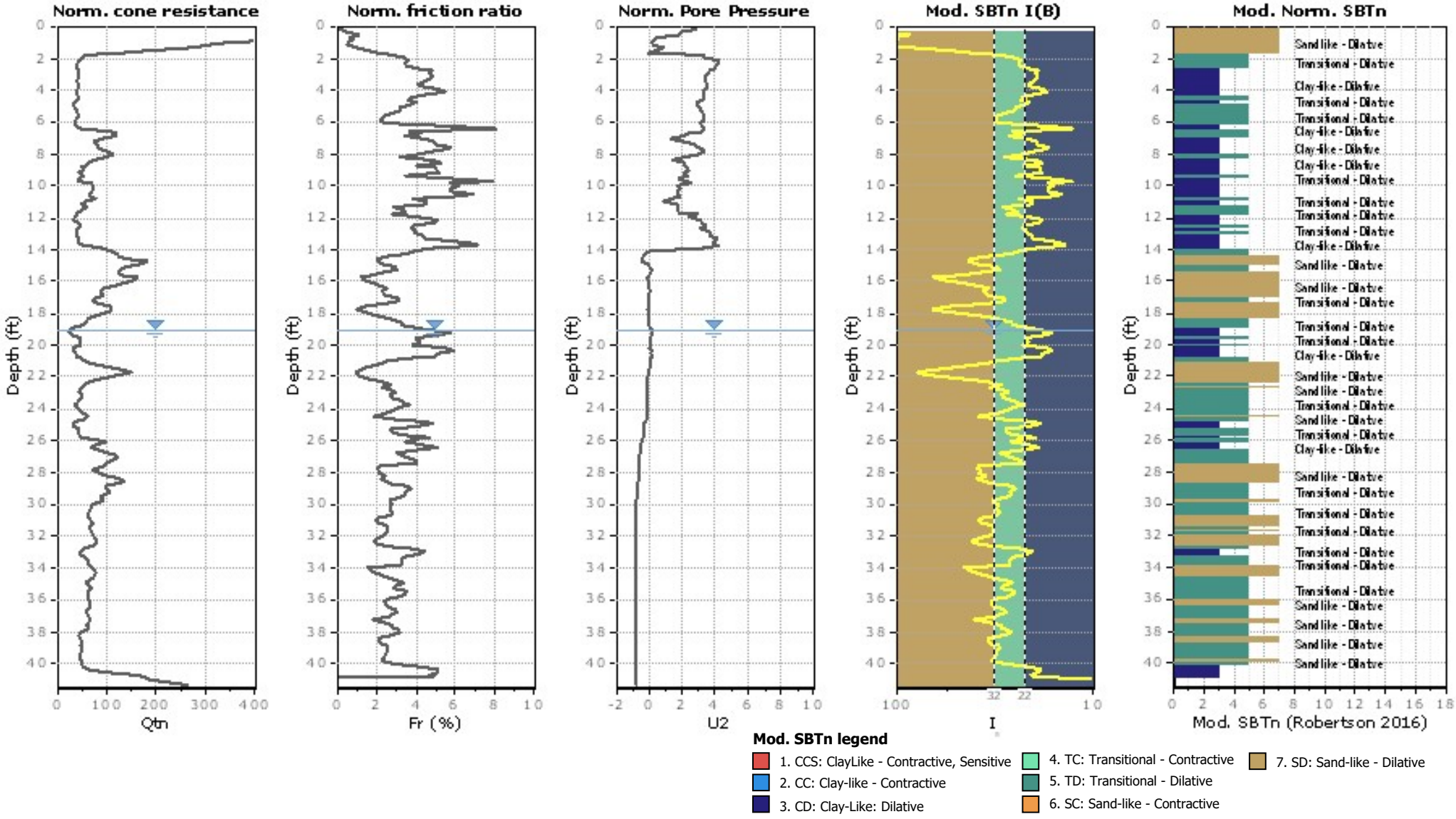

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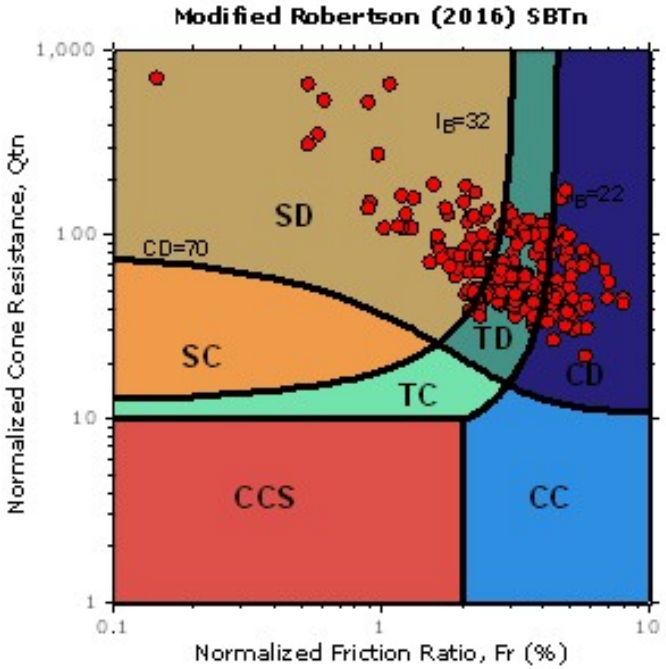
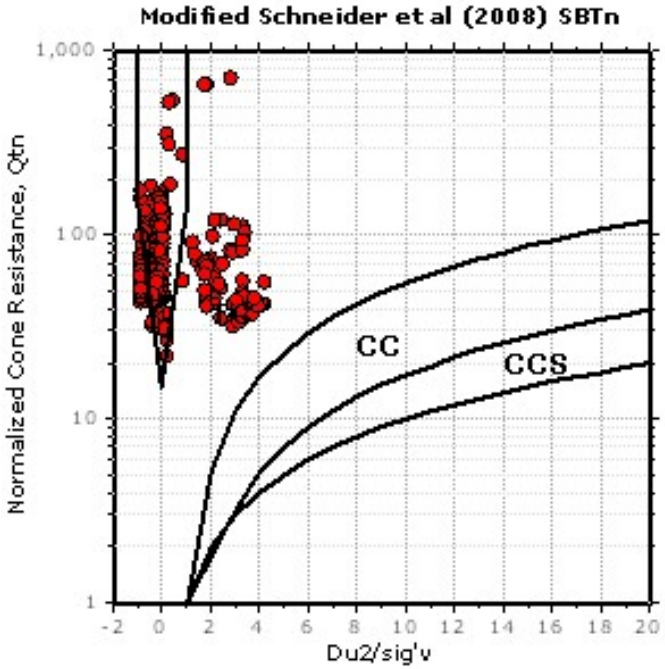
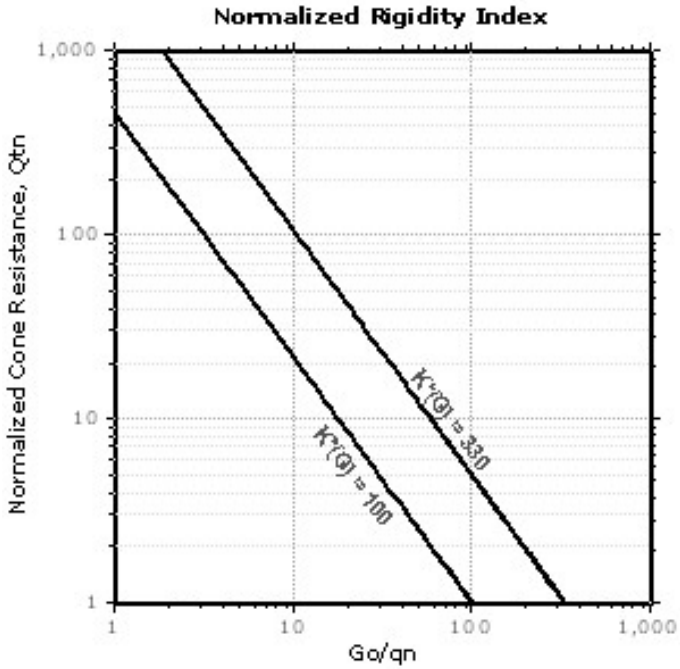
Cone Operator: JM-GM

Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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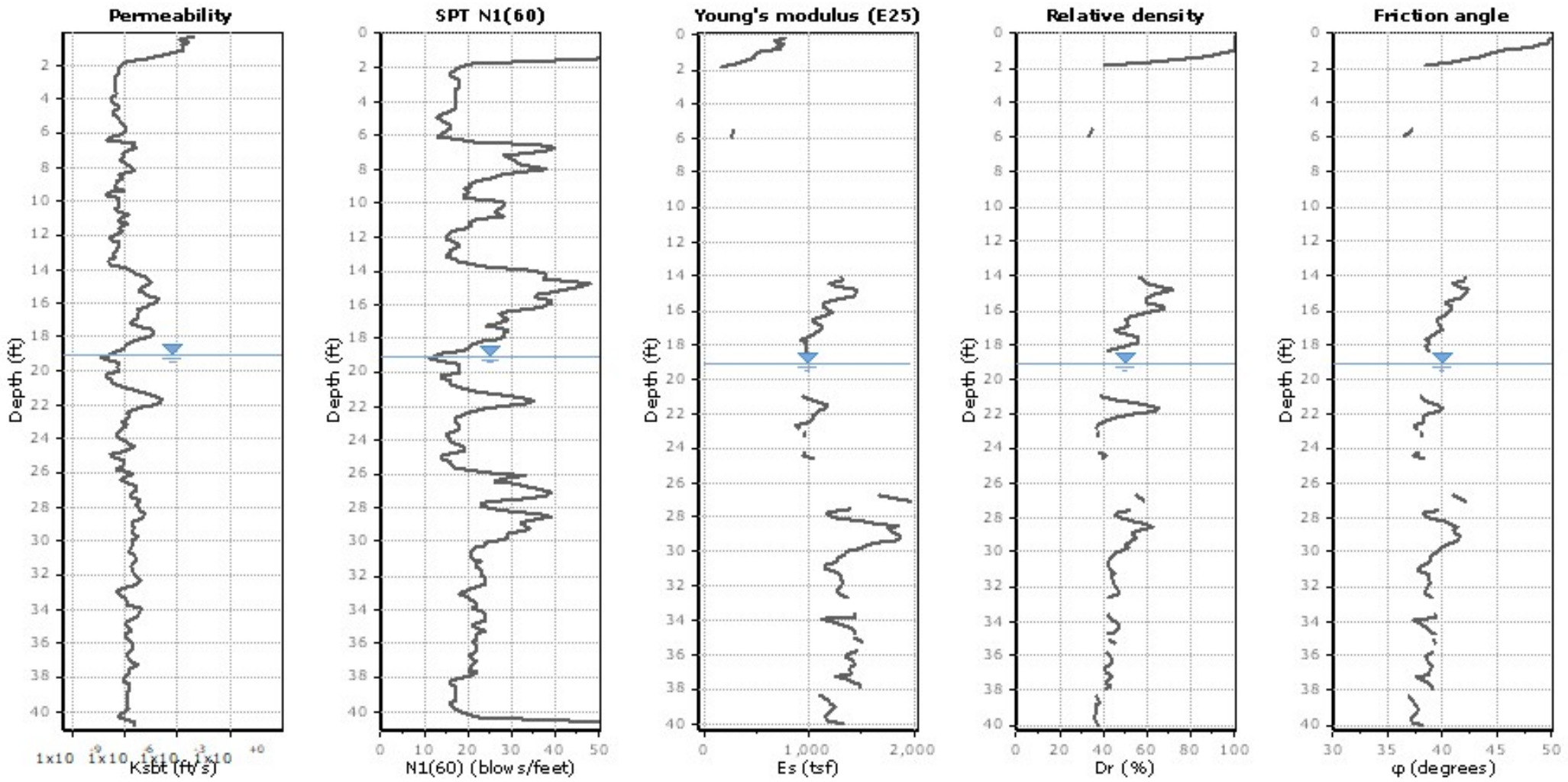

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-01

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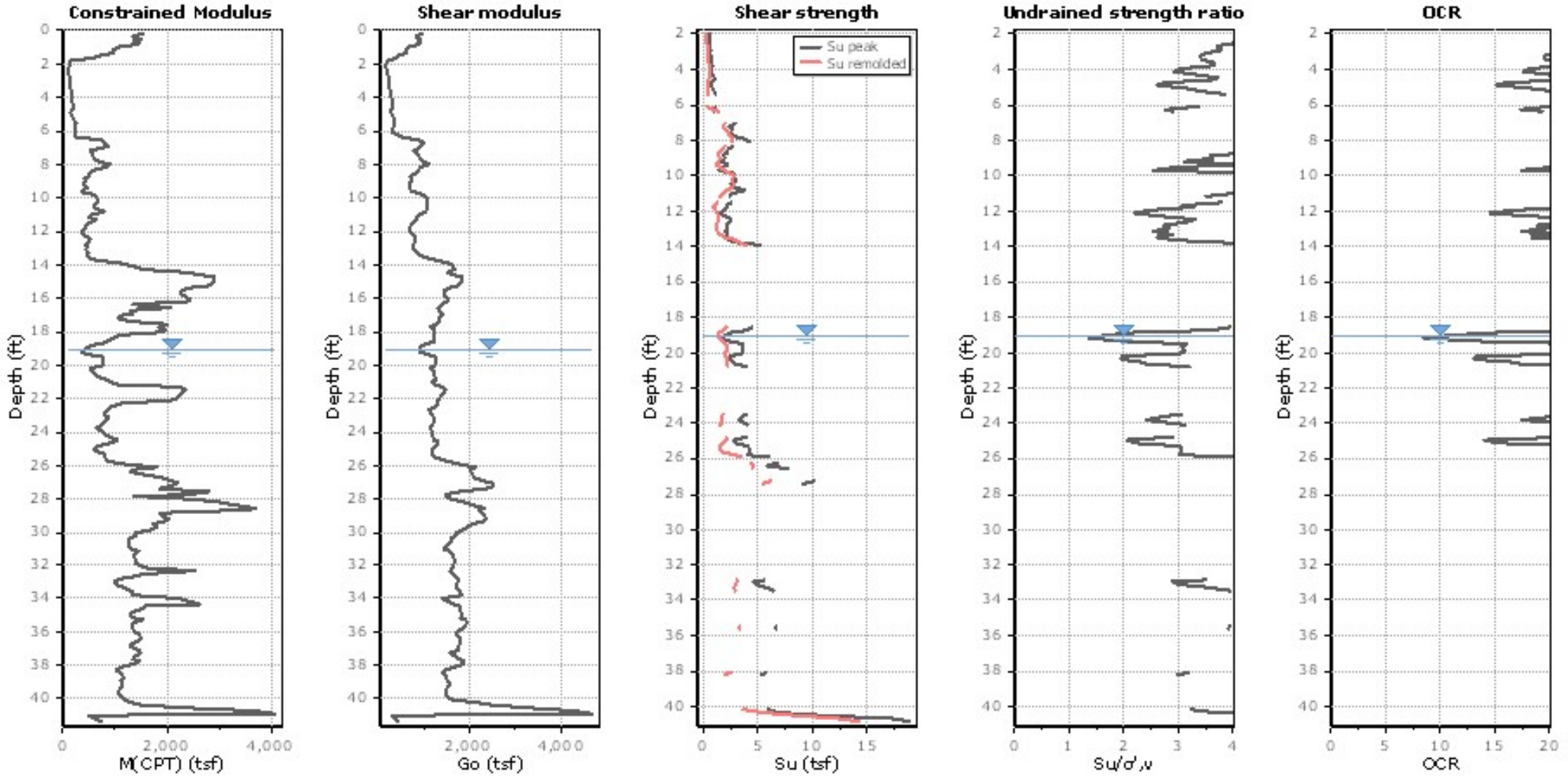
Location: **Arcata**



Calculation parameters

Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

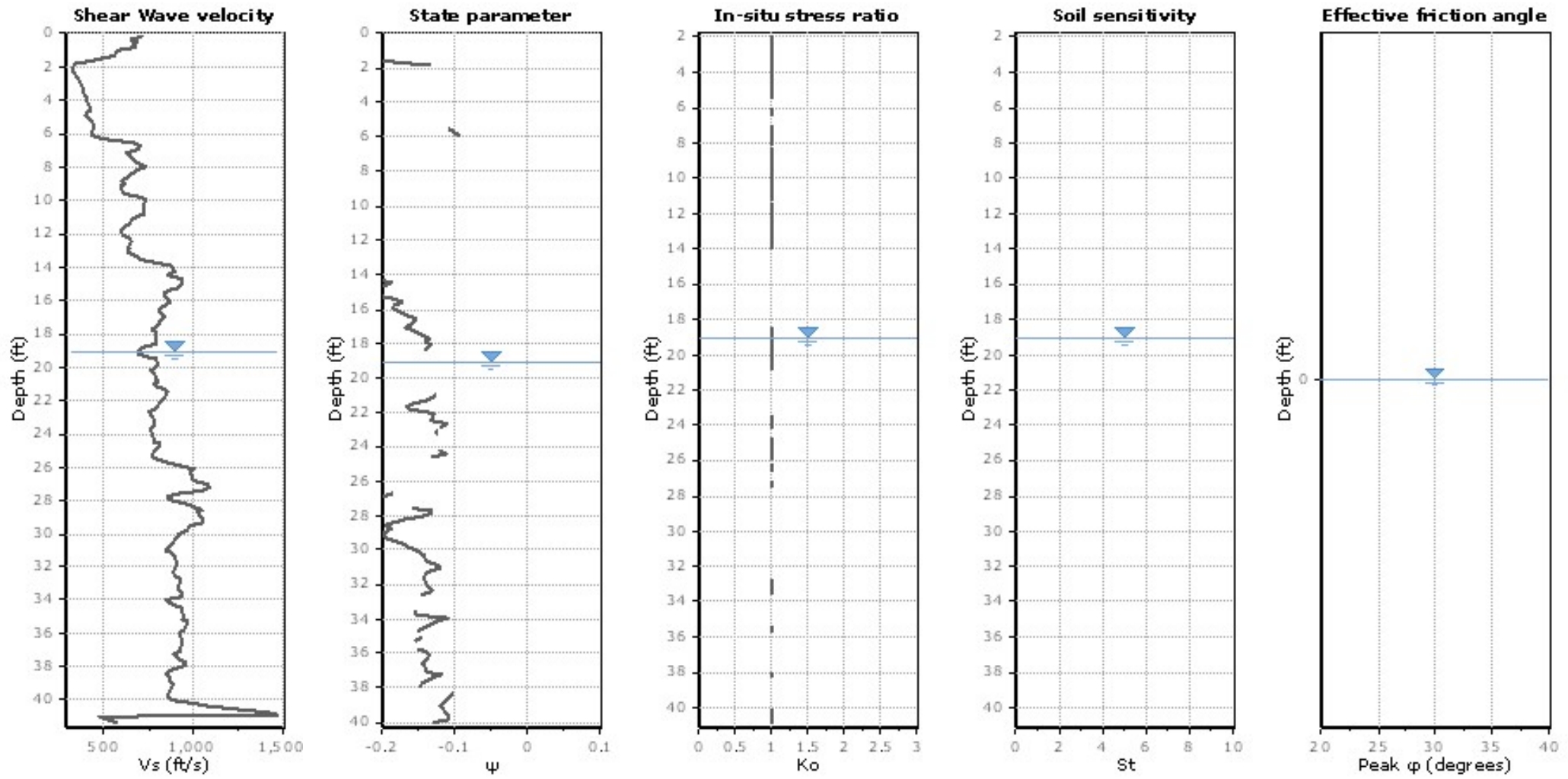
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-01

Total depth: 41.34 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

Middle Earth Geo Testing, Inc.

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CPT: CPT-01

Total depth: 41.34 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
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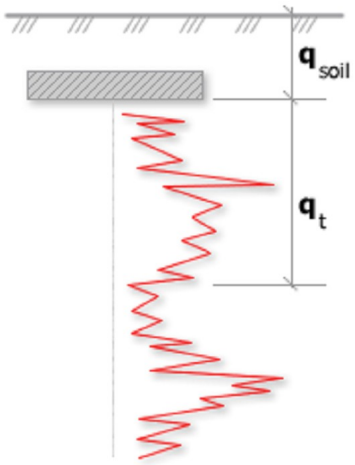
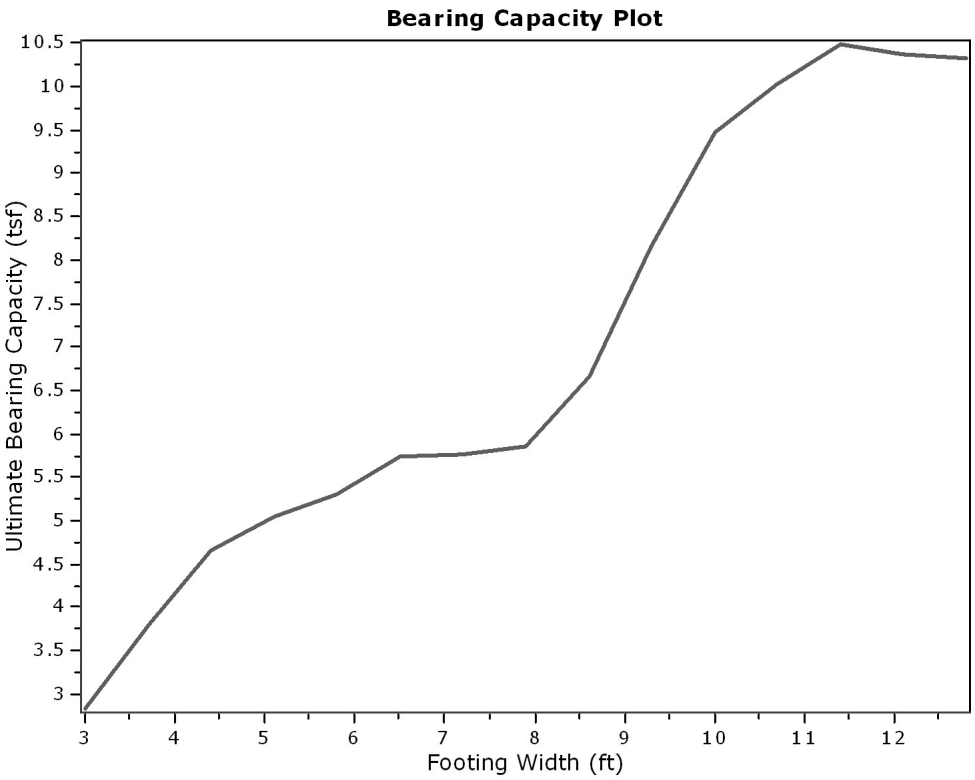


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	13.70	0.20	0.10	2.84
2	3.70	1.60	7.15	18.59	0.20	0.10	3.81
3	4.40	1.60	8.20	22.75	0.20	0.10	4.65
4	5.10	1.60	9.25	24.72	0.20	0.10	5.04
5	5.80	1.60	10.30	26.07	0.20	0.10	5.31
6	6.50	1.60	11.35	28.18	0.20	0.10	5.73
7	7.20	1.60	12.40	28.37	0.20	0.10	5.77
8	7.90	1.60	13.45	28.78	0.20	0.10	5.85
9	8.60	1.60	14.50	32.79	0.20	0.10	6.65
10	9.30	1.60	15.55	40.35	0.20	0.10	8.17
11	10.00	1.60	16.60	46.86	0.20	0.10	9.47
12	10.70	1.60	17.65	49.60	0.20	0.10	10.02
13	11.40	1.60	18.70	51.93	0.20	0.10	10.48
14	12.10	1.60	19.75	51.38	0.20	0.10	10.37
15	12.80	1.60	20.80	51.12	0.20	0.10	10.32

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

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CPT: CPT-02

Total depth: 39.04 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
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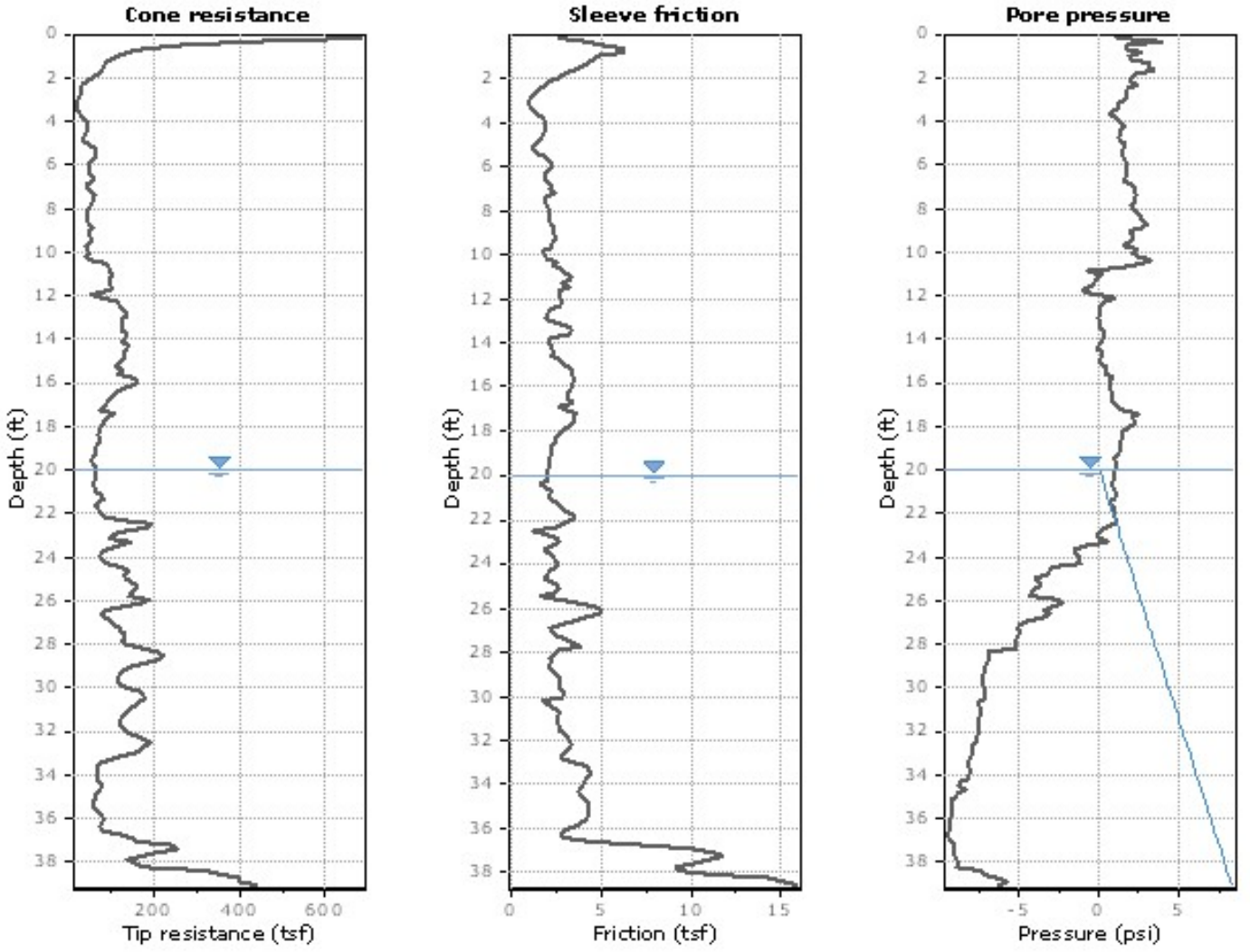
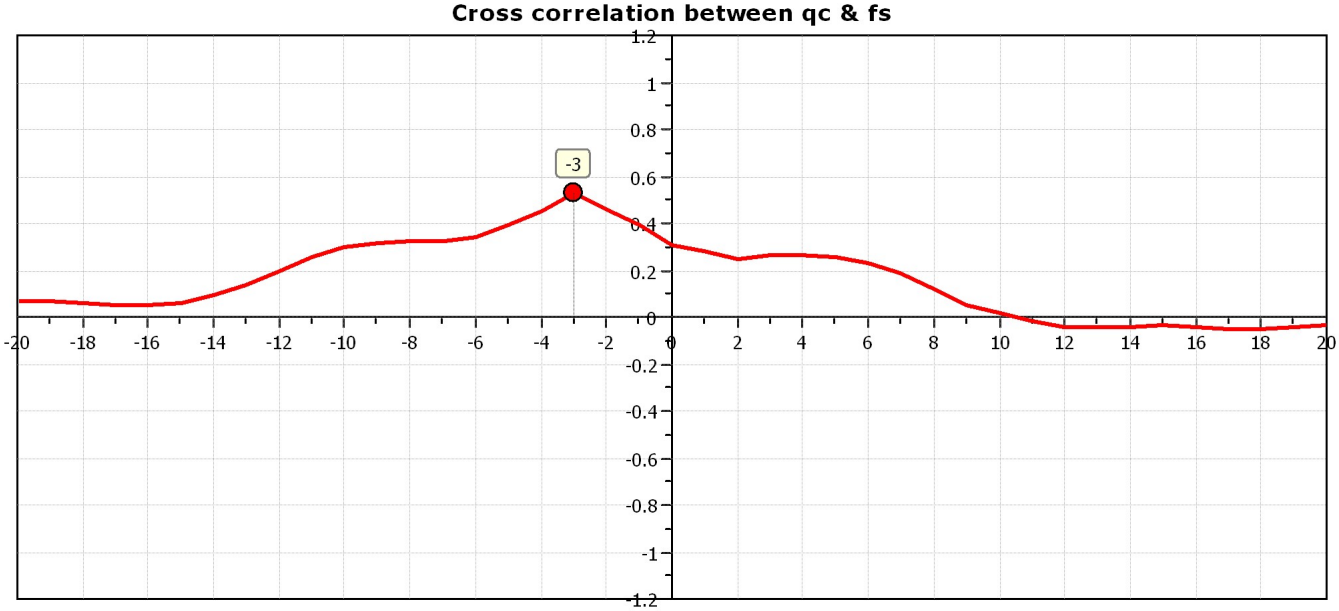
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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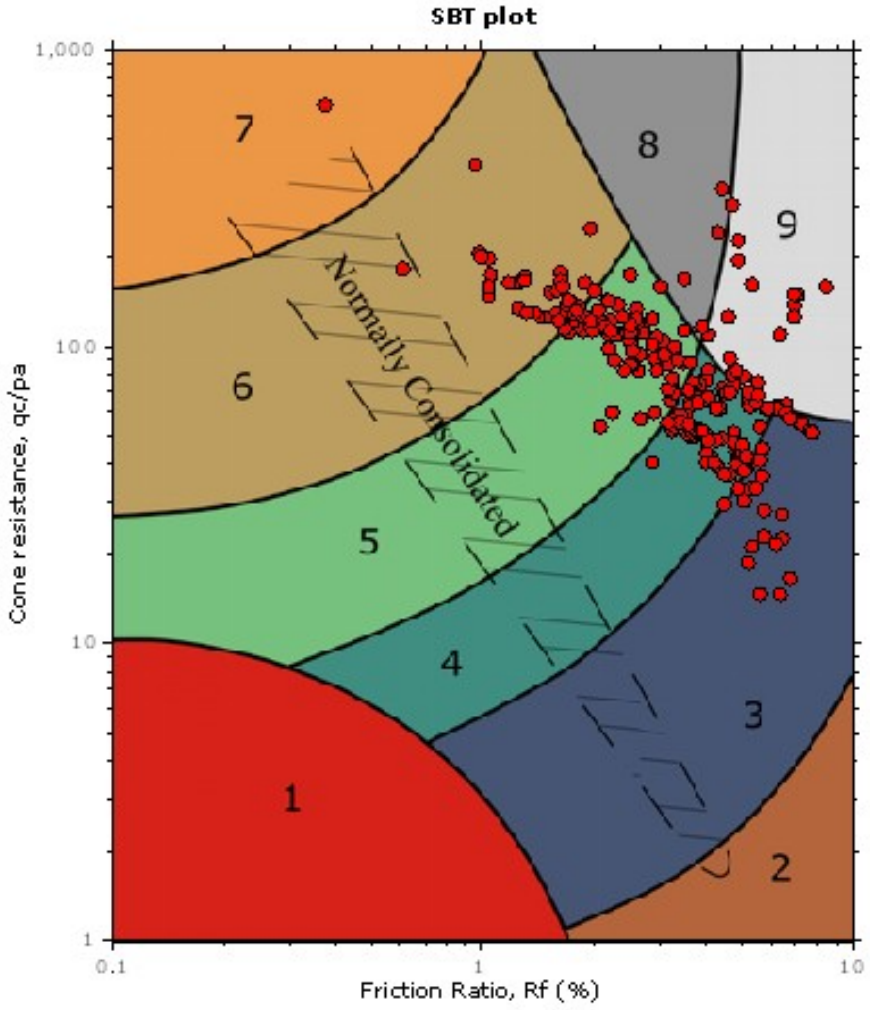
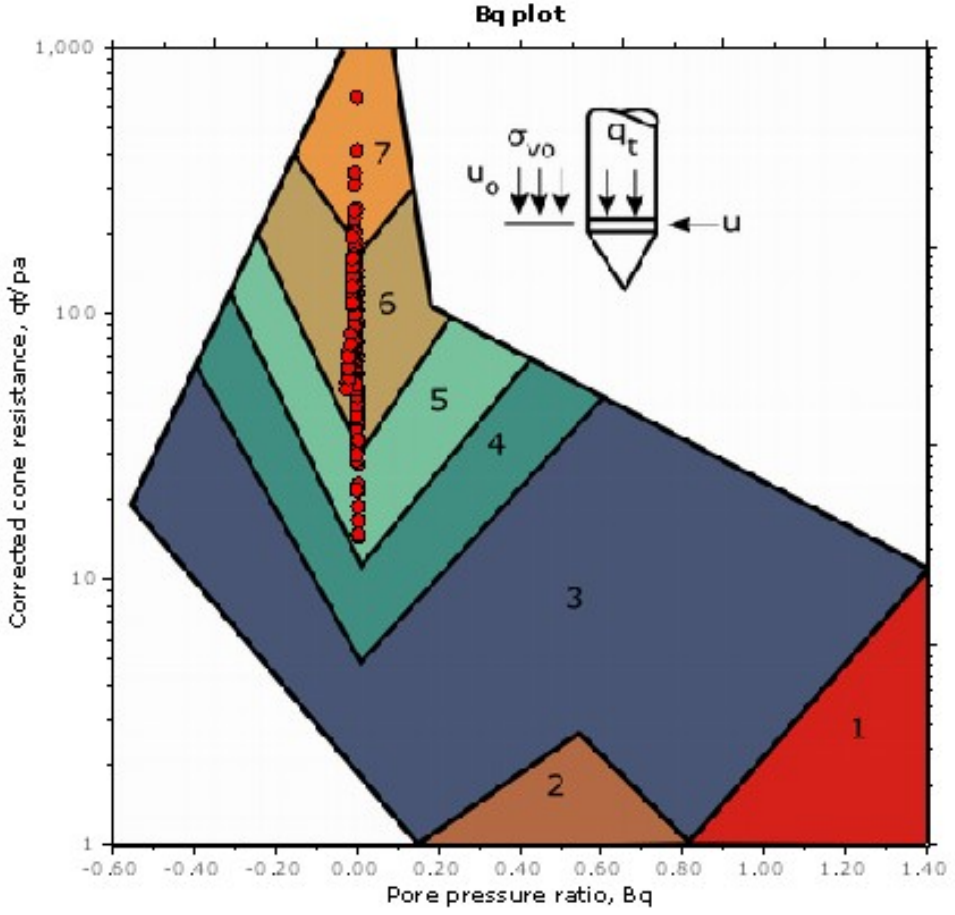
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

SBT - Bq plots





SBT legend

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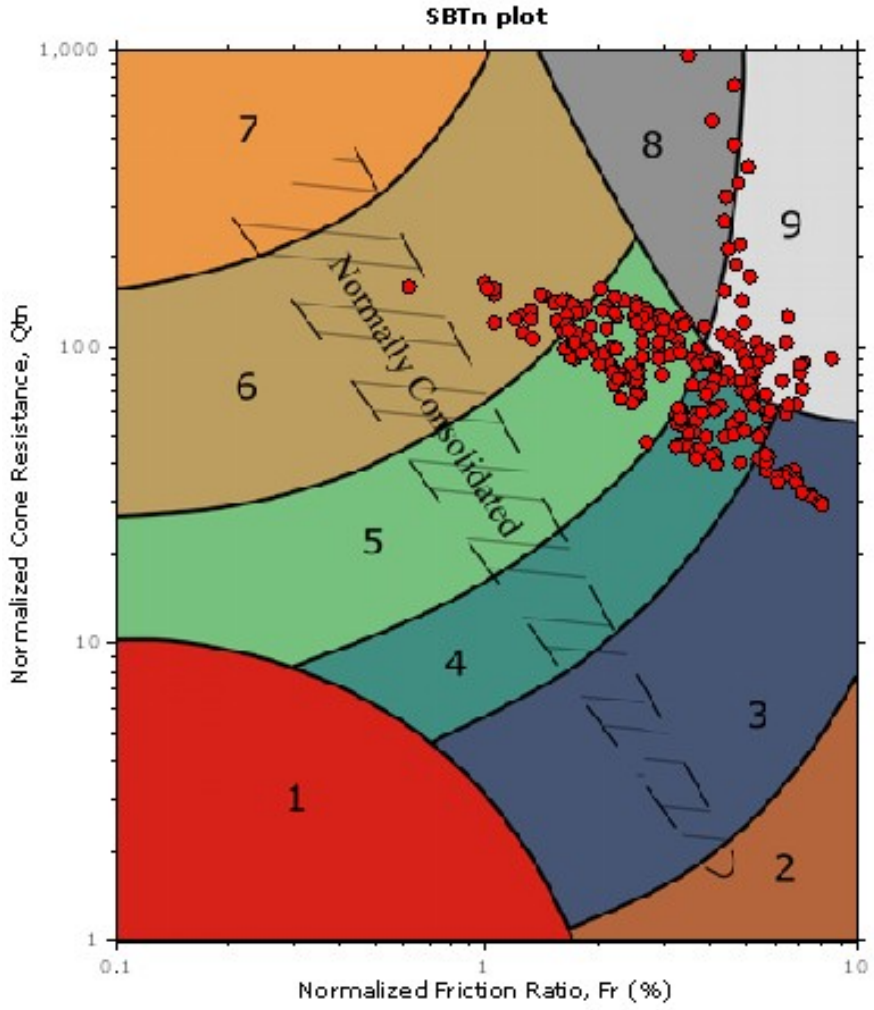

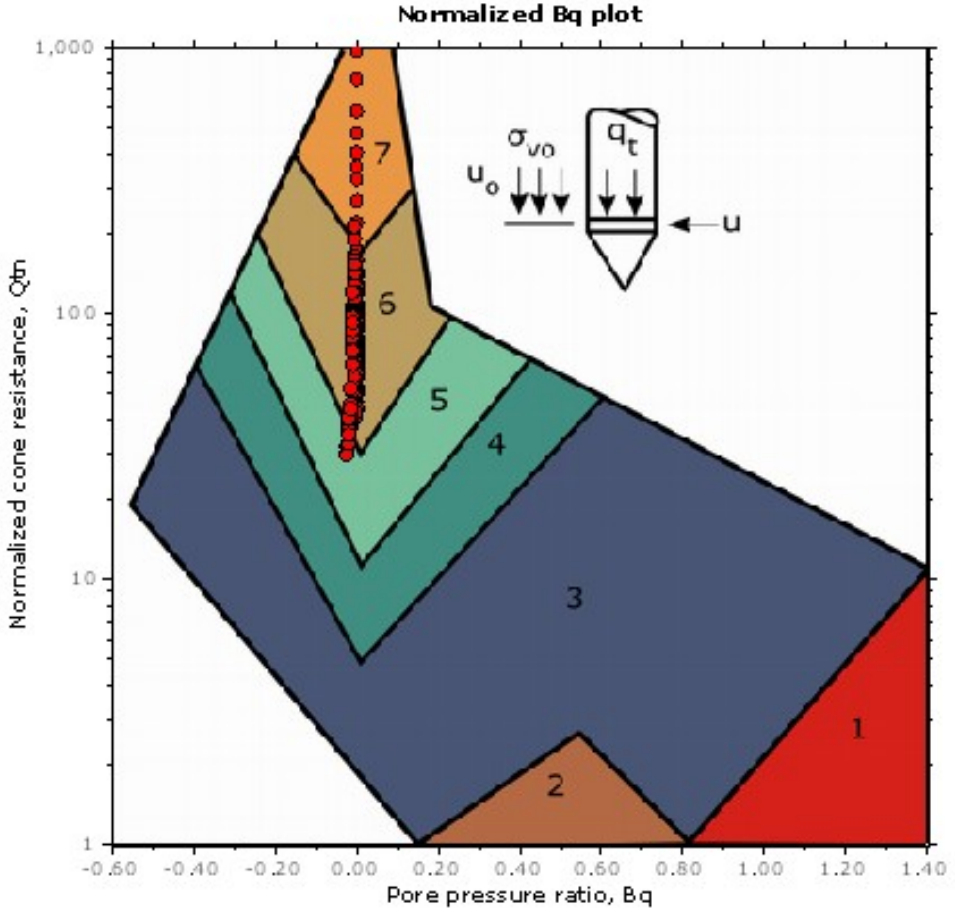

SBTn legend

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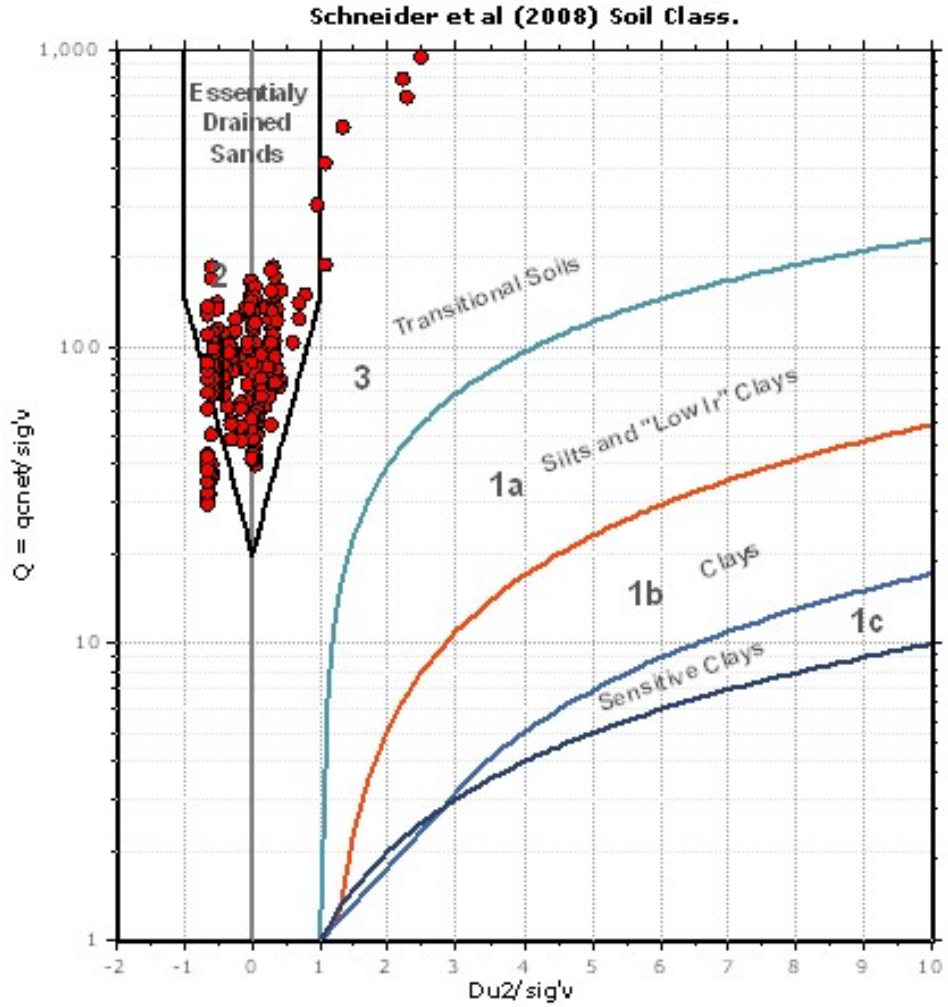
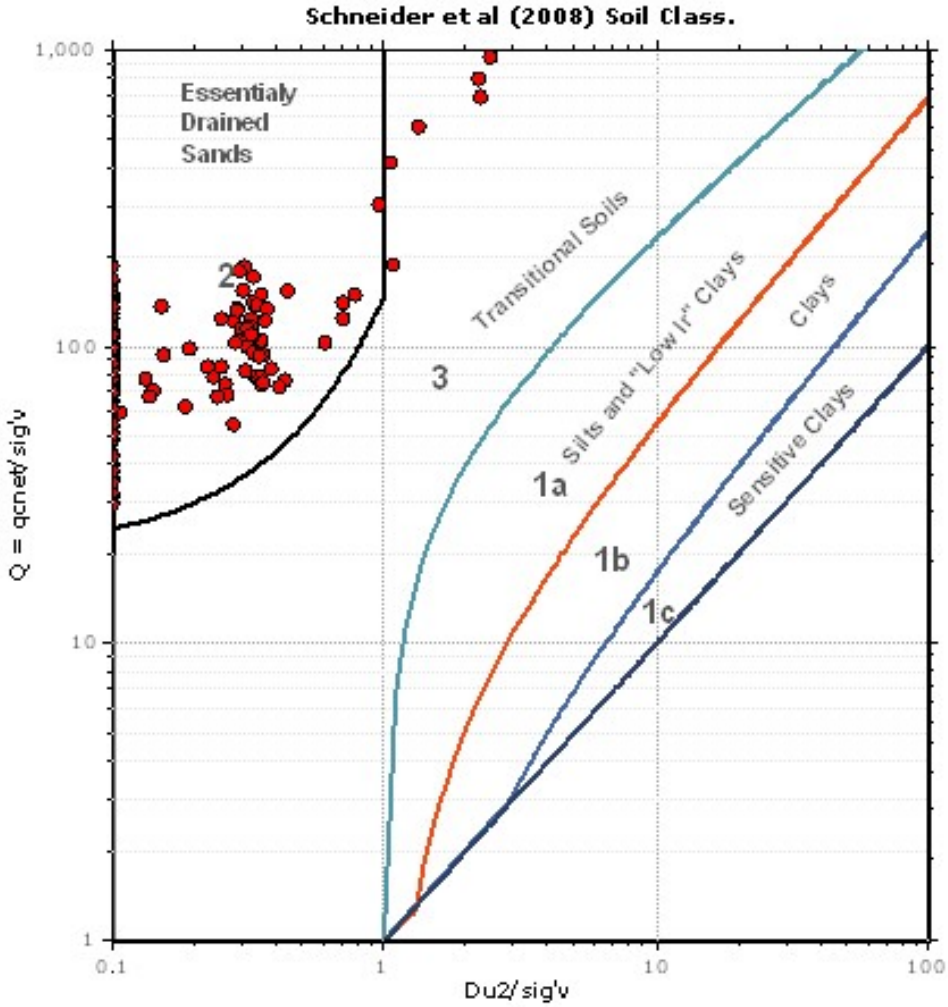
Bq plots (Schneider)





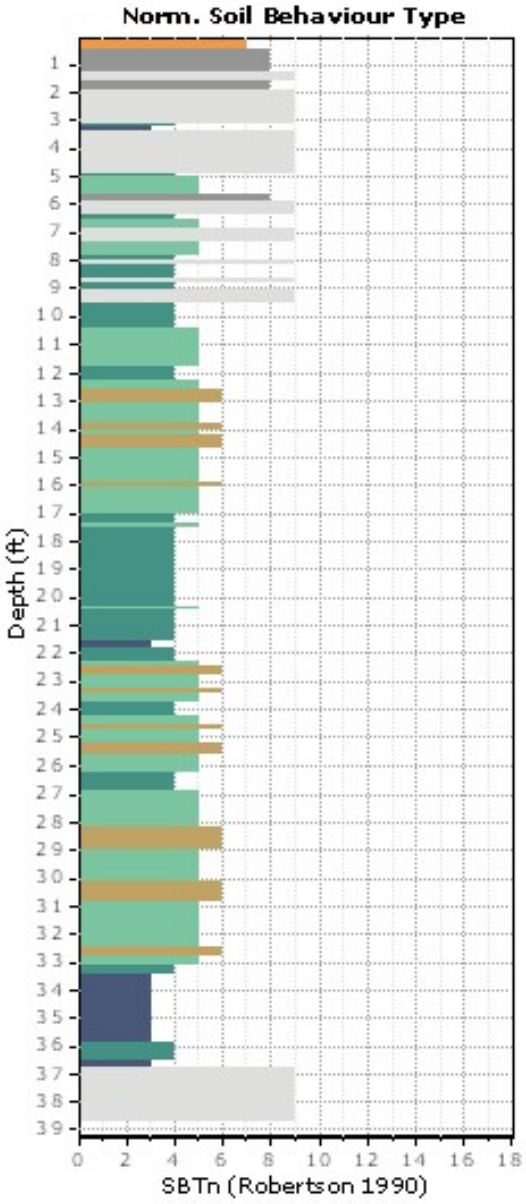
Middle Earth Geo Testing, Inc.

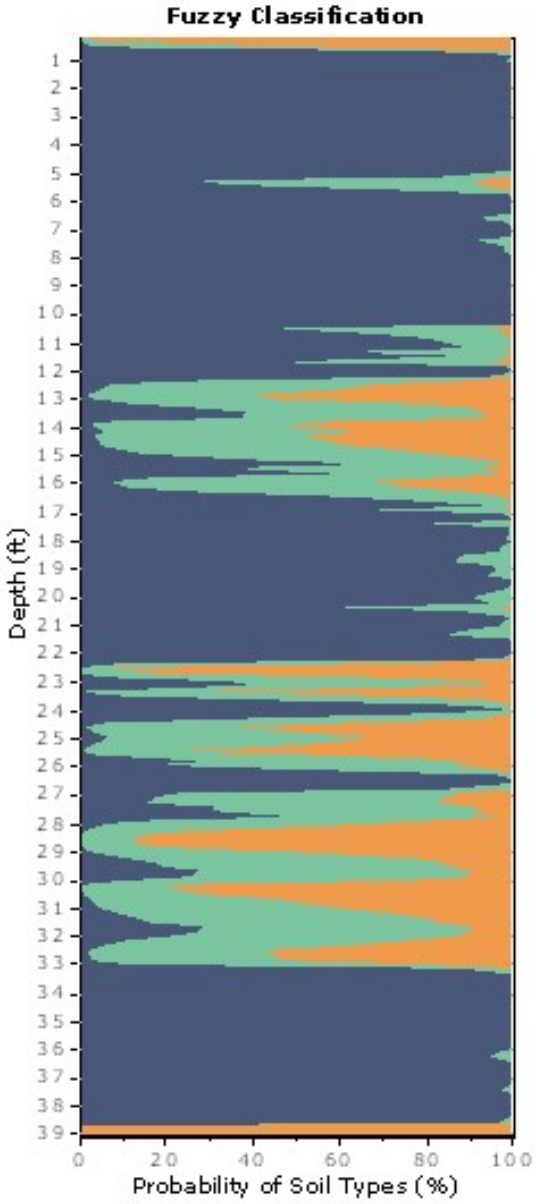
www.middleearthgeo.com

CPT: CPT-02

Total depth: 39.04 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**





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Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

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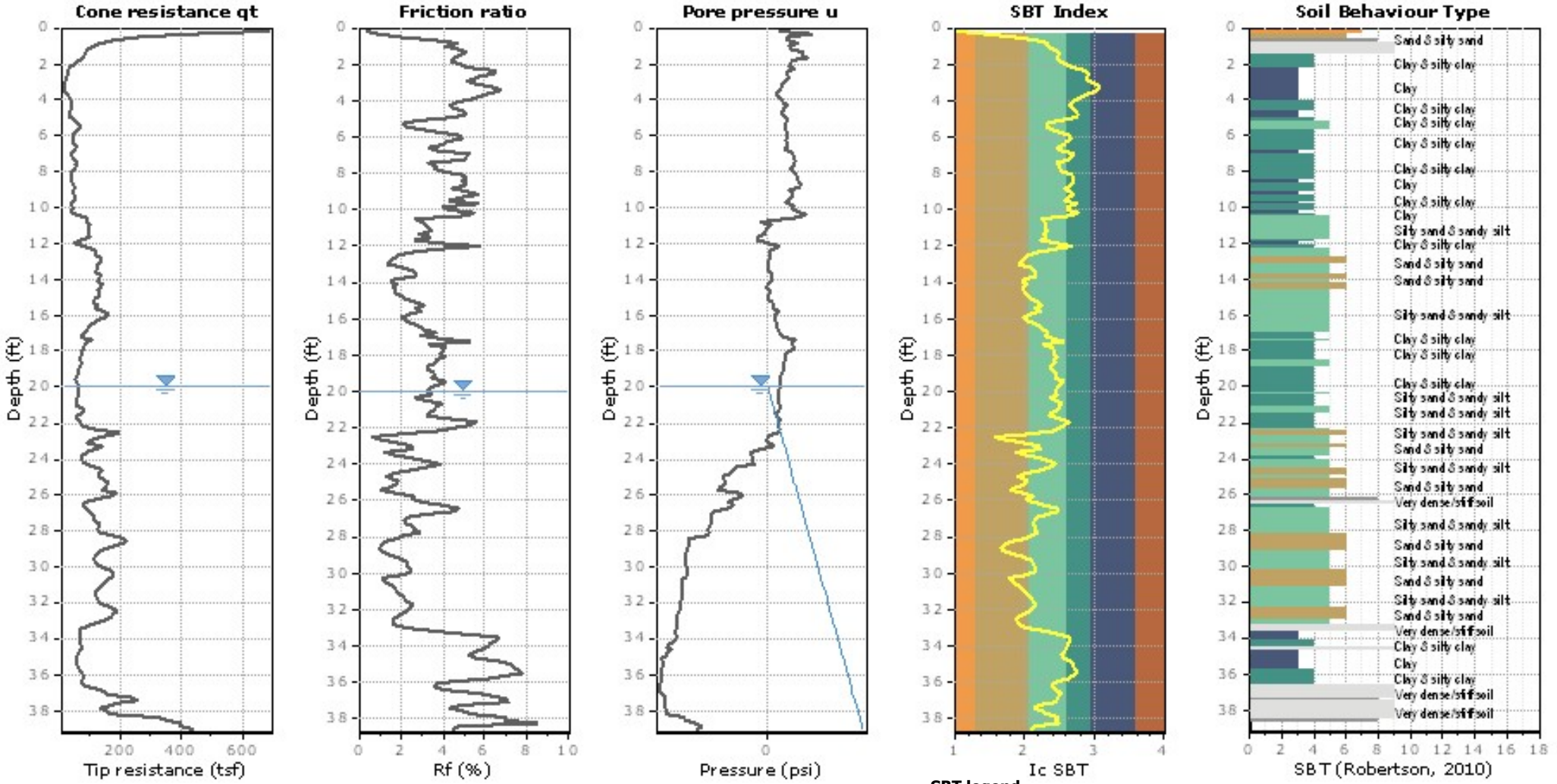

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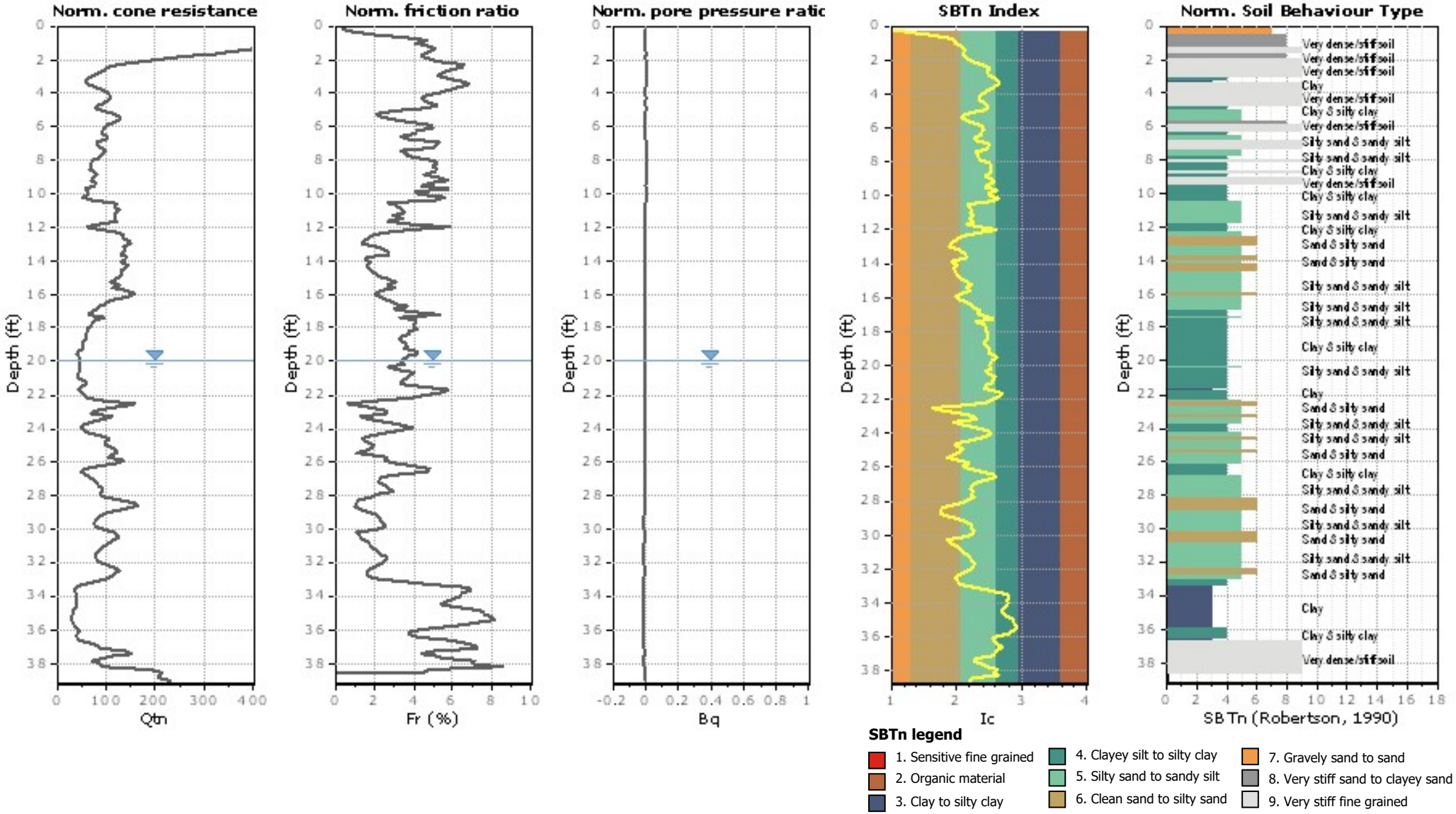

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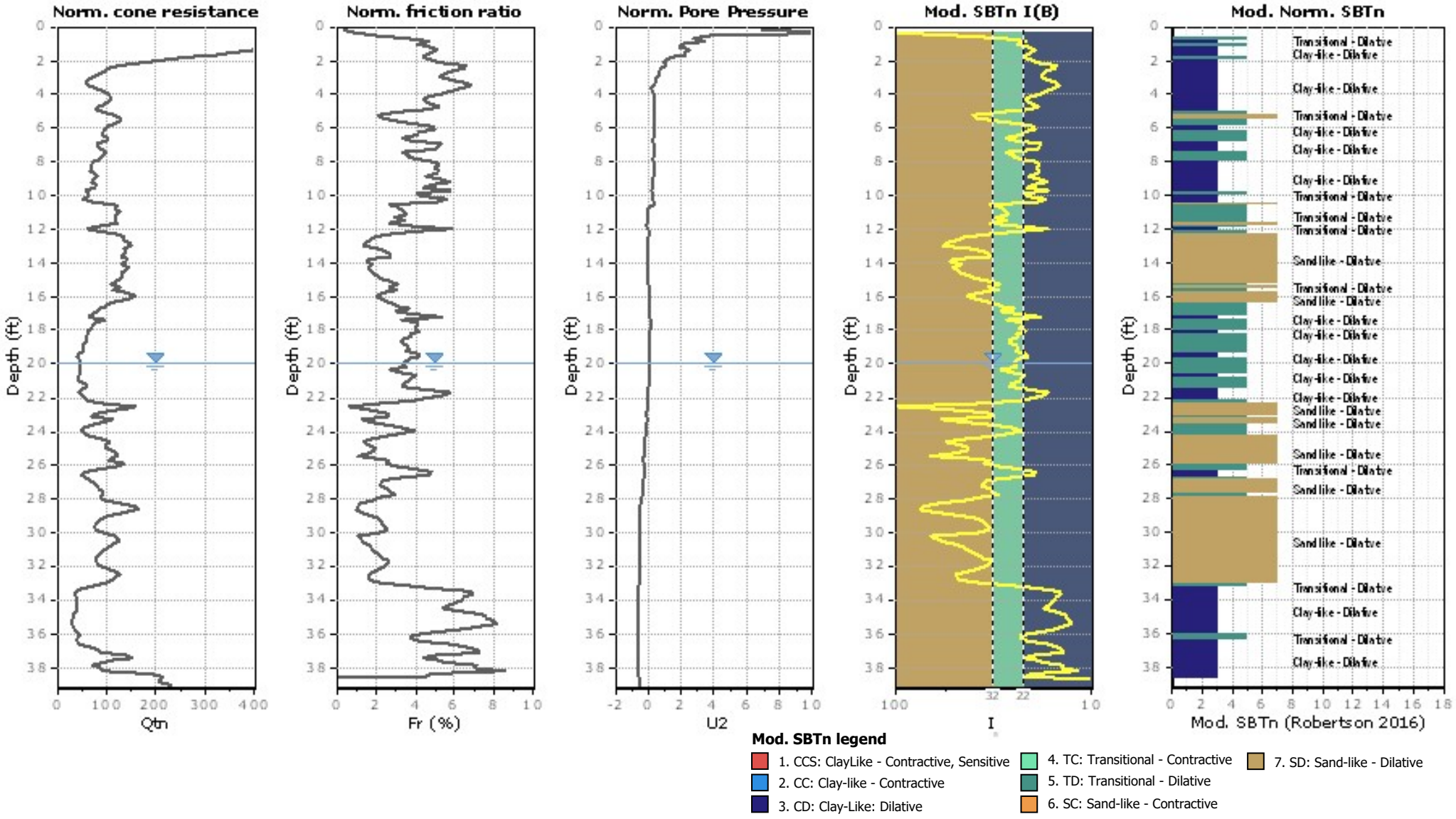

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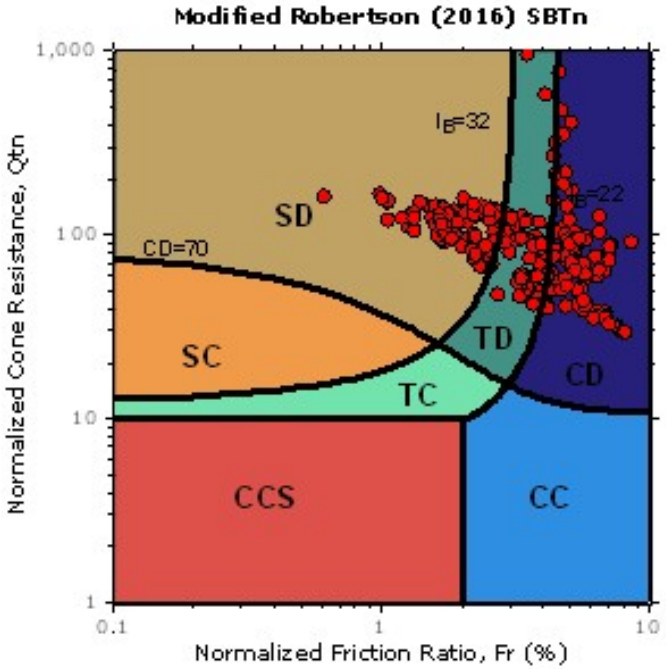
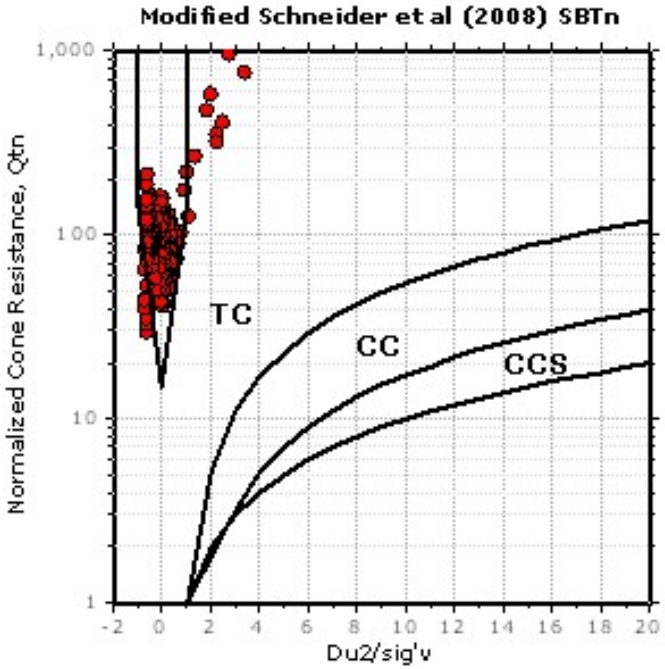
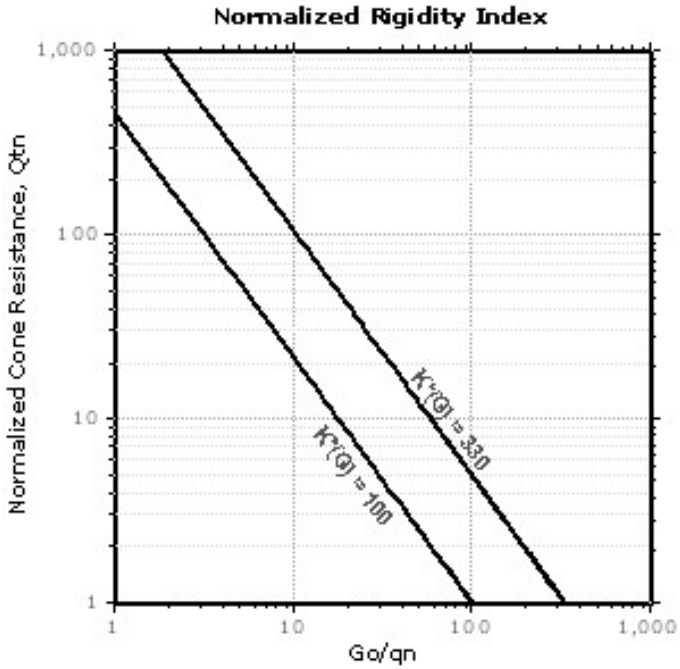
Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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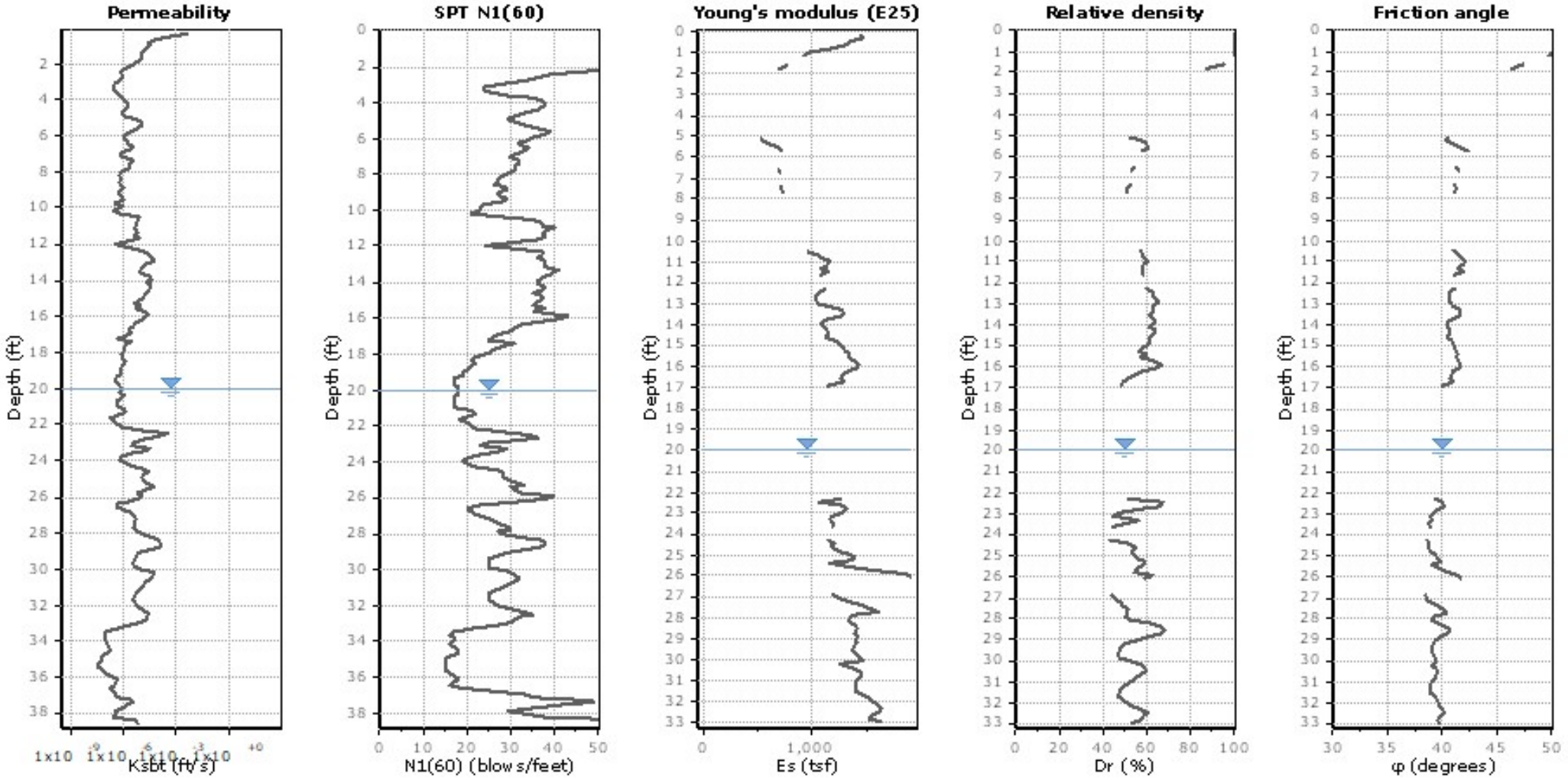

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

Middle Earth Geo Testing, Inc.

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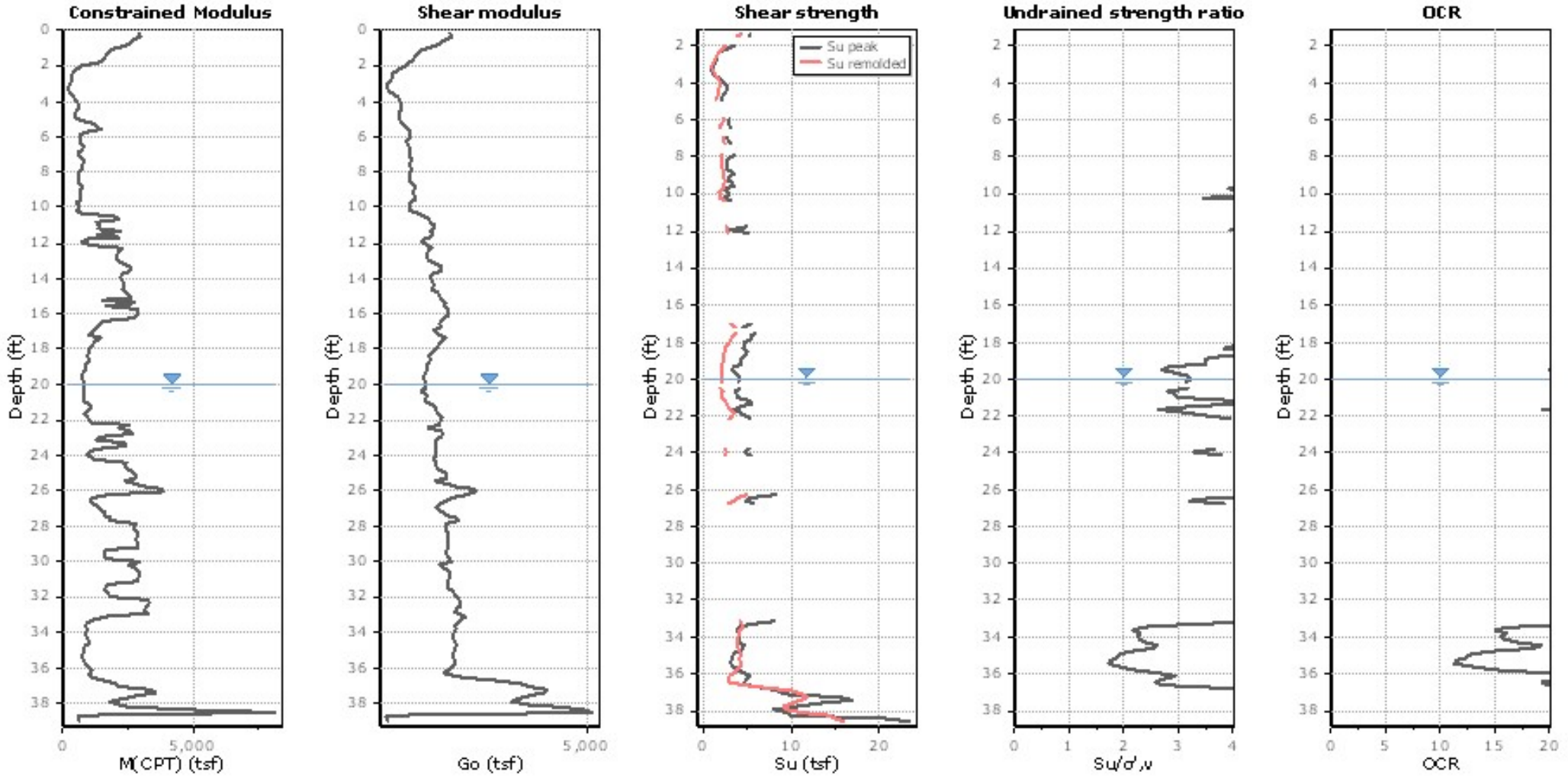

Calculation parameters

Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

Middle Earth Geo Testing, Inc.

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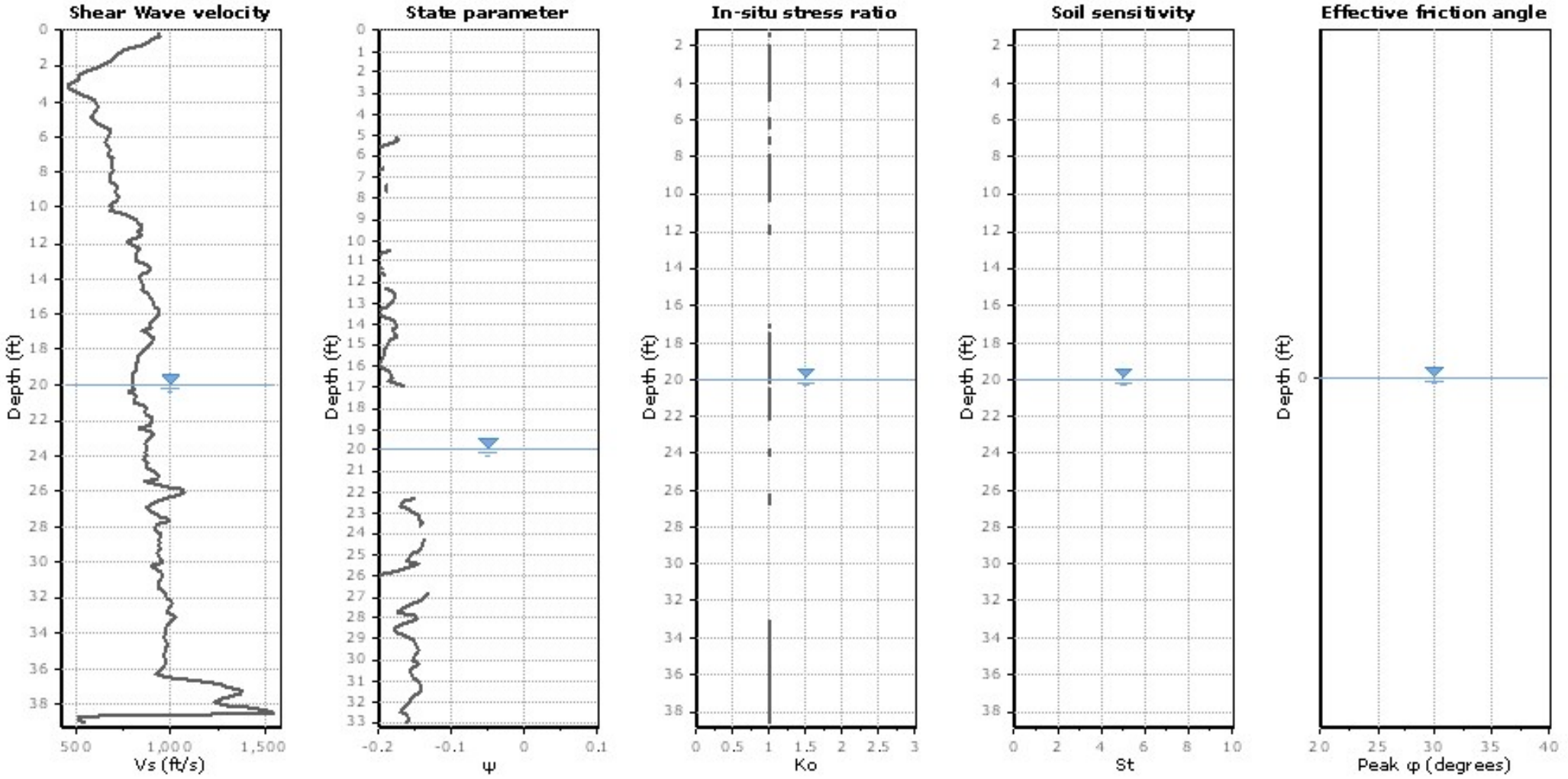

Calculation parameters

Soil Sensitivity factor, N_S: 350.00
User defined estimation data

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CPT: CPT-02

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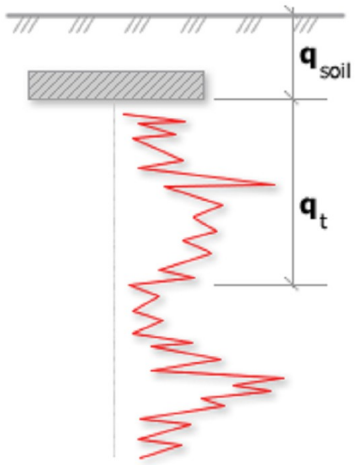
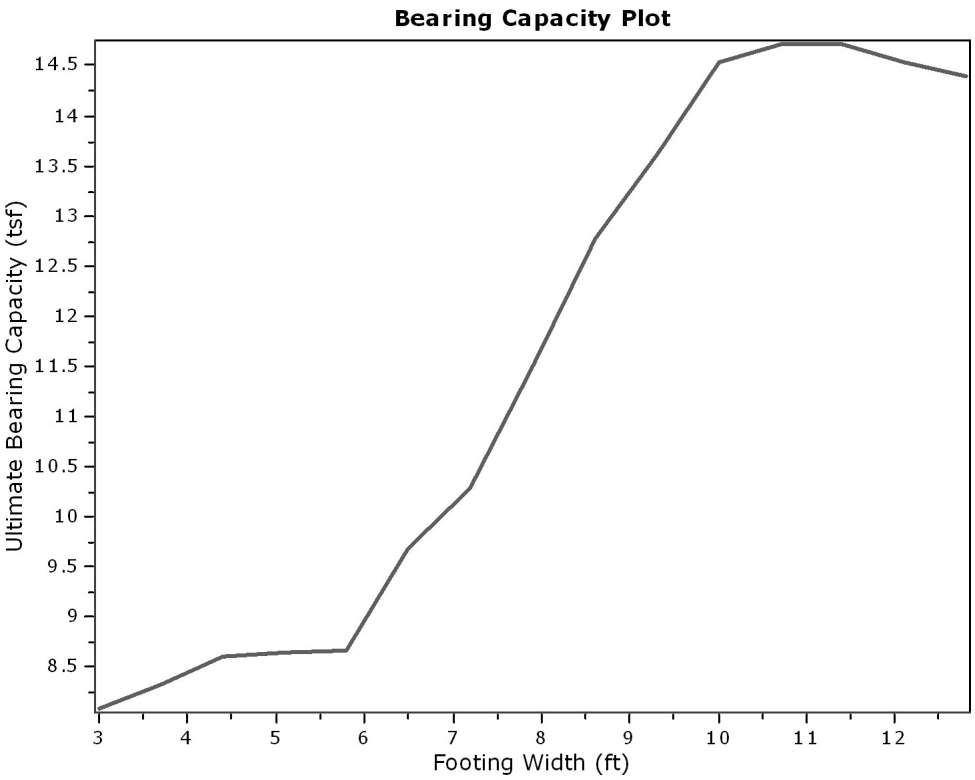


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	39.97	0.20	0.10	8.09
2	3.70	1.60	7.15	41.18	0.20	0.10	8.33
3	4.40	1.60	8.20	42.55	0.20	0.10	8.61
4	5.10	1.60	9.25	42.78	0.20	0.10	8.65
5	5.80	1.60	10.30	42.85	0.20	0.10	8.67
6	6.50	1.60	11.35	47.90	0.20	0.10	9.68
7	7.20	1.60	12.40	50.96	0.20	0.10	10.29
8	7.90	1.60	13.45	57.15	0.20	0.10	11.53
9	8.60	1.60	14.50	63.41	0.20	0.10	12.78
10	9.30	1.60	15.55	67.54	0.20	0.10	13.60
11	10.00	1.60	16.60	72.18	0.20	0.10	14.53
12	10.70	1.60	17.65	73.06	0.20	0.10	14.71
13	11.40	1.60	18.70	73.04	0.20	0.10	14.70
14	12.10	1.60	19.75	72.18	0.20	0.10	14.53
15	12.80	1.60	20.80	71.47	0.20	0.10	14.39

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

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www.middleearthgeo.com

CPT: CPT-03

Total depth: 34.94 ft, Date: 4/13/2023
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Cone Type: 15cm
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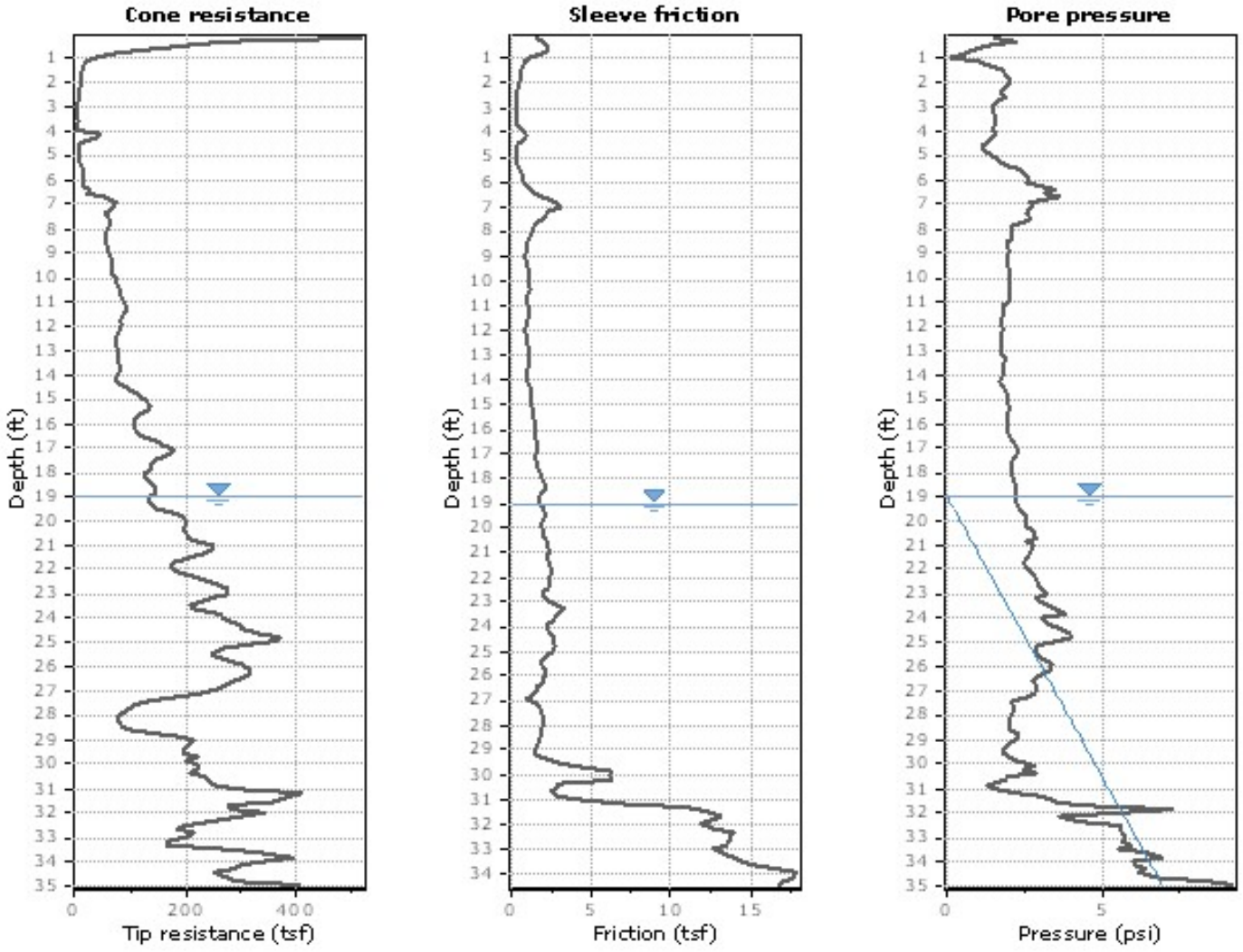
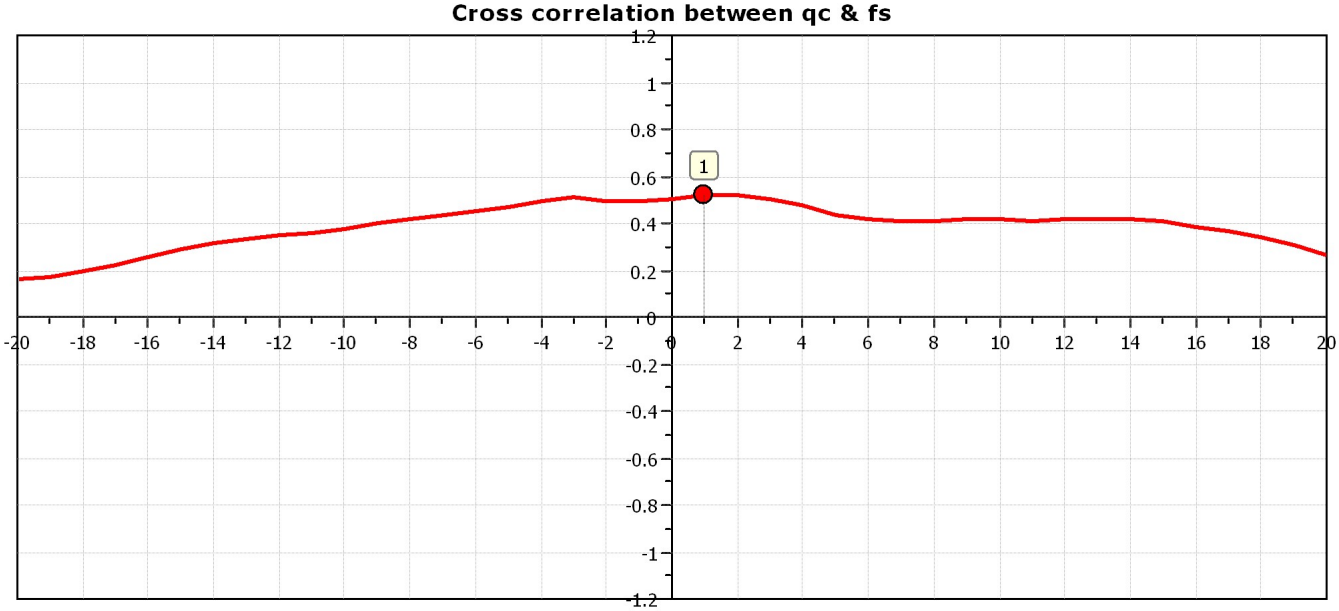
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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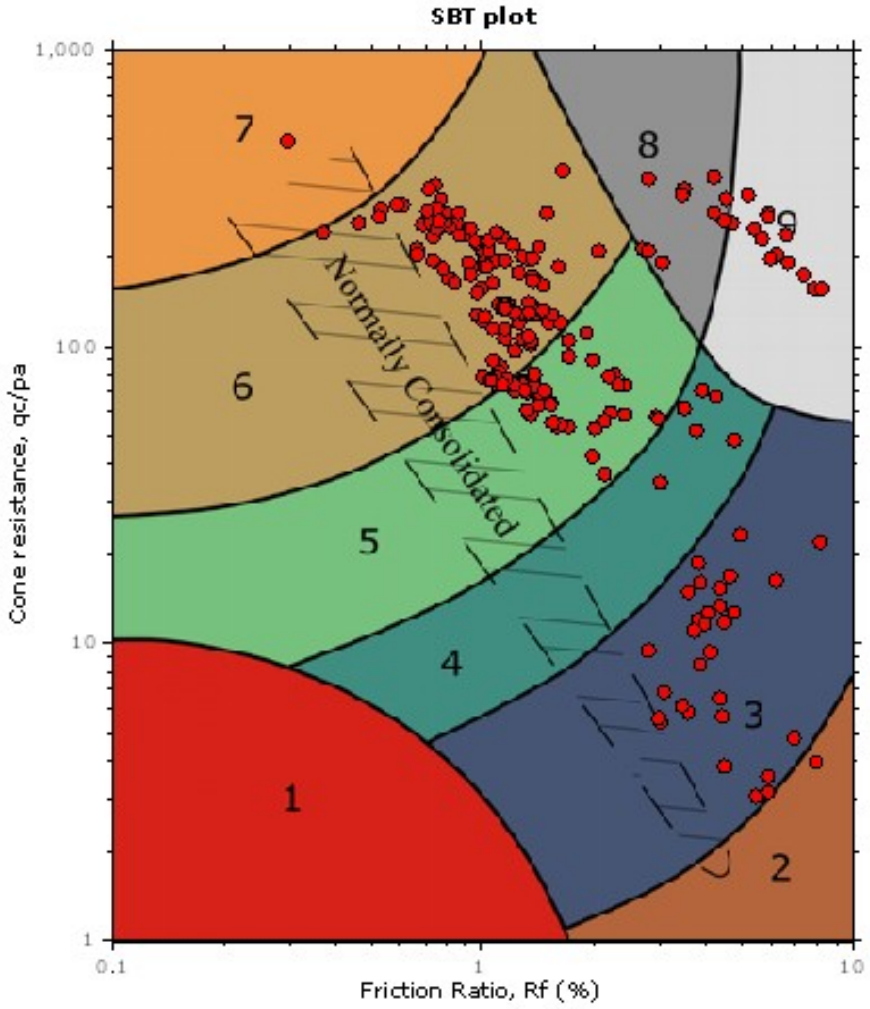
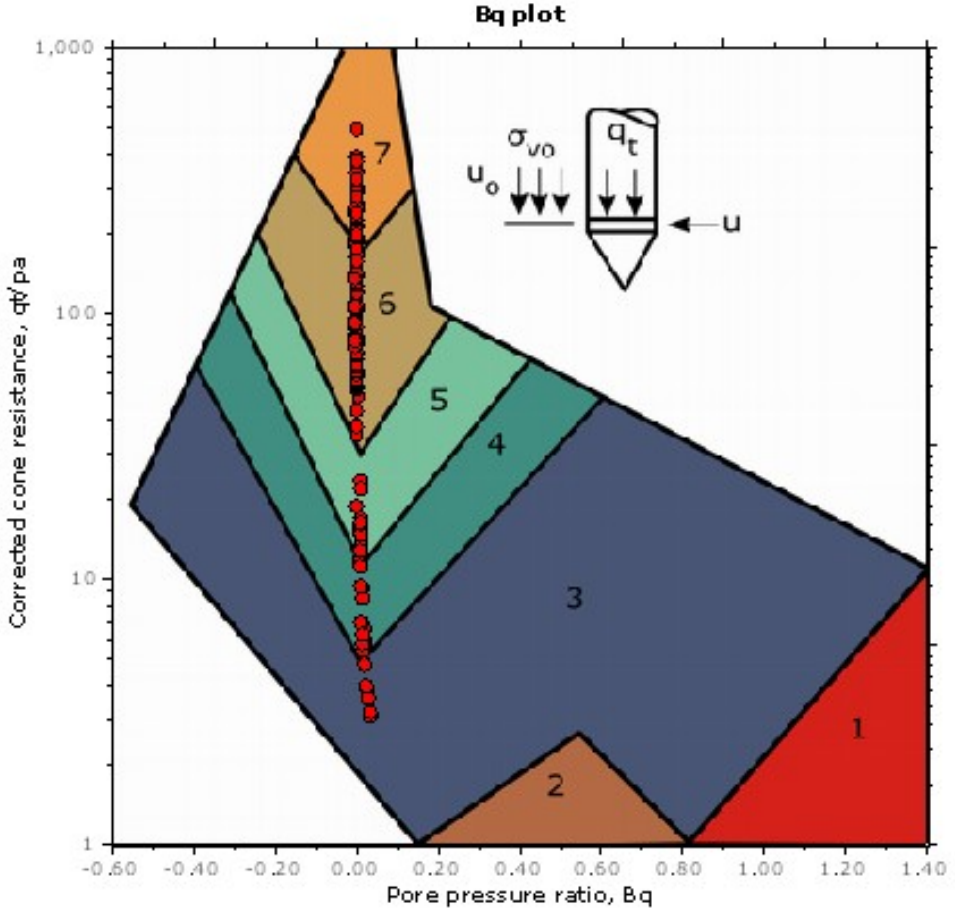
SBT - Bq plots





SBT legend

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

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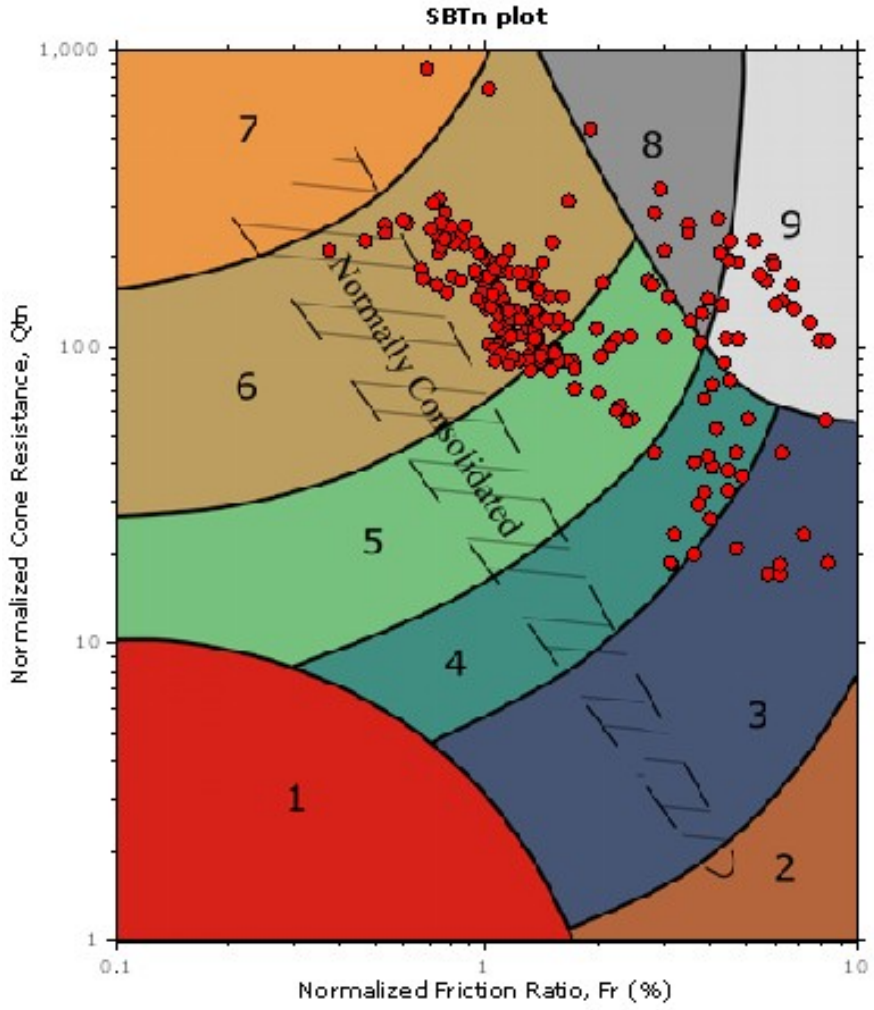
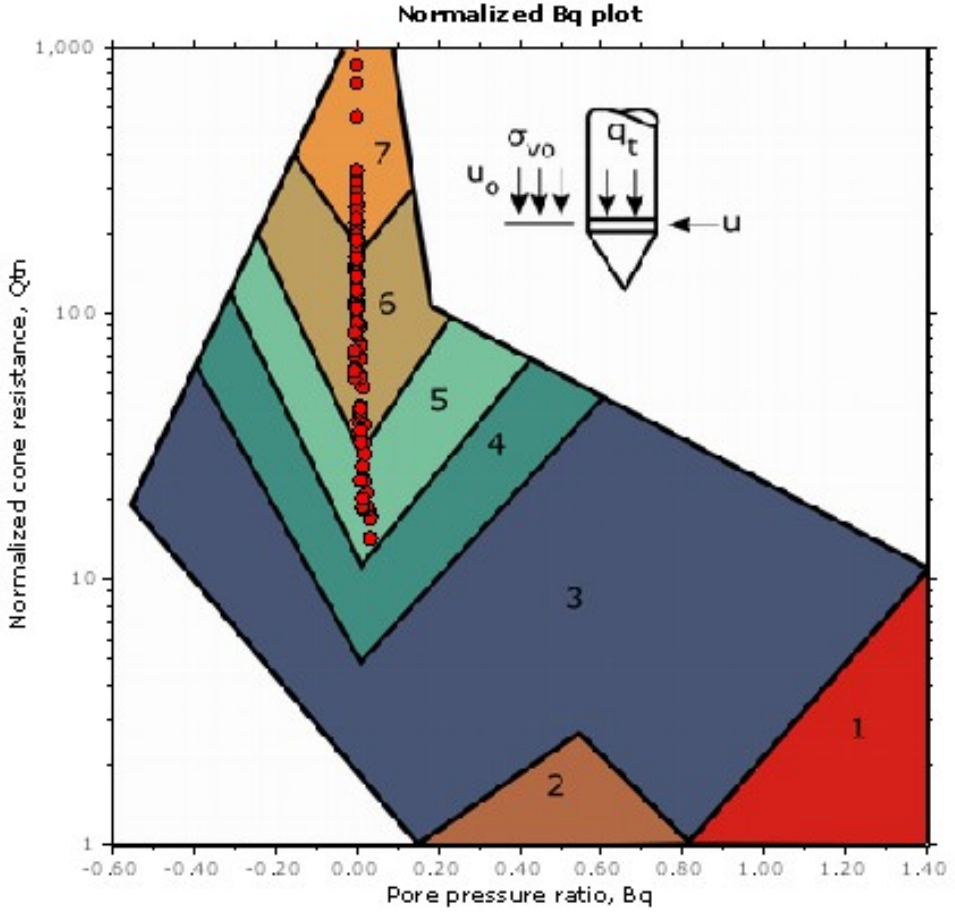
SBT - Bq plots (normalized)





SBTn legend

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

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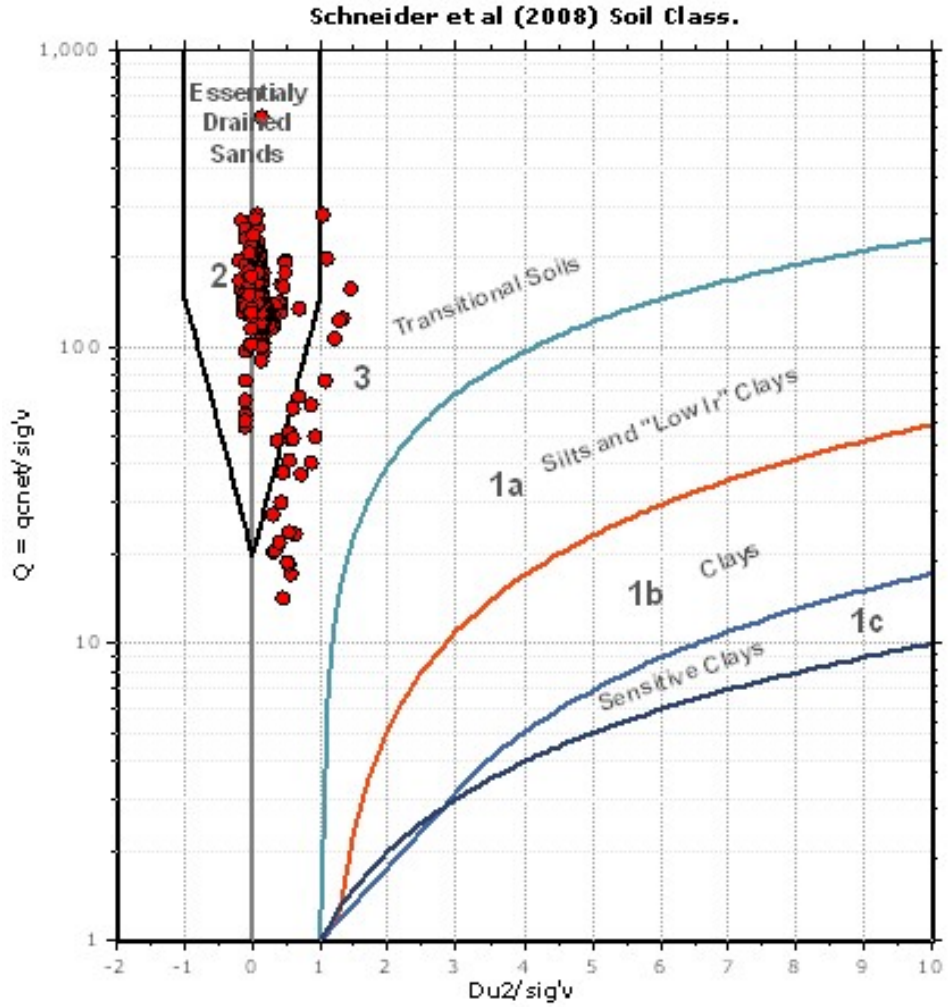
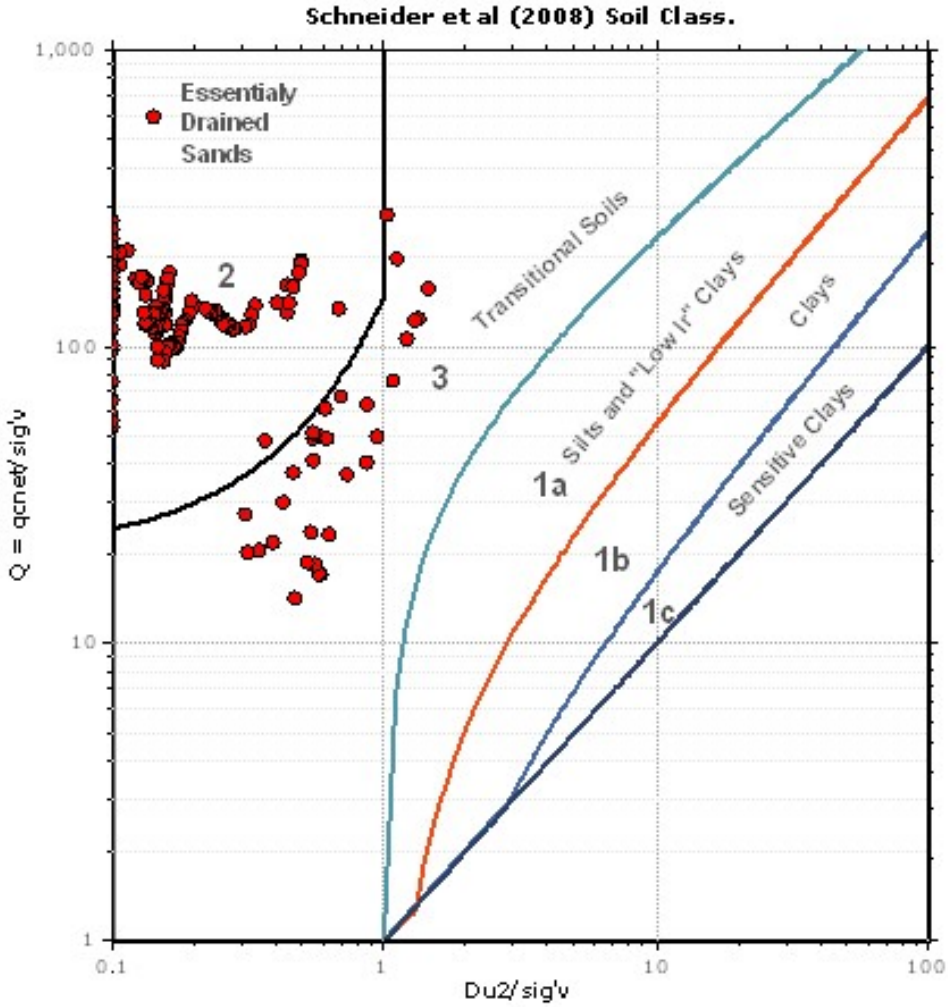
Bq plots (Schneider)





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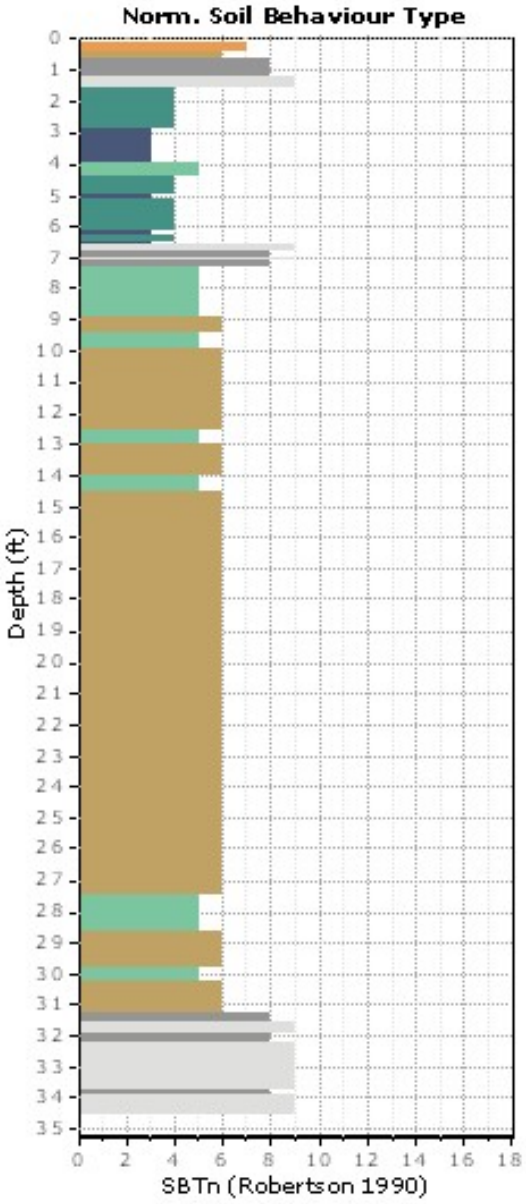

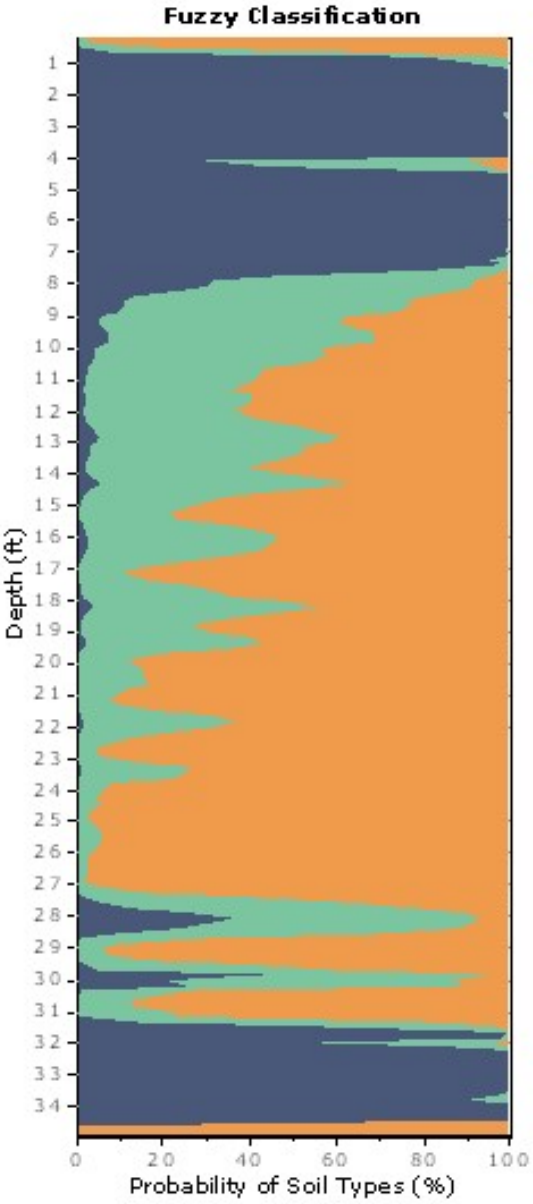

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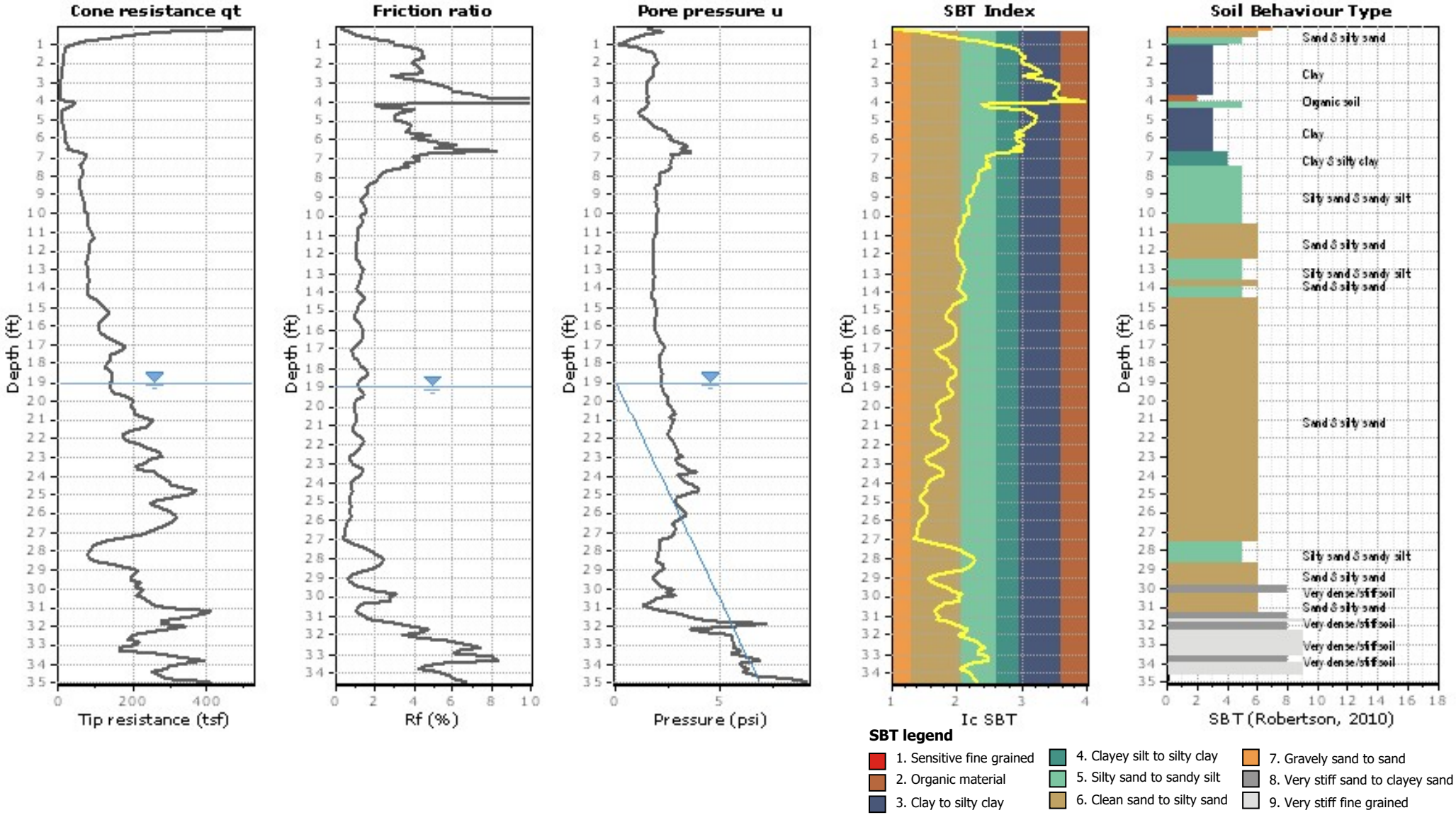

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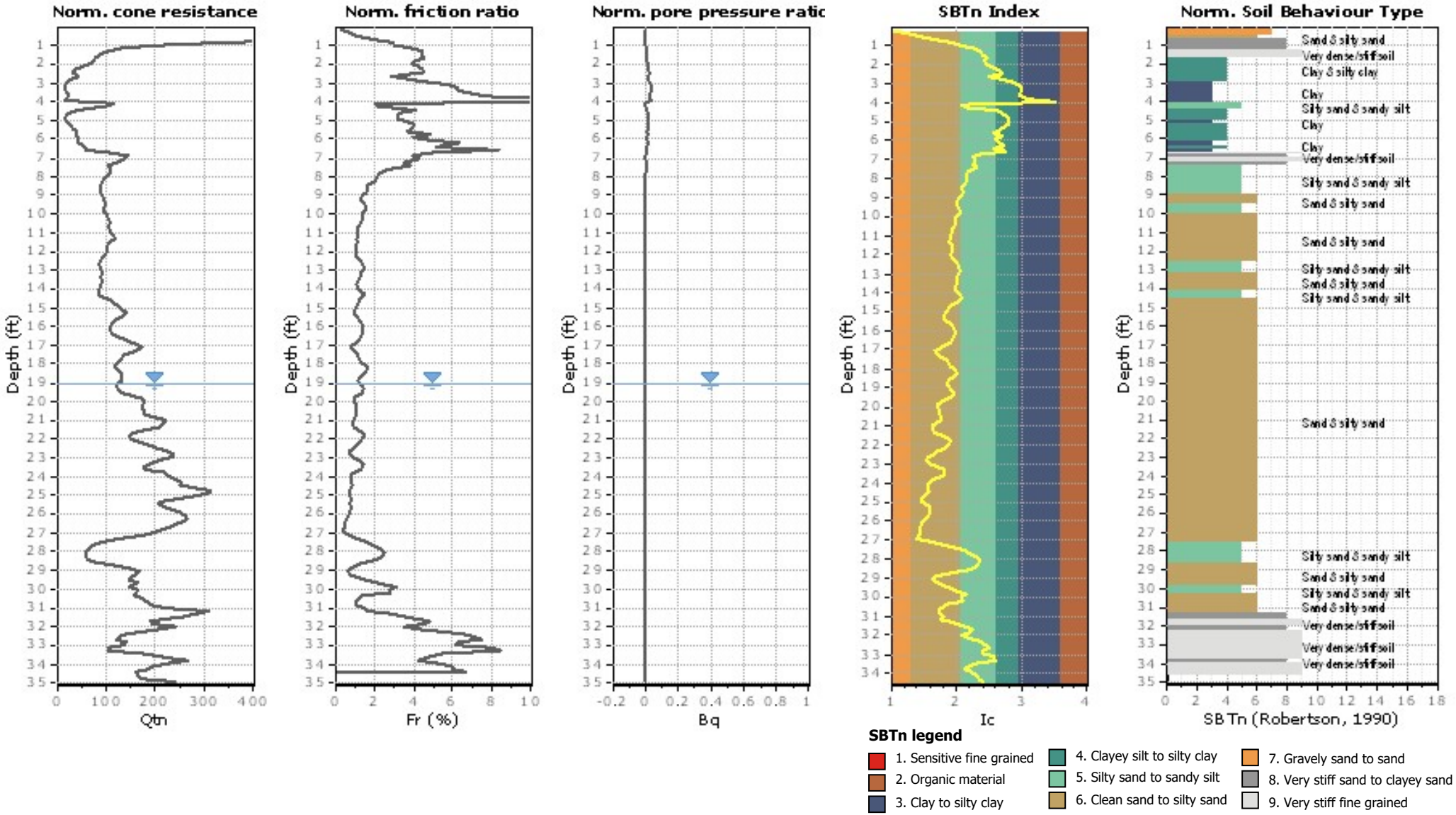

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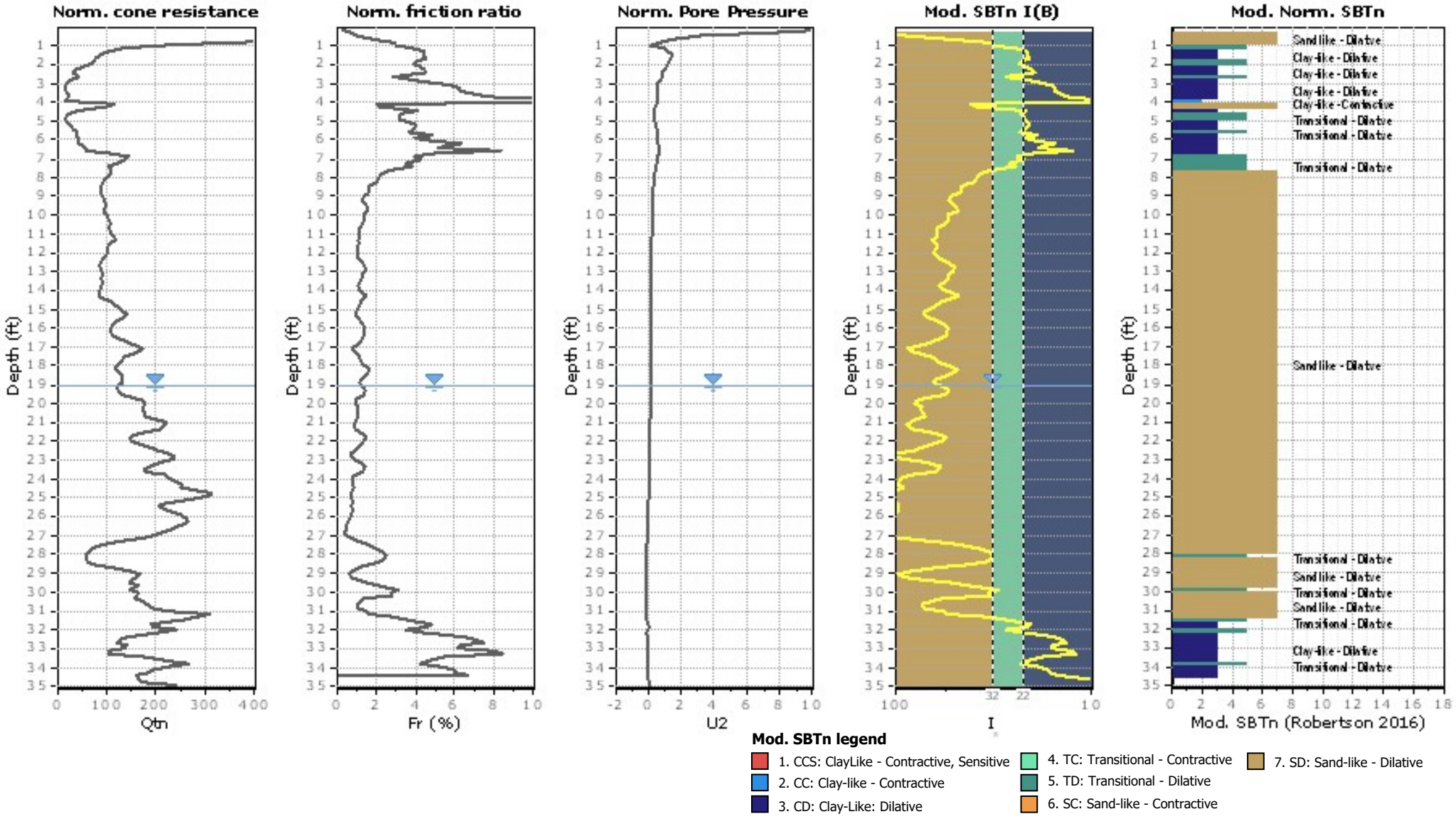

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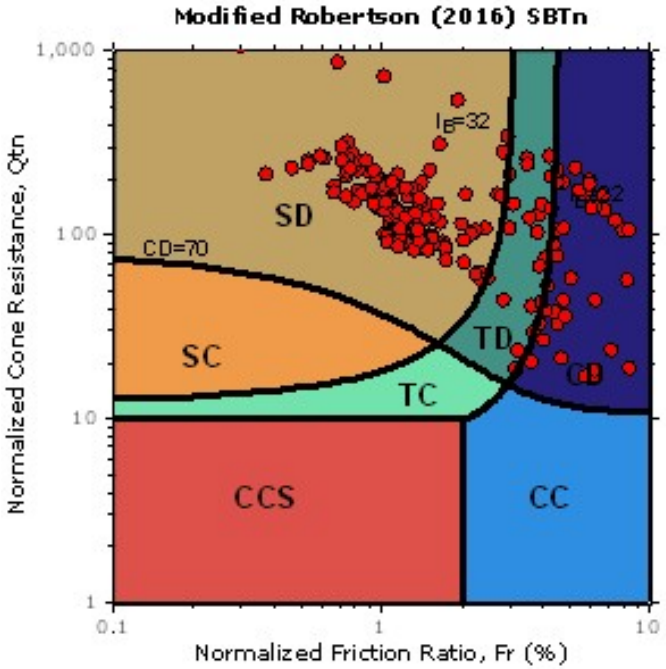
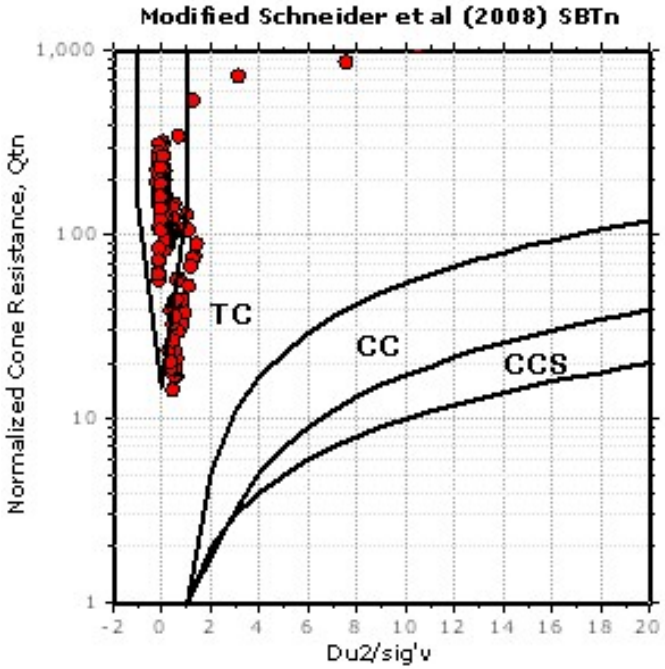
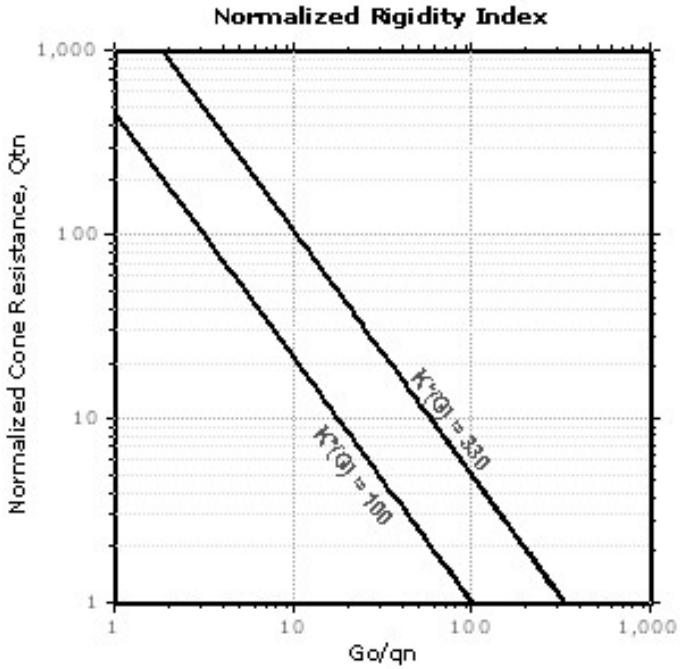
Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
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SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

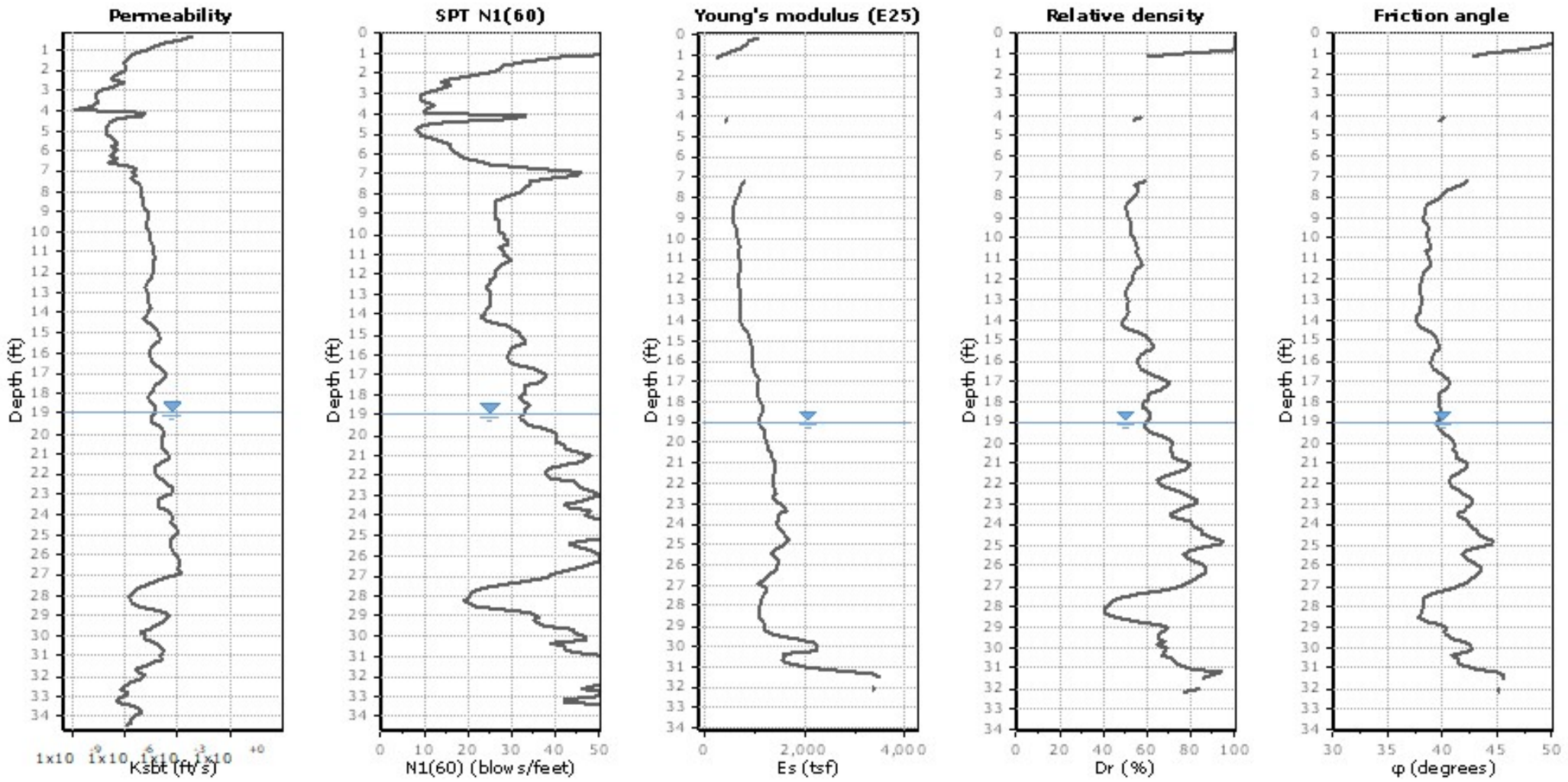
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-03

Total depth: 34.94 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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CPT: CPT-03

Total depth: 34.94 ft, Date: 4/13/2023
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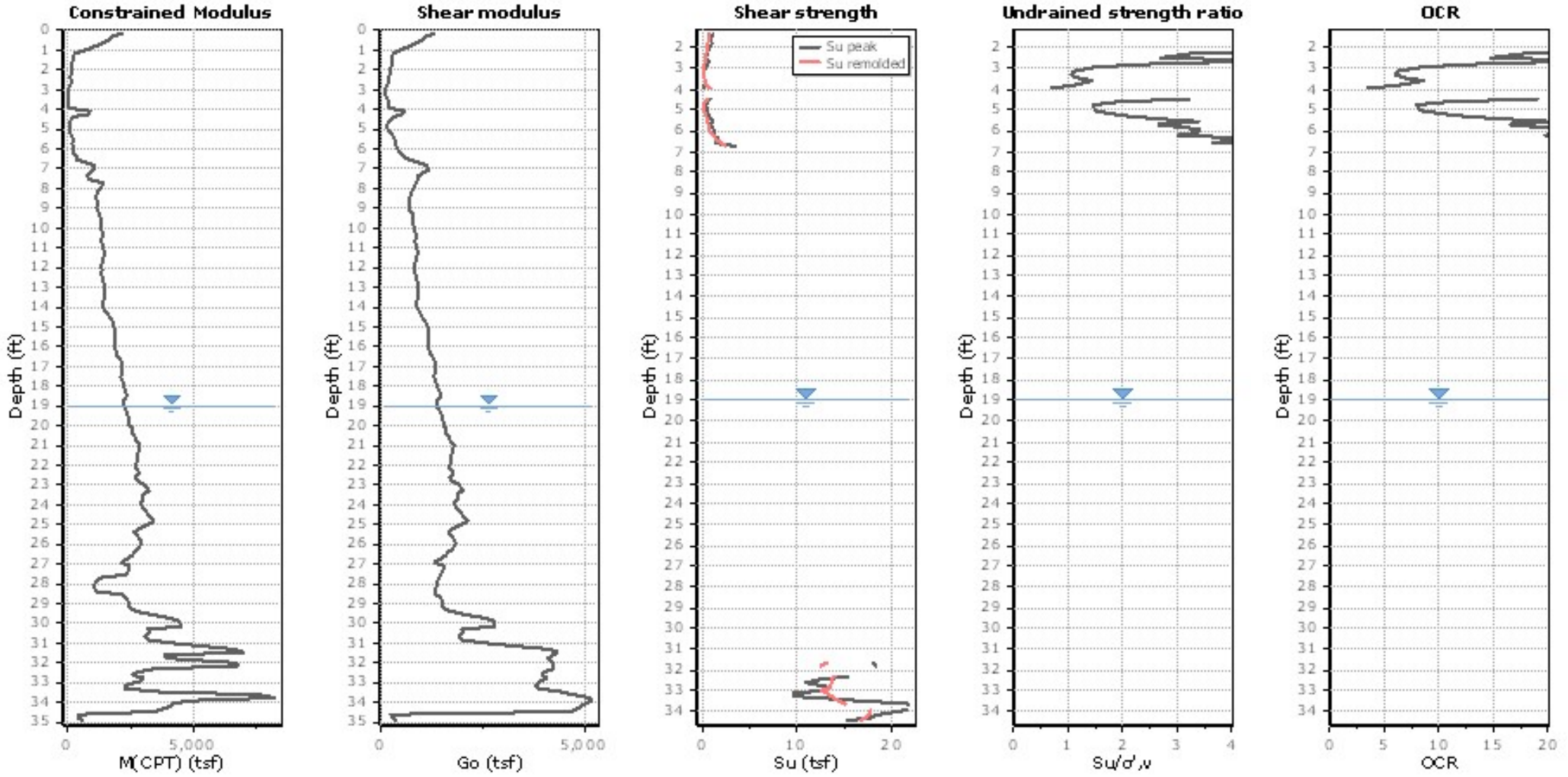
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

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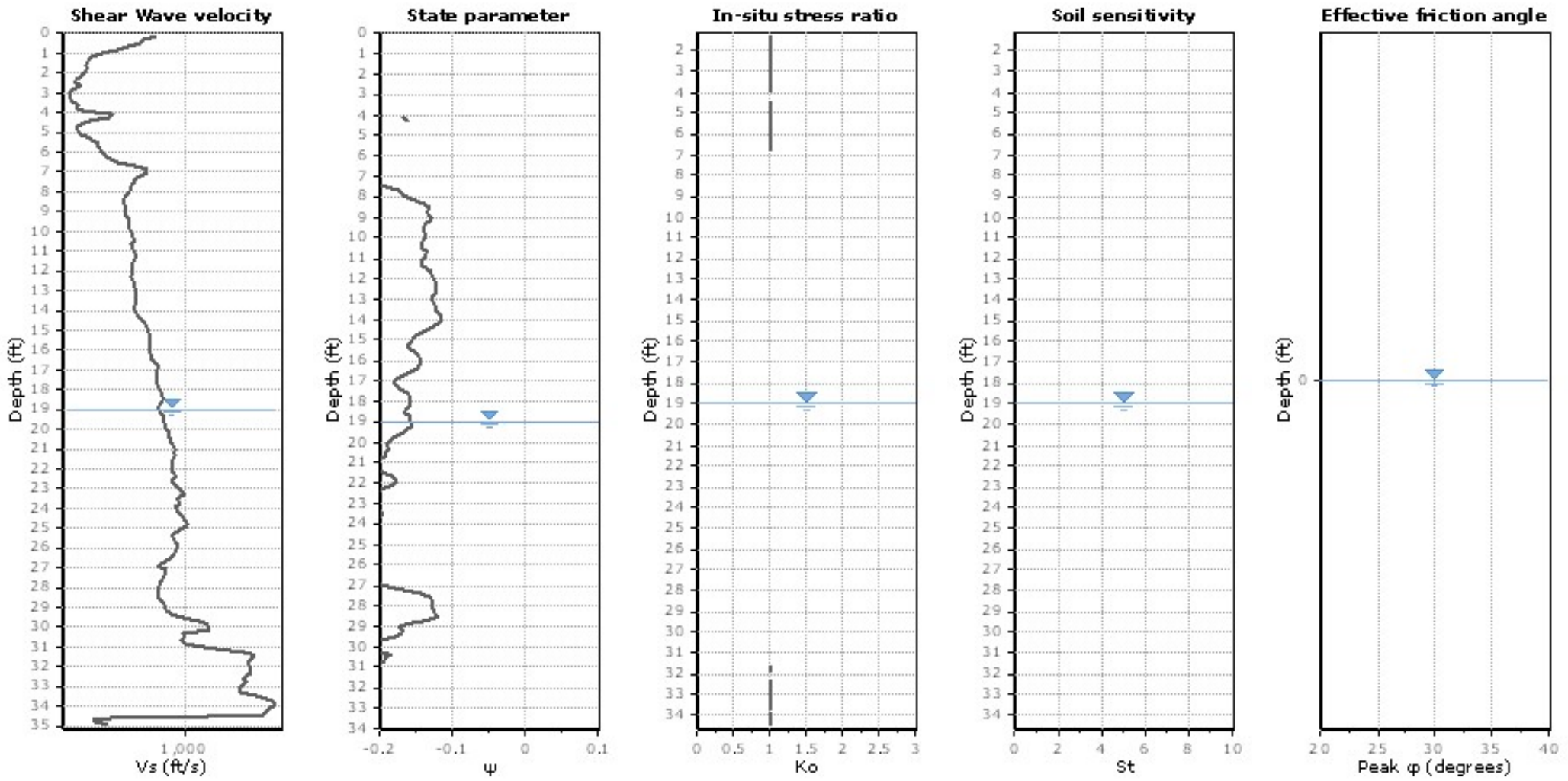

Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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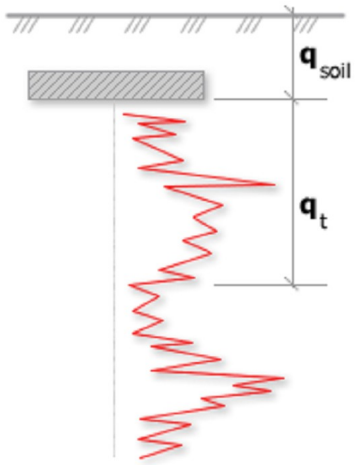
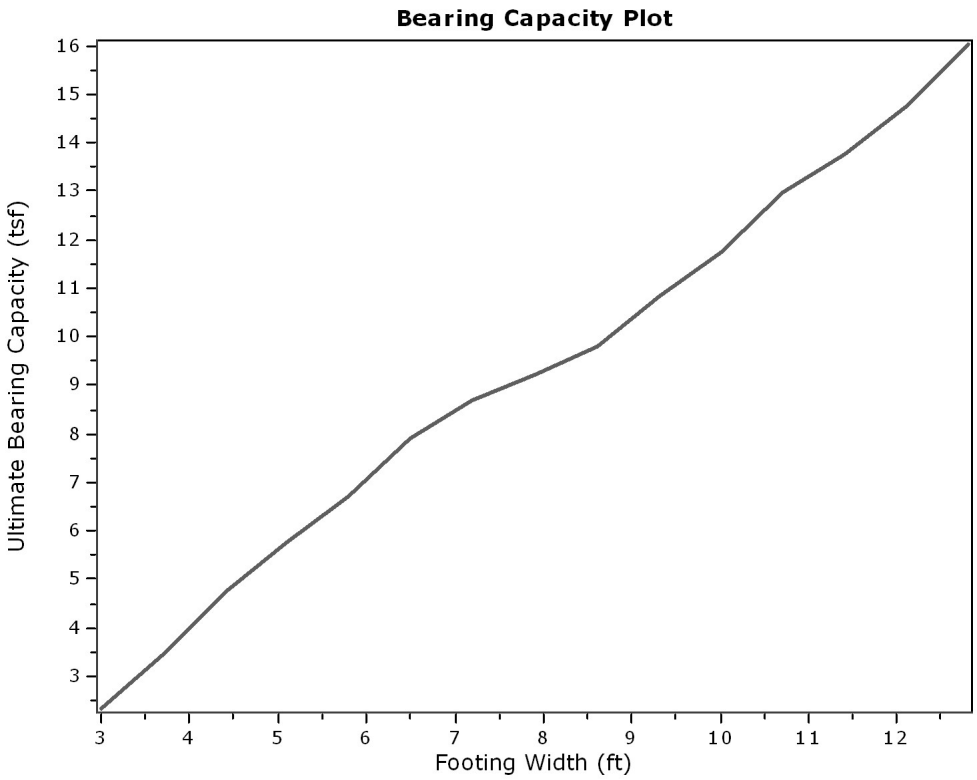


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	11.19	0.20	0.10	2.33
2	3.70	1.60	7.15	16.75	0.20	0.10	3.45
3	4.40	1.60	8.20	23.21	0.20	0.10	4.74
4	5.10	1.60	9.25	28.40	0.20	0.10	5.78
5	5.80	1.60	10.30	33.01	0.20	0.10	6.70
6	6.50	1.60	11.35	38.97	0.20	0.10	7.89
7	7.20	1.60	12.40	42.85	0.20	0.10	8.67
8	7.90	1.60	13.45	45.59	0.20	0.10	9.21
9	8.60	1.60	14.50	48.52	0.20	0.10	9.80
10	9.30	1.60	15.55	53.64	0.20	0.10	10.82
11	10.00	1.60	16.60	58.16	0.20	0.10	11.73
12	10.70	1.60	17.65	64.37	0.20	0.10	12.97
13	11.40	1.60	18.70	68.37	0.20	0.10	13.77
14	12.10	1.60	19.75	73.24	0.20	0.10	14.74
15	12.80	1.60	20.80	79.64	0.20	0.10	16.02

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

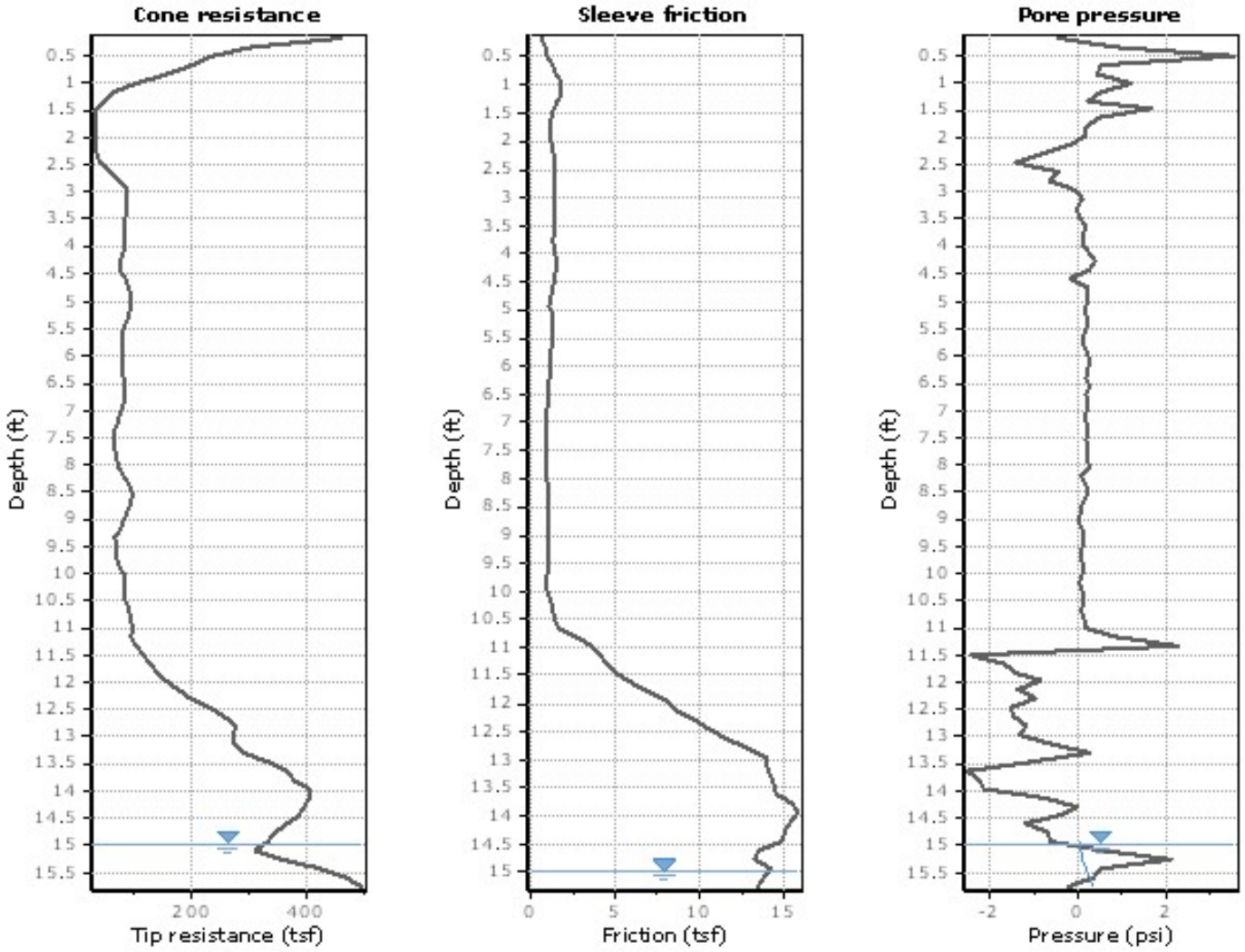
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

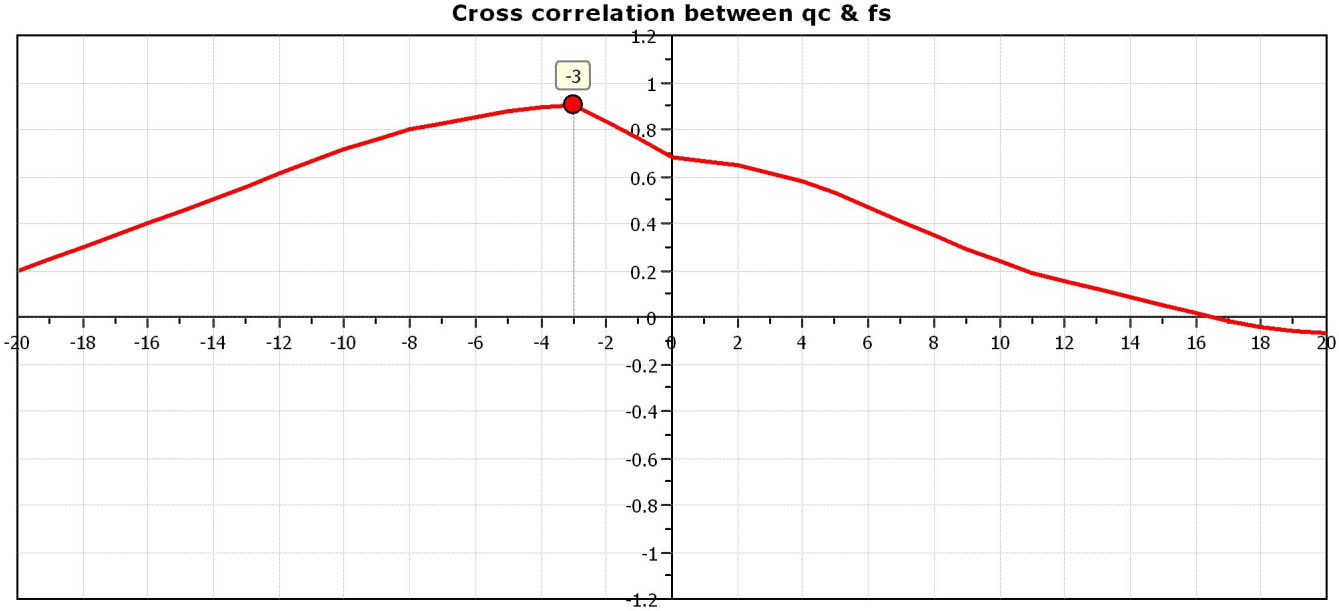
CPT: CPT-04

Total depth: 15.75 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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Location: **Arcata**

CPT: CPT-04

Total depth: 15.75 ft, Date: 4/13/2023
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Cone Type: 15cm
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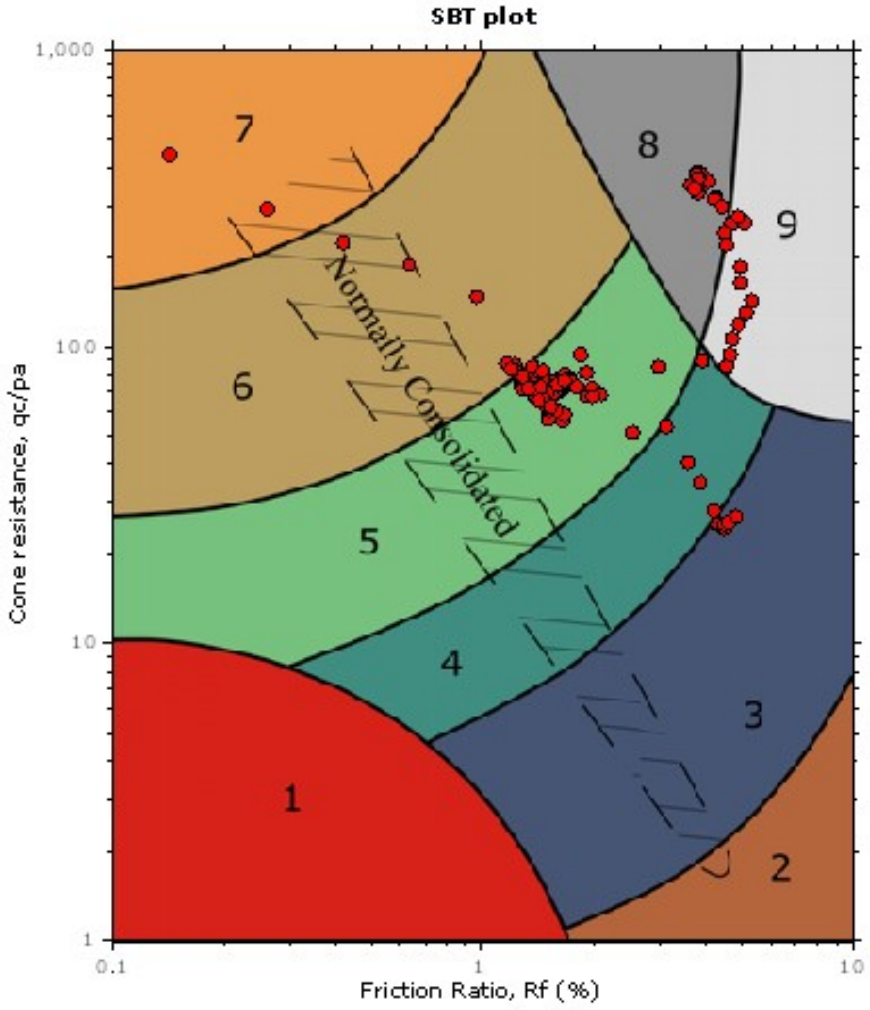
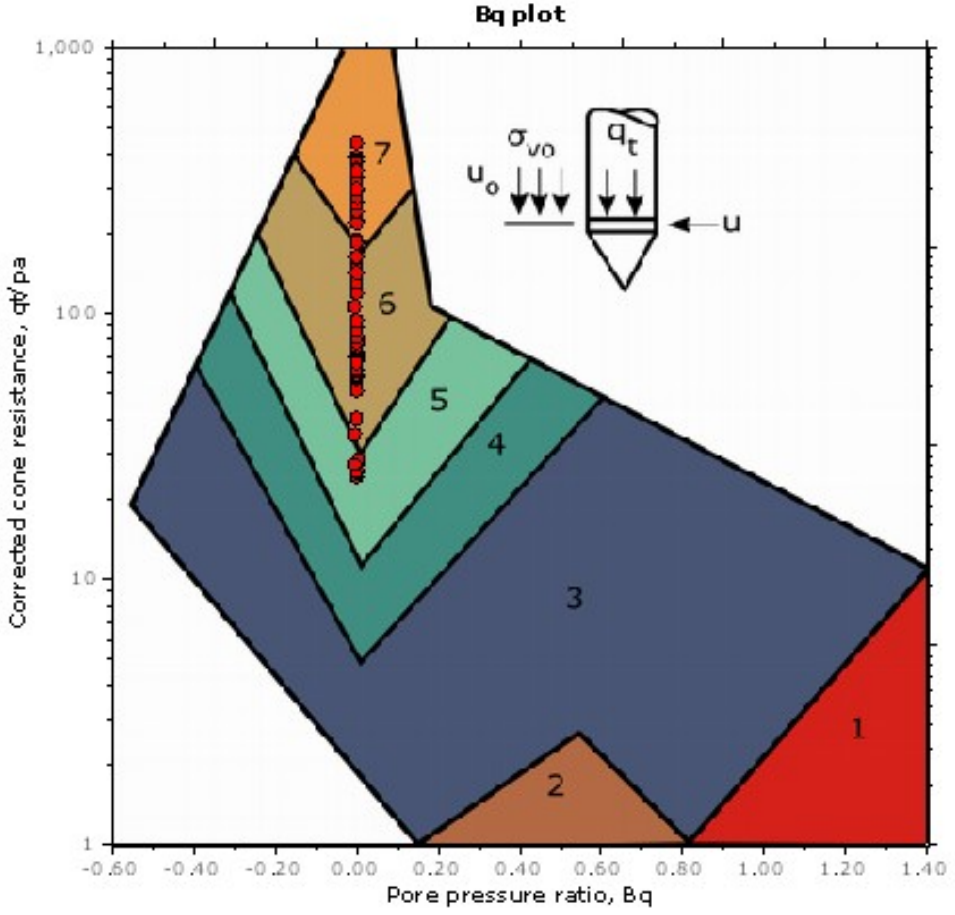
SBT - Bq plots





SBT legend

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

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Cone Type: 15cm
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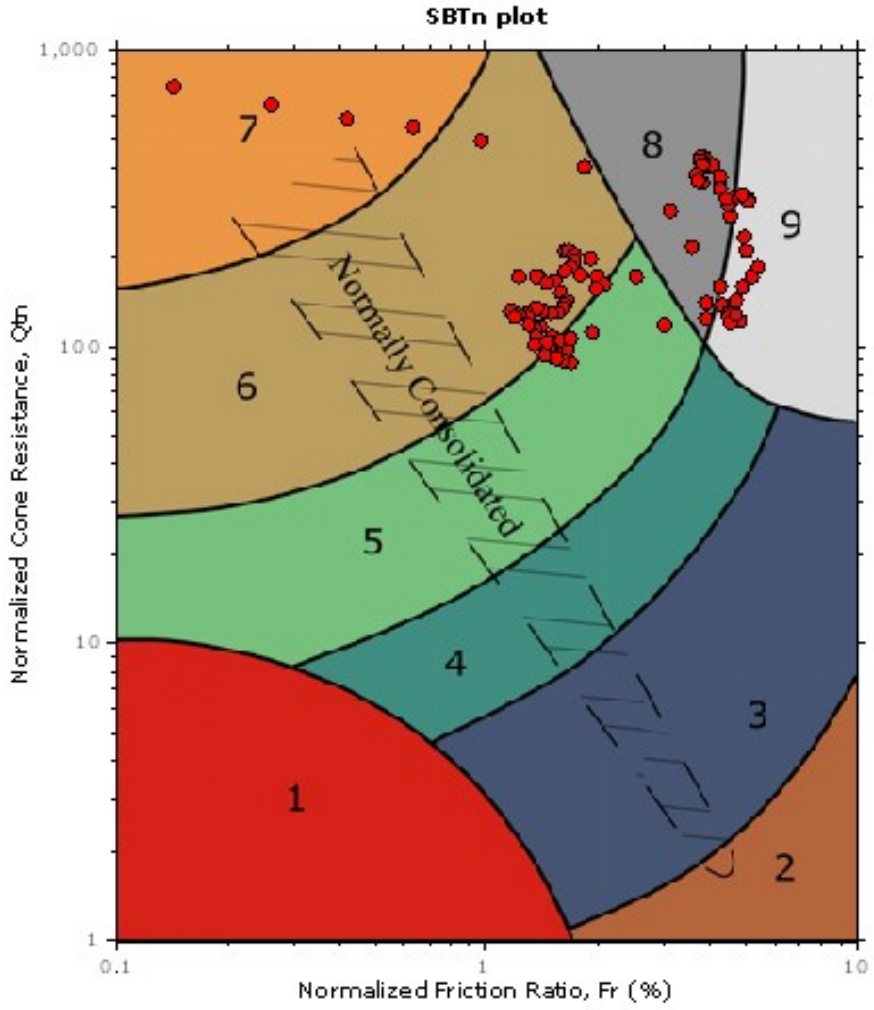
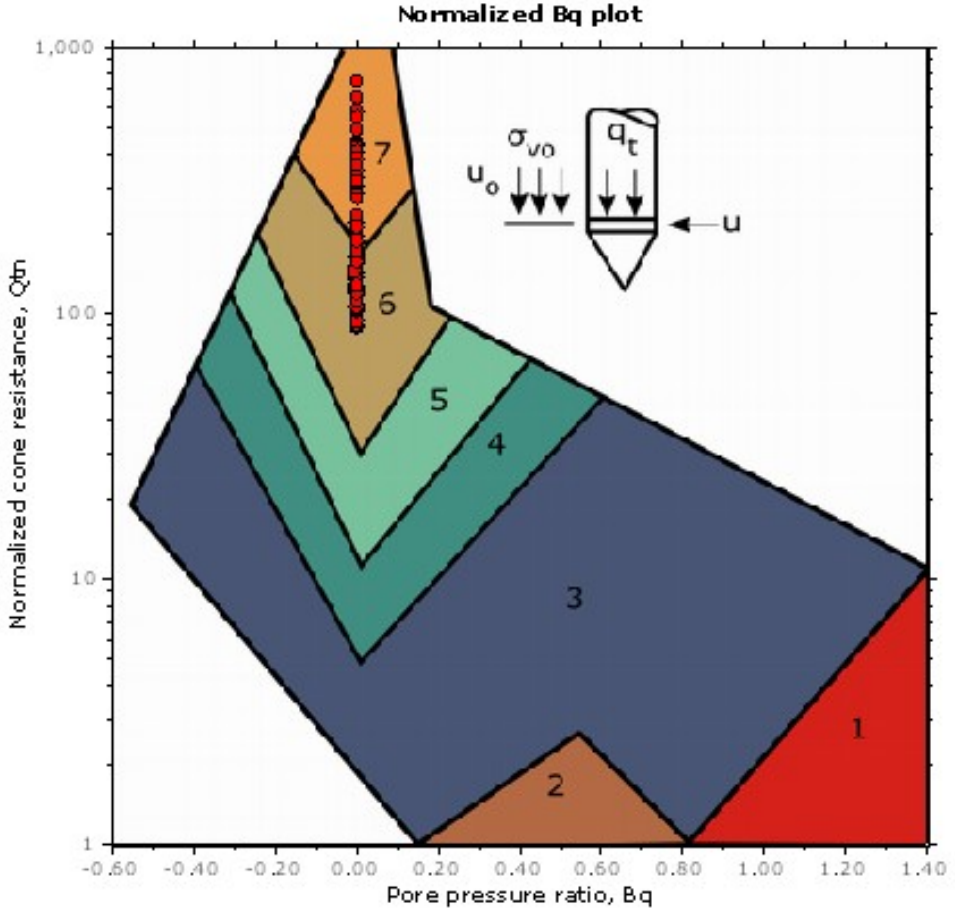
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

SBT - Bq plots (normalized)





SBTn legend

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

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CPT: CPT-04

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Cone Type: 15cm
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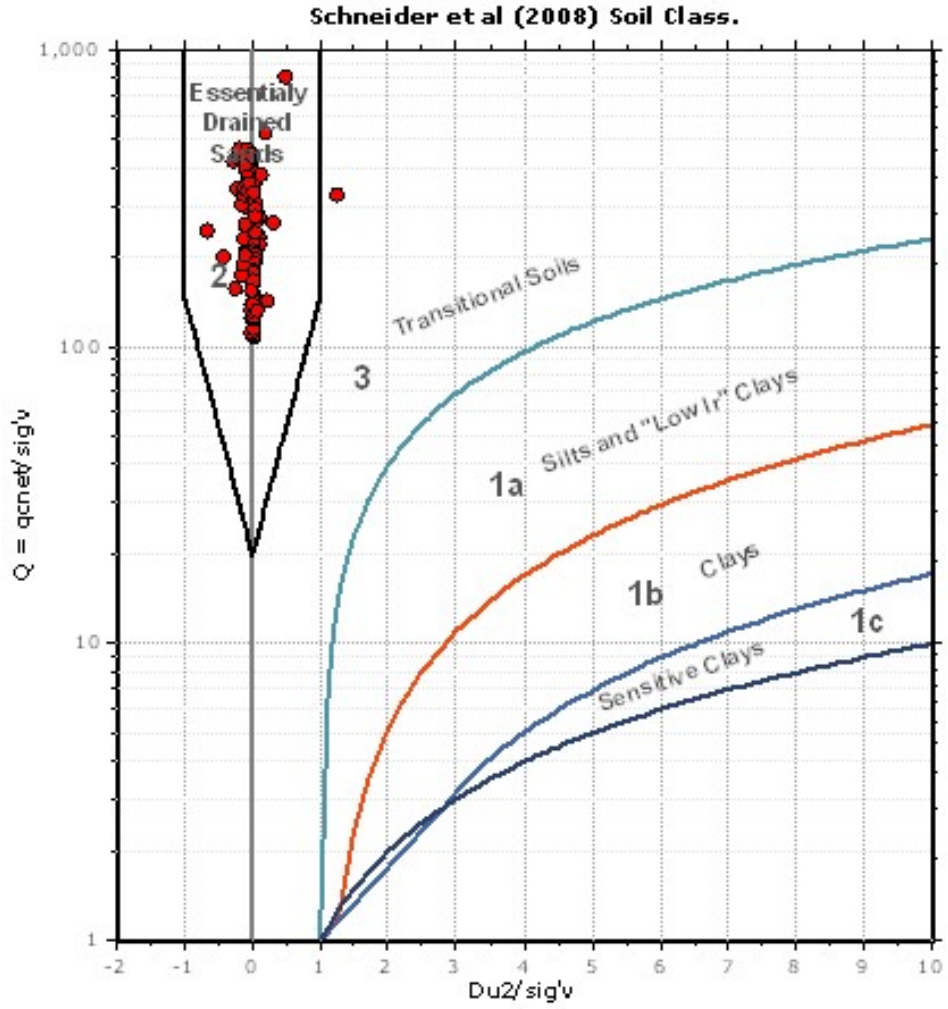
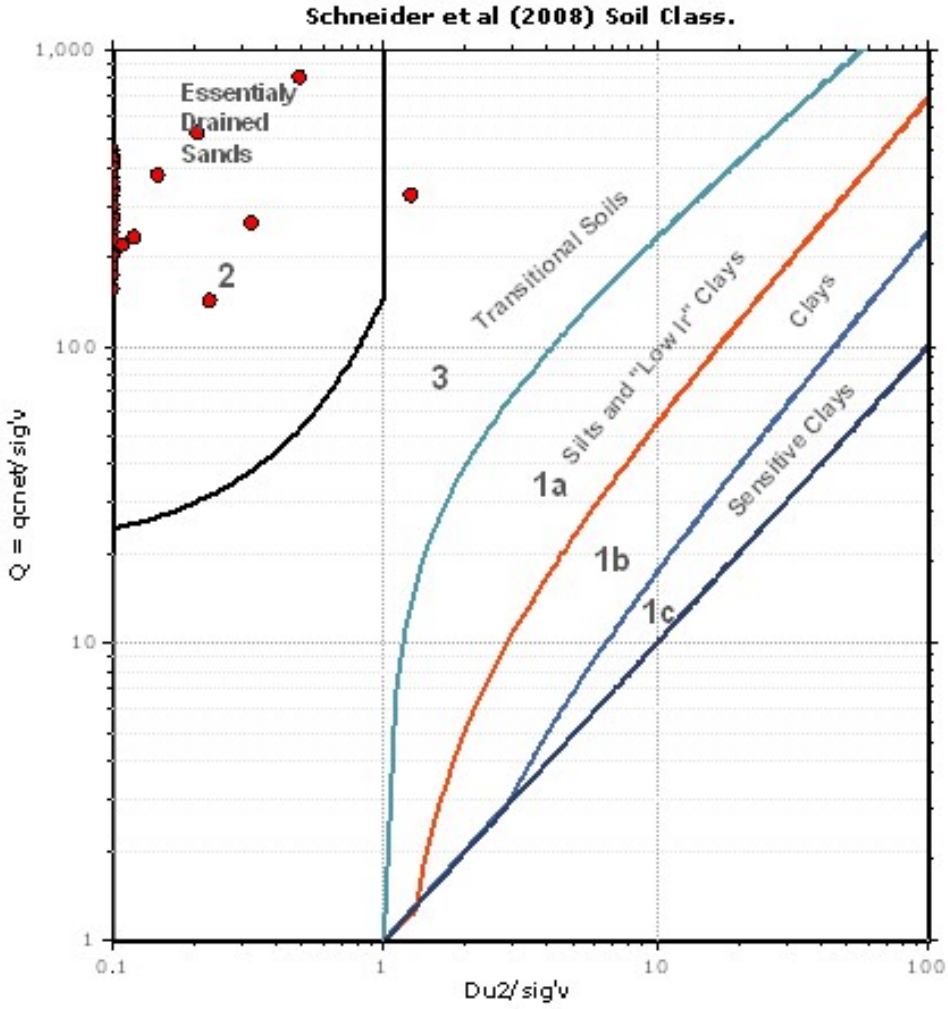
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

Bq plots (Schneider)





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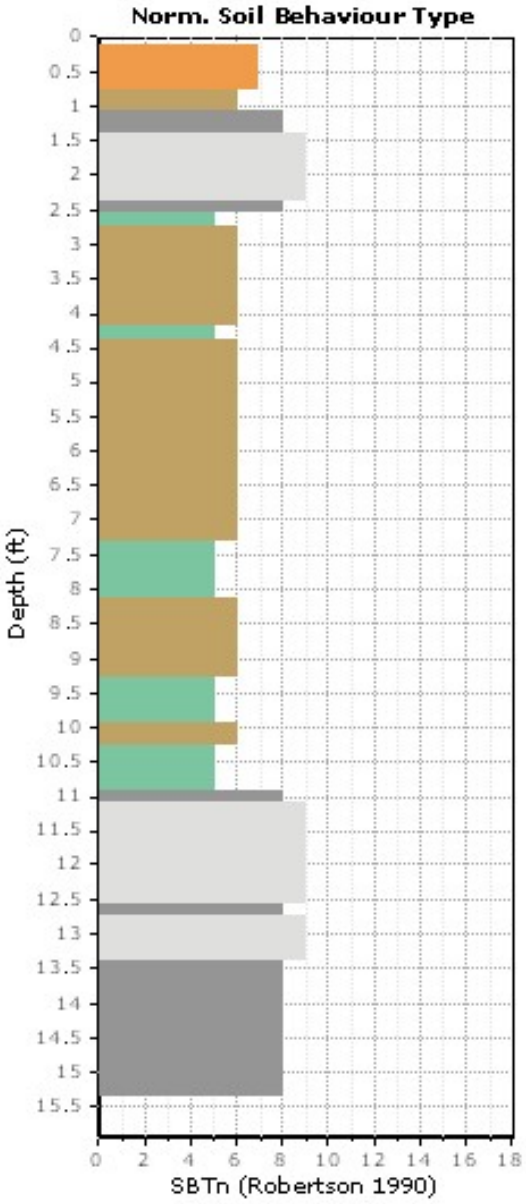

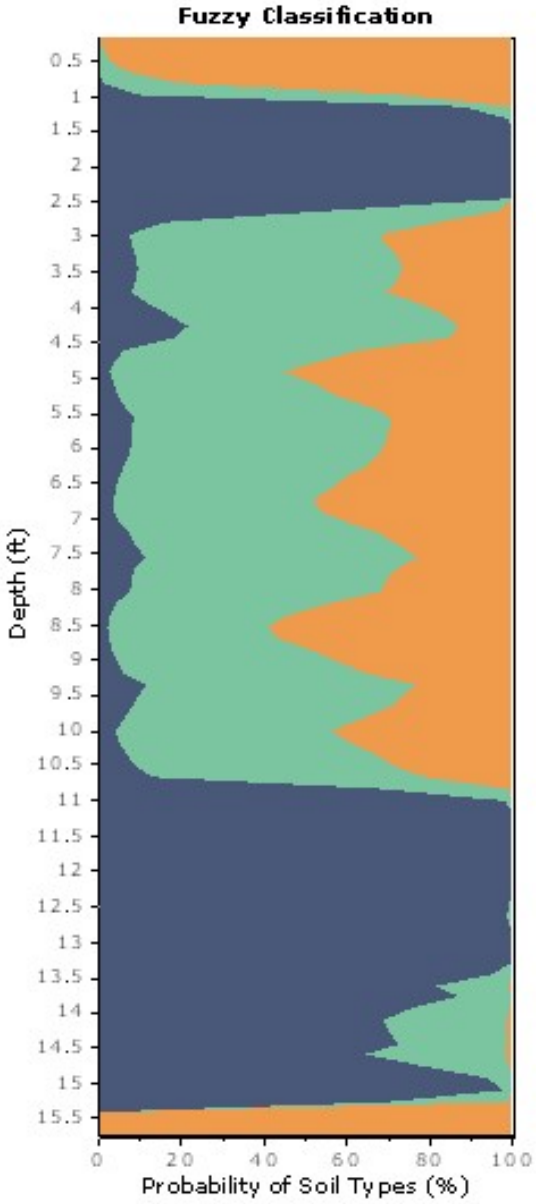

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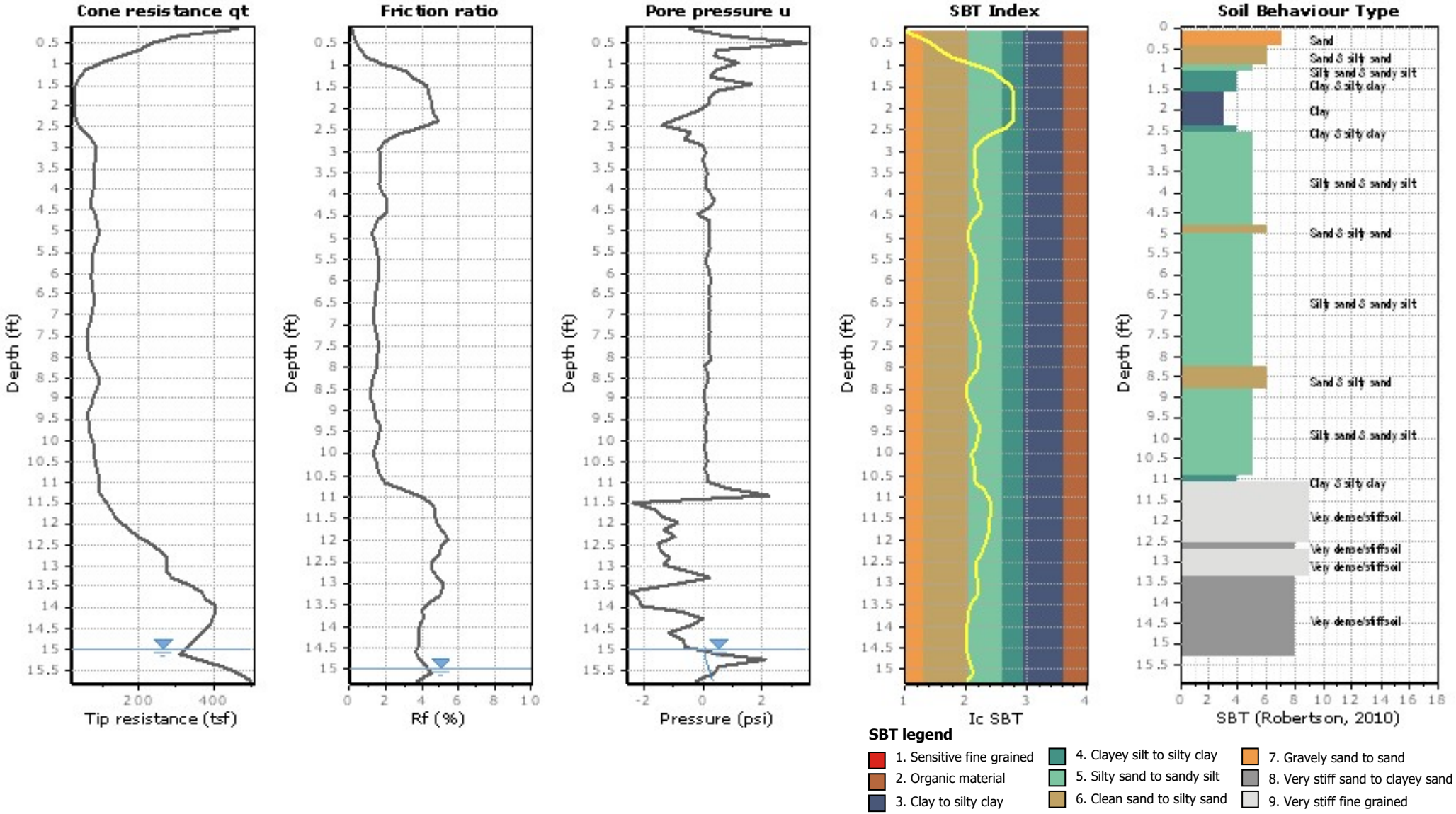

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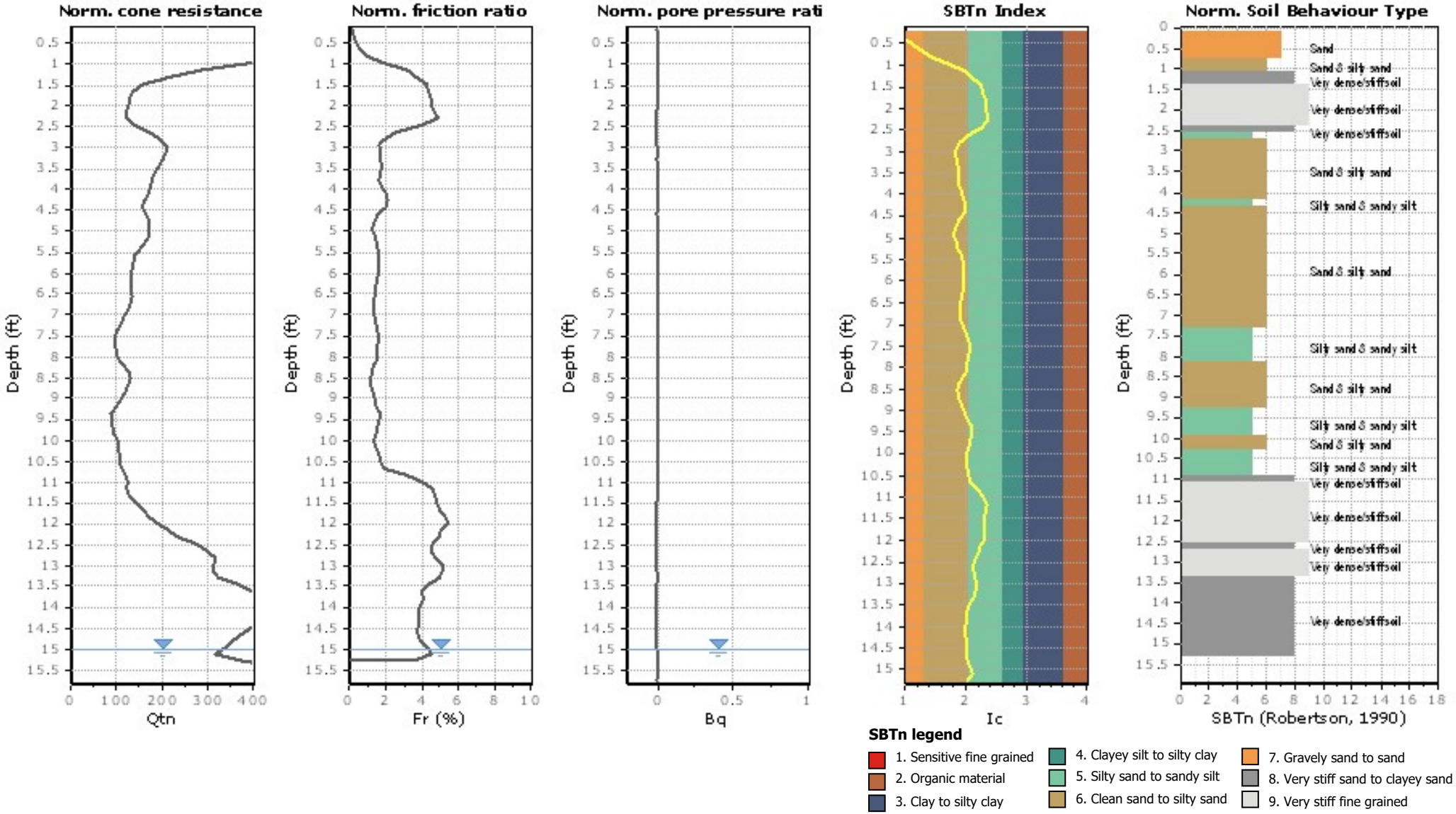

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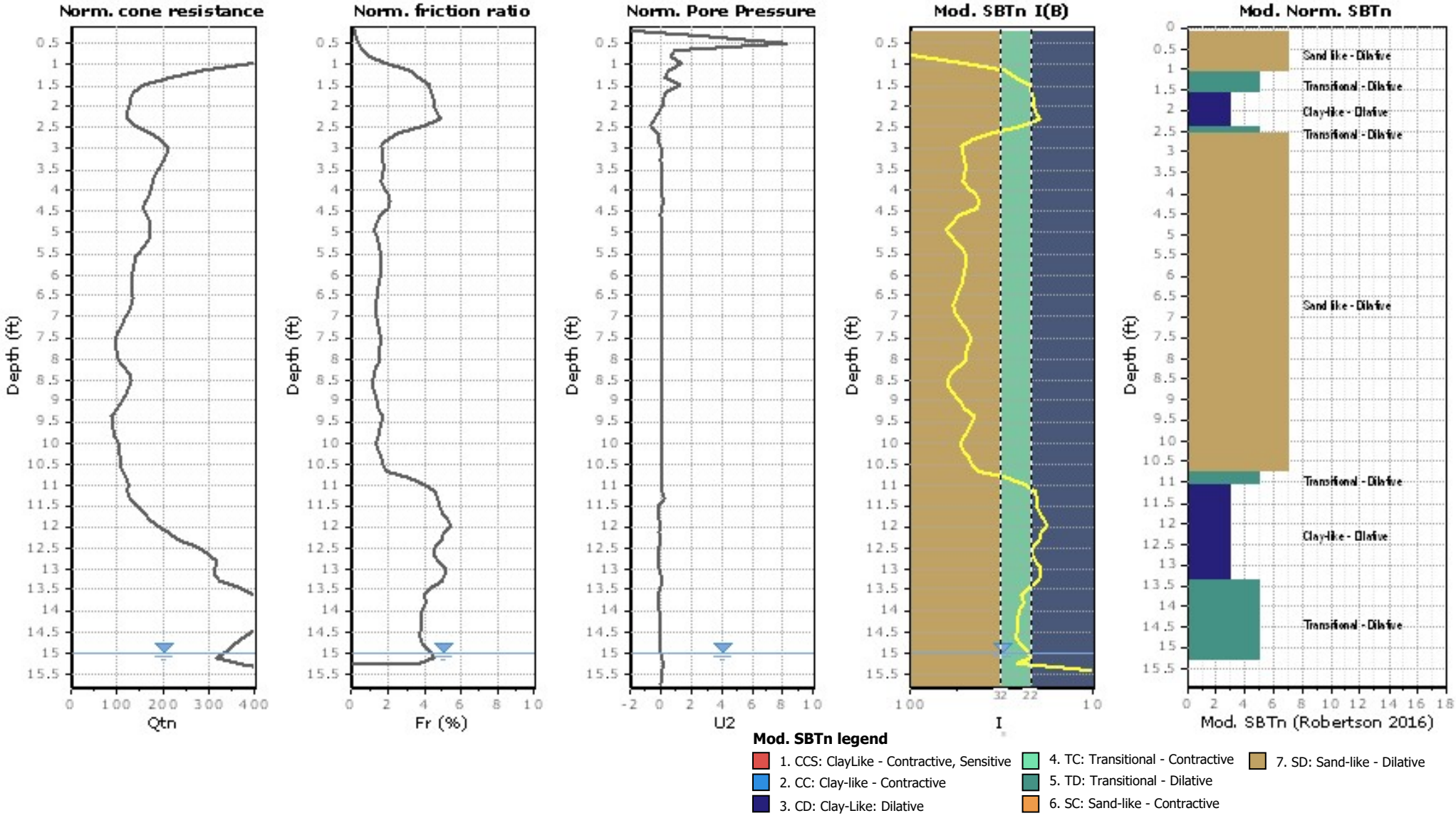

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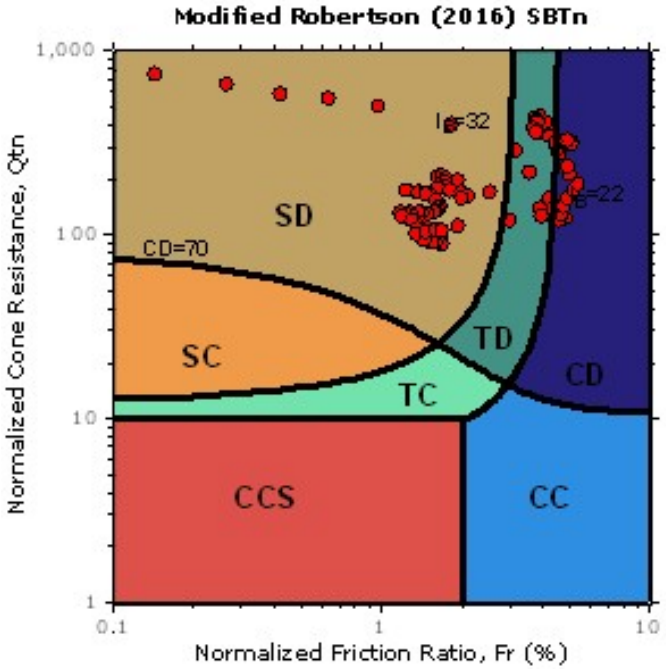
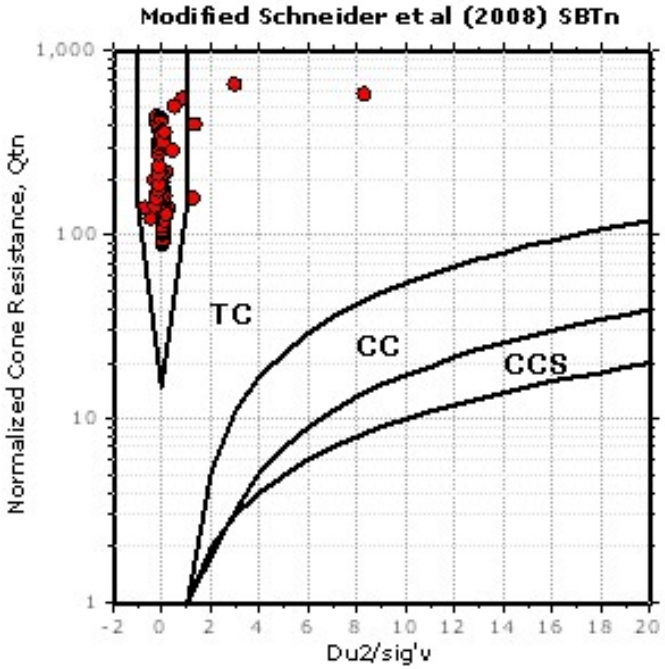
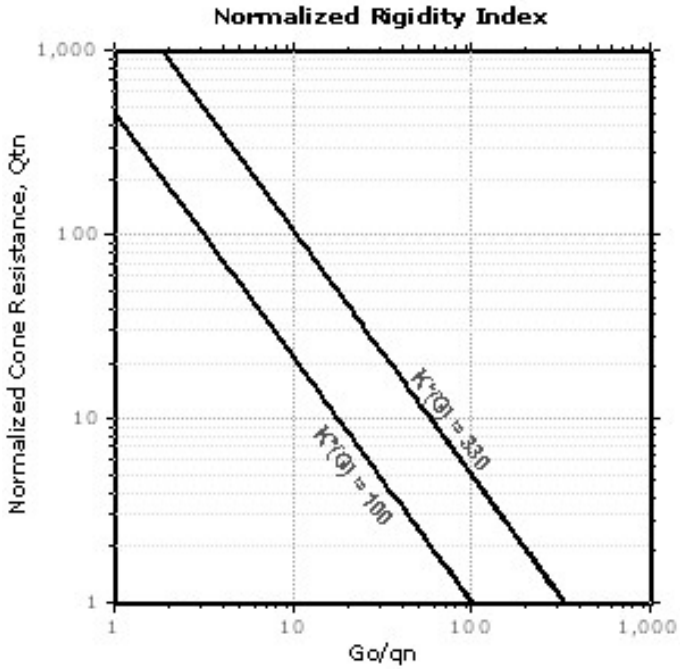
Updated SBTn plots







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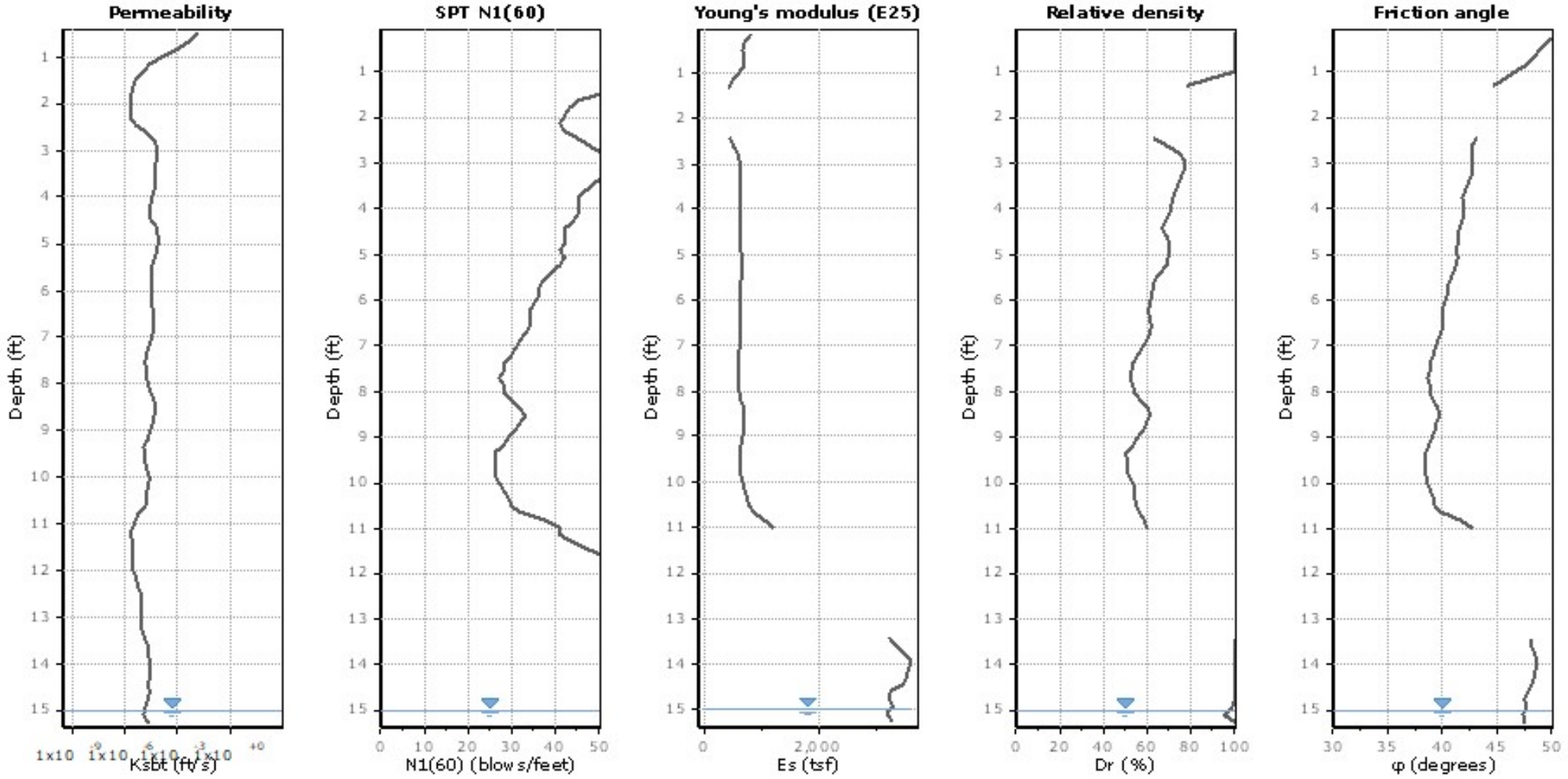

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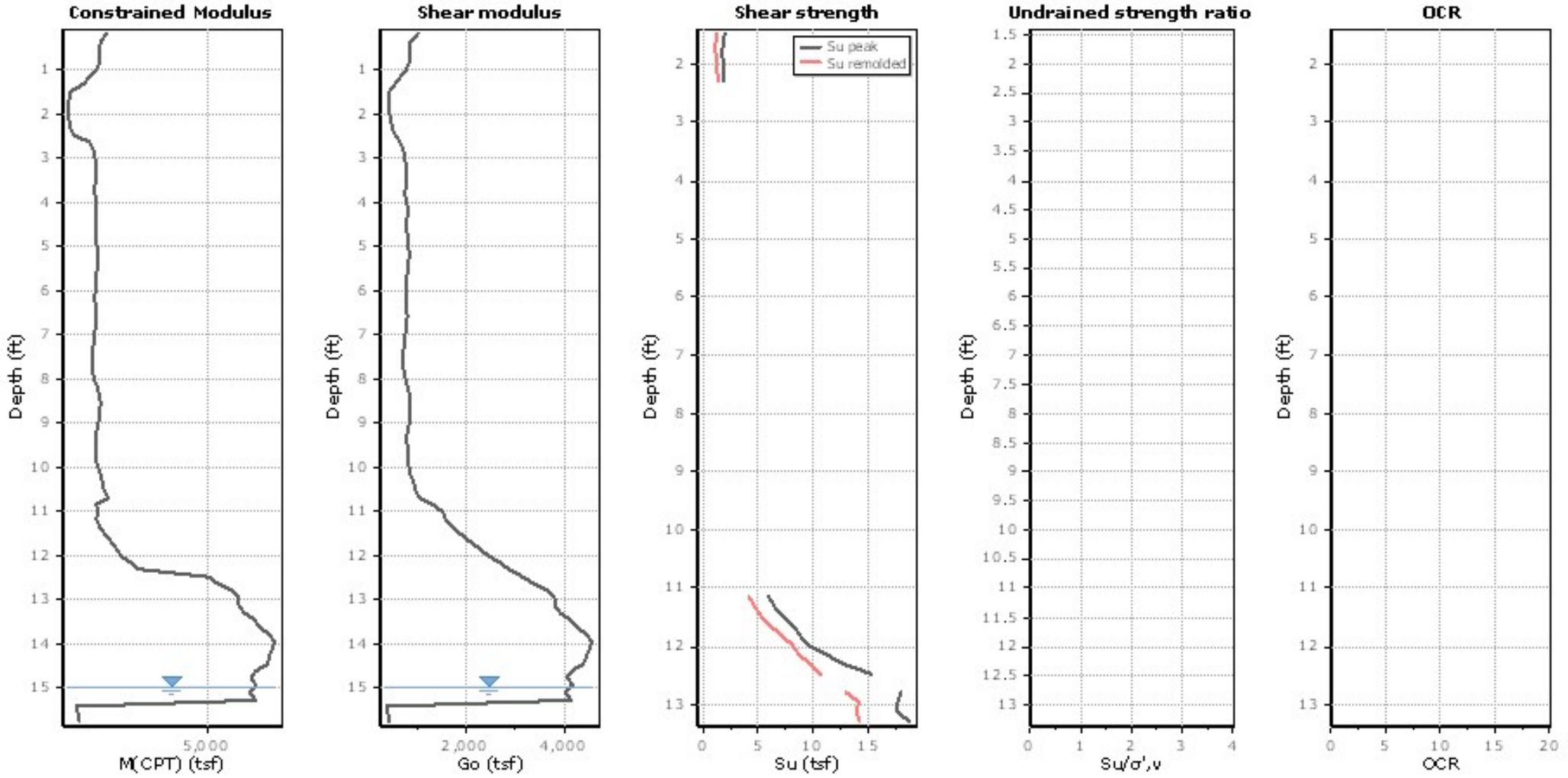

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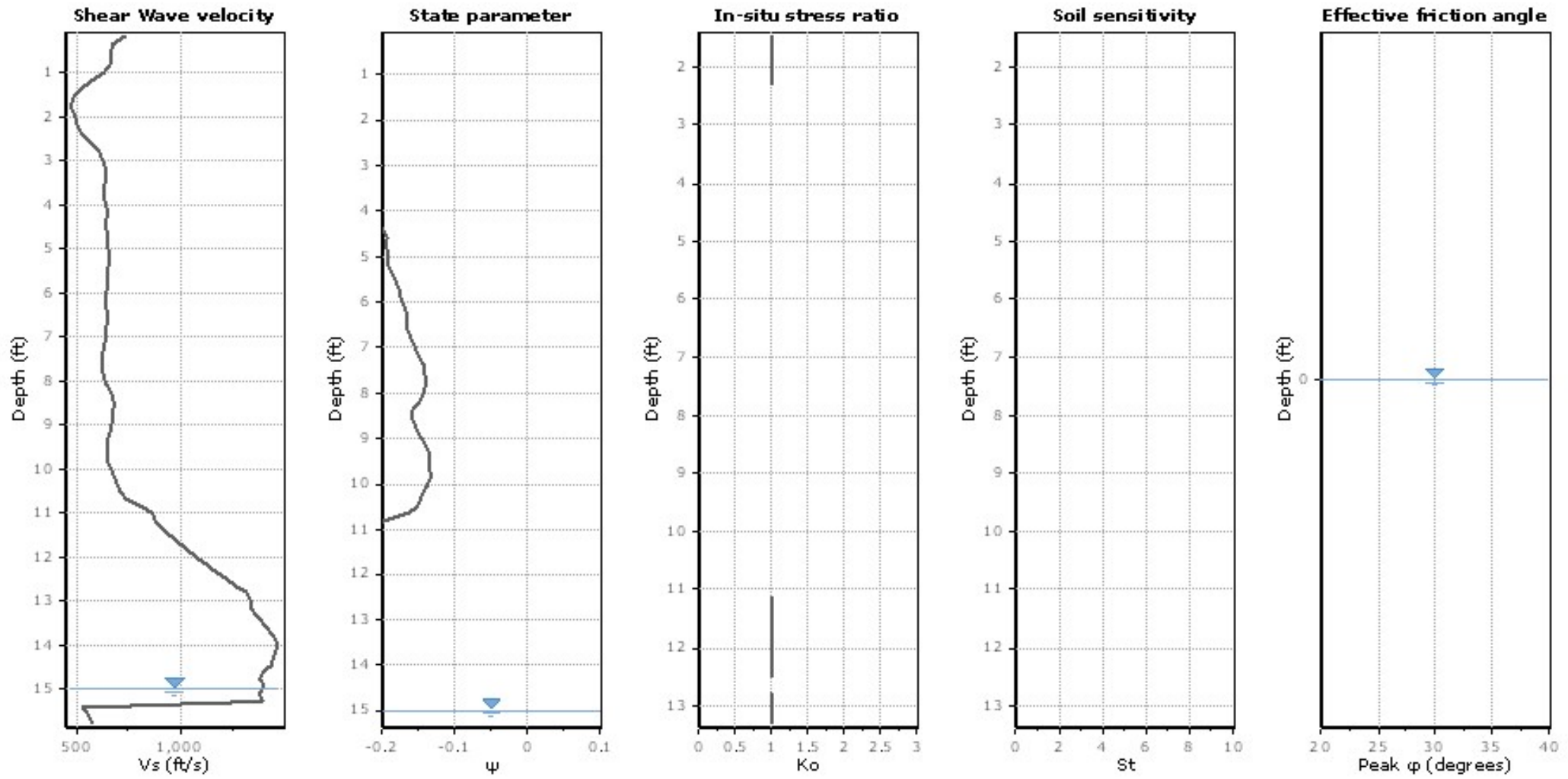

Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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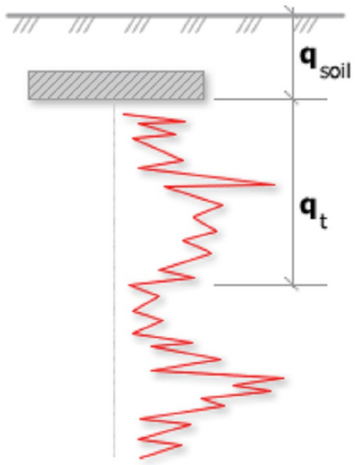
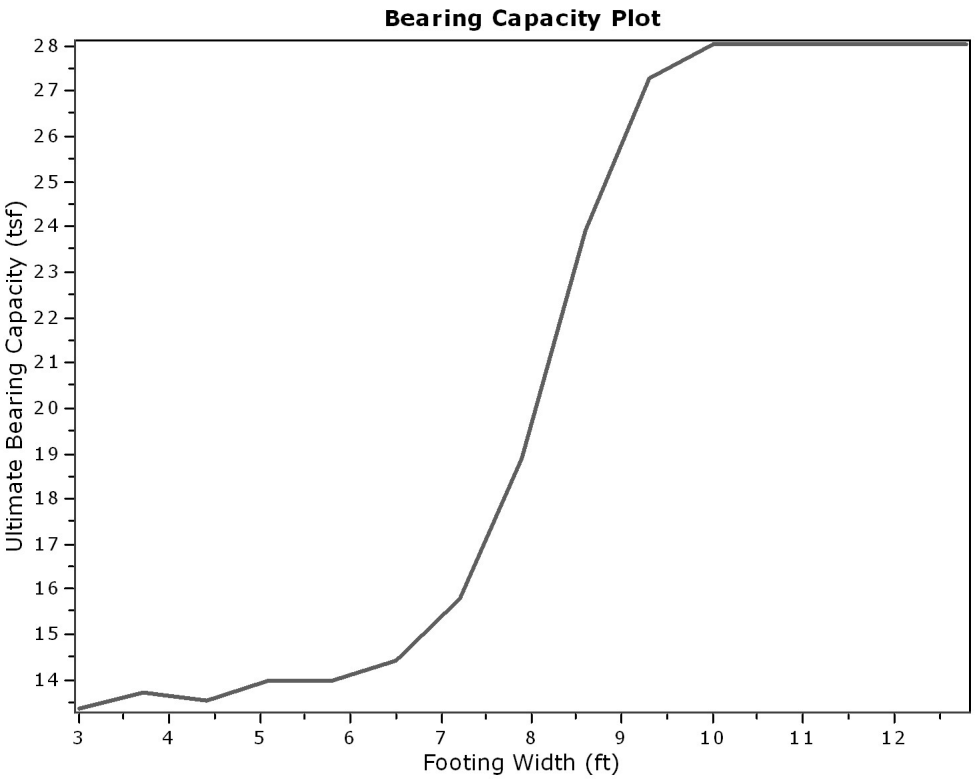
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	66.39	0.20	0.10	13.37
2	3.70	1.60	7.15	68.05	0.20	0.10	13.71
3	4.40	1.60	8.20	67.32	0.20	0.10	13.56
4	5.10	1.60	9.25	69.48	0.20	0.10	13.99
5	5.80	1.60	10.30	69.43	0.20	0.10	13.98
6	6.50	1.60	11.35	71.61	0.20	0.10	14.42
7	7.20	1.60	12.40	78.50	0.20	0.10	15.80
8	7.90	1.60	13.45	93.94	0.20	0.10	18.88
9	8.60	1.60	14.50	119.22	0.20	0.10	23.94
10	9.30	1.60	15.55	135.80	0.20	0.10	27.26
11	10.00	1.60	16.60	139.65	0.20	0.10	28.03
12	10.70	1.60	17.65	139.65	0.20	0.10	28.03
13	11.40	1.60	18.70	139.65	0.20	0.10	28.03
14	12.10	1.60	19.75	139.65	0.20	0.10	28.03
15	12.80	1.60	20.80	139.65	0.20	0.10	28.03

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

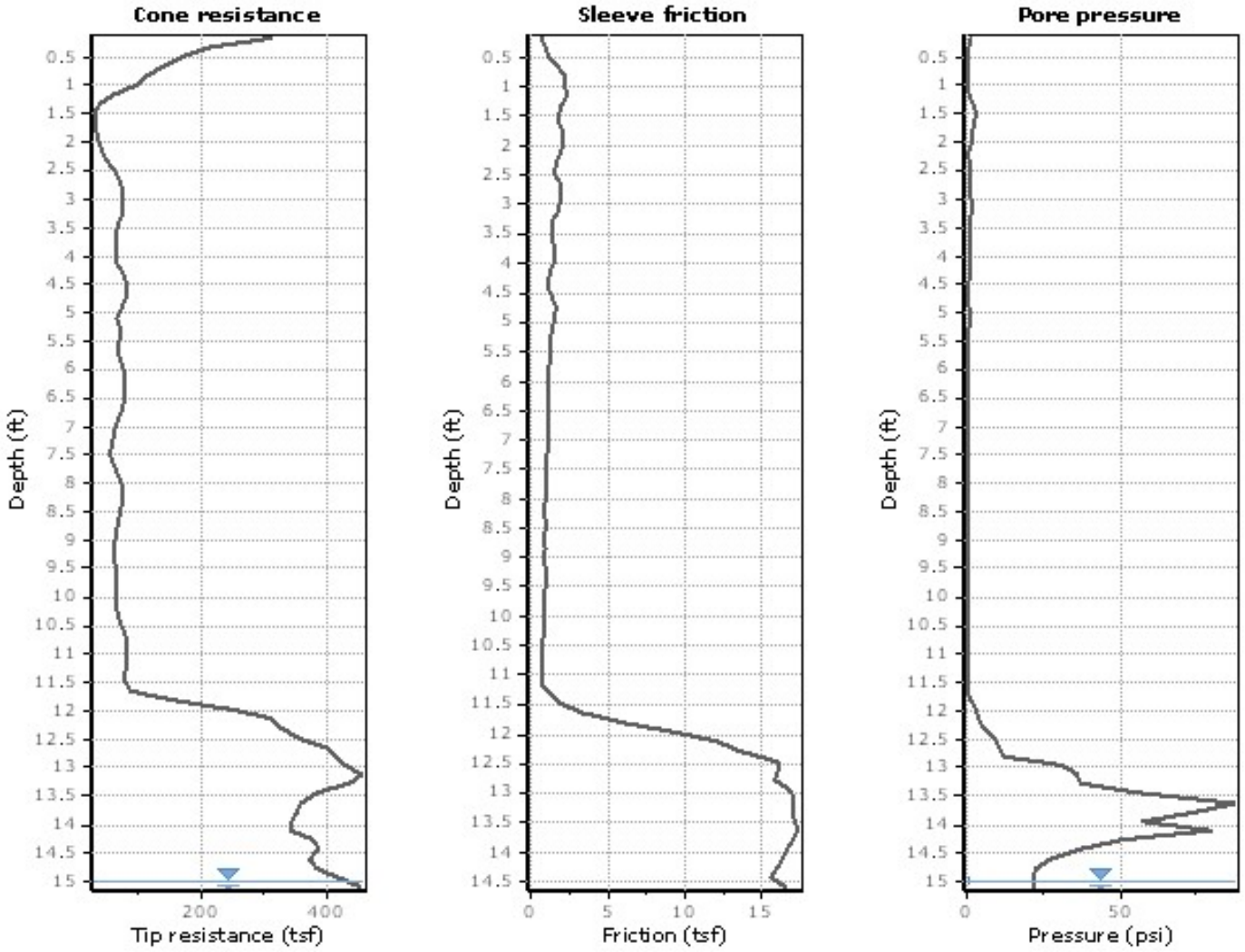
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

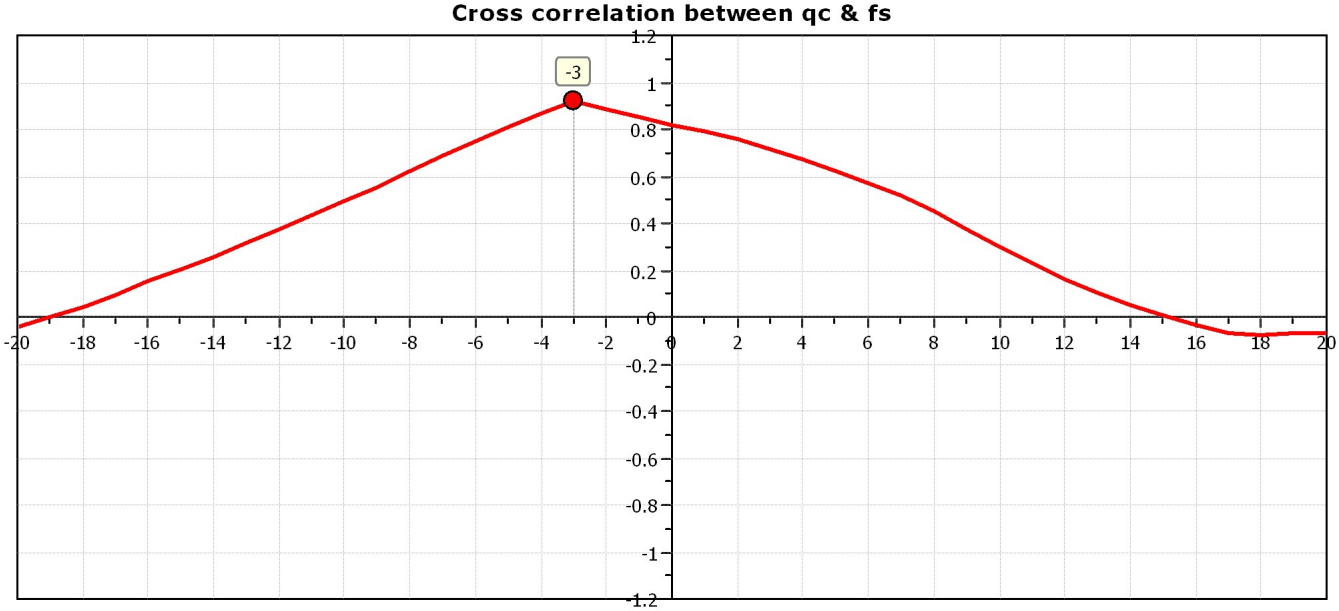
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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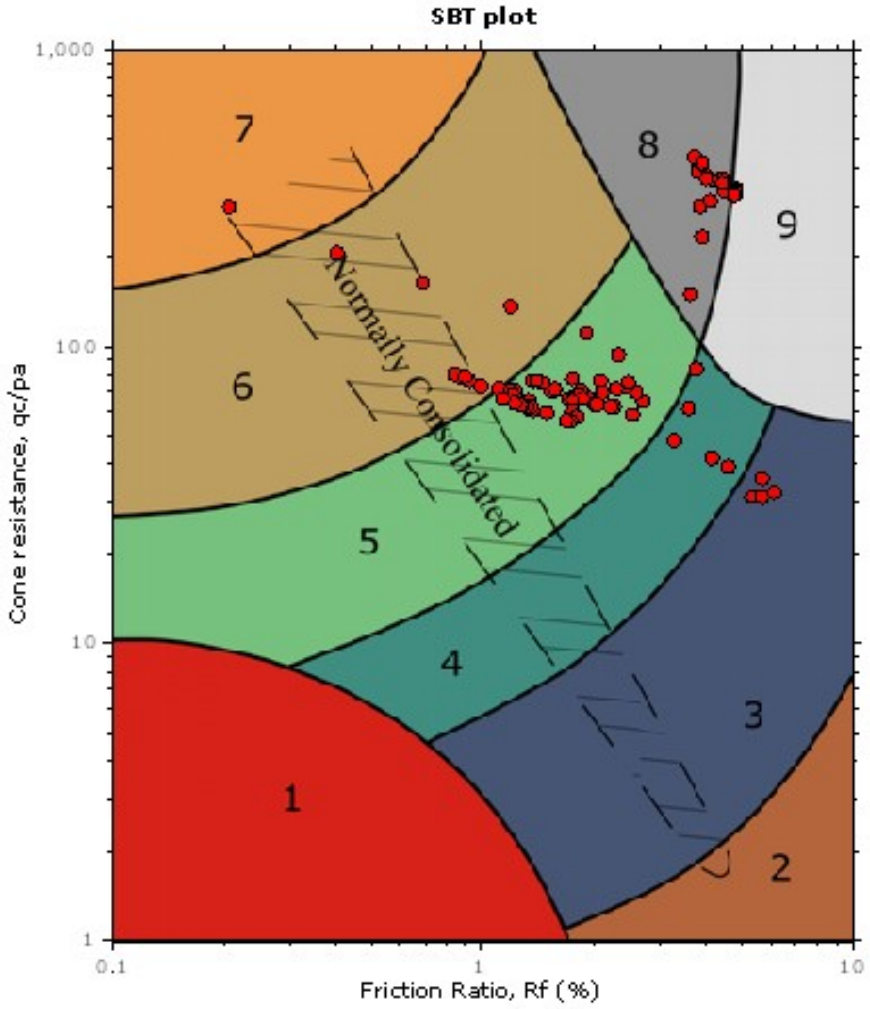
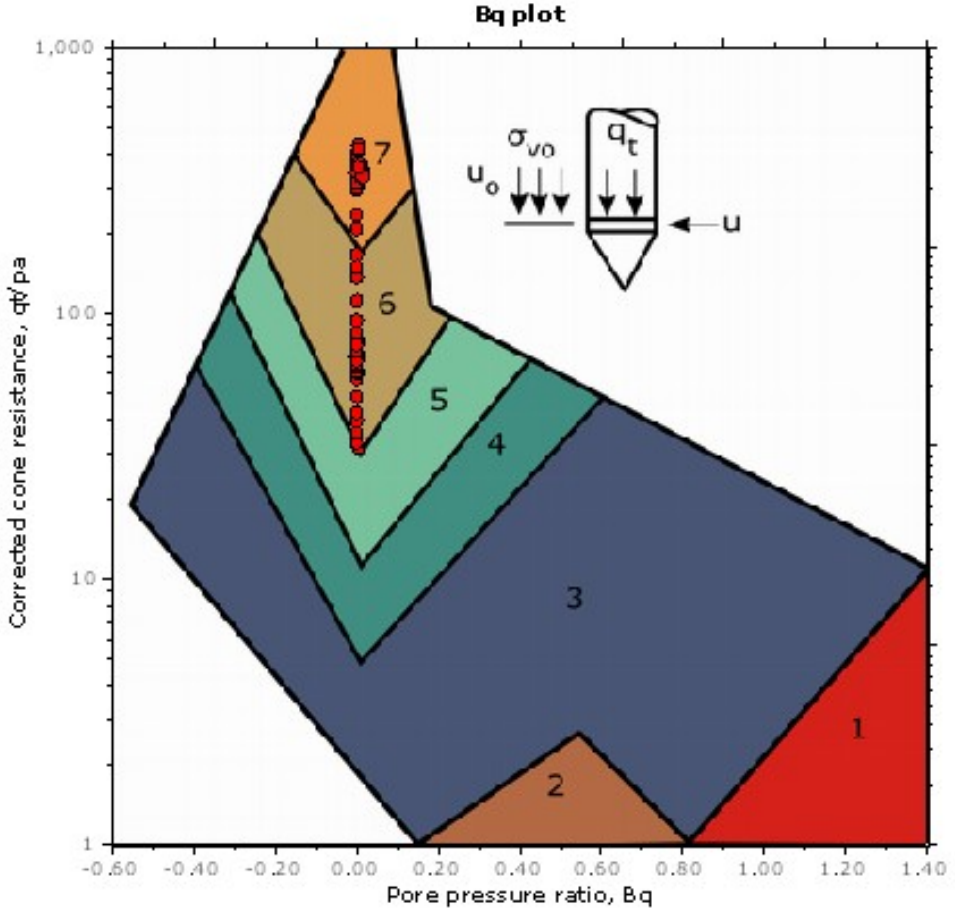
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

SBT - Bq plots





SBT legend

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

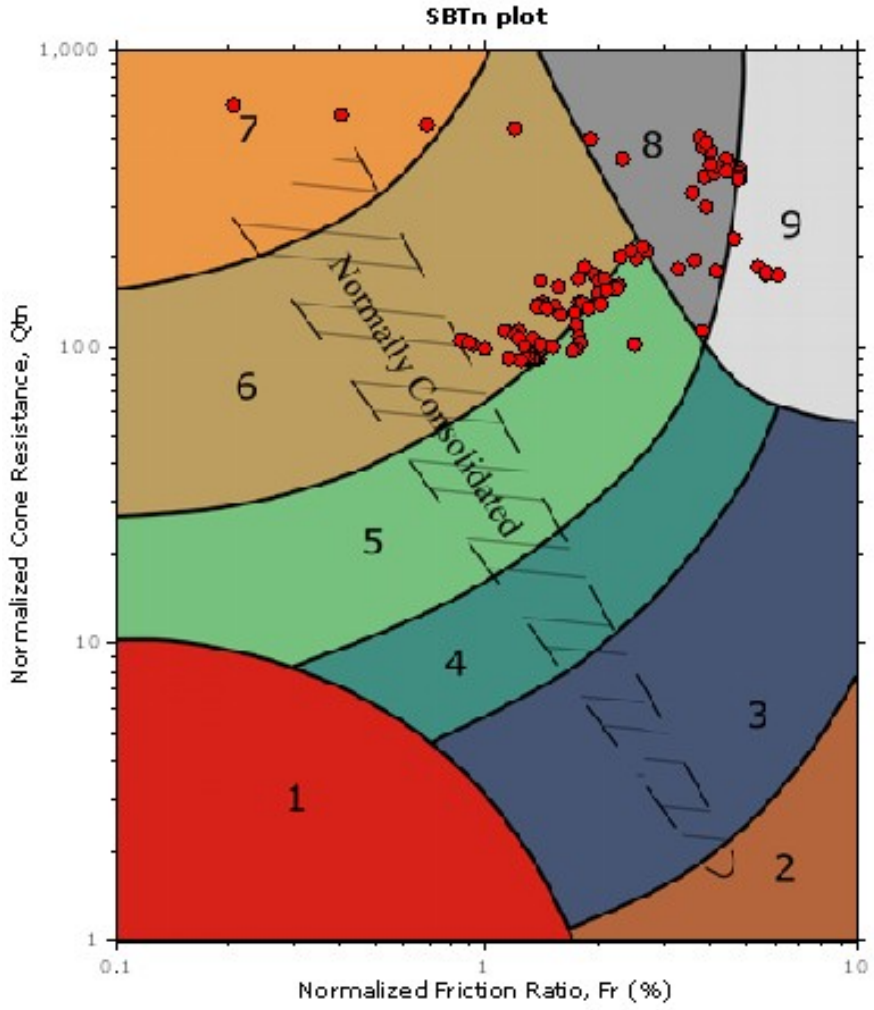
Middle Earth Geo Testing, Inc.

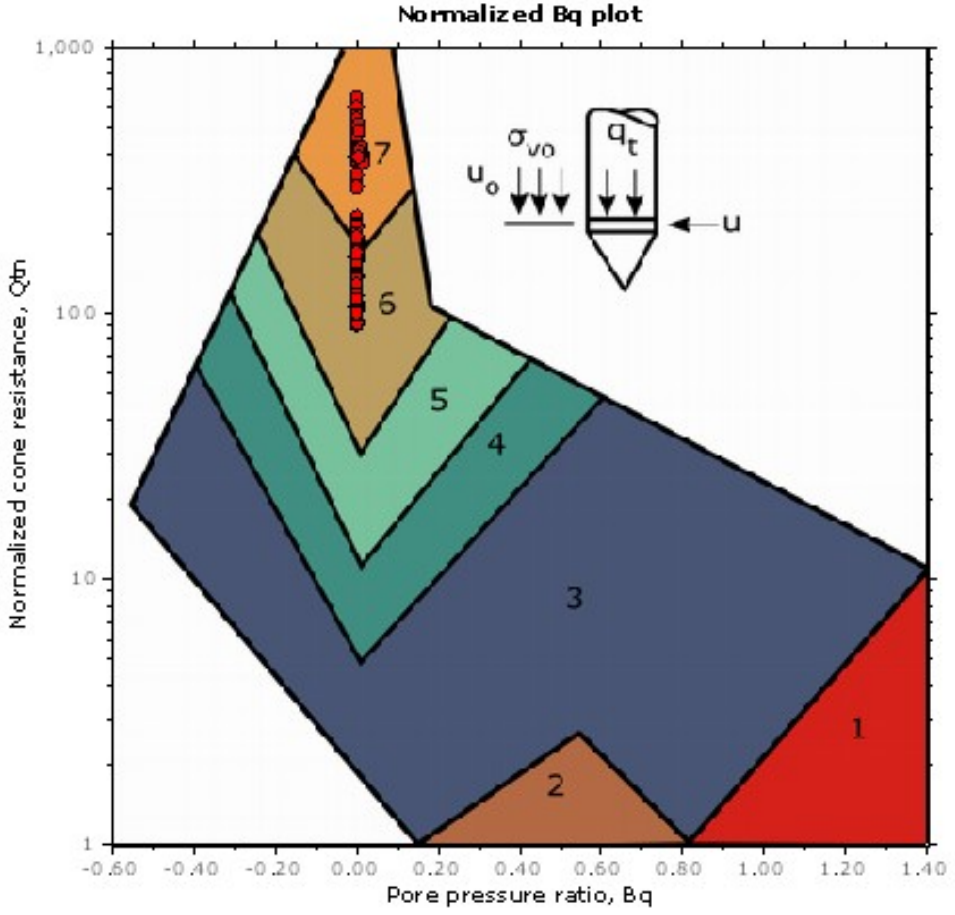
www.middleearthgeo.com

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-04A
Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

SBT - Bq plots (normalized)





SBTn legend

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

Middle Earth Geo Testing, Inc.

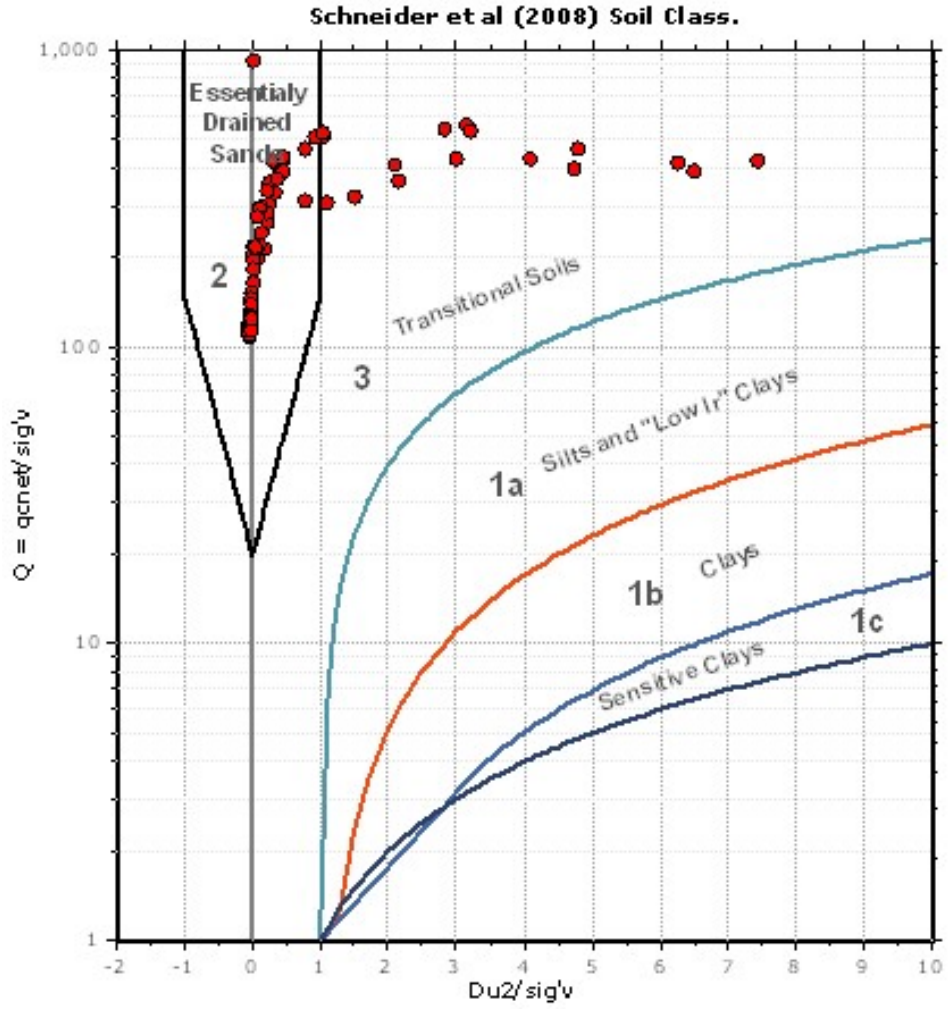
www.middleearthgeo.com

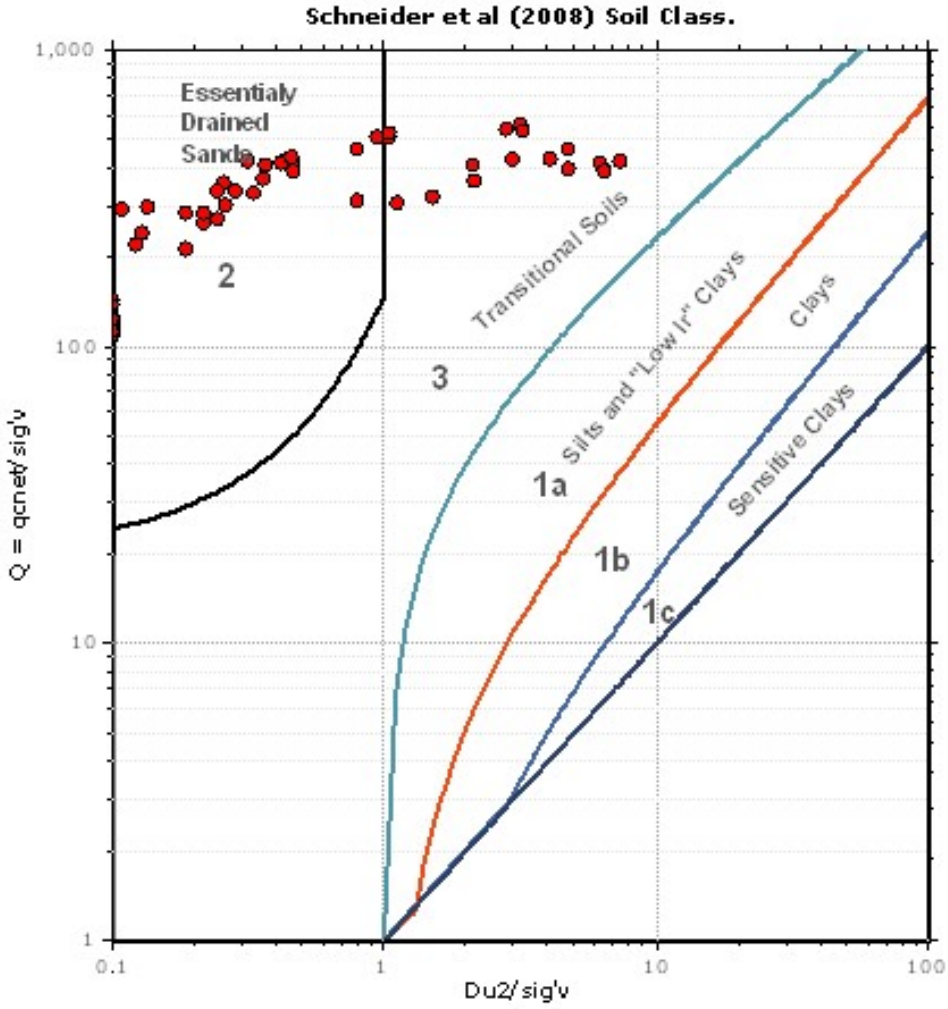
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

Bq plots (Schneider)





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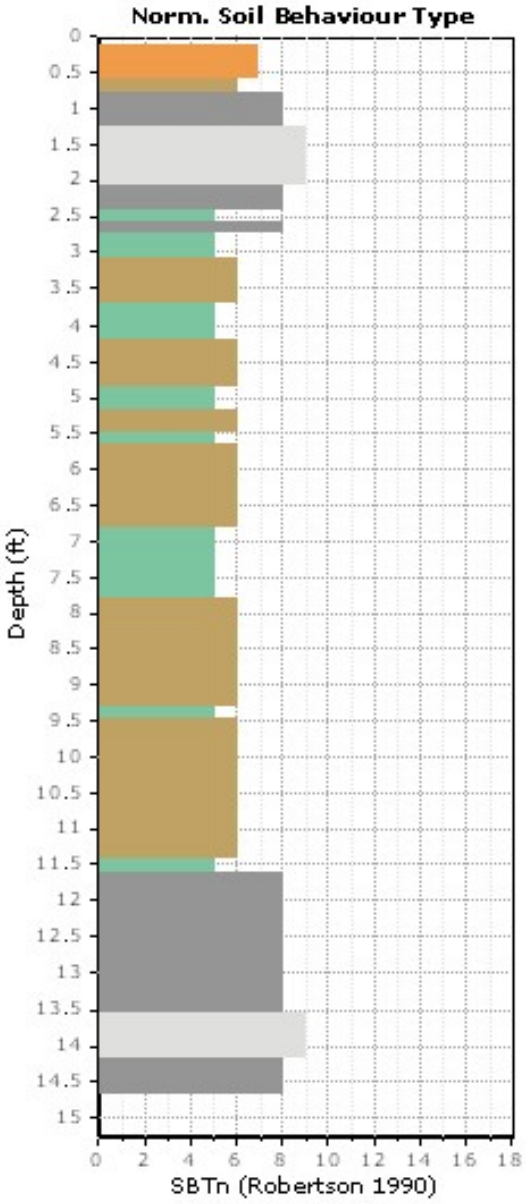
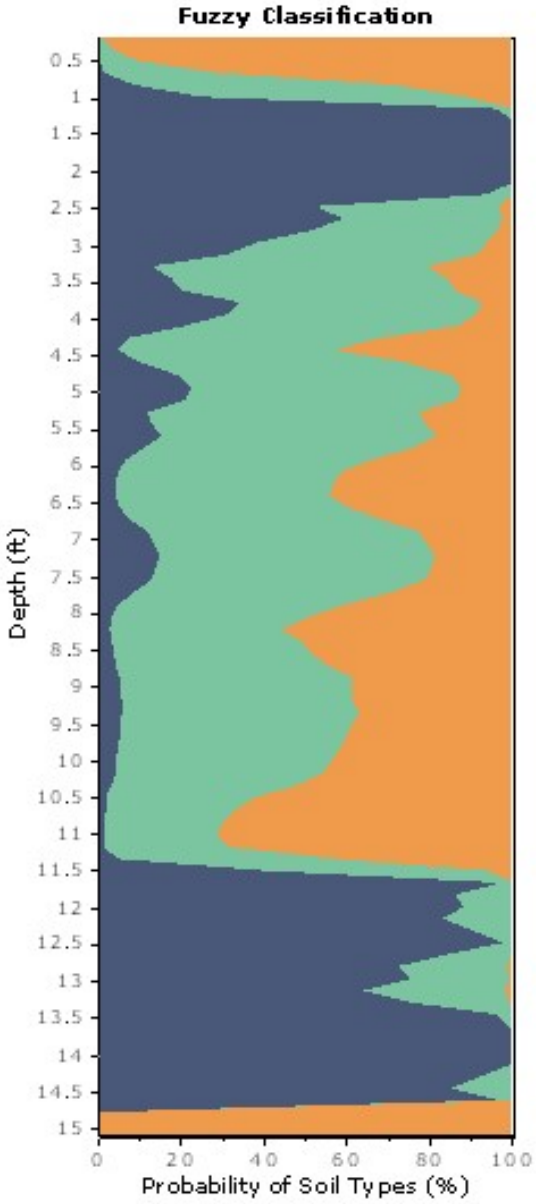
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



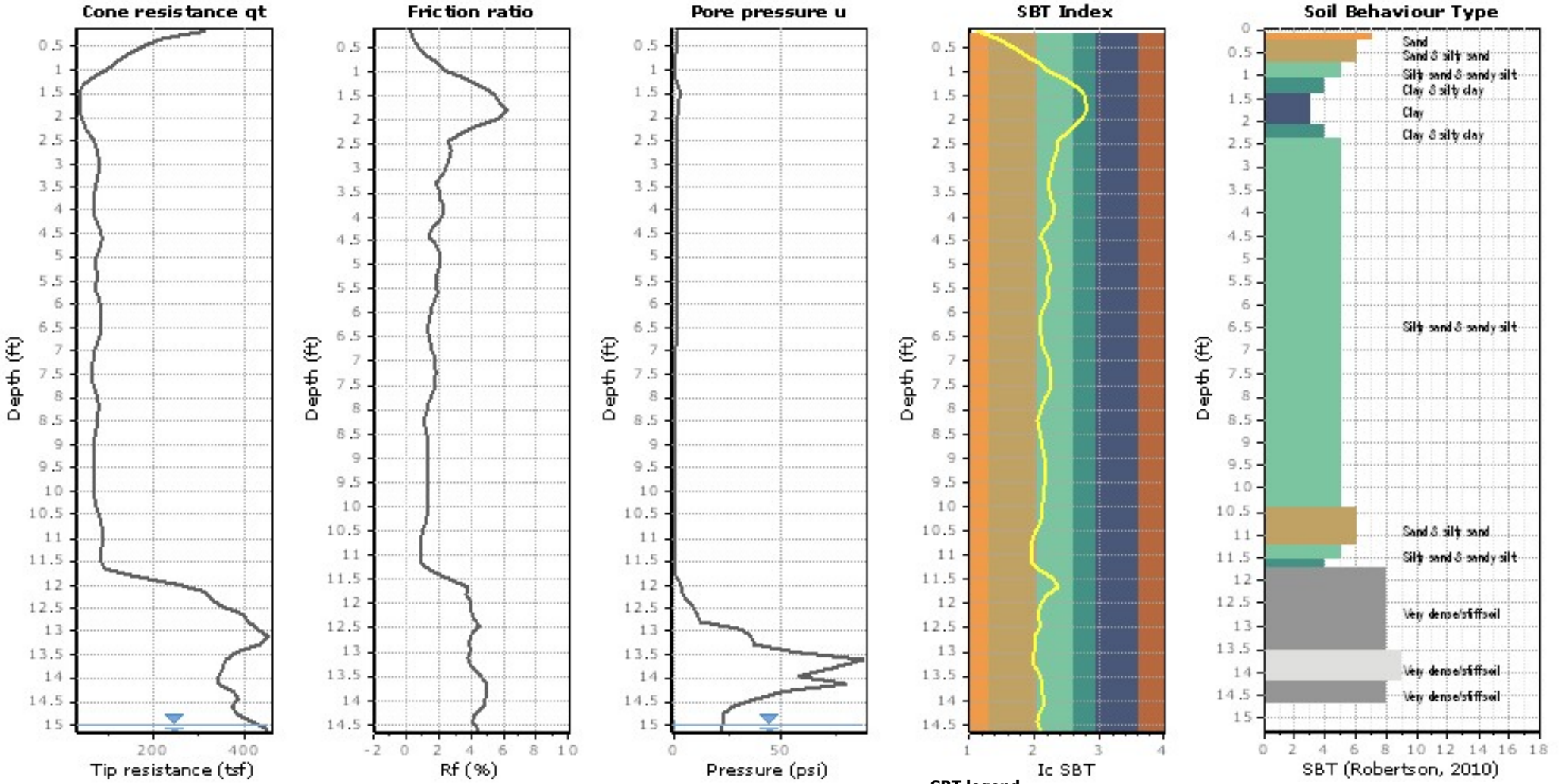


Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

Project: Liberty Circle Geo Evaluation
Location: Arcata

CPT: CPT-04A
Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM



Middle Earth Geo Testing, Inc.

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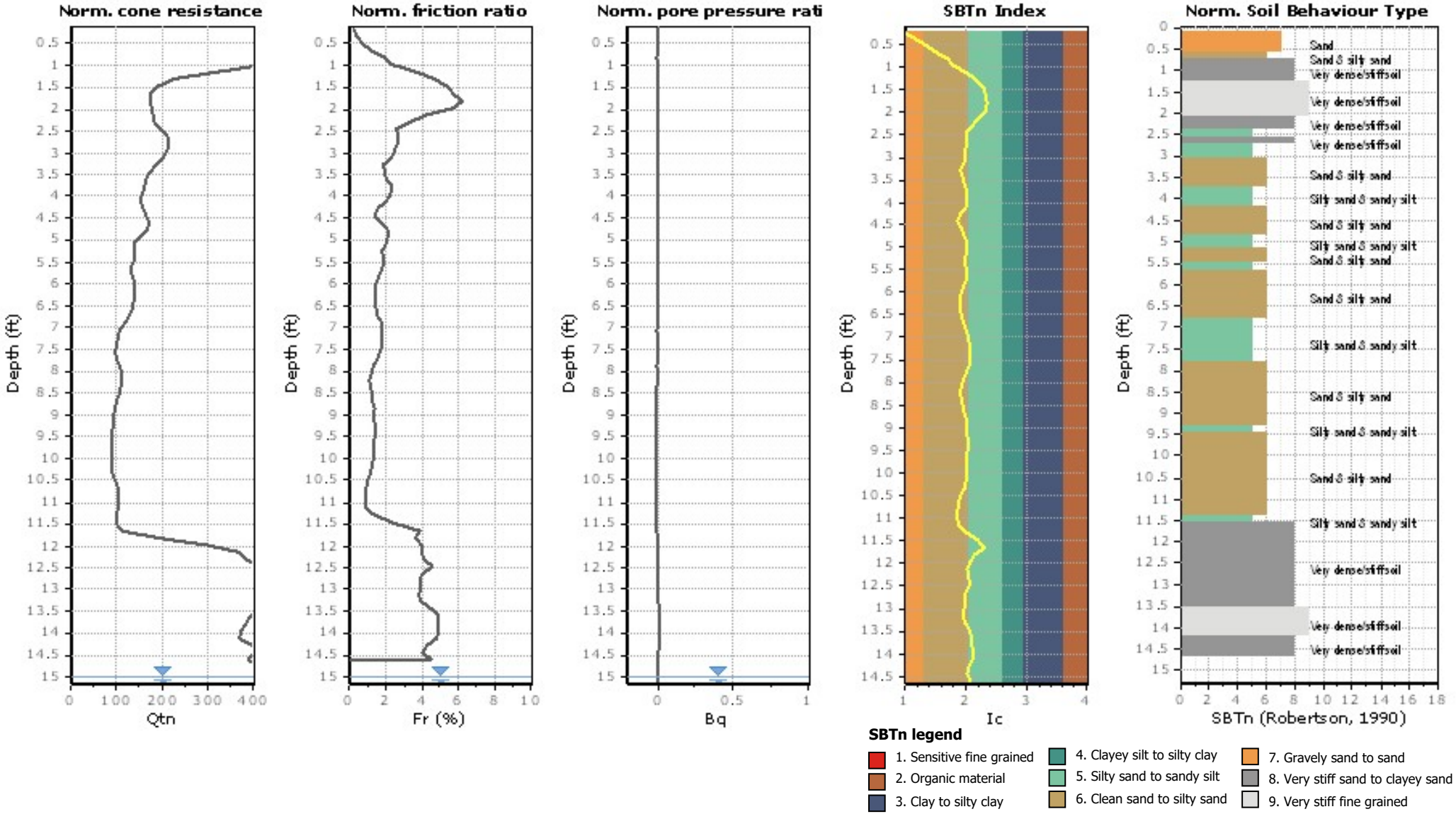
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



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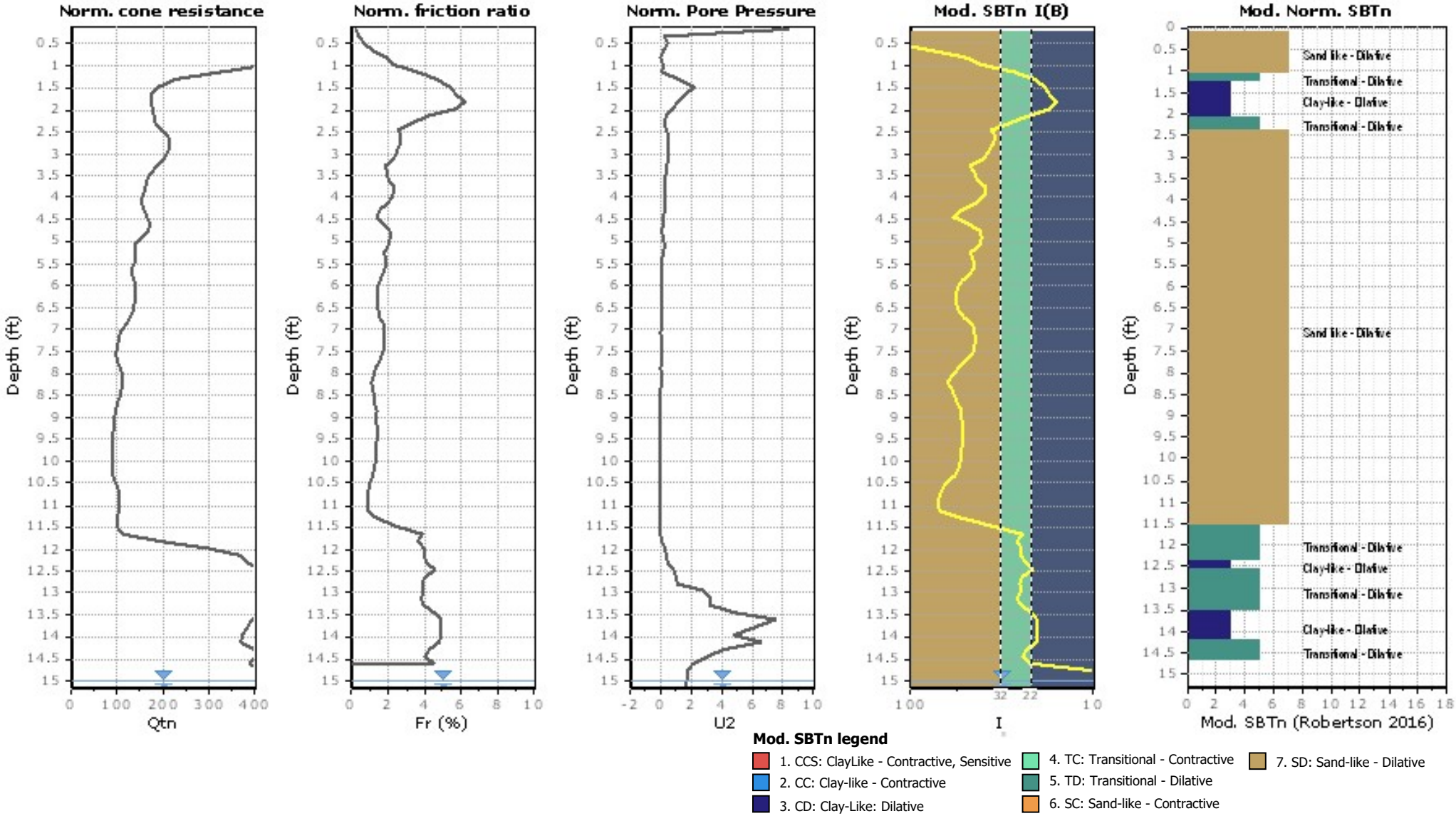

Middle Earth Geo Testing, Inc.

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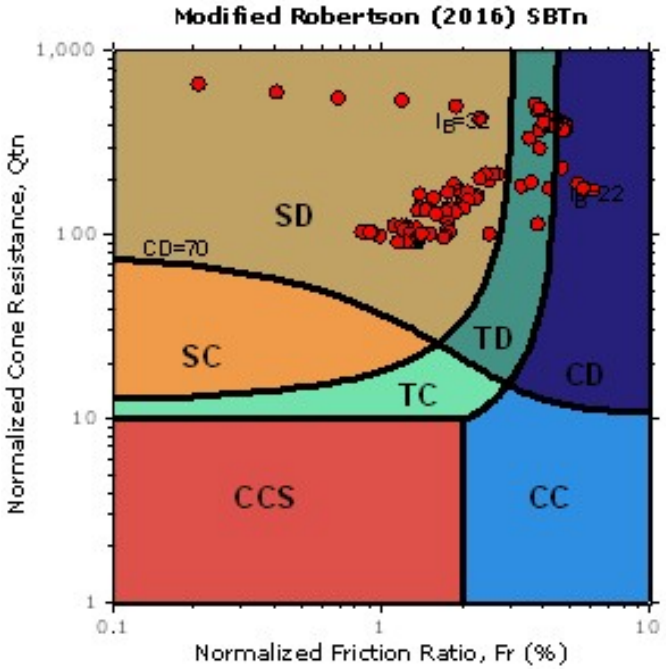
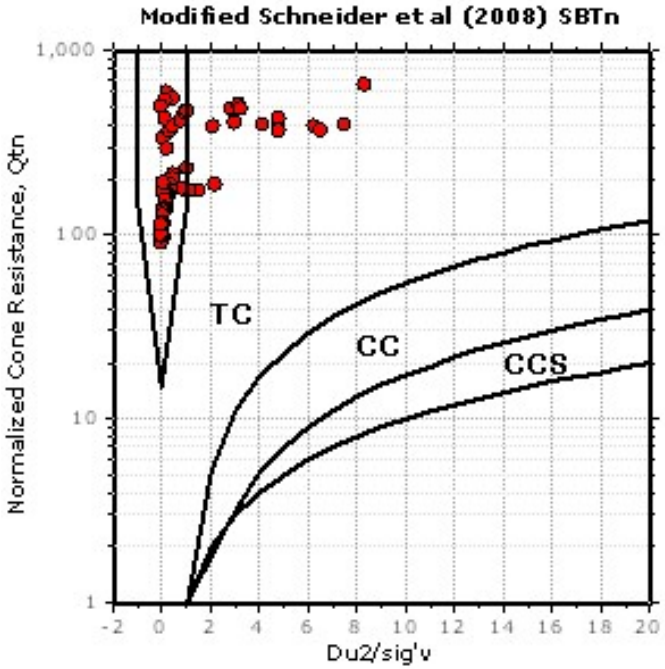
CPT: CPT-04A

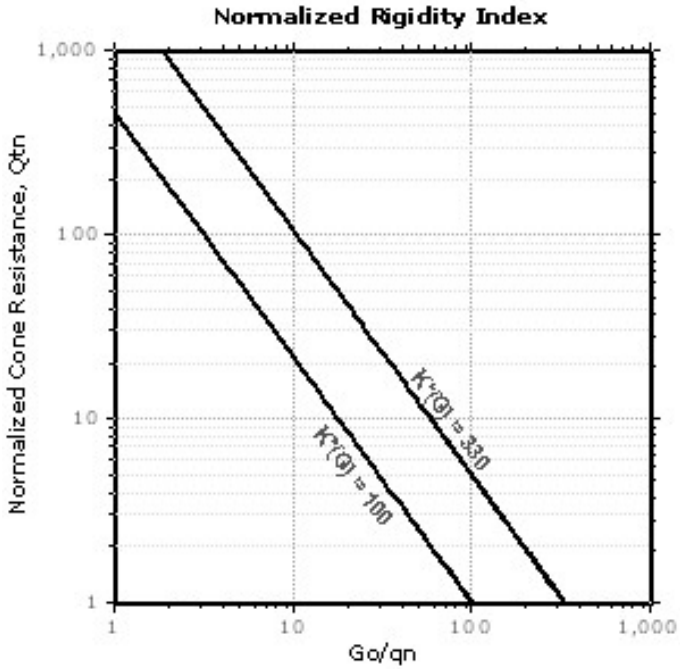
Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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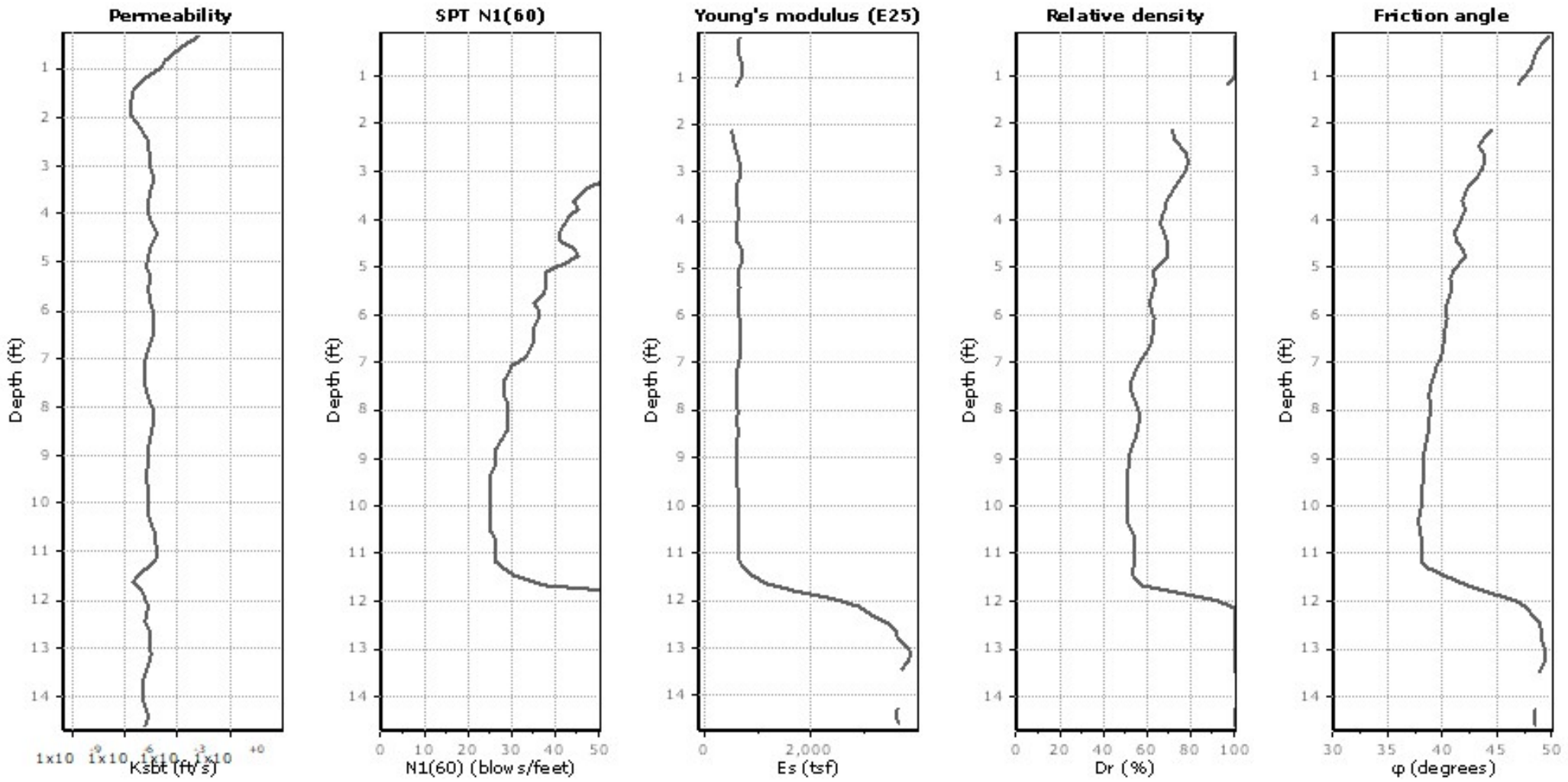
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

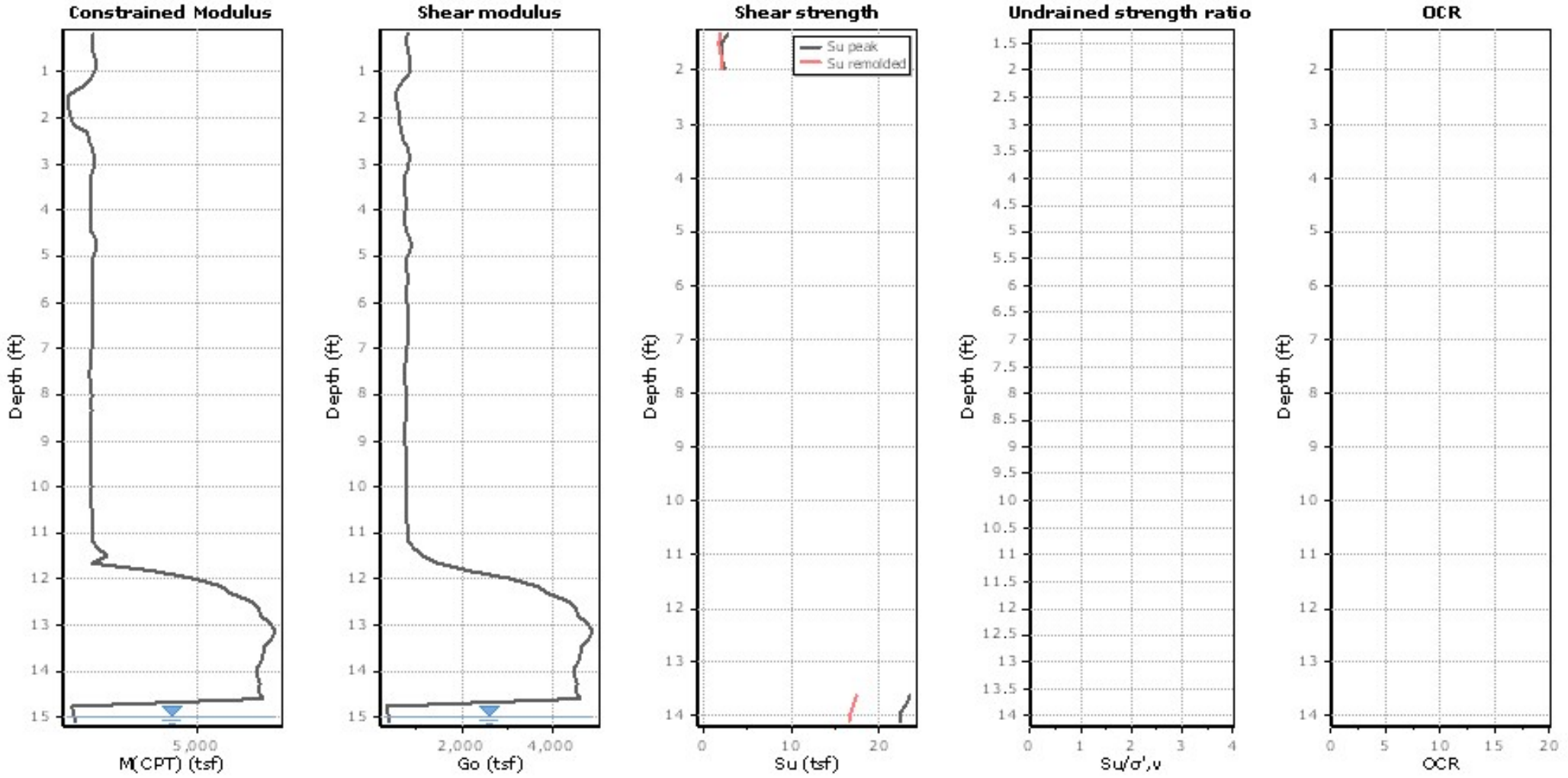
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

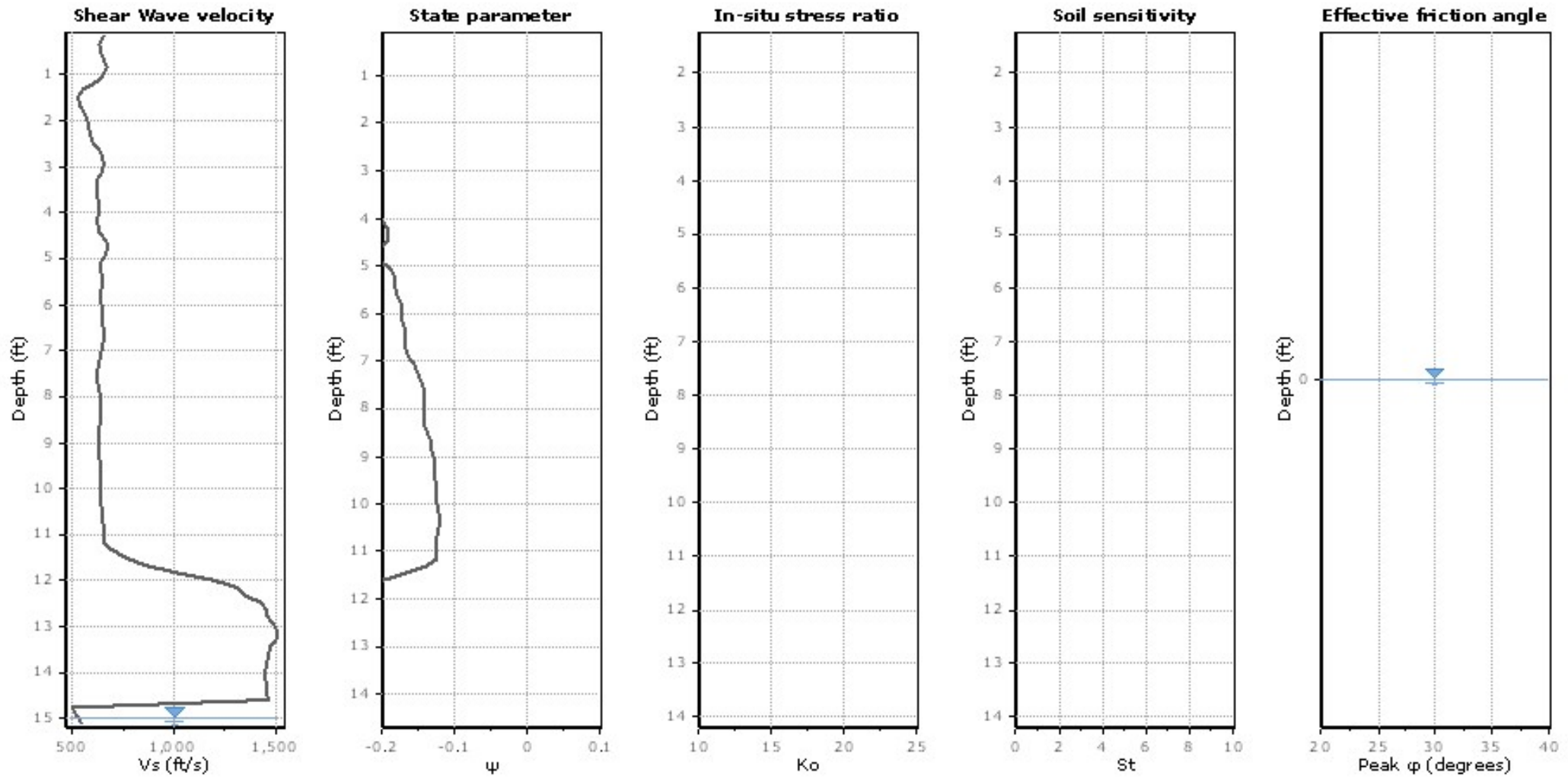
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

Middle Earth Geo Testing, Inc.

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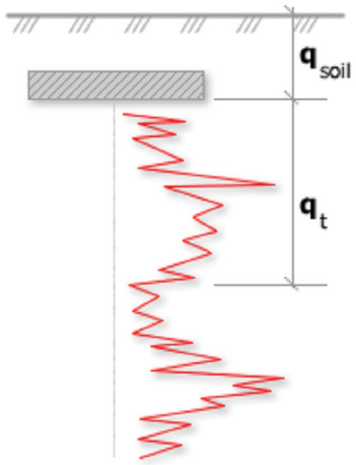
CPT: CPT-04A

Total depth: 15.09 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
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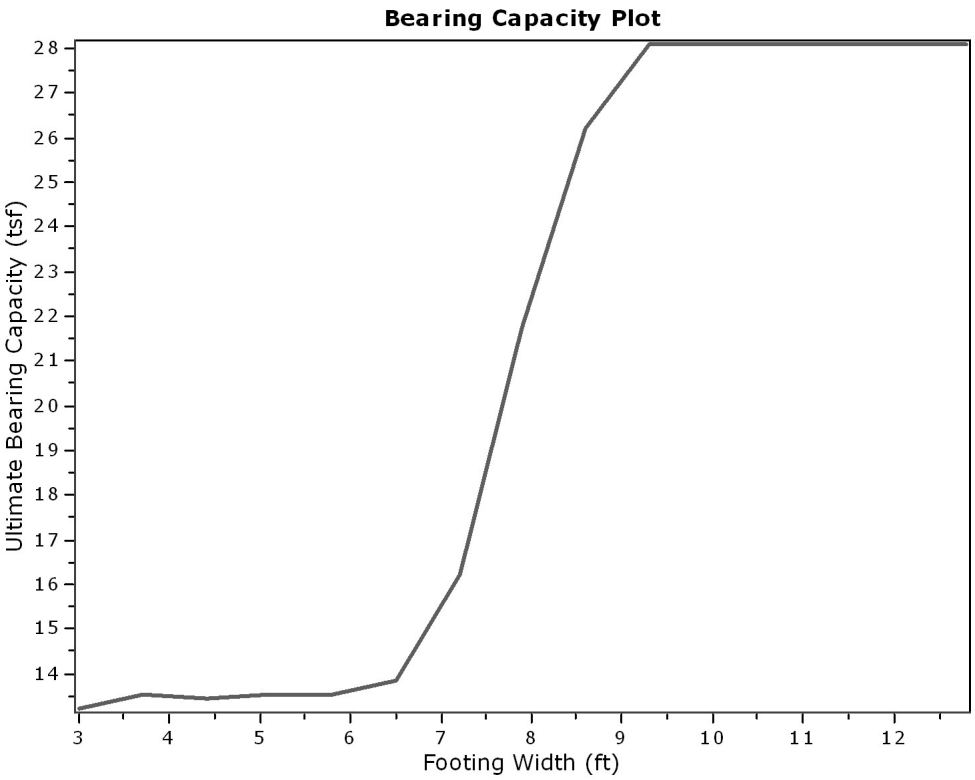

:: Tabular results ::

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1	3.00	1.60	6.10	65.68	0.20	0.10	13.23
2	3.70	1.60	7.15	67.27	0.20	0.10	13.55
3	4.40	1.60	8.20	66.90	0.20	0.10	13.48
4	5.10	1.60	9.25	67.35	0.20	0.10	13.57
5	5.80	1.60	10.30	67.27	0.20	0.10	13.55
6	6.50	1.60	11.35	68.76	0.20	0.10	13.85
7	7.20	1.60	12.40	80.69	0.20	0.10	16.23
8	7.90	1.60	13.45	108.12	0.20	0.10	21.72
9	8.60	1.60	14.50	130.54	0.20	0.10	26.20
10	9.30	1.60	15.55	139.95	0.20	0.10	28.09
11	10.00	1.60	16.60	139.95	0.20	0.10	28.09
12	10.70	1.60	17.65	139.95	0.20	0.10	28.09
13	11.40	1.60	18.70	139.95	0.20	0.10	28.09
14	12.10	1.60	19.75	139.95	0.20	0.10	28.09
15	12.80	1.60	20.80	139.95	0.20	0.10	28.09

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

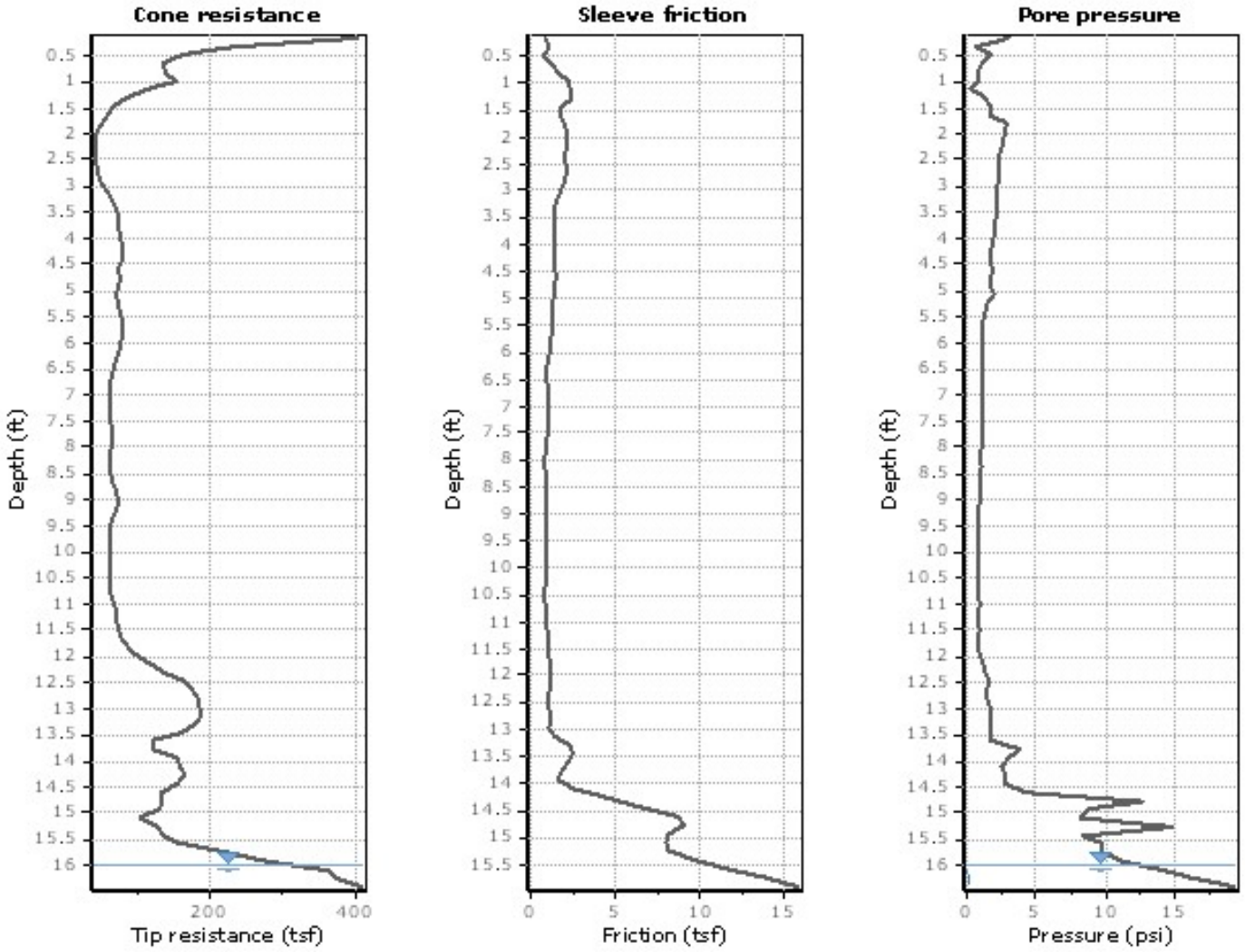
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

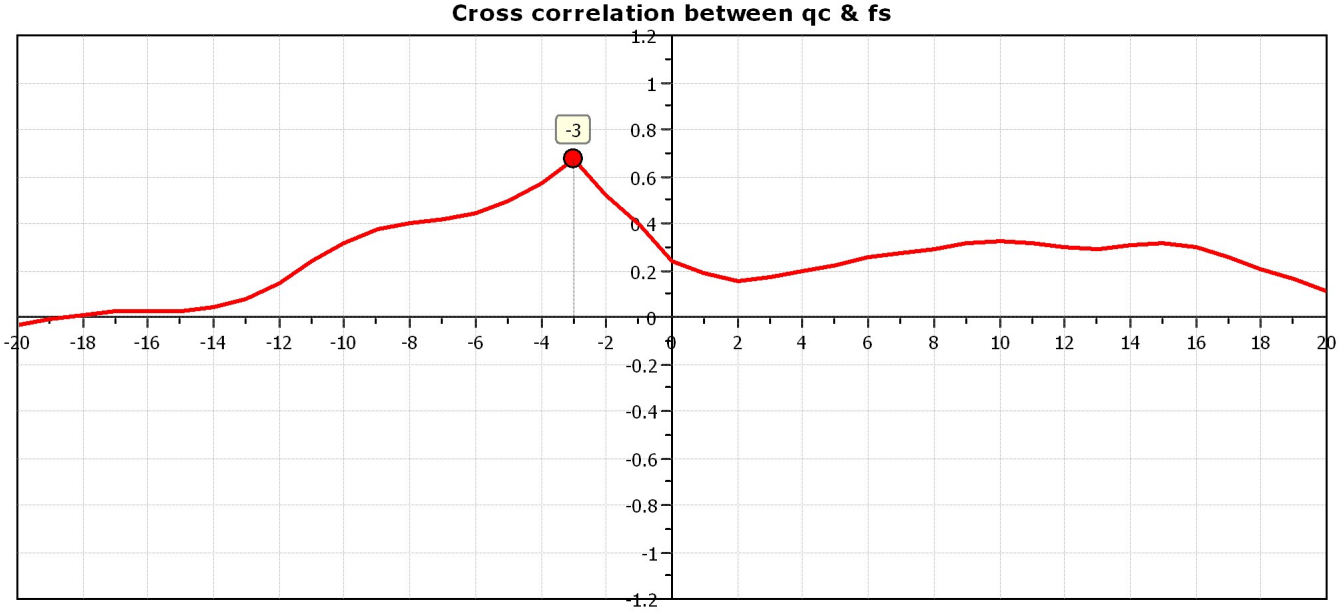
CPT: CPT-04B

Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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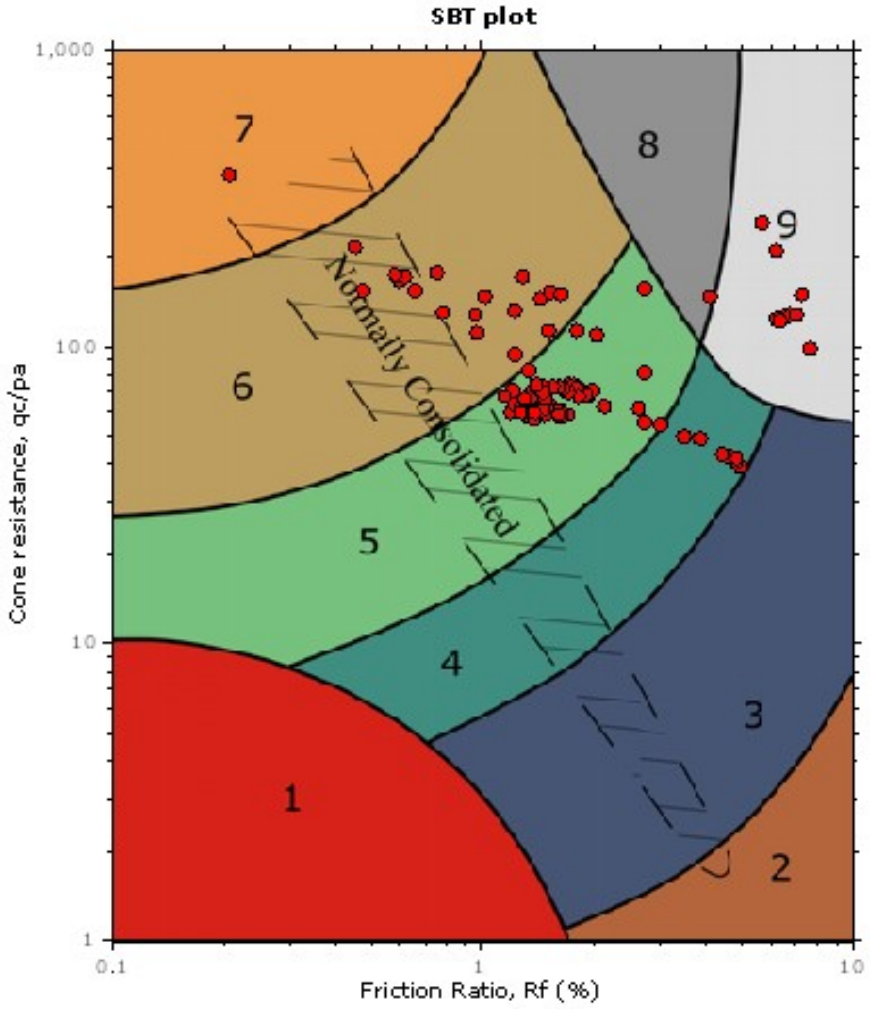
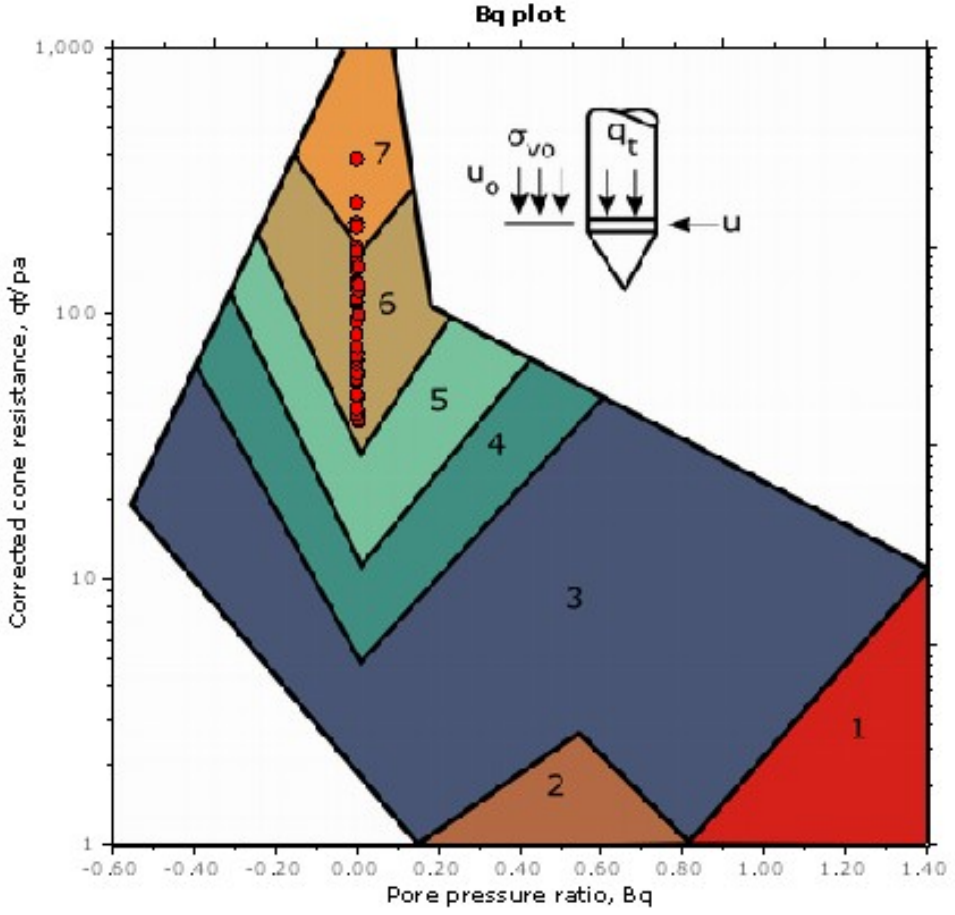
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-04B
Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

SBT - Bq plots





SBT legend

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

Middle Earth Geo Testing, Inc.

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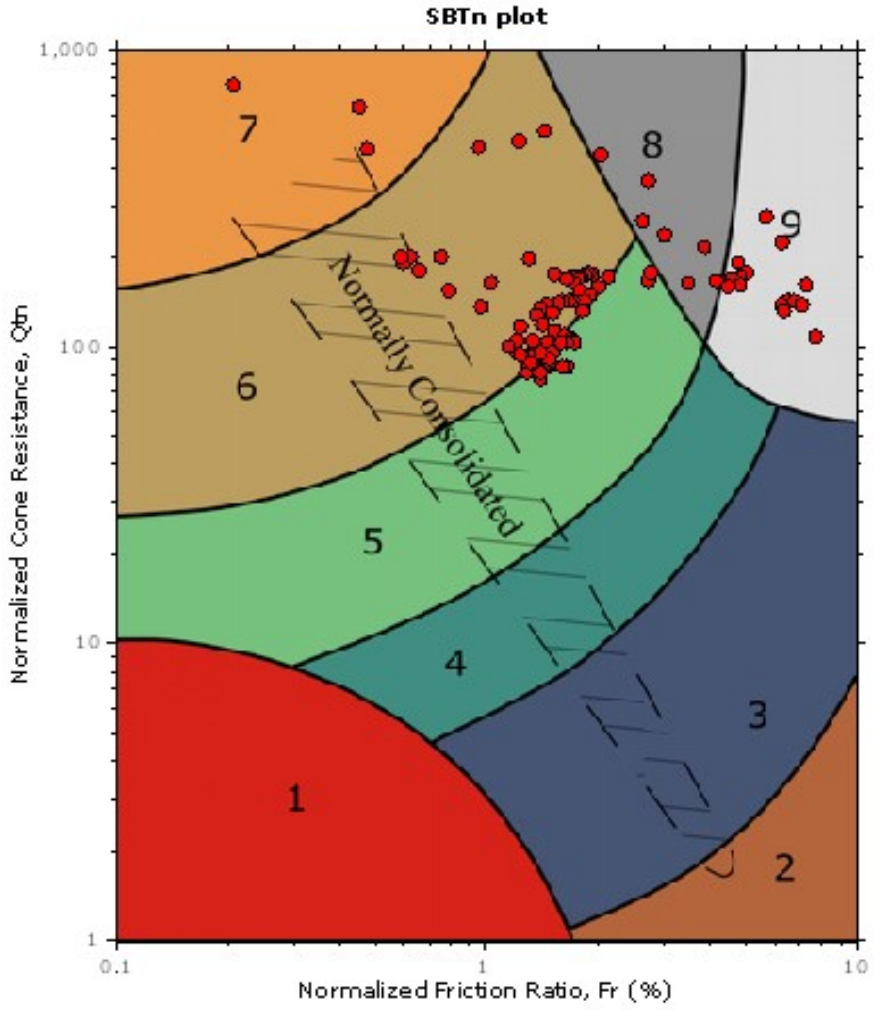
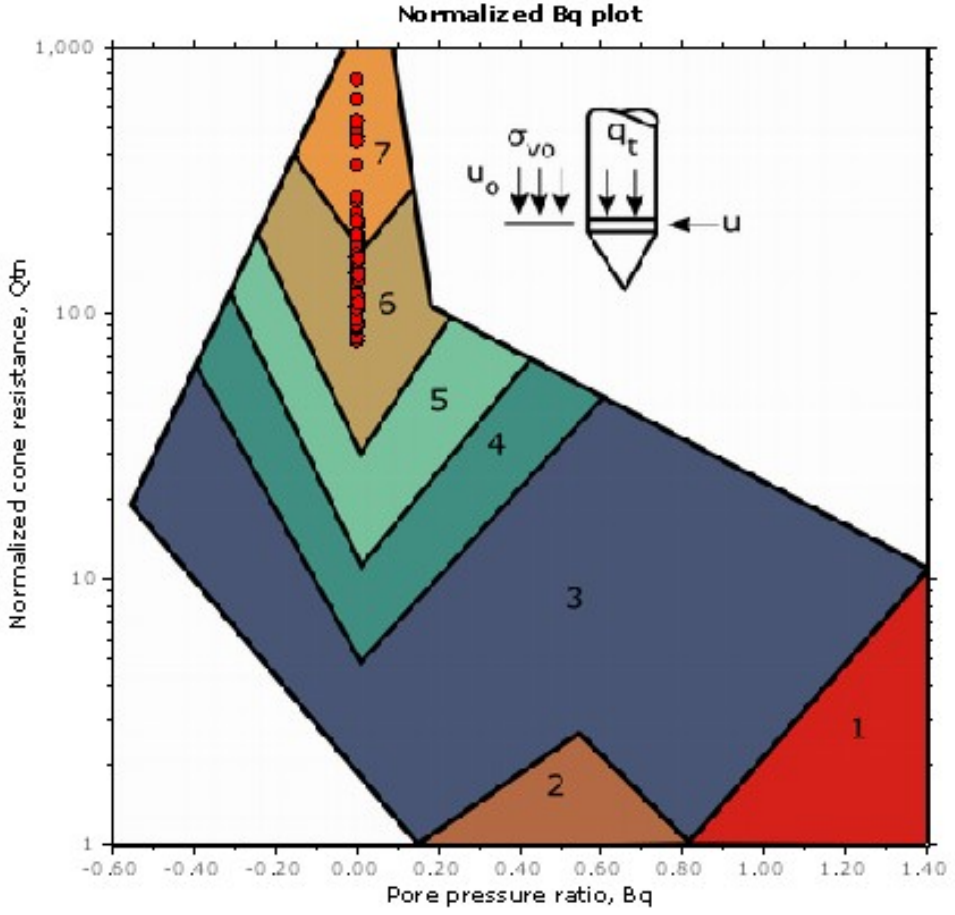
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-04B
Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

SBT - Bq plots (normalized)





SBTn legend

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

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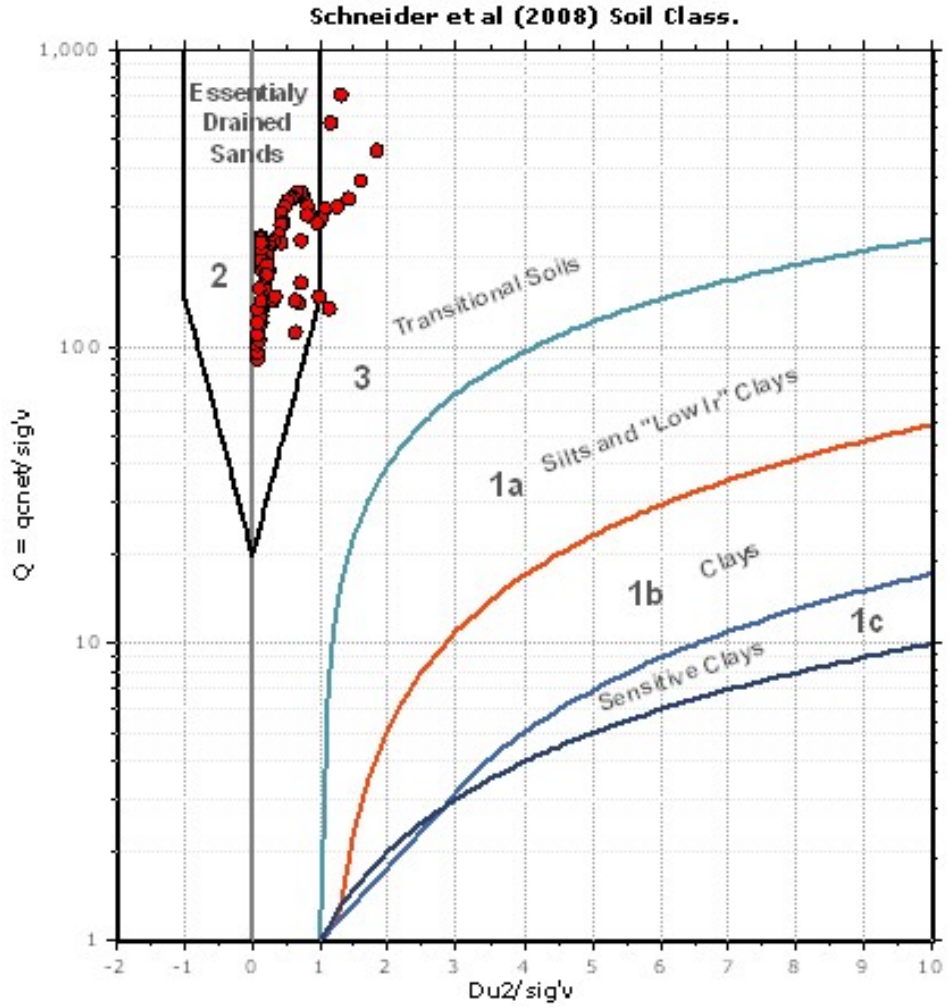
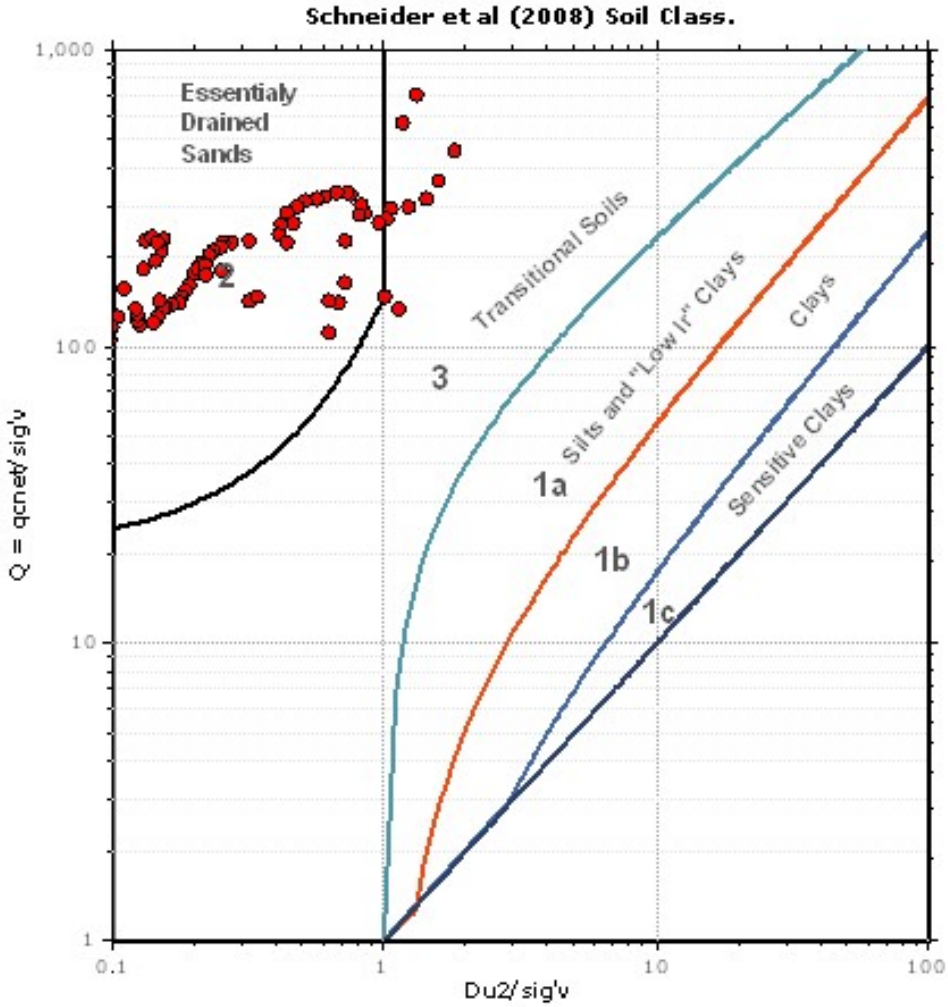
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-04B
Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Bq plots (Schneider)





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CPT: CPT-04B

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Surface Elevation: 0.00 ft
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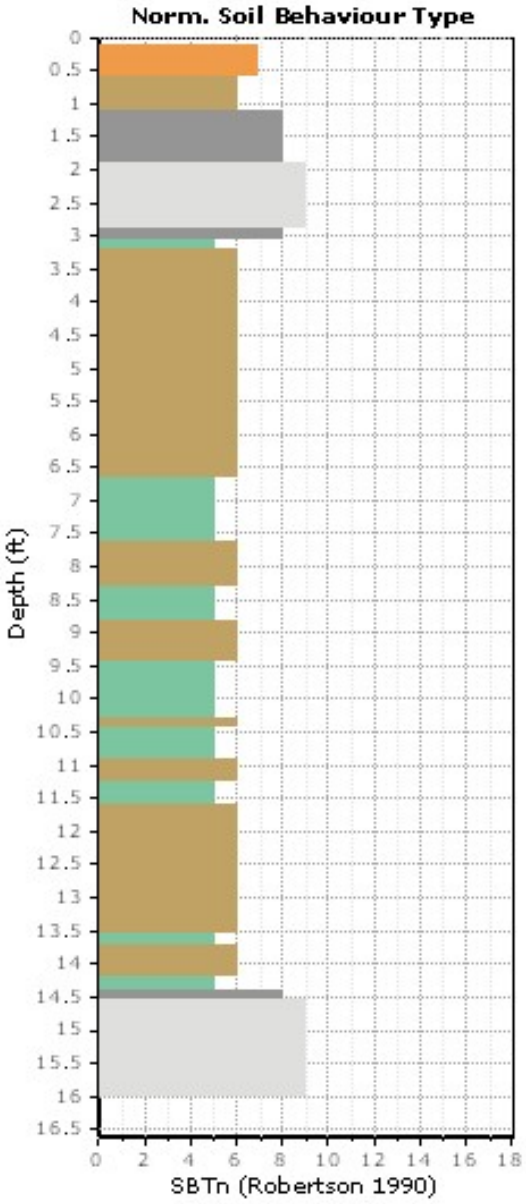
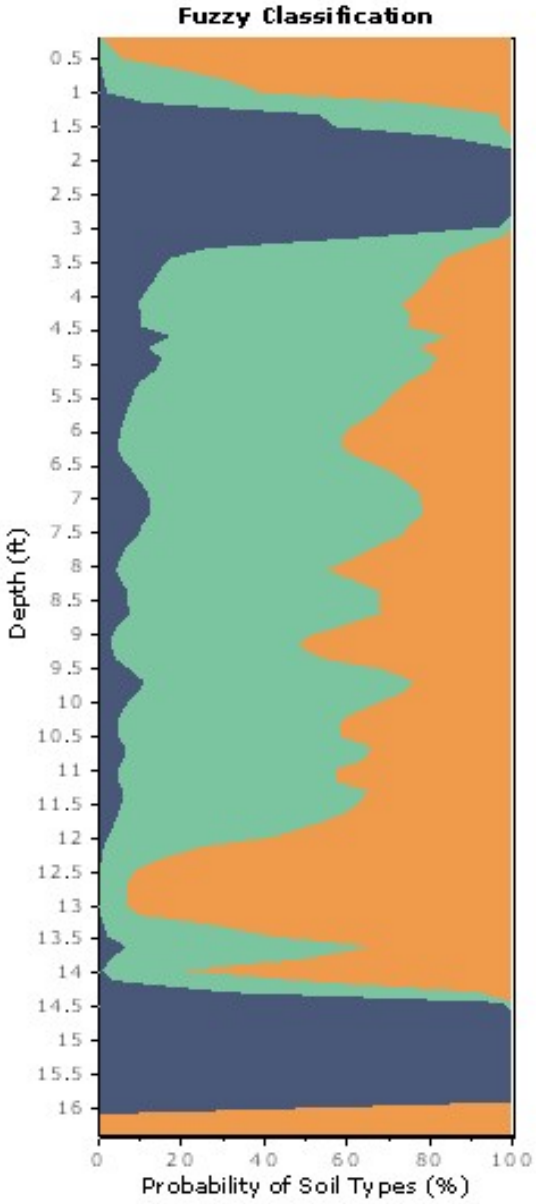
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**





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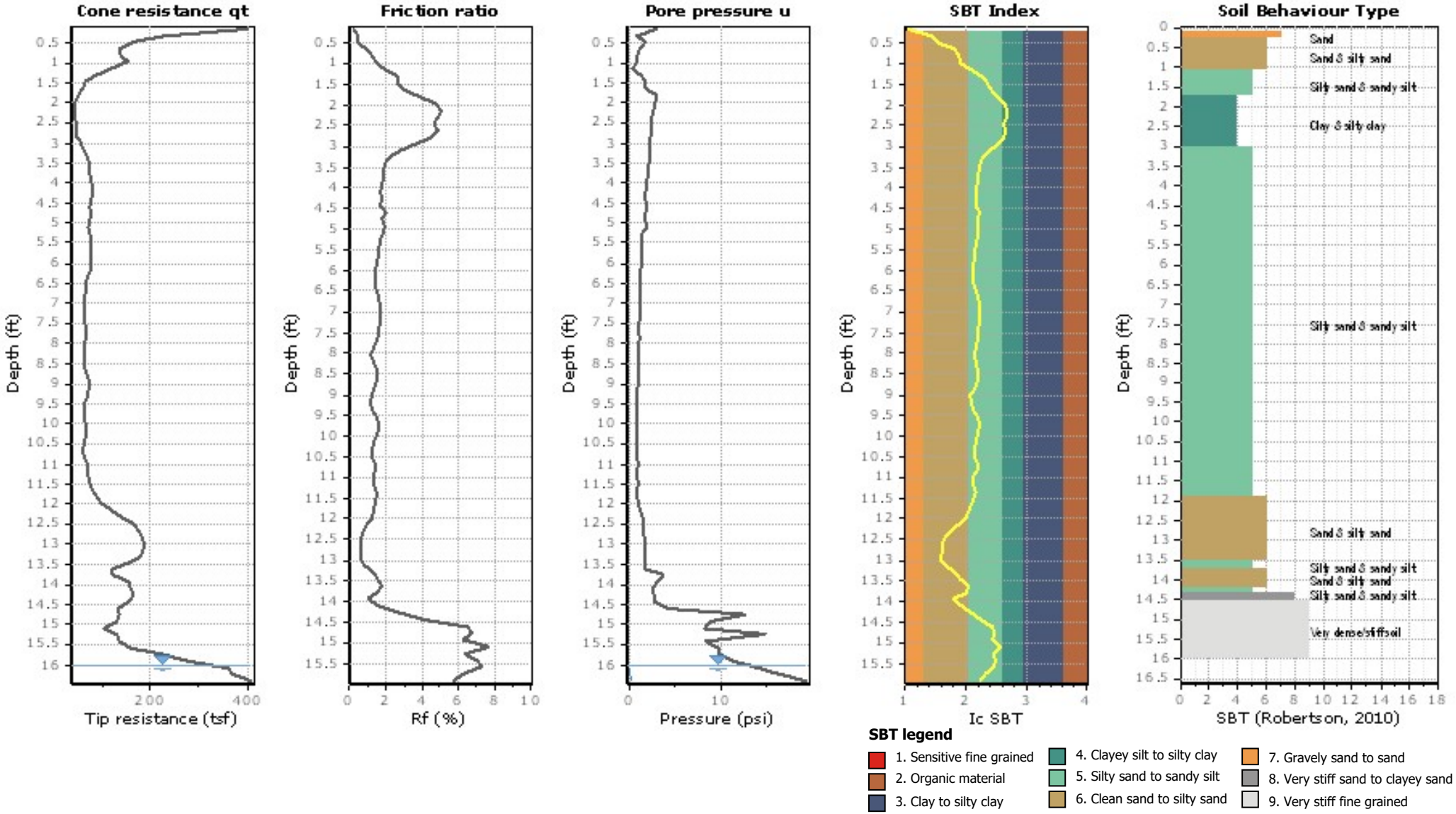

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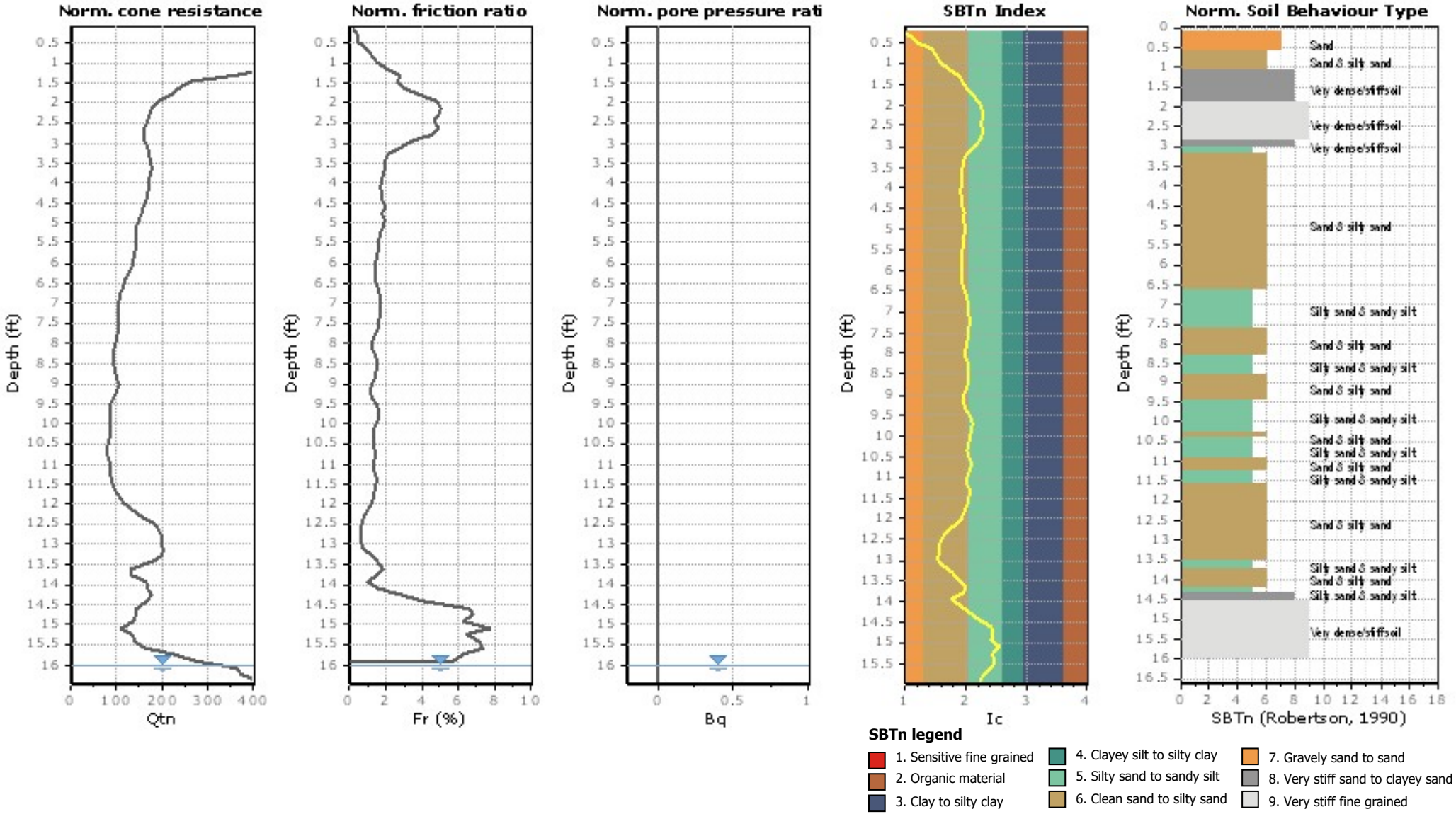

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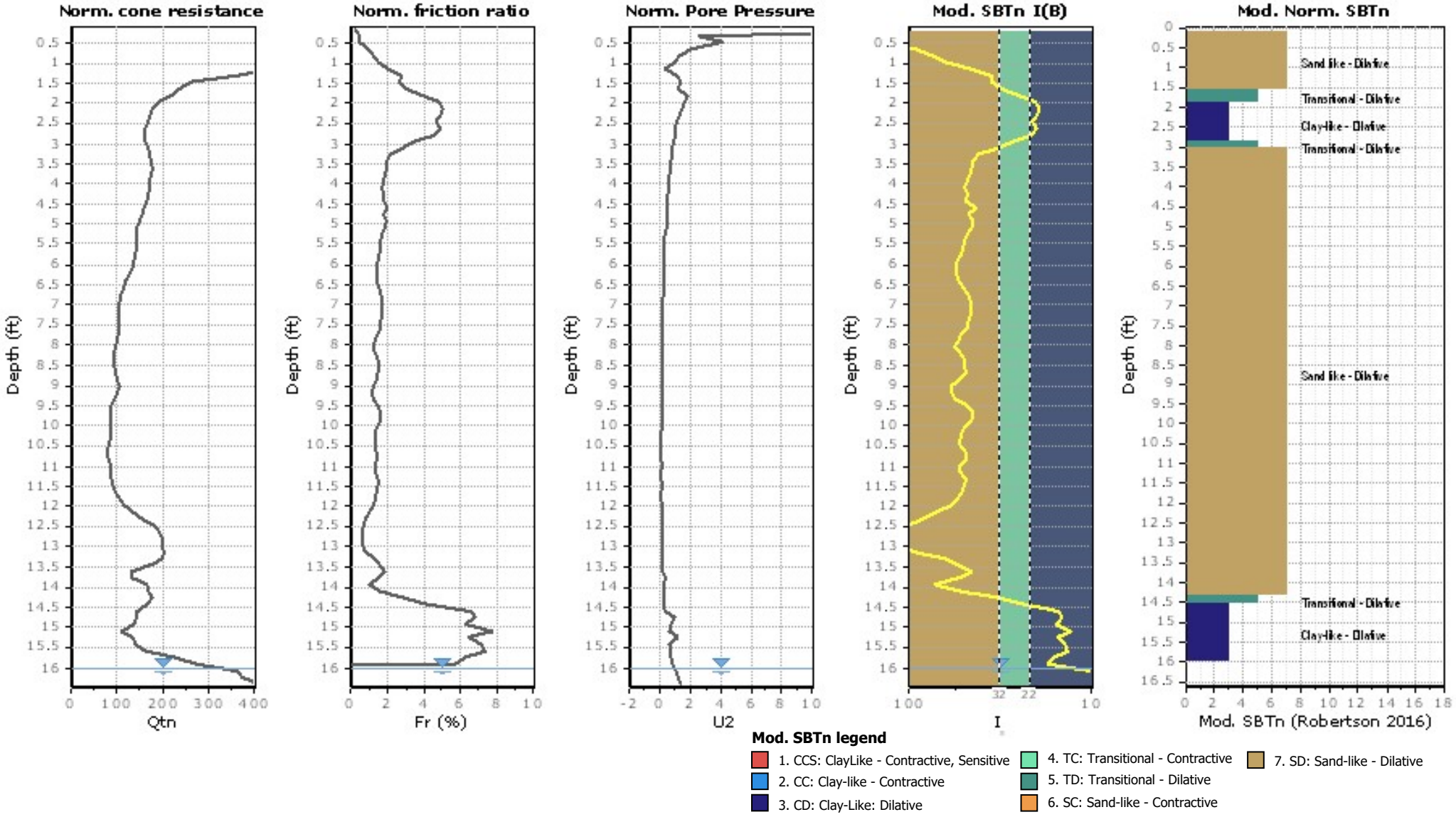

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Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
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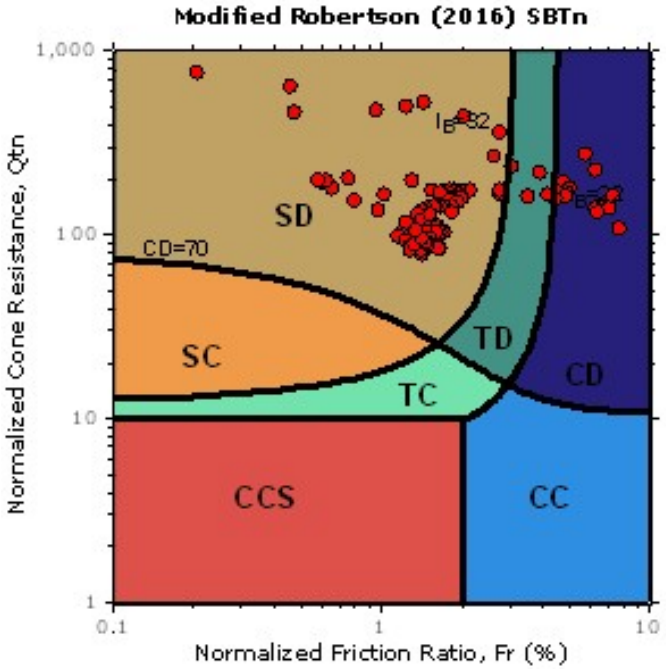
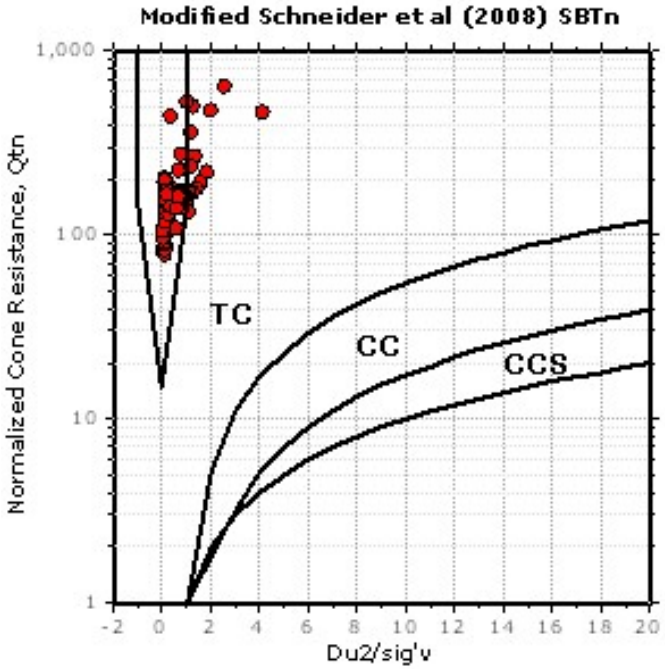
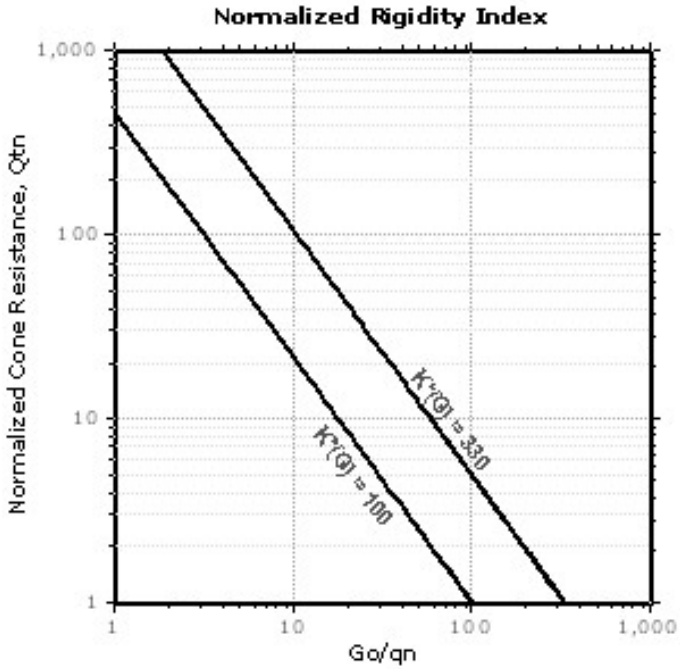
Cone Type: 15cm
Cone Operator: JM-GM

Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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CPT: CPT-04B

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Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
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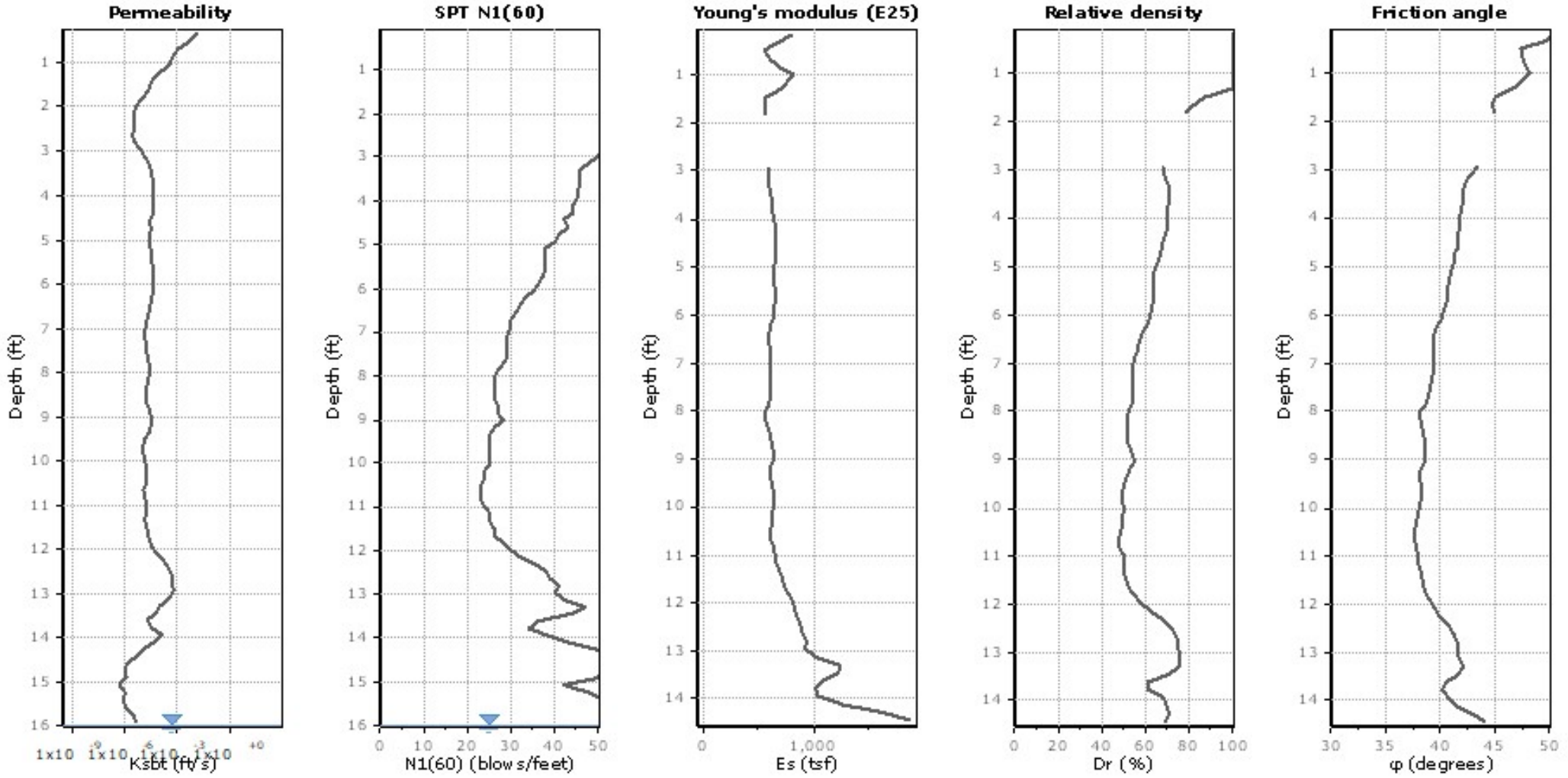
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

Middle Earth Geo Testing, Inc.

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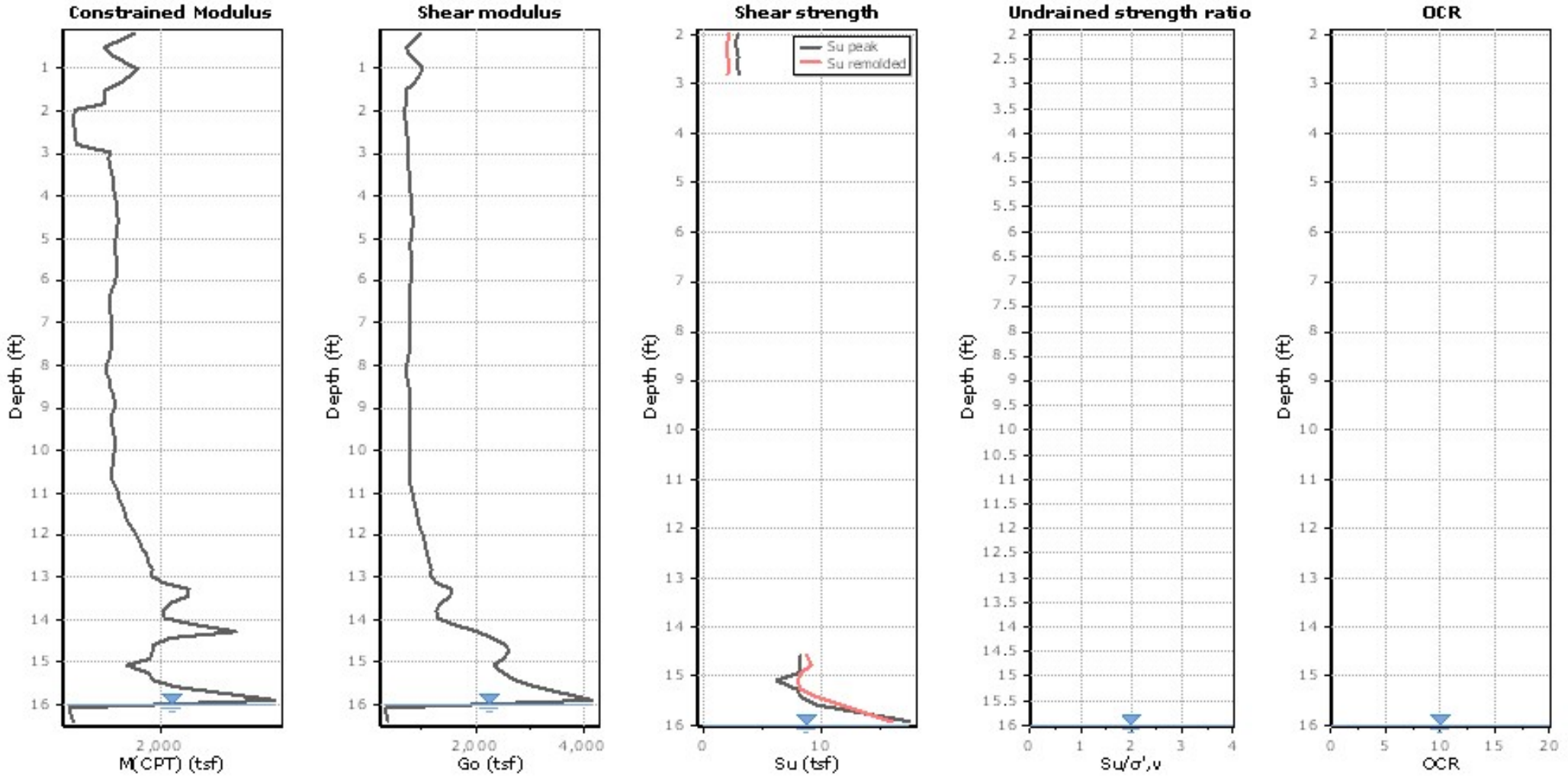
CPT: CPT-04B

Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

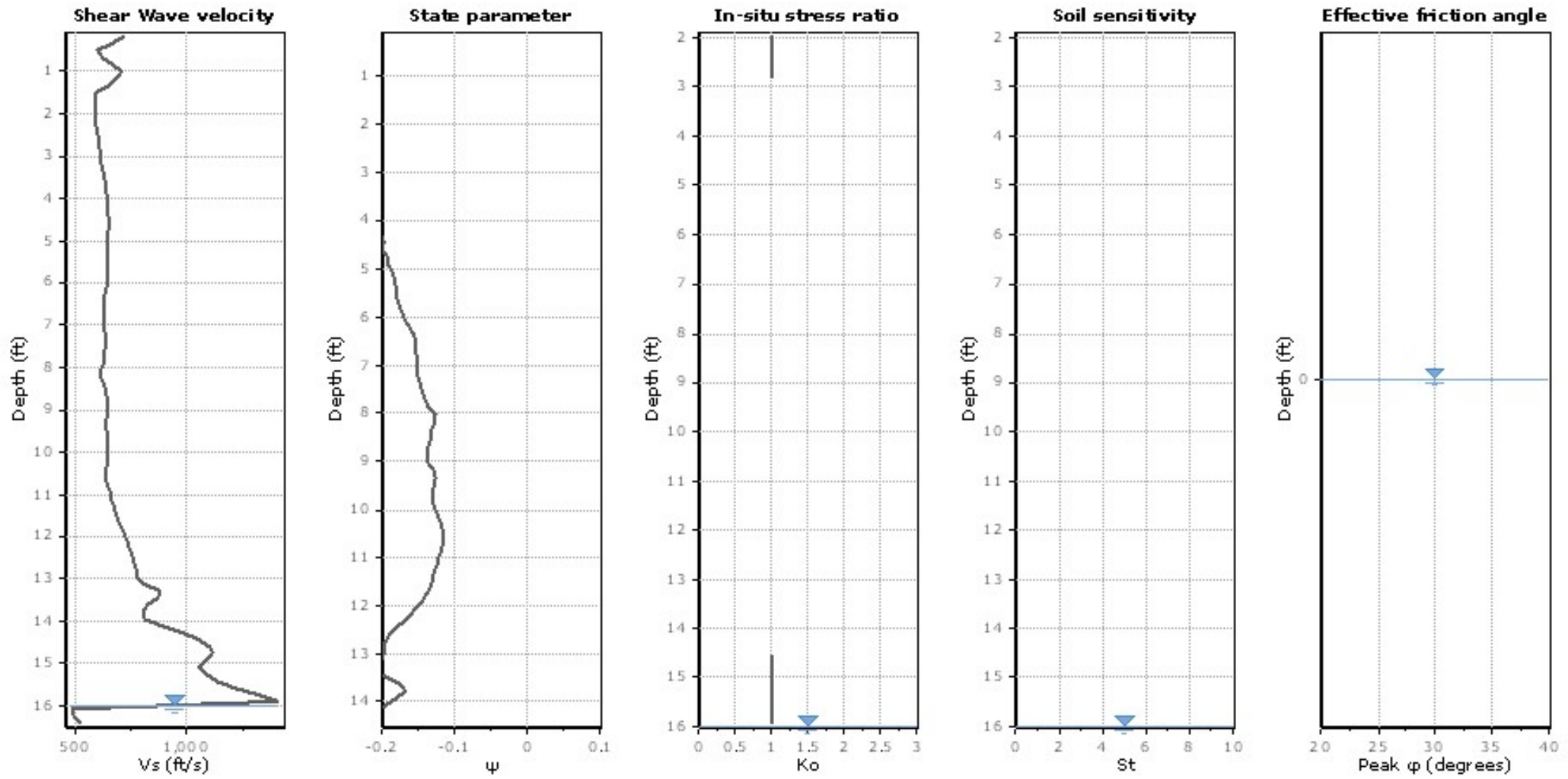
Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-04B
Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM



Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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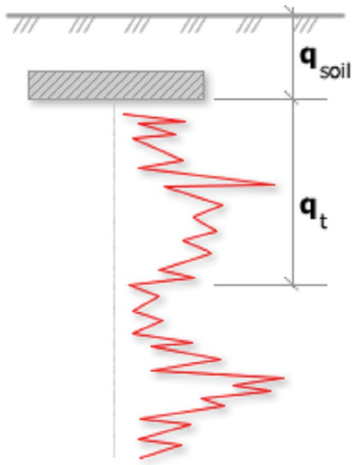
CPT: CPT-04B

Total depth: 16.40 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

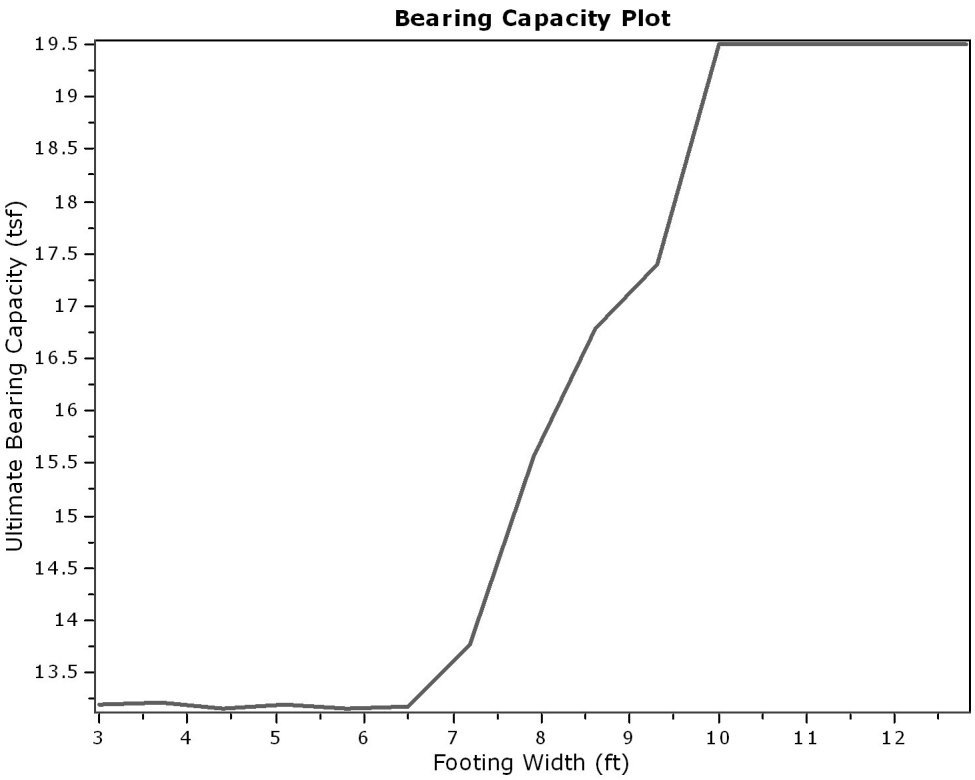
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	65.44	0.20	0.10	13.18
2	3.70	1.60	7.15	65.57	0.20	0.10	13.21
3	4.40	1.60	8.20	65.31	0.20	0.10	13.16
4	5.10	1.60	9.25	65.52	0.20	0.10	13.20
5	5.80	1.60	10.30	65.30	0.20	0.10	13.16
6	6.50	1.60	11.35	65.38	0.20	0.10	13.17
7	7.20	1.60	12.40	68.35	0.20	0.10	13.77
8	7.90	1.60	13.45	77.37	0.20	0.10	15.57
9	8.60	1.60	14.50	83.49	0.20	0.10	16.79
10	9.30	1.60	15.55	86.55	0.20	0.10	17.41
11	10.00	1.60	16.60	97.04	0.20	0.10	19.50
12	10.70	1.60	17.65	97.04	0.20	0.10	19.50
13	11.40	1.60	18.70	97.04	0.20	0.10	19.50
14	12.10	1.60	19.75	97.04	0.20	0.10	19.50
15	12.80	1.60	20.80	97.04	0.20	0.10	19.50

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
$\alpha = 14$ for $Q_{tn} > 14$
$\alpha = Q_{tn}$ for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

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CPT: CPT-05

Total depth: 17.88 ft, Date: 4/13/2023
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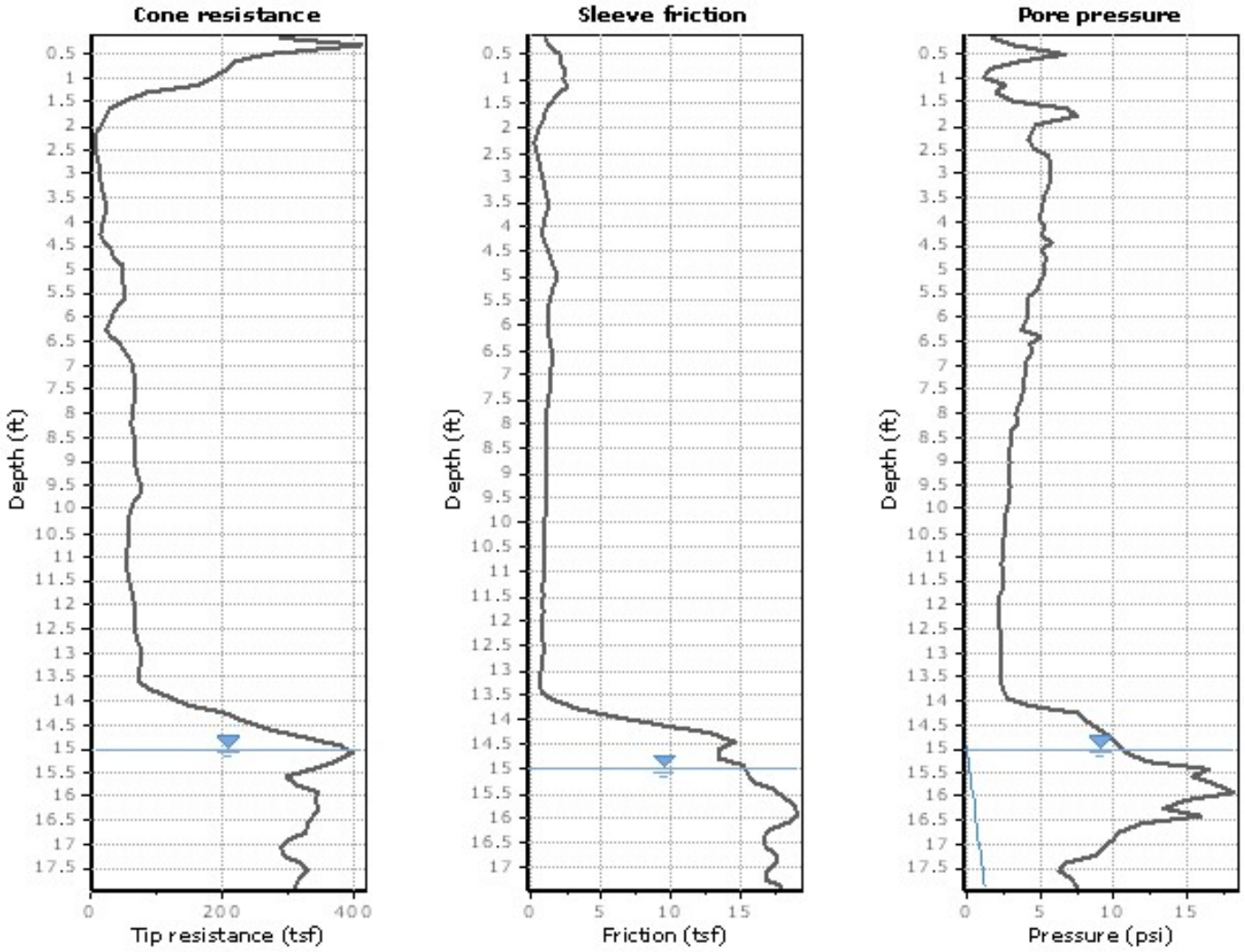
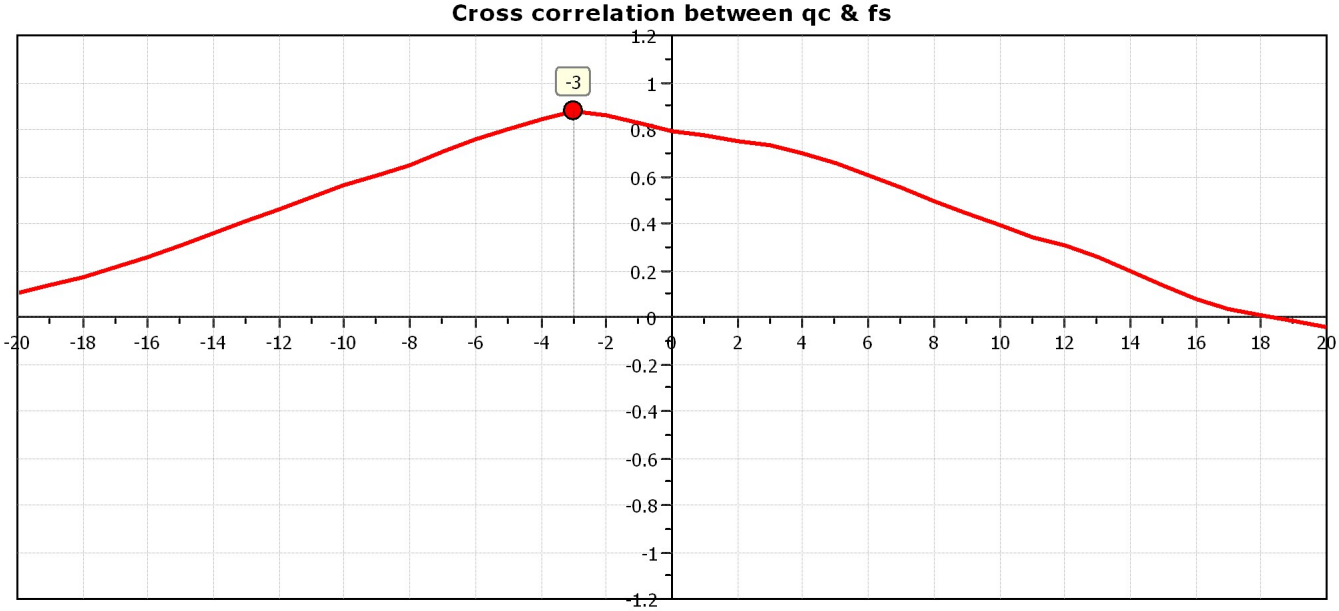
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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Location: **Arcata**

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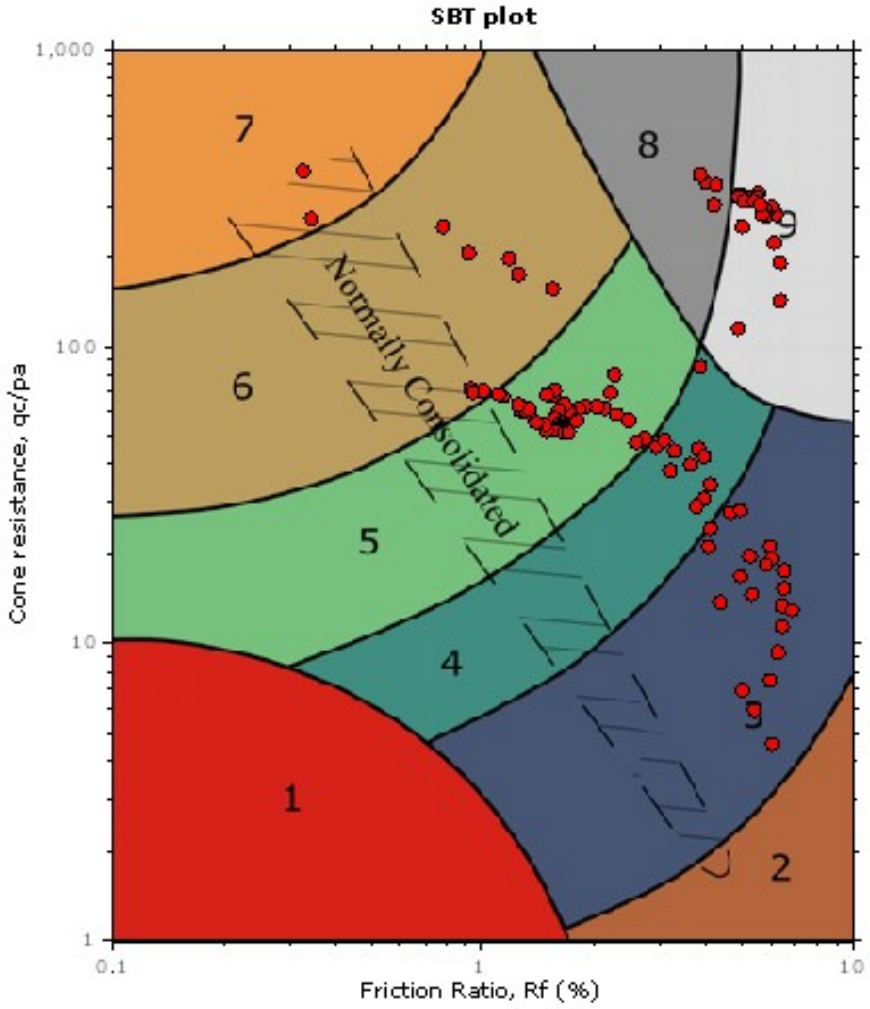
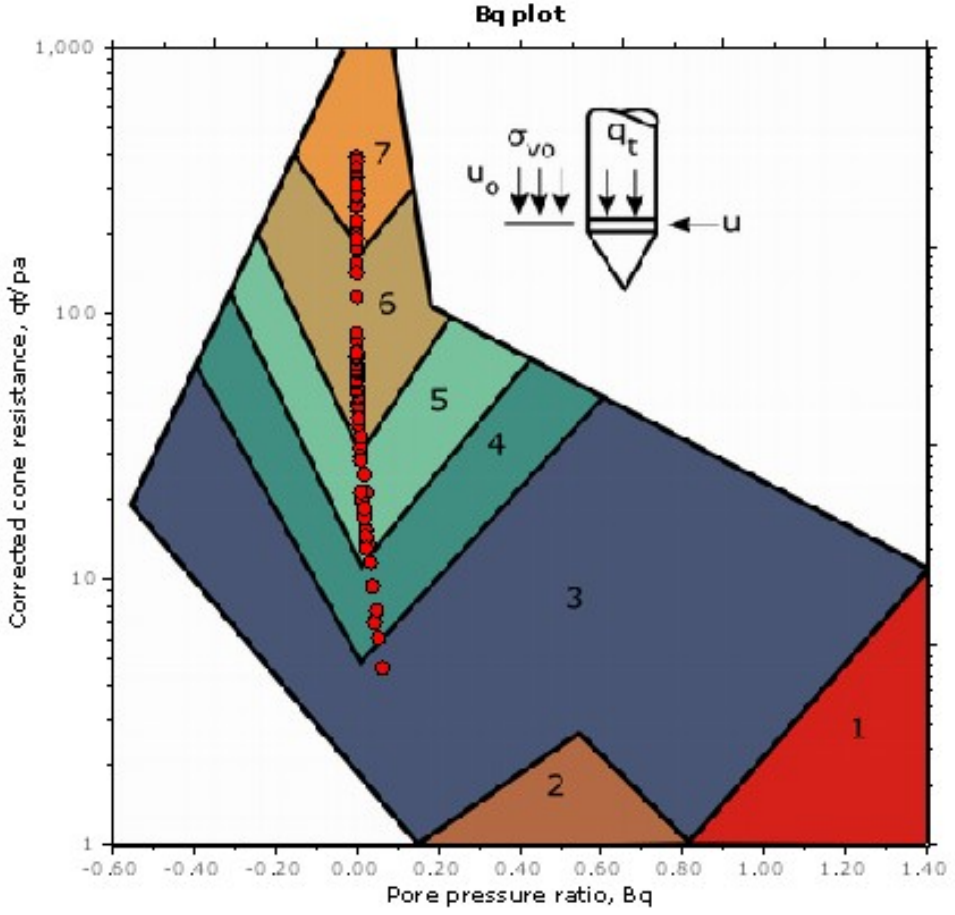
SBT - Bq plots





SBT legend

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

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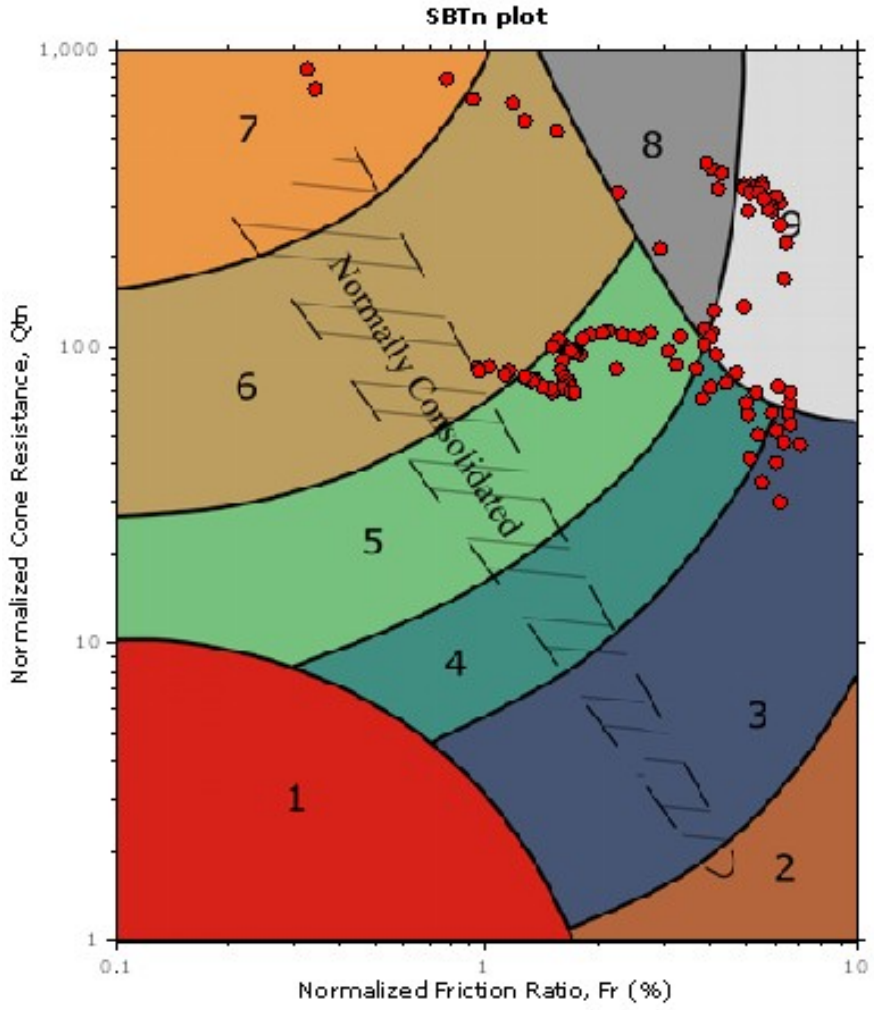
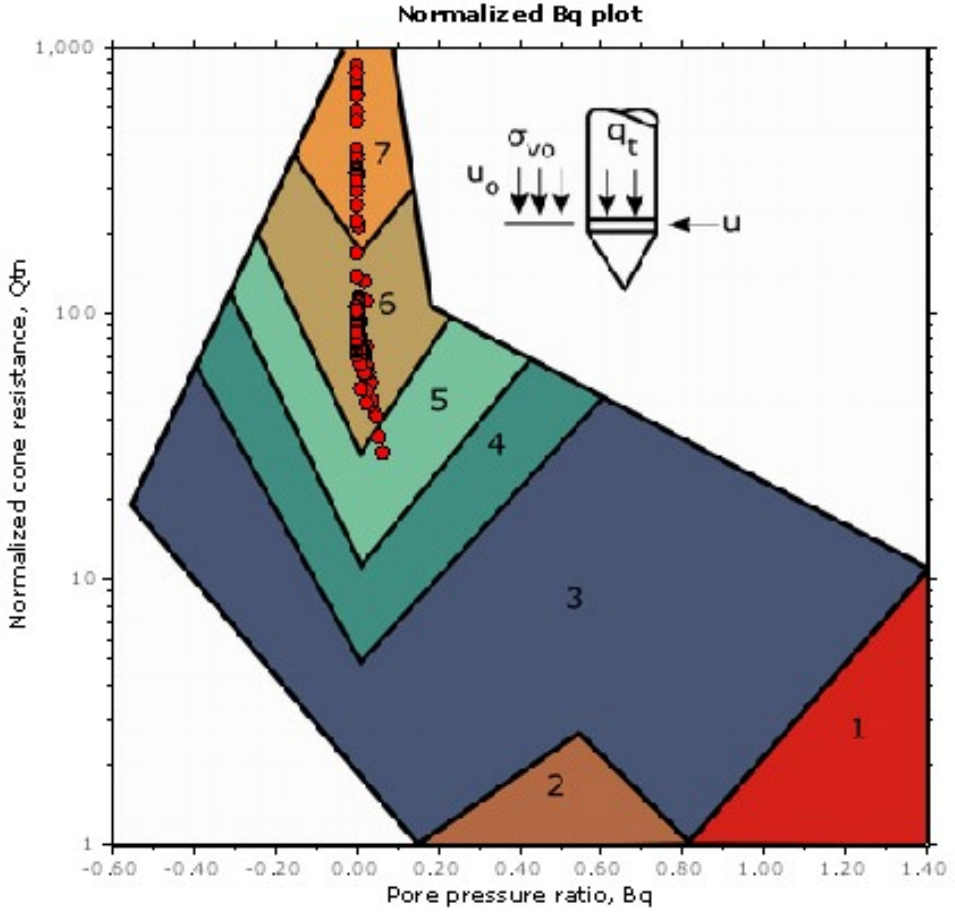
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

SBT - Bq plots (normalized)





SBTn legend

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

Middle Earth Geo Testing, Inc.

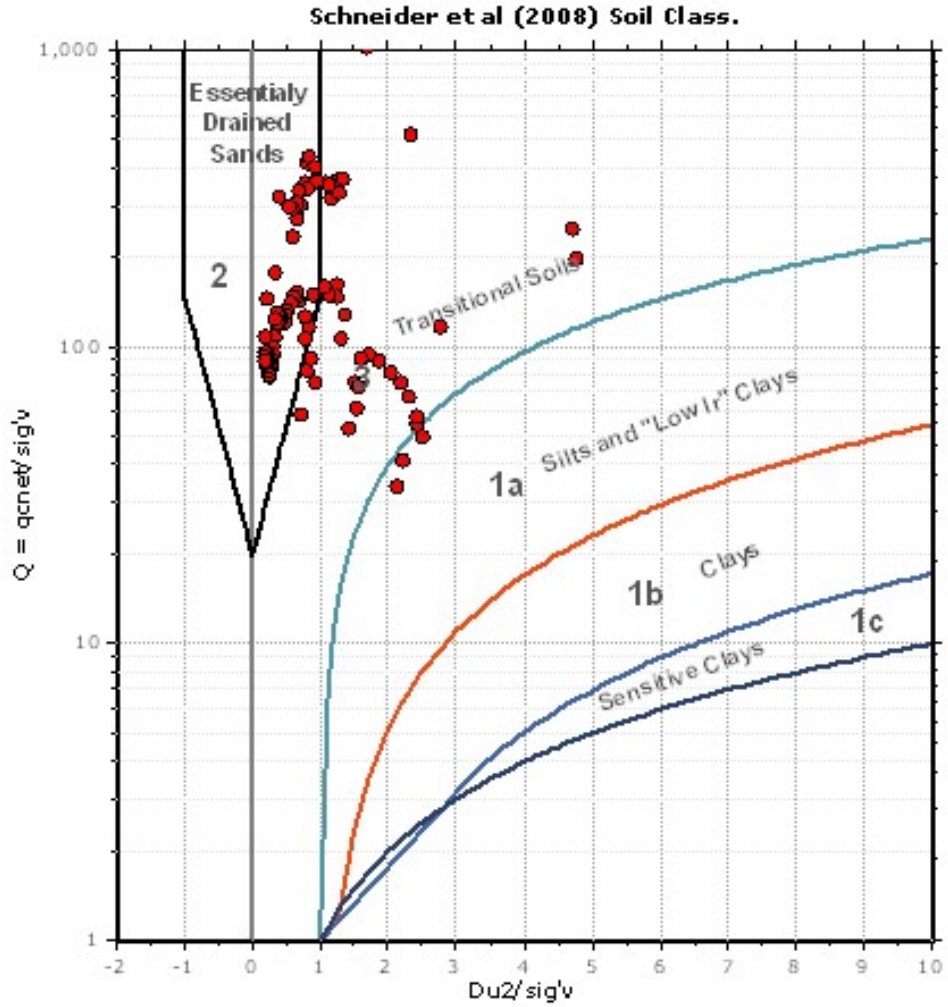
www.middleearthgeo.com

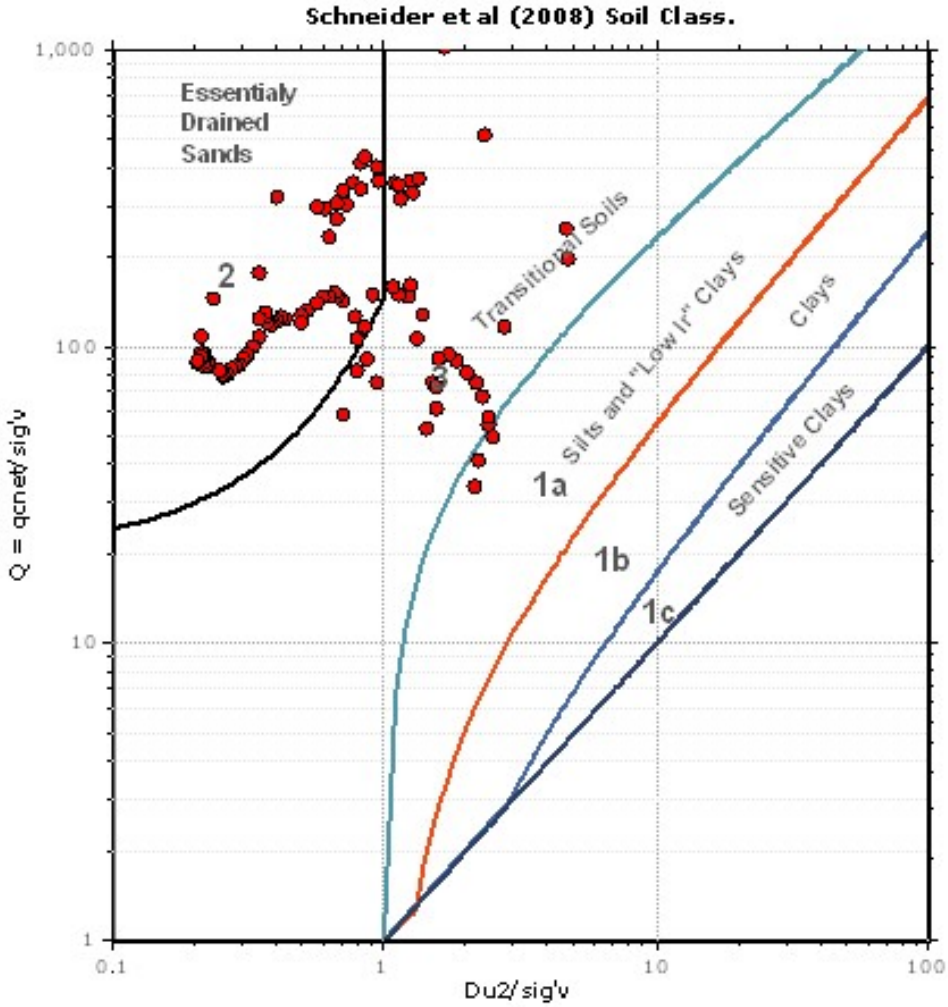
CPT: CPT-05

Total depth: 17.88 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

Bq plots (Schneider)





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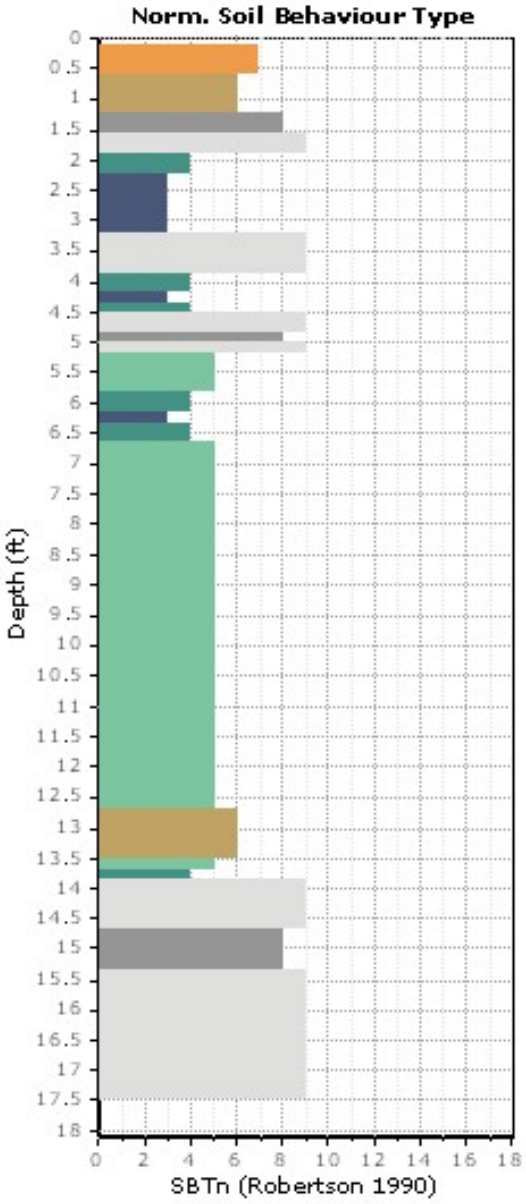

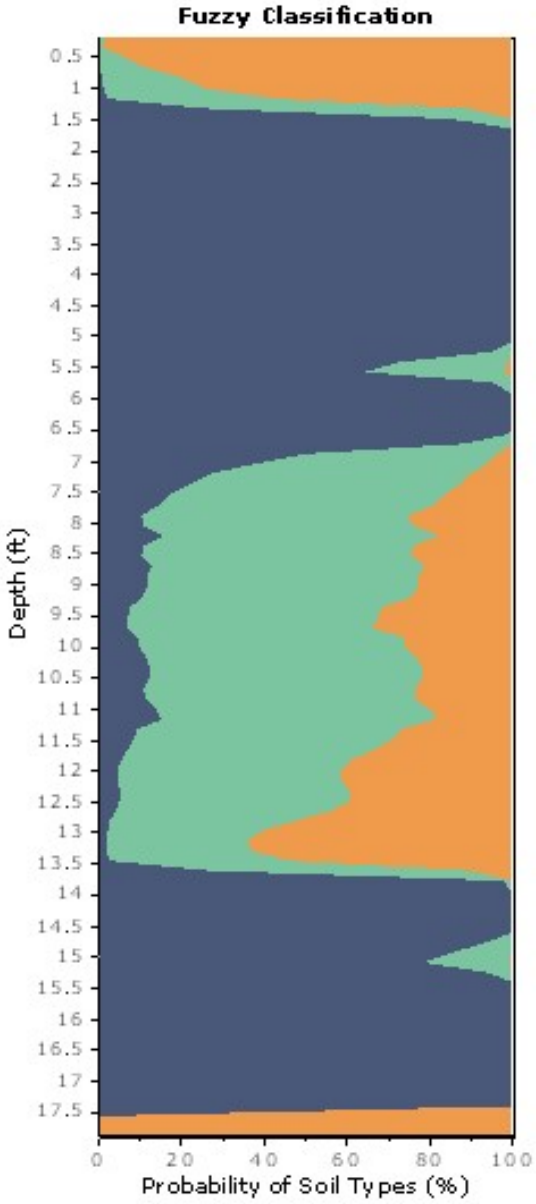

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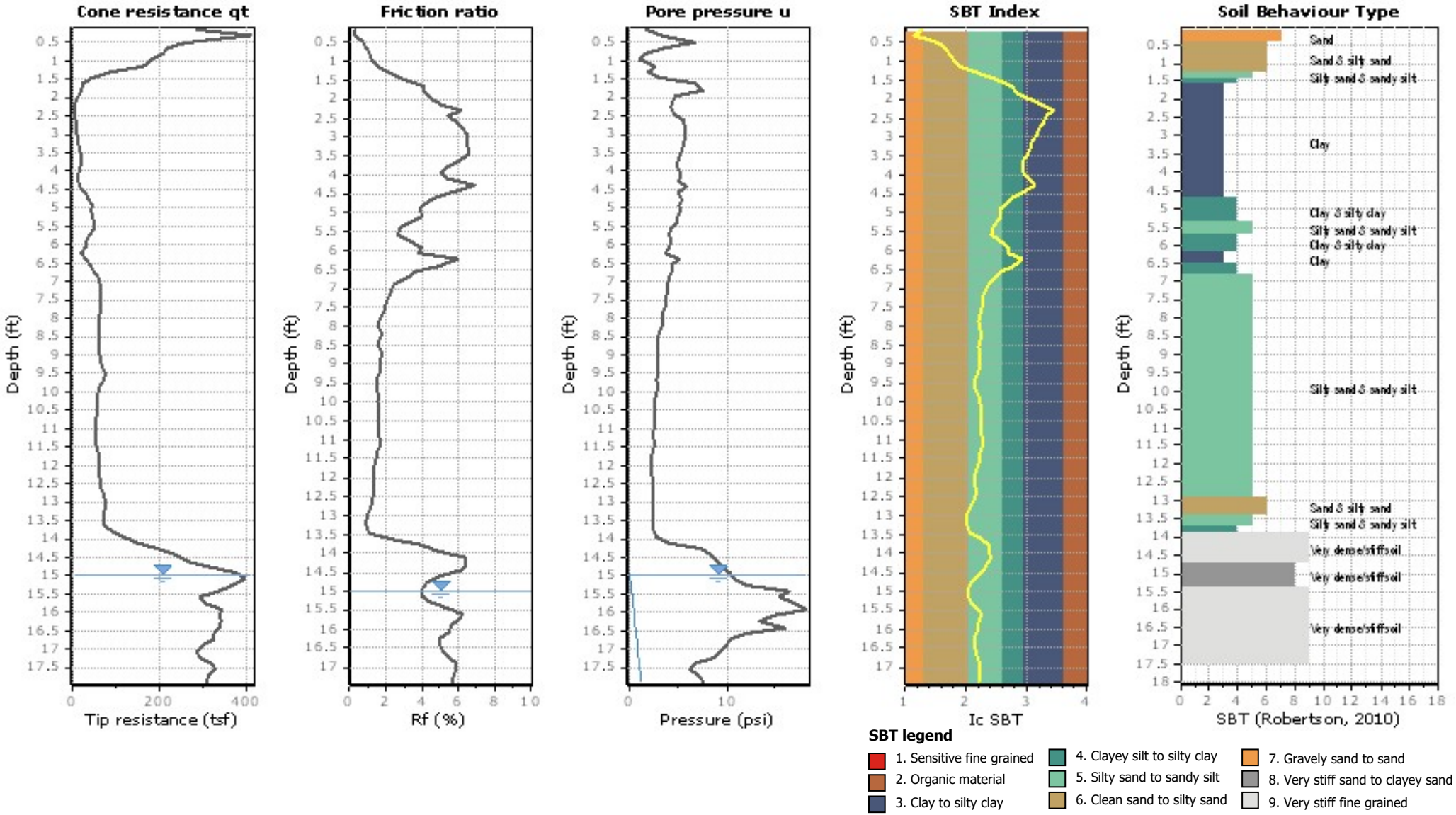

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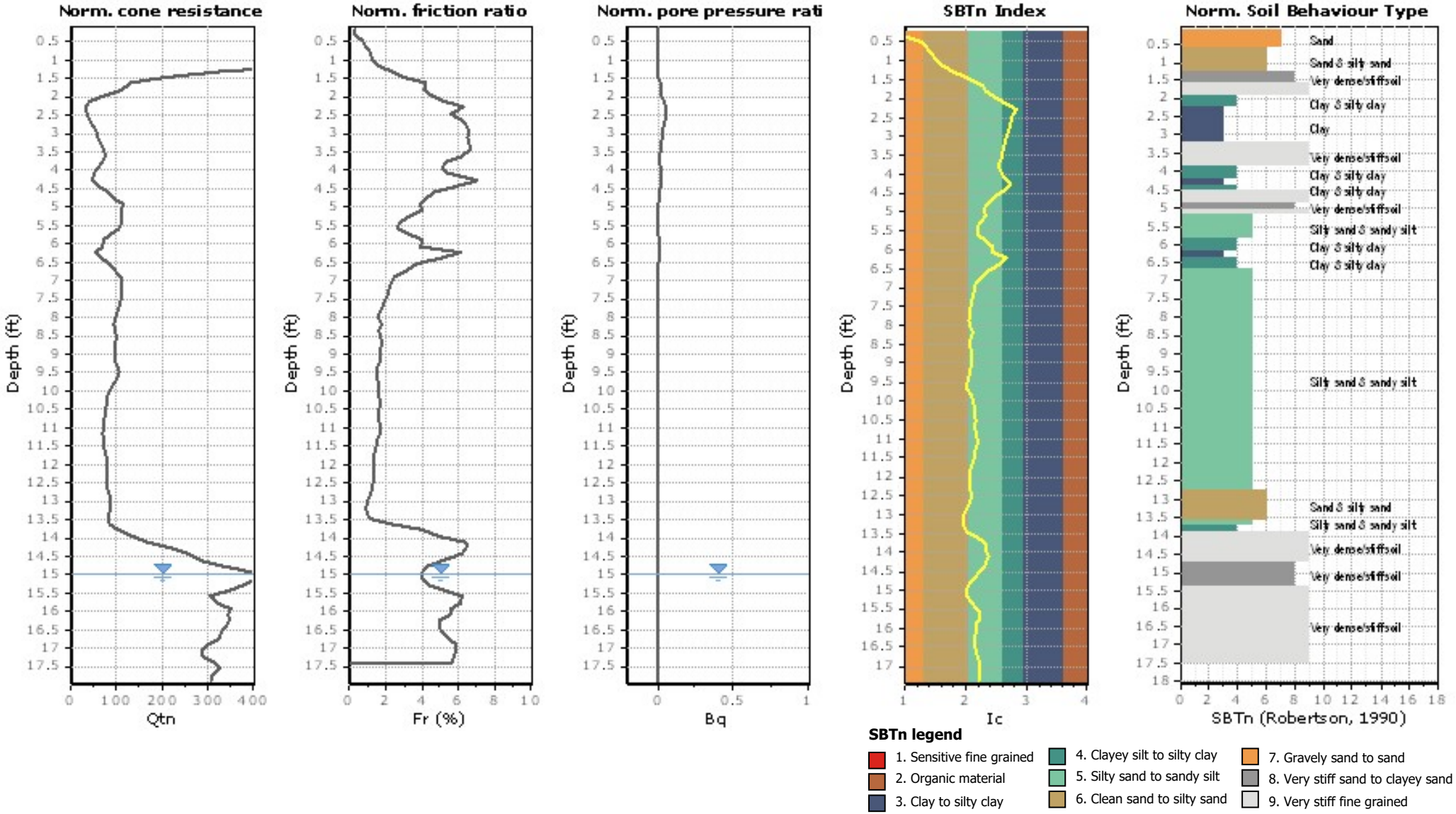

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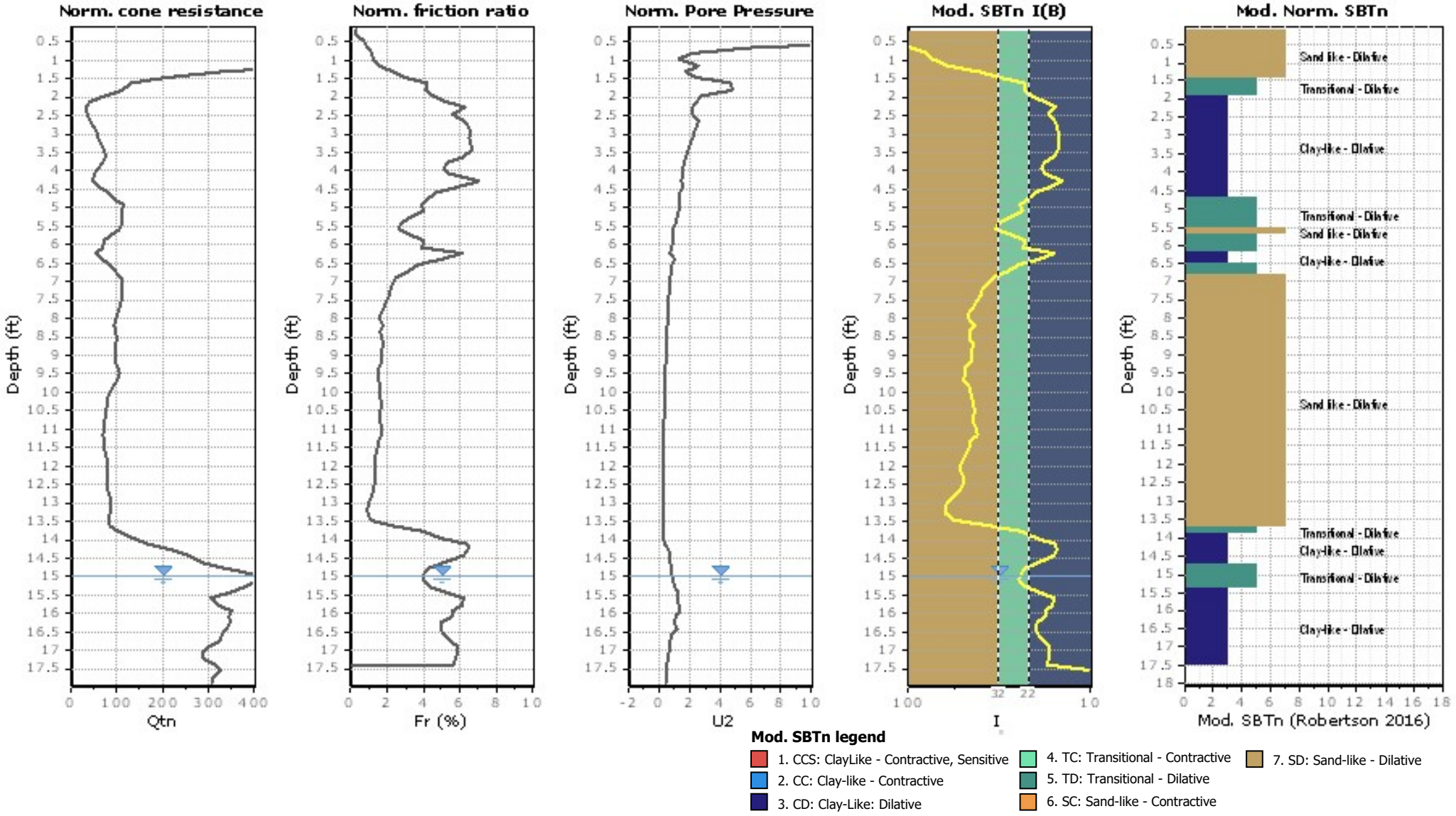

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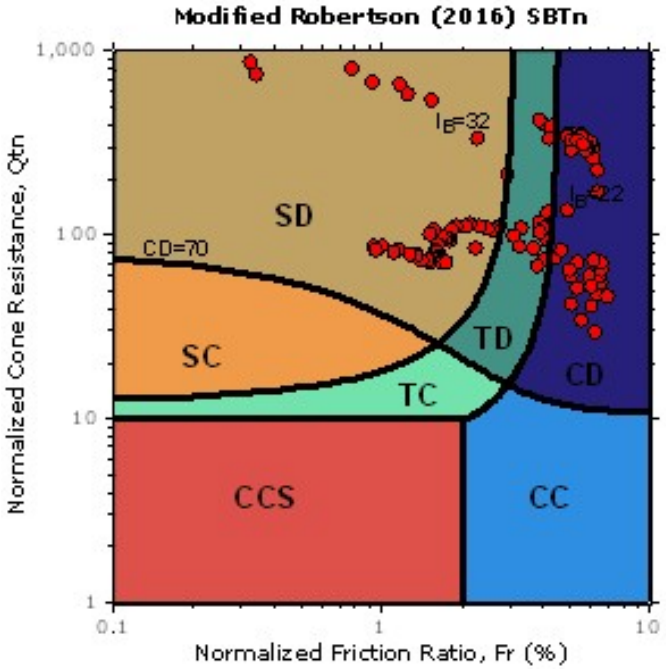
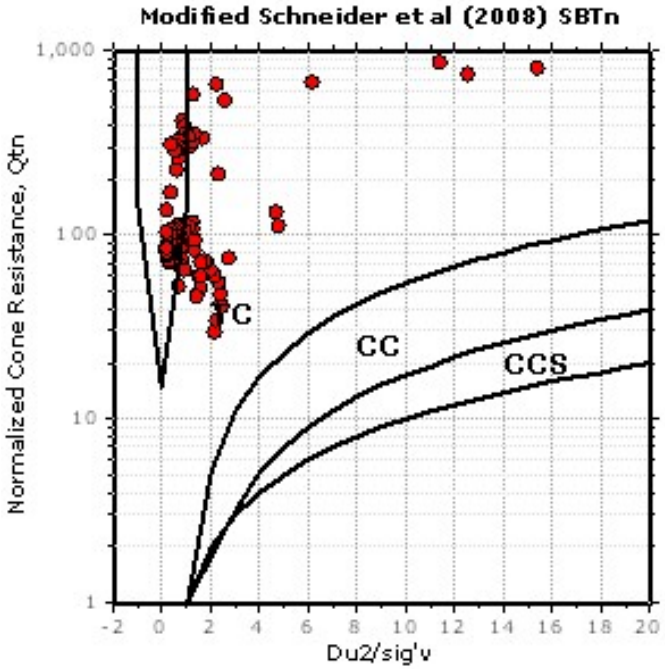
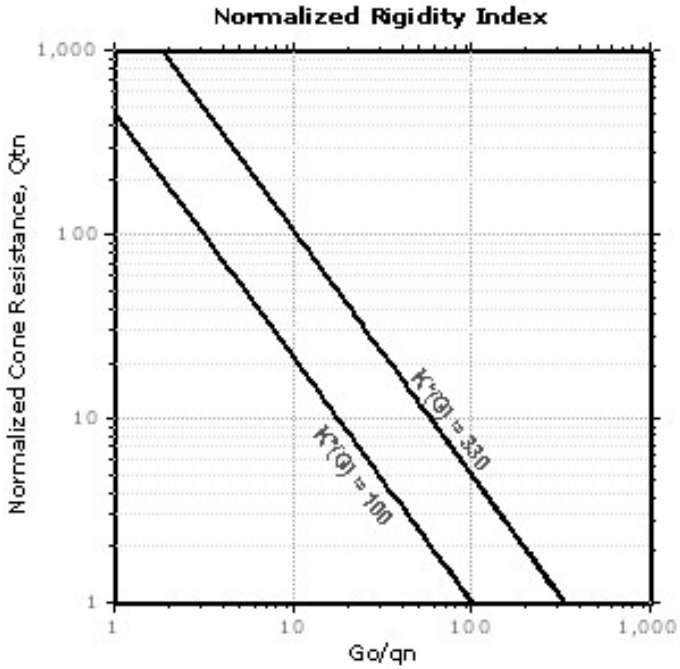
Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

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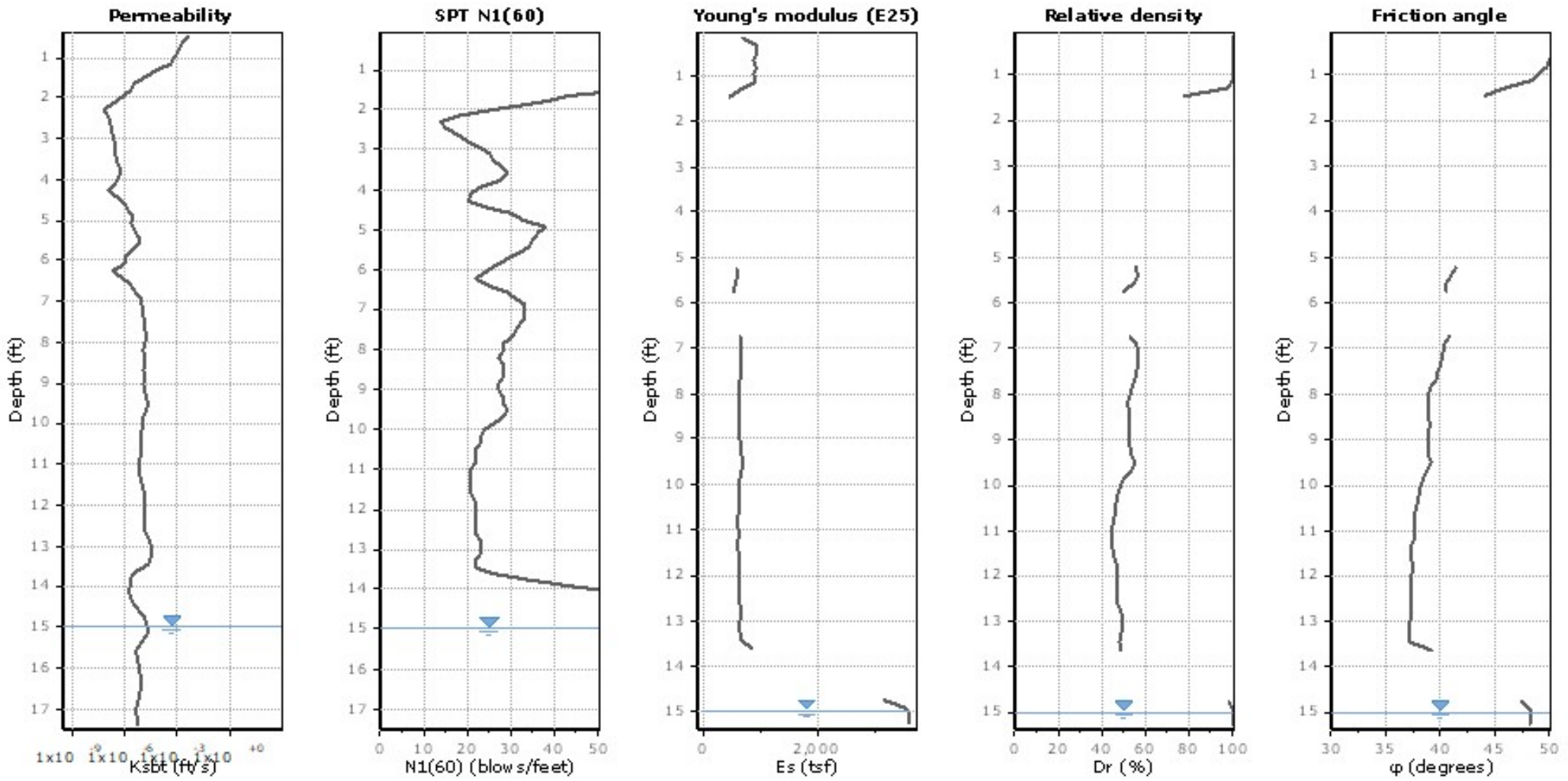

Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

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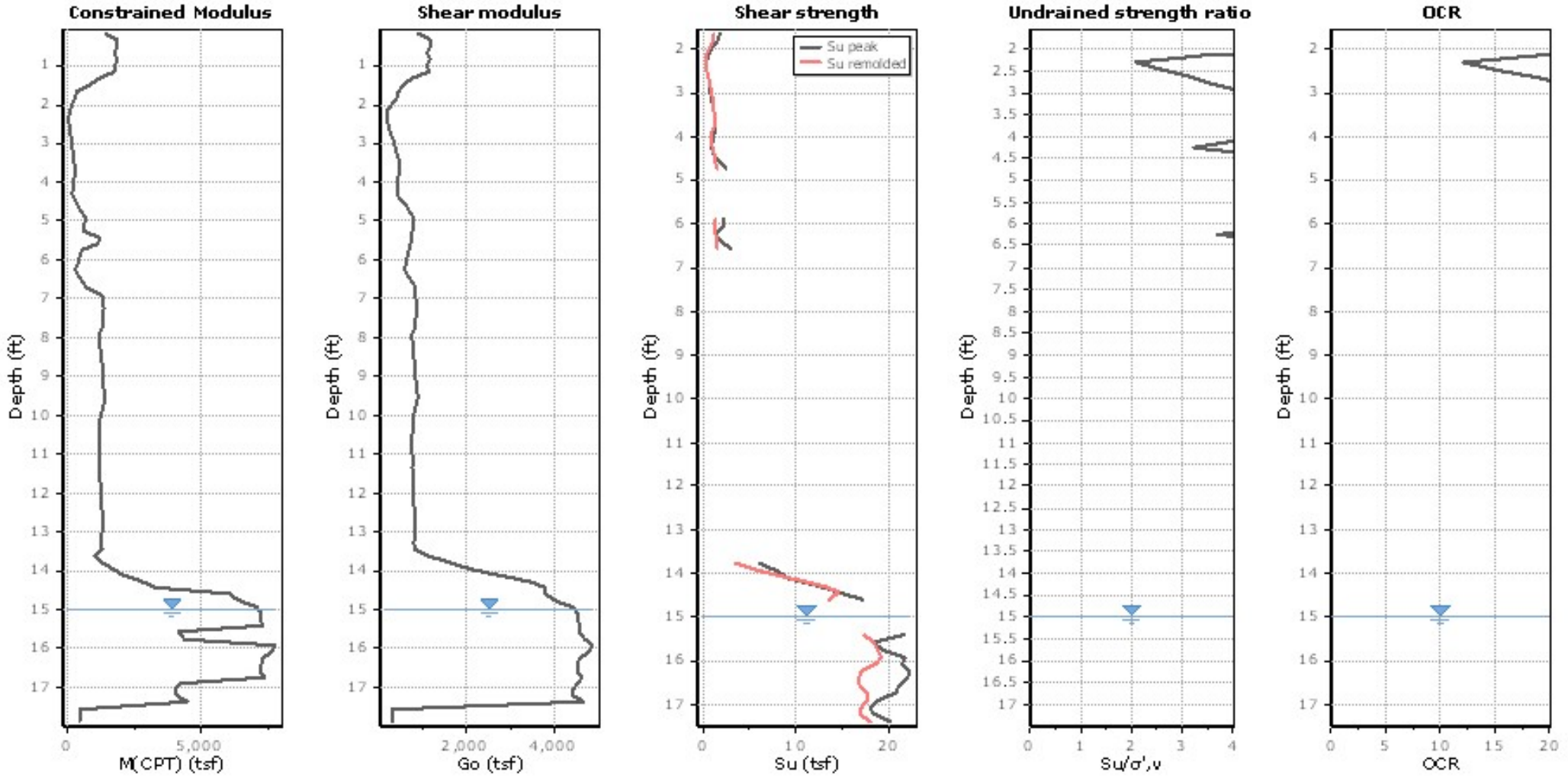

Calculation parameters

Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

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CPT: CPT-05

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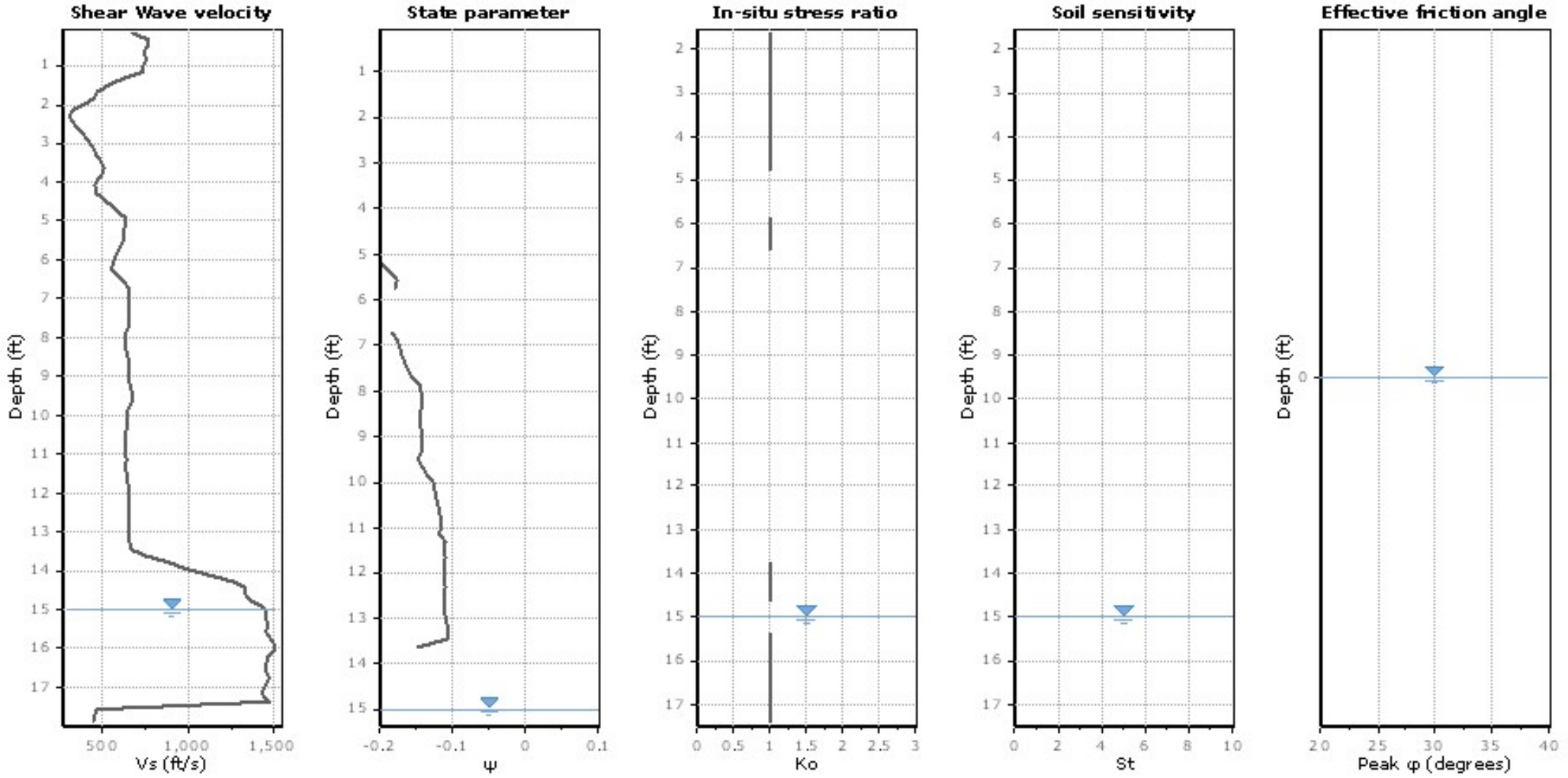

Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

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CPT: CPT-05

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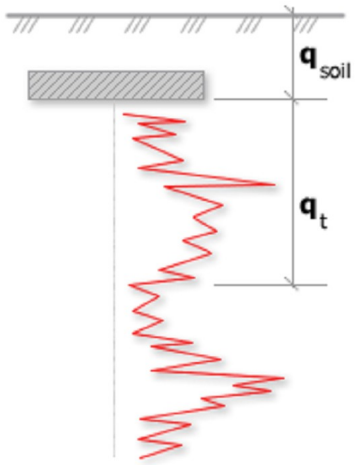
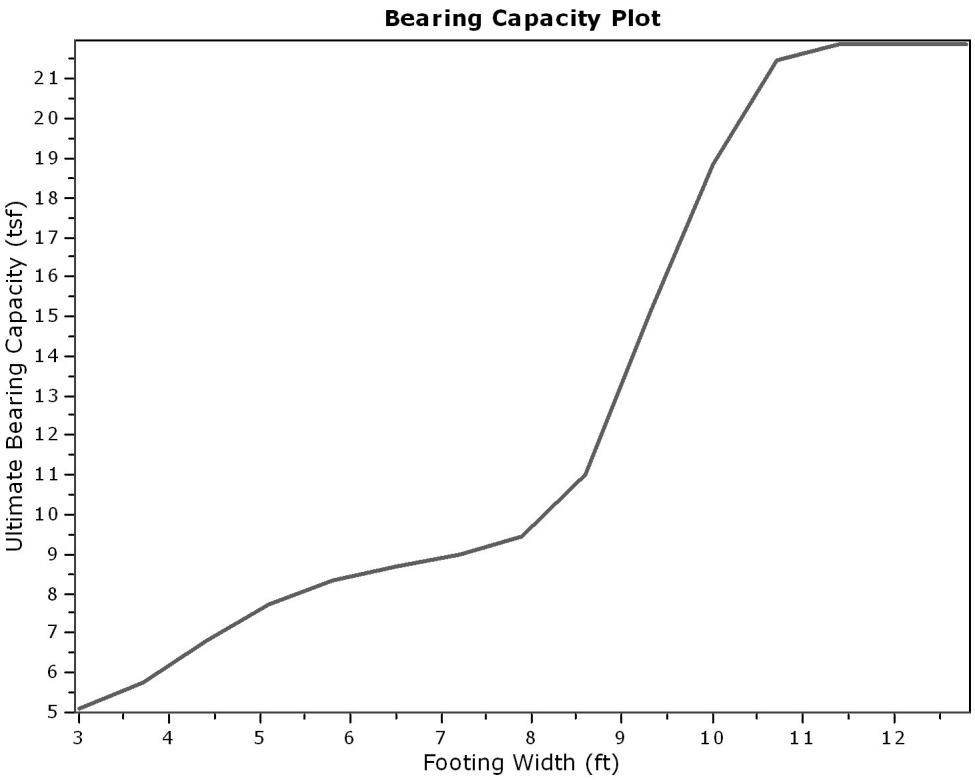


Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	25.02	0.20	0.10	5.10
2	3.70	1.60	7.15	28.35	0.20	0.10	5.77
3	4.40	1.60	8.20	33.67	0.20	0.10	6.83
4	5.10	1.60	9.25	38.08	0.20	0.10	7.71
5	5.80	1.60	10.30	41.27	0.20	0.10	8.35
6	6.50	1.60	11.35	42.86	0.20	0.10	8.67
7	7.20	1.60	12.40	44.58	0.20	0.10	9.01
8	7.90	1.60	13.45	46.78	0.20	0.10	9.45
9	8.60	1.60	14.50	54.49	0.20	0.10	10.99
10	9.30	1.60	15.55	74.69	0.20	0.10	15.03
11	10.00	1.60	16.60	93.76	0.20	0.10	18.85
12	10.70	1.60	17.65	106.83	0.20	0.10	21.46
13	11.40	1.60	18.70	108.90	0.20	0.10	21.88
14	12.10	1.60	19.75	108.90	0.20	0.10	21.88
15	12.80	1.60	20.80	108.90	0.20	0.10	21.88

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

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Cone Operator: JM-GM

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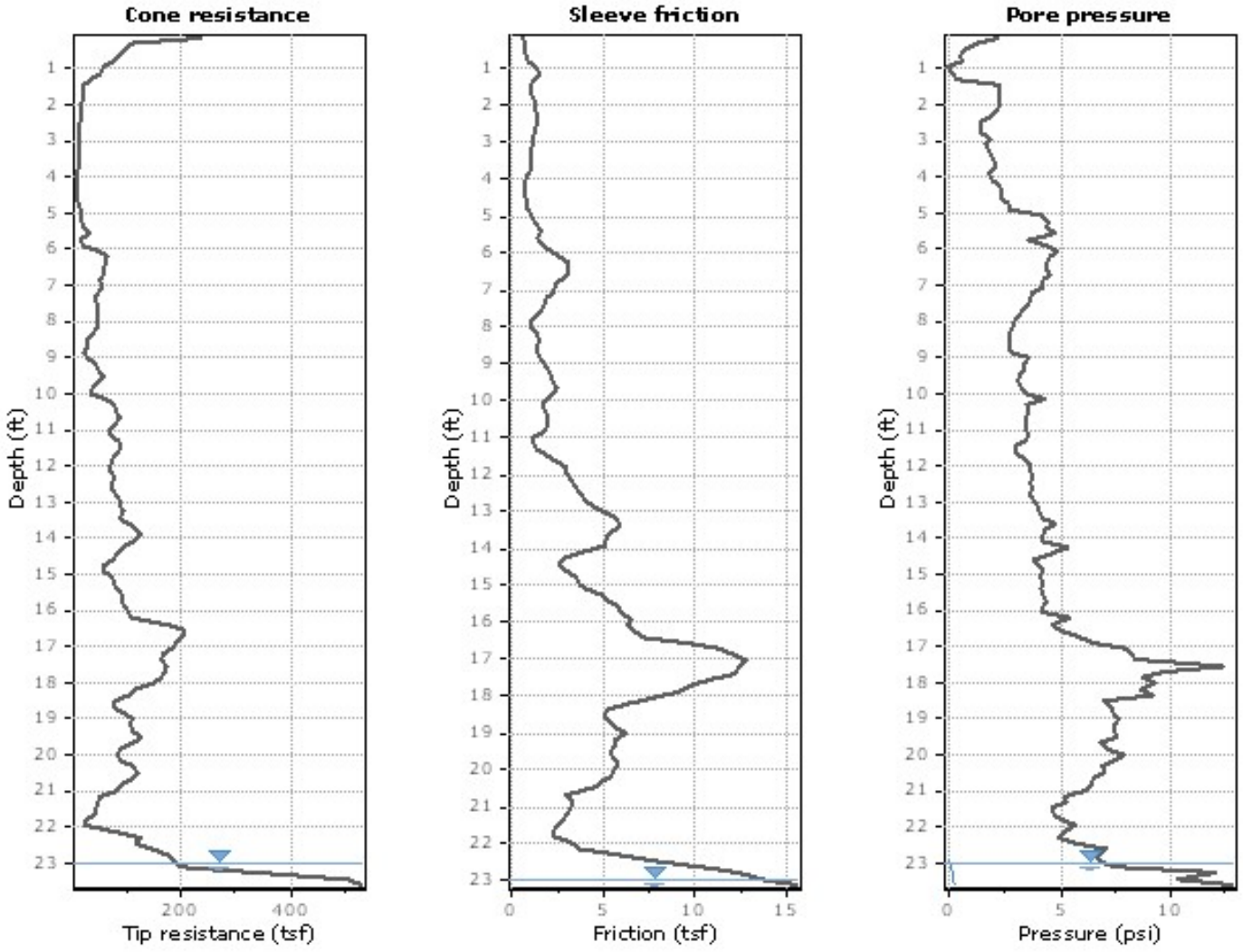
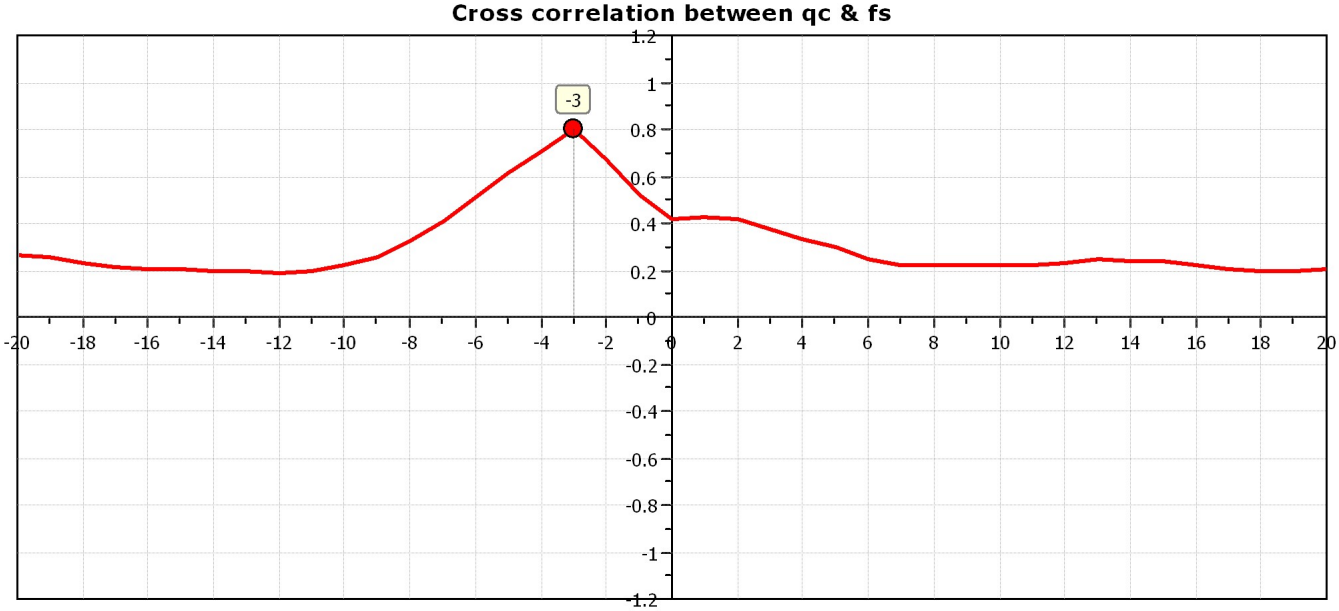


The plot below presents the cross correlation coeficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two sucessive CPT measurements).



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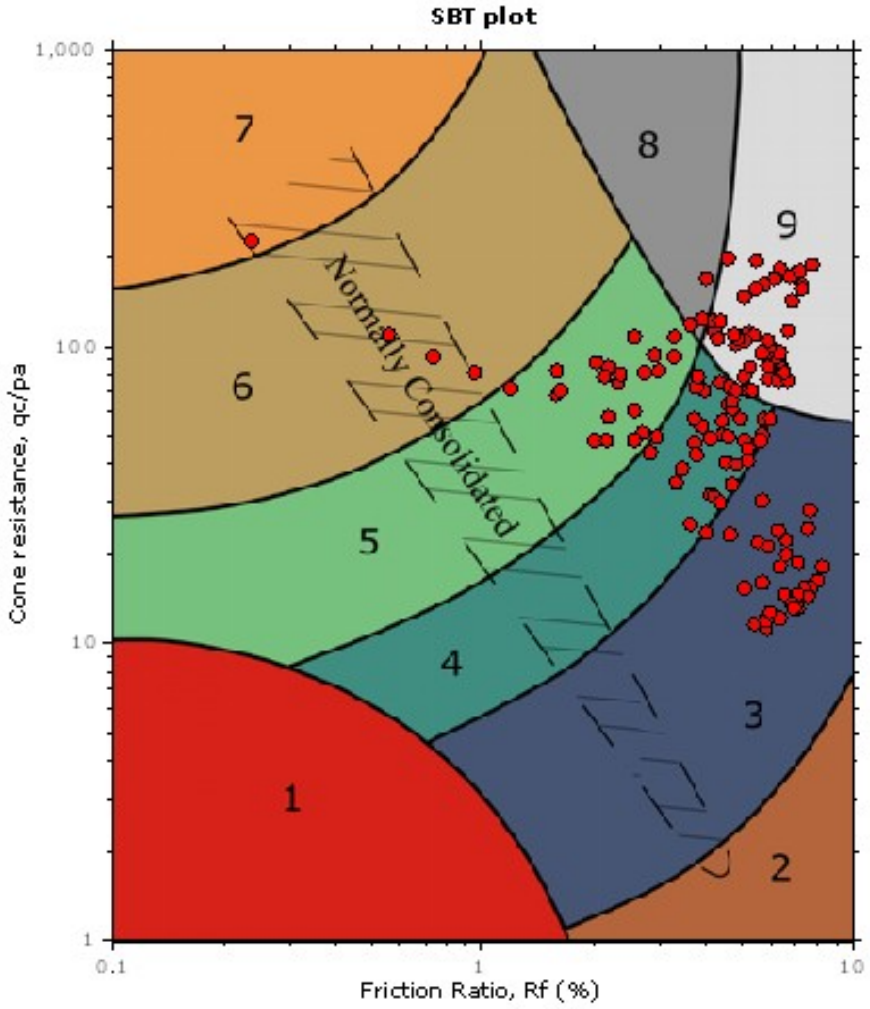
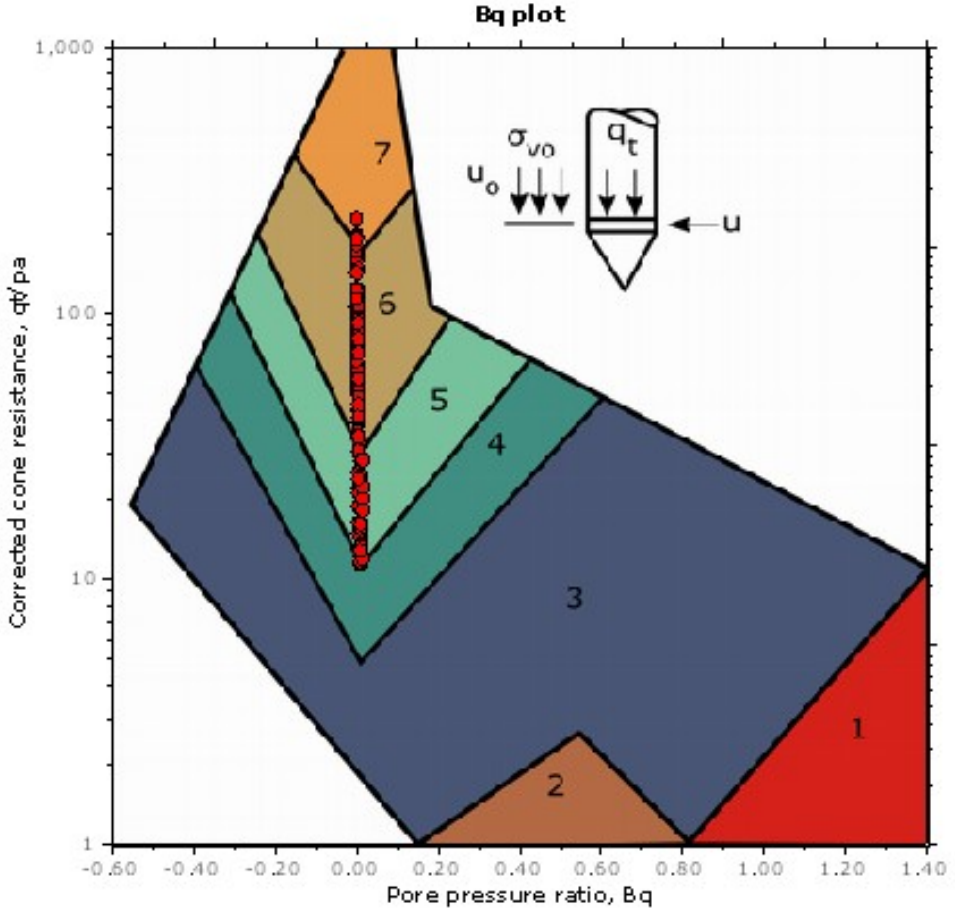
SBT - Bq plots





SBT legend

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3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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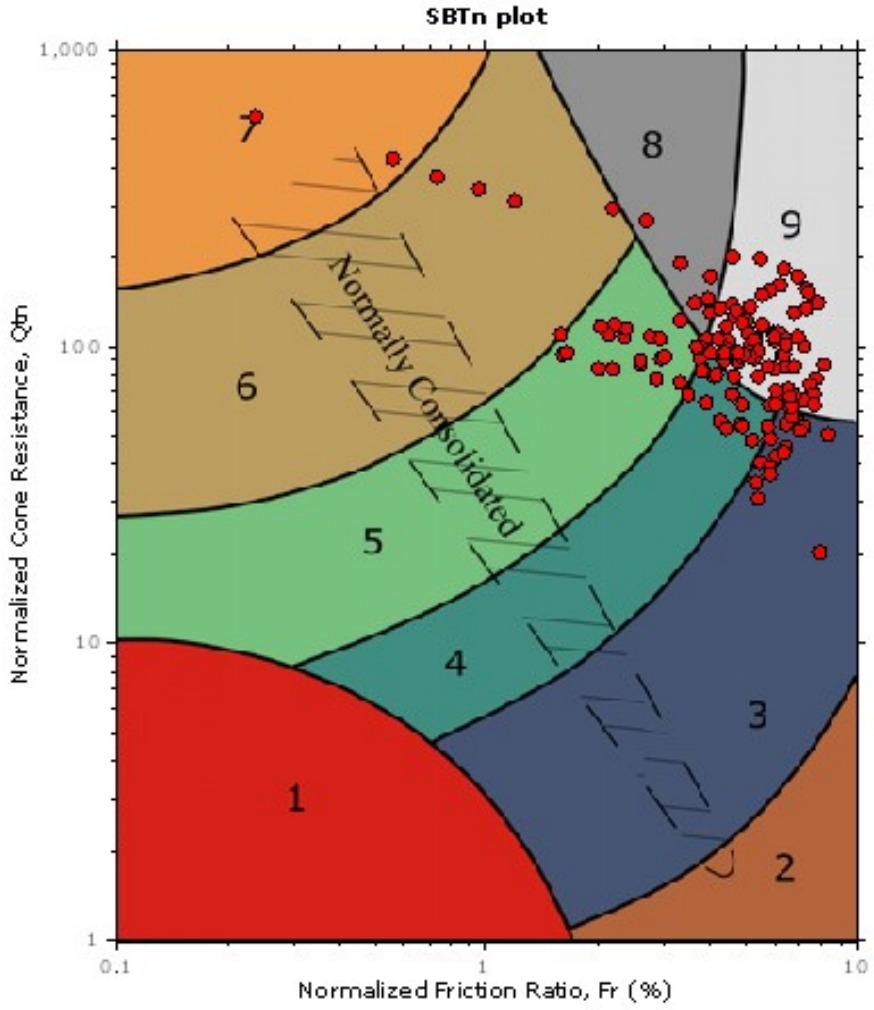

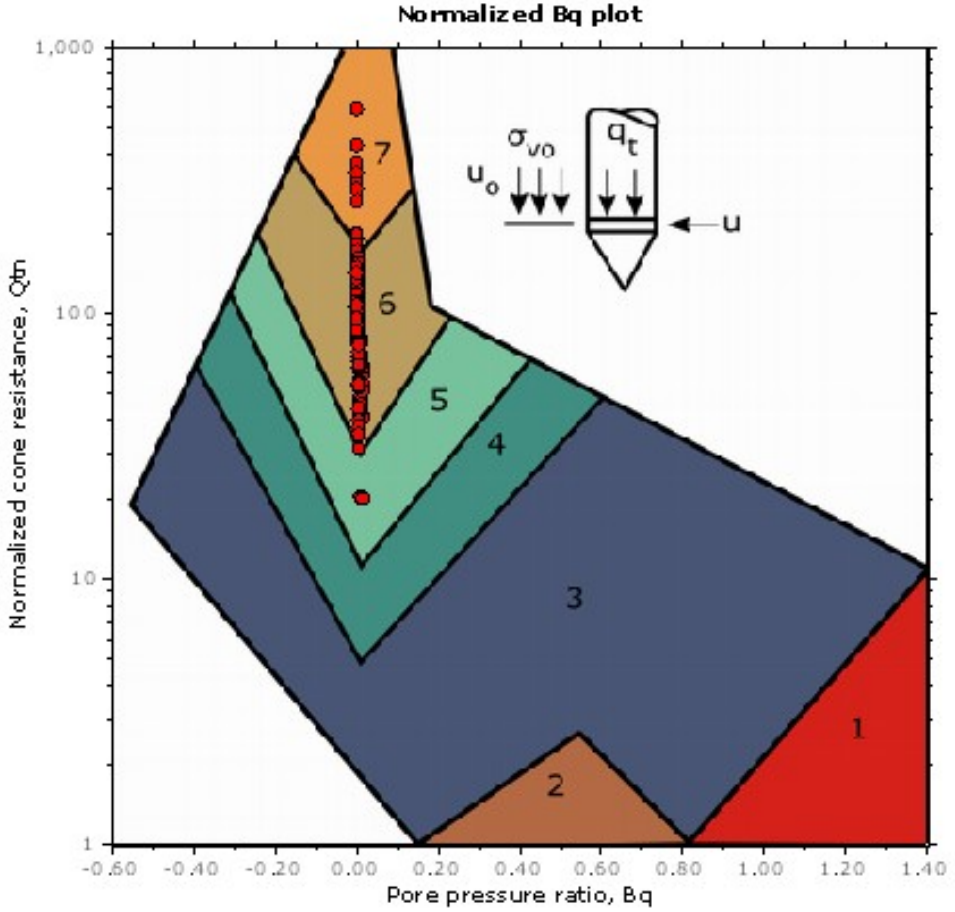

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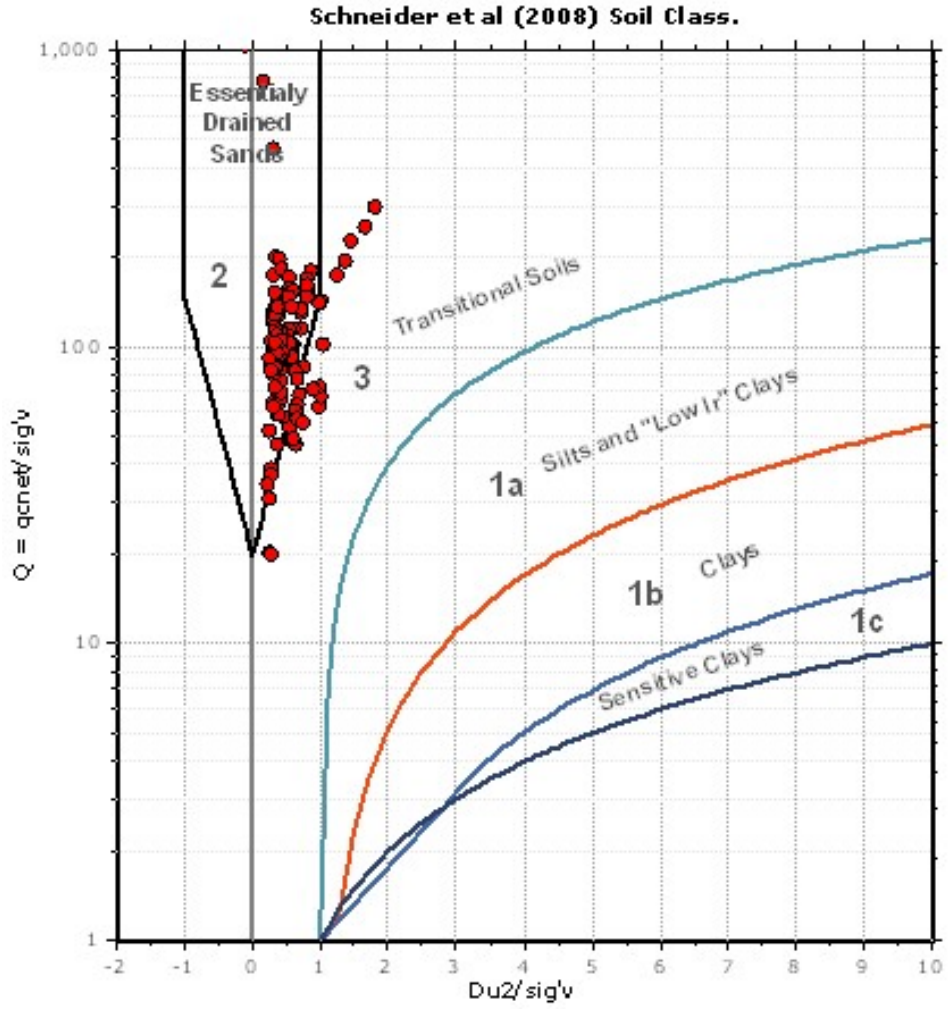

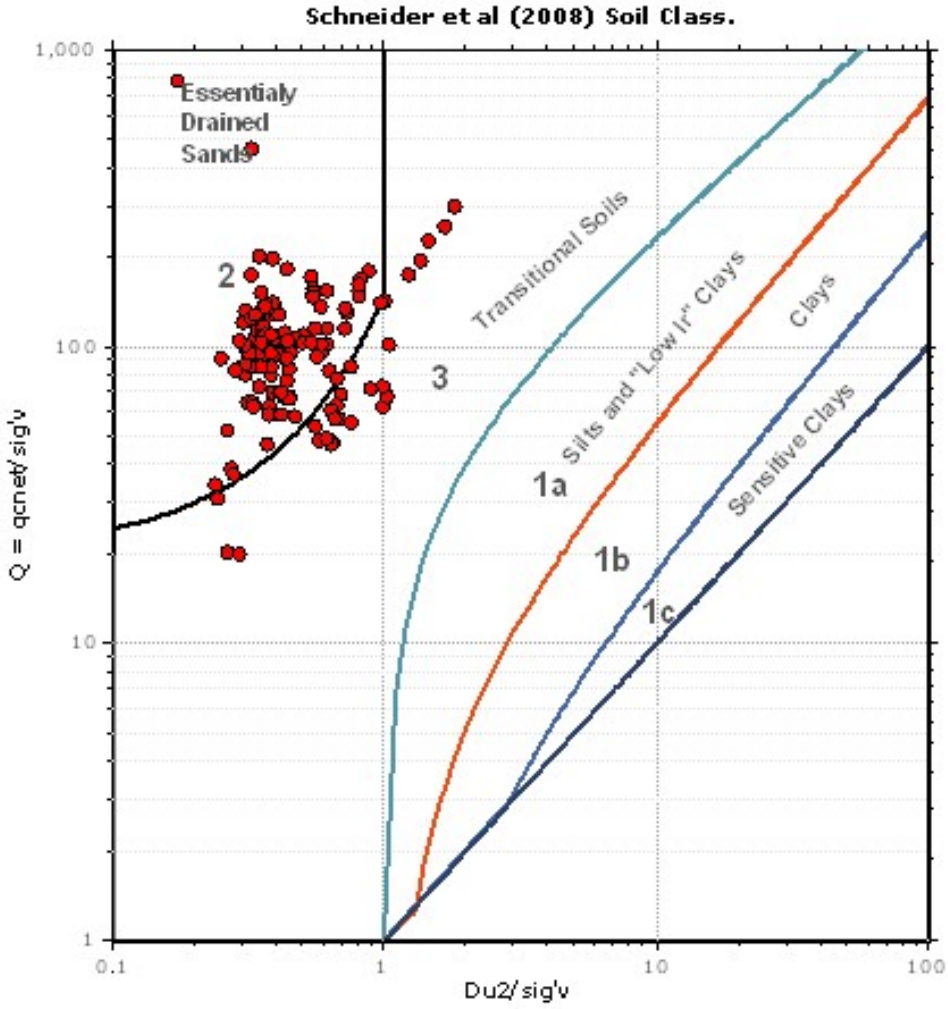

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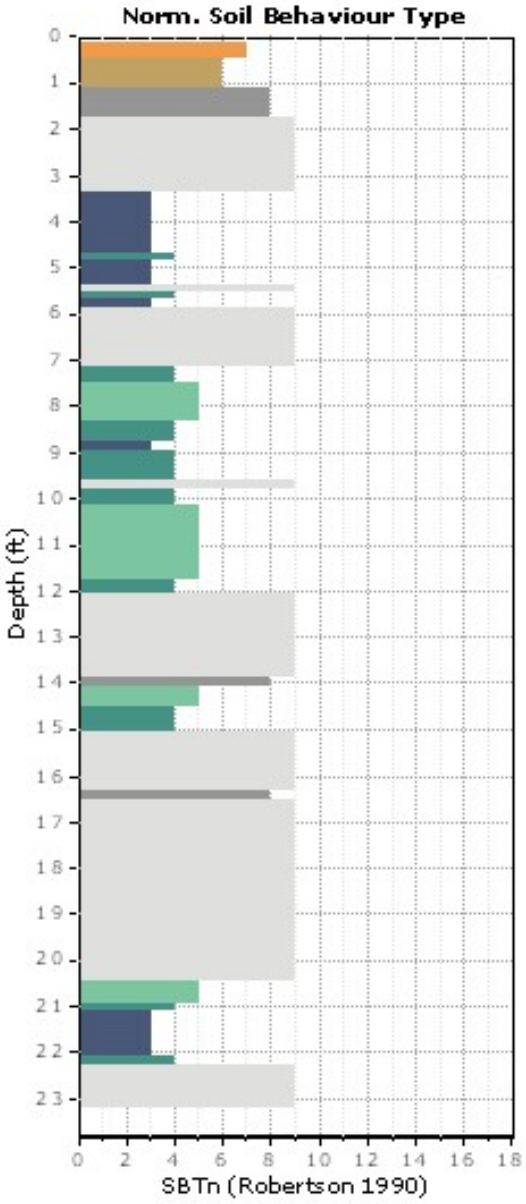

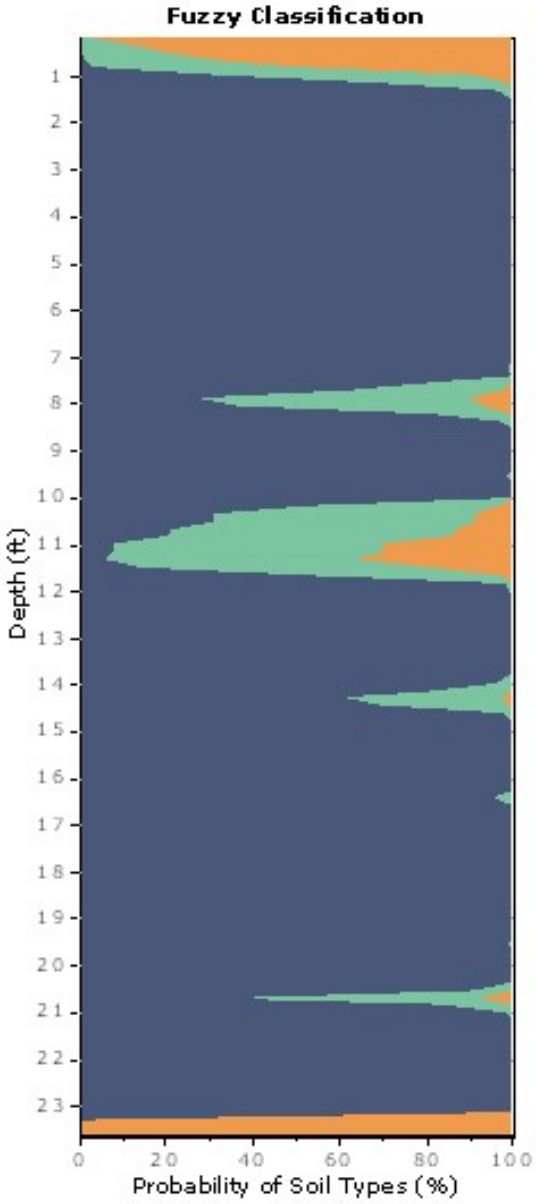

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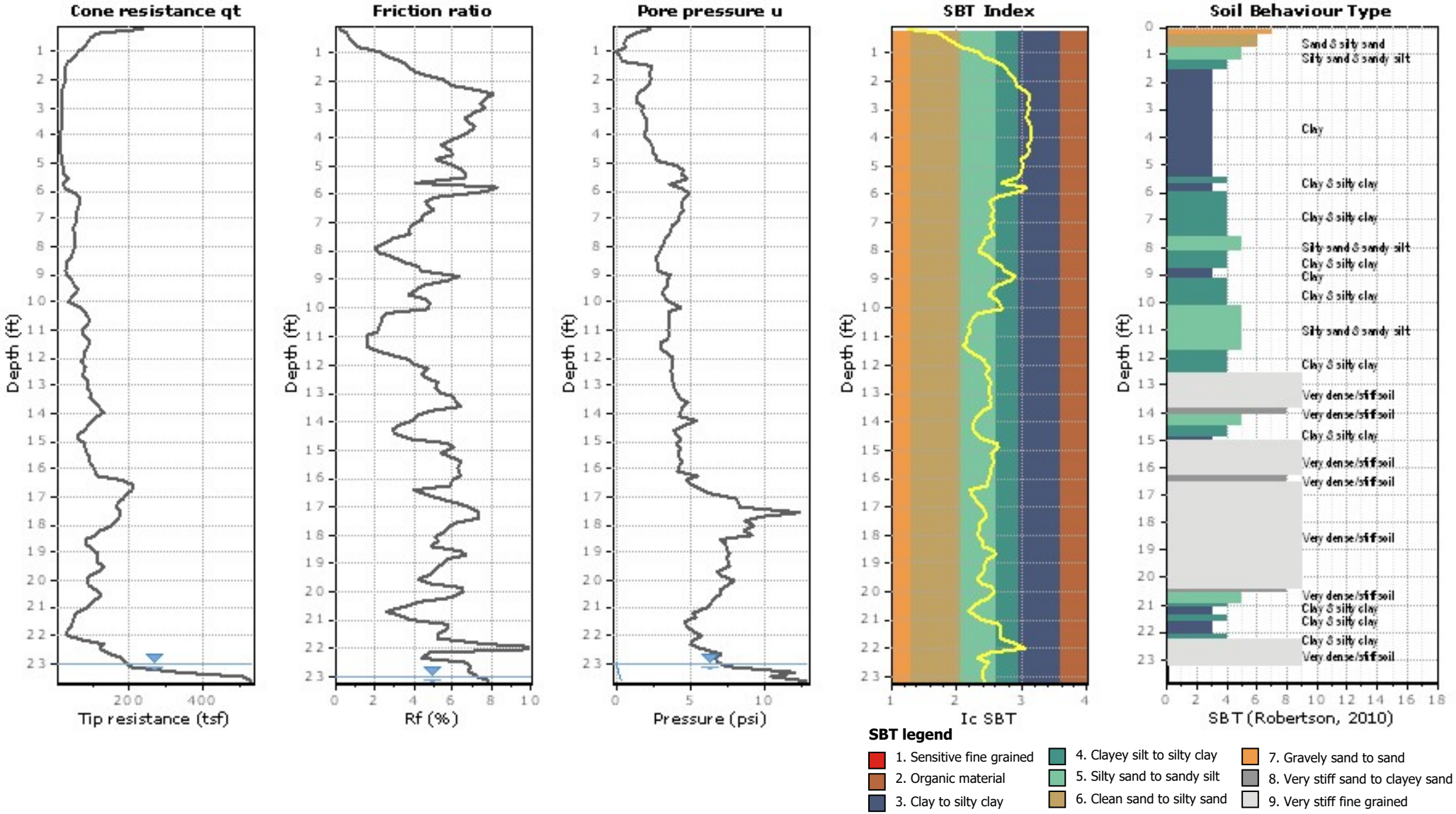

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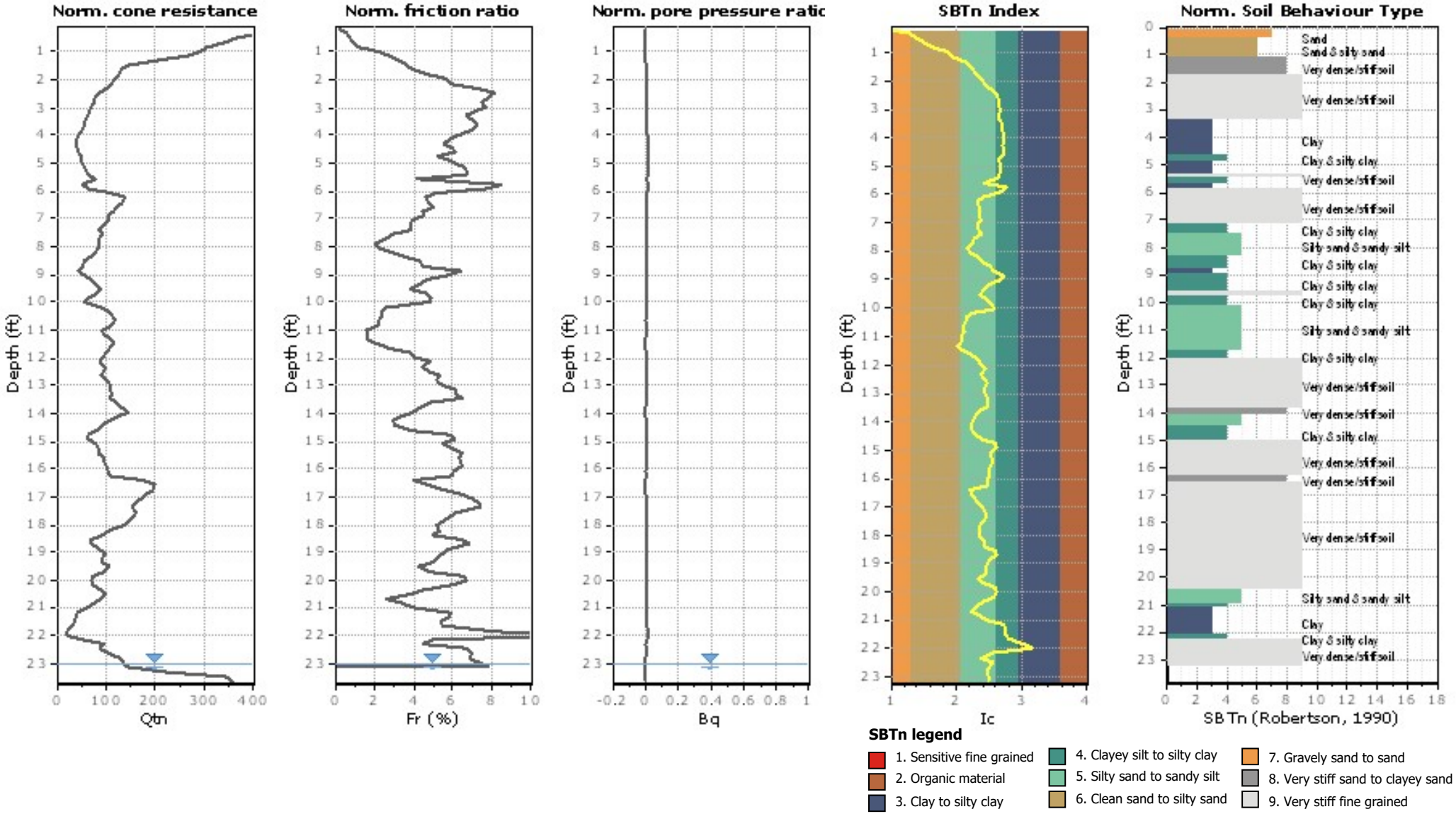


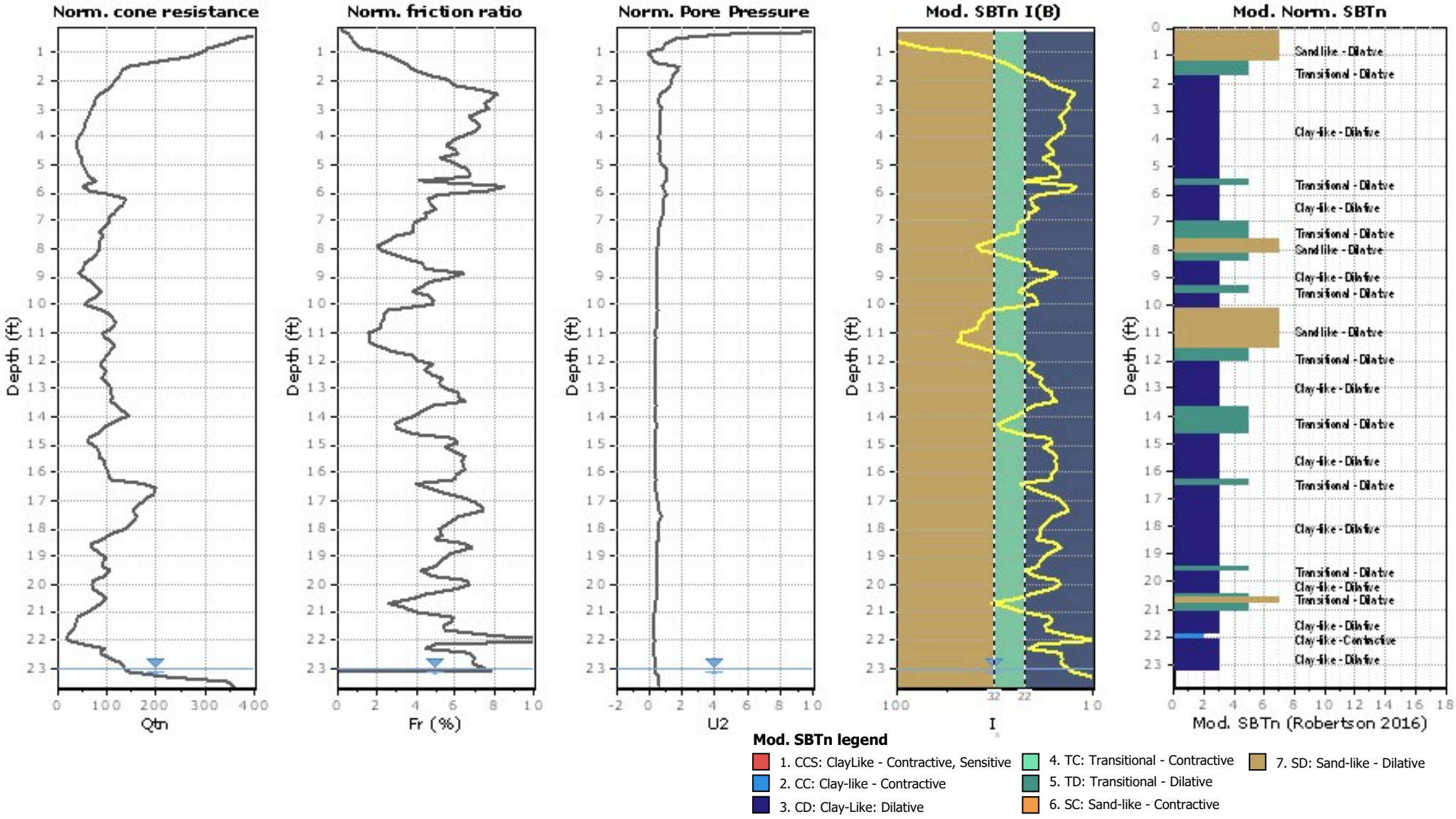
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-06

Total depth: 23.62 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



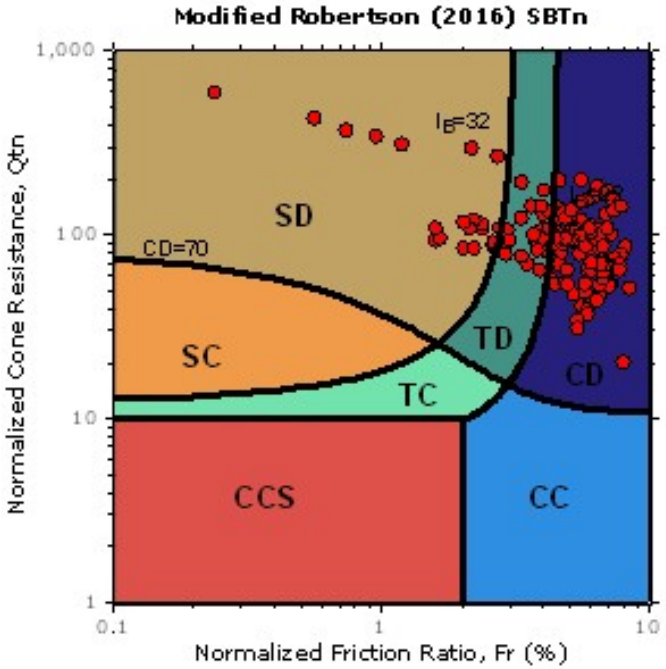
Middle Earth Geo Testing, Inc.

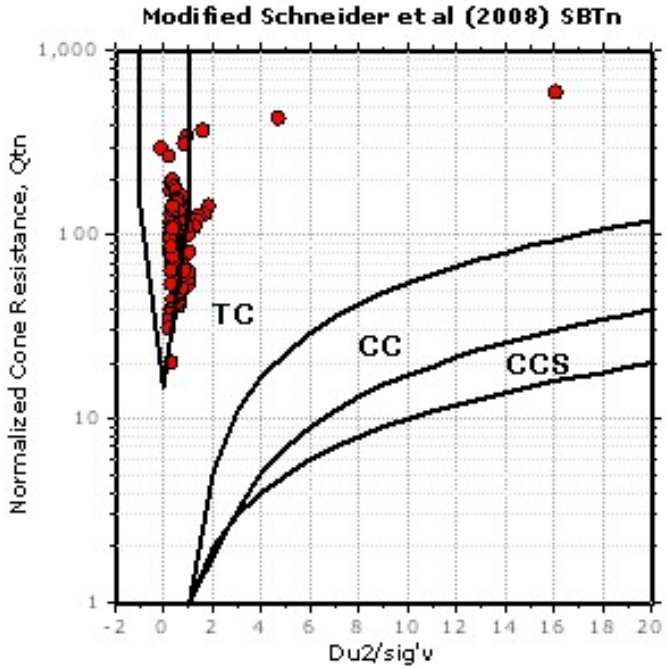
www.middleearthgeo.com

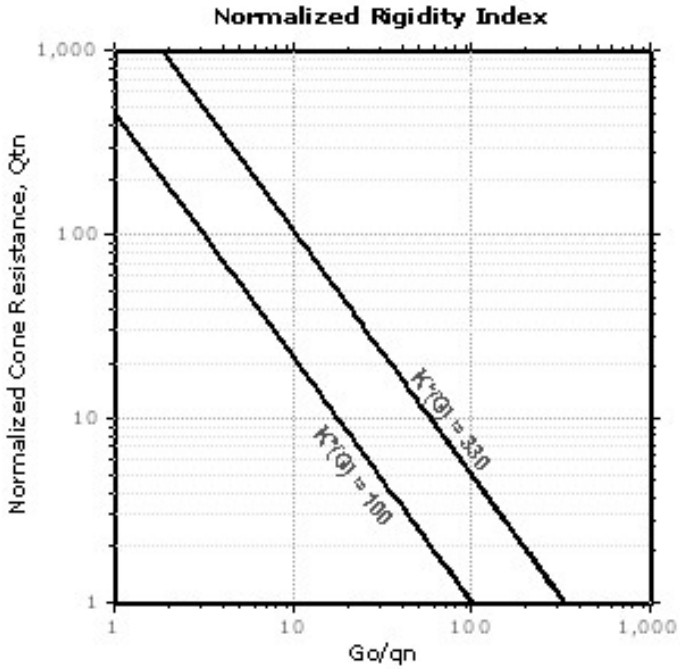
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**

CPT: CPT-06
Total depth: 23.62 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Updated SBTn plots







CCS: Clay-like - Contractive - Sensitive
CC: Clay-like - Contractive
CD: Clay-like - Dilative
TC: Transitional - Contractive
TD: Transitional - Dilative
SC: Sand-like - Contractive
SD: Sand-like - Dilative

K(G) > 330: Soils with significant microstructure (e.g. age/cementation)

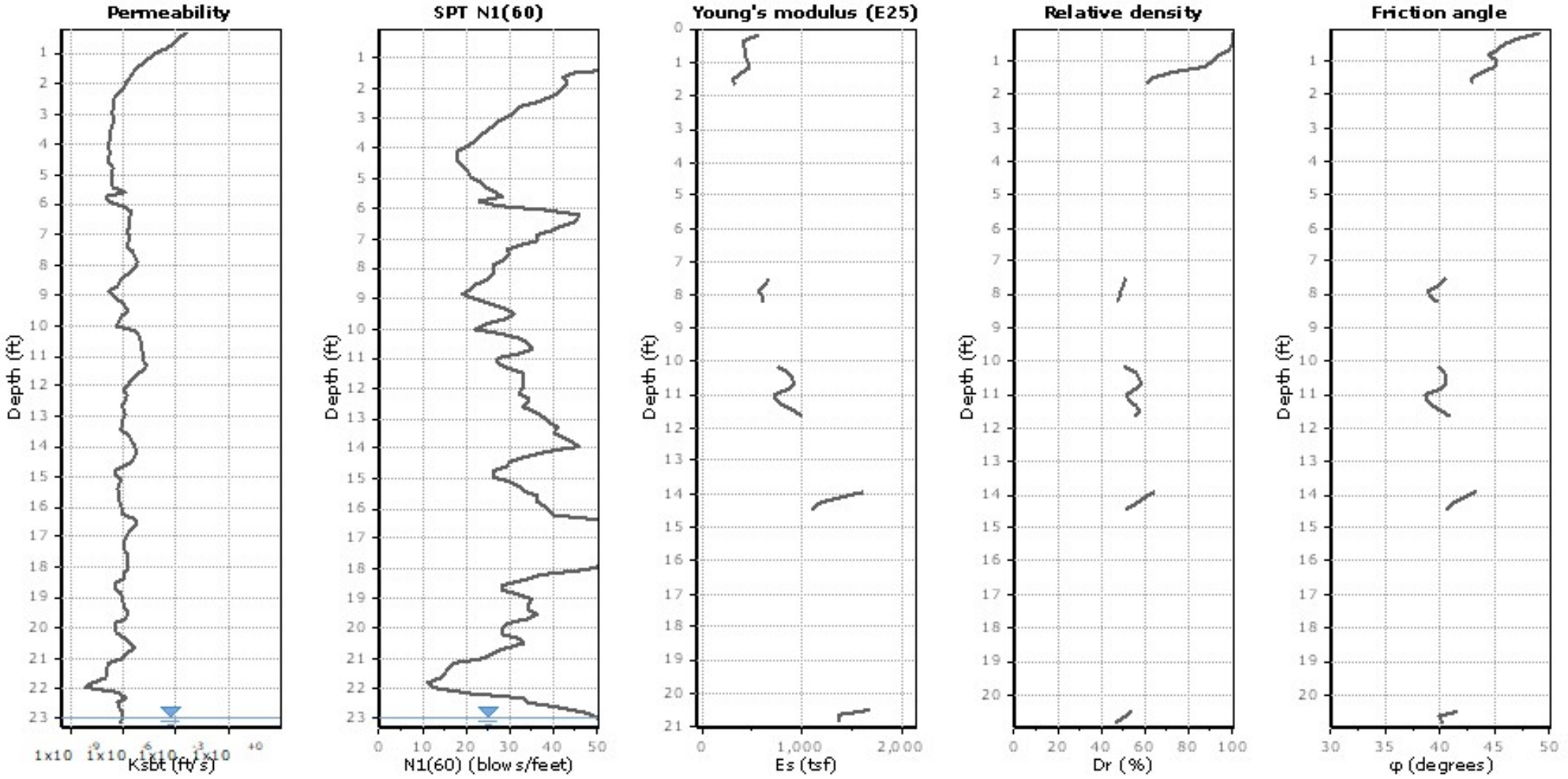
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-06

Total depth: 23.62 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Permeability: Based on SBT_n
SPT N_{60}: Based on I_c and q_t
Young's modulus: Based on variable alpha using I_c (Robertson, 2009)
Relative density constant, C_{Dr}: 350.0
Phi: Based on Kulhawy & Mayne (1990)
User defined estimation data

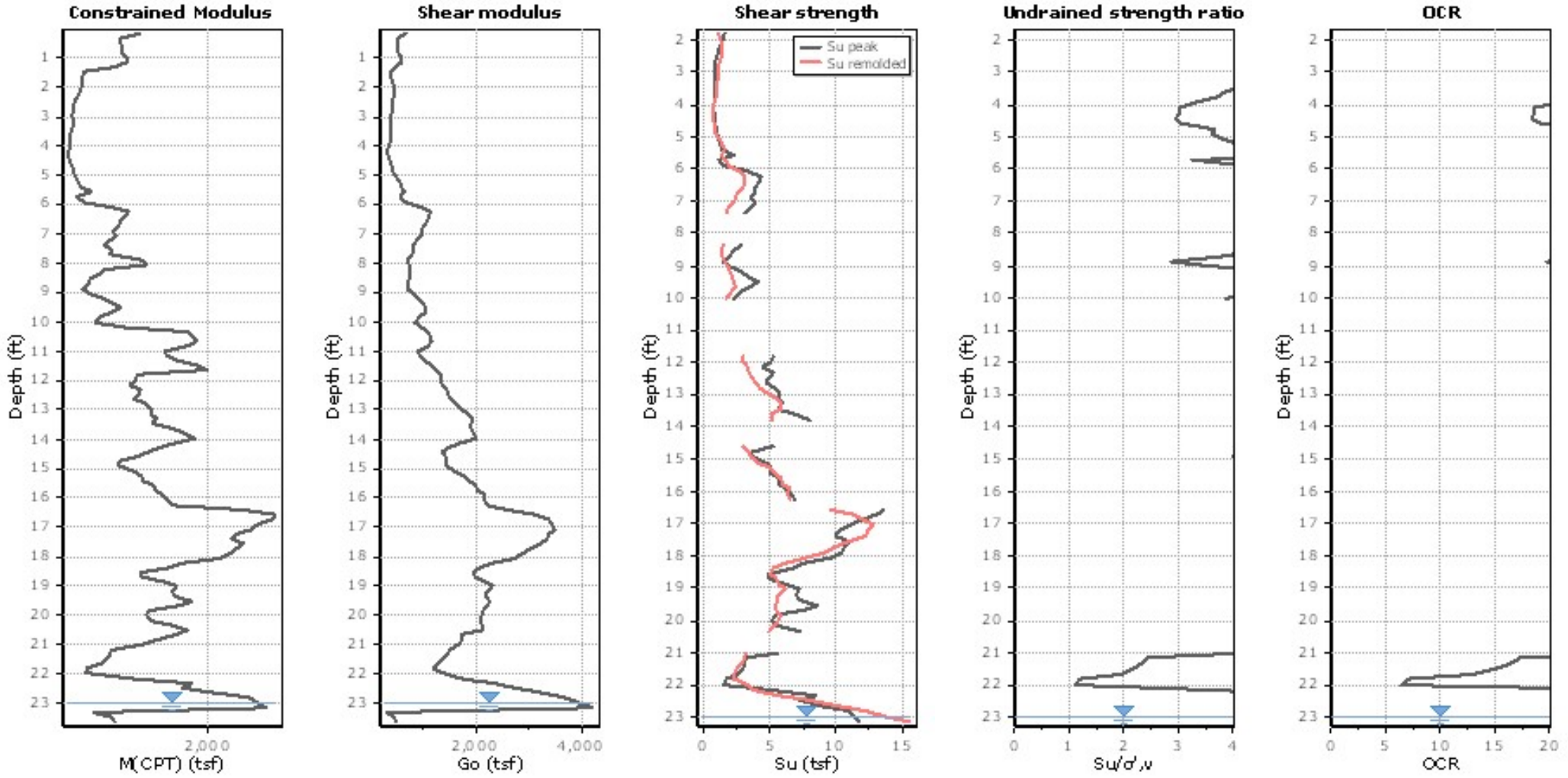
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-06

Total depth: 23.62 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: Liberty Circle Geo Evaluation
Location: Arcata



Calculation parameters

Constrained modulus: Based on variable alpha using I_c and Q_{tn} (Robertson, 2009)
Go: Based on variable alpha using I_c (Robertson, 2009)
Undrained shear strength cone factor for clays, N_{kt}: Auto
OCR factor for clays, N_{kt}: Auto
User defined estimation data
Flat Dilatometer Test data

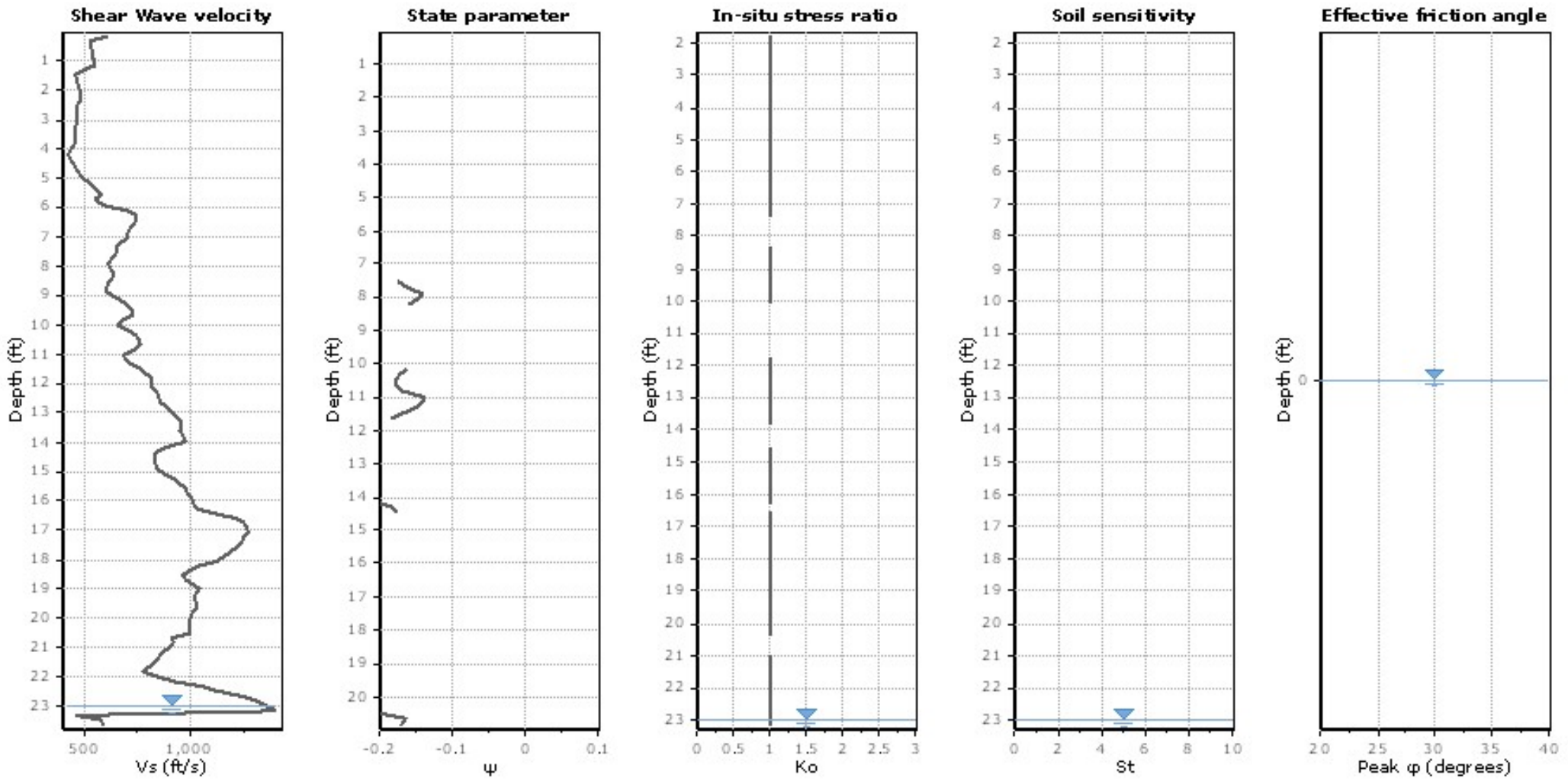
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-06

Total depth: 23.62 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Calculation parameters

Soil Sensitivity factor, N_S: 350.00

User defined estimation data

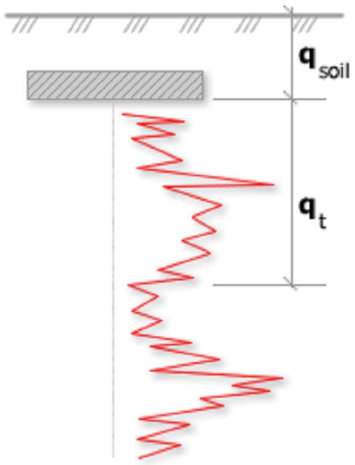
Middle Earth Geo Testing, Inc.

www.middleearthgeo.com

CPT: CPT-06

Total depth: 23.62 ft, Date: 4/13/2023
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: 15cm
Cone Operator: JM-GM

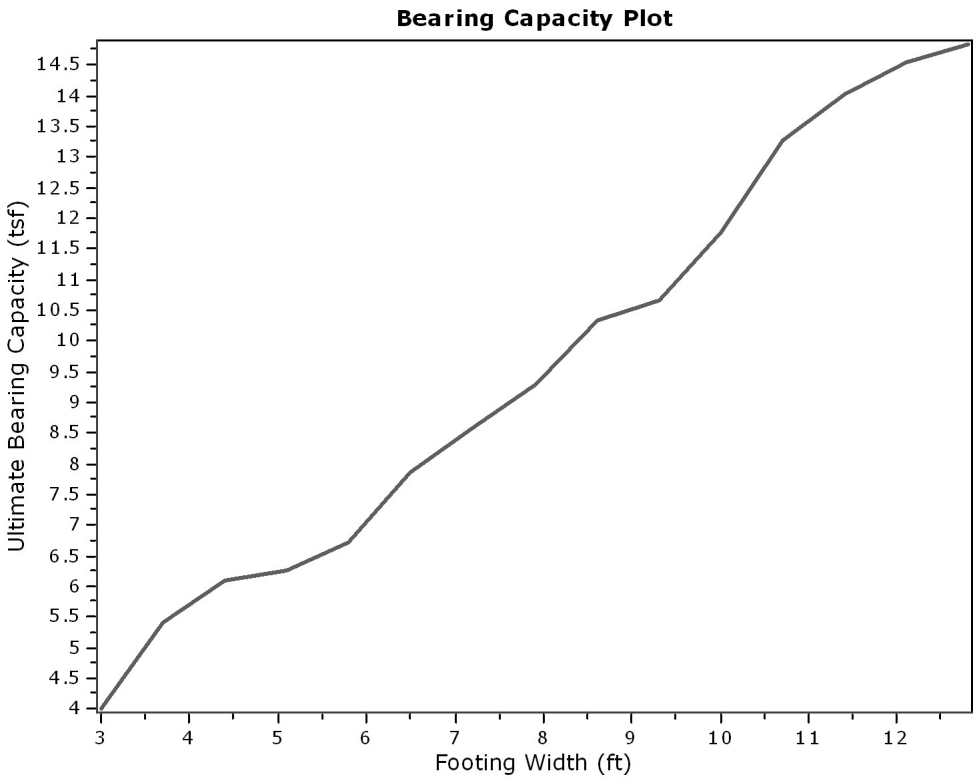
Project: **Liberty Circle Geo Evaluation**
Location: **Arcata**



Bearing Capacity calculation is perfromed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:
R_k: Bearing capacity factor
q_t: Average corrected cone resistance over calculation depth
q_{soil}: Pressure applied by soil above footing



:: Tabular results ::

No	B (ft)	Start Depth (ft)	End Depth (ft)	Ave. q_t (tsf)	R_k	Soil Press. (tsf)	Ult. bearing cap. (tsf)
1	3.00	1.60	6.10	19.56	0.20	0.10	4.01
2	3.70	1.60	7.15	26.56	0.20	0.10	5.41
3	4.40	1.60	8.20	30.00	0.20	0.10	6.10
4	5.10	1.60	9.25	30.88	0.20	0.10	6.27
5	5.80	1.60	10.30	33.13	0.20	0.10	6.72
6	6.50	1.60	11.35	38.75	0.20	0.10	7.85
7	7.20	1.60	12.40	42.44	0.20	0.10	8.58
8	7.90	1.60	13.45	45.96	0.20	0.10	9.29
9	8.60	1.60	14.50	51.28	0.20	0.10	10.35
10	9.30	1.60	15.55	52.79	0.20	0.10	10.65
11	10.00	1.60	16.60	58.38	0.20	0.10	11.77
12	10.70	1.60	17.65	65.90	0.20	0.10	13.28
13	11.40	1.60	18.70	69.71	0.20	0.10	14.04
14	12.10	1.60	19.75	72.18	0.20	0.10	14.53
15	12.80	1.60	20.80	73.72	0.20	0.10	14.84

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m³) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N_{SPT} (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a} \right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$ (applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Drained Friction Angle, φ (°) ::

(applicable only to SBT_n: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$
α = 14 for $Q_{tn} > 14$
α = Q_{tn} for $Q_{tn} \leq 14$
$M_{CPT} = \alpha \cdot (q_t - \sigma_v)$

If $I_c \geq 2.20$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho} \right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot +7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$OCR = k_{OCR} \cdot Q_{tn}$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S_t ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT_n: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Peak Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

• Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012

• Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

APPENDIX 2

Laboratory Test Results

LACO

FINER THAN #200 SIEVE
ASTM C117/ASTM D-1140

PROJECT	Library Circle Geo Evaluations	JOB NO. 5376.13		SHEET
CLIENT	Cal Poly Humboldt	SAMPLE ID 23-022EK		1 of 1
LOCATION	Arcata, CA	TEST BY AMC	DATE 5/5/23	
SOIL TYPE	VARIOUS SANDS	CHECKED BY	CHECK DATE	

GB-1 @ 15.0'

(B)	Net sample (Dry)	168.2	gms
(C)	Dry sample after washing	117.6	gms
	Total Material finer than 200 sieve	50.6	gms
(A)	% Material finer than 200 sieve	**30.1%**	
	A=[(B-C)/B]X100		

GB-2 @ 10.0'

(B)	Net sample (Dry)	138.6	gms
(C)	Dry sample after washing	86.4	gms
	Total Material finer than 200 sieve	52.2	gms
(A)	% Material finer than 200 sieve	**37.7%**	
	A=[(B-C)/B]X100		

GB-2 @ 20.0'

(B)	Net sample (Dry)	184.7	gms
(C)	Dry sample after washing	126.0	gms
	Total Material finer than 200 sieve	58.7	gms
(A)	% Material finer than 200 sieve	**31.8%**	
	A=[(B-C)/B]X100		

GB-3 @ 10.0'

(B)	Net sample (Dry)	138.5	gms
(C)	Dry sample after washing	107.7	gms
	Total Material finer than 200 sieve	30.8	gms
(A)	% Material finer than 200 sieve	**22.2%**	
	A=[(B-C)/B]X100		

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ATTERBERG LIMITS
ASTM D-4318

PROJECT	Library Circle Geo Evaluation			JOB NO. 5376.13	SHEET
CLIENT	Cal Poly Humboldt			SAMPLE ID 23-022EK	1 of 1
SOURCE	GB-3 @ 5.0'-7.0'	TEST BY	SLC	DATE	5/18/23
SOIL TYPE	CL	CHECKED BY	0	CHECK DATE	1/0/00

Material Source GB-3 @ 5.0'-7.0'

	Point 1	Point 2	Point 3
Tare + Wet Soil (gm)	21.43	21.36	18.43
Tare + Dry Soil (gm)	18.20	18.03	15.86
Water (gm)	3.23	3.33	2.57
Tare (gm)	8.66	8.45	8.55
Dry Soil (gm)	9.54	9.58	7.31
Water Content (%)	**33.9%**	**34.8%**	**35.2%**
* Number of Blows	**33**	**27**	**22**

* Groove closure = 13mm

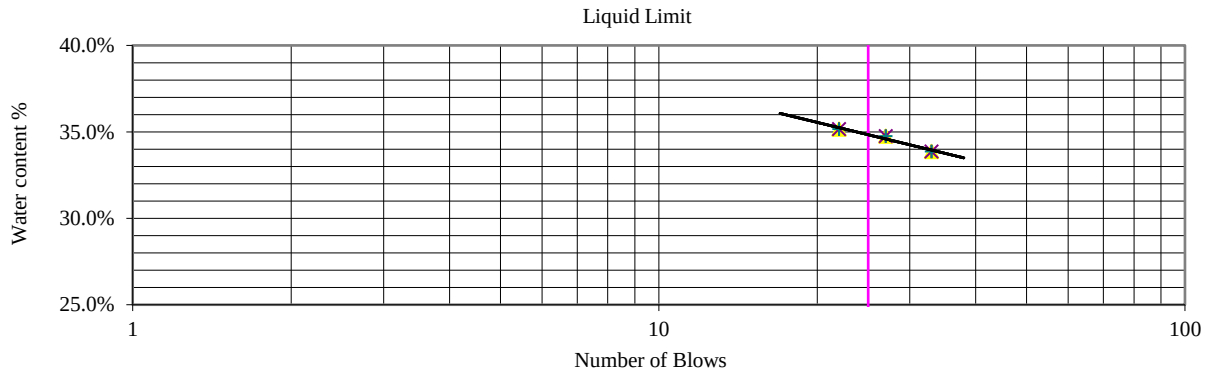
PLASTIC LIMIT

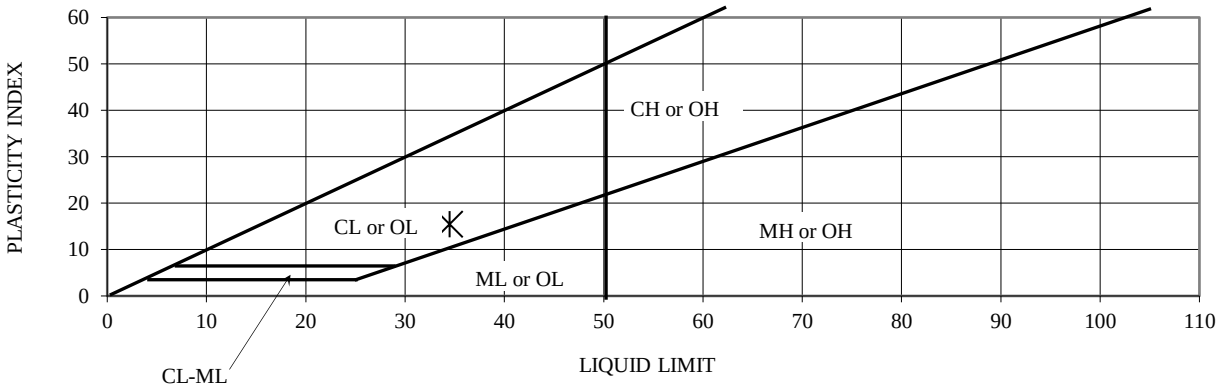
Run 1	Run 2
31.37	29.44
29.73	28.11
1.64	1.33
21.06	21.20
8.67	6.91
18.92%	**19.25%**

LIQUID LIMIT = 34

PLASTIC LIMIT = 19

PLASTIC INDEX = 15





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CONSOLIDATION TEST
ASTM D-2435

PROJECT	Library Circle Geo Eval	JOB NO. 5376.13		SHEET
CLIENT	Cal Poly Humboldt	SAMPLE ID 23-022EK		1 of 11
LOCATION	GB-2 @ 7.0'	TEST BY AMC	DATE 6/2/23	
SOIL TYPE	Sand w/ fines	CHECKED BY	CHECK DATE	

Diameter of Sample	6.35	cm
Area of Sample	31.7	cm^2
Density of Water ρ_w	1	$gram/cm^3$
Specific Gravity of Solids G	2.65	$gram/cm^3$

PRECONSOLIDATION

Initial Specimen Height H_0	2.53	cm
Water Content		
Wet soil + pan	183.9	gram
Dry soil + pan	157.4	gram
Pan	8.4	gram
Total water	26.5	gram
Dry soil	149.0	gram
Water Content W_{fp}	17.8%	
Moisture Density		
Wet soil + consol assembly	1150.5	gram
Consol assembly	987.1	gram
Moist Mass of Specimen M_{TI}	163.4	gram
Initial Volume of Sample V_o	80.1	cm^3
Wet Density	2.0	$gram/cm^3$
Dry Mass of Specimen M_d	138.7	grams
Initial Dry Density ρ_d	1.7	$gram/cm^3$
Dry Unit Weight	108.1	lb/ft^3
Volume of Solids V_s	52.3	cm^3
Equivalent Height of Solids H_s	1.65	cm
Void Ratio Before Test e_o	0.53	
Initial Degree of Saturation S_o	88.8%	

POSTCONSOLIDATION

Final Speciment Height H_f	2.38	cm
Water Content		
Wet soil + pan	172.2	gram
Dry soil + pan	144.0	gram
Pan	8.3	gram
Total water	28.2	gram
Dry soil	135.7	gram
Water Content W_{fp}	20.8%	
Moisture Density		
Wet soil + consol assembly	1152.6	gram
Consol assembly	988	gram
Moist Mass of Specimen M_{Tf}	164.6	gram
Final Volume of Sample V_f	75.4	cm^3
Wet Density	2.2	$gram/cm^3$
Dry Mass of Specimen M_d	136.3	grams
Final Dry Density	1.8	$gram/cm^3$
Final Dry Unit Wieght	112.8	lb/ft^3
Volume of Solids V_s	51.4	cm^3
Equivalent Height of Solids H_s	1.62	cm
Void Ratio After Test e_f	0.47	
Final Degree of Saturation Sf	118.0%	

Load Increment	Change in height d_f (inches)	Change in height d_f (cm)	$\sum\Delta H$	Percent strain $\varepsilon = \sum\Delta H/H_0$	Height $H=H_0-\Delta H$	Void Ratio $e=(H-H_s)/H_s$
Initial	1		0	0.00%	2.53	0.53
125	0.0014	0.0035	0.0035	0.14%	2.53	0.53
250	0.0020	0.0051	0.0086	0.34%	2.52	0.53
500	0.0033	0.0084	0.0170	0.67%	2.51	0.52
1000	0.0056	0.0142	0.0312	1.23%	2.50	0.51
2000	0.0087	0.0221	0.0533	2.11%	2.48	0.50
4000	0.0111	0.0282	0.0815	3.22%	2.45	0.48
8000	0.0151	0.0384	0.1199	4.74%	2.41	0.46
16000	0.0184	0.0467	0.1666	6.59%	2.36	0.43
4000	-0.0071	-0.0180	0.1486	5.87%	2.38	0.44
1000	-0.0075	-0.0191	0.1295	5.12%	2.40	0.45
250	-0.0084	-0.0213	0.1082	4.28%	2.42	0.47

NO NEED TO MESS WITH THIS TABLE. IT AUTOMATICALLY GETS ITS DATA FROM "CALCULATIONS" SHEET

Load Increment	Change in height d_f (inches)	Change in height d_f (cm)	$\sum\Delta H$	Percent strain $\varepsilon = \sum\Delta H/H_0$	Height $H=H_0-\Delta H$	Void Ratio $e=(H-H_s)/H_s$
Initial	1	0	0	0.00%	2.53	0.53
125	0.001	0.004	0.004	0.14%	2.53	0.53
250	0.002	0.005	0.009	0.34%	2.52	0.53
500	0.003	0.008	0.017	0.67%	2.51	0.52
1000	0.006	0.014	0.031	1.23%	2.50	0.51
2000	0.009	0.022	0.053	2.11%	2.48	0.50
4000	0.011	0.028	0.082	3.22%	2.45	0.48
8000	0.015	0.038	0.120	4.74%	2.41	0.46
16000	0.018	0.047	0.167	6.59%	2.36	0.43
4000	-0.007	-0.018	0.149	5.87%	2.38	0.44
1000	-0.008	-0.019	0.130	5.12%	2.40	0.45
250	-0.008	-0.021	0.108	4.28%	2.42	0.47

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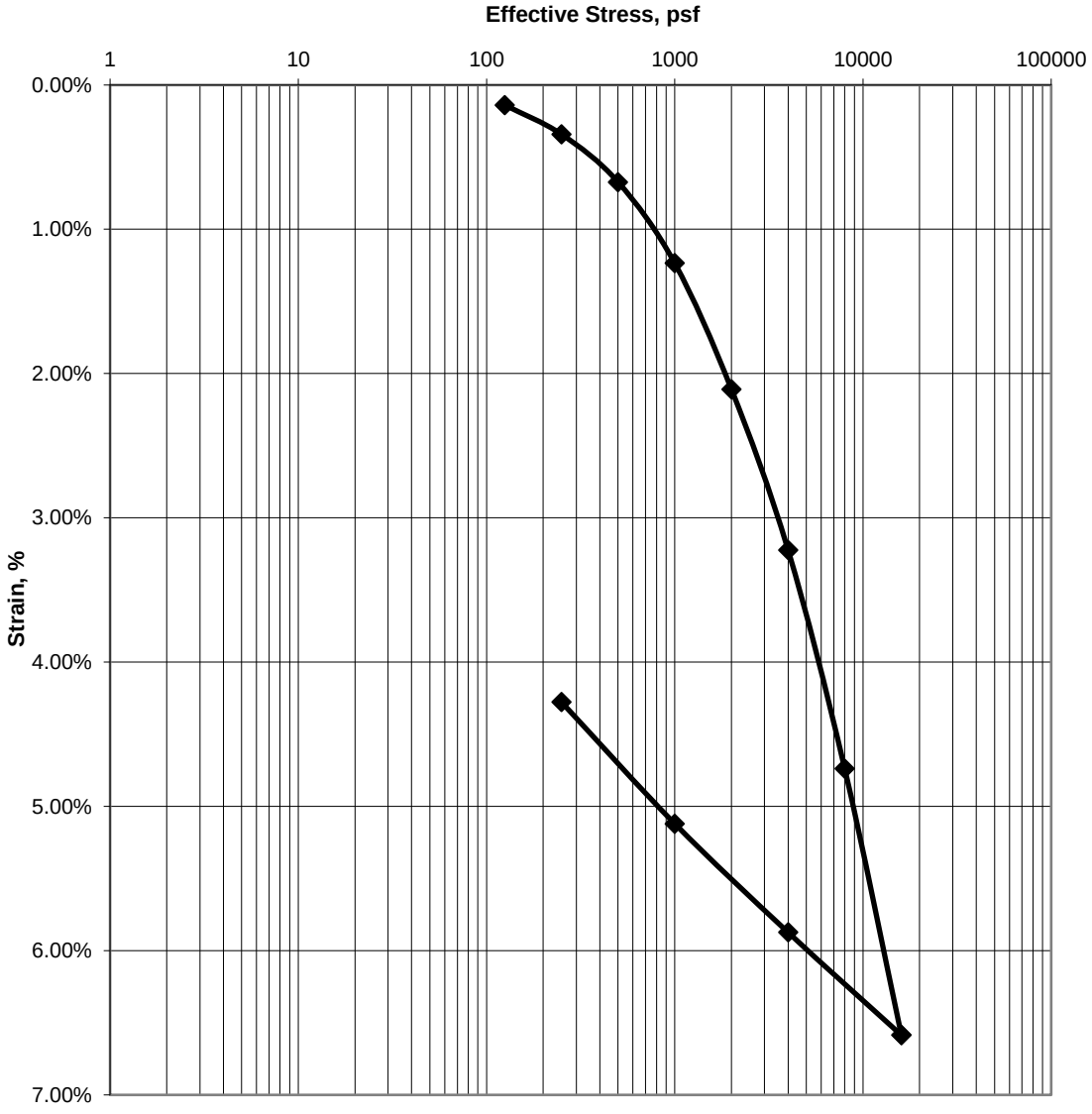
CONSOLIDATION TEST
ASTM D-2435

PROJECT	Library Circle Geo Eval		JOB NO. 5376.13		SHEET
CLIENT	Cal Poly Humboldt		SAMPLE ID 23-022EK		2 of 11
LOCATION	GB-2 @ 7.0'	TEST BY AMC	DATE	6/2/23	
SOIL TYPE	Sand w/ fines	CHECKED BY	CHECK DATE		

Strain-Log-P Curve



	Initial	Final
Moisture %	17.8%	20.8%
Dry Density, pcf	108.1	112.8
Void Ratio	0.53	0.47
% Saturation	88.8%	118.0%

Assumed Specific Gravity = 2.65

NOTES:

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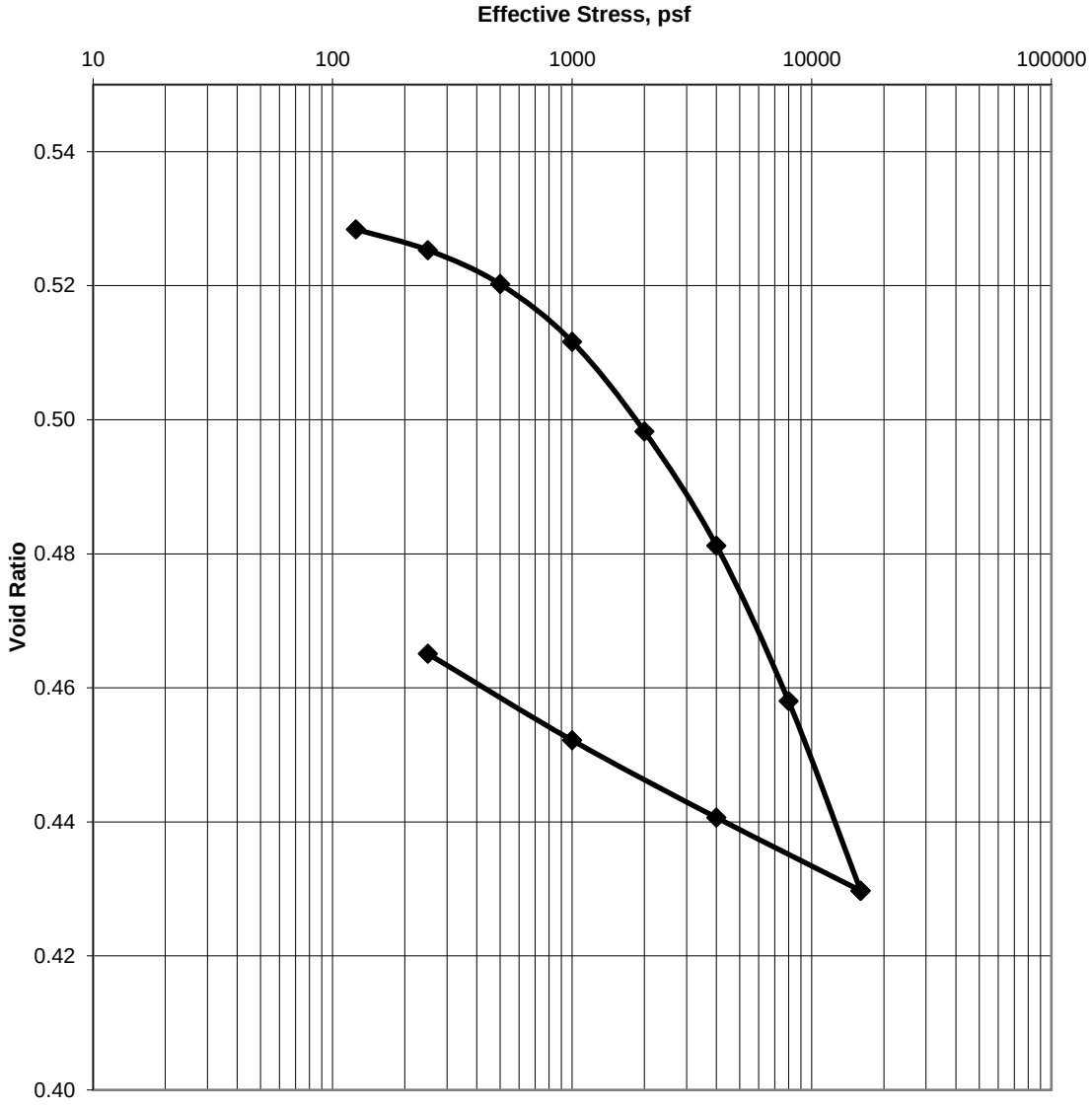
CONSOLIDATION TEST
ASTM D-2435

PROJECT	Library Circle Geo Eval		JOB NO. 5376.13		SHEET
CLIENT	Cal Poly Humboldt		SAMPLE ID 23-022EK		2 of 11
LOCATION	GB-2 @ 7.0'	TEST BY AMC	DATE	6/2/23	
SOIL TYPE	Sand w/ fines	CHECKED BY	CHECK DATE		

Void Ratio-Log-P Curve



	Initial	Final
Moisture %	17.8%	20.8%
Dry Density, pcf	108.1	112.8
Void Ratio	0.53	0.47
% Saturation	88.8%	118.0%

Assumed Specific Gravity = 2.65

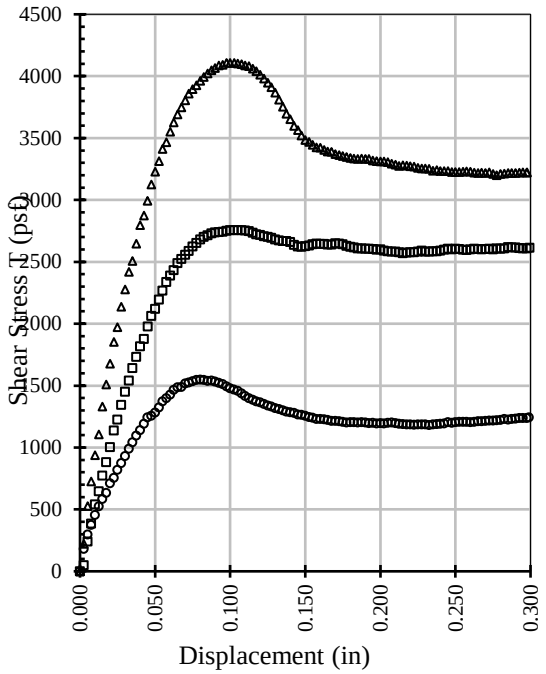
NOTES:

LACO

DIRECT SHEAR
ASTM D-3080

PROJECT	Library Circle Geo Evaluations		JOB NO. 5376.13		SHEET
CLIENT	Cal Poly Humboldt		SAMPLE ID 23-022EK		1 of 1
LOCATION	GB-2 at 5.0'-7.0'	TEST BY AMC		DATE 5/11/23	
SOIL TYPE	Sand with fines	CHECKED BY		CHECK DATE	

Shear Stress -vs- Displacement



Sample Dimensions

Diameter (inch)	2.5
Height (inch)	1.0

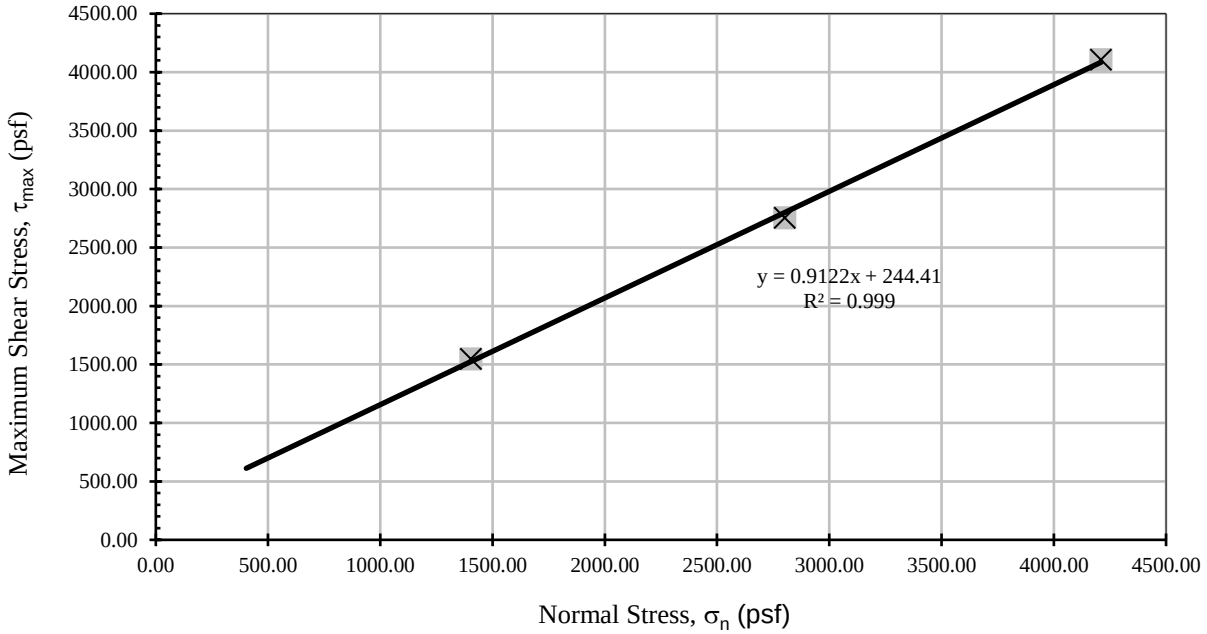
	Point 1	Point 2	Point 3	Average
Water Content (%)	15.2	16.1	16.4	15.9
Dry Density (pcf)	105.4	103.0	101.8	103.4
Void Ratio*	0.6	0.6	0.6	0.6
Peak Shear Stress (psf)	1547.1	2754.7	4107.5	

*Void ratio calculation assumes a specific gravity of 2.65

c - intercept (cohesion)	244
phi (internal friction angle)	42.4°

Notes: Undisturbed Shelby

Maximum Shear Stress -vs- Normal Stress

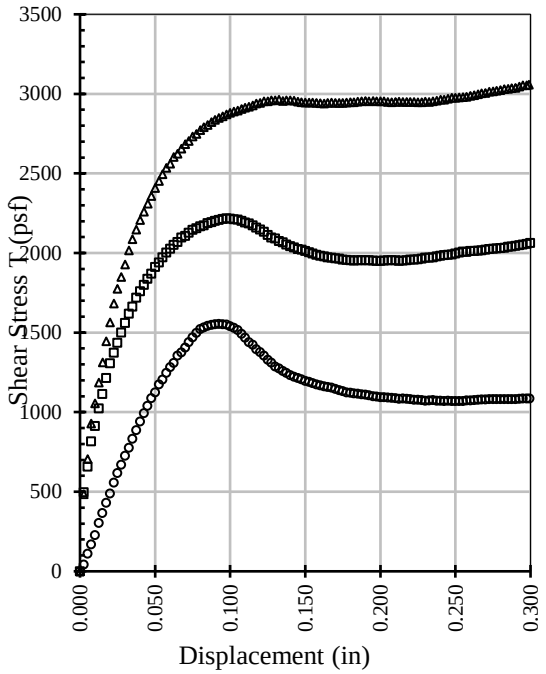


LACO

DIRECT SHEAR
ASTM D-3080

PROJECT	Library Circle Geo Evaluations		JOB NO. 5376.13	SHEET	
CLIENT	Cal Poly Humboldt		SAMPLE ID 23-022EK	1 of 1	
LOCATION	GB-3 at 5.0'-7.0'	TEST BY AMC	DATE 5/16/23		
SOIL TYPE	Sand with fines	CHECKED BY	CHECK DATE		

Shear Stress -vs- Displacement



Sample Dimensions

Diameter (inch)	2.5
Height (inch)	1.0

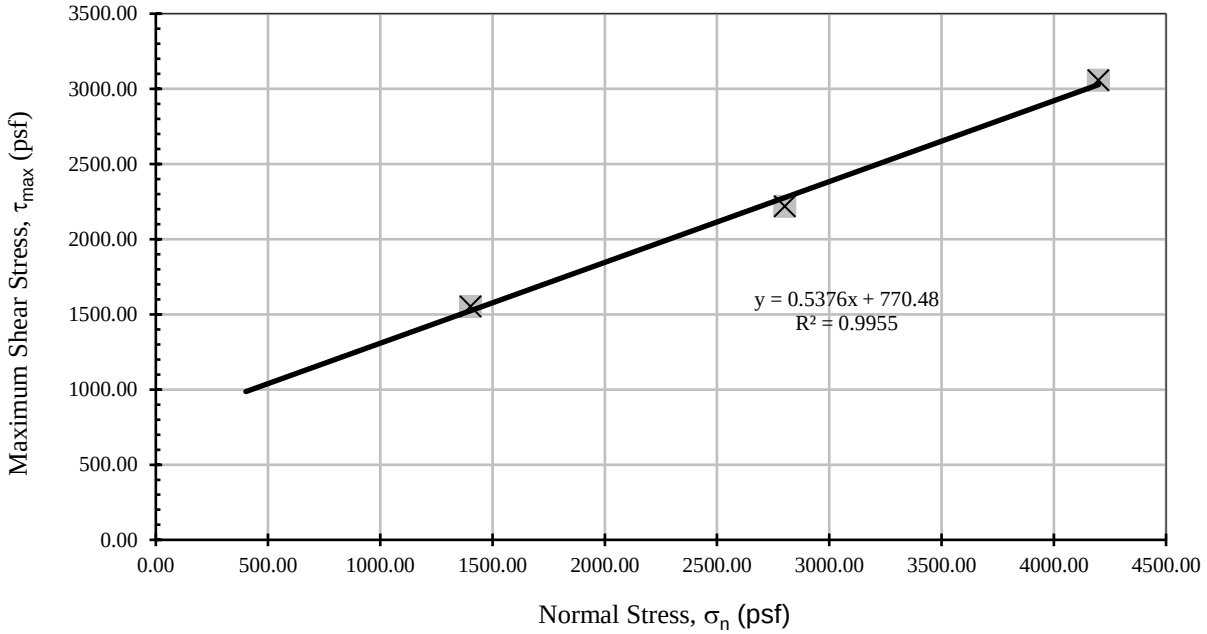
	Point 1	Point 2	Point 3	Average
Water Content (%)	20.8	22.0	22.4	21.7
Dry Density (pcf)	103.4	101.8	100.4	101.8
Void Ratio*	0.6	0.6	0.7	0.6
Peak Shear Stress (psf)	1552.9	2218.1	3056.8	

*Void ratio calculation assumes a specific gravity of 2.65

c - intercept (cohesion)	770
phi (internal friction angle)	28.3°

Notes: Undisturbed Shelby

Maximum Shear Stress -vs- Normal Stress



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MOISTURE / DENSITY
ASTM D-2216 / 2937

PROJECT	Library Circle Geo Evaluations			JOB NO. 5376.13	SHEET 1 of 1
CLIENT	Cal Poly Humboldt			LAB ID 23-022EK	
LOCATION	Arcata, CA	TEST BY	AMC	DATE	6/6/23
SOIL TYPE	VARIOUS	CHECKED BY		CHECK DATE	

Sample Location	GB-3							
Sample Depth (ft bgs)	5.0-7.0							
Soil Type (USCS)	VARIOUS							
Moisture Content (%)	20.7							
Wet Density (pcf)	133.4							
Dry Density (pcf)	110.5							
Void Ratio*	0.5							
% Saturation	110.0							

*Void ratio calculation assumes a specific gravity of 2.65

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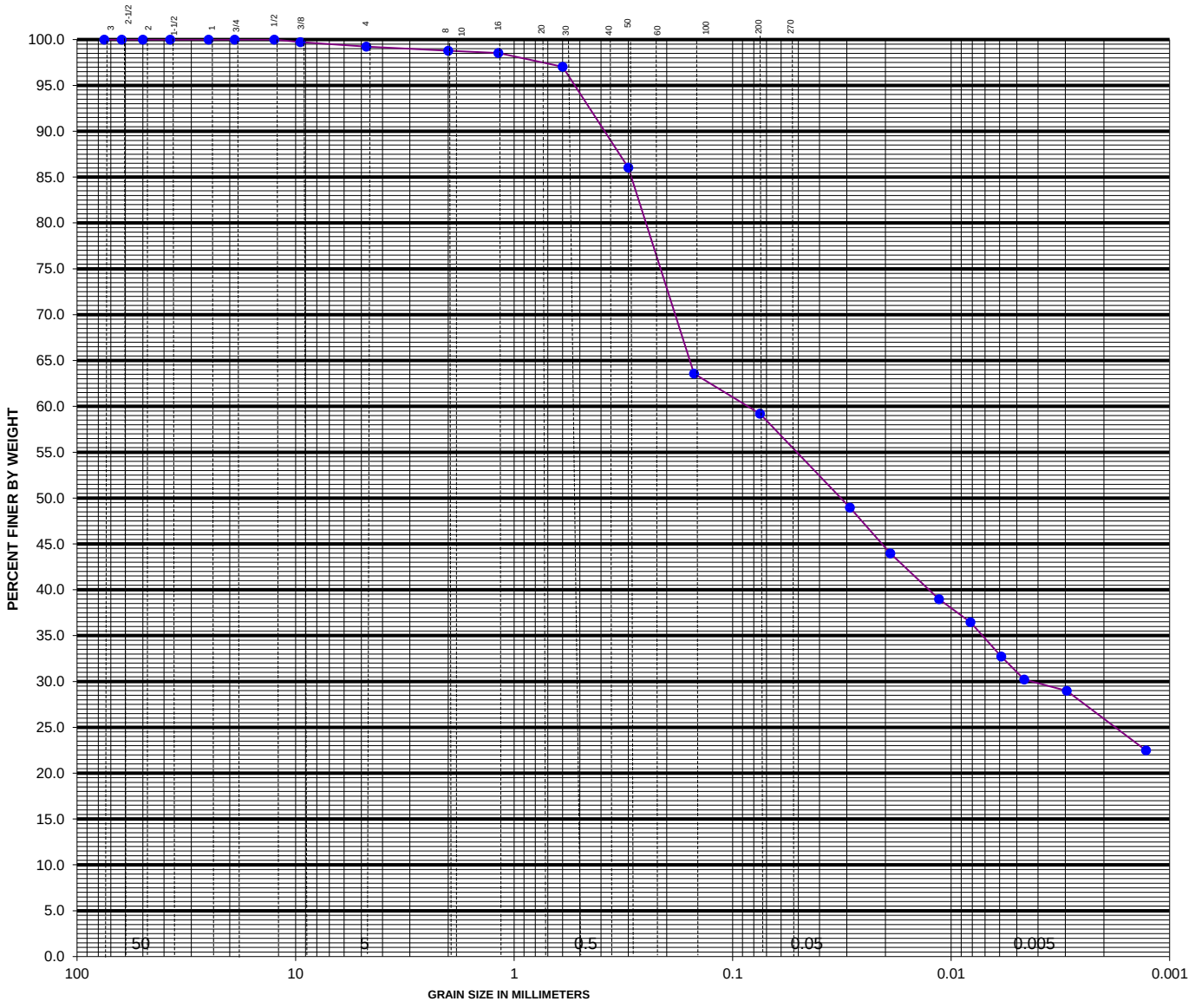
800-515-5054 · www.lacoassociates.com

PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	1	5376.13
Project: Library Circle Geo Evaluation	Tested By: AMC	Date: 5/18/23
Sample ID: 23-022EK	Client: Cal Poly Humboldt	Checked By / Date



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION		SOIL CLASSIFICATION	
GB-3 @ 5.0'-7.0'		**Sandy Lean Clay**	
GRAVEL=	0.8%	GRAVEL=	passing 3" and retained on #4 sieve
SAND=	40.0%	SAND=	passing #4 sieve and retained on #200 sieve
SILT=	28.2%	SILT=	0.074mm to 0.005mm
CLAY=	31.0%	CLAY=	smaller than 0.005mm

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SIEVE ANALYSIS WORKSHEET (ASTM C-136)

Project No.	5376.13	Material Desc.	Sand	Tested By:	AMC	Date: 5/5/2023
Client:	Cal Poly Humboldt	Manufacturer	Native	Checked By:		Date:
Sample ID:	23-022EK	Sample Location	GB-3 @ 15.0'	Total Sample Weight	646.1 grams	

	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 4.75mm) 3/4 x #4	Pass (4.75mm) #4
Partial Weight (g)				284.5
% Used				44.03%
Size of Sample (g)				646.1

	Wt. Ret.	% Ret.	% Pass	Wt. Ret.	% Ret.	% Pass	Wt. Ret.	% Ret.	% Pass	Wt. Ret.	% Ret.	% Pass	**Combined Grading %**
(75mm) 3													
(62.5mm) 2 1/2													
(50mm) 2													
(37.5mm) 1 1/2													
(25mm) 1													
(19mm) 3/4													
(12.5mm) 1/2													
(9.5mm) 3/8													
(4.75mm) 4													
(2.36mm) 8										40.6 40.6	14.3	85.7	**86**
(1.18mm) 16										57.0 97.6	34.3	65.7	**66**
(600µm) 30										39.2 136.8	48.1	51.9	**52**
(300µm) 50										58.5 195.3	68.6	31.4	**31**
(150µm) 100										57.3 252.6	88.8	11.2	**11**
(75µm) 200										11.4 264.0	92.8	7.2	**7**
Wash Wt.										20.5 284.5	100.0	0	**0**

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-Technical Support

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COMPANY:	LACO Associates, 21 West 4th Street, Eureka, CA 95501			ANALYST(S)	SUPERVISOR
ATTN:	Gary Manhart		DATE of	L. Quijano	S. Godinez
JOB NAME:	Cal Poly Humboldt, 1 Harpst Street, Arcata	DATE RECEIVED	COMPLETION	S. Santos	LAB DIRECTOR
JOB #:	5376.13 California	5/31/2023	6/12/2023		G.S. Conrad PhD

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SOIL pH -log[H+]	MINIMUM RESISTIVITY ohm-cm	ELECTRICAL CONDUCTIVITY µmhos/cm	SULFATE SO4 ppm	CHLORIDE Cl ppm
09386-1	CPH1-HS/A	GB-3 @ 5'	**5.58**	**4,091**	**[244]**	**36**	**37.5**
Method	Detection	Limits --->	---	1	0.1	1	1

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SALINITY Sol Slts salts ppm	SOLUBLE SULFIDES (S=) ppm	SOLUBLE CYANIDES (CN=) ppm	REDOX mV	PERCENT MOISTURE %
09386-1	CPH1-HS/A	GB-3 @ 5'	**420**			**+158.0**	
Method	Detection	Limits --->	---	0.1	0.1	1	0.1

********** COMMENTS **********

Resistivity is >4,000 ohm-cm, i.e., fair, but soil reaction (i.e., pH) is moderately acidic; sulfate is very low (@ 200 ppm), and chlor ide is very very low as well (i.e., @ <100 ppm); this soil is somewhat reduced (@ <200 mV); total salts content is low [see the table below on the right for assigned point values and ranges]. CalTrans (CT) times to perforation and full depth pitting times (following Uhlig) are determined based on pertinent parameters [see table below at left]. Sulfate should not have any adverse impact on concrete, cement, mortar or grout; likewise, chloride should not have any adverse impact on rebar,or buried steel in this soil over the long run. In principle, lime or mild cement treatment could be of substantial benefit in that raising soil pH to the 7.5-8.5 range would increase times to perforation [as indicated at left below]. To increase longevity any more in this soil would require steel upgrading and/or other actions. At times, structural strength considerations can require heavier gauge steel than is used in the presented examples such that perforation and pitting times can be beyond the specified life span. And where this is not the case, increasing longevity any more in this soil would require steel upgrading and/or other actions. For examples, one potential solution is cathodic protection along with coating or wrapping the steel assets. Some other potential solutions include the use of specialized engineering fill, use of polymers or other coatings, or use of plastic, fiberglass, or concrete assets. Therefore, based on these results, for some routine projects no actions may be necessary, but for other projects, despite the good Rs, some upgrading may be prudent due to depressed soil redox (and the acidic pH), especially if soil remediation is not done.

SAMPLE ID	CT 18 ga	CT 12 ga	2 mm (Uhlig)
CPH1-HS/A	>15 yrs	>34 yrs	>10 yrs
treated	<45 yrs	<98 yrs	~53 yrs

PARAMETER/ID	CPH1-HS/A
pH	Ø
Rs	Ø-4
SO4	Ø
Cl	Ø-3
Redox	Ø-4
Sulfides	-
TOTAL POINTS	Ø-11

\\\\NOTES: Methods are from following sources: extractions by Cal Trans protocols as per Cal Test 417 (SO4), 422 (Cl), and 532/643 (pH & resistivity); &/or by ASTM Vol. 4.08 & ASTM Vol. 11.01 (=EPA Methods of Chemical Analysis, or Standard Methods); pH - ASTM G 51; Spec. Cond. - ASTM D 1125; resistivity - ASTM G 57; redox - Pt probe/ISE; sulfate - extraction Title 22, detection ASTM D 516 (=EPA 375.4); chloride - extraction Title 22, detection ASTM D 512 (=EPA 325.3); sulfides - extraction by Title 22, and detection EPA 376.2 (= SMEWW 4500-S D); cyanides - extraction by Title 22, and detection by ASTM D 4374 (=EPA 335.2).

APPENDIX 3

Liquefaction Analysis

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LIQUEFACTION ANALYSIS REPORT

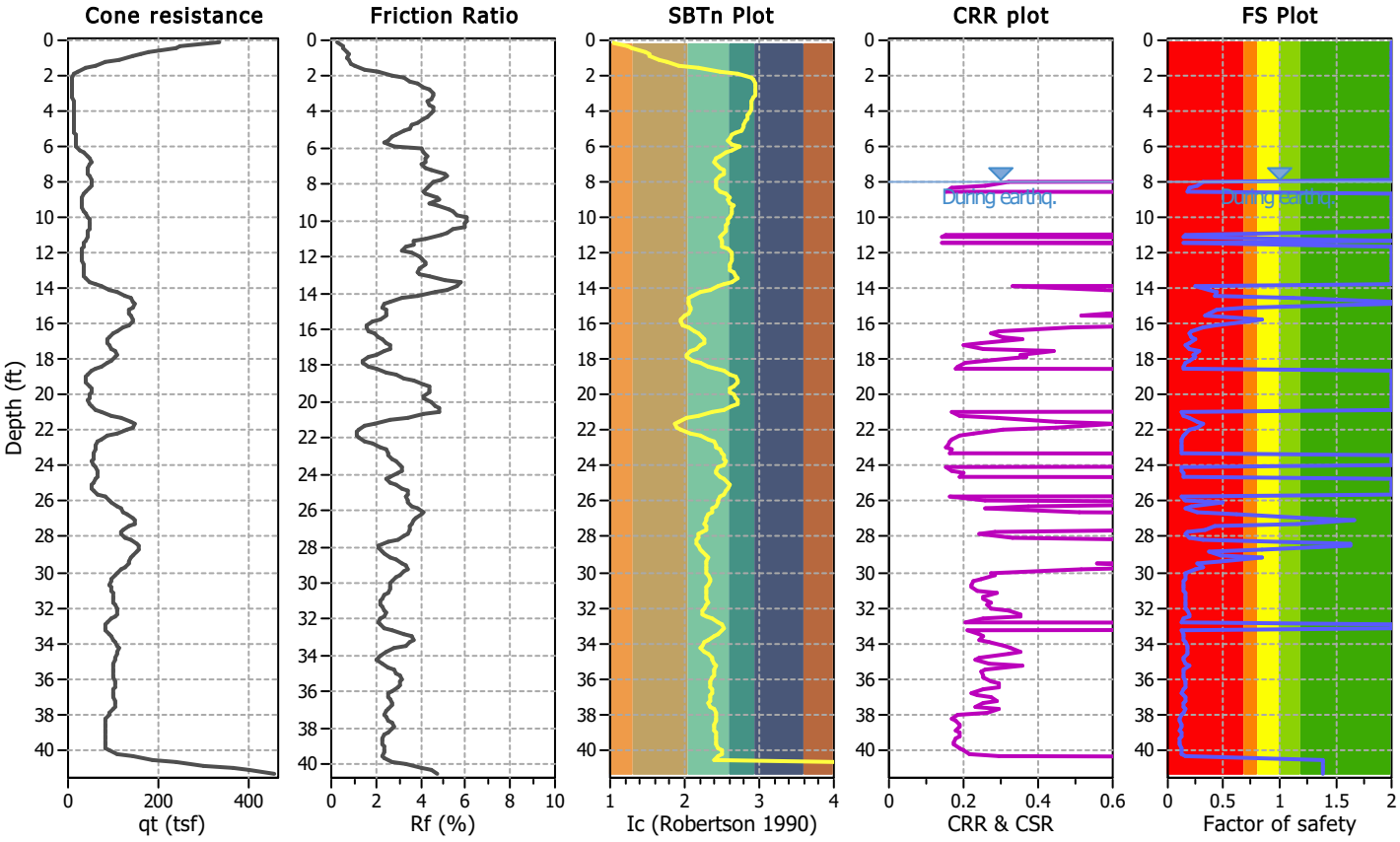
Project title : CalL Poly Humboldt health dining and housing

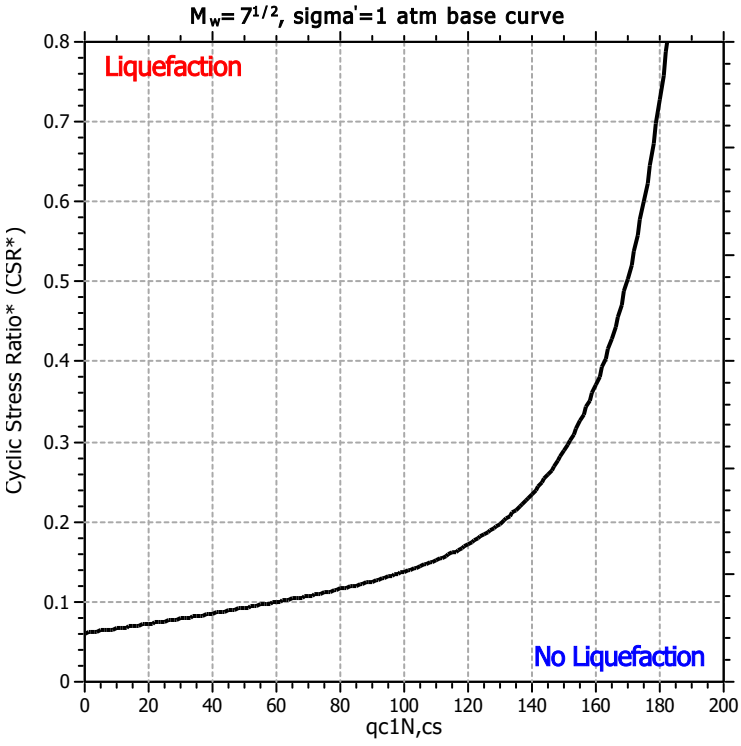
Location : Arcata, CA

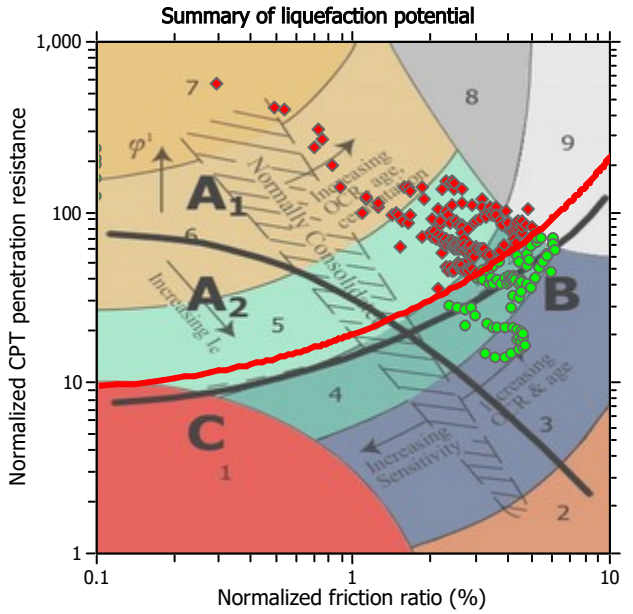
CPT file : CPT-01 - Basic

Input parameters and analysis data

Analysis method:	**B&I (2014)**	**G.W.T. (in-situ):**	**20.00 ft**	**Use fill:**	**No**	**Clay like behavior applied:**	**Sands only**
Fines correction method:	**B&I (2014)**	**G.W.T. (earthq.):**	**8.00 ft**	**Fill height:**	**N/A**	**Limit depth applie**	**Yes**
Points to test:	**Based on Ic value**	**Average results interva**	**5**	**Fill weight:**	**N/A**	**Limit depth:**	**42.00 ft**
Earthquake magnitude M_w:	**9.00**	**Ic cut-off value:**	**2.50**	**Trans. detect. applied:**	**No**	**MSF method:**	**Method base**
Peak ground acceleration:	**1.19**	**Unit weight calculation**	**Based on SBT**	**K_σ applied:**	**Yes**		

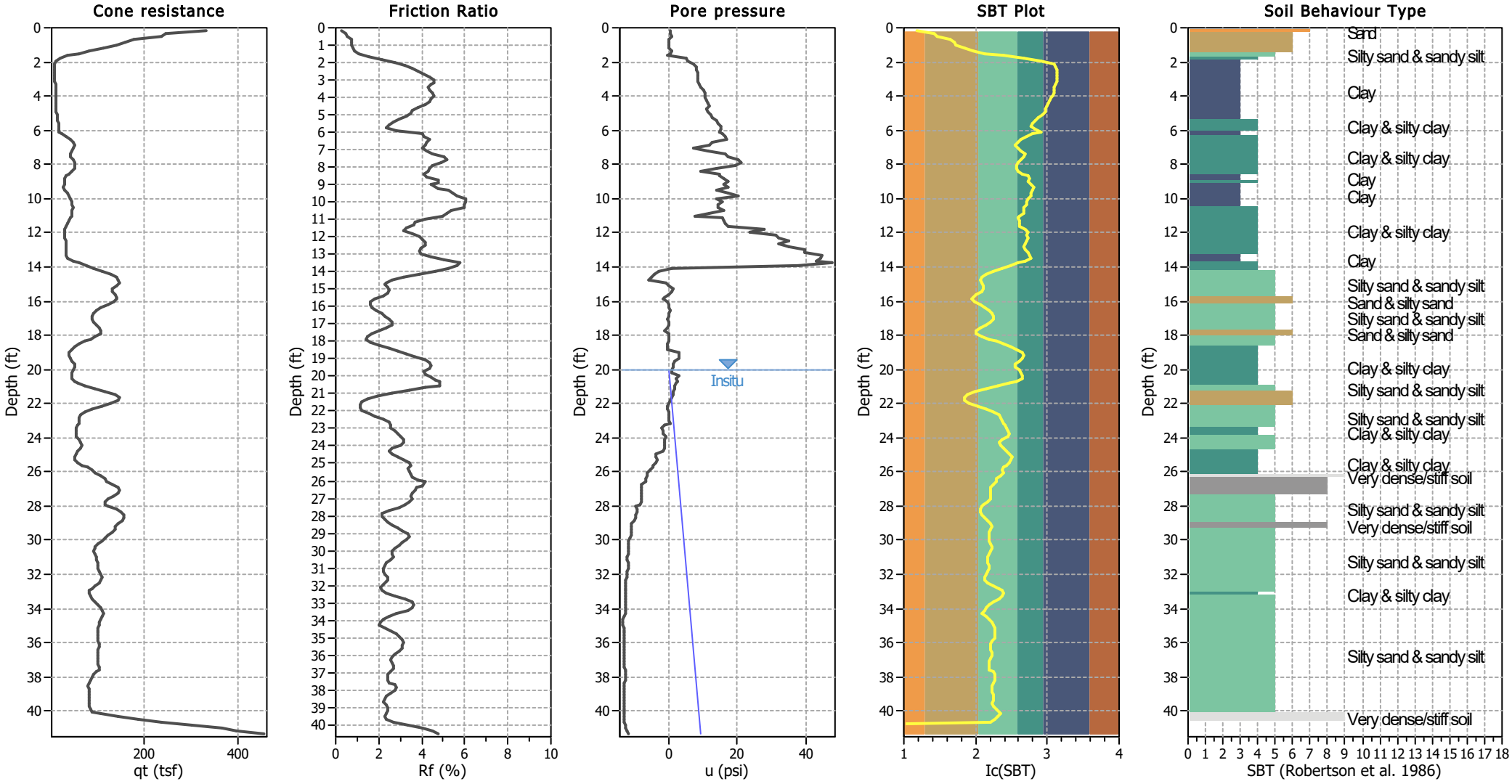






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and 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

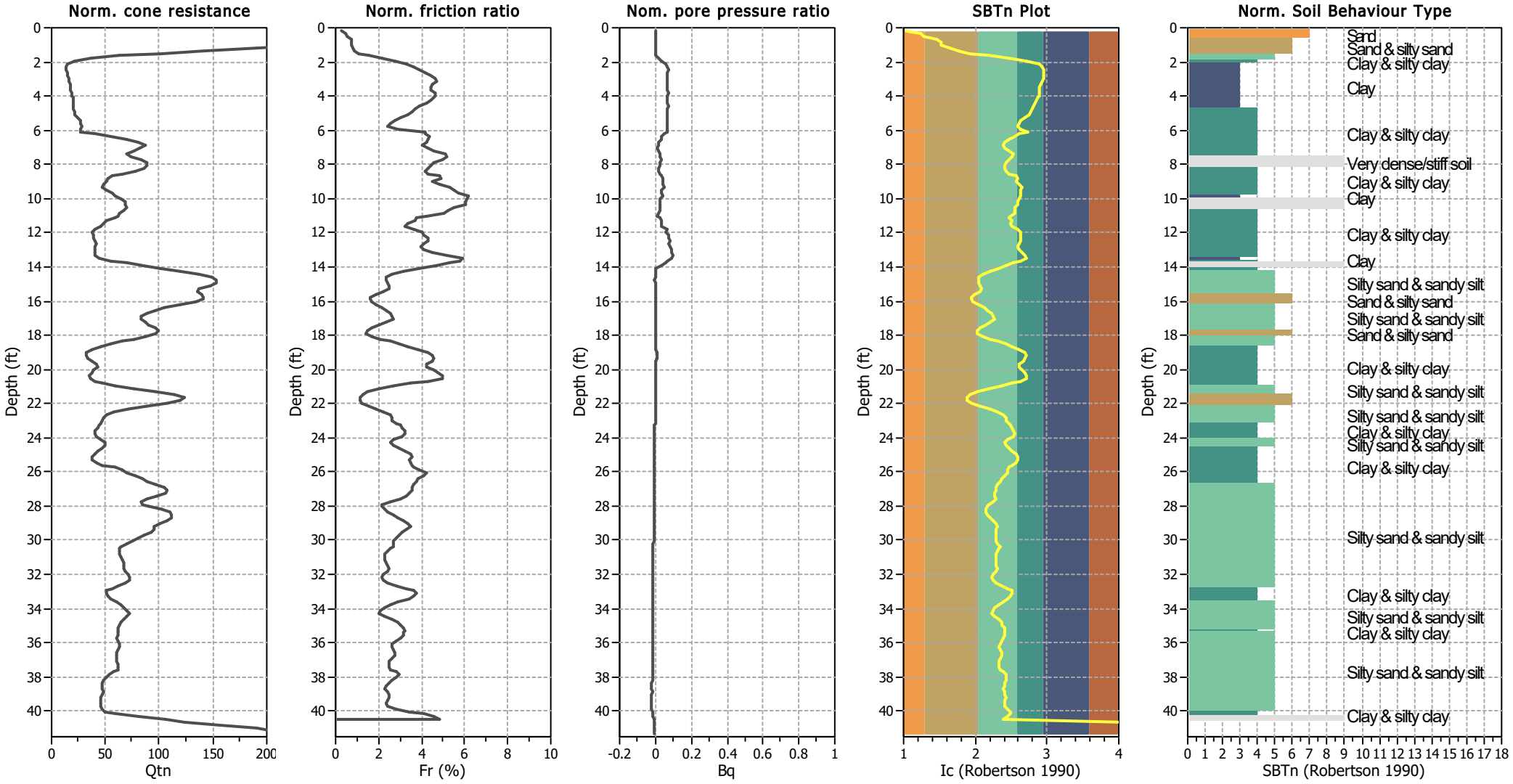
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 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

'T name: CPT-01 - Basic

CPT basic interpretation plots (normalized)



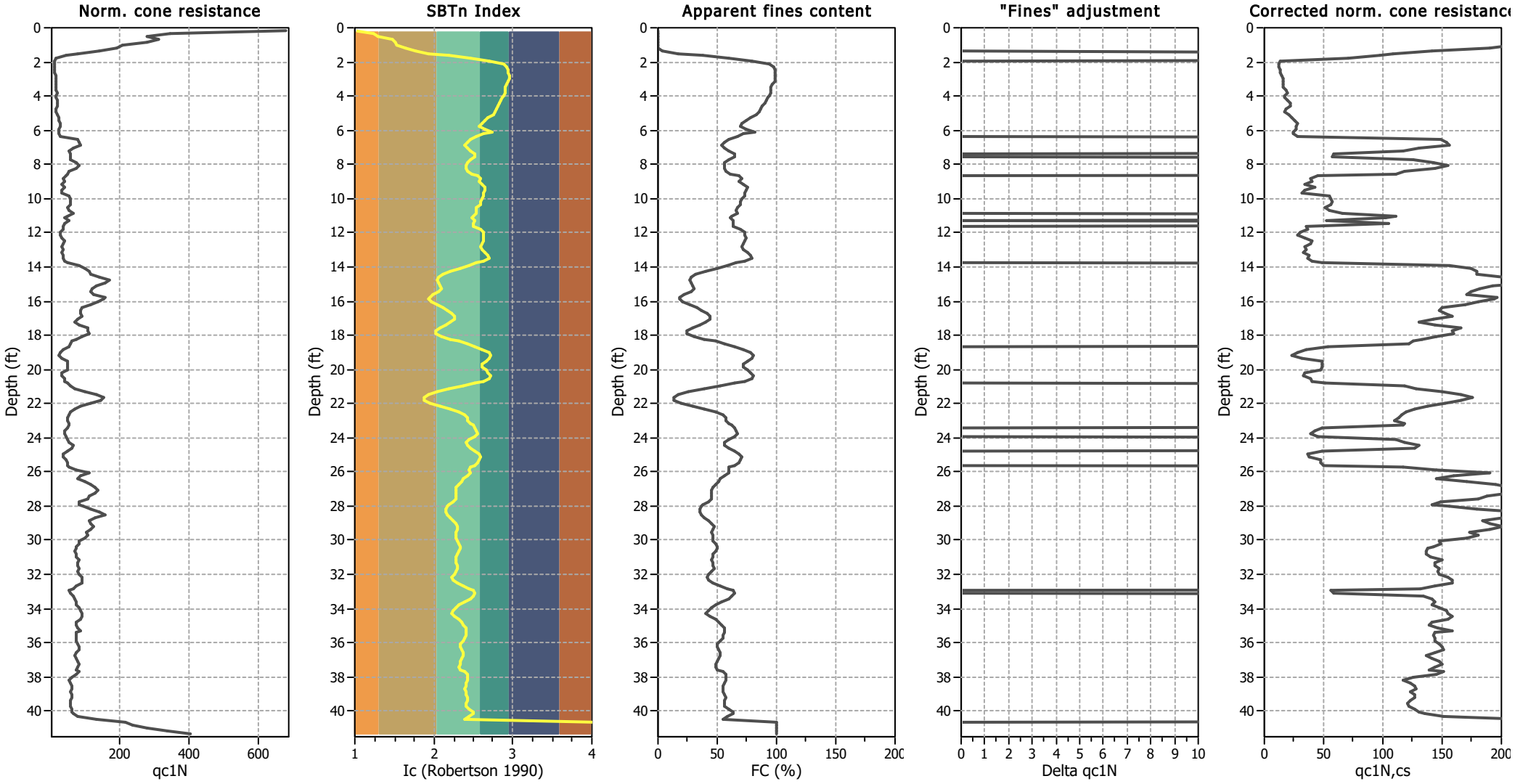
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 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

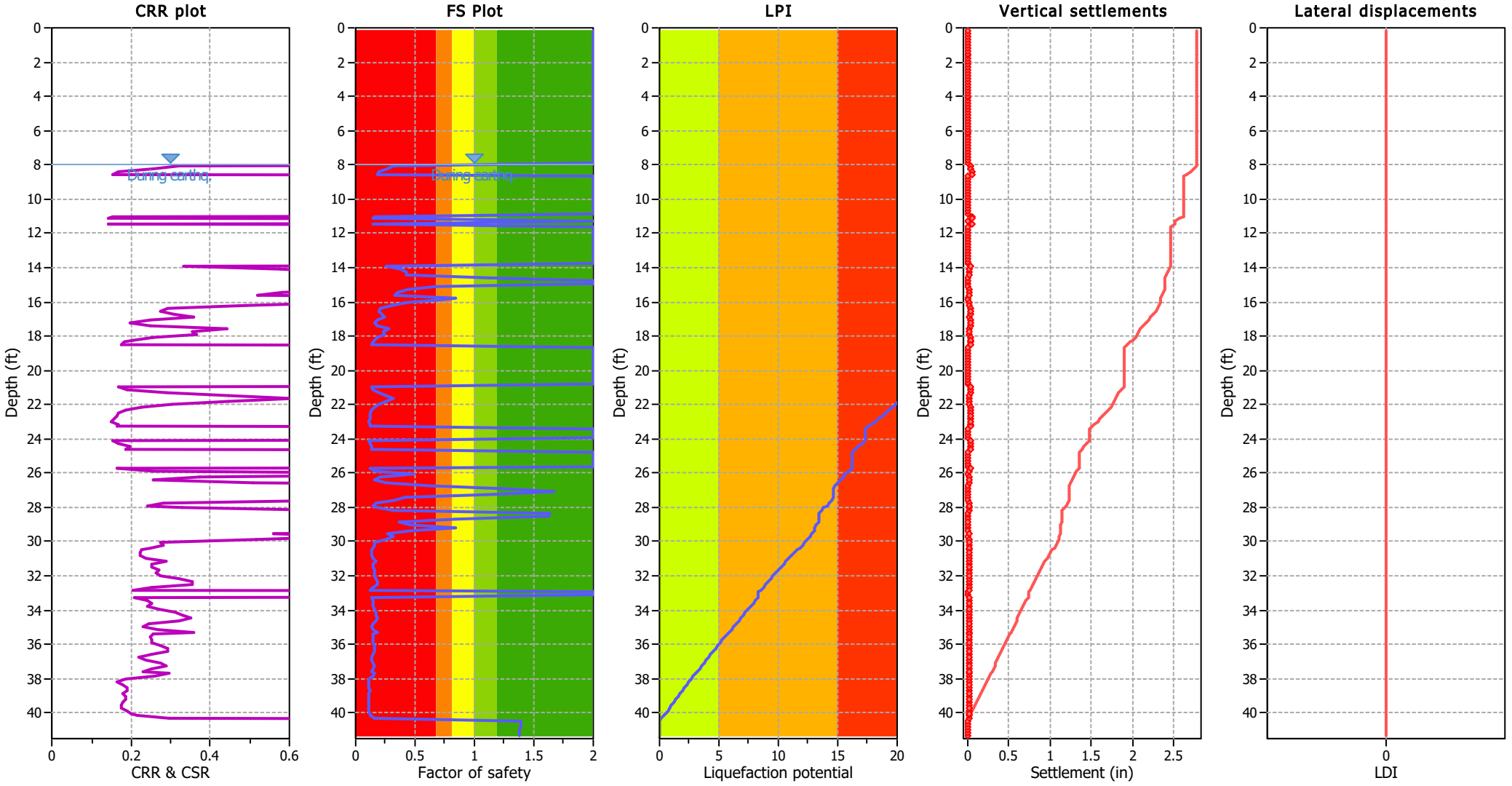
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

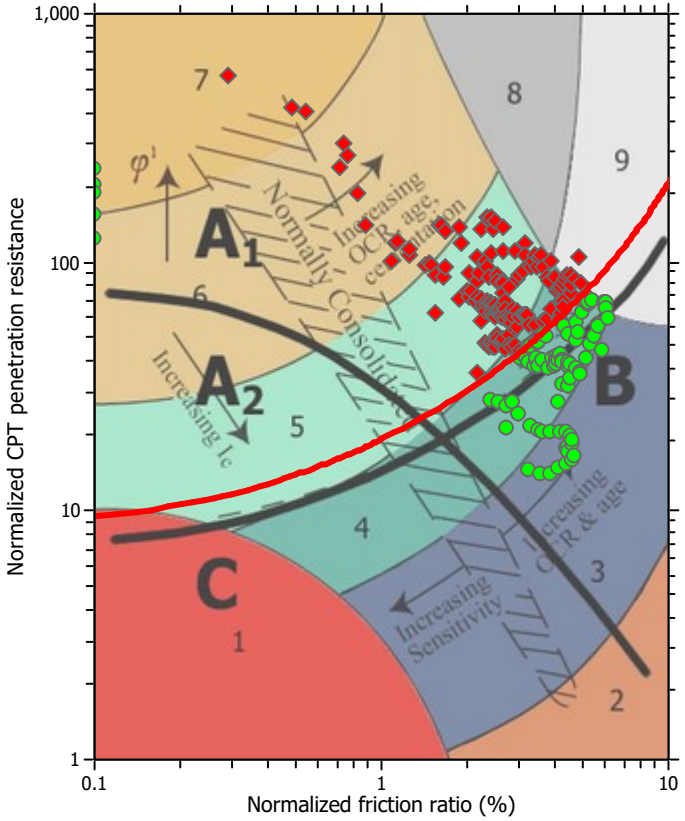
F.S. color scheme

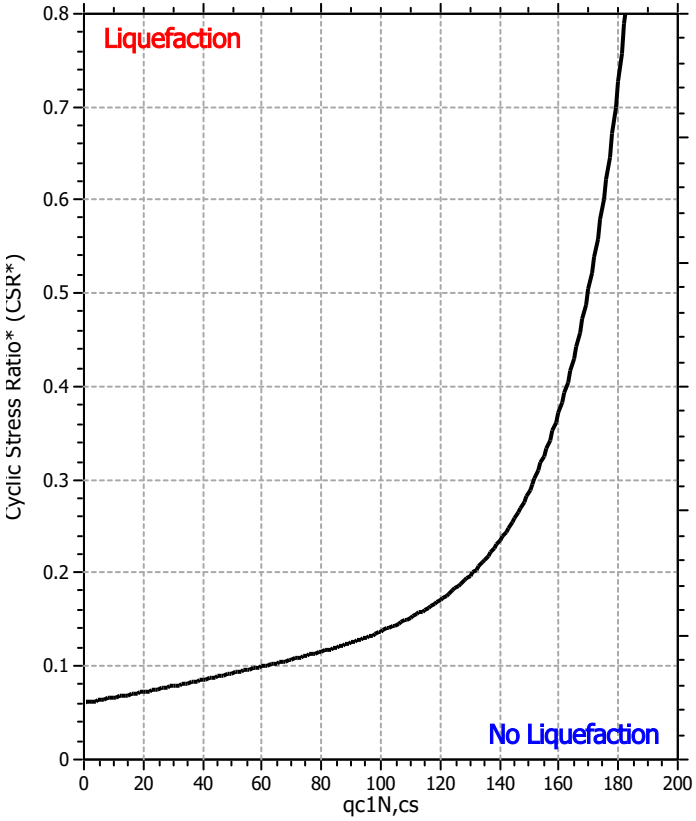
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

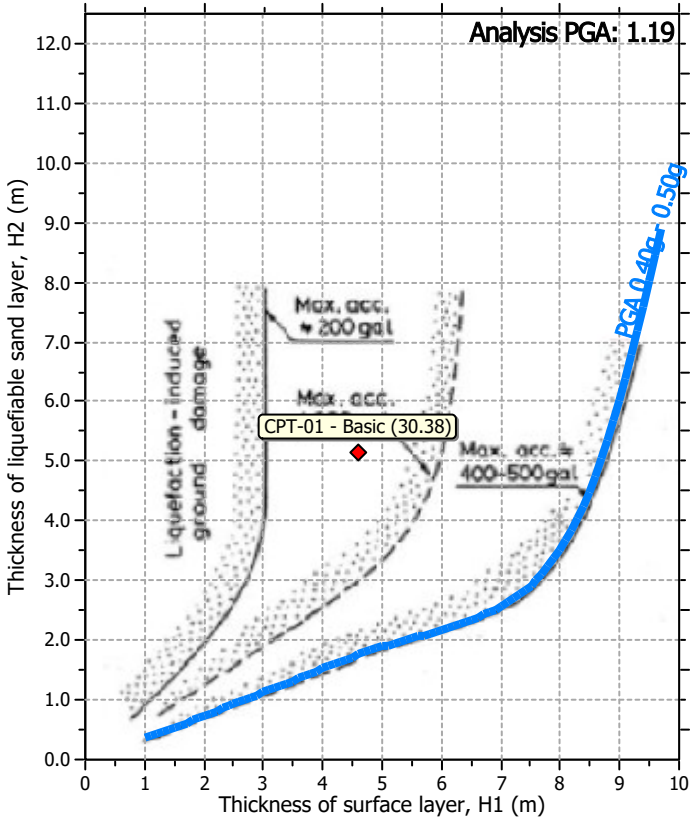
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



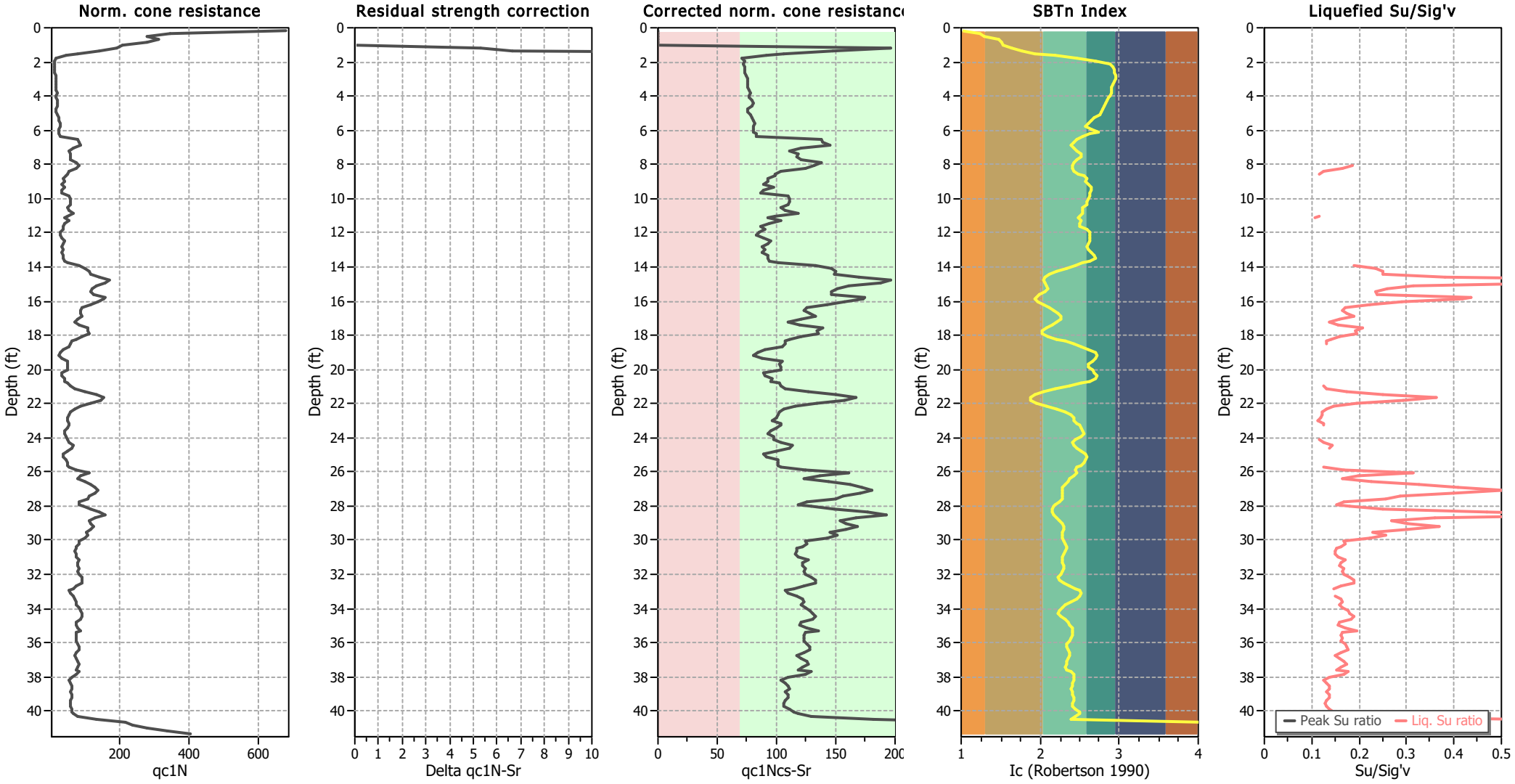




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	423.18	0.61	0.40	0.00	124.22
2	0.33	216.07	1.15	0.52	0.00	125.01
3	0.49	174.77	1.88	0.77	0.28	125.40
4	0.66	195.02	1.20	0.25	2.42	124.87
5	0.82	172.70	1.55	0.21	3.05	124.00
6	0.98	130.49	0.76	0.15	3.26	122.36
7	1.15	118.79	0.64	0.27	5.12	121.17
8	1.31	87.86	0.86	0.97	7.32	118.79
9	1.48	49.82	0.79	0.49	11.14	116.93
10	1.64	28.59	0.62	-0.14	18.45	114.95
11	1.80	10.46	0.28	5.04	29.22	111.86
12	1.97	8.72	0.29	5.41	40.81	108.71
13	2.13	7.54	0.27	7.35	51.08	106.23
14	2.30	7.91	0.27	7.90	53.71	106.48
15	2.46	8.39	0.29	8.10	54.91	107.22
16	2.62	8.45	0.35	8.32	54.75	108.16
17	2.79	9.20	0.44	8.31	55.10	109.02
18	2.95	9.82	0.46	8.52	55.35	109.65
19	3.12	9.64	0.47	8.45	54.67	110.04
20	3.28	9.72	0.45	9.00	53.21	110.17
21	3.44	10.17	0.44	9.48	51.97	110.35
22	3.61	11.15	0.45	10.01	51.79	110.62
23	3.77	11.79	0.49	10.67	52.02	111.06
24	3.94	10.63	0.54	10.67	51.32	111.47
25	4.10	10.73	0.58	10.52	50.06	111.74
26	4.27	12.31	0.55	11.20	49.02	111.81
27	4.43	13.70	0.51	11.66	48.15	111.55
28	4.59	13.49	0.49	11.81	46.95	110.98
29	4.76	11.04	0.44	11.08	45.72	110.56
30	4.92	10.65	0.39	11.30	44.94	110.46
31	5.09	12.78	0.41	12.23	43.20	110.43
32	5.25	14.59	0.47	12.76	39.82	110.56
33	5.41	16.20	0.45	14.07	37.24	110.75
34	5.58	17.57	0.41	14.40	35.50	110.65
35	5.74	16.70	0.39	15.28	34.49	110.24
36	5.91	16.32	0.35	15.40	37.24	111.51
37	6.07	15.22	0.35	14.88	42.55	114.13
38	6.23	15.27	0.83	15.61	36.32	117.91
39	6.40	17.66	1.41	16.65	32.67	121.26
40	6.56	54.43	1.98	17.08	28.96	123.52
41	6.73	58.65	2.47	12.79	27.20	124.72
42	6.89	61.49	2.12	11.89	25.76	125.17
43	7.05	44.70	1.96	7.13	27.16	125.06
44	7.22	36.66	1.77	11.65	28.99	124.74
45	7.38	41.01	2.01	16.40	31.77	124.75
46	7.55	40.19	2.30	17.51	31.31	125.35
47	7.71	42.93	2.42	20.24	29.16	126.19
48	7.87	55.47	2.67	21.24	27.21	126.23

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	64.09	2.63	19.49	26.77	126.01
50	8.20	57.78	1.82	13.86	26.80	125.56
51	8.37	40.56	1.94	9.55	27.31	124.40
52	8.53	35.45	1.84	14.76	29.79	123.01
53	8.69	33.86	1.35	15.02	33.52	122.34
54	8.86	28.79	1.42	16.26	34.97	121.55
55	9.02	29.81	1.49	17.36	33.94	120.76
56	9.19	26.04	1.33	16.03	35.86	120.77
57	9.35	32.78	1.12	17.54	37.97	121.20
58	9.51	25.96	1.48	13.99	37.32	122.39
59	9.68	24.38	1.91	17.23	36.49	123.88
60	9.84	43.98	2.51	20.29	36.73	125.15
61	10.01	45.93	2.81	13.88	35.49	126.10
62	10.17	46.81	2.69	15.49	34.51	126.83
63	10.33	46.17	2.63	14.57	34.53	126.89
64	10.50	41.88	2.85	14.38	32.71	126.60
65	10.66	45.95	2.58	16.07	32.61	125.99
66	10.83	56.08	2.10	11.93	32.77	125.19
67	10.99	40.05	1.78	7.57	30.38	124.08
68	11.15	35.21	1.57	15.75	29.50	122.81
69	11.32	44.90	1.28	16.07	31.10	121.44
70	11.48	36.72	1.20	16.51	30.62	120.28
71	11.65	30.45	1.03	17.42	30.97	119.51
72	11.81	31.34	0.87	28.00	34.50	119.15
73	11.98	26.37	1.06	23.65	36.71	119.38
74	12.14	24.62	1.24	31.14	36.58	119.90
75	12.30	29.68	1.46	32.24	37.11	120.45
76	12.47	35.89	1.37	34.91	36.79	120.69
77	12.63	34.49	1.29	31.88	35.57	120.81
78	12.80	30.59	1.21	34.98	35.35	120.62
79	12.96	32.14	1.25	39.62	36.08	120.75
80	13.12	29.68	1.29	39.82	37.87	121.44
81	13.29	34.28	1.50	44.75	39.55	122.81
82	13.45	33.27	1.95	44.13	40.62	124.57
83	13.62	36.95	2.59	42.91	36.68	126.78
84	13.78	46.13	3.29	47.62	32.31	128.54
85	13.94	80.83	3.91	37.88	28.04	129.88
86	14.11	98.62	3.80	1.11	23.70	130.41
87	14.27	108.68	3.73	-2.99	19.38	130.68
88	14.44	115.42	2.76	-4.05	16.23	130.87
89	14.60	140.73	2.84	-4.88	14.50	131.02
90	14.76	171.19	3.49	-5.90	14.10	131.18
91	14.93	161.14	3.61	-0.91	14.53	131.60
92	15.09	132.21	3.91	0.16	15.06	131.49
93	15.26	121.91	3.70	1.48	15.57	130.77
94	15.42	119.41	2.74	0.99	14.59	129.94
95	15.58	125.82	2.21	0.01	12.77	129.04
96	15.75	159.37	1.88	-0.98	11.53	128.33

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	158.48	2.08	-1.68	11.41	128.15
98	16.08	139.84	2.43	-0.18	12.26	128.14
99	16.24	118.85	2.48	0.15	14.26	127.98
100	16.40	95.75	2.35	0.28	16.52	127.74
101	16.57	89.99	2.04	0.53	18.16	127.47
102	16.73	92.01	2.15	0.23	19.86	127.32
103	16.90	96.22	2.33	-0.06	20.91	127.19
104	17.06	82.97	2.54	-0.18	21.05	127.22
105	17.22	75.08	2.32	0.31	19.33	126.94
106	17.39	89.81	2.09	0.18	17.39	126.24
107	17.55	116.75	1.52	-0.21	14.96	125.49
108	17.72	116.67	1.20	-1.06	13.50	124.91
109	17.88	117.88	1.40	-0.04	13.55	124.55
110	18.04	96.48	1.56	0.20	15.75	124.66
111	18.21	79.31	1.77	0.28	19.12	125.10
112	18.37	68.50	1.88	0.18	23.14	125.12
113	18.54	63.52	2.02	-0.18	27.27	124.59
114	18.70	58.14	1.86	-0.35	31.35	123.83
115	18.86	39.41	1.42	-0.12	36.03	123.03
116	19.03	31.50	1.35	3.19	40.18	122.53
117	19.19	26.33	1.46	3.12	41.43	122.73
118	19.36	36.01	1.83	3.21	40.45	123.61
119	19.52	54.97	2.13	1.74	38.43	124.60
120	19.69	54.66	2.23	1.25	35.71	125.28
121	19.85	55.48	2.27	1.17	35.85	125.43
122	20.01	54.29	2.02	0.95	38.22	125.31
123	20.18	38.17	2.02	0.87	39.66	125.22
124	20.34	38.17	2.19	2.91	41.10	125.11
125	20.51	45.14	2.25	2.36	40.86	125.24
126	20.67	46.20	2.25	2.62	36.67	125.25
127	20.83	57.70	2.16	2.19	31.41	125.30
128	21.00	64.69	1.64	1.70	25.17	125.50
129	21.16	79.66	1.73	1.62	18.89	125.79
130	21.33	114.33	1.83	1.53	13.94	125.84
131	21.49	149.60	1.83	1.40	11.16	126.07
132	21.65	174.34	1.57	1.03	9.86	126.08
133	21.82	163.49	1.46	0.55	10.01	125.84
134	21.98	132.43	1.53	0.14	11.61	125.55
135	22.15	99.28	1.62	-0.18	15.03	125.35
136	22.31	79.09	1.79	-0.21	19.06	124.75
137	22.47	67.62	1.83	0.13	23.18	124.27
138	22.64	62.59	1.35	0.07	26.37	123.96
139	22.80	59.26	1.49	-0.04	27.51	123.71
140	22.97	56.10	1.62	-0.04	27.80	123.51
141	23.13	63.41	1.65	0.46	29.08	123.86
142	23.29	61.86	1.66	-1.03	30.31	123.99
143	23.46	56.77	1.78	-1.79	31.40	123.96
144	23.62	50.91	1.72	-1.78	32.47	123.85

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	46.96	1.68	-1.44	32.91	123.75
146	23.95	53.56	1.62	-0.67	31.67	123.65
147	24.11	57.45	1.59	-1.32	28.67	123.58
148	24.28	65.40	1.58	-1.24	26.84	123.95
149	24.44	76.18	1.41	-1.07	27.27	124.40
150	24.61	72.05	1.87	-1.31	29.19	124.67
151	24.77	57.47	2.09	-1.69	31.51	124.69
152	24.93	43.50	2.04	-3.72	33.79	124.61
153	25.10	45.09	1.81	-3.58	35.01	124.21
154	25.26	56.91	1.52	-3.34	34.42	124.04
155	25.43	57.59	1.54	-3.85	33.51	124.91
156	25.59	59.77	1.86	-4.43	31.55	126.45
157	25.75	63.98	2.90	-4.60	29.09	128.61
158	25.92	89.25	3.51	-5.25	28.63	130.20
159	26.08	129.39	4.43	-6.19	28.88	131.46
160	26.25	103.97	4.35	-6.33	27.19	132.24
161	26.41	91.92	4.59	-6.66	25.29	132.66
162	26.57	115.42	4.40	-6.76	24.63	132.88
163	26.74	138.77	4.11	-7.69	23.21	133.51
164	26.90	151.30	4.82	-7.88	21.97	134.16
165	27.07	160.13	5.63	-7.87	21.89	134.51
166	27.23	151.37	6.06	-8.06	21.57	134.08
167	27.40	134.81	5.40	-8.01	21.71	133.02
168	27.56	128.34	2.74	-7.89	21.74	131.47
169	27.72	102.25	1.99	-7.98	20.54	129.62
170	27.89	98.71	2.02	-8.14	18.73	128.45
171	28.05	112.93	2.31	-9.36	18.12	129.15
172	28.22	136.52	3.25	-9.33	17.44	130.72
173	28.38	168.15	3.68	-9.34	17.35	131.88
174	28.54	182.59	4.50	-9.55	18.15	132.87
175	28.71	153.05	4.27	-9.76	19.10	133.51
176	28.87	135.31	4.74	-9.98	20.39	133.87
177	29.04	138.98	5.09	-10.70	21.93	133.81
178	29.20	147.89	5.00	-10.70	22.78	133.61
179	29.36	138.92	4.76	-10.82	22.23	133.16
180	29.53	124.21	3.96	-10.86	21.74	132.44
181	29.69	130.54	3.40	-11.02	22.06	131.40
182	29.86	121.89	3.16	-11.13	22.09	130.34
183	30.02	101.24	2.76	-11.73	22.16	129.49
184	30.18	101.32	2.66	-11.83	23.22	128.82
185	30.35	95.29	2.46	-11.80	24.07	128.20
186	30.51	90.80	2.47	-11.83	23.76	127.64
187	30.68	90.48	2.33	-11.84	23.22	127.06
188	30.84	91.65	1.90	-11.80	22.45	126.91
189	31.00	95.29	1.81	-11.98	22.04	126.93
190	31.17	104.44	2.16	-11.98	21.84	127.06
191	31.33	98.89	2.44	-11.61	21.99	127.49
192	31.50	98.22	2.47	-11.74	22.44	127.96

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	101.59	2.47	-11.84	22.70	128.11
194	31.82	101.41	2.52	-11.95	21.93	128.06
195	31.99	104.63	2.40	-12.01	20.83	127.90
196	32.15	112.08	2.25	-12.05	20.17	127.81
197	32.32	114.93	2.08	-12.47	20.61	127.92
198	32.48	112.97	2.25	-12.40	22.19	128.21
199	32.64	96.57	2.73	-12.38	25.06	128.50
200	32.81	83.61	3.03	-12.37	28.34	128.77
201	32.97	72.19	3.11	-12.35	30.89	128.88
202	33.14	74.77	2.97	-12.35	31.43	128.95
203	33.30	84.16	2.79	-12.37	30.53	129.03
204	33.46	92.42	2.92	-12.43	28.85	129.15
205	33.63	96.93	3.04	-12.47	25.76	128.58
206	33.79	97.13	3.07	-12.47	23.38	128.19
207	33.96	104.54	1.56	-12.53	21.62	127.87
208	34.12	112.45	1.85	-12.54	20.38	127.67
209	34.28	115.74	2.22	-12.53	19.66	127.59
210	34.45	115.69	2.59	-12.93	21.36	128.44
211	34.61	110.23	2.85	-13.35	23.34	129.04
212	34.78	96.97	2.98	-13.24	24.78	129.33
213	34.94	94.16	3.08	-13.14	25.52	129.58
214	35.10	99.88	2.92	-13.07	26.67	129.78
215	35.27	111.28	3.14	-13.01	26.95	129.92
216	35.43	98.25	3.39	-12.96	26.67	129.89
217	35.60	97.25	3.27	-12.95	26.47	129.75
218	35.76	98.30	2.97	-12.92	26.28	129.38
219	35.93	99.41	2.62	-12.89	25.09	128.99
220	36.09	104.27	2.45	-12.86	24.12	128.74
221	36.25	107.07	2.56	-12.84	23.95	128.68
222	36.42	106.86	2.71	-12.82	24.43	128.72
223	36.58	100.01	2.85	-12.81	25.01	128.82
224	36.75	93.10	2.75	-12.80	25.24	128.86
225	36.91	98.07	2.68	-12.78	24.47	128.42
226	37.07	105.01	2.65	-12.76	23.89	128.13
227	37.24	107.57	1.91	-12.74	23.62	128.08
228	37.40	102.02	2.33	-12.73	23.49	128.29
229	37.57	96.92	2.64	-12.69	24.12	128.48
230	37.73	106.86	2.96	-12.60	26.09	128.69
231	37.89	100.48	3.02	-12.57	27.38	128.33
232	38.06	82.23	2.52	-12.55	27.37	127.64
233	38.22	74.01	1.94	-12.54	27.47	126.71
234	38.39	79.90	1.60	-12.77	27.06	125.79
235	38.55	83.97	1.72	-12.82	26.47	125.33
236	38.71	85.50	1.86	-12.79	26.11	125.53
237	38.88	80.16	1.95	-12.78	26.47	125.86
238	39.04	83.42	2.12	-12.76	26.97	125.98
239	39.21	83.21	2.00	-12.75	27.38	125.88
240	39.37	80.51	1.90	-12.74	27.20	125.73

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	78.76	1.78	-12.75	26.81	125.48
242	39.70	79.54	1.76	-12.79	27.13	125.79
243	39.86	83.45	1.80	-12.79	28.64	127.07
244	40.03	86.43	2.37	-12.79	30.58	129.23
245	40.19	91.14	3.65	-12.78	30.62	132.41
246	40.35	107.05	5.34	-12.78	28.20	136.04
247	40.52	170.50	8.51	-12.75	26.05	137.28
248	40.68	266.24	12.41	-12.73	100.00	137.28
249	40.85	293.32	14.28	-12.65	100.00	137.28
250	41.01	347.27	-273363.24	-12.55	100.00	137.28
251	41.17	418.65	-273363.24	-11.99	100.00	137.28
252	41.34	501.94	-273363.24	-11.82	100.00	137.28

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.16	0.01	0.00	0.01	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
2	0.33	0.02	0.00	0.02	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
3	0.49	0.03	0.00	0.03	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
4	0.66	0.04	0.00	0.04	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
5	0.82	0.05	0.00	0.05	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
6	0.98	0.06	0.00	0.06	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
7	1.15	0.07	0.00	0.07	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
8	1.31	0.08	0.00	0.08	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
9	1.48	0.09	0.00	0.09	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
10	1.64	0.10	0.00	0.10	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
11	1.80	0.11	0.00	0.11	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
12	1.97	0.12	0.00	0.12	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
13	2.13	0.13	0.00	0.13	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
14	2.30	0.14	0.00	0.14	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
15	2.46	0.14	0.00	0.14	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
16	2.62	0.15	0.00	0.15	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
17	2.79	0.16	0.00	0.16	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
18	2.95	0.17	0.00	0.17	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
19	3.12	0.18	0.00	0.18	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
20	3.28	0.19	0.00	0.19	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
21	3.44	0.20	0.00	0.20	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
22	3.61	0.21	0.00	0.21	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
23	3.77	0.22	0.00	0.22	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
24	3.94	0.23	0.00	0.23	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
25	4.10	0.23	0.00	0.23	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
26	4.27	0.24	0.00	0.24	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
27	4.43	0.25	0.00	0.25	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
28	4.59	0.26	0.00	0.26	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
29	4.76	0.27	0.00	0.27	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
30	4.92	0.28	0.00	0.28	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
31	5.09	0.29	0.00	0.29	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
32	5.25	0.30	0.00	0.30	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
33	5.41	0.31	0.00	0.31	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
34	5.58	0.32	0.00	0.32	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
35	5.74	0.33	0.00	0.33	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
36	5.91	0.33	0.00	0.33	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
37	6.07	0.34	0.00	0.34	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
38	6.23	0.35	0.00	0.35	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
39	6.40	0.36	0.00	0.36	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
40	6.56	0.37	0.00	0.37	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
41	6.73	0.38	0.00	0.38	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
42	6.89	0.39	0.00	0.39	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
43	7.05	0.40	0.00	0.40	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
44	7.22	0.41	0.00	0.41	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
45	7.38	0.42	0.00	0.42	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
46	7.55	0.44	0.00	0.44	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
47	7.71	0.45	0.00	0.45	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
48	7.87	0.46	0.00	0.46	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.04	0.47	0.00	0.47	1.00	0.776	0.67	1.159	1.10	1.00	1.006	**No**
50	8.20	0.48	0.01	0.47	1.00	0.784	0.67	1.171	1.10	1.00	0.952	**No**
51	8.37	0.49	0.01	0.48	1.00	0.792	0.67	1.184	1.10	1.00	0.853	**No**
52	8.53	0.50	0.02	0.48	1.00	0.800	0.67	1.196	1.09	1.00	0.846	**No**
53	8.69	0.51	0.02	0.49	1.00	0.808	0.67	1.207	1.09	1.00	0.852	**No**
54	8.86	0.52	0.03	0.49	1.00	0.816	0.67	1.219	1.08	1.00	0.847	**No**
55	9.02	0.53	0.03	0.49	1.00	0.823	0.67	1.230	1.08	1.00	0.857	**No**
56	9.19	0.54	0.04	0.50	1.00	0.831	0.67	1.242	1.08	1.00	0.857	**No**
57	9.35	0.55	0.04	0.50	1.00	0.838	0.67	1.252	1.08	1.00	0.883	**No**
58	9.51	0.56	0.05	0.51	1.00	0.845	0.67	1.263	1.07	1.00	0.872	**No**
59	9.68	0.57	0.05	0.51	1.00	0.852	0.67	1.274	1.07	1.00	0.876	**No**
60	9.84	0.58	0.06	0.52	1.00	0.859	0.67	1.283	1.09	1.00	0.945	**No**
61	10.01	0.59	0.06	0.52	1.00	0.866	0.67	1.294	1.09	1.00	0.960	**No**
62	10.17	0.60	0.07	0.53	1.00	0.872	0.67	1.303	1.09	1.00	0.969	**No**
63	10.33	0.61	0.07	0.54	1.00	0.879	0.67	1.313	1.09	1.00	0.973	**No**
64	10.50	0.62	0.08	0.54	1.00	0.885	0.67	1.322	1.08	1.00	0.960	**No**
65	10.66	0.63	0.08	0.55	1.00	0.891	0.67	1.332	1.08	1.00	0.983	**No**
66	10.83	0.64	0.09	0.55	1.00	0.897	0.67	1.341	1.09	1.00	1.042	**No**
67	10.99	0.65	0.09	0.56	1.00	0.903	0.67	1.350	1.07	1.00	0.970	**No**
68	11.15	0.66	0.10	0.56	1.00	0.909	0.67	1.358	1.07	1.00	0.960	**No**
69	11.32	0.67	0.10	0.57	1.00	0.915	0.67	1.367	1.08	1.00	1.001	**No**
70	11.48	0.68	0.11	0.57	1.00	0.921	0.67	1.376	1.07	1.00	0.978	**No**
71	11.65	0.69	0.11	0.58	1.00	0.927	0.67	1.385	1.06	1.00	0.968	**No**
72	11.81	0.70	0.12	0.58	1.00	0.932	0.67	1.393	1.06	1.00	0.978	**No**
73	11.98	0.71	0.12	0.58	1.00	0.938	0.67	1.401	1.06	1.00	0.974	**No**
74	12.14	0.72	0.13	0.59	1.00	0.943	0.67	1.409	1.06	1.00	0.976	**No**
75	12.30	0.73	0.13	0.59	1.00	0.948	0.67	1.417	1.06	1.00	0.993	**No**
76	12.47	0.74	0.14	0.60	1.00	0.954	0.67	1.425	1.06	1.00	1.016	**No**
77	12.63	0.75	0.14	0.60	1.00	0.959	0.67	1.432	1.06	1.00	1.016	**No**
78	12.80	0.76	0.15	0.61	1.00	0.964	0.67	1.440	1.06	1.00	1.012	**No**
79	12.96	0.77	0.15	0.61	1.00	0.969	0.67	1.447	1.06	1.00	1.021	**No**
80	13.12	0.78	0.16	0.62	1.00	0.973	0.67	1.455	1.05	1.00	1.021	**No**
81	13.29	0.79	0.17	0.62	1.00	0.978	0.67	1.462	1.06	1.00	1.040	**No**
82	13.45	0.80	0.17	0.63	1.00	0.983	0.67	1.469	1.05	1.00	1.042	**No**
83	13.62	0.81	0.18	0.63	1.00	0.988	0.67	1.476	1.06	1.00	1.056	**No**
84	13.78	0.82	0.18	0.64	1.00	0.992	0.67	1.482	1.06	1.00	1.089	**No**
85	13.94	0.83	0.19	0.64	1.00	0.996	0.67	1.488	1.08	1.00	1.324	**No**
86	14.11	0.84	0.19	0.65	1.00	1.000	0.67	1.495	1.10	1.00	1.549	**No**
87	14.27	0.85	0.20	0.66	1.00	1.004	0.67	1.501	1.10	1.00	1.658	**No**
88	14.44	0.86	0.20	0.66	1.00	1.009	0.67	1.507	1.10	1.00	1.660	**No**
89	14.60	0.87	0.21	0.67	1.00	1.012	0.67	1.513	1.10	1.00	1.830	**No**
90	14.76	0.88	0.21	0.67	1.00	1.016	0.67	1.518	1.10	1.00	1.837	**No**
91	14.93	0.89	0.22	0.68	1.00	1.020	0.67	1.524	1.10	1.00	1.844	**No**
92	15.09	0.90	0.22	0.68	1.00	1.024	0.67	1.530	1.10	1.00	1.851	**No**
93	15.26	0.92	0.23	0.69	1.00	1.028	0.67	1.535	1.09	1.00	1.752	**No**
94	15.42	0.93	0.23	0.69	1.00	1.031	0.67	1.541	1.08	1.00	1.620	**No**
95	15.58	0.94	0.24	0.70	1.00	1.035	0.67	1.546	1.08	1.00	1.575	**No**
96	15.75	0.95	0.24	0.71	1.00	1.038	0.67	1.552	1.10	1.00	1.878	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	15.91	0.96	0.25	0.71	1.00	1.042	0.67	1.557	1.10	1.00	1.888	**No**
98	16.08	0.97	0.25	0.72	1.00	1.046	0.67	1.562	1.08	1.00	1.778	**No**
99	16.24	0.98	0.26	0.72	1.00	1.049	0.67	1.567	1.07	1.00	1.582	**No**
100	16.40	0.99	0.26	0.73	1.00	1.052	0.67	1.572	1.06	1.00	1.378	**No**
101	16.57	1.00	0.27	0.73	1.00	1.056	0.67	1.578	1.06	1.00	1.359	**No**
102	16.73	1.01	0.27	0.74	1.00	1.059	0.67	1.582	1.06	1.00	1.409	**No**
103	16.90	1.02	0.28	0.74	1.00	1.062	0.67	1.587	1.06	1.00	1.477	**No**
104	17.06	1.03	0.28	0.75	1.00	1.066	0.67	1.592	1.05	1.00	1.341	**No**
105	17.22	1.04	0.29	0.75	1.00	1.069	0.67	1.597	1.05	1.00	1.269	**No**
106	17.39	1.05	0.29	0.76	1.00	1.072	0.67	1.602	1.05	1.00	1.355	**No**
107	17.55	1.06	0.30	0.76	1.00	1.075	0.67	1.606	1.06	1.00	1.589	**No**
108	17.72	1.07	0.30	0.77	1.00	1.078	0.67	1.611	1.05	1.00	1.501	**No**
109	17.88	1.08	0.31	0.77	1.00	1.081	0.67	1.616	1.05	1.00	1.520	**No**
110	18.04	1.09	0.31	0.78	1.00	1.084	0.67	1.620	1.05	1.00	1.385	**No**
111	18.21	1.10	0.32	0.78	1.00	1.087	0.67	1.625	1.04	1.00	1.311	**No**
112	18.37	1.11	0.32	0.79	1.00	1.090	0.67	1.629	1.04	1.00	1.276	**No**
113	18.54	1.12	0.33	0.80	1.00	1.093	0.67	1.634	1.04	1.00	1.268	**No**
114	18.70	1.13	0.33	0.80	1.00	1.096	0.67	1.638	1.03	1.00	1.253	**No**
115	18.86	1.14	0.34	0.80	1.00	1.099	0.67	1.642	1.03	1.00	1.191	**No**
116	19.03	1.15	0.34	0.81	1.00	1.102	0.67	1.647	1.03	1.00	1.177	**No**
117	19.19	1.16	0.35	0.81	1.00	1.105	0.67	1.651	1.02	1.00	1.169	**No**
118	19.36	1.17	0.35	0.82	1.00	1.108	0.67	1.655	1.03	1.00	1.194	**No**
119	19.52	1.18	0.36	0.83	1.00	1.110	0.67	1.659	1.03	1.00	1.263	**No**
120	19.69	1.20	0.36	0.83	1.00	1.113	0.67	1.663	1.03	1.00	1.262	**No**
121	19.85	1.21	0.37	0.84	1.00	1.116	0.67	1.667	1.03	1.00	1.268	**No**
122	20.01	1.22	0.37	0.84	1.00	1.118	0.67	1.671	1.03	1.00	1.269	**No**
123	20.18	1.23	0.38	0.85	1.00	1.121	0.67	1.675	1.02	1.00	1.216	**No**
124	20.34	1.24	0.39	0.85	1.00	1.124	0.67	1.679	1.02	1.00	1.220	**No**
125	20.51	1.25	0.39	0.86	1.00	1.126	0.67	1.683	1.02	1.00	1.245	**No**
126	20.67	1.26	0.40	0.86	1.00	1.129	0.67	1.686	1.02	1.00	1.249	**No**
127	20.83	1.27	0.40	0.87	1.00	1.131	0.67	1.690	1.02	1.00	1.291	**No**
128	21.00	1.28	0.41	0.87	1.00	1.133	0.67	1.694	1.02	1.00	1.312	**No**
129	21.16	1.29	0.41	0.88	1.00	1.136	0.67	1.697	1.02	1.00	1.361	**No**
130	21.33	1.30	0.42	0.88	1.00	1.138	0.67	1.701	1.03	1.00	1.532	**No**
131	21.49	1.31	0.42	0.89	1.00	1.140	0.67	1.704	1.03	1.00	1.737	**No**
132	21.65	1.32	0.43	0.89	1.00	1.143	0.67	1.707	1.03	1.00	1.903	**No**
133	21.82	1.33	0.43	0.90	1.00	1.145	0.67	1.711	1.03	1.00	1.747	**No**
134	21.98	1.34	0.44	0.90	1.00	1.147	0.67	1.714	1.03	1.00	1.572	**No**
135	22.15	1.35	0.44	0.91	1.00	1.150	0.67	1.718	1.02	1.00	1.448	**No**
136	22.31	1.36	0.45	0.91	1.00	1.152	0.67	1.721	1.02	1.00	1.379	**No**
137	22.47	1.37	0.45	0.92	1.00	1.154	0.67	1.724	1.02	1.00	1.345	**No**
138	22.64	1.38	0.46	0.92	1.00	1.156	0.67	1.728	1.02	1.00	1.335	**No**
139	22.80	1.39	0.46	0.93	1.00	1.158	0.67	1.731	1.02	1.00	1.326	**No**
140	22.97	1.40	0.47	0.93	1.00	1.161	0.67	1.734	1.01	1.00	1.316	**No**
141	23.13	1.41	0.47	0.94	1.00	1.163	0.67	1.737	1.01	1.00	1.355	**No**
142	23.29	1.42	0.48	0.94	1.00	1.165	0.67	1.740	1.01	1.00	1.353	**No**
143	23.46	1.43	0.48	0.95	1.00	1.167	0.67	1.744	1.01	1.00	1.334	**No**
144	23.62	1.44	0.49	0.95	1.00	1.169	0.67	1.747	1.01	1.00	1.314	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.79	1.45	0.49	0.96	1.00	1.171	0.67	1.750	1.01	1.00	1.303	**No**
146	23.95	1.46	0.50	0.96	1.00	1.173	0.67	1.753	1.01	1.00	1.329	**No**
147	24.11	1.47	0.50	0.97	1.00	1.175	0.67	1.756	1.01	1.00	1.342	**No**
148	24.28	1.48	0.51	0.97	1.00	1.177	0.67	1.759	1.01	1.00	1.378	**No**
149	24.44	1.49	0.51	0.98	1.00	1.179	0.67	1.762	1.01	1.00	1.449	**No**
150	24.61	1.50	0.52	0.98	1.00	1.181	0.67	1.765	1.01	1.00	1.430	**No**
151	24.77	1.51	0.52	0.99	1.00	1.183	0.67	1.767	1.01	1.00	1.358	**No**
152	24.93	1.52	0.53	0.99	1.00	1.185	0.67	1.770	1.01	1.00	1.311	**No**
153	25.10	1.53	0.53	1.00	1.00	1.187	0.67	1.773	1.01	1.00	1.320	**No**
154	25.26	1.54	0.54	1.00	1.00	1.188	0.67	1.776	1.01	1.00	1.368	**No**
155	25.43	1.55	0.54	1.01	1.00	1.190	0.67	1.779	1.01	1.00	1.372	**No**
156	25.59	1.56	0.55	1.01	1.00	1.192	0.67	1.781	1.00	1.00	1.381	**No**
157	25.75	1.57	0.55	1.02	1.00	1.194	0.67	1.783	1.00	1.00	1.399	**No**
158	25.92	1.58	0.56	1.03	1.00	1.195	0.67	1.786	1.00	1.00	1.591	**No**
159	26.08	1.60	0.56	1.03	1.00	1.197	0.67	1.788	1.01	1.00	2.366	**No**
160	26.25	1.61	0.57	1.04	1.00	1.198	0.67	1.790	1.00	1.00	1.778	**No**
161	26.41	1.62	0.57	1.04	1.00	1.200	0.67	1.793	1.00	1.00	1.601	**No**
162	26.57	1.63	0.58	1.05	1.00	1.201	0.67	1.795	1.00	1.00	1.960	**No**
163	26.74	1.64	0.58	1.05	1.00	1.203	0.67	1.797	1.00	1.00	2.390	**No**
164	26.90	1.65	0.59	1.06	1.00	1.204	0.67	1.799	1.00	1.00	2.396	**No**
165	27.07	1.66	0.59	1.07	1.00	1.205	0.67	1.801	1.00	1.00	2.402	**No**
166	27.23	1.67	0.60	1.07	1.00	1.206	0.67	1.803	1.00	1.00	2.408	**No**
167	27.40	1.68	0.61	1.08	1.00	1.208	0.67	1.805	1.00	1.00	2.413	**No**
168	27.56	1.69	0.61	1.08	1.00	1.209	0.67	1.807	1.00	1.00	2.218	**No**
169	27.72	1.70	0.62	1.09	1.00	1.211	0.67	1.809	1.00	1.00	1.671	**No**
170	27.89	1.71	0.62	1.09	1.00	1.212	0.67	1.811	0.99	1.00	1.601	**No**
171	28.05	1.73	0.63	1.10	1.00	1.214	0.67	1.813	0.99	1.00	1.756	**No**
172	28.22	1.74	0.63	1.11	1.00	1.215	0.67	1.815	0.99	1.00	2.218	**No**
173	28.38	1.75	0.64	1.11	1.00	1.216	0.67	1.817	0.99	1.00	2.455	**No**
174	28.54	1.76	0.64	1.12	1.00	1.217	0.67	1.819	0.98	1.00	2.461	**No**
175	28.71	1.77	0.65	1.12	1.00	1.219	0.67	1.821	0.98	1.00	2.463	**No**
176	28.87	1.78	0.65	1.13	1.00	1.220	0.67	1.823	0.99	1.00	2.380	**No**
177	29.04	1.79	0.66	1.13	1.00	1.221	0.67	1.825	0.98	1.00	2.469	**No**
178	29.20	1.80	0.66	1.14	1.00	1.222	0.67	1.826	0.98	1.00	2.481	**No**
179	29.36	1.81	0.67	1.15	1.00	1.223	0.67	1.828	0.98	1.00	2.480	**No**
180	29.53	1.82	0.67	1.15	1.00	1.225	0.67	1.830	0.98	1.00	2.095	**No**
181	29.69	1.83	0.68	1.16	1.00	1.226	0.67	1.832	0.98	1.00	2.291	**No**
182	29.86	1.85	0.68	1.16	1.00	1.227	0.67	1.833	0.98	1.00	2.050	**No**
183	30.02	1.86	0.69	1.17	1.00	1.228	0.67	1.835	0.98	1.00	1.702	**No**
184	30.18	1.87	0.69	1.17	1.00	1.230	0.67	1.837	0.98	1.00	1.719	**No**
185	30.35	1.88	0.70	1.18	1.00	1.231	0.67	1.839	0.98	1.00	1.660	**No**
186	30.51	1.89	0.70	1.18	1.00	1.232	0.67	1.841	0.98	1.00	1.613	**No**
187	30.68	1.90	0.71	1.19	1.00	1.233	0.67	1.843	0.98	1.00	1.607	**No**
188	30.84	1.91	0.71	1.20	1.00	1.235	0.67	1.845	0.98	1.00	1.612	**No**
189	31.00	1.92	0.72	1.20	1.00	1.236	0.67	1.847	0.98	1.00	1.643	**No**
190	31.17	1.93	0.72	1.21	1.00	1.237	0.67	1.849	0.98	1.00	1.745	**No**
191	31.33	1.94	0.73	1.21	1.00	1.238	0.67	1.850	0.98	1.00	1.683	**No**
192	31.50	1.95	0.73	1.22	1.00	1.240	0.67	1.852	0.98	1.00	1.683	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.66	1.96	0.74	1.22	1.00	1.241	0.67	1.854	0.98	1.00	1.726	**No**
194	31.82	1.97	0.74	1.23	1.00	1.242	0.67	1.856	0.98	1.00	1.714	**No**
195	31.99	1.98	0.75	1.23	1.00	1.243	0.67	1.857	0.98	1.00	1.736	**No**
196	32.15	1.99	0.75	1.24	1.00	1.244	0.67	1.859	0.97	1.00	1.823	**No**
197	32.32	2.00	0.76	1.24	1.00	1.245	0.67	1.861	0.97	1.00	1.879	**No**
198	32.48	2.01	0.76	1.25	1.00	1.247	0.67	1.863	0.97	1.00	1.884	**No**
199	32.64	2.02	0.77	1.25	1.00	1.248	0.67	1.864	0.97	1.00	1.702	**No**
200	32.81	2.03	0.77	1.26	1.00	1.249	0.67	1.866	0.98	1.00	1.601	**No**
201	32.97	2.04	0.78	1.27	1.00	1.250	0.67	1.868	0.98	1.00	1.529	**No**
202	33.14	2.06	0.78	1.27	1.00	1.251	0.67	1.869	0.98	1.00	1.549	**No**
203	33.30	2.07	0.79	1.28	1.00	1.252	0.67	1.871	0.97	1.00	1.620	**No**
204	33.46	2.08	0.79	1.28	1.00	1.253	0.67	1.872	0.97	1.00	1.692	**No**
205	33.63	2.09	0.80	1.29	1.00	1.254	0.67	1.874	0.97	1.00	1.719	**No**
206	33.79	2.10	0.80	1.29	1.00	1.255	0.67	1.875	0.97	1.00	1.699	**No**
207	33.96	2.11	0.81	1.30	1.00	1.256	0.67	1.877	0.97	1.00	1.760	**No**
208	34.12	2.12	0.81	1.30	1.00	1.257	0.67	1.879	0.97	1.00	1.843	**No**
209	34.28	2.13	0.82	1.31	1.00	1.258	0.67	1.880	0.96	1.00	1.874	**No**
210	34.45	2.14	0.83	1.31	1.00	1.259	0.67	1.882	0.96	1.00	1.918	**No**
211	34.61	2.15	0.83	1.32	1.00	1.260	0.67	1.883	0.96	1.00	1.871	**No**
212	34.78	2.16	0.84	1.32	1.00	1.261	0.67	1.885	0.97	1.00	1.718	**No**
213	34.94	2.17	0.84	1.33	1.00	1.262	0.67	1.886	0.97	1.00	1.696	**No**
214	35.10	2.18	0.85	1.34	1.00	1.263	0.67	1.887	0.96	1.00	1.772	**No**
215	35.27	2.19	0.85	1.34	1.00	1.264	0.67	1.889	0.96	1.00	1.944	**No**
216	35.43	2.20	0.86	1.35	1.00	1.265	0.67	1.890	0.96	1.00	1.754	**No**
217	35.60	2.21	0.86	1.35	1.00	1.266	0.67	1.892	0.96	1.00	1.741	**No**
218	35.76	2.22	0.87	1.36	1.00	1.267	0.67	1.893	0.96	1.00	1.753	**No**
219	35.93	2.23	0.87	1.36	1.00	1.268	0.67	1.894	0.96	1.00	1.755	**No**
220	36.09	2.25	0.88	1.37	1.00	1.269	0.67	1.896	0.96	1.00	1.804	**No**
221	36.25	2.26	0.88	1.37	1.00	1.270	0.67	1.897	0.96	1.00	1.840	**No**
222	36.42	2.27	0.89	1.38	1.00	1.271	0.67	1.898	0.96	1.00	1.844	**No**
223	36.58	2.28	0.89	1.39	1.00	1.271	0.67	1.900	0.96	1.00	1.764	**No**
224	36.75	2.29	0.90	1.39	1.00	1.272	0.67	1.901	0.96	1.00	1.694	**No**
225	36.91	2.30	0.90	1.40	1.00	1.273	0.67	1.902	0.96	1.00	1.739	**No**
226	37.07	2.31	0.91	1.40	1.00	1.274	0.67	1.904	0.96	1.00	1.815	**No**
227	37.24	2.32	0.91	1.41	1.00	1.275	0.67	1.905	0.95	1.00	1.846	**No**
228	37.40	2.33	0.92	1.41	1.00	1.276	0.67	1.906	0.96	1.00	1.775	**No**
229	37.57	2.34	0.92	1.42	1.00	1.277	0.67	1.908	0.96	1.00	1.727	**No**
230	37.73	2.35	0.93	1.42	1.00	1.278	0.67	1.909	0.95	1.00	1.871	**No**
231	37.89	2.36	0.93	1.43	1.00	1.279	0.67	1.910	0.95	1.00	1.799	**No**
232	38.06	2.37	0.94	1.43	1.00	1.279	0.67	1.912	0.96	1.00	1.624	**No**
233	38.22	2.38	0.94	1.44	1.00	1.280	0.67	1.913	0.96	1.00	1.571	**No**
234	38.39	2.39	0.95	1.44	1.00	1.281	0.67	1.914	0.96	1.00	1.608	**No**
235	38.55	2.40	0.95	1.45	1.00	1.282	0.67	1.916	0.96	1.00	1.636	**No**
236	38.71	2.41	0.96	1.45	1.00	1.283	0.67	1.917	0.96	1.00	1.647	**No**
237	38.88	2.42	0.96	1.46	1.00	1.284	0.67	1.918	0.96	1.00	1.611	**No**
238	39.04	2.43	0.97	1.47	1.00	1.285	0.67	1.920	0.96	1.00	1.638	**No**
239	39.21	2.44	0.97	1.47	1.00	1.286	0.67	1.921	0.96	1.00	1.640	**No**
240	39.37	2.45	0.98	1.48	1.00	1.287	0.67	1.922	0.96	1.00	1.620	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.53	2.46	0.98	1.48	1.00	1.287	0.67	1.924	0.96	1.00	1.607	**No**
242	39.70	2.47	0.99	1.49	1.00	1.288	0.67	1.925	0.96	1.00	1.615	**No**
243	39.86	2.49	0.99	1.49	1.00	1.289	0.67	1.926	0.95	1.00	1.652	**No**
244	40.03	2.50	1.00	1.50	1.00	1.290	0.67	1.927	0.95	1.00	1.687	**No**
245	40.19	2.51	1.00	1.50	1.00	1.291	0.67	1.928	0.95	1.00	1.731	**No**
246	40.35	2.52	1.01	1.51	1.00	1.291	0.67	1.929	0.94	1.00	1.906	**No**
247	40.52	2.53	1.01	1.51	1.00	1.292	0.67	1.930	0.89	1.00	2.879	**No**
248	40.68	2.54	1.02	1.52	1.00	1.292	0.67	1.931	0.89	1.00	2.884	**No**
249	40.85	2.55	1.02	1.53	1.00	1.293	0.67	1.932	0.89	1.00	2.889	**No**
250	41.01	2.56	1.03	1.53	1.00	1.293	0.67	1.932	0.89	1.00	2.894	**No**
251	41.17	2.57	1.03	1.54	1.00	1.294	0.67	1.933	0.89	1.00	2.899	**No**
252	41.34	2.59	1.04	1.55	1.00	1.294	0.67	1.934	0.89	1.00	2.904	**No**

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	**0.16**	332.08	0.00	0.99	0.26	1.70	679.90	0.00	254.00	4.000	**No**	**No**	**2.00**
2	**0.33**	245.03	0.00	1.24	0.26	1.70	347.15	0.00	254.00	4.000	**No**	**No**	**2.00**
3	**0.49**	236.35	0.00	1.29	0.26	1.70	280.79	0.00	254.00	4.000	**No**	**No**	**2.00**
4	**0.66**	177.82	0.00	1.47	0.26	1.70	313.33	0.00	254.00	4.000	**No**	**No**	**2.00**
5	**0.82**	158.36	0.00	1.51	0.26	1.70	277.47	0.00	254.00	4.000	**No**	**No**	**2.00**
6	**0.98**	140.98	0.00	1.53	0.32	1.70	209.65	0.00	209.65	4.000	**No**	**No**	**2.00**
7	**1.15**	111.94	0.00	1.64	0.34	1.70	190.85	0.00	190.85	4.000	**No**	**No**	**2.00**
8	**1.31**	83.12	3.92	1.76	0.42	1.70	141.16	0.02	141.18	4.000	**No**	**No**	**2.00**
9	**1.48**	59.12	17.45	1.93	0.48	1.70	80.04	28.09	108.13	4.000	**No**	**No**	**2.00**
10	**1.64**	37.12	37.68	2.18	0.50	1.70	45.93	51.43	97.36	4.000	**No**	**No**	**2.00**
11	**1.80**	21.08	60.34	2.47	0.57	1.70	16.81	53.51	70.31	4.000	**No**	**No**	**2.00**
12	**1.97**	12.72	79.54	2.71	0.57	1.70	14.01	0.00	14.01	4.000	**No**	**Yes**	**2.00**
13	**2.13**	8.70	93.82	2.89	0.58	1.70	12.11	0.00	12.11	4.000	**No**	**Yes**	**2.00**
14	**2.30**	8.31	97.17	2.93	0.57	1.70	12.71	0.00	12.71	4.000	**No**	**Yes**	**2.00**
15	**2.46**	8.41	98.67	2.95	0.57	1.70	13.48	0.00	13.48	4.000	**No**	**Yes**	**2.00**
16	**2.62**	8.87	98.47	2.94	0.57	1.70	13.58	0.00	13.58	4.000	**No**	**Yes**	**2.00**
17	**2.79**	9.22	98.90	2.95	0.56	1.70	14.78	0.00	14.78	4.000	**No**	**Yes**	**2.00**
18	**2.95**	9.49	99.21	2.95	0.56	1.70	15.78	0.00	15.78	4.000	**No**	**Yes**	**2.00**
19	**3.12**	9.84	98.37	2.94	0.56	1.70	15.49	0.00	15.49	4.000	**No**	**Yes**	**2.00**
20	**3.28**	10.23	96.55	2.92	0.56	1.70	15.62	0.00	15.62	4.000	**No**	**Yes**	**2.00**
21	**3.44**	10.63	94.97	2.90	0.56	1.70	16.34	0.00	16.34	4.000	**No**	**Yes**	**2.00**
22	**3.61**	10.84	94.74	2.90	0.55	1.70	17.91	0.00	17.91	4.000	**No**	**Yes**	**2.00**
23	**3.77**	11.04	95.03	2.90	0.55	1.70	18.94	0.00	18.94	4.000	**No**	**Yes**	**2.00**
24	**3.94**	11.47	94.13	2.89	0.56	1.70	17.08	0.00	17.08	4.000	**No**	**Yes**	**2.00**
25	**4.10**	11.99	92.49	2.87	0.56	1.70	17.24	0.00	17.24	4.000	**No**	**Yes**	**2.00**
26	**4.27**	12.33	91.12	2.85	0.55	1.70	19.78	0.00	19.78	4.000	**No**	**Yes**	**2.00**
27	**4.43**	12.42	89.95	2.84	0.54	1.70	22.01	0.00	22.01	4.000	**No**	**Yes**	**2.00**
28	**4.59**	12.40	88.32	2.82	0.54	1.70	21.67	0.00	21.67	4.000	**No**	**Yes**	**2.00**
29	**4.76**	12.50	86.61	2.80	0.56	1.70	17.74	0.00	17.74	4.000	**No**	**Yes**	**2.00**
30	**4.92**	12.68	85.53	2.78	0.56	1.70	17.11	0.00	17.11	4.000	**No**	**Yes**	**2.00**
31	**5.09**	13.23	83.05	2.75	0.55	1.70	20.53	0.00	20.53	4.000	**No**	**Yes**	**2.00**
32	**5.25**	14.54	78.03	2.69	0.54	1.70	23.44	0.00	23.44	4.000	**No**	**Yes**	**2.00**
33	**5.41**	15.77	74.04	2.64	0.53	1.70	26.03	0.00	26.03	4.000	**No**	**Yes**	**2.00**
34	**5.58**	16.48	71.23	2.60	0.53	1.70	28.23	0.00	28.23	4.000	**No**	**Yes**	**2.00**
35	**5.74**	16.62	69.57	2.58	0.53	1.70	26.83	0.00	26.83	4.000	**No**	**Yes**	**2.00**
36	**5.91**	16.43	74.03	2.64	0.53	1.70	26.22	0.00	26.22	4.000	**No**	**Yes**	**2.00**
37	**6.07**	16.46	82.11	2.74	0.54	1.70	24.45	0.00	24.45	4.000	**No**	**Yes**	**2.00**
38	**6.23**	24.01	72.56	2.62	0.54	1.70	24.53	0.00	24.53	4.000	**No**	**Yes**	**2.00**
39	**6.40**	32.47	66.48	2.54	0.53	1.70	28.37	0.00	28.37	4.000	**No**	**Yes**	**2.00**
40	**6.56**	41.71	59.85	2.46	0.40	1.52	78.36	70.64	149.00	4.000	**No**	**No**	**2.00**
41	**6.73**	47.57	56.54	2.42	0.40	1.49	82.85	70.73	153.58	4.000	**No**	**No**	**2.00**
42	**6.89**	51.36	53.72	2.38	0.39	1.47	85.65	70.37	156.02	4.000	**No**	**No**	**2.00**
43	**7.05**	48.67	56.46	2.42	0.44	1.52	64.37	65.60	129.98	4.000	**No**	**No**	**2.00**
44	**7.22**	45.00	59.91	2.46	0.46	1.54	53.45	63.67	117.12	4.000	**No**	**No**	**2.00**
45	**7.38**	41.31	64.92	2.52	0.45	1.51	58.36	0.00	58.36	4.000	**No**	**Yes**	**2.00**
46	**7.55**	43.50	64.12	2.51	0.45	1.49	56.77	0.00	56.77	4.000	**No**	**Yes**	**2.00**
47	**7.71**	49.01	60.24	2.47	0.45	1.47	59.75	65.54	125.29	4.000	**No**	**No**	**2.00**
48	**7.87**	52.36	56.56	2.42	0.42	1.42	74.37	68.40	142.77	4.000	**No**	**No**	**2.00**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	**8.04**	52.41	55.69	2.41	0.40	1.38	83.76	70.66	154.42	0.321	**No**	**No**	**0.32**
50	**8.20**	50.90	55.76	2.41	0.41	1.39	75.88	68.52	144.40	0.256	**No**	**No**	**0.27**
51	**8.37**	46.56	56.74	2.42	0.46	1.43	54.83	63.07	117.90	0.167	**No**	**No**	**0.20**
52	**8.53**	39.49	61.39	2.48	0.48	1.43	48.01	62.56	110.57	0.153	**No**	**No**	**0.18**
53	**8.69**	33.90	67.94	2.56	0.48	1.42	45.54	0.00	45.54	4.000	**No**	**Yes**	**2.00**
54	**8.86**	31.02	70.37	2.59	0.50	1.43	38.82	0.00	38.82	4.000	**No**	**Yes**	**2.00**
55	**9.02**	30.49	68.65	2.57	0.49	1.41	39.77	0.00	39.77	4.000	**No**	**Yes**	**2.00**
56	**9.19**	28.91	71.82	2.61	0.51	1.41	34.74	0.00	34.74	4.000	**No**	**Yes**	**2.00**
57	**9.35**	28.03	75.19	2.65	0.48	1.38	42.65	0.00	42.65	4.000	**No**	**Yes**	**2.00**
58	**9.51**	30.87	74.15	2.64	0.51	1.39	34.04	0.00	34.04	4.000	**No**	**Yes**	**2.00**
59	**9.68**	34.84	72.84	2.62	0.52	1.38	31.79	0.00	31.79	4.000	**No**	**Yes**	**2.00**
60	**9.84**	37.64	73.23	2.63	0.45	1.32	54.72	0.00	54.72	4.000	**No**	**Yes**	**2.00**
61	**10.01**	41.69	71.21	2.60	0.45	1.30	56.55	0.00	56.55	4.000	**No**	**Yes**	**2.00**
62	**10.17**	45.18	69.60	2.58	0.45	1.29	57.16	0.00	57.16	4.000	**No**	**Yes**	**2.00**
63	**10.33**	45.56	69.64	2.58	0.45	1.28	56.04	0.00	56.04	4.000	**No**	**Yes**	**2.00**
64	**10.50**	47.59	66.56	2.54	0.47	1.28	50.82	0.00	50.82	4.000	**No**	**Yes**	**2.00**
65	**10.66**	46.21	66.38	2.54	0.46	1.27	55.04	0.00	55.04	4.000	**No**	**Yes**	**2.00**
66	**10.83**	44.02	66.65	2.55	0.43	1.24	65.81	0.00	65.81	4.000	**No**	**Yes**	**2.00**
67	**10.99**	44.63	62.45	2.49	0.48	1.26	47.75	62.77	110.52	0.153	**No**	**No**	**0.16**
68	**11.15**	42.79	60.86	2.47	0.49	1.26	41.99	60.72	102.72	0.141	**No**	**No**	**0.15**
69	**11.32**	37.68	63.75	2.51	0.46	1.24	52.45	0.00	52.45	4.000	**No**	**Yes**	**2.00**
70	**11.48**	35.99	62.89	2.50	0.49	1.24	43.09	61.56	104.65	0.144	**No**	**No**	**0.15**
71	**11.65**	34.25	63.51	2.51	0.51	1.24	35.79	0.00	35.79	4.000	**No**	**Yes**	**2.00**
72	**11.81**	30.24	69.59	2.58	0.50	1.23	36.50	0.00	36.50	4.000	**No**	**Yes**	**2.00**
73	**11.98**	28.87	73.19	2.63	0.52	1.23	30.68	0.00	30.68	4.000	**No**	**Yes**	**2.00**
74	**12.14**	30.01	72.97	2.62	0.53	1.23	28.52	0.00	28.52	4.000	**No**	**Yes**	**2.00**
75	**12.30**	30.65	73.82	2.64	0.51	1.21	33.93	0.00	33.93	4.000	**No**	**Yes**	**2.00**
76	**12.47**	31.53	73.31	2.63	0.49	1.19	40.46	0.00	40.46	4.000	**No**	**Yes**	**2.00**
77	**12.63**	33.06	71.34	2.60	0.50	1.19	38.71	0.00	38.71	4.000	**No**	**Yes**	**2.00**
78	**12.80**	33.08	70.99	2.60	0.51	1.19	34.26	0.00	34.26	4.000	**No**	**Yes**	**2.00**
79	**12.96**	32.79	72.17	2.61	0.50	1.18	35.71	0.00	35.71	4.000	**No**	**Yes**	**2.00**
80	**13.12**	32.58	75.03	2.65	0.51	1.17	32.84	0.00	32.84	4.000	**No**	**Yes**	**2.00**
81	**13.29**	33.87	77.63	2.68	0.50	1.16	37.51	0.00	37.51	4.000	**No**	**Yes**	**2.00**
82	**13.45**	36.69	79.25	2.70	0.50	1.15	36.21	0.00	36.21	4.000	**No**	**Yes**	**2.00**
83	**13.62**	46.92	73.14	2.63	0.49	1.14	39.85	0.00	39.85	4.000	**No**	**Yes**	**2.00**
84	**13.78**	59.66	65.87	2.54	0.47	1.13	49.17	0.00	49.17	4.000	**No**	**Yes**	**2.00**
85	**13.94**	74.61	58.15	2.44	0.39	1.10	84.08	71.65	155.73	0.332	**No**	**No**	**0.25**
86	**14.11**	90.17	49.51	2.33	0.37	1.09	101.39	72.60	174.00	0.579	**No**	**No**	**0.37**
87	**14.27**	108.93	39.91	2.21	0.36	1.08	111.03	68.64	179.68	0.718	**No**	**No**	**0.43**
88	**14.44**	126.88	32.11	2.11	0.36	1.08	117.38	61.96	179.34	0.708	**No**	**No**	**0.43**
89	**14.60**	139.38	27.46	2.06	0.33	1.07	141.67	59.71	201.38	2.047	**No**	**No**	**1.12**
90	**14.76**	144.09	26.31	2.04	0.29	1.05	170.43	62.81	233.24	4.000	**No**	**No**	**2.00**
91	**14.93**	145.41	27.52	2.06	0.30	1.05	160.16	63.33	223.50	4.000	**No**	**No**	**2.00**
92	**15.09**	141.16	28.97	2.07	0.34	1.05	131.78	60.40	192.17	1.251	**No**	**No**	**0.68**
93	**15.26**	132.10	30.35	2.09	0.35	1.05	121.26	60.38	181.64	0.777	**No**	**No**	**0.44**
94	**15.42**	131.75	27.69	2.06	0.37	1.05	118.47	55.71	174.18	0.583	**No**	**No**	**0.36**
95	**15.58**	137.00	22.46	1.99	0.37	1.05	124.40	46.43	170.83	0.518	**No**	**No**	**0.33**
96	**15.75**	140.58	18.68	1.95	0.33	1.04	156.26	40.55	196.81	1.588	**No**	**No**	**0.85**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	**15.91**	140.46	18.30	1.94	0.34	1.03	154.89	39.16	194.05	1.374	**No**	**No**	**0.73**
98	**16.08**	134.45	20.92	1.97	0.36	1.03	136.37	44.42	180.80	0.751	**No**	**No**	**0.42**
99	**16.24**	120.58	26.79	2.05	0.37	1.03	115.62	53.64	169.26	0.492	**No**	**No**	**0.31**
100	**16.40**	107.29	32.85	2.12	0.40	1.03	92.97	57.62	150.59	0.293	**No**	**No**	**0.21**
101	**16.57**	98.57	36.99	2.17	0.41	1.02	87.02	60.44	147.47	0.273	**No**	**No**	**0.20**
102	**16.73**	91.39	41.04	2.23	0.40	1.02	88.58	64.08	152.65	0.307	**No**	**No**	**0.22**
103	**16.90**	87.26	43.45	2.26	0.39	1.01	92.20	66.66	158.86	0.360	**No**	**No**	**0.24**
104	**17.06**	87.22	43.77	2.26	0.42	1.01	79.25	63.61	142.86	0.248	**No**	**No**	**0.18**
105	**17.22**	92.17	39.79	2.21	0.44	1.01	71.45	59.02	130.47	0.199	**No**	**No**	**0.16**
106	**17.39**	96.25	35.08	2.15	0.41	1.00	85.08	58.22	143.30	0.250	**No**	**No**	**0.18**
107	**17.55**	103.24	28.71	2.07	0.38	1.00	110.18	55.72	165.90	0.442	**No**	**No**	**0.28**
108	**17.72**	107.52	24.62	2.02	0.39	0.99	109.67	48.61	158.28	0.355	**No**	**No**	**0.24**
109	**17.88**	105.42	24.77	2.02	0.39	0.99	110.41	49.01	159.42	0.366	**No**	**No**	**0.24**
110	**18.04**	95.77	30.84	2.10	0.41	0.99	89.98	54.59	144.57	0.257	**No**	**No**	**0.19**
111	**18.21**	85.14	39.30	2.20	0.43	0.98	73.61	59.17	132.77	0.207	**No**	**No**	**0.16**
112	**18.37**	73.19	48.32	2.32	0.45	0.98	63.28	61.99	125.28	0.184	**No**	**No**	**0.14**
113	**18.54**	61.78	56.67	2.42	0.45	0.97	58.41	64.04	122.45	0.177	**No**	**No**	**0.14**
114	**18.70**	52.22	64.18	2.51	0.46	0.97	53.22	0.00	53.22	4.000	**No**	**Yes**	**2.00**
115	**18.86**	43.80	72.10	2.61	0.50	0.96	35.81	0.00	35.81	4.000	**No**	**Yes**	**2.00**
116	**19.03**	38.30	78.59	2.69	0.52	0.96	28.44	0.00	28.44	4.000	**No**	**Yes**	**2.00**
117	**19.19**	37.68	80.46	2.72	0.54	0.95	23.64	0.00	23.64	4.000	**No**	**Yes**	**2.00**
118	**19.36**	40.73	78.99	2.70	0.51	0.95	32.26	0.00	32.26	4.000	**No**	**Yes**	**2.00**
119	**19.52**	45.52	75.91	2.66	0.47	0.95	49.29	0.00	49.29	4.000	**No**	**Yes**	**2.00**
120	**19.69**	51.11	71.57	2.61	0.47	0.94	48.79	0.00	48.79	4.000	**No**	**Yes**	**2.00**
121	**19.85**	51.53	71.80	2.61	0.47	0.94	49.34	0.00	49.34	4.000	**No**	**Yes**	**2.00**
122	**20.01**	48.17	75.58	2.66	0.47	0.94	48.09	0.00	48.09	4.000	**No**	**Yes**	**2.00**
123	**20.18**	46.27	77.80	2.69	0.51	0.93	33.55	0.00	33.55	4.000	**No**	**Yes**	**2.00**
124	**20.34**	44.42	79.96	2.71	0.51	0.93	33.48	0.00	33.48	4.000	**No**	**Yes**	**2.00**
125	**20.51**	45.11	79.62	2.71	0.49	0.93	39.61	0.00	39.61	4.000	**No**	**Yes**	**2.00**
126	**20.67**	50.41	73.12	2.63	0.49	0.93	40.46	0.00	40.46	4.000	**No**	**Yes**	**2.00**
127	**20.83**	58.71	64.30	2.52	0.47	0.93	50.62	0.00	50.62	4.000	**No**	**Yes**	**2.00**
128	**21.00**	72.54	52.53	2.37	0.46	0.93	56.72	62.07	118.79	0.169	**No**	**No**	**0.13**
129	**21.16**	93.22	38.75	2.20	0.44	0.93	69.91	57.87	127.79	0.191	**No**	**No**	**0.14**
130	**21.33**	116.54	25.88	2.04	0.40	0.93	100.82	49.36	150.18	0.290	**No**	**No**	**0.19**
131	**21.49**	136.30	17.51	1.93	0.38	0.94	132.30	34.04	166.34	0.448	**No**	**No**	**0.26**
132	**21.65**	146.85	13.22	1.88	0.36	0.94	154.31	20.92	175.24	0.606	**No**	**No**	**0.32**
133	**21.82**	143.84	13.72	1.88	0.38	0.93	144.13	22.13	166.26	0.447	**No**	**No**	**0.26**
134	**21.98**	129.73	18.91	1.95	0.40	0.93	116.10	36.26	152.36	0.305	**No**	**No**	**0.19**
135	**22.15**	108.38	28.90	2.07	0.42	0.92	86.48	51.34	137.82	0.225	**No**	**No**	**0.16**
136	**22.31**	88.20	39.16	2.20	0.44	0.92	68.50	57.85	126.35	0.187	**No**	**No**	**0.14**
137	**22.47**	73.57	48.41	2.32	0.46	0.91	58.31	60.74	119.04	0.169	**No**	**No**	**0.13**
138	**22.64**	64.93	54.92	2.40	0.46	0.91	53.80	62.17	115.97	0.163	**No**	**No**	**0.12**
139	**22.80**	61.80	57.14	2.43	0.47	0.91	50.78	62.08	112.87	0.157	**No**	**No**	**0.12**
140	**22.97**	60.64	57.69	2.43	0.48	0.90	47.91	61.46	109.37	0.151	**No**	**No**	**0.11**
141	**23.13**	59.47	60.08	2.46	0.46	0.91	54.27	63.95	118.22	0.168	**No**	**No**	**0.12**
142	**23.29**	57.80	62.33	2.49	0.46	0.90	52.82	64.18	117.00	0.165	**No**	**No**	**0.12**
143	**23.46**	55.97	64.27	2.52	0.47	0.90	48.27	0.00	48.27	4.000	**No**	**Yes**	**2.00**
144	**23.62**	53.99	66.14	2.54	0.49	0.90	43.09	0.00	43.09	4.000	**No**	**Yes**	**2.00**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	**23.79**	53.11	66.89	2.55	0.50	0.89	39.58	0.00	39.58	4.000	**No**	**Yes**	**2.00**
146	**23.95**	54.84	64.74	2.52	0.48	0.89	45.22	0.00	45.22	4.000	**No**	**Yes**	**2.00**
147	**24.11**	59.89	59.33	2.45	0.48	0.89	48.48	62.11	110.59	0.153	**No**	**No**	**0.11**
148	**24.28**	64.91	55.83	2.41	0.46	0.89	55.29	62.89	118.18	0.167	**No**	**No**	**0.12**
149	**24.44**	65.69	56.68	2.42	0.44	0.90	64.66	65.76	130.42	0.199	**No**	**No**	**0.14**
150	**24.61**	62.89	60.28	2.47	0.44	0.90	60.95	65.89	126.84	0.188	**No**	**No**	**0.13**
151	**24.77**	58.83	64.47	2.52	0.47	0.89	48.17	0.00	48.17	4.000	**No**	**Yes**	**2.00**
152	**24.93**	54.96	68.39	2.57	0.50	0.88	36.11	0.00	36.11	4.000	**No**	**Yes**	**2.00**
153	**25.10**	52.07	70.43	2.59	0.50	0.88	37.40	0.00	37.40	4.000	**No**	**Yes**	**2.00**
154	**25.26**	52.52	69.44	2.58	0.47	0.88	47.46	0.00	47.46	4.000	**No**	**Yes**	**2.00**
155	**25.43**	56.61	67.93	2.56	0.47	0.88	47.95	0.00	47.95	4.000	**No**	**Yes**	**2.00**
156	**25.59**	65.44	64.53	2.52	0.47	0.88	49.72	0.00	49.72	4.000	**No**	**Yes**	**2.00**
157	**25.75**	79.93	60.10	2.46	0.46	0.88	53.22	63.66	116.88	0.165	**No**	**No**	**0.12**
158	**25.92**	89.19	59.24	2.45	0.41	0.89	75.16	69.54	144.70	0.257	**No**	**No**	**0.16**
159	**26.08**	95.62	59.71	2.46	0.34	0.91	110.95	79.72	190.67	1.162	**No**	**No**	**0.49**
160	**26.25**	105.90	56.52	2.42	0.39	0.89	87.88	72.11	159.99	0.372	**No**	**No**	**0.21**
161	**26.41**	115.80	52.78	2.37	0.41	0.89	77.02	67.64	144.66	0.257	**No**	**No**	**0.16**
162	**26.57**	120.17	51.44	2.36	0.37	0.90	97.72	72.60	170.31	0.509	**No**	**No**	**0.26**
163	**26.74**	131.40	48.48	2.32	0.34	0.90	118.54	76.54	195.08	1.450	**No**	**No**	**0.61**
164	**26.90**	143.29	45.81	2.29	0.32	0.91	129.74	77.75	207.49	2.964	**No**	**No**	**1.24**
165	**27.07**	147.16	45.62	2.28	0.31	0.91	137.65	79.65	217.30	4.000	**No**	**No**	**1.66**
166	**27.23**	145.08	44.92	2.27	0.32	0.90	129.40	77.05	206.45	2.776	**No**	**No**	**1.15**
167	**27.40**	135.27	45.23	2.28	0.35	0.90	114.15	73.38	187.53	1.003	**No**	**No**	**0.42**
168	**27.56**	122.98	45.30	2.28	0.36	0.89	108.16	71.90	180.06	0.729	**No**	**No**	**0.33**
169	**27.72**	115.29	42.61	2.25	0.41	0.88	84.74	64.23	148.97	0.282	**No**	**No**	**0.17**
170	**27.89**	115.63	38.37	2.19	0.42	0.87	81.35	60.29	141.64	0.242	**No**	**No**	**0.15**
171	**28.05**	123.58	36.89	2.17	0.39	0.88	93.64	61.89	155.53	0.330	**No**	**No**	**0.19**
172	**28.22**	139.65	35.19	2.15	0.36	0.89	114.39	64.94	179.33	0.708	**No**	**No**	**0.32**
173	**28.38**	150.51	34.97	2.15	0.31	0.90	142.99	71.11	214.10	4.000	**No**	**No**	**1.63**
174	**28.54**	154.99	36.96	2.17	0.29	0.91	156.31	76.47	232.78	4.000	**No**	**No**	**1.63**
175	**28.71**	155.47	39.24	2.20	0.33	0.89	129.10	72.39	201.49	2.060	**No**	**No**	**0.84**
176	**28.87**	151.42	42.27	2.24	0.35	0.88	113.02	71.00	184.02	0.859	**No**	**No**	**0.36**
177	**29.04**	142.68	45.71	2.28	0.34	0.89	116.32	74.25	190.57	1.157	**No**	**No**	**0.47**
178	**29.20**	136.91	47.55	2.31	0.33	0.89	124.29	77.48	201.77	2.093	**No**	**No**	**0.84**
179	**29.36**	135.95	46.38	2.29	0.34	0.88	115.97	74.59	190.56	1.157	**No**	**No**	**0.47**
180	**29.53**	132.53	45.29	2.28	0.37	0.87	102.59	70.47	173.06	0.560	**No**	**No**	**0.27**
181	**29.69**	123.20	45.99	2.29	0.36	0.88	108.10	72.33	180.43	0.739	**No**	**No**	**0.32**
182	**29.86**	115.68	46.06	2.29	0.37	0.87	100.26	70.36	170.62	0.515	**No**	**No**	**0.25**
183	**30.02**	109.89	46.22	2.29	0.41	0.86	82.06	65.77	147.83	0.275	**No**	**No**	**0.16**
184	**30.18**	101.94	48.49	2.32	0.41	0.86	82.07	66.99	149.07	0.283	**No**	**No**	**0.16**
185	**30.35**	95.66	50.27	2.34	0.41	0.85	76.79	66.47	143.26	0.250	**No**	**No**	**0.15**
186	**30.51**	93.74	49.62	2.33	0.42	0.85	72.81	65.11	137.92	0.226	**No**	**No**	**0.14**
187	**30.68**	92.53	48.50	2.32	0.43	0.85	72.39	64.46	136.85	0.221	**No**	**No**	**0.14**
188	**30.84**	94.36	46.85	2.30	0.43	0.85	73.24	63.84	137.08	0.222	**No**	**No**	**0.14**
189	**31.00**	95.98	45.96	2.29	0.42	0.85	76.21	64.12	140.33	0.236	**No**	**No**	**0.14**
190	**31.17**	97.53	45.53	2.28	0.40	0.85	83.94	65.86	149.79	0.287	**No**	**No**	**0.16**
191	**31.33**	99.52	45.84	2.29	0.41	0.85	79.05	64.79	143.84	0.253	**No**	**No**	**0.15**
192	**31.50**	100.74	46.82	2.30	0.41	0.84	78.39	65.16	143.55	0.251	**No**	**No**	**0.15**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	**31.66**	100.78	47.39	2.30	0.41	0.85	81.18	66.18	147.36	0.272	**No**	**No**	**0.16**
194	**31.82**	103.41	45.70	2.28	0.41	0.84	80.85	65.17	146.02	0.265	**No**	**No**	**0.15**
195	**31.99**	106.75	43.27	2.25	0.41	0.84	83.40	64.33	147.73	0.275	**No**	**No**	**0.16**
196	**32.15**	109.03	41.75	2.23	0.40	0.85	89.63	64.85	154.48	0.321	**No**	**No**	**0.18**
197	**32.32**	108.06	42.76	2.25	0.39	0.85	92.01	66.14	158.15	0.353	**No**	**No**	**0.19**
198	**32.48**	103.85	46.27	2.29	0.39	0.85	90.33	67.93	158.27	0.355	**No**	**No**	**0.19**
199	**32.64**	95.88	52.31	2.37	0.41	0.84	76.33	67.26	143.59	0.252	**No**	**No**	**0.15**
200	**32.81**	87.84	58.71	2.45	0.43	0.83	65.42	66.65	132.07	0.204	**No**	**No**	**0.13**
201	**32.97**	82.08	63.37	2.50	0.45	0.82	55.91	0.00	55.91	4.000	**No**	**Yes**	**2.00**
202	**33.14**	81.25	64.33	2.52	0.45	0.82	57.96	0.00	57.96	4.000	**No**	**Yes**	**2.00**
203	**33.30**	83.92	62.72	2.50	0.43	0.83	65.65	67.92	133.57	0.209	**No**	**No**	**0.13**
204	**33.46**	88.90	59.67	2.46	0.42	0.83	72.43	68.91	141.34	0.241	**No**	**No**	**0.14**
205	**33.63**	94.86	53.71	2.38	0.41	0.83	75.99	67.75	143.74	0.252	**No**	**No**	**0.15**
206	**33.79**	100.51	48.84	2.32	0.42	0.83	75.92	65.55	141.47	0.241	**No**	**No**	**0.14**
207	**33.96**	105.18	45.02	2.28	0.41	0.83	81.94	65.05	146.99	0.270	**No**	**No**	**0.15**
208	**34.12**	108.93	42.25	2.24	0.40	0.83	88.45	64.90	153.35	0.313	**No**	**No**	**0.17**
209	**34.28**	111.55	40.56	2.22	0.40	0.83	91.06	64.33	155.39	0.329	**No**	**No**	**0.18**
210	**34.45**	110.03	44.44	2.27	0.39	0.83	91.08	67.01	158.10	0.353	**No**	**No**	**0.18**
211	**34.61**	106.37	48.75	2.32	0.40	0.83	86.46	68.28	154.74	0.324	**No**	**No**	**0.17**
212	**34.78**	103.20	51.73	2.36	0.42	0.82	75.21	66.71	141.91	0.243	**No**	**No**	**0.14**
213	**34.94**	102.31	53.24	2.38	0.42	0.82	72.78	66.69	139.48	0.232	**No**	**No**	**0.14**
214	**35.10**	99.92	55.51	2.41	0.41	0.82	77.54	68.88	146.42	0.267	**No**	**No**	**0.15**
215	**35.27**	99.98	56.05	2.41	0.39	0.83	87.11	71.71	158.82	0.360	**No**	**No**	**0.19**
216	**35.43**	100.81	55.50	2.41	0.41	0.82	75.95	68.44	144.38	0.256	**No**	**No**	**0.15**
217	**35.60**	100.71	55.13	2.40	0.42	0.82	74.98	68.03	143.02	0.249	**No**	**No**	**0.14**
218	**35.76**	99.31	54.75	2.40	0.41	0.82	75.75	68.10	143.84	0.253	**No**	**No**	**0.14**
219	**35.93**	101.07	52.37	2.37	0.41	0.81	76.50	67.33	143.83	0.253	**No**	**No**	**0.14**
220	**36.09**	103.00	50.37	2.34	0.41	0.82	80.41	67.48	147.89	0.275	**No**	**No**	**0.15**
221	**36.25**	103.34	50.04	2.34	0.40	0.82	82.65	67.91	150.56	0.293	**No**	**No**	**0.16**
222	**36.42**	102.08	51.03	2.35	0.40	0.82	82.39	68.31	150.70	0.294	**No**	**No**	**0.16**
223	**36.58**	100.84	52.20	2.36	0.41	0.81	76.57	67.27	143.84	0.253	**No**	**No**	**0.14**
224	**36.75**	100.43	52.67	2.37	0.43	0.80	70.74	65.90	136.64	0.221	**No**	**No**	**0.13**
225	**36.91**	100.57	51.10	2.35	0.42	0.81	74.71	66.30	141.00	0.239	**No**	**No**	**0.14**
226	**37.07**	100.97	49.89	2.34	0.41	0.81	80.35	67.24	147.59	0.274	**No**	**No**	**0.15**
227	**37.24**	101.73	49.34	2.33	0.40	0.81	82.36	67.50	149.86	0.288	**No**	**No**	**0.16**
228	**37.40**	103.49	49.08	2.33	0.41	0.80	77.61	66.12	143.72	0.252	**No**	**No**	**0.14**
229	**37.57**	102.59	50.38	2.34	0.42	0.80	73.31	65.60	138.91	0.230	**No**	**No**	**0.13**
230	**37.73**	97.52	54.38	2.39	0.40	0.81	81.61	69.55	151.16	0.297	**No**	**No**	**0.16**
231	**37.89**	91.92	56.87	2.42	0.41	0.80	76.26	69.03	145.29	0.261	**No**	**No**	**0.14**
232	**38.06**	88.51	56.86	2.42	0.45	0.79	61.21	64.87	126.08	0.186	**No**	**No**	**0.11**
233	**38.22**	83.94	57.05	2.43	0.46	0.78	54.55	63.09	117.64	0.166	**No**	**No**	**0.11**
234	**38.39**	80.94	56.26	2.42	0.45	0.78	59.15	64.10	123.25	0.179	**No**	**No**	**0.11**
235	**38.55**	80.52	55.11	2.40	0.44	0.79	62.32	64.56	126.88	0.188	**No**	**No**	**0.12**
236	**38.71**	82.41	54.41	2.39	0.44	0.79	63.45	64.62	128.06	0.192	**No**	**No**	**0.12**
237	**38.88**	83.07	55.11	2.40	0.45	0.78	59.09	63.68	122.77	0.178	**No**	**No**	**0.11**
238	**39.04**	82.38	56.10	2.41	0.44	0.78	61.64	64.73	126.37	0.187	**No**	**No**	**0.11**
239	**39.21**	81.03	56.87	2.42	0.45	0.78	61.41	64.93	126.33	0.187	**No**	**No**	**0.11**
240	**39.37**	80.90	56.54	2.42	0.45	0.78	59.16	64.20	123.35	0.179	**No**	**No**	**0.11**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	**39.53**	80.91	55.77	2.41	0.45	0.77	57.67	63.52	121.19	0.174	**No**	**No**	**0.11**
242	**39.70**	81.55	56.39	2.42	0.45	0.77	58.22	63.89	122.11	0.176	**No**	**No**	**0.11**
243	**39.86**	83.68	59.27	2.45	0.44	0.78	61.32	65.68	127.00	0.189	**No**	**No**	**0.11**
244	**40.03**	89.34	62.82	2.50	0.44	0.78	63.69	67.40	131.09	0.201	**No**	**No**	**0.12**
245	**40.19**	107.53	62.88	2.50	0.43	0.78	67.40	68.46	135.87	0.218	**No**	**No**	**0.13**
246	**40.35**	144.09	58.44	2.44	0.40	0.79	80.23	70.68	150.91	0.295	**No**	**No**	**0.15**
247	**40.52**	185.47	54.29	2.39	0.31	0.84	135.00	84.05	219.05	4.000	**No**	**No**	**1.39**
248	**40.68**	236.69	100.00	4.06	0.26	0.86	215.74	0.00	215.74	4.000	**No**	**Yes**	**1.39**
249	**40.85**	299.02	100.00	4.06	0.26	0.86	237.47	0.00	237.47	4.000	**No**	**Yes**	**1.38**
250	**41.01**	365.31	100.00	4.06	0.26	0.86	280.92	0.00	280.92	4.000	**No**	**Yes**	**1.38**
251	**41.17**	395.79	100.00	4.06	0.26	0.86	338.38	0.00	338.38	4.000	**No**	**Yes**	**1.38**
252	**41.34**	454.18	100.00	4.06	0.26	0.85	405.34	0.00	405.34	4.000	**No**	**Yes**	**1.38**

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.16	2.00	0.00	9.98	0.17	0.00	0.33	2.00	0.00	9.95	0.17	0.00
0.49	2.00	0.00	9.93	0.16	0.00	0.66	2.00	0.00	9.90	0.17	0.00
0.82	2.00	0.00	9.88	0.16	0.00	0.98	2.00	0.00	9.85	0.16	0.00
1.15	2.00	0.00	9.82	0.17	0.00	1.31	2.00	0.00	9.80	0.16	0.00
1.48	2.00	0.00	9.77	0.17	0.00	1.64	2.00	0.00	9.75	0.16	0.00
1.80	2.00	0.00	9.73	0.16	0.00	1.97	2.00	0.00	9.70	0.17	0.00
2.13	2.00	0.00	9.68	0.16	0.00	2.30	2.00	0.00	9.65	0.17	0.00
2.46	2.00	0.00	9.63	0.16	0.00	2.62	2.00	0.00	9.60	0.16	0.00
2.79	2.00	0.00	9.57	0.17	0.00	2.95	2.00	0.00	9.55	0.16	0.00
3.12	2.00	0.00	9.52	0.17	0.00	3.28	2.00	0.00	9.50	0.16	0.00
3.44	2.00	0.00	9.48	0.16	0.00	3.61	2.00	0.00	9.45	0.17	0.00
3.77	2.00	0.00	9.43	0.16	0.00	3.94	2.00	0.00	9.40	0.17	0.00
4.10	2.00	0.00	9.38	0.16	0.00	4.27	2.00	0.00	9.35	0.17	0.00
4.43	2.00	0.00	9.32	0.16	0.00	4.59	2.00	0.00	9.30	0.16	0.00
4.76	2.00	0.00	9.27	0.17	0.00	4.92	2.00	0.00	9.25	0.16	0.00
5.09	2.00	0.00	9.22	0.17	0.00	5.25	2.00	0.00	9.20	0.16	0.00
5.41	2.00	0.00	9.18	0.16	0.00	5.58	2.00	0.00	9.15	0.17	0.00
5.74	2.00	0.00	9.13	0.16	0.00	5.91	2.00	0.00	9.10	0.17	0.00
6.07	2.00	0.00	9.07	0.16	0.00	6.23	2.00	0.00	9.05	0.16	0.00
6.40	2.00	0.00	9.02	0.17	0.00	6.56	2.00	0.00	9.00	0.16	0.00
6.73	2.00	0.00	8.97	0.17	0.00	6.89	2.00	0.00	8.95	0.16	0.00
7.05	2.00	0.00	8.93	0.16	0.00	7.22	2.00	0.00	8.90	0.17	0.00
7.38	2.00	0.00	8.88	0.16	0.00	7.55	2.00	0.00	8.85	0.17	0.00
7.71	2.00	0.00	8.82	0.16	0.00	7.87	2.00	0.00	8.80	0.16	0.00
8.04	0.32	0.68	8.77	0.17	0.31	8.20	0.27	0.73	8.75	0.16	0.31
8.37	0.20	0.80	8.72	0.17	0.36	8.53	0.18	0.82	8.70	0.16	0.35
8.69	2.00	0.00	8.68	0.16	0.00	8.86	2.00	0.00	8.65	0.17	0.00
9.02	2.00	0.00	8.63	0.16	0.00	9.19	2.00	0.00	8.60	0.17	0.00
9.35	2.00	0.00	8.58	0.16	0.00	9.51	2.00	0.00	8.55	0.16	0.00
9.68	2.00	0.00	8.52	0.17	0.00	9.84	2.00	0.00	8.50	0.16	0.00
10.01	2.00	0.00	8.47	0.17	0.00	10.17	2.00	0.00	8.45	0.16	0.00
10.33	2.00	0.00	8.43	0.16	0.00	10.50	2.00	0.00	8.40	0.17	0.00
10.66	2.00	0.00	8.38	0.16	0.00	10.83	2.00	0.00	8.35	0.17	0.00
10.99	0.16	0.84	8.33	0.16	0.34	11.15	0.15	0.85	8.30	0.16	0.35
11.32	2.00	0.00	8.27	0.17	0.00	11.48	0.15	0.85	8.25	0.16	0.34
11.65	2.00	0.00	8.22	0.17	0.00	11.81	2.00	0.00	8.20	0.16	0.00
11.98	2.00	0.00	8.17	0.17	0.00	12.14	2.00	0.00	8.15	0.16	0.00
12.30	2.00	0.00	8.13	0.16	0.00	12.47	2.00	0.00	8.10	0.17	0.00
12.63	2.00	0.00	8.08	0.16	0.00	12.80	2.00	0.00	8.05	0.17	0.00
12.96	2.00	0.00	8.02	0.16	0.00	13.12	2.00	0.00	8.00	0.16	0.00
13.29	2.00	0.00	7.97	0.17	0.00	13.45	2.00	0.00	7.95	0.16	0.00
13.62	2.00	0.00	7.92	0.17	0.00	13.78	2.00	0.00	7.90	0.16	0.00
13.94	0.25	0.75	7.88	0.16	0.29	14.11	0.37	0.63	7.85	0.17	0.25
14.27	0.43	0.57	7.83	0.16	0.22	14.44	0.43	0.57	7.80	0.17	0.23
14.60	1.12	0.00	7.77	0.16	0.00	14.76	2.00	0.00	7.75	0.16	0.00
14.93	2.00	0.00	7.72	0.17	0.00	15.09	0.68	0.32	7.70	0.16	0.12
15.26	0.44	0.56	7.67	0.17	0.22	15.42	0.36	0.64	7.65	0.16	0.24
15.58	0.33	0.67	7.63	0.16	0.25	15.75	0.85	0.15	7.60	0.17	0.06

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
15.91	0.73	0.27	7.58	0.16	0.10	16.08	0.42	0.58	7.55	0.17	0.23
16.24	0.31	0.69	7.53	0.16	0.25	16.40	0.21	0.79	7.50	0.16	0.29
16.57	0.20	0.80	7.47	0.17	0.31	16.73	0.22	0.78	7.45	0.16	0.28
16.90	0.24	0.76	7.42	0.17	0.29	17.06	0.18	0.82	7.40	0.16	0.29
17.22	0.16	0.84	7.38	0.16	0.30	17.39	0.18	0.82	7.35	0.17	0.31
17.55	0.28	0.72	7.33	0.16	0.26	17.72	0.24	0.76	7.30	0.17	0.29
17.88	0.24	0.76	7.28	0.16	0.27	18.04	0.19	0.81	7.25	0.16	0.29
18.21	0.16	0.84	7.22	0.17	0.32	18.37	0.14	0.86	7.20	0.16	0.30
18.54	0.14	0.86	7.17	0.17	0.32	18.70	2.00	0.00	7.15	0.16	0.00
18.86	2.00	0.00	7.13	0.16	0.00	19.03	2.00	0.00	7.10	0.17	0.00
19.19	2.00	0.00	7.08	0.16	0.00	19.36	2.00	0.00	7.05	0.17	0.00
19.52	2.00	0.00	7.03	0.16	0.00	19.69	2.00	0.00	7.00	0.17	0.00
19.85	2.00	0.00	6.97	0.16	0.00	20.01	2.00	0.00	6.95	0.16	0.00
20.18	2.00	0.00	6.92	0.17	0.00	20.34	2.00	0.00	6.90	0.16	0.00
20.51	2.00	0.00	6.87	0.17	0.00	20.67	2.00	0.00	6.85	0.16	0.00
20.83	2.00	0.00	6.83	0.16	0.00	21.00	0.13	0.87	6.80	0.17	0.31
21.16	0.14	0.86	6.78	0.16	0.28	21.33	0.19	0.81	6.75	0.17	0.28
21.49	0.26	0.74	6.72	0.16	0.24	21.65	0.32	0.68	6.70	0.16	0.22
21.82	0.26	0.74	6.67	0.17	0.26	21.98	0.19	0.81	6.65	0.16	0.26
22.15	0.16	0.84	6.62	0.17	0.29	22.31	0.14	0.86	6.60	0.16	0.28
22.47	0.13	0.87	6.58	0.16	0.28	22.64	0.12	0.88	6.55	0.17	0.30
22.80	0.12	0.88	6.53	0.16	0.28	22.97	0.11	0.89	6.50	0.17	0.30
23.13	0.12	0.88	6.47	0.16	0.28	23.29	0.12	0.88	6.45	0.16	0.28
23.46	2.00	0.00	6.42	0.17	0.00	23.62	2.00	0.00	6.40	0.16	0.00
23.79	2.00	0.00	6.37	0.17	0.00	23.95	2.00	0.00	6.35	0.16	0.00
24.11	0.11	0.89	6.33	0.16	0.27	24.28	0.12	0.88	6.30	0.17	0.29
24.44	0.14	0.86	6.28	0.16	0.26	24.61	0.13	0.87	6.25	0.17	0.28
24.77	2.00	0.00	6.23	0.16	0.00	24.93	2.00	0.00	6.20	0.16	0.00
25.10	2.00	0.00	6.17	0.17	0.00	25.26	2.00	0.00	6.15	0.16	0.00
25.43	2.00	0.00	6.12	0.17	0.00	25.59	2.00	0.00	6.10	0.16	0.00
25.75	0.12	0.88	6.08	0.16	0.26	25.92	0.16	0.84	6.05	0.17	0.26
26.08	0.49	0.51	6.03	0.16	0.15	26.25	0.21	0.79	6.00	0.17	0.25
26.41	0.16	0.84	5.98	0.16	0.24	26.57	0.26	0.74	5.95	0.16	0.21
26.74	0.61	0.39	5.92	0.17	0.12	26.90	1.24	0.00	5.90	0.16	0.00
27.07	1.66	0.00	5.87	0.17	0.00	27.23	1.15	0.00	5.85	0.16	0.00
27.40	0.42	0.58	5.82	0.17	0.18	27.56	0.33	0.67	5.80	0.16	0.19
27.72	0.17	0.83	5.78	0.16	0.23	27.89	0.15	0.85	5.75	0.17	0.25
28.05	0.19	0.81	5.73	0.16	0.23	28.22	0.32	0.68	5.70	0.17	0.20
28.38	1.63	0.00	5.67	0.16	0.00	28.54	1.63	0.00	5.65	0.16	0.00
28.71	0.84	0.16	5.62	0.17	0.05	28.87	0.36	0.64	5.60	0.16	0.17
29.04	0.47	0.53	5.57	0.17	0.15	29.20	0.84	0.16	5.55	0.16	0.04
29.36	0.47	0.53	5.53	0.16	0.14	29.53	0.27	0.73	5.50	0.17	0.21
29.69	0.32	0.68	5.48	0.16	0.18	29.86	0.25	0.75	5.45	0.17	0.21
30.02	0.16	0.84	5.42	0.16	0.22	30.18	0.16	0.84	5.40	0.16	0.22
30.35	0.15	0.85	5.37	0.17	0.24	30.51	0.14	0.86	5.35	0.16	0.22
30.68	0.14	0.86	5.32	0.17	0.24	30.84	0.14	0.86	5.30	0.16	0.22
31.00	0.14	0.86	5.28	0.16	0.22	31.17	0.16	0.84	5.25	0.17	0.23
31.33	0.15	0.85	5.23	0.16	0.22	31.50	0.15	0.85	5.20	0.17	0.23

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
31.66	0.16	0.84	5.18	0.16	0.21	31.82	0.15	0.85	5.15	0.16	0.21
31.99	0.16	0.84	5.12	0.17	0.22	32.15	0.18	0.82	5.10	0.16	0.20
32.32	0.19	0.81	5.07	0.17	0.21	32.48	0.19	0.81	5.05	0.16	0.20
32.64	0.15	0.85	5.03	0.16	0.21	32.81	0.13	0.87	5.00	0.17	0.23
32.97	2.00	0.00	4.98	0.16	0.00	33.14	2.00	0.00	4.95	0.17	0.00
33.30	0.13	0.87	4.93	0.16	0.21	33.46	0.14	0.86	4.90	0.16	0.21
33.63	0.15	0.85	4.87	0.17	0.22	33.79	0.14	0.86	4.85	0.16	0.20
33.96	0.15	0.85	4.82	0.17	0.21	34.12	0.17	0.83	4.80	0.16	0.19
34.28	0.18	0.82	4.78	0.16	0.19	34.45	0.18	0.82	4.75	0.17	0.20
34.61	0.17	0.83	4.73	0.16	0.19	34.78	0.14	0.86	4.70	0.17	0.21
34.94	0.14	0.86	4.68	0.16	0.20	35.10	0.15	0.85	4.65	0.16	0.19
35.27	0.19	0.81	4.62	0.17	0.20	35.43	0.15	0.85	4.60	0.16	0.19
35.60	0.14	0.86	4.57	0.17	0.20	35.76	0.14	0.86	4.55	0.16	0.19
35.93	0.14	0.86	4.52	0.17	0.20	36.09	0.15	0.85	4.50	0.16	0.19
36.25	0.16	0.84	4.48	0.16	0.18	36.42	0.16	0.84	4.45	0.17	0.19
36.58	0.14	0.86	4.43	0.16	0.18	36.75	0.13	0.87	4.40	0.17	0.20
36.91	0.14	0.86	4.37	0.16	0.18	37.07	0.15	0.85	4.35	0.16	0.18
37.24	0.16	0.84	4.32	0.17	0.19	37.40	0.14	0.86	4.30	0.16	0.18
37.57	0.13	0.87	4.27	0.17	0.19	37.73	0.16	0.84	4.25	0.16	0.17
37.89	0.14	0.86	4.23	0.16	0.18	38.06	0.11	0.89	4.20	0.17	0.19
38.22	0.11	0.89	4.18	0.16	0.18	38.39	0.11	0.89	4.15	0.17	0.19
38.55	0.12	0.88	4.12	0.16	0.18	38.71	0.12	0.88	4.10	0.16	0.18
38.88	0.11	0.89	4.07	0.17	0.19	39.04	0.11	0.89	4.05	0.16	0.17
39.21	0.11	0.89	4.02	0.17	0.18	39.37	0.11	0.89	4.00	0.16	0.17
39.53	0.11	0.89	3.98	0.16	0.17	39.70	0.11	0.89	3.95	0.17	0.18
39.86	0.11	0.89	3.93	0.16	0.17	40.03	0.12	0.88	3.90	0.17	0.18
40.19	0.13	0.87	3.88	0.16	0.17	40.35	0.15	0.85	3.85	0.16	0.16
40.52	1.39	0.00	3.82	0.17	0.00	40.68	1.39	0.00	3.80	0.16	0.00
40.85	1.38	0.00	3.77	0.17	0.00	41.01	1.38	0.00	3.75	0.16	0.00
41.17	1.38	0.00	3.73	0.16	0.00	41.34	1.38	0.00	3.70	0.17	0.00

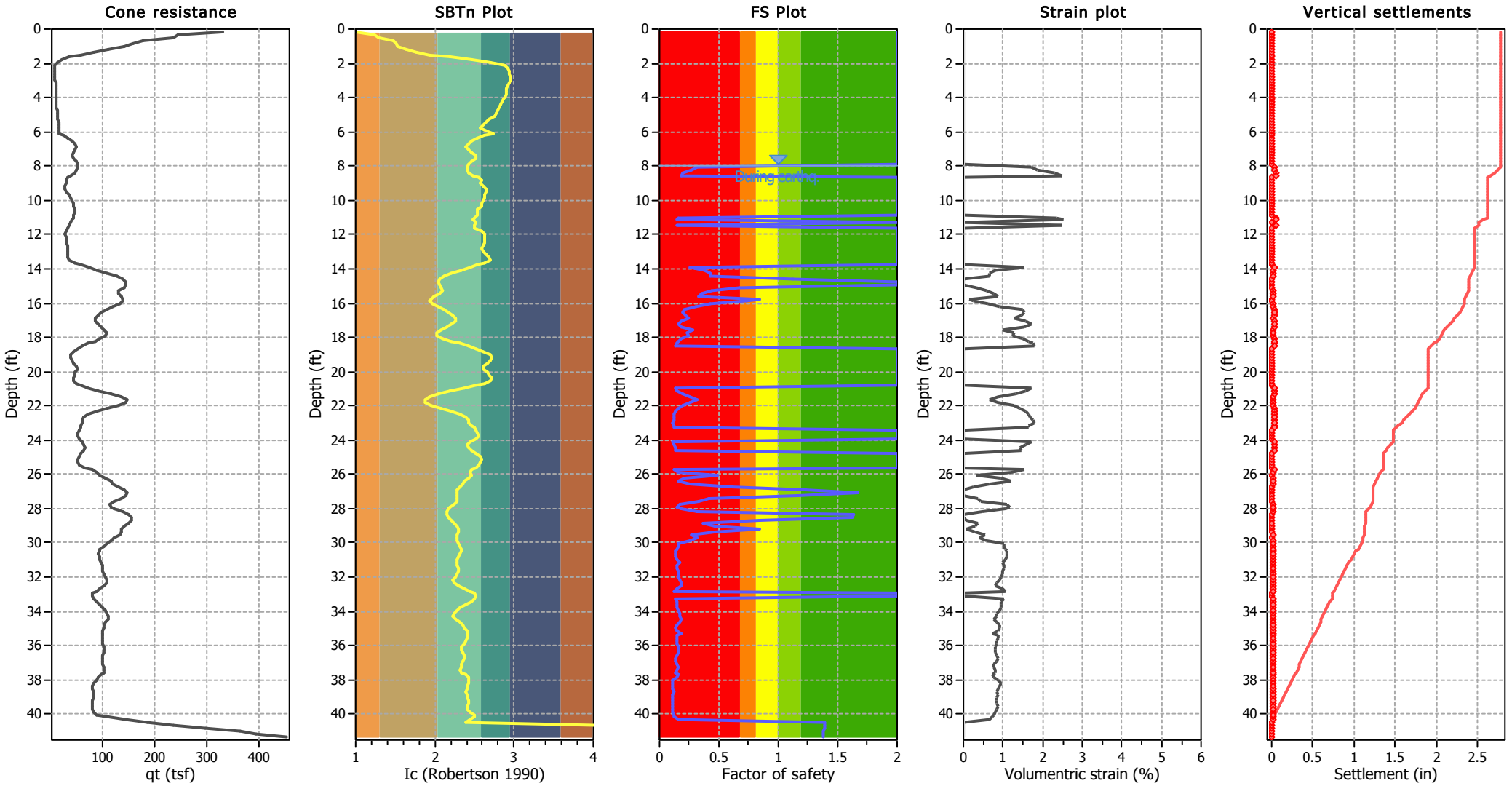
Overall liquefaction potential: 30.38

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

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

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
8.04	154.42	0.32	1.73	0.86	0.04	8.20	144.40	0.27	1.87	0.86	0.04
8.37	117.90	0.20	2.32	0.86	0.05	8.53	110.57	0.18	2.48	0.86	0.05
8.69	45.54	2.00	0.00	0.85	0.00	8.86	38.82	2.00	0.00	0.85	0.00
9.02	39.77	2.00	0.00	0.85	0.00	9.19	34.74	2.00	0.00	0.84	0.00
9.35	42.65	2.00	0.00	0.84	0.00	9.51	34.04	2.00	0.00	0.84	0.00
9.68	31.79	2.00	0.00	0.84	0.00	9.84	54.72	2.00	0.00	0.83	0.00
10.01	56.55	2.00	0.00	0.83	0.00	10.17	57.16	2.00	0.00	0.83	0.00
10.33	56.04	2.00	0.00	0.82	0.00	10.50	50.82	2.00	0.00	0.82	0.00
10.66	55.04	2.00	0.00	0.82	0.00	10.83	65.81	2.00	0.00	0.82	0.00
10.99	110.52	0.16	2.36	0.81	0.05	11.15	102.72	0.15	2.54	0.81	0.05
11.32	52.45	2.00	0.00	0.81	0.00	11.48	104.65	0.15	2.47	0.81	0.05
11.65	35.79	2.00	0.00	0.80	0.00	11.81	36.50	2.00	0.00	0.80	0.00
11.98	30.68	2.00	0.00	0.80	0.00	12.14	28.52	2.00	0.00	0.79	0.00
12.30	33.93	2.00	0.00	0.79	0.00	12.47	40.46	2.00	0.00	0.79	0.00
12.63	38.71	2.00	0.00	0.79	0.00	12.80	34.26	2.00	0.00	0.78	0.00
12.96	35.71	2.00	0.00	0.78	0.00	13.12	32.84	2.00	0.00	0.78	0.00
13.29	37.51	2.00	0.00	0.77	0.00	13.45	36.21	2.00	0.00	0.77	0.00
13.62	39.85	2.00	0.00	0.77	0.00	13.78	49.17	2.00	0.00	0.77	0.00
13.94	155.73	0.25	1.52	0.76	0.03	14.11	174.00	0.37	0.81	0.76	0.02
14.27	179.68	0.43	0.66	0.76	0.01	14.44	179.34	0.43	0.66	0.76	0.01
14.60	201.38	1.12	0.02	0.75	0.00	14.76	233.24	2.00	0.00	0.75	0.00
14.93	223.50	2.00	0.00	0.75	0.00	15.09	192.17	0.68	0.34	0.74	0.01
15.26	181.64	0.44	0.60	0.74	0.01	15.42	174.18	0.36	0.78	0.74	0.01
15.58	170.83	0.33	0.87	0.74	0.02	15.75	196.81	0.85	0.15	0.73	0.00
15.91	194.05	0.73	0.27	0.73	0.01	16.08	180.80	0.42	0.61	0.73	0.01
16.24	169.26	0.31	0.91	0.72	0.02	16.40	150.59	0.21	1.49	0.72	0.03
16.57	147.47	0.20	1.52	0.72	0.03	16.73	152.65	0.22	1.46	0.72	0.03
16.90	158.86	0.24	1.28	0.71	0.03	17.06	142.86	0.18	1.56	0.71	0.03
17.22	130.47	0.16	1.72	0.71	0.03	17.39	143.30	0.18	1.54	0.71	0.03
17.55	165.90	0.28	0.99	0.70	0.02	17.72	158.28	0.24	1.28	0.70	0.03
17.88	159.42	0.24	1.23	0.70	0.02	18.04	144.57	0.19	1.50	0.69	0.03
18.21	132.77	0.16	1.64	0.69	0.03	18.37	125.28	0.14	1.75	0.69	0.03
18.54	122.45	0.14	1.78	0.69	0.04	18.70	53.22	2.00	0.00	0.68	0.00
18.86	35.81	2.00	0.00	0.68	0.00	19.03	28.44	2.00	0.00	0.68	0.00
19.19	23.64	2.00	0.00	0.67	0.00	19.36	32.26	2.00	0.00	0.67	0.00
19.52	49.29	2.00	0.00	0.67	0.00	19.69	48.79	2.00	0.00	0.67	0.00
19.85	49.34	2.00	0.00	0.66	0.00	20.01	48.09	2.00	0.00	0.66	0.00
20.18	33.55	2.00	0.00	0.66	0.00	20.34	33.48	2.00	0.00	0.66	0.00
20.51	39.61	2.00	0.00	0.65	0.00	20.67	40.46	2.00	0.00	0.65	0.00
20.83	50.62	2.00	0.00	0.65	0.00	21.00	118.79	0.13	1.73	0.64	0.04
21.16	127.79	0.14	1.59	0.64	0.03	21.33	150.18	0.19	1.32	0.64	0.03
21.49	166.34	0.26	0.88	0.64	0.02	21.65	175.24	0.32	0.64	0.63	0.01
21.82	166.26	0.26	0.88	0.63	0.02	21.98	152.36	0.19	1.28	0.63	0.02
22.15	137.82	0.16	1.43	0.62	0.03	22.31	126.35	0.14	1.56	0.62	0.03
22.47	119.04	0.13	1.66	0.62	0.03	22.64	115.97	0.12	1.70	0.62	0.03
22.80	112.87	0.12	1.74	0.61	0.03	22.97	109.37	0.11	1.79	0.61	0.04
23.13	118.22	0.12	1.64	0.61	0.03	23.29	117.00	0.12	1.65	0.61	0.03
23.46	48.27	2.00	0.00	0.60	0.00	23.62	43.09	2.00	0.00	0.60	0.00

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
23.79	39.58	2.00	0.00	0.60	0.00	23.95	45.22	2.00	0.00	0.59	0.00
24.11	110.59	0.11	1.71	0.59	0.03	24.28	118.18	0.12	1.59	0.59	0.03
24.44	130.42	0.14	1.42	0.59	0.03	24.61	126.84	0.13	1.46	0.58	0.03
24.77	48.17	2.00	0.00	0.58	0.00	24.93	36.11	2.00	0.00	0.58	0.00
25.10	37.40	2.00	0.00	0.57	0.00	25.26	47.46	2.00	0.00	0.57	0.00
25.43	47.95	2.00	0.00	0.57	0.00	25.59	49.72	2.00	0.00	0.57	0.00
25.75	116.88	0.12	1.54	0.56	0.03	25.92	144.70	0.16	1.21	0.56	0.02
26.08	190.67	0.49	0.32	0.56	0.01	26.25	159.99	0.21	0.96	0.56	0.02
26.41	144.66	0.16	1.19	0.55	0.02	26.57	170.31	0.26	0.67	0.55	0.01
26.74	195.08	0.61	0.25	0.55	0.01	26.90	207.49	1.24	0.00	0.54	0.00
27.07	217.30	1.66	0.00	0.54	0.00	27.23	206.45	1.15	0.01	0.54	0.00
27.40	187.53	0.42	0.35	0.54	0.01	27.56	180.06	0.33	0.46	0.53	0.01
27.72	148.97	0.17	1.11	0.53	0.02	27.89	141.64	0.15	1.17	0.53	0.02
28.05	155.53	0.19	1.04	0.52	0.02	28.22	179.33	0.32	0.46	0.52	0.01
28.38	214.10	1.63	0.00	0.52	0.00	28.54	232.78	1.63	0.00	0.52	0.00
28.71	201.49	0.84	0.09	0.51	0.00	28.87	184.02	0.36	0.38	0.51	0.01
29.04	190.57	0.47	0.29	0.51	0.01	29.20	201.77	0.84	0.08	0.51	0.00
29.36	190.56	0.47	0.29	0.50	0.01	29.53	173.06	0.27	0.55	0.50	0.01
29.69	180.43	0.32	0.42	0.50	0.01	29.86	170.62	0.25	0.59	0.49	0.01
30.02	147.83	0.16	1.04	0.49	0.02	30.18	149.07	0.16	1.02	0.49	0.02
30.35	143.26	0.15	1.06	0.49	0.02	30.51	137.92	0.14	1.10	0.48	0.02
30.68	136.85	0.14	1.10	0.48	0.02	30.84	137.08	0.14	1.10	0.48	0.02
31.00	140.33	0.14	1.06	0.47	0.02	31.17	149.79	0.16	0.98	0.47	0.02
31.33	143.84	0.15	1.02	0.47	0.02	31.50	143.55	0.15	1.02	0.47	0.02
31.66	147.36	0.16	0.98	0.46	0.02	31.82	146.02	0.15	0.99	0.46	0.02
31.99	147.73	0.16	0.97	0.46	0.02	32.15	154.48	0.18	0.91	0.46	0.02
32.32	158.15	0.19	0.83	0.45	0.02	32.48	158.27	0.19	0.82	0.45	0.02
32.64	143.59	0.15	0.97	0.45	0.02	32.81	132.07	0.13	1.06	0.44	0.02
32.97	55.91	2.00	0.00	0.44	0.00	33.14	57.96	2.00	0.00	0.44	0.00
33.30	133.57	0.13	1.03	0.44	0.02	33.46	141.34	0.14	0.96	0.43	0.02
33.63	143.74	0.15	0.94	0.43	0.02	33.79	141.47	0.14	0.95	0.43	0.02
33.96	146.99	0.15	0.90	0.42	0.02	34.12	153.35	0.17	0.85	0.42	0.02
34.28	155.39	0.18	0.84	0.42	0.02	34.45	158.10	0.18	0.77	0.42	0.02
34.61	154.74	0.17	0.83	0.41	0.02	34.78	141.91	0.14	0.91	0.41	0.02
34.94	139.48	0.14	0.92	0.41	0.02	35.10	146.42	0.15	0.86	0.41	0.02
35.27	158.82	0.19	0.72	0.40	0.01	35.43	144.38	0.15	0.87	0.40	0.02
35.60	143.02	0.14	0.87	0.40	0.02	35.76	143.84	0.14	0.86	0.39	0.02
35.93	143.83	0.14	0.85	0.39	0.02	36.09	147.89	0.15	0.82	0.39	0.02
36.25	150.56	0.16	0.80	0.39	0.02	36.42	150.70	0.16	0.79	0.38	0.02
36.58	143.84	0.14	0.83	0.38	0.02	36.75	136.64	0.13	0.87	0.38	0.02
36.91	141.00	0.14	0.83	0.37	0.02	37.07	147.59	0.15	0.79	0.37	0.02
37.24	149.86	0.16	0.77	0.37	0.02	37.40	143.72	0.14	0.80	0.37	0.02
37.57	138.91	0.13	0.82	0.36	0.02	37.73	151.16	0.16	0.74	0.36	0.01
37.89	145.29	0.14	0.77	0.36	0.01	38.06	126.08	0.11	0.89	0.35	0.02
38.22	117.64	0.11	0.96	0.35	0.02	38.39	123.25	0.11	0.90	0.35	0.02
38.55	126.88	0.12	0.87	0.35	0.02	38.71	128.06	0.12	0.85	0.34	0.02
38.88	122.77	0.11	0.88	0.34	0.02	39.04	126.37	0.11	0.85	0.34	0.02
39.21	126.33	0.11	0.84	0.34	0.02	39.37	123.35	0.11	0.86	0.33	0.02

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
39.53	121.19	0.11	0.87	0.33	0.02	39.70	122.11	0.11	0.85	0.33	0.02
39.86	127.00	0.11	0.81	0.32	0.02	40.03	131.09	0.12	0.78	0.32	0.02
40.19	135.87	0.13	0.74	0.32	0.01	40.35	150.91	0.15	0.65	0.32	0.01
40.52	219.05	1.39	0.00	0.31	0.00	40.68	215.74	1.39	0.00	0.31	0.00
40.85	237.47	1.38	0.00	0.31	0.00	41.01	280.92	1.38	0.00	0.30	0.00
41.17	338.38	1.38	0.00	0.30	0.00	41.34	405.34	1.38	0.00	0.30	0.00

Total estimated settlement: 2.77

Abbreviations

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

:: Strength loss calculation Idriss & Boulanger (2008) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	332.08	564.91	1.00	564.91	0.99	N/A	N/A
0.33	245.03	416.80	1.00	416.80	1.24	N/A	N/A
0.49	236.35	402.02	1.00	402.02	1.29	N/A	N/A
0.66	177.82	302.42	1.00	302.42	1.47	N/A	N/A
0.82	158.36	269.30	1.00	269.30	1.51	N/A	N/A
0.98	140.98	239.72	1.00	239.72	1.53	N/A	N/A
1.15	111.94	190.30	1.00	190.25	1.64	N/A	N/A
1.31	83.12	141.25	1.08	152.48	1.76	N/A	N/A
1.48	59.12	100.42	1.22	122.43	1.93	N/A	N/A
1.64	37.12	62.98	1.63	102.50	2.18	N/A	N/A
1.80	21.08	35.67	2.61	92.96	2.47	N/A	N/A
1.97	12.72	21.43	4.05	86.70	2.71	N/A	N/A
2.13	8.70	14.59	5.55	81.03	2.89	N/A	N/A
2.30	8.31	13.90	5.97	82.99	2.93	N/A	N/A
2.46	8.41	14.07	6.16	86.67	2.95	N/A	N/A
2.62	8.87	14.83	6.14	91.00	2.94	N/A	N/A
2.79	9.22	15.41	6.19	95.40	2.95	N/A	N/A
2.95	9.49	15.85	6.23	98.78	2.95	N/A	N/A
3.12	9.84	16.43	6.12	100.57	2.94	N/A	N/A
3.28	10.23	17.08	5.89	100.62	2.92	N/A	N/A
3.44	10.63	17.75	5.69	101.07	2.90	N/A	N/A
3.61	10.84	18.08	5.67	102.44	2.90	N/A	N/A
3.77	11.04	18.42	5.70	105.02	2.90	N/A	N/A
3.94	11.47	19.14	5.59	107.02	2.89	N/A	N/A
4.10	11.99	20.00	5.40	107.94	2.87	N/A	N/A
4.27	12.33	20.56	5.24	107.73	2.85	N/A	N/A
4.43	12.42	20.69	5.11	105.66	2.84	N/A	N/A
4.59	12.40	20.65	4.93	101.73	2.82	N/A	N/A
4.76	12.50	20.80	4.74	98.67	2.80	N/A	N/A
4.92	12.68	21.09	4.63	97.68	2.78	N/A	N/A
5.09	13.23	22.01	4.38	96.40	2.75	N/A	N/A
5.25	14.54	24.23	3.91	94.74	2.69	N/A	N/A
5.41	15.77	26.30	3.57	93.82	2.64	N/A	N/A
5.58	16.48	27.50	3.34	91.98	2.60	N/A	N/A
5.74	16.62	27.71	3.22	89.20	2.58	N/A	N/A
5.91	16.43	27.39	3.57	97.69	2.64	N/A	N/A
6.07	16.46	27.41	4.29	117.53	2.74	N/A	N/A
6.23	24.01	40.24	3.45	138.75	2.62	N/A	N/A
6.40	32.47	54.61	3.00	163.75	2.54	N/A	N/A
6.56	41.71	70.32	2.58	181.26	2.46	N/A	N/A
6.73	47.57	80.28	2.39	192.09	2.42	N/A	N/A
6.89	51.36	86.70	2.25	194.92	2.38	N/A	N/A
7.05	48.67	82.11	2.39	196.11	2.42	N/A	N/A
7.22	45.00	75.84	2.58	195.71	2.46	N/A	N/A
7.38	41.31	69.55	2.89	201.19	2.52	N/A	N/A
7.55	43.50	73.26	2.84	208.10	2.51	N/A	N/A
7.71	49.01	82.62	2.60	214.81	2.47	N/A	N/A
7.87	52.36	88.29	2.39	211.37	2.42	N/A	N/A

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	52.41	88.36	2.35	207.48	2.41	0.19	0.81
8.20	50.90	85.77	2.35	201.68	2.41	0.17	0.81
8.37	46.56	78.37	2.40	188.37	2.42	0.12	0.79
8.53	39.49	66.33	2.67	177.01	2.48	0.12	0.77
8.69	33.90	56.81	3.10	176.17	2.56	0.12	4.71
8.86	31.02	51.89	3.28	170.13	2.59	0.11	4.21
9.02	30.49	50.98	3.15	160.65	2.57	0.11	4.06
9.19	28.91	48.27	3.39	163.61	2.61	0.10	3.77
9.35	28.03	46.65	3.66	170.87	2.65	0.12	3.59
9.51	30.87	50.51	3.58	180.67	2.64	0.10	3.89
9.68	34.84	55.98	3.47	194.26	2.62	0.10	4.32
9.84	37.64	59.70	3.50	209.04	2.63	0.14	4.59
10.01	41.69	64.79	3.34	216.60	2.60	0.14	5.00
10.17	45.18	68.95	3.22	222.10	2.58	0.14	5.33
10.33	45.56	68.55	3.22	221.03	2.58	0.14	5.28
10.50	47.59	70.01	3.00	210.28	2.54	0.12	5.42
10.66	46.21	67.01	2.99	200.43	2.54	0.13	5.18
10.83	44.02	62.93	3.01	189.42	2.55	0.15	4.85
10.99	44.63	62.37	2.73	170.54	2.49	0.12	0.76
11.15	42.79	58.80	2.64	155.03	2.47	0.11	0.76
11.32	37.68	51.33	2.82	144.56	2.51	0.13	3.95
11.48	35.99	48.32	2.76	133.45	2.50	0.11	0.73
11.65	34.25	45.42	2.80	127.21	2.51	0.10	3.48
11.81	30.24	40.00	3.22	128.81	2.58	0.10	3.02
11.98	28.87	37.94	3.50	132.72	2.63	0.10	2.84
12.14	30.01	38.98	3.48	135.70	2.62	0.09	2.91
12.30	30.65	39.42	3.55	139.94	2.64	0.10	2.94
12.47	31.53	40.03	3.51	140.44	2.63	0.11	2.98
12.63	33.06	41.40	3.35	138.81	2.60	0.11	3.08
12.80	33.08	40.90	3.33	136.06	2.60	0.10	3.04
12.96	32.79	40.15	3.42	137.22	2.61	0.10	2.98
13.12	32.58	39.61	3.65	144.54	2.65	0.10	2.92
13.29	33.87	40.87	3.87	158.32	2.68	0.11	3.00
13.45	36.69	43.94	4.02	176.60	2.70	0.11	3.21
13.62	46.92	55.33	3.49	193.34	2.63	0.11	4.07
13.78	59.66	69.21	2.96	204.63	2.54	0.12	5.13
13.94	74.61	85.09	2.48	211.04	2.44	0.19	0.80
14.11	90.17	100.96	2.05	207.31	2.33	0.24	0.83
14.27	108.93	119.81	1.70	203.11	2.21	0.25	0.85
14.44	126.88	137.34	1.48	203.32	2.11	0.25	0.87
14.60	139.38	149.06	1.38	205.69	2.06	0.38	0.88
14.76	144.09	152.75	1.36	207.44	2.04	0.85	0.89
14.93	145.41	153.00	1.38	211.33	2.06	0.63	0.89
15.09	141.16	147.50	1.41	208.07	2.07	0.31	0.88
15.26	132.10	136.96	1.44	197.25	2.09	0.26	0.87
15.42	131.75	135.30	1.38	187.33	2.06	0.24	0.87
15.58	137.00	139.25	1.29	179.80	1.99	0.24	0.87
15.75	140.58	141.55	1.24	174.87	1.95	0.44	0.88

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	140.46	140.44	1.23	172.78	1.94	0.42	0.88
16.08	134.45	133.57	1.27	169.30	1.97	0.29	0.87
16.24	120.58	119.13	1.37	162.84	2.05	0.22	0.85
16.40	107.29	105.35	1.50	157.83	2.12	0.17	0.83
16.57	98.57	96.06	1.61	154.41	2.17	0.16	0.82
16.73	91.39	88.41	1.73	153.08	2.23	0.18	0.81
16.90	87.26	83.73	1.81	151.91	2.26	0.19	0.80
17.06	87.22	83.06	1.83	151.64	2.26	0.16	0.80
17.22	92.17	87.14	1.69	147.39	2.21	0.14	0.81
17.39	96.25	90.34	1.55	140.47	2.15	0.16	0.81
17.55	103.24	96.30	1.41	135.32	2.07	0.21	0.82
17.72	107.52	99.67	1.33	132.30	2.02	0.19	0.83
17.88	105.42	97.09	1.33	129.12	2.02	0.20	0.82
18.04	95.77	87.48	1.45	126.93	2.10	0.16	0.81
18.21	85.14	76.99	1.68	129.03	2.20	0.14	0.79
18.37	73.19	65.45	2.00	131.08	2.32	0.13	0.77
18.54	61.78	54.53	2.40	130.85	2.42	0.13	0.75
18.70	52.22	45.49	2.84	129.38	2.51	0.13	3.22
18.86	43.80	37.58	3.41	128.22	2.61	0.10	2.66
19.03	38.30	32.38	3.96	128.19	2.69	0.10	2.30
19.19	37.68	31.55	4.13	130.32	2.72	0.09	2.24
19.36	40.73	33.91	4.00	135.48	2.70	0.10	2.41
19.52	45.52	37.77	3.72	140.64	2.66	0.13	2.67
19.69	51.11	42.27	3.37	142.51	2.61	0.12	2.98
19.85	51.53	42.30	3.39	143.33	2.61	0.12	2.98
20.01	48.17	39.08	3.70	144.45	2.66	0.12	2.76
20.18	46.27	37.28	3.89	144.99	2.69	0.10	2.64
20.34	44.42	35.55	4.08	145.22	2.71	0.10	2.52
20.51	45.11	35.97	4.05	145.76	2.71	0.11	2.55
20.67	50.41	40.35	3.49	140.93	2.63	0.11	2.84
20.83	58.71	47.29	2.85	134.86	2.52	0.12	3.31
21.00	72.54	58.99	2.19	129.22	2.37	0.12	0.76
21.16	93.22	76.68	1.66	127.22	2.20	0.13	0.79
21.33	116.54	96.82	1.35	130.70	2.04	0.17	0.82
21.49	136.30	113.89	1.22	138.92	1.93	0.25	0.85
21.65	146.85	122.91	1.17	143.63	1.88	0.36	0.86
21.82	143.84	119.97	1.17	140.87	1.88	0.29	0.85
21.98	129.73	107.31	1.24	132.92	1.95	0.19	0.84
22.15	108.38	88.40	1.41	124.57	2.07	0.15	0.81
22.31	88.20	70.85	1.67	118.44	2.20	0.13	0.78
22.47	73.57	58.21	2.01	116.82	2.32	0.12	0.75
22.64	64.93	50.75	2.31	117.15	2.40	0.12	0.74
22.80	61.80	47.98	2.42	116.35	2.43	0.12	0.73
22.97	60.64	46.87	2.45	115.06	2.43	0.11	0.73
23.13	59.47	45.68	2.59	118.35	2.46	0.13	0.72
23.29	57.80	44.11	2.73	120.25	2.49	0.13	0.72
23.46	55.97	42.43	2.85	120.92	2.52	0.12	2.94
23.62	53.99	40.67	2.97	120.98	2.54	0.11	2.83

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	53.11	39.81	3.03	120.49	2.55	0.11	2.77
23.95	54.84	41.09	2.88	118.39	2.52	0.11	2.85
24.11	59.89	45.11	2.55	114.89	2.45	0.12	0.72
24.28	64.91	49.01	2.36	115.43	2.41	0.12	0.73
24.44	65.69	49.40	2.40	118.56	2.42	0.14	0.73
24.61	62.89	46.88	2.60	122.01	2.47	0.14	0.73
24.77	58.83	43.41	2.86	124.27	2.52	0.12	3.00
24.93	54.96	40.15	3.13	125.78	2.57	0.10	2.79
25.10	52.07	37.74	3.28	123.92	2.59	0.11	2.63
25.26	52.52	37.99	3.21	121.94	2.58	0.12	2.64
25.43	56.61	40.97	3.10	126.98	2.56	0.12	2.84
25.59	65.44	47.58	2.87	136.41	2.52	0.12	3.29
25.75	79.93	58.50	2.59	151.61	2.46	0.12	0.75
25.92	89.19	65.25	2.54	165.87	2.45	0.17	0.77
26.08	95.62	69.75	2.57	179.17	2.46	0.31	0.78
26.25	105.90	77.42	2.39	185.16	2.42	0.20	0.79
26.41	115.80	84.91	2.20	187.01	2.37	0.16	0.80
26.57	120.17	88.03	2.14	188.35	2.36	0.23	0.81
26.74	131.40	96.42	2.01	193.77	2.32	0.33	0.82
26.90	143.29	105.31	1.90	200.28	2.29	0.41	0.83
27.07	147.16	107.84	1.89	204.30	2.28	0.50	0.84
27.23	145.08	106.05	1.87	198.11	2.27	0.40	0.84
27.40	135.27	98.41	1.88	184.98	2.28	0.29	0.83
27.56	122.98	89.07	1.88	167.67	2.28	0.25	0.81
27.72	115.29	83.51	1.78	149.03	2.25	0.17	0.80
27.89	115.63	84.05	1.65	138.50	2.19	0.15	0.80
28.05	123.58	89.87	1.60	144.21	2.17	0.18	0.81
28.22	139.65	101.67	1.56	158.40	2.15	0.25	0.83
28.38	150.51	109.40	1.55	169.78	2.15	0.47	0.84
28.54	154.99	111.99	1.61	179.93	2.17	0.73	0.84
28.71	155.47	111.57	1.67	186.79	2.20	0.36	0.84
28.87	151.42	107.75	1.77	191.01	2.24	0.27	0.84
29.04	142.68	100.54	1.90	190.81	2.28	0.30	0.83
29.20	136.91	95.81	1.97	188.85	2.31	0.37	0.82
29.36	135.95	95.02	1.92	182.82	2.29	0.30	0.82
29.53	132.53	92.47	1.88	174.03	2.28	0.23	0.82
29.69	123.20	85.50	1.91	163.23	2.29	0.26	0.81
29.86	115.68	79.94	1.91	152.80	2.29	0.22	0.80
30.02	109.89	75.63	1.92	145.03	2.29	0.17	0.79
30.18	101.94	69.57	2.01	139.83	2.32	0.17	0.78
30.35	95.66	64.78	2.09	135.21	2.34	0.16	0.77
30.51	93.74	63.35	2.06	130.40	2.33	0.15	0.77
30.68	92.53	62.46	2.01	125.55	2.32	0.15	0.76
30.84	94.36	63.73	1.94	123.80	2.30	0.15	0.77
31.00	95.98	64.77	1.91	123.56	2.29	0.15	0.77
31.17	97.53	65.69	1.89	124.23	2.28	0.17	0.77
31.33	99.52	66.83	1.90	127.19	2.29	0.16	0.77
31.50	100.74	67.34	1.94	130.75	2.30	0.16	0.77

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	100.78	67.10	1.96	131.80	2.30	0.17	0.77
31.82	103.41	68.92	1.90	130.80	2.28	0.16	0.78
31.99	106.75	71.34	1.81	128.96	2.25	0.17	0.78
32.15	109.03	72.91	1.76	127.97	2.23	0.18	0.78
32.32	108.06	71.89	1.79	128.67	2.25	0.19	0.78
32.48	103.85	68.35	1.92	131.22	2.29	0.19	0.78
32.64	95.88	62.04	2.18	135.26	2.37	0.16	0.76
32.81	87.84	55.81	2.51	140.19	2.45	0.15	0.75
32.97	82.08	51.41	2.79	143.52	2.50	0.13	3.49
33.14	81.25	50.60	2.85	144.43	2.52	0.14	3.44
33.30	83.92	52.32	2.75	143.93	2.50	0.15	0.74
33.46	88.90	55.70	2.57	142.95	2.46	0.16	0.75
33.63	94.86	60.09	2.25	135.07	2.38	0.16	0.76
33.79	100.51	64.25	2.02	130.07	2.32	0.16	0.77
33.96	105.18	67.67	1.87	126.67	2.28	0.17	0.77
34.12	108.93	70.37	1.77	124.70	2.24	0.18	0.78
34.28	111.55	72.17	1.72	123.85	2.22	0.18	0.78
34.45	110.03	70.36	1.85	130.19	2.27	0.19	0.78
34.61	106.37	67.13	2.02	135.64	2.32	0.18	0.77
34.78	103.20	64.45	2.15	138.78	2.36	0.16	0.77
34.94	102.31	63.49	2.22	141.26	2.38	0.16	0.77
35.10	99.92	61.48	2.34	143.77	2.41	0.17	0.76
35.27	99.98	61.25	2.37	144.95	2.41	0.20	0.76
35.43	100.81	61.67	2.34	144.19	2.41	0.17	0.76
35.60	100.71	61.47	2.32	142.54	2.40	0.16	0.76
35.76	99.31	60.48	2.30	139.07	2.40	0.16	0.76
35.93	101.07	61.74	2.18	134.78	2.37	0.16	0.76
36.09	103.00	63.06	2.09	131.89	2.34	0.17	0.76
36.25	103.34	63.15	2.08	131.14	2.34	0.17	0.76
36.42	102.08	62.04	2.12	131.57	2.35	0.18	0.76
36.58	100.84	60.93	2.17	132.51	2.36	0.16	0.76
36.75	100.43	60.42	2.20	132.77	2.37	0.15	0.76
36.91	100.57	60.58	2.12	128.69	2.35	0.16	0.76
37.07	100.97	60.86	2.07	126.00	2.34	0.17	0.76
37.24	101.73	61.24	2.05	125.31	2.33	0.17	0.76
37.40	103.49	62.20	2.03	126.57	2.33	0.16	0.76
37.57	102.59	61.27	2.09	128.15	2.34	0.15	0.76
37.73	97.52	57.42	2.28	130.96	2.39	0.18	0.75
37.89	91.92	53.55	2.41	129.09	2.42	0.17	0.74
38.06	88.51	51.37	2.41	123.79	2.42	0.14	0.74
38.22	83.94	48.48	2.42	117.33	2.43	0.12	0.73
38.39	80.94	46.66	2.38	110.95	2.42	0.13	0.73
38.55	80.52	46.43	2.32	107.62	2.40	0.14	0.72
38.71	82.41	47.51	2.28	108.46	2.39	0.14	0.73
38.88	83.07	47.69	2.32	110.54	2.40	0.13	0.73
39.04	82.38	47.03	2.37	111.43	2.41	0.14	0.73
39.21	81.03	46.02	2.41	110.92	2.42	0.14	0.72
39.37	80.90	45.86	2.39	109.74	2.42	0.13	0.72

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.53	80.91	45.84	2.35	107.83	2.41	0.13	0.72
39.70	81.55	46.01	2.38	109.74	2.42	0.13	0.72
39.86	83.68	46.76	2.54	118.94	2.45	0.14	0.73
40.03	89.34	49.40	2.76	136.21	2.50	0.15	0.73
40.19	107.53	59.57	2.76	164.45	2.50	0.15	0.76
40.35	144.09	81.04	2.50	202.32	2.44	0.18	0.80
40.52	185.47	105.59	2.28	240.37	2.39	0.54	0.83
40.68	236.69	123.56	26.61	3287.45	4.06	0.86	8.83
40.85	299.02	155.92	26.61	4148.34	4.06	0.89	11.14
41.01	365.31	190.18	26.61	5059.83	4.06	0.92	13.58
41.17	395.79	205.51	26.61	5467.72	4.06	0.93	14.68
41.34	454.18	235.24	26.61	6258.59	4.06	0.96	16.80

Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

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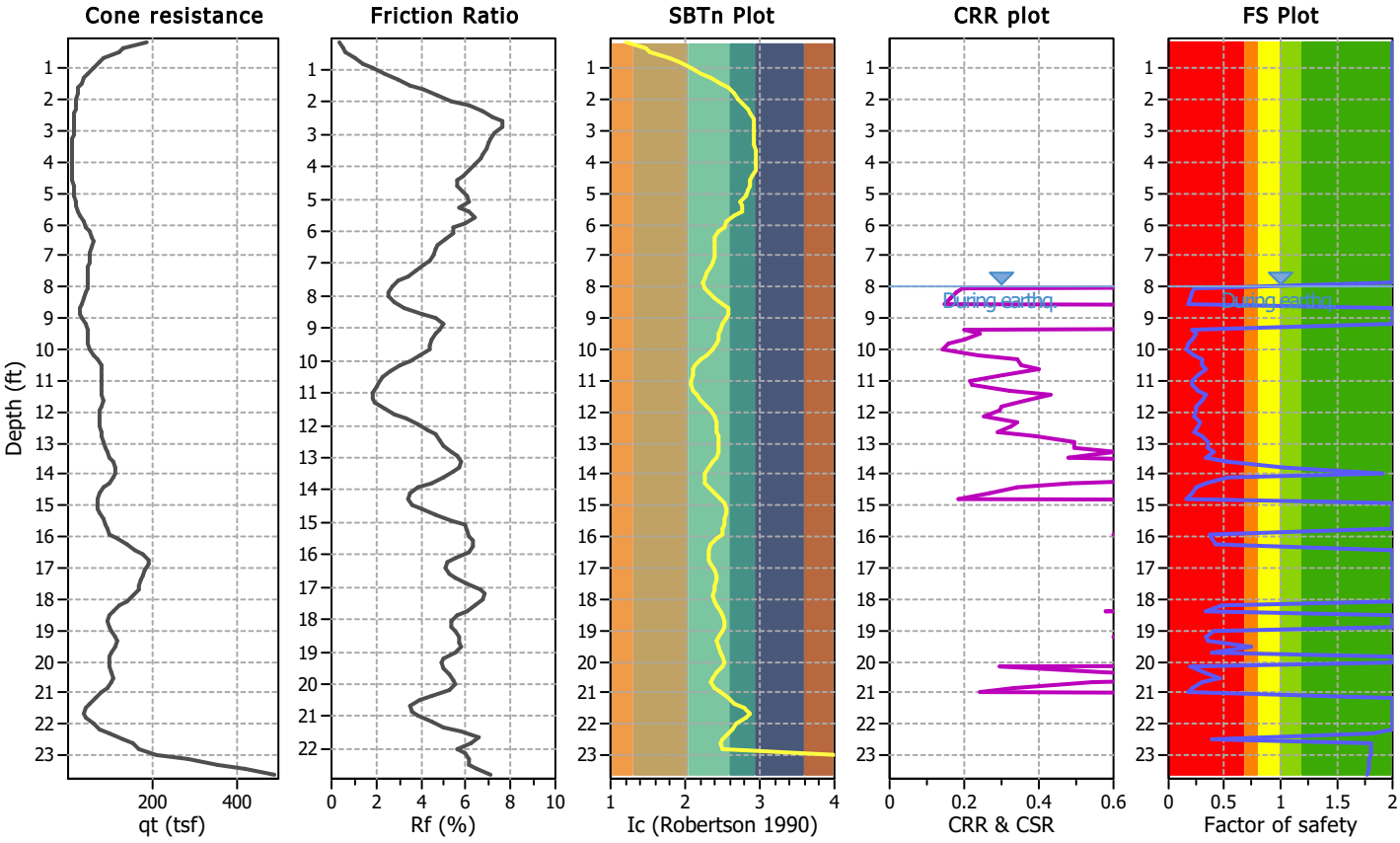
LIQUEFACTION ANALYSIS REPORT

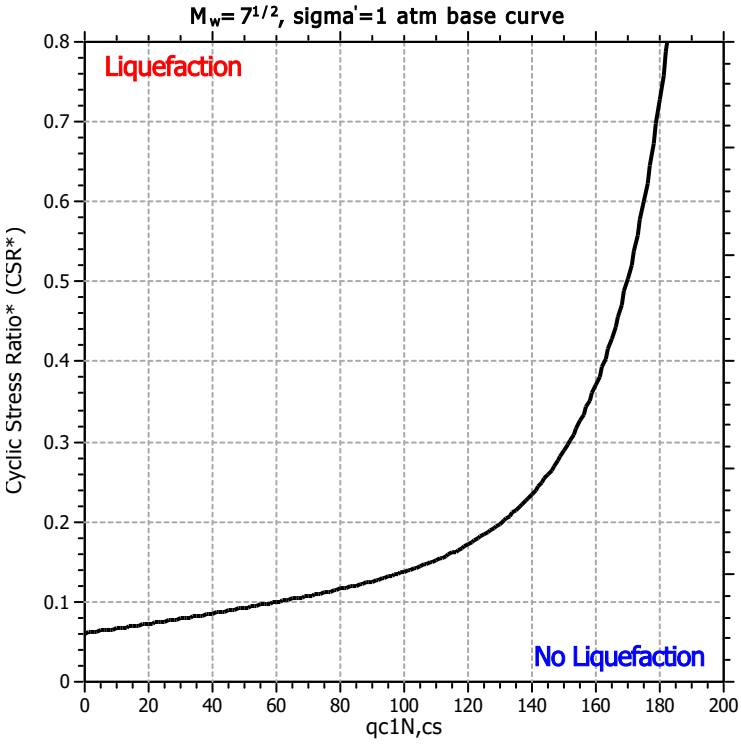
Project title : CalL Poly Humboldt health dining and housing **Location : Arcata, CA**

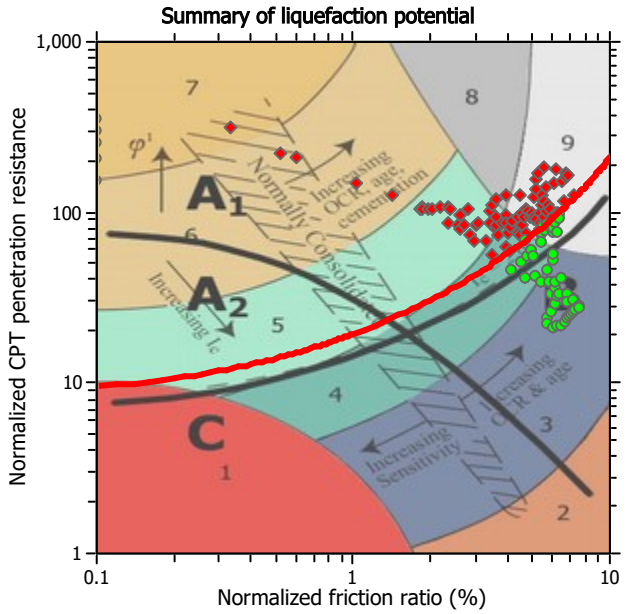
CPT file : CPT-06 - Basic

Input parameters and analysis data

Analysis method:	**B&I (2014)**	**G.W.T. (in-situ):**	**20.00 ft**	**Use fill:**	**No**	**Clay like behavior applied:**	**Sands only**
Fines correction method:	**B&I (2014)**	**G.W.T. (earthq.):**	**8.00 ft**	**Fill height:**	**N/A**	**Limit depth applie**	**Yes**
Points to test:	**Based on Ic value**	**Average results interva**	**5**	**Fill weight:**	**N/A**	**Limit depth:**	**42.00 ft**
Earthquake magnitude M_w:	**9.00**	**Ic cut-off value:**	**2.50**	**Trans. detect. applied:**	**No**	**MSF method:**	**Method base**
Peak ground acceleration:	**1.19**	**Unit weight calculation**	**Based on SBT**	**K_σ applied:**	**Yes**		

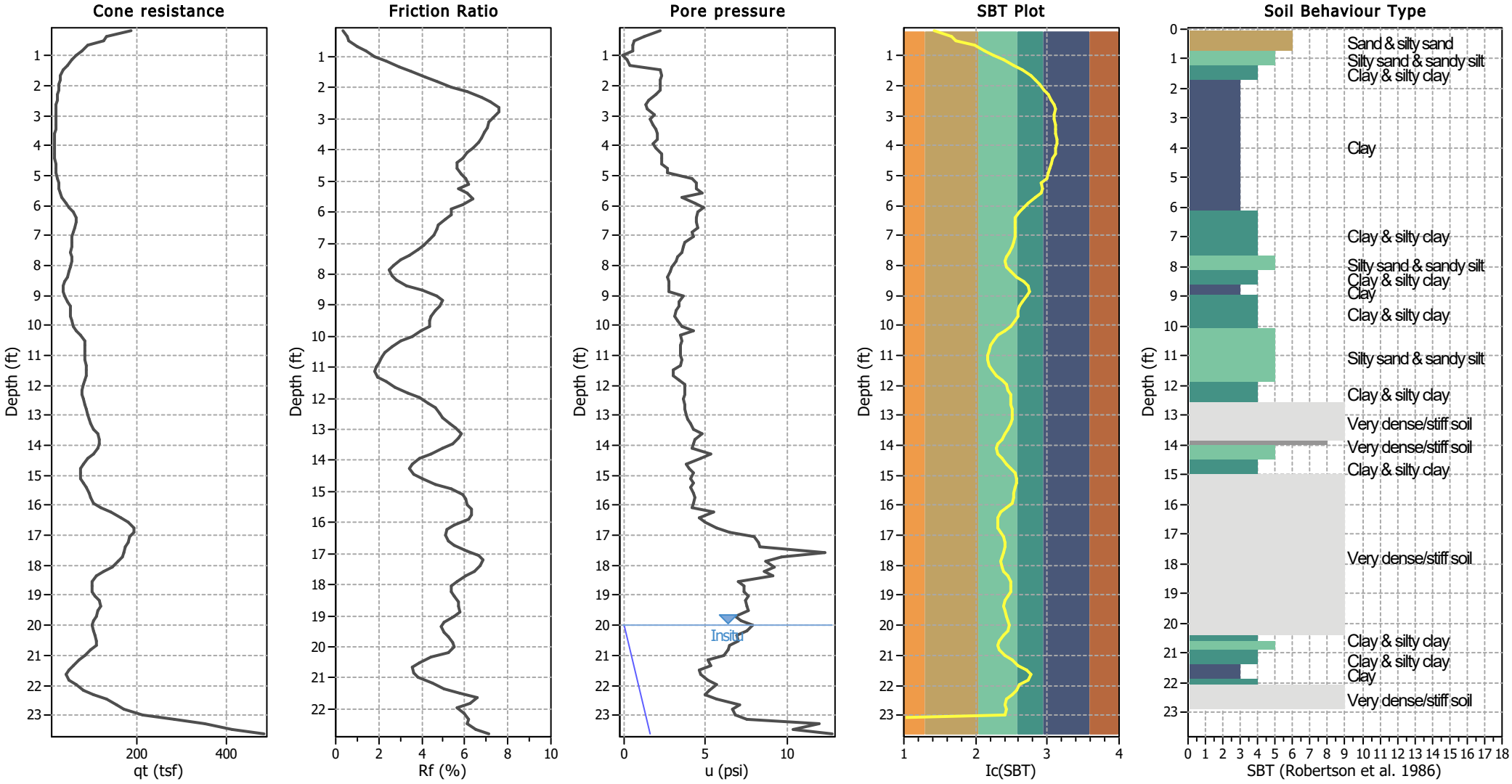






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and 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

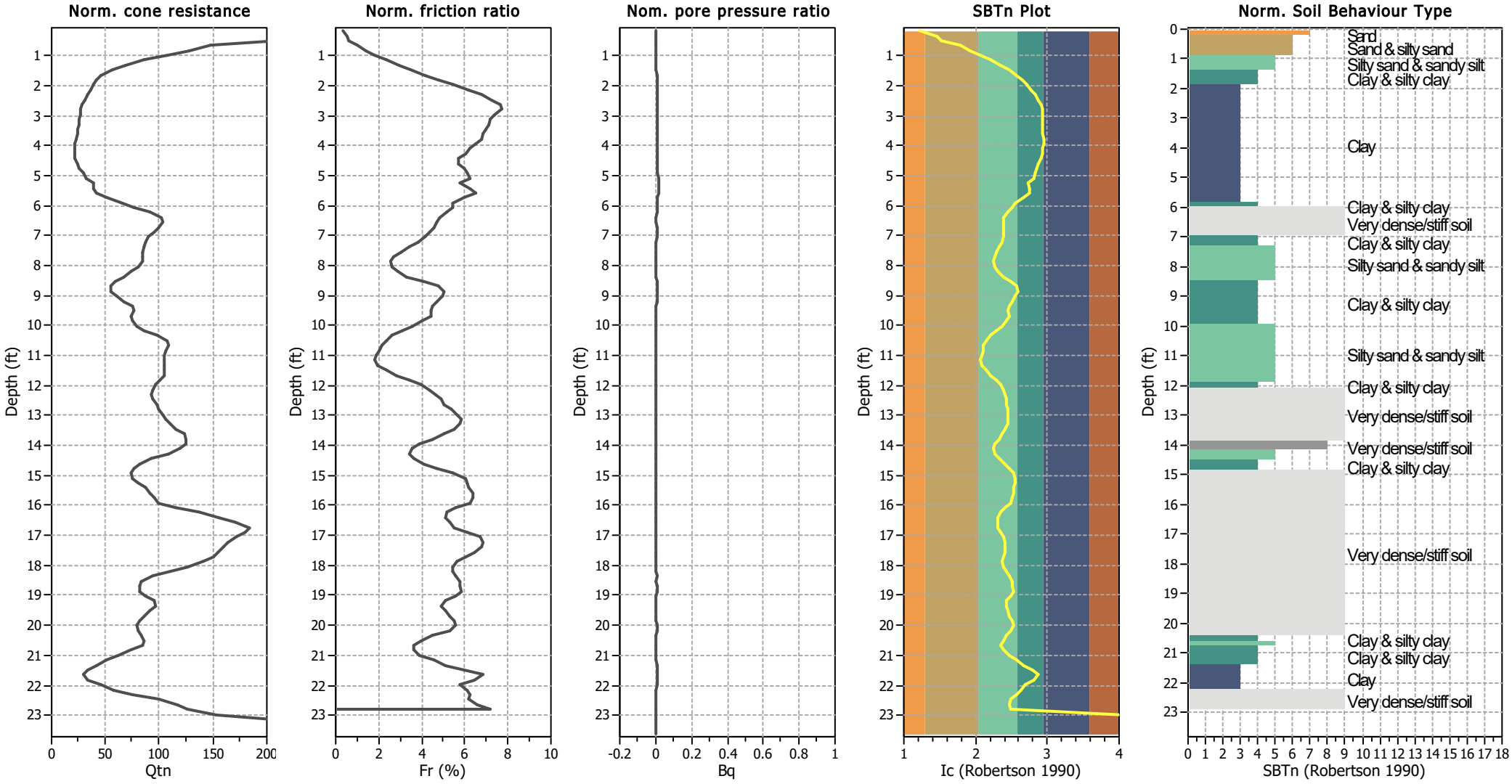
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 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

'T name: CPT-06 - Basic

CPT basic interpretation plots (normalized)



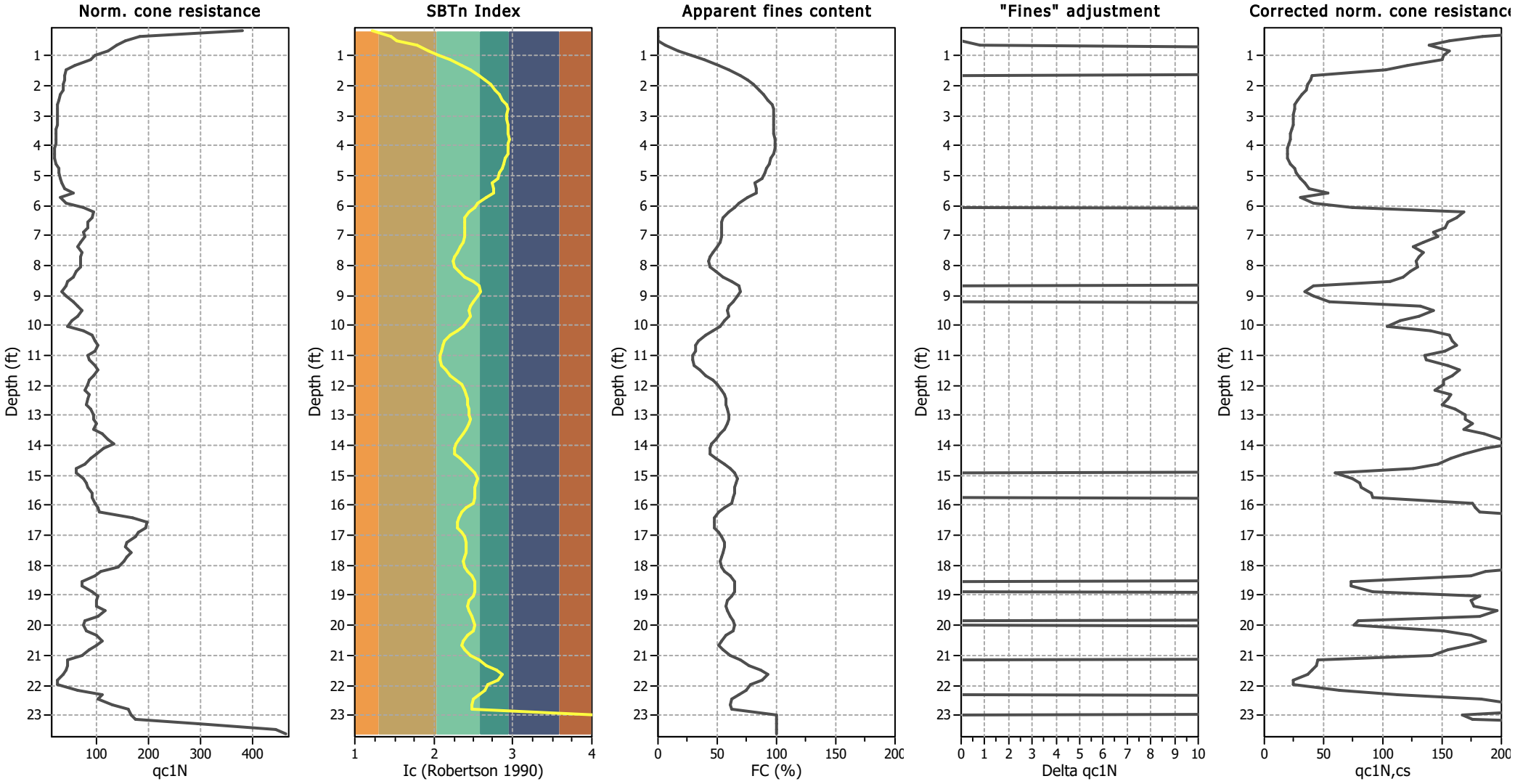
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 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)

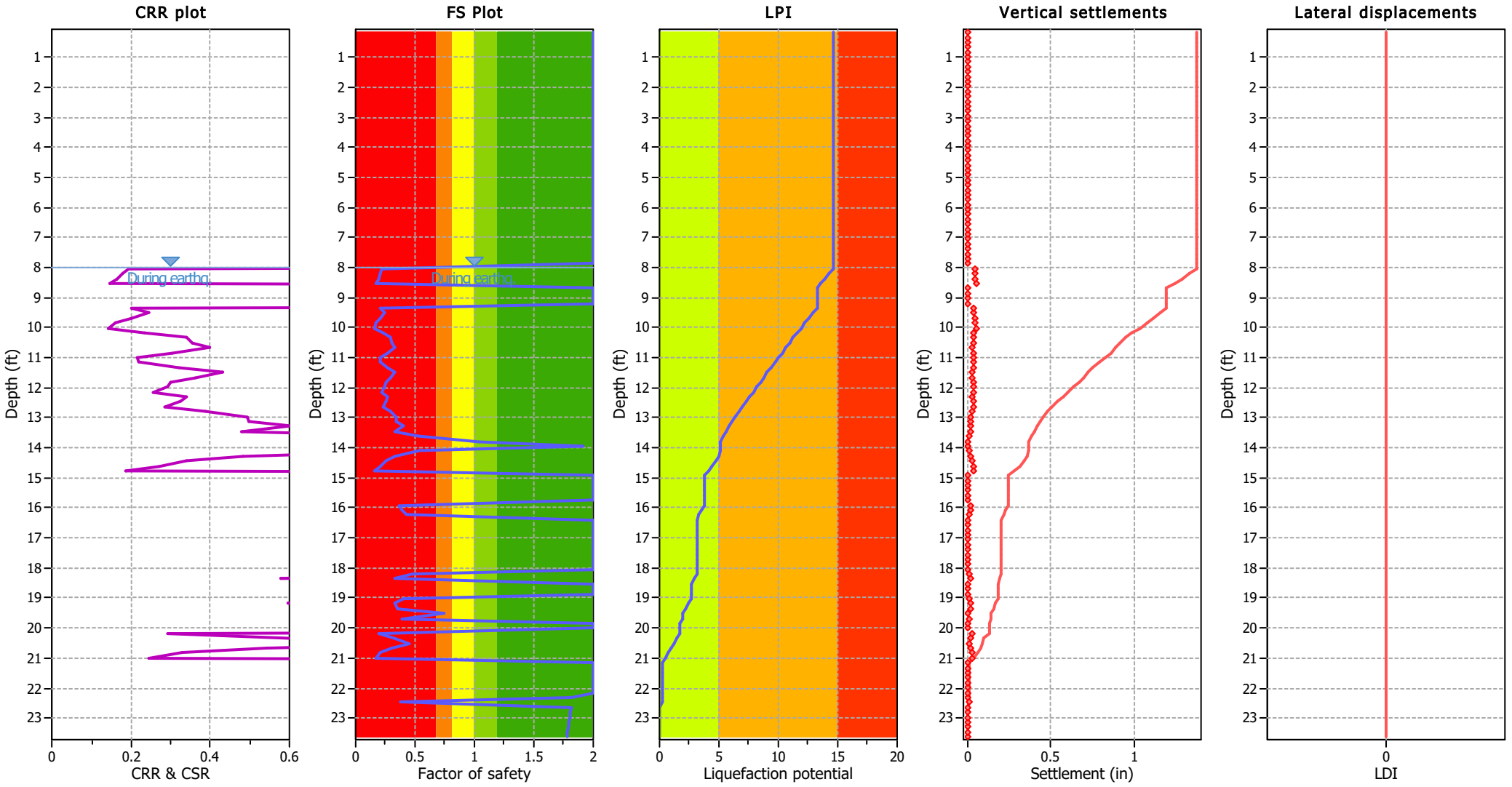


Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

'T name: CPT-06 - Basic

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

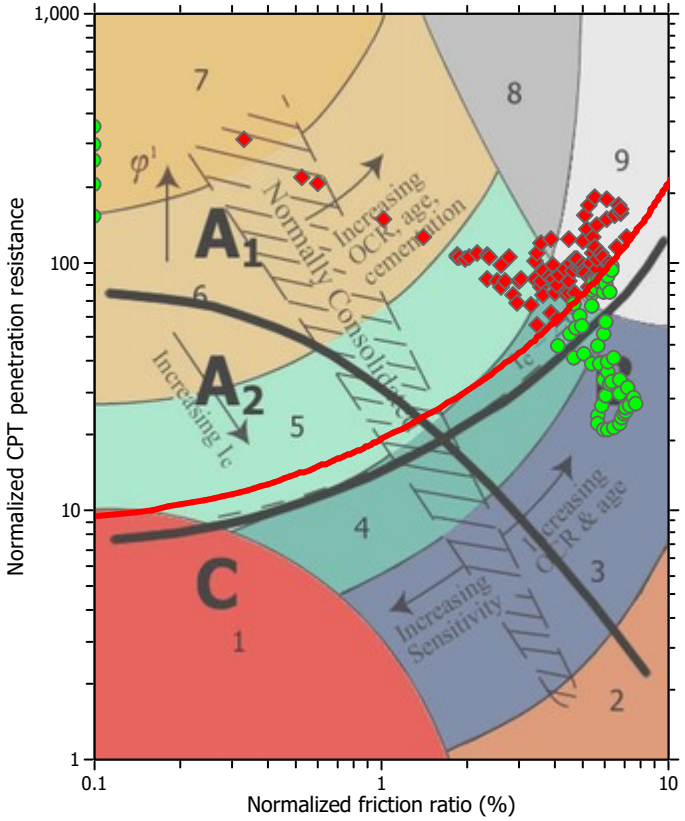
F.S. color scheme

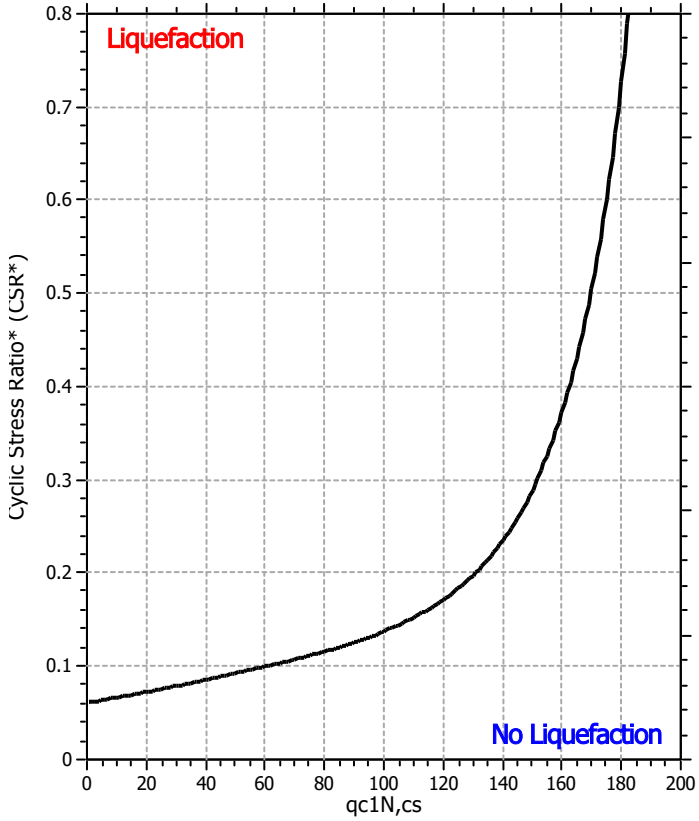
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

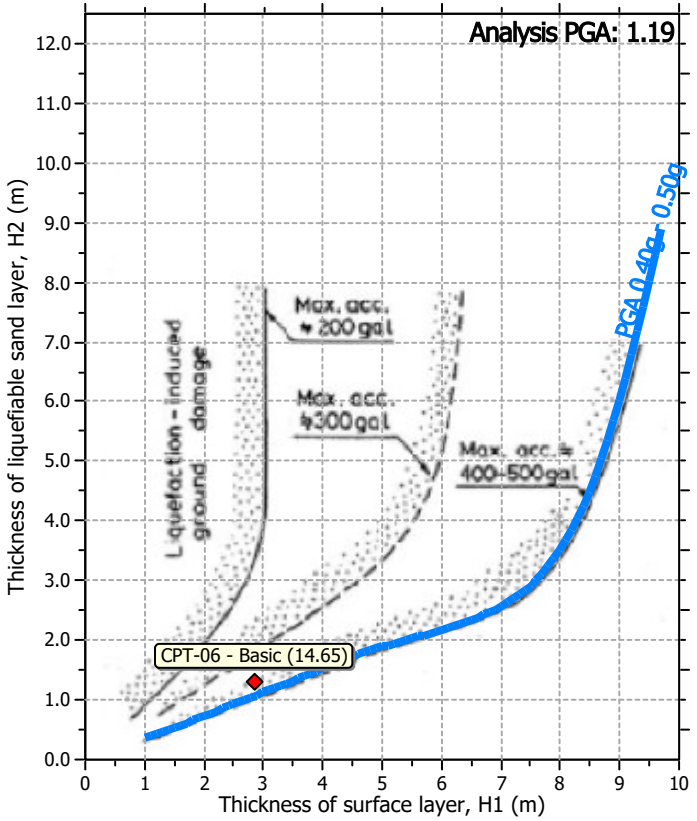
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



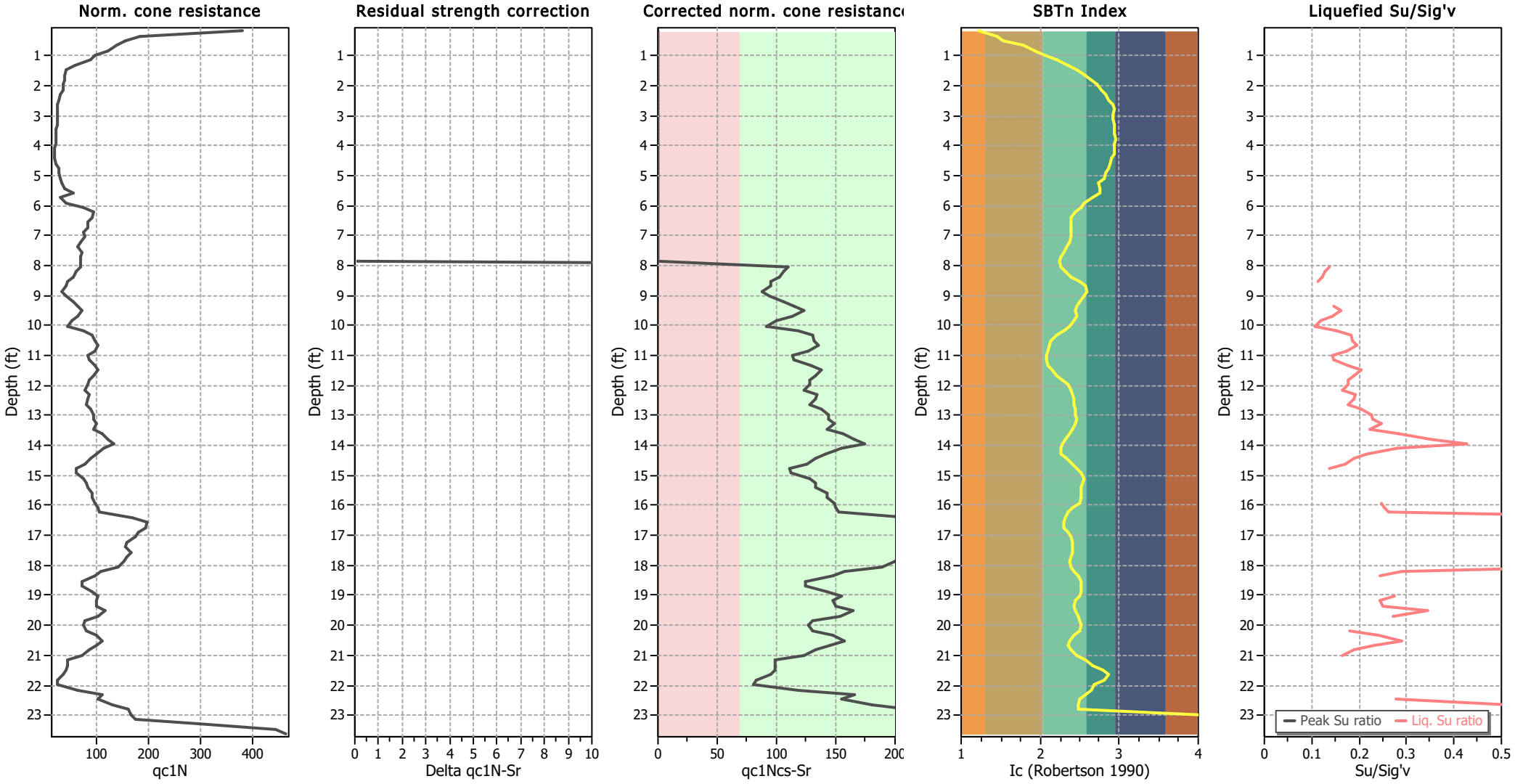




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	237.35	0.56	2.19	0.00	119.38
2	0.33	114.77	0.65	1.27	2.36	119.34
3	0.49	97.26	0.72	0.66	3.18	119.73
4	0.66	86.25	0.83	0.52	7.89	120.31
5	0.82	76.14	0.91	0.56	11.20	121.20
6	0.98	60.89	1.34	-0.08	14.92	121.44
7	1.15	54.41	1.48	0.17	19.23	121.09
8	1.31	36.56	1.23	0.36	24.45	120.65
9	1.48	26.29	0.96	2.25	29.02	119.92
10	1.64	24.73	1.00	2.30	34.38	119.16
11	1.80	24.42	1.14	2.19	38.06	119.00
12	1.97	23.07	1.28	2.26	41.15	119.42
13	2.13	22.23	1.32	2.21	44.58	119.70
14	2.30	19.61	1.41	1.93	47.81	119.61
15	2.46	17.11	1.39	1.47	50.34	119.34
16	2.62	16.02	1.24	1.36	52.95	118.97
17	2.79	16.12	1.20	1.38	53.97	118.48
18	2.95	15.25	1.16	1.86	53.58	117.95
19	3.12	15.47	1.10	1.62	53.58	117.56
20	3.28	15.39	1.01	1.82	53.99	117.20
21	3.44	14.26	0.98	1.98	53.99	116.87
22	3.61	13.91	0.99	2.00	54.39	116.36
23	3.77	13.87	0.96	2.01	55.15	115.72
24	3.94	12.80	0.82	1.81	54.99	115.10
25	4.10	11.82	0.69	1.96	54.69	114.59
26	4.27	12.20	0.66	2.28	54.22	114.29
27	4.43	12.52	0.74	2.35	52.20	114.43
28	4.59	13.46	0.81	2.35	50.73	115.14
29	4.76	16.21	0.83	2.65	49.63	116.32
30	4.92	16.84	0.97	2.66	48.20	117.57
31	5.09	19.07	1.22	4.13	46.65	118.81
32	5.25	21.11	1.40	4.46	42.42	119.87
33	5.41	23.47	1.56	4.42	43.35	120.57
34	5.58	33.62	1.39	4.80	43.22	121.41
35	5.74	19.00	1.58	3.56	38.51	122.96
36	5.91	25.54	1.95	4.38	33.39	124.71
37	6.07	50.62	2.58	4.90	31.46	126.16
38	6.23	67.03	3.09	4.54	28.61	127.38
39	6.40	64.93	3.08	4.40	26.30	128.03
40	6.56	60.32	3.03	4.40	25.89	127.96
41	6.73	59.36	2.65	4.52	25.88	127.43
42	6.89	53.54	2.40	4.20	25.89	126.62
43	7.05	56.80	2.24	4.21	25.73	125.66
44	7.22	50.00	1.88	3.72	24.99	124.81
45	7.38	45.35	1.73	3.65	23.75	123.94
46	7.55	52.11	1.54	3.55	22.47	122.78
47	7.71	51.08	1.33	3.28	21.12	121.99
48	7.87	50.77	1.02	3.15	20.39	121.55

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	51.08	1.11	2.94	21.28	121.32
50	8.20	46.38	1.33	2.85	23.19	121.19
51	8.37	41.01	1.43	2.70	26.05	121.38
52	8.53	32.74	1.39	2.72	30.53	121.56
53	8.69	31.29	1.38	2.78	33.96	121.83
54	8.86	25.27	1.59	2.79	34.67	122.38
55	9.02	31.93	1.82	3.59	33.12	123.30
56	9.19	43.03	1.98	3.40	30.78	124.35
57	9.35	51.92	2.16	3.40	28.99	125.25
58	9.51	60.07	2.27	3.15	28.40	125.50
59	9.68	52.42	2.43	3.07	28.94	125.26
60	9.84	42.06	2.04	3.27	27.27	125.02
61	10.01	36.36	1.73	3.53	25.16	124.91
62	10.17	63.85	1.65	4.29	22.29	124.86
63	10.33	79.70	1.87	3.49	19.34	125.19
64	10.50	84.97	2.02	3.55	17.11	125.54
65	10.66	90.43	2.00	3.50	16.30	125.21
66	10.83	83.83	1.79	3.49	15.91	124.62
67	10.99	73.04	1.17	3.42	15.17	124.05
68	11.15	74.74	1.22	3.55	15.04	123.96
69	11.32	87.57	1.39	3.43	15.70	124.51
70	11.48	92.69	1.89	2.98	17.49	126.01
71	11.65	85.58	2.36	2.99	19.27	127.23
72	11.81	77.34	2.96	3.38	21.98	128.24
73	11.98	75.30	3.00	3.69	24.21	128.97
74	12.14	69.64	3.30	3.69	25.85	129.52
75	12.30	79.13	3.48	3.69	26.92	129.91
76	12.47	77.77	3.65	3.63	27.50	130.49
77	12.63	74.25	3.91	3.74	27.41	131.17
78	12.80	83.46	4.29	3.69	28.19	131.93
79	12.96	89.74	4.77	3.78	28.60	132.71
80	13.12	90.24	5.48	3.94	28.86	133.37
81	13.29	95.46	5.81	4.08	28.19	133.74
82	13.45	91.25	5.85	4.21	26.94	133.98
83	13.62	106.94	5.21	4.79	25.03	134.09
84	13.78	119.91	5.10	4.34	23.35	133.59
85	13.94	130.68	5.16	4.24	21.57	132.70
86	14.11	112.99	3.76	4.20	20.92	131.69
87	14.27	98.41	2.88	5.34	21.36	130.64
88	14.44	86.90	2.61	4.68	23.59	129.52
89	14.60	77.18	2.94	3.78	26.68	129.13
90	14.76	59.78	3.46	3.98	29.42	129.52
91	14.93	60.01	3.61	4.25	31.82	130.42
92	15.09	75.31	4.07	4.05	33.33	131.33
93	15.26	81.67	4.88	4.25	32.62	132.31
94	15.42	82.98	5.34	4.11	31.90	133.20
95	15.58	92.74	5.82	4.24	31.76	133.99
96	15.75	93.76	5.95	4.35	31.24	134.48

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	101.21	6.48	4.23	30.43	134.91
98	16.08	105.64	6.33	4.13	27.11	135.60
99	16.24	110.81	6.58	5.47	24.42	136.81
100	16.40	177.70	7.17	4.65	23.02	137.28
101	16.57	207.13	9.59	5.00	22.65	137.28
102	16.73	205.79	11.36	5.68	22.66	137.28
103	16.90	191.78	12.25	6.45	24.26	137.28
104	17.06	184.24	12.83	7.97	26.02	137.28
105	17.22	169.59	12.43	8.23	26.77	137.28
106	17.39	165.93	12.22	8.32	26.86	137.28
107	17.55	176.73	10.92	12.32	26.48	137.28
108	17.72	170.88	9.95	9.63	25.74	137.28
109	17.88	165.37	9.12	8.66	25.39	137.28
110	18.04	153.79	7.90	9.21	25.77	137.28
111	18.21	117.99	6.20	8.56	27.29	135.97
112	18.37	106.76	5.23	9.15	29.47	134.76
113	18.54	80.22	5.06	6.99	31.27	133.97
114	18.70	81.00	5.45	7.31	31.57	133.96
115	18.86	101.08	5.76	7.39	31.70	134.08
116	19.03	114.69	6.22	7.64	30.28	134.37
117	19.19	110.19	5.64	7.45	28.00	134.58
118	19.36	112.64	5.58	7.50	27.31	134.59
119	19.52	128.76	5.44	7.57	28.35	134.37
120	19.69	115.61	5.53	6.78	29.67	134.27
121	19.85	89.30	5.80	7.15	30.86	134.11
122	20.01	85.88	5.66	7.90	31.59	133.87
123	20.18	89.97	5.38	7.50	30.59	133.66
124	20.34	111.78	4.87	6.92	27.65	132.92
125	20.51	124.50	4.58	6.97	25.62	132.17
126	20.67	112.87	2.91	6.48	24.52	131.36
127	20.83	97.35	3.23	6.40	26.18	130.33
128	21.00	83.92	3.25	6.10	29.34	129.16
129	21.16	53.16	3.06	5.17	34.19	128.53
130	21.33	50.91	2.90	5.29	38.87	127.61
131	21.49	47.84	2.50	4.59	45.32	126.54
132	21.65	43.16	2.27	4.71	50.11	126.41
133	21.82	29.39	2.26	5.13	46.88	127.07
134	21.98	29.13	3.33	5.69	39.58	129.31
135	22.15	74.69	3.62	5.21	37.23	131.97
136	22.31	128.72	5.65	4.99	33.87	134.85
137	22.47	119.67	8.02	5.65	30.36	137.28
138	22.64	149.24	10.33	7.07	29.57	137.28
139	22.80	181.27	12.28	6.62	30.13	137.28
140	22.97	188.91	13.70	6.80	100.00	137.28
141	23.13	199.44	15.58	7.48	100.00	137.28
142	23.29	333.51	-273363.25	11.97	100.00	137.28
143	23.46	506.64	-273363.25	10.33	100.00	137.28
144	23.62	528.35	-273363.25	12.74	100.00	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.16	0.01	0.00	0.01	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
2	0.33	0.02	0.00	0.02	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
3	0.49	0.03	0.00	0.03	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
4	0.66	0.04	0.00	0.04	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
5	0.82	0.05	0.00	0.05	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
6	0.98	0.06	0.00	0.06	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
7	1.15	0.07	0.00	0.07	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
8	1.31	0.08	0.00	0.08	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
9	1.48	0.09	0.00	0.09	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
10	1.64	0.10	0.00	0.10	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
11	1.80	0.11	0.00	0.11	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
12	1.97	0.12	0.00	0.12	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
13	2.13	0.13	0.00	0.13	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
14	2.30	0.14	0.00	0.14	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
15	2.46	0.15	0.00	0.15	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
16	2.62	0.16	0.00	0.16	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
17	2.79	0.17	0.00	0.17	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
18	2.95	0.18	0.00	0.18	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
19	3.12	0.19	0.00	0.19	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
20	3.28	0.20	0.00	0.20	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
21	3.44	0.21	0.00	0.21	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
22	3.61	0.22	0.00	0.22	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
23	3.77	0.22	0.00	0.22	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
24	3.94	0.23	0.00	0.23	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
25	4.10	0.24	0.00	0.24	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
26	4.27	0.25	0.00	0.25	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
27	4.43	0.26	0.00	0.26	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
28	4.59	0.27	0.00	0.27	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
29	4.76	0.28	0.00	0.28	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
30	4.92	0.29	0.00	0.29	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
31	5.09	0.30	0.00	0.30	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
32	5.25	0.31	0.00	0.31	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
33	5.41	0.32	0.00	0.32	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
34	5.58	0.33	0.00	0.33	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
35	5.74	0.34	0.00	0.34	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
36	5.91	0.35	0.00	0.35	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
37	6.07	0.36	0.00	0.36	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
38	6.23	0.37	0.00	0.37	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
39	6.40	0.38	0.00	0.38	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
40	6.56	0.39	0.00	0.39	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
41	6.73	0.40	0.00	0.40	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
42	6.89	0.41	0.00	0.41	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
43	7.05	0.42	0.00	0.42	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
44	7.22	0.43	0.00	0.43	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
45	7.38	0.44	0.00	0.44	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
46	7.55	0.45	0.00	0.45	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
47	7.71	0.46	0.00	0.46	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
48	7.87	0.47	0.00	0.47	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.04	0.48	0.00	0.48	1.00	0.775	0.67	1.159	1.10	1.00	0.871	**No**
50	8.20	0.49	0.01	0.49	1.00	0.783	0.67	1.171	1.10	1.00	0.860	**No**
51	8.37	0.50	0.01	0.49	1.00	0.792	0.67	1.183	1.09	1.00	0.853	**No**
52	8.53	0.51	0.02	0.50	1.00	0.799	0.67	1.194	1.08	1.00	0.839	**No**
53	8.69	0.52	0.02	0.50	1.00	0.807	0.67	1.205	1.08	1.00	0.845	**No**
54	8.86	0.53	0.03	0.51	1.00	0.814	0.67	1.217	1.07	1.00	0.839	**No**
55	9.02	0.54	0.03	0.51	1.00	0.822	0.67	1.228	1.08	1.00	0.862	**No**
56	9.19	0.55	0.04	0.52	1.00	0.829	0.67	1.239	1.09	1.00	0.905	**No**
57	9.35	0.56	0.04	0.52	1.00	0.836	0.67	1.249	1.10	1.00	0.951	**No**
58	9.51	0.57	0.05	0.53	1.00	0.843	0.67	1.259	1.10	1.00	1.010	**No**
59	9.68	0.59	0.05	0.53	1.00	0.850	0.67	1.270	1.09	1.00	0.967	**No**
60	9.84	0.60	0.06	0.54	1.00	0.856	0.67	1.279	1.08	1.00	0.925	**No**
61	10.01	0.61	0.06	0.54	1.00	0.863	0.67	1.289	1.07	1.00	0.911	**No**
62	10.17	0.62	0.07	0.55	1.00	0.869	0.67	1.299	1.10	1.00	1.033	**No**
63	10.33	0.63	0.07	0.55	1.00	0.875	0.67	1.308	1.10	1.00	1.154	**No**
64	10.50	0.64	0.08	0.56	1.00	0.882	0.67	1.317	1.10	1.00	1.177	**No**
65	10.66	0.65	0.08	0.56	1.00	0.887	0.67	1.326	1.10	1.00	1.225	**No**
66	10.83	0.66	0.09	0.57	1.00	0.894	0.67	1.335	1.10	1.00	1.141	**No**
67	10.99	0.67	0.09	0.57	1.00	0.899	0.67	1.344	1.09	1.00	1.053	**No**
68	11.15	0.68	0.10	0.58	1.00	0.905	0.67	1.352	1.09	1.00	1.066	**No**
69	11.32	0.69	0.10	0.58	1.00	0.911	0.67	1.361	1.10	1.00	1.182	**No**
70	11.48	0.70	0.11	0.59	1.00	0.916	0.67	1.369	1.10	1.00	1.294	**No**
71	11.65	0.71	0.11	0.59	1.00	0.922	0.67	1.377	1.10	1.00	1.238	**No**
72	11.81	0.72	0.12	0.60	1.00	0.927	0.67	1.385	1.09	1.00	1.188	**No**
73	11.98	0.73	0.12	0.61	1.00	0.932	0.67	1.393	1.09	1.00	1.190	**No**
74	12.14	0.74	0.13	0.61	1.00	0.937	0.67	1.400	1.08	1.00	1.154	**No**
75	12.30	0.75	0.13	0.62	1.00	0.942	0.67	1.407	1.09	1.00	1.253	**No**
76	12.47	0.76	0.14	0.62	1.00	0.947	0.67	1.415	1.09	1.00	1.245	**No**
77	12.63	0.77	0.14	0.63	1.00	0.952	0.67	1.422	1.08	1.00	1.213	**No**
78	12.80	0.78	0.15	0.63	1.00	0.956	0.67	1.429	1.09	1.00	1.322	**No**
79	12.96	0.79	0.15	0.64	1.00	0.961	0.67	1.436	1.10	1.00	1.419	**No**
80	13.12	0.80	0.16	0.64	1.00	0.965	0.67	1.442	1.09	1.00	1.430	**No**
81	13.29	0.82	0.17	0.65	1.00	0.970	0.67	1.449	1.10	1.00	1.520	**No**
82	13.45	0.83	0.17	0.66	1.00	0.974	0.67	1.455	1.09	1.00	1.432	**No**
83	13.62	0.84	0.18	0.66	1.00	0.978	0.67	1.462	1.10	1.00	1.755	**No**
84	13.78	0.85	0.18	0.67	1.00	0.982	0.67	1.468	1.10	1.00	1.776	**No**
85	13.94	0.86	0.19	0.67	1.00	0.986	0.67	1.474	1.10	1.00	1.783	**No**
86	14.11	0.87	0.19	0.68	1.00	0.990	0.67	1.480	1.10	1.00	1.791	**No**
87	14.27	0.88	0.20	0.69	1.00	0.994	0.67	1.486	1.08	1.00	1.479	**No**
88	14.44	0.89	0.20	0.69	1.00	0.998	0.67	1.492	1.07	1.00	1.351	**No**
89	14.60	0.90	0.21	0.70	1.00	1.002	0.67	1.498	1.07	1.00	1.275	**No**
90	14.76	0.91	0.21	0.70	1.00	1.006	0.67	1.503	1.05	1.00	1.164	**No**
91	14.93	0.92	0.22	0.71	1.00	1.010	0.67	1.509	1.05	1.00	1.175	**No**
92	15.09	0.93	0.22	0.71	1.00	1.014	0.67	1.514	1.06	1.00	1.294	**No**
93	15.26	0.95	0.23	0.72	1.00	1.017	0.67	1.520	1.06	1.00	1.359	**No**
94	15.42	0.96	0.23	0.72	1.00	1.021	0.67	1.525	1.06	1.00	1.373	**No**
95	15.58	0.97	0.24	0.73	1.00	1.024	0.67	1.530	1.07	1.00	1.508	**No**
96	15.75	0.98	0.24	0.74	1.00	1.028	0.67	1.535	1.07	1.00	1.521	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	15.91	0.99	0.25	0.74	1.00	1.031	0.67	1.540	1.07	1.00	1.655	**No**
98	16.08	1.00	0.25	0.75	1.00	1.034	0.67	1.545	1.07	1.00	1.712	**No**
99	16.24	1.01	0.26	0.75	1.00	1.037	0.67	1.550	1.07	1.00	1.789	**No**
100	16.40	1.02	0.26	0.76	1.00	1.040	0.67	1.554	1.10	1.00	1.882	**No**
101	16.57	1.03	0.27	0.77	1.00	1.043	0.67	1.559	1.10	1.00	1.892	**No**
102	16.73	1.05	0.27	0.77	1.00	1.046	0.67	1.563	1.09	1.00	1.901	**No**
103	16.90	1.06	0.28	0.78	1.00	1.049	0.67	1.568	1.09	1.00	1.911	**No**
104	17.06	1.07	0.28	0.78	1.00	1.052	0.67	1.572	1.09	1.00	1.920	**No**
105	17.22	1.08	0.29	0.79	1.00	1.055	0.67	1.576	1.09	1.00	1.930	**No**
106	17.39	1.09	0.29	0.80	1.00	1.058	0.67	1.580	1.08	1.00	1.939	**No**
107	17.55	1.10	0.30	0.80	1.00	1.060	0.67	1.584	1.08	1.00	1.948	**No**
108	17.72	1.11	0.30	0.81	1.00	1.063	0.67	1.589	1.08	1.00	1.958	**No**
109	17.88	1.12	0.31	0.82	1.00	1.066	0.67	1.593	1.08	1.00	1.966	**No**
110	18.04	1.13	0.31	0.82	1.00	1.068	0.67	1.596	1.08	1.00	1.975	**No**
111	18.21	1.15	0.32	0.83	1.00	1.071	0.67	1.600	1.06	1.00	2.016	**No**
112	18.37	1.16	0.32	0.83	1.00	1.074	0.67	1.604	1.05	1.00	1.742	**No**
113	18.54	1.17	0.33	0.84	1.00	1.076	0.67	1.608	1.03	1.00	1.378	**No**
114	18.70	1.18	0.33	0.85	1.00	1.079	0.67	1.612	1.03	1.00	1.388	**No**
115	18.86	1.19	0.34	0.85	1.00	1.081	0.67	1.616	1.04	1.00	1.649	**No**
116	19.03	1.20	0.34	0.86	1.00	1.084	0.67	1.620	1.05	1.00	1.945	**No**
117	19.19	1.21	0.35	0.86	1.00	1.086	0.67	1.623	1.04	1.00	1.791	**No**
118	19.36	1.22	0.35	0.87	1.00	1.089	0.67	1.627	1.04	1.00	1.836	**No**
119	19.52	1.23	0.36	0.88	1.00	1.091	0.67	1.630	1.05	1.00	2.071	**No**
120	19.69	1.25	0.36	0.88	1.00	1.094	0.67	1.634	1.04	1.00	1.947	**No**
121	19.85	1.26	0.37	0.89	1.00	1.096	0.67	1.638	1.03	1.00	1.480	**No**
122	20.01	1.27	0.37	0.89	1.00	1.098	0.67	1.641	1.03	1.00	1.448	**No**
123	20.18	1.28	0.38	0.90	1.00	1.101	0.67	1.644	1.03	1.00	1.490	**No**
124	20.34	1.29	0.39	0.90	1.00	1.103	0.67	1.648	1.03	1.00	1.817	**No**
125	20.51	1.30	0.39	0.91	1.00	1.105	0.67	1.651	1.03	1.00	2.125	**No**
126	20.67	1.31	0.40	0.92	1.00	1.107	0.67	1.655	1.03	1.00	1.792	**No**
127	20.83	1.32	0.40	0.92	1.00	1.110	0.67	1.658	1.02	1.00	1.559	**No**
128	21.00	1.33	0.41	0.93	1.00	1.112	0.67	1.662	1.02	1.00	1.437	**No**
129	21.16	1.34	0.41	0.93	1.00	1.114	0.67	1.665	1.01	1.00	1.262	**No**
130	21.33	1.35	0.42	0.94	1.00	1.117	0.67	1.668	1.01	1.00	1.261	**No**
131	21.49	1.36	0.42	0.94	1.00	1.119	0.67	1.672	1.01	1.00	1.257	**No**
132	21.65	1.37	0.43	0.95	1.00	1.121	0.67	1.675	1.01	1.00	1.246	**No**
133	21.82	1.38	0.43	0.95	1.00	1.123	0.67	1.678	1.01	1.00	1.210	**No**
134	21.98	1.39	0.44	0.96	1.00	1.125	0.67	1.682	1.01	1.00	1.210	**No**
135	22.15	1.41	0.44	0.96	1.00	1.127	0.67	1.685	1.01	1.00	1.405	**No**
136	22.31	1.42	0.45	0.97	1.00	1.129	0.67	1.687	1.02	1.00	2.199	**No**
137	22.47	1.43	0.45	0.98	1.00	1.131	0.67	1.690	1.02	1.00	2.090	**No**
138	22.64	1.44	0.46	0.98	1.00	1.133	0.67	1.693	1.02	1.00	2.205	**No**
139	22.80	1.45	0.46	0.99	1.00	1.135	0.67	1.695	1.02	1.00	2.212	**No**
140	22.97	1.46	0.47	1.00	1.00	1.137	0.67	1.698	1.02	1.00	2.220	**No**
141	23.13	1.47	0.47	1.00	1.00	1.138	0.67	1.701	1.02	1.00	2.227	**No**
142	23.29	1.48	0.48	1.01	1.00	1.140	0.67	1.703	1.01	1.00	2.234	**No**
143	23.46	1.50	0.48	1.01	1.00	1.142	0.67	1.706	1.01	1.00	2.242	**No**
144	23.62	1.51	0.49	1.02	1.00	1.143	0.67	1.708	1.01	1.00	2.249	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

CPT name: CPT-06 - Basic

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	**0.16**	184.84	0.00	1.22	0.26	1.70	381.34	0.00	254.00	4.000	**No**	**No**	**2.00**
2	**0.33**	130.10	0.00	1.47	0.35	1.70	184.39	0.00	184.39	4.000	**No**	**No**	**2.00**
3	**0.49**	122.37	0.00	1.52	0.39	1.70	156.26	0.00	156.26	4.000	**No**	**No**	**2.00**
4	**0.66**	87.07	6.13	1.79	0.42	1.70	138.57	0.80	139.37	4.000	**No**	**No**	**2.00**
5	**0.82**	75.00	17.63	1.93	0.39	1.70	122.33	33.29	155.62	4.000	**No**	**No**	**2.00**
6	**0.98**	62.85	28.60	2.07	0.40	1.70	97.83	53.14	150.97	4.000	**No**	**No**	**2.00**
7	**1.15**	50.87	39.57	2.21	0.40	1.70	87.42	62.69	150.10	4.000	**No**	**No**	**2.00**
8	**1.31**	40.59	51.07	2.35	0.46	1.70	58.74	62.02	120.76	4.000	**No**	**No**	**2.00**
9	**1.48**	33.30	59.98	2.46	0.49	1.70	42.24	60.55	102.79	4.000	**No**	**No**	**2.00**
10	**1.64**	27.04	69.39	2.58	0.49	1.70	39.73	0.00	39.73	4.000	**No**	**Yes**	**2.00**
11	**1.80**	24.18	75.32	2.65	0.49	1.70	39.23	0.00	39.23	4.000	**No**	**Yes**	**2.00**
12	**1.97**	22.84	80.04	2.71	0.50	1.70	37.07	0.00	37.07	4.000	**No**	**Yes**	**2.00**
13	**2.13**	21.32	85.02	2.78	0.50	1.70	35.72	0.00	35.72	4.000	**No**	**Yes**	**2.00**
14	**2.30**	19.63	89.49	2.83	0.51	1.70	31.51	0.00	31.51	4.000	**No**	**Yes**	**2.00**
15	**2.46**	18.24	92.85	2.87	0.52	1.70	27.49	0.00	27.49	4.000	**No**	**Yes**	**2.00**
16	**2.62**	16.85	96.21	2.92	0.53	1.70	25.74	0.00	25.74	4.000	**No**	**Yes**	**2.00**
17	**2.79**	16.02	97.50	2.93	0.53	1.70	25.90	0.00	25.90	4.000	**No**	**Yes**	**2.00**
18	**2.95**	15.67	97.00	2.93	0.53	1.70	24.50	0.00	24.50	4.000	**No**	**Yes**	**2.00**
19	**3.12**	15.32	97.01	2.93	0.53	1.70	24.85	0.00	24.85	4.000	**No**	**Yes**	**2.00**
20	**3.28**	14.88	97.52	2.93	0.53	1.70	24.73	0.00	24.73	4.000	**No**	**Yes**	**2.00**
21	**3.44**	14.61	97.53	2.93	0.54	1.70	22.91	0.00	22.91	4.000	**No**	**Yes**	**2.00**
22	**3.61**	14.07	98.02	2.94	0.54	1.70	22.35	0.00	22.35	4.000	**No**	**Yes**	**2.00**
23	**3.77**	13.36	98.97	2.95	0.54	1.70	22.28	0.00	22.28	4.000	**No**	**Yes**	**2.00**
24	**3.94**	12.95	98.77	2.95	0.54	1.70	20.57	0.00	20.57	4.000	**No**	**Yes**	**2.00**
25	**4.10**	12.67	98.39	2.94	0.55	1.70	18.99	0.00	18.99	4.000	**No**	**Yes**	**2.00**
26	**4.27**	12.59	97.81	2.94	0.55	1.70	19.60	0.00	19.60	4.000	**No**	**Yes**	**2.00**
27	**4.43**	13.28	95.26	2.90	0.55	1.70	20.12	0.00	20.12	4.000	**No**	**Yes**	**2.00**
28	**4.59**	14.28	93.36	2.88	0.54	1.70	21.63	0.00	21.63	4.000	**No**	**Yes**	**2.00**
29	**4.76**	15.66	91.92	2.86	0.53	1.70	26.04	0.00	26.04	4.000	**No**	**Yes**	**2.00**
30	**4.92**	17.38	90.02	2.84	0.53	1.70	27.06	0.00	27.06	4.000	**No**	**Yes**	**2.00**
31	**5.09**	19.39	87.90	2.81	0.51	1.70	30.64	0.00	30.64	4.000	**No**	**Yes**	**2.00**
32	**5.25**	22.88	81.92	2.74	0.51	1.70	33.92	0.00	33.92	4.000	**No**	**Yes**	**2.00**
33	**5.41**	23.32	83.26	2.75	0.49	1.70	37.71	0.00	37.71	4.000	**No**	**Yes**	**2.00**
34	**5.58**	24.61	83.07	2.75	0.45	1.69	53.79	0.00	53.79	4.000	**No**	**Yes**	**2.00**
35	**5.74**	30.51	76.02	2.66	0.52	1.70	30.53	0.00	30.53	4.000	**No**	**Yes**	**2.00**
36	**5.91**	39.23	67.71	2.56	0.49	1.70	41.03	0.00	41.03	4.000	**No**	**Yes**	**2.00**
37	**6.07**	45.49	64.39	2.52	0.41	1.56	74.40	0.00	74.40	4.000	**No**	**Yes**	**2.00**
38	**6.23**	53.75	59.21	2.45	0.37	1.48	93.67	74.70	168.37	4.000	**No**	**No**	**2.00**
39	**6.40**	60.52	54.77	2.40	0.38	1.48	90.57	72.15	162.72	4.000	**No**	**No**	**2.00**
40	**6.56**	61.10	53.97	2.39	0.40	1.48	84.39	70.14	154.52	4.000	**No**	**No**	**2.00**
41	**6.73**	59.05	53.96	2.39	0.40	1.47	82.48	69.61	152.09	4.000	**No**	**No**	**2.00**
42	**6.89**	56.06	53.97	2.39	0.42	1.48	74.80	67.53	142.34	4.000	**No**	**No**	**2.00**
43	**7.05**	53.07	53.64	2.38	0.41	1.45	78.08	68.29	146.37	4.000	**No**	**No**	**2.00**
44	**7.22**	51.62	52.16	2.36	0.43	1.47	69.29	65.30	134.60	4.000	**No**	**No**	**2.00**
45	**7.38**	51.12	49.60	2.33	0.45	1.47	63.19	62.56	125.76	4.000	**No**	**No**	**2.00**
46	**7.55**	49.91	46.89	2.30	0.43	1.44	70.86	63.25	134.11	4.000	**No**	**No**	**2.00**
47	**7.71**	50.13	43.91	2.26	0.44	1.44	69.28	61.19	130.47	4.000	**No**	**No**	**2.00**
48	**7.87**	50.33	42.27	2.24	0.44	1.43	68.44	59.97	128.41	4.000	**No**	**No**	**2.00**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	**8.04**	48.11	44.27	2.27	0.44	1.41	68.12	61.10	129.23	0.195	**No**	**No**	**0.22**
50	**8.20**	44.44	48.44	2.32	0.45	1.41	61.81	61.66	123.47	0.180	**No**	**No**	**0.21**
51	**8.37**	40.54	54.29	2.39	0.46	1.41	54.65	62.17	116.82	0.165	**No**	**No**	**0.19**
52	**8.53**	35.38	62.72	2.50	0.49	1.42	43.95	61.77	105.72	0.145	**No**	**No**	**0.17**
53	**8.69**	32.49	68.68	2.57	0.49	1.41	41.72	0.00	41.72	4.000	**No**	**Yes**	**2.00**
54	**8.86**	32.90	69.87	2.59	0.51	1.42	33.87	0.00	33.87	4.000	**No**	**Yes**	**2.00**
55	**9.02**	36.73	67.25	2.55	0.49	1.39	41.80	0.00	41.80	4.000	**No**	**Yes**	**2.00**
56	**9.19**	42.49	63.16	2.50	0.46	1.34	54.68	0.00	54.68	4.000	**No**	**Yes**	**2.00**
57	**9.35**	47.92	59.92	2.46	0.44	1.32	64.54	66.79	131.33	0.202	**No**	**No**	**0.21**
58	**9.51**	49.95	58.82	2.45	0.42	1.29	73.26	68.87	142.13	0.244	**No**	**No**	**0.24**
59	**9.68**	48.61	59.82	2.46	0.44	1.30	64.18	66.65	130.84	0.200	**No**	**No**	**0.21**
60	**9.84**	51.00	56.66	2.42	0.47	1.31	52.04	62.28	114.32	0.160	**No**	**No**	**0.17**
61	**10.01**	54.93	52.51	2.37	0.49	1.31	45.15	58.95	104.10	0.143	**No**	**No**	**0.16**
62	**10.17**	61.44	46.50	2.29	0.42	1.26	75.78	64.31	140.09	0.235	**No**	**No**	**0.23**
63	**10.33**	71.11	39.82	2.21	0.39	1.23	92.57	64.12	156.68	0.340	**No**	**No**	**0.29**
64	**10.50**	80.61	34.38	2.14	0.39	1.22	97.91	60.37	158.28	0.355	**No**	**No**	**0.30**
65	**10.66**	82.44	32.28	2.12	0.38	1.21	103.24	59.16	162.39	0.398	**No**	**No**	**0.32**
66	**10.83**	81.45	31.26	2.10	0.40	1.21	95.89	56.35	152.24	0.304	**No**	**No**	**0.27**
67	**10.99**	81.97	29.29	2.08	0.43	1.22	84.13	51.41	135.53	0.216	**No**	**No**	**0.21**
68	**11.15**	82.42	28.92	2.07	0.43	1.21	85.47	51.17	136.63	0.221	**No**	**No**	**0.21**
69	**11.32**	82.77	30.71	2.10	0.40	1.19	98.22	56.13	154.35	0.320	**No**	**No**	**0.27**
70	**11.48**	83.63	35.33	2.15	0.38	1.17	102.61	62.42	165.02	0.430	**No**	**No**	**0.33**
71	**11.65**	83.74	39.65	2.21	0.39	1.17	94.56	64.46	159.03	0.362	**No**	**No**	**0.29**
72	**11.81**	80.16	45.82	2.29	0.40	1.17	85.36	66.39	151.75	0.301	**No**	**No**	**0.25**
73	**11.98**	77.45	50.56	2.34	0.40	1.16	82.65	68.16	150.82	0.294	**No**	**No**	**0.25**
74	**12.14**	75.89	53.90	2.39	0.41	1.16	76.30	67.91	144.21	0.255	**No**	**No**	**0.22**
75	**12.30**	75.27	56.00	2.41	0.39	1.14	85.59	71.28	156.87	0.342	**No**	**No**	**0.27**
76	**12.47**	76.90	57.12	2.43	0.40	1.14	83.72	71.18	154.90	0.325	**No**	**No**	**0.26**
77	**12.63**	80.92	56.94	2.42	0.40	1.14	79.71	70.01	149.72	0.287	**No**	**No**	**0.24**
78	**12.80**	83.15	58.43	2.44	0.39	1.12	88.57	73.00	161.57	0.389	**No**	**No**	**0.29**
79	**12.96**	86.69	59.19	2.45	0.37	1.11	94.42	74.90	169.33	0.493	**No**	**No**	**0.35**
80	**13.12**	90.09	59.68	2.46	0.37	1.11	94.47	75.09	169.55	0.497	**No**	**No**	**0.35**
81	**13.29**	94.79	58.43	2.44	0.36	1.10	99.19	75.96	175.15	0.604	**No**	**No**	**0.40**
82	**13.45**	100.82	56.03	2.41	0.37	1.10	94.60	73.76	168.37	0.478	**No**	**No**	**0.33**
83	**13.62**	108.91	52.24	2.37	0.35	1.08	109.65	76.19	185.84	0.930	**No**	**No**	**0.53**
84	**13.78**	112.42	48.76	2.32	0.33	1.08	121.90	77.59	199.49	1.838	**No**	**No**	**1.04**
85	**13.94**	113.85	44.91	2.27	0.32	1.07	131.94	77.69	209.63	3.405	**No**	**No**	**1.91**
86	**14.11**	109.84	43.47	2.26	0.35	1.07	114.30	72.21	186.51	0.958	**No**	**No**	**0.53**
87	**14.27**	101.30	44.45	2.27	0.37	1.07	99.61	69.18	168.79	0.484	**No**	**No**	**0.33**
88	**14.44**	87.12	49.27	2.33	0.39	1.07	87.83	68.90	156.73	0.340	**No**	**No**	**0.25**
89	**14.60**	76.52	55.53	2.41	0.41	1.07	77.85	68.97	146.83	0.269	**No**	**No**	**0.21**
90	**14.76**	71.90	60.72	2.47	0.44	1.07	60.35	65.85	126.19	0.187	**No**	**No**	**0.16**
91	**14.93**	70.85	65.02	2.53	0.44	1.06	60.24	0.00	60.24	4.000	**No**	**Yes**	**2.00**
92	**15.09**	72.01	67.62	2.56	0.41	1.05	74.90	0.00	74.90	4.000	**No**	**Yes**	**2.00**
93	**15.26**	78.60	66.40	2.54	0.40	1.05	80.72	0.00	80.72	4.000	**No**	**Yes**	**2.00**
94	**15.42**	85.35	65.15	2.53	0.40	1.04	81.64	0.00	81.64	4.000	**No**	**Yes**	**2.00**
95	**15.58**	90.53	64.91	2.52	0.38	1.03	90.69	0.00	90.69	4.000	**No**	**Yes**	**2.00**
96	**15.75**	95.33	63.98	2.51	0.38	1.03	91.27	0.00	91.27	4.000	**No**	**Yes**	**2.00**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	**15.91**	100.90	62.54	2.49	0.36	1.02	98.04	77.05	175.09	0.602	**No**	**No**	**0.36**
98	**16.08**	117.89	56.35	2.42	0.36	1.02	101.88	75.90	177.77	0.666	**No**	**No**	**0.39**
99	**16.24**	140.57	50.99	2.35	0.36	1.02	106.42	74.70	181.12	0.761	**No**	**No**	**0.43**
100	**16.40**	161.49	48.08	2.31	0.26	1.01	169.47	89.60	254.00	4.000	**No**	**No**	**2.00**
101	**16.57**	178.72	47.27	2.30	0.26	1.01	196.95	96.15	254.00	4.000	**No**	**No**	**2.00**
102	**16.73**	193.41	47.30	2.30	0.26	1.00	195.13	95.71	254.00	4.000	**No**	**No**	**2.00**
103	**16.90**	191.80	50.66	2.35	0.26	1.00	181.31	94.46	254.00	4.000	**No**	**No**	**2.00**
104	**17.06**	183.57	54.23	2.39	0.26	1.00	173.71	94.55	254.00	4.000	**No**	**No**	**2.00**
105	**17.22**	177.78	55.71	2.41	0.27	0.99	159.46	91.43	250.89	4.000	**No**	**No**	**2.00**
106	**17.39**	173.61	55.87	2.41	0.27	0.99	155.54	90.44	245.98	4.000	**No**	**No**	**2.00**
107	**17.55**	169.84	55.14	2.40	0.26	0.99	165.27	92.74	254.00	4.000	**No**	**No**	**2.00**
108	**17.72**	166.68	53.67	2.38	0.27	0.99	159.32	90.34	249.65	4.000	**No**	**No**	**2.00**
109	**17.88**	157.09	52.98	2.37	0.28	0.98	153.69	88.44	242.13	4.000	**No**	**No**	**2.00**
110	**18.04**	143.09	53.73	2.38	0.29	0.98	142.38	85.77	228.15	4.000	**No**	**No**	**2.00**
111	**18.21**	124.95	56.70	2.42	0.35	0.97	108.44	77.85	186.29	0.948	**No**	**No**	**0.47**
112	**18.37**	108.07	60.81	2.47	0.37	0.97	97.64	76.37	174.01	0.579	**No**	**No**	**0.33**
113	**18.54**	97.52	64.04	2.51	0.41	0.96	72.75	0.00	72.75	4.000	**No**	**Yes**	**2.00**
114	**18.70**	96.86	64.57	2.52	0.41	0.96	73.19	0.00	73.19	4.000	**No**	**Yes**	**2.00**
115	**18.86**	97.54	64.81	2.52	0.38	0.96	91.40	0.00	91.40	4.000	**No**	**Yes**	**2.00**
116	**19.03**	104.03	62.28	2.49	0.35	0.96	103.62	78.55	182.17	0.794	**No**	**No**	**0.41**
117	**19.19**	113.58	58.05	2.44	0.36	0.95	99.10	75.79	174.89	0.598	**No**	**No**	**0.33**
118	**19.36**	116.48	56.74	2.42	0.36	0.95	101.00	75.81	176.81	0.642	**No**	**No**	**0.35**
119	**19.52**	111.40	58.72	2.45	0.33	0.95	115.57	80.63	196.20	1.537	**No**	**No**	**0.74**
120	**19.69**	106.54	61.16	2.48	0.36	0.94	103.09	78.02	181.12	0.760	**No**	**No**	**0.39**
121	**19.85**	102.01	63.31	2.50	0.40	0.93	78.75	0.00	78.75	4.000	**No**	**Yes**	**2.00**
122	**20.01**	98.61	64.61	2.52	0.41	0.93	75.40	0.00	75.40	4.000	**No**	**Yes**	**2.00**
123	**20.18**	100.39	62.83	2.50	0.40	0.93	78.93	71.72	150.65	0.293	**No**	**No**	**0.20**
124	**20.34**	105.10	57.41	2.43	0.37	0.93	98.57	75.40	173.96	0.578	**No**	**No**	**0.32**
125	**20.51**	107.39	53.43	2.38	0.35	0.93	109.99	76.84	186.83	0.972	**No**	**No**	**0.46**
126	**20.67**	106.18	51.20	2.35	0.37	0.93	99.14	72.87	172.01	0.540	**No**	**No**	**0.30**
127	**20.83**	94.45	54.55	2.39	0.39	0.92	84.94	70.52	155.46	0.330	**No**	**No**	**0.21**
128	**21.00**	79.73	60.56	2.47	0.42	0.92	72.76	69.29	142.05	0.244	**No**	**No**	**0.17**
129	**21.16**	66.72	69.07	2.58	0.48	0.90	45.42	0.00	45.42	4.000	**No**	**Yes**	**2.00**
130	**21.33**	55.87	76.59	2.67	0.48	0.90	43.38	0.00	43.38	4.000	**No**	**Yes**	**2.00**
131	**21.49**	44.96	86.06	2.79	0.49	0.90	40.65	0.00	40.65	4.000	**No**	**Yes**	**2.00**
132	**21.65**	40.16	92.55	2.87	0.50	0.90	36.52	0.00	36.52	4.000	**No**	**Yes**	**2.00**
133	**21.82**	44.91	88.22	2.82	0.53	0.89	24.61	0.00	24.61	4.000	**No**	**Yes**	**2.00**
134	**21.98**	61.09	77.67	2.68	0.54	0.88	24.31	0.00	24.31	4.000	**No**	**Yes**	**2.00**
135	**22.15**	76.40	74.02	2.64	0.43	0.90	63.77	0.00	63.77	4.000	**No**	**Yes**	**2.00**
136	**22.31**	100.37	68.52	2.57	0.34	0.92	112.22	0.00	112.22	4.000	**No**	**Yes**	**1.82**
137	**22.47**	130.80	62.43	2.49	0.35	0.92	103.73	78.63	182.35	0.800	**No**	**No**	**0.38**
138	**22.64**	153.65	60.98	2.47	0.31	0.93	130.60	85.71	216.31	4.000	**No**	**No**	**1.81**
139	**22.80**	167.80	62.01	2.49	0.26	0.94	160.23	94.48	254.00	4.000	**No**	**No**	**1.81**
140	**22.97**	210.59	100.00	4.06	0.26	0.93	166.78	0.00	166.78	4.000	**No**	**Yes**	**1.80**
141	**23.13**	282.08	100.00	4.06	0.26	0.93	175.87	0.00	175.87	4.000	**No**	**Yes**	**1.80**
142	**23.29**	351.51	100.00	4.06	0.26	0.93	293.76	0.00	293.76	4.000	**No**	**Yes**	**1.79**
143	**23.46**	415.07	100.00	4.06	0.26	0.93	445.72	0.00	445.72	4.000	**No**	**Yes**	**1.78**
144	**23.62**	485.21	100.00	4.06	0.26	0.93	464.29	0.00	464.29	4.000	**No**	**Yes**	**1.78**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.16	2.00	0.00	9.98	0.17	0.00	0.33	2.00	0.00	9.95	0.17	0.00
0.49	2.00	0.00	9.93	0.16	0.00	0.66	2.00	0.00	9.90	0.17	0.00
0.82	2.00	0.00	9.88	0.16	0.00	0.98	2.00	0.00	9.85	0.16	0.00
1.15	2.00	0.00	9.82	0.17	0.00	1.31	2.00	0.00	9.80	0.16	0.00
1.48	2.00	0.00	9.77	0.17	0.00	1.64	2.00	0.00	9.75	0.16	0.00
1.80	2.00	0.00	9.73	0.16	0.00	1.97	2.00	0.00	9.70	0.17	0.00
2.13	2.00	0.00	9.68	0.16	0.00	2.30	2.00	0.00	9.65	0.17	0.00
2.46	2.00	0.00	9.63	0.16	0.00	2.62	2.00	0.00	9.60	0.16	0.00
2.79	2.00	0.00	9.57	0.17	0.00	2.95	2.00	0.00	9.55	0.16	0.00
3.12	2.00	0.00	9.52	0.17	0.00	3.28	2.00	0.00	9.50	0.16	0.00
3.44	2.00	0.00	9.48	0.16	0.00	3.61	2.00	0.00	9.45	0.17	0.00
3.77	2.00	0.00	9.43	0.16	0.00	3.94	2.00	0.00	9.40	0.17	0.00
4.10	2.00	0.00	9.38	0.16	0.00	4.27	2.00	0.00	9.35	0.17	0.00
4.43	2.00	0.00	9.32	0.16	0.00	4.59	2.00	0.00	9.30	0.16	0.00
4.76	2.00	0.00	9.27	0.17	0.00	4.92	2.00	0.00	9.25	0.16	0.00
5.09	2.00	0.00	9.22	0.17	0.00	5.25	2.00	0.00	9.20	0.16	0.00
5.41	2.00	0.00	9.18	0.16	0.00	5.58	2.00	0.00	9.15	0.17	0.00
5.74	2.00	0.00	9.13	0.16	0.00	5.91	2.00	0.00	9.10	0.17	0.00
6.07	2.00	0.00	9.07	0.16	0.00	6.23	2.00	0.00	9.05	0.16	0.00
6.40	2.00	0.00	9.02	0.17	0.00	6.56	2.00	0.00	9.00	0.16	0.00
6.73	2.00	0.00	8.97	0.17	0.00	6.89	2.00	0.00	8.95	0.16	0.00
7.05	2.00	0.00	8.93	0.16	0.00	7.22	2.00	0.00	8.90	0.17	0.00
7.38	2.00	0.00	8.88	0.16	0.00	7.55	2.00	0.00	8.85	0.17	0.00
7.71	2.00	0.00	8.82	0.16	0.00	7.87	2.00	0.00	8.80	0.16	0.00
8.04	0.22	0.78	8.77	0.17	0.35	8.20	0.21	0.79	8.75	0.16	0.34
8.37	0.19	0.81	8.72	0.17	0.36	8.53	0.17	0.83	8.70	0.16	0.35
8.69	2.00	0.00	8.68	0.16	0.00	8.86	2.00	0.00	8.65	0.17	0.00
9.02	2.00	0.00	8.63	0.16	0.00	9.19	2.00	0.00	8.60	0.17	0.00
9.35	0.21	0.79	8.58	0.16	0.33	9.51	0.24	0.76	8.55	0.16	0.32
9.68	0.21	0.79	8.52	0.17	0.35	9.84	0.17	0.83	8.50	0.16	0.34
10.01	0.16	0.84	8.47	0.17	0.37	10.17	0.23	0.77	8.45	0.16	0.32
10.33	0.29	0.71	8.43	0.16	0.29	10.50	0.30	0.70	8.40	0.17	0.30
10.66	0.32	0.68	8.38	0.16	0.28	10.83	0.27	0.73	8.35	0.17	0.32
10.99	0.21	0.79	8.33	0.16	0.32	11.15	0.21	0.79	8.30	0.16	0.32
11.32	0.27	0.73	8.27	0.17	0.31	11.48	0.33	0.67	8.25	0.16	0.27
11.65	0.29	0.71	8.22	0.17	0.30	11.81	0.25	0.75	8.20	0.16	0.30
11.98	0.25	0.75	8.17	0.17	0.32	12.14	0.22	0.78	8.15	0.16	0.31
12.30	0.27	0.73	8.13	0.16	0.29	12.47	0.26	0.74	8.10	0.17	0.31
12.63	0.24	0.76	8.08	0.16	0.30	12.80	0.29	0.71	8.05	0.17	0.29
12.96	0.35	0.65	8.02	0.16	0.26	13.12	0.35	0.65	8.00	0.16	0.25
13.29	0.40	0.60	7.97	0.17	0.25	13.45	0.33	0.67	7.95	0.16	0.26
13.62	0.53	0.47	7.92	0.17	0.19	13.78	1.04	0.00	7.90	0.16	0.00
13.94	1.91	0.00	7.88	0.16	0.00	14.11	0.53	0.47	7.85	0.17	0.19
14.27	0.33	0.67	7.83	0.16	0.26	14.44	0.25	0.75	7.80	0.17	0.30
14.60	0.21	0.79	7.77	0.16	0.30	14.76	0.16	0.84	7.75	0.16	0.32
14.93	2.00	0.00	7.72	0.17	0.00	15.09	2.00	0.00	7.70	0.16	0.00
15.26	2.00	0.00	7.67	0.17	0.00	15.42	2.00	0.00	7.65	0.16	0.00
15.58	2.00	0.00	7.63	0.16	0.00	15.75	2.00	0.00	7.60	0.17	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
15.91	0.36	0.64	7.58	0.16	0.23	16.08	0.39	0.61	7.55	0.17	0.24
16.24	0.43	0.57	7.53	0.16	0.21	16.40	2.00	0.00	7.50	0.16	0.00
16.57	2.00	0.00	7.47	0.17	0.00	16.73	2.00	0.00	7.45	0.16	0.00
16.90	2.00	0.00	7.42	0.17	0.00	17.06	2.00	0.00	7.40	0.16	0.00
17.22	2.00	0.00	7.38	0.16	0.00	17.39	2.00	0.00	7.35	0.17	0.00
17.55	2.00	0.00	7.33	0.16	0.00	17.72	2.00	0.00	7.30	0.17	0.00
17.88	2.00	0.00	7.28	0.16	0.00	18.04	2.00	0.00	7.25	0.16	0.00
18.21	0.47	0.53	7.22	0.17	0.20	18.37	0.33	0.67	7.20	0.16	0.23
18.54	2.00	0.00	7.17	0.17	0.00	18.70	2.00	0.00	7.15	0.16	0.00
18.86	2.00	0.00	7.13	0.16	0.00	19.03	0.41	0.59	7.10	0.17	0.22
19.19	0.33	0.67	7.08	0.16	0.23	19.36	0.35	0.65	7.05	0.17	0.24
19.52	0.74	0.26	7.03	0.16	0.09	19.69	0.39	0.61	7.00	0.17	0.22
19.85	2.00	0.00	6.97	0.16	0.00	20.01	2.00	0.00	6.95	0.16	0.00
20.18	0.20	0.80	6.92	0.17	0.29	20.34	0.32	0.68	6.90	0.16	0.23
20.51	0.46	0.54	6.87	0.17	0.19	20.67	0.30	0.70	6.85	0.16	0.23
20.83	0.21	0.79	6.83	0.16	0.26	21.00	0.17	0.83	6.80	0.17	0.29
21.16	2.00	0.00	6.78	0.16	0.00	21.33	2.00	0.00	6.75	0.17	0.00
21.49	2.00	0.00	6.72	0.16	0.00	21.65	2.00	0.00	6.70	0.16	0.00
21.82	2.00	0.00	6.67	0.17	0.00	21.98	2.00	0.00	6.65	0.16	0.00
22.15	2.00	0.00	6.62	0.17	0.00	22.31	1.82	0.00	6.60	0.16	0.00
22.47	0.38	0.62	6.58	0.16	0.20	22.64	1.81	0.00	6.55	0.17	0.00
22.80	1.81	0.00	6.53	0.16	0.00	22.97	1.80	0.00	6.50	0.17	0.00
23.13	1.80	0.00	6.47	0.16	0.00	23.29	1.79	0.00	6.45	0.16	0.00
23.46	1.78	0.00	6.42	0.17	0.00	23.62	1.78	0.00	6.40	0.16	0.00

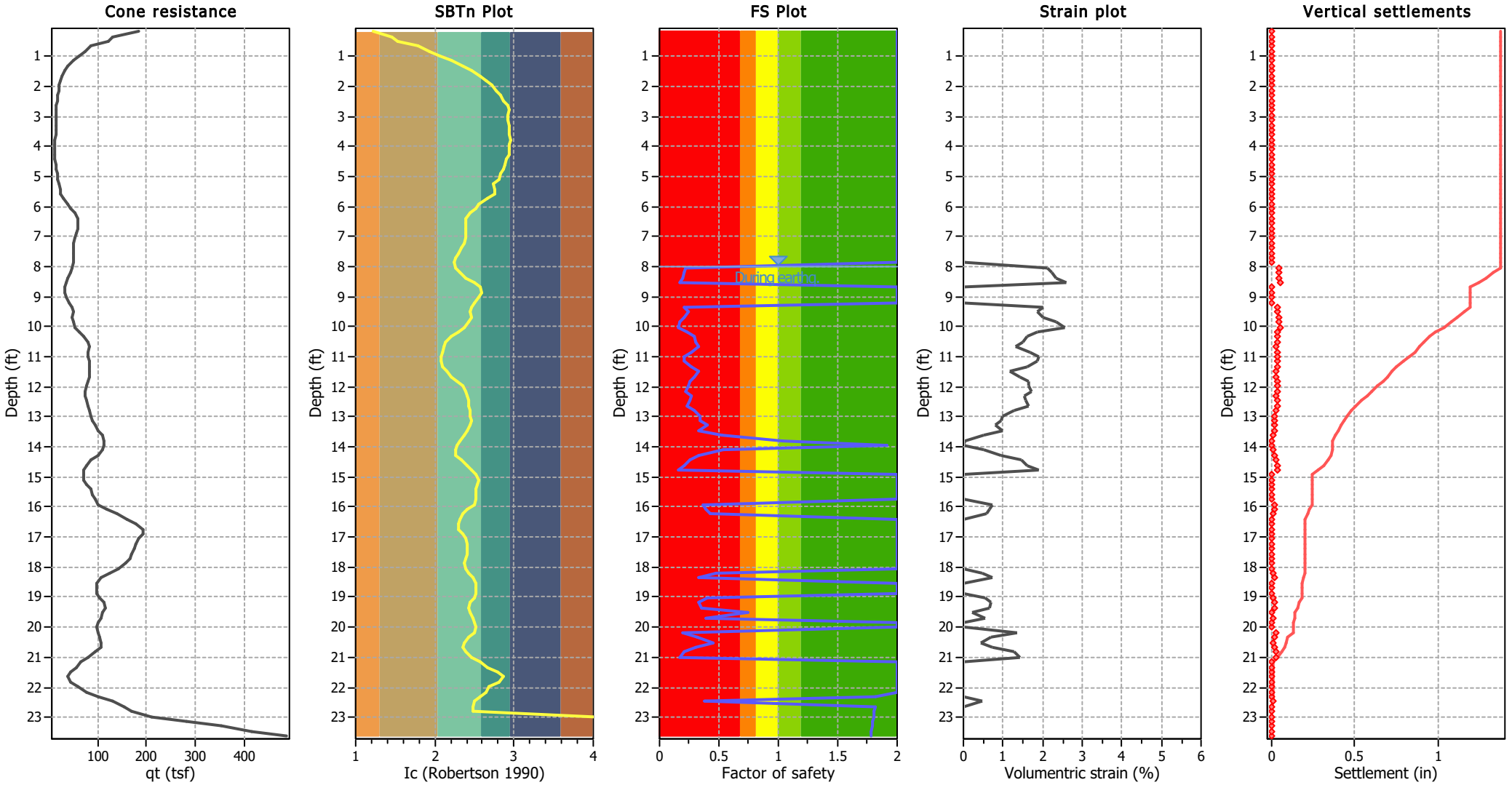
Overall liquefaction potential: 14.65

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

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

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
8.04	129.23	0.22	2.12	0.86	0.04	8.20	123.47	0.21	2.22	0.86	0.04
8.37	116.82	0.19	2.34	0.86	0.05	8.53	105.72	0.17	2.60	0.86	0.05
8.69	41.72	2.00	0.00	0.85	0.00	8.86	33.87	2.00	0.00	0.85	0.00
9.02	41.80	2.00	0.00	0.85	0.00	9.19	54.68	2.00	0.00	0.84	0.00
9.35	131.33	0.21	2.03	0.84	0.04	9.51	142.13	0.24	1.85	0.84	0.04
9.68	130.84	0.21	2.02	0.84	0.04	9.84	114.32	0.17	2.33	0.83	0.04
10.01	104.10	0.16	2.56	0.83	0.05	10.17	140.09	0.23	1.86	0.83	0.04
10.33	156.68	0.29	1.59	0.82	0.03	10.50	158.28	0.30	1.50	0.82	0.03
10.66	162.39	0.32	1.30	0.82	0.03	10.83	152.24	0.27	1.67	0.82	0.03
10.99	135.53	0.21	1.89	0.81	0.04	11.15	136.63	0.21	1.87	0.81	0.04
11.32	154.35	0.27	1.62	0.81	0.03	11.48	165.02	0.33	1.17	0.81	0.02
11.65	159.03	0.29	1.43	0.80	0.03	11.81	151.75	0.25	1.64	0.80	0.03
11.98	150.82	0.25	1.64	0.80	0.03	12.14	144.21	0.22	1.72	0.79	0.03
12.30	156.87	0.27	1.52	0.79	0.03	12.47	154.90	0.26	1.58	0.79	0.03
12.63	149.72	0.24	1.63	0.79	0.03	12.80	161.57	0.29	1.28	0.78	0.03
12.96	169.33	0.35	0.98	0.78	0.02	13.12	169.55	0.35	0.97	0.78	0.02
13.29	175.15	0.40	0.79	0.77	0.02	13.45	168.37	0.33	1.00	0.77	0.02
13.62	185.84	0.53	0.52	0.77	0.01	13.78	199.49	1.04	0.04	0.77	0.00
13.94	209.63	1.91	0.00	0.76	0.00	14.11	186.51	0.53	0.51	0.76	0.01
14.27	168.79	0.33	0.97	0.76	0.02	14.44	156.73	0.25	1.46	0.76	0.03
14.60	146.83	0.21	1.60	0.75	0.03	14.76	126.19	0.16	1.89	0.75	0.04
14.93	60.24	2.00	0.00	0.75	0.00	15.09	74.90	2.00	0.00	0.74	0.00
15.26	80.72	2.00	0.00	0.74	0.00	15.42	81.64	2.00	0.00	0.74	0.00
15.58	90.69	2.00	0.00	0.74	0.00	15.75	91.27	2.00	0.00	0.73	0.00
15.91	175.09	0.36	0.75	0.73	0.01	16.08	177.77	0.39	0.68	0.73	0.01
16.24	181.12	0.43	0.60	0.72	0.01	16.40	254.00	2.00	0.00	0.72	0.00
16.57	254.00	2.00	0.00	0.72	0.00	16.73	254.00	2.00	0.00	0.72	0.00
16.90	254.00	2.00	0.00	0.71	0.00	17.06	254.00	2.00	0.00	0.71	0.00
17.22	250.89	2.00	0.00	0.71	0.00	17.39	245.98	2.00	0.00	0.71	0.00
17.55	254.00	2.00	0.00	0.70	0.00	17.72	249.65	2.00	0.00	0.70	0.00
17.88	242.13	2.00	0.00	0.70	0.00	18.04	228.15	2.00	0.00	0.69	0.00
18.21	186.29	0.47	0.47	0.69	0.01	18.37	174.01	0.33	0.73	0.69	0.01
18.54	72.75	2.00	0.00	0.69	0.00	18.70	73.19	2.00	0.00	0.68	0.00
18.86	91.40	2.00	0.00	0.68	0.00	19.03	182.17	0.41	0.54	0.68	0.01
19.19	174.89	0.33	0.69	0.67	0.01	19.36	176.81	0.35	0.65	0.67	0.01
19.52	196.20	0.74	0.22	0.67	0.00	19.69	181.12	0.39	0.55	0.67	0.01
19.85	78.75	2.00	0.00	0.66	0.00	20.01	75.40	2.00	0.00	0.66	0.00
20.18	150.65	0.20	1.36	0.66	0.03	20.34	173.96	0.32	0.70	0.66	0.01
20.51	186.83	0.46	0.43	0.65	0.01	20.67	172.01	0.30	0.74	0.65	0.01
20.83	155.46	0.21	1.29	0.65	0.02	21.00	142.05	0.17	1.42	0.64	0.03
21.16	45.42	2.00	0.00	0.64	0.00	21.33	43.38	2.00	0.00	0.64	0.00
21.49	40.65	2.00	0.00	0.64	0.00	21.65	36.52	2.00	0.00	0.63	0.00
21.82	24.61	2.00	0.00	0.63	0.00	21.98	24.31	2.00	0.00	0.63	0.00
22.15	63.77	2.00	0.00	0.62	0.00	22.31	112.22	1.82	0.00	0.62	0.00
22.47	182.35	0.38	0.49	0.62	0.01	22.64	216.31	1.81	0.00	0.62	0.00
22.80	254.00	1.81	0.00	0.61	0.00	22.97	166.78	1.80	0.00	0.61	0.00
23.13	175.87	1.80	0.00	0.61	0.00	23.29	293.76	1.79	0.00	0.61	0.00
23.46	445.72	1.78	0.00	0.60	0.00	23.62	464.29	1.78	0.00	0.60	0.00

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)

Total estimated settlement: 1.38

Abbreviations

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

:: Strength loss calculation Idriss & Boulanger (2008) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	184.84	314.43	1.00	314.43	1.22	N/A	N/A
0.33	130.10	221.28	1.00	221.28	1.47	N/A	N/A
0.49	122.37	208.12	1.00	208.12	1.52	N/A	N/A
0.66	87.07	148.05	1.10	162.69	1.79	N/A	N/A
0.82	75.00	127.49	1.22	155.72	1.93	N/A	N/A
0.98	62.85	106.82	1.40	149.87	2.07	N/A	N/A
1.15	50.87	86.42	1.68	145.56	2.21	N/A	N/A
1.31	40.59	68.92	2.12	146.28	2.35	N/A	N/A
1.48	33.30	56.50	2.58	146.04	2.46	N/A	N/A
1.64	27.04	45.83	3.21	146.93	2.58	N/A	N/A
1.80	24.18	40.95	3.67	150.44	2.65	N/A	N/A
1.97	22.84	38.66	4.09	158.19	2.71	N/A	N/A
2.13	21.32	36.05	4.58	165.02	2.78	N/A	N/A
2.30	19.63	33.17	5.06	167.67	2.83	N/A	N/A
2.46	18.24	30.78	5.44	167.47	2.87	N/A	N/A
2.62	16.85	28.39	5.85	166.01	2.92	N/A	N/A
2.79	16.02	26.96	6.01	162.06	2.93	N/A	N/A
2.95	15.67	26.36	5.95	156.79	2.93	N/A	N/A
3.12	15.32	25.75	5.95	153.15	2.93	N/A	N/A
3.28	14.88	24.98	6.01	150.24	2.93	N/A	N/A
3.44	14.61	24.50	6.01	147.35	2.93	N/A	N/A
3.61	14.07	23.58	6.08	143.28	2.94	N/A	N/A
3.77	13.36	22.35	6.20	138.55	2.95	N/A	N/A
3.94	12.95	21.63	6.17	133.55	2.95	N/A	N/A
4.10	12.67	21.14	6.13	129.51	2.94	N/A	N/A
4.27	12.59	20.99	6.05	127.00	2.94	N/A	N/A
4.43	13.28	22.14	5.73	126.86	2.90	N/A	N/A
4.59	14.28	23.83	5.50	131.08	2.88	N/A	N/A
4.76	15.66	26.16	5.33	139.47	2.86	N/A	N/A
4.92	17.38	29.08	5.11	148.70	2.84	N/A	N/A
5.09	19.39	32.48	4.88	158.52	2.81	N/A	N/A
5.25	22.88	38.40	4.27	163.94	2.74	N/A	N/A
5.41	23.32	39.12	4.40	172.14	2.75	N/A	N/A
5.58	24.61	41.30	4.38	181.00	2.75	N/A	N/A
5.74	30.51	51.33	3.73	191.64	2.66	N/A	N/A
5.91	39.23	66.13	3.08	203.98	2.56	N/A	N/A
6.07	45.49	76.77	2.86	219.36	2.52	N/A	N/A
6.23	53.75	90.81	2.54	230.70	2.45	N/A	N/A
6.40	60.52	102.30	2.30	235.37	2.40	N/A	N/A
6.56	61.10	103.27	2.26	233.44	2.39	N/A	N/A
6.73	59.05	99.77	2.26	225.49	2.39	N/A	N/A
6.89	56.06	94.67	2.26	213.99	2.39	N/A	N/A
7.05	53.07	89.56	2.24	201.01	2.38	N/A	N/A
7.22	51.62	87.07	2.17	189.23	2.36	N/A	N/A
7.38	51.12	86.21	2.06	177.37	2.33	N/A	N/A
7.55	49.91	84.14	1.94	163.57	2.30	N/A	N/A
7.71	50.13	84.48	1.83	154.68	2.26	N/A	N/A
7.87	50.33	84.46	1.77	149.74	2.24	N/A	N/A

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	48.11	80.05	1.84	147.61	2.27	0.14	0.80
8.20	44.44	73.93	2.01	148.44	2.32	0.13	0.79
8.37	40.54	67.72	2.28	154.16	2.39	0.12	0.77
8.53	35.38	59.31	2.75	163.14	2.50	0.11	0.76
8.69	32.49	54.38	3.15	171.50	2.57	0.11	4.36
8.86	32.90	55.05	3.24	178.45	2.59	0.10	4.33
9.02	36.73	60.18	3.05	183.66	2.55	0.11	4.75
9.19	42.49	67.77	2.78	188.33	2.50	0.13	5.40
9.35	47.92	74.71	2.58	192.83	2.46	0.14	0.79
9.51	49.95	76.52	2.52	192.66	2.45	0.16	0.79
9.68	48.61	73.57	2.58	189.47	2.46	0.14	0.79
9.84	51.00	75.52	2.40	181.19	2.42	0.12	0.79
10.01	54.93	79.38	2.19	173.84	2.37	0.11	0.80
10.17	61.44	86.42	1.93	166.70	2.29	0.15	0.81
10.33	71.11	97.33	1.69	164.70	2.21	0.18	0.82
10.50	80.61	107.69	1.54	165.46	2.14	0.19	0.84
10.66	82.44	108.44	1.48	160.98	2.12	0.20	0.84
10.83	81.45	105.71	1.46	154.41	2.10	0.17	0.84
10.99	81.97	104.86	1.42	148.63	2.08	0.14	0.83
11.15	82.42	104.32	1.41	147.05	2.07	0.14	0.83
11.32	82.77	104.07	1.45	150.72	2.10	0.18	0.83
11.48	83.63	105.09	1.56	164.10	2.15	0.20	0.83
11.65	83.74	104.97	1.69	177.07	2.21	0.19	0.83
11.81	80.16	100.54	1.90	191.25	2.29	0.18	0.83
11.98	77.45	96.84	2.10	203.34	2.34	0.18	0.82
12.14	75.89	94.37	2.26	212.99	2.39	0.16	0.82
12.30	75.27	92.88	2.36	219.57	2.41	0.19	0.82
12.47	76.90	93.97	2.42	227.75	2.43	0.19	0.82
12.63	80.92	97.81	2.41	236.12	2.42	0.18	0.82
12.80	83.15	99.57	2.50	248.53	2.44	0.20	0.83
12.96	86.69	102.82	2.54	261.07	2.45	0.23	0.83
13.12	90.09	105.80	2.57	271.58	2.46	0.23	0.84
13.29	94.79	109.91	2.50	274.34	2.44	0.25	0.84
13.45	100.82	115.40	2.37	273.00	2.41	0.22	0.85
13.62	108.91	122.85	2.18	267.43	2.37	0.28	0.86
13.78	112.42	125.11	2.02	252.90	2.32	0.35	0.86
13.94	113.85	125.03	1.87	233.51	2.27	0.43	0.86
14.11	109.84	119.26	1.81	216.43	2.26	0.28	0.85
14.27	101.30	109.02	1.85	201.75	2.27	0.22	0.84
14.44	87.12	93.11	2.04	190.22	2.33	0.19	0.82
14.60	76.52	81.32	2.34	190.26	2.41	0.17	0.80
14.76	71.90	75.91	2.63	199.51	2.47	0.14	0.79
14.93	70.85	74.24	2.90	215.26	2.53	0.14	5.41
15.09	72.01	74.86	3.08	230.40	2.56	0.17	5.44
15.26	78.60	80.89	2.99	242.06	2.54	0.19	5.87
15.42	85.35	87.02	2.91	253.04	2.53	0.19	6.31
15.58	90.53	91.47	2.89	264.53	2.52	0.22	6.62
15.75	95.33	95.36	2.83	269.98	2.51	0.22	6.89

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	100.90	99.99	2.74	273.93	2.49	0.25	0.83
16.08	117.89	115.65	2.38	275.58	2.42	0.25	0.85
16.24	140.57	136.70	2.12	289.71	2.35	0.26	0.87
16.40	161.49	155.77	1.99	310.41	2.31	0.89	0.89
16.57	178.72	170.96	1.96	335.04	2.30	0.91	0.91
16.73	193.41	183.57	1.96	359.99	2.30	0.92	0.92
16.90	191.80	180.46	2.10	379.76	2.35	0.91	0.91
17.06	183.57	171.23	2.27	389.27	2.39	0.91	0.91
17.22	177.78	164.39	2.35	386.12	2.41	0.90	0.90
17.39	173.61	159.08	2.36	375.00	2.41	0.89	0.89
17.55	169.84	154.34	2.32	358.03	2.40	0.89	0.89
17.72	166.68	150.19	2.25	337.33	2.38	0.89	0.89
17.88	157.09	140.39	2.21	310.58	2.37	0.88	0.88
18.04	143.09	126.74	2.25	284.99	2.38	0.66	0.86
18.21	124.95	109.50	2.40	262.95	2.42	0.29	0.84
18.37	108.07	93.66	2.63	246.66	2.47	0.24	0.82
18.54	97.52	83.58	2.83	236.94	2.51	0.17	5.89
18.70	96.86	82.32	2.87	236.25	2.52	0.17	5.79
18.86	97.54	82.23	2.89	237.26	2.52	0.22	5.78
19.03	104.03	87.16	2.72	237.39	2.49	0.28	0.81
19.19	113.58	94.78	2.47	234.57	2.44	0.24	0.82
19.36	116.48	96.54	2.40	232.03	2.42	0.25	0.82
19.52	111.40	91.47	2.51	229.82	2.45	0.34	0.81
19.69	106.54	86.58	2.65	229.84	2.48	0.27	0.81
19.85	102.01	82.08	2.79	228.88	2.50	0.18	5.73
20.01	98.61	78.65	2.87	225.91	2.52	0.17	5.49
20.18	100.39	79.87	2.76	220.24	2.50	0.18	0.80
20.34	105.10	83.74	2.44	204.27	2.43	0.24	0.80
20.51	107.39	85.56	2.23	191.12	2.38	0.29	0.81
20.67	106.18	84.45	2.13	179.78	2.35	0.23	0.80
20.83	94.45	74.50	2.29	170.55	2.39	0.19	0.79
21.00	79.73	62.11	2.62	162.65	2.47	0.16	0.76
21.16	66.72	51.17	3.18	162.85	2.58	0.12	3.57
21.33	55.87	42.19	3.78	159.56	2.67	0.12	2.97
21.49	44.96	33.28	4.69	155.95	2.79	0.12	2.36
21.65	40.16	29.33	5.40	158.52	2.87	0.11	2.10
21.82	44.91	32.89	4.92	161.67	2.82	0.09	2.34
21.98	61.09	45.45	3.88	176.22	2.68	0.09	3.20
22.15	76.40	57.09	3.57	203.58	2.64	0.15	4.00
22.31	100.37	75.50	3.14	237.25	2.57	0.35	5.26
22.47	130.80	99.01	2.73	270.56	2.49	0.28	0.83
22.64	153.65	116.21	2.64	307.24	2.47	0.52	0.85
22.80	167.80	126.36	2.71	342.04	2.49	0.86	0.86
22.97	210.59	152.69	26.61	4062.40	4.06	0.89	10.91
23.13	282.08	203.99	26.61	5427.17	4.06	0.93	14.57
23.29	351.51	253.35	26.61	6740.51	4.06	0.97	18.10
23.46	415.07	297.97	26.61	7927.67	4.06	0.99	21.28
23.62	485.21	347.00	26.61	9232.23	4.06	1.02	24.79

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

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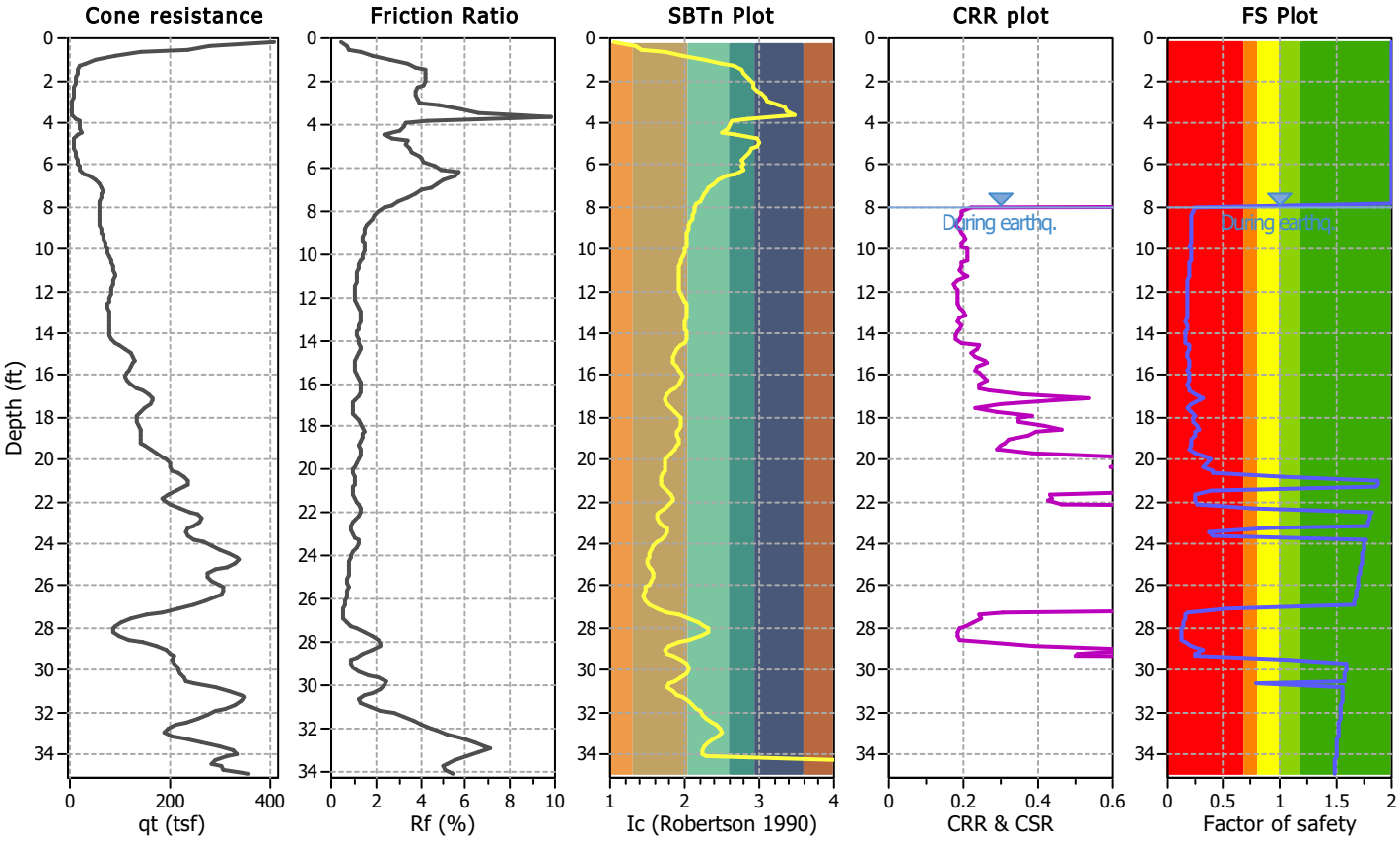
LIQUEFACTION ANALYSIS REPORT

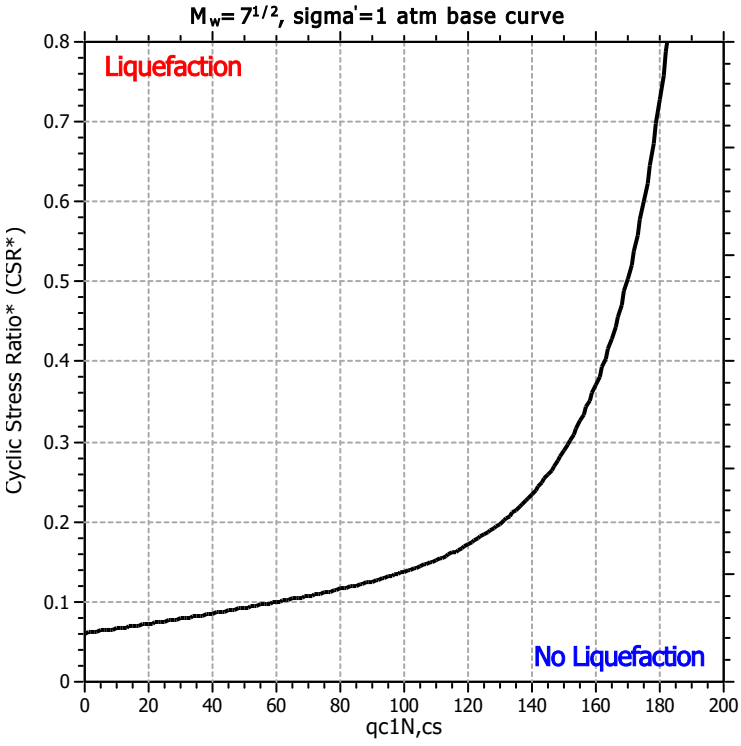
Project title : CalL Poly Humboldt health dining and housing **Location : Arcata, CA**

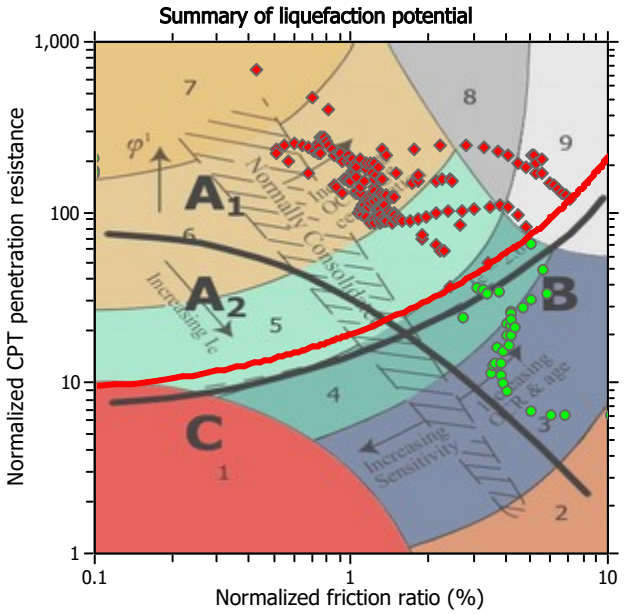
CPT file : CPT-03 - Basic

Input parameters and analysis data

Analysis method:	**B&I (2014)**	**G.W.T. (in-situ):**	**20.00 ft**	**Use fill:**	**No**	**Clay like behavior applied:**	**Sands only**
Fines correction method:	**B&I (2014)**	**G.W.T. (earthq.):**	**8.00 ft**	**Fill height:**	**N/A**	**Limit depth applie**	**Yes**
Points to test:	**Based on Ic value**	**Average results interva**	**5**	**Fill weight:**	**N/A**	**Limit depth:**	**42.00 ft**
Earthquake magnitude M_w:	**9.00**	**Ic cut-off value:**	**2.50**	**Trans. detect. applied:**	**No**	**MSF method:**	**Method base**
Peak ground acceleration:	**1.19**	**Unit weight calculation**	**Based on SBT**	**K_σ applied:**	**Yes**		

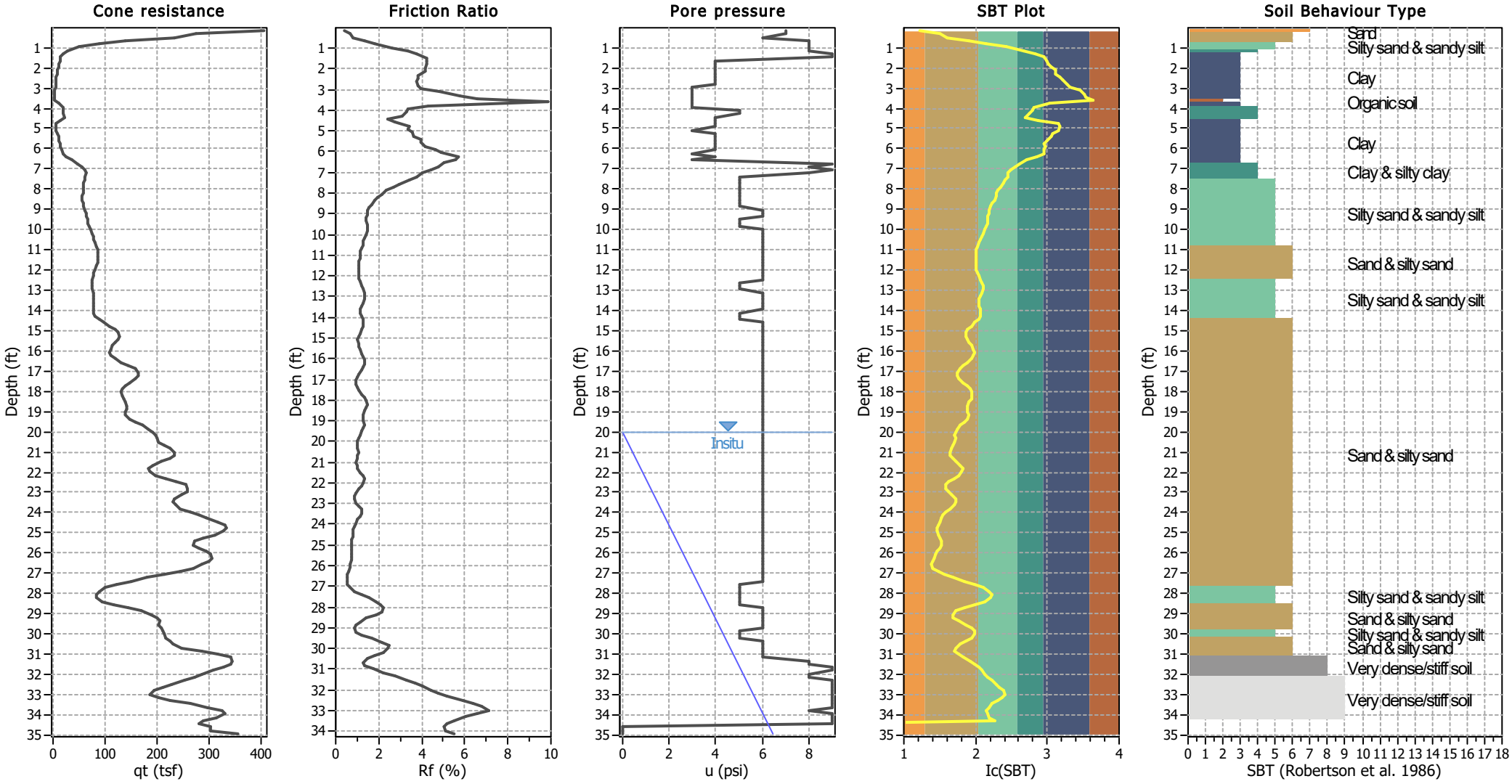






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



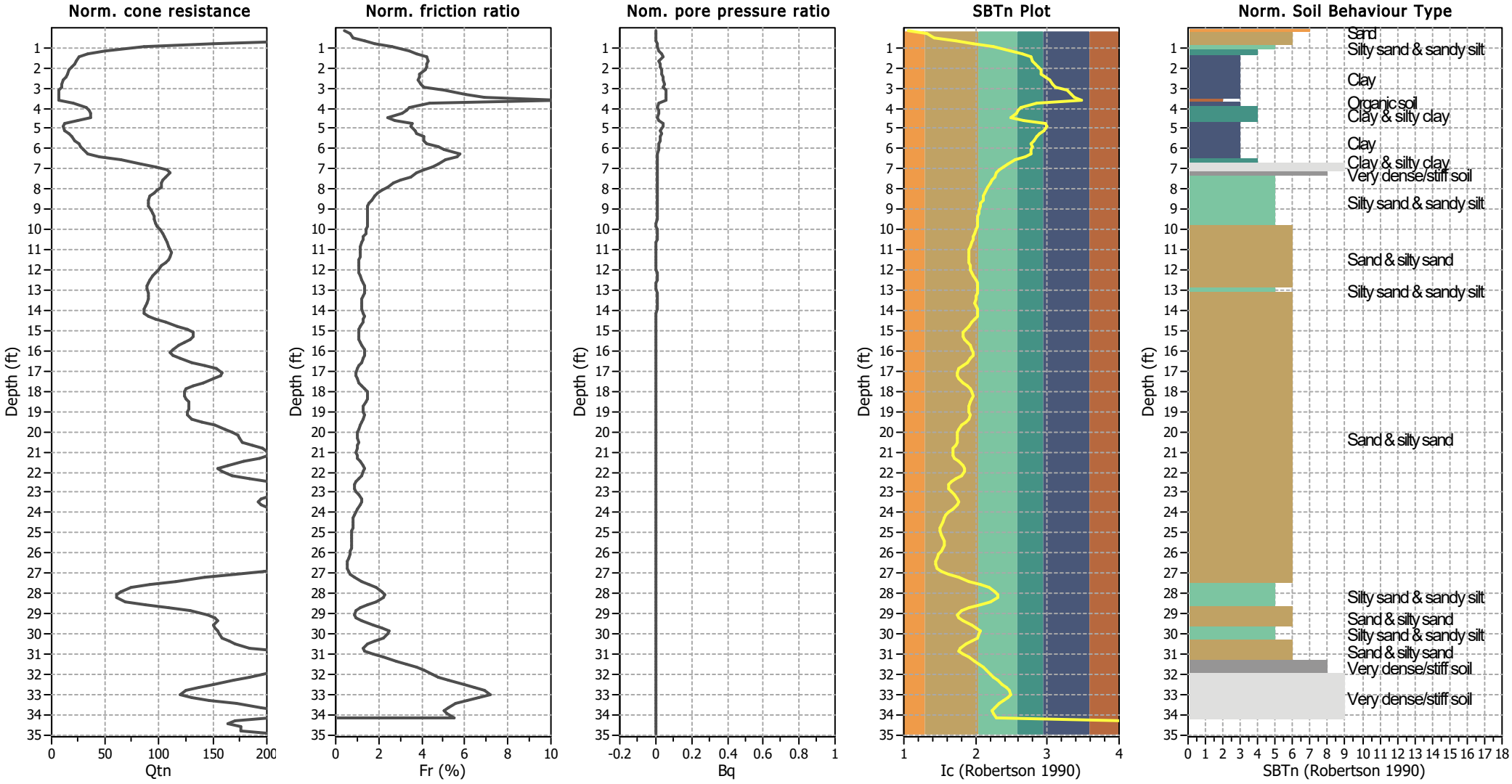
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 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)



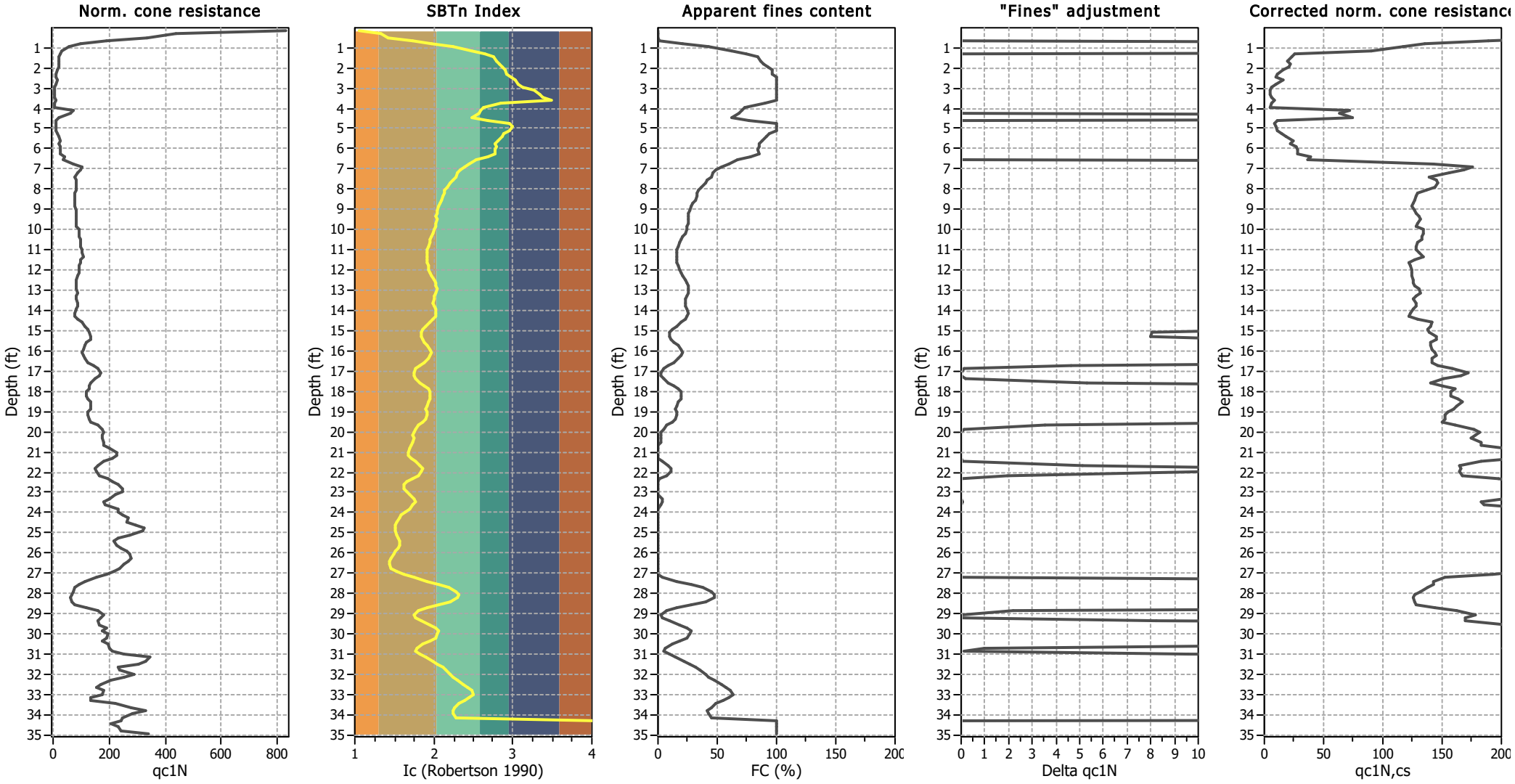
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 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)

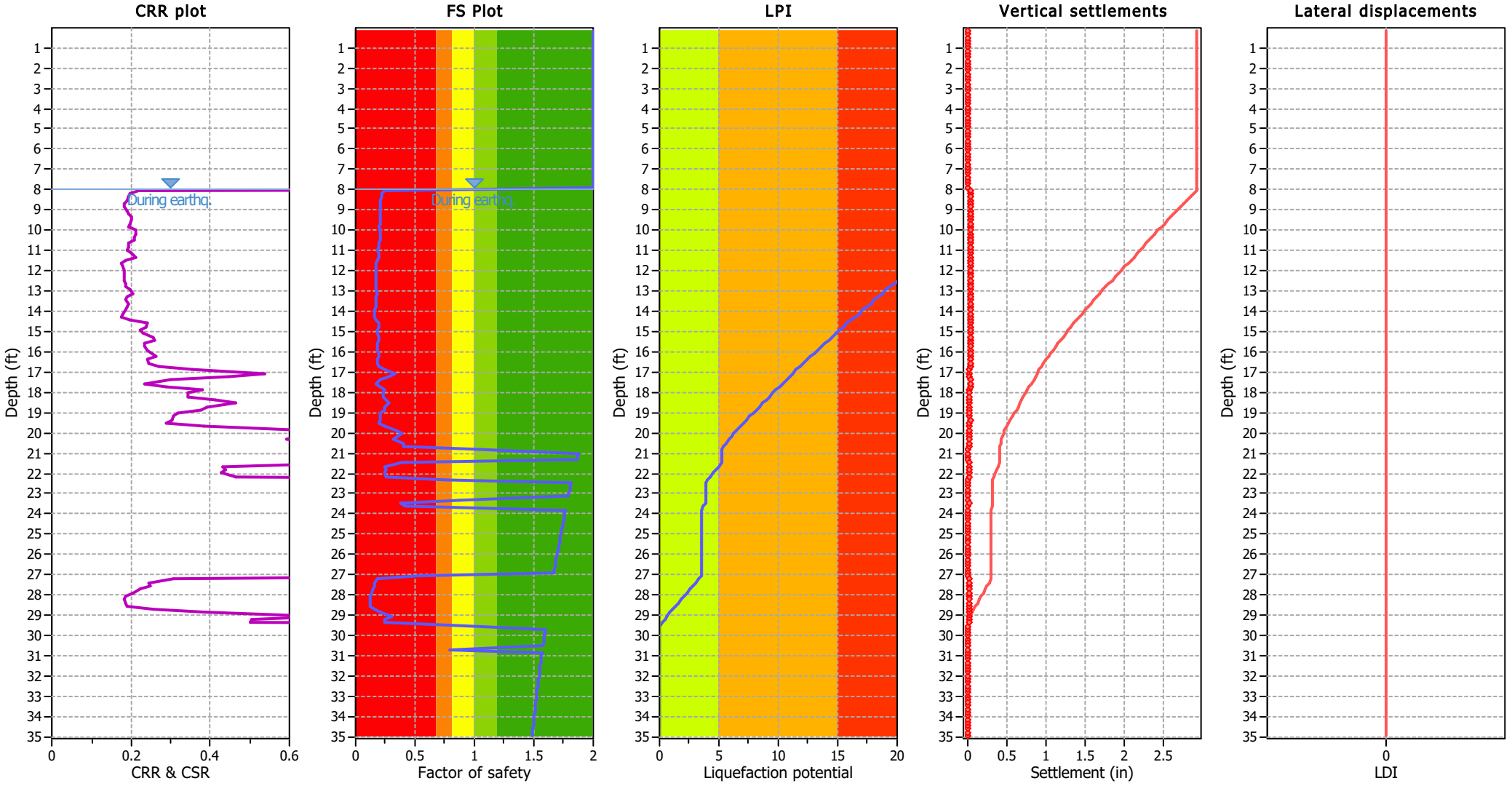


Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

'T name: CPT-03 - Basic

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

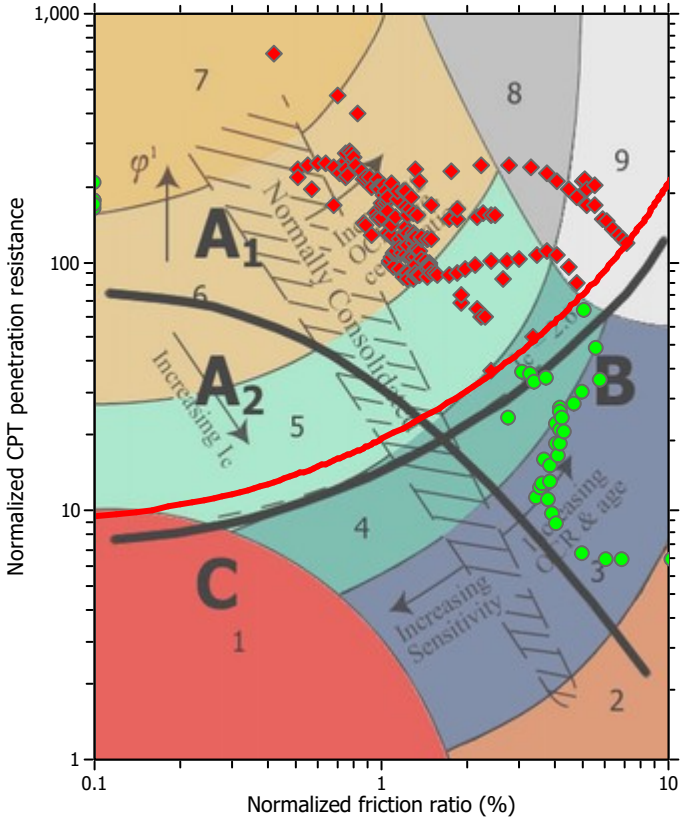
F.S. color scheme

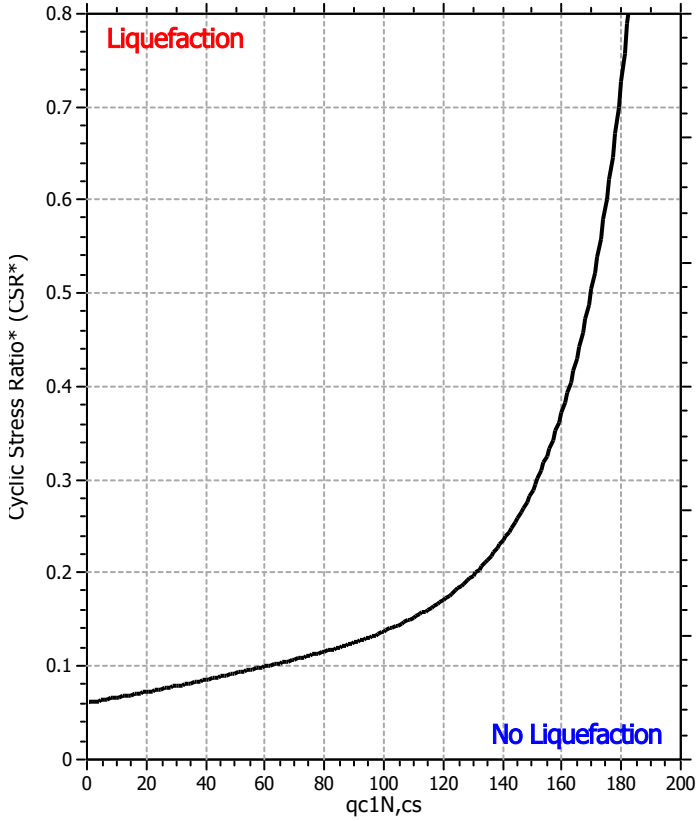
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

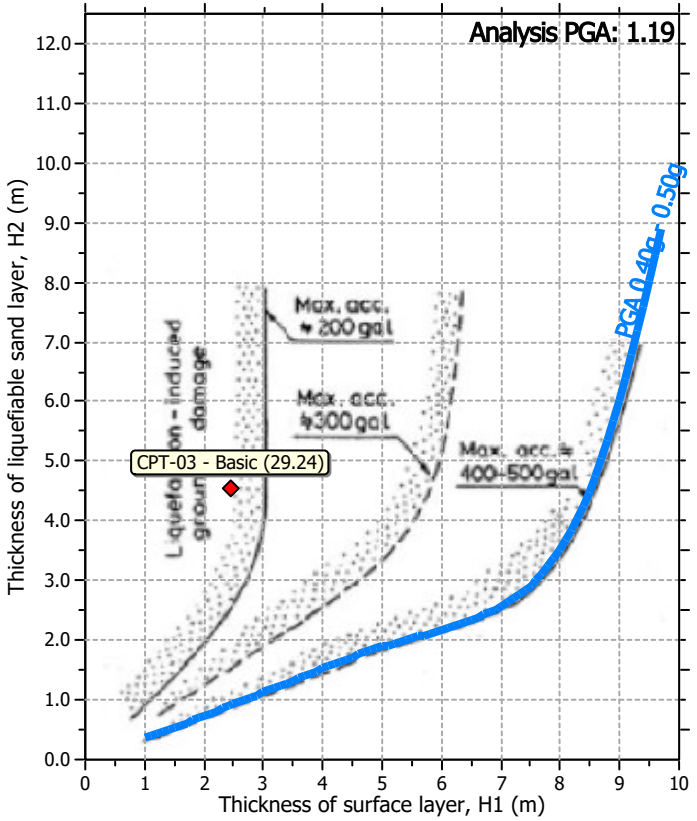
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



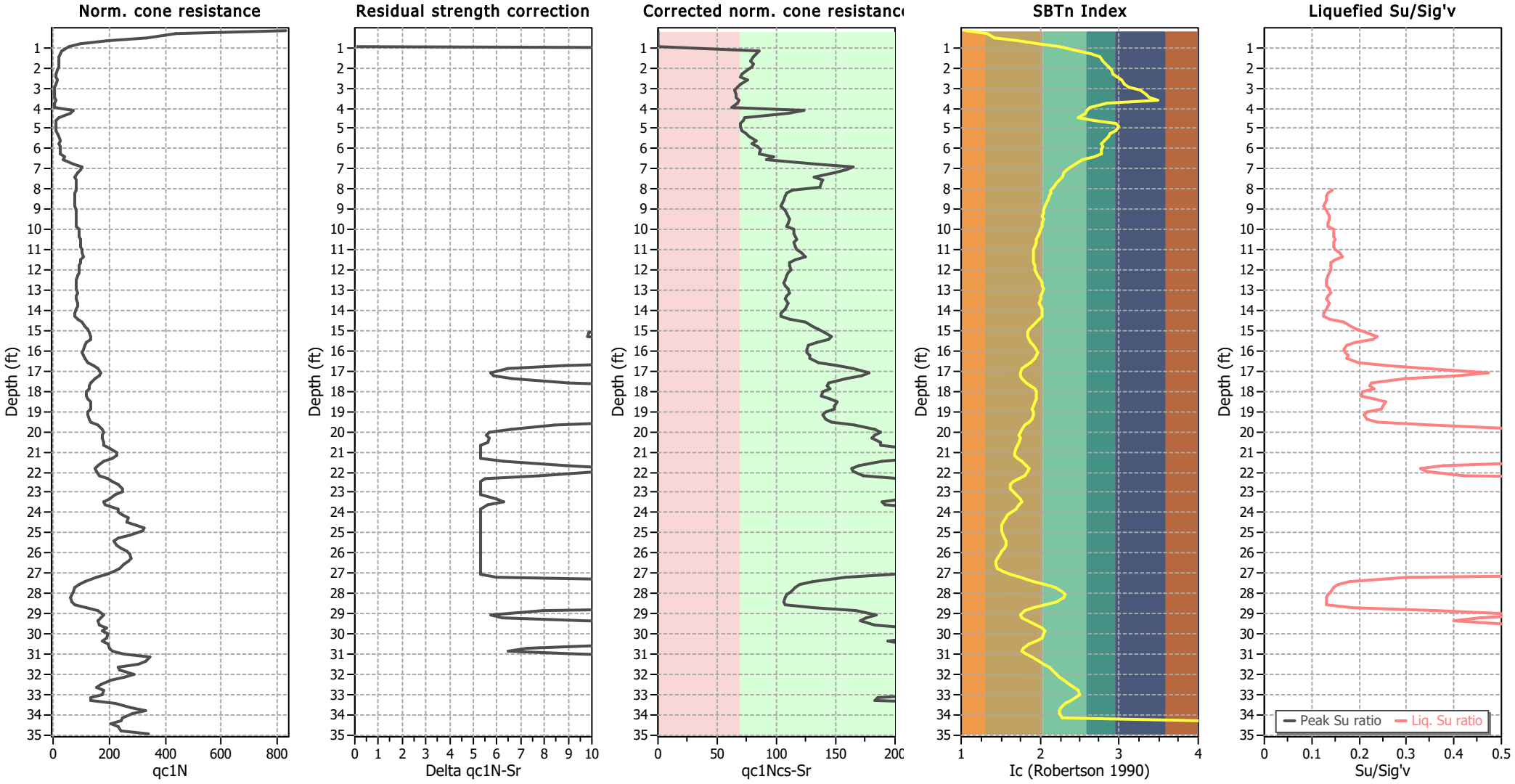




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	8.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	5	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.50	K_σ applied:	Yes
Earthquake magnitude M_w:	9.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	1.19	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	42.00 ft

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CPT name: CPT-03 - Basic

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	516.82	1.54	7.00	0.00	128.91
2	0.33	271.52	1.88	7.00	0.72	128.83
3	0.49	207.16	2.12	6.00	1.87	128.37
4	0.66	117.46	2.27	8.00	6.75	126.75
5	0.82	60.95	1.81	8.00	12.04	124.71
6	0.98	36.54	1.10	8.00	20.75	121.93
7	1.15	19.88	0.77	8.00	30.15	118.55
8	1.31	16.13	0.71	9.00	37.68	115.48
9	1.48	14.06	0.62	9.00	43.96	113.68
10	1.64	12.47	0.56	4.00	45.99	112.77
11	1.80	13.40	0.55	4.00	47.76	111.74
12	1.97	12.66	0.49	4.00	50.16	110.49
13	2.13	9.74	0.41	4.00	52.67	109.20
14	2.30	6.88	0.30	4.00	53.14	107.97
15	2.46	5.97	0.27	4.00	56.52	106.37
16	2.62	9.90	0.28	4.00	60.20	104.75
17	2.79	6.12	0.22	4.00	63.60	103.72
18	2.95	4.06	0.18	3.00	66.76	103.02
19	3.12	3.19	0.18	3.00	78.45	101.96
20	3.28	3.32	0.20	3.00	84.17	102.71
21	3.44	3.75	0.22	3.00	86.99	103.70
22	3.61	5.01	0.35	3.00	96.99	106.74
23	3.77	4.17	0.34	3.00	48.79	111.72
24	3.94	3.31	0.84	3.00	36.65	114.40
25	4.10	45.10	0.89	5.00	35.08	114.88
26	4.27	39.24	0.85	5.00	33.78	114.71
27	4.43	12.17	0.49	4.00	30.21	113.10
28	4.59	7.20	0.23	4.00	39.27	109.72
29	4.76	5.67	0.17	4.00	56.25	105.34
30	4.92	5.91	0.18	4.00	58.10	104.29
31	5.09	6.46	0.23	3.00	55.97	105.80
32	5.25	8.94	0.35	4.00	51.17	108.18
33	5.41	11.61	0.44	4.00	49.64	110.27
34	5.58	15.53	0.56	4.00	46.30	111.97
35	5.74	13.44	0.65	4.00	44.60	113.46
36	5.91	16.82	0.66	4.00	45.11	114.98
37	6.07	17.61	0.82	4.00	44.15	116.43
38	6.23	17.24	1.07	3.00	44.84	118.49
39	6.40	24.55	1.23	4.00	39.47	121.21
40	6.56	23.08	1.89	3.00	32.67	123.91
41	6.73	51.06	2.44	9.00	28.61	125.91
42	6.89	74.37	2.95	8.00	25.94	126.93
43	7.05	71.37	3.08	9.00	23.60	127.29
44	7.22	64.96	2.30	8.00	22.30	127.00
45	7.38	54.73	2.07	5.00	21.62	126.00
46	7.55	60.54	1.82	5.00	20.24	124.69
47	7.71	62.21	1.52	5.00	19.29	123.79
48	7.87	62.78	1.40	5.00	17.90	122.90

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	59.66	1.29	5.00	17.07	121.93
50	8.20	55.97	1.13	5.00	16.60	121.12
51	8.37	56.34	0.96	5.00	16.31	120.46
52	8.53	56.59	0.90	5.00	15.86	119.90
53	8.69	57.57	0.94	5.00	15.12	119.50
54	8.86	58.47	0.91	5.00	14.59	119.38
55	9.02	62.01	0.84	6.00	14.22	119.55
56	9.19	64.36	0.85	6.00	13.97	119.79
57	9.35	66.84	0.95	6.00	13.83	120.04
58	9.51	67.77	1.04	5.00	13.96	120.37
59	9.68	67.28	1.03	5.00	13.80	120.63
60	9.84	67.52	1.03	5.00	13.60	120.83
61	10.01	74.05	0.98	6.00	13.26	120.96
62	10.17	76.14	1.04	6.00	12.81	121.09
63	10.33	78.83	1.08	6.00	12.20	121.01
64	10.50	81.17	1.06	6.00	11.89	121.02
65	10.66	80.42	0.91	6.00	11.50	120.98
66	10.83	83.29	0.95	6.00	11.09	120.96
67	10.99	86.13	0.97	6.00	10.65	120.94
68	11.15	90.32	1.02	6.00	10.59	121.05
69	11.32	93.79	1.00	6.00	10.61	120.99
70	11.48	86.69	0.96	6.00	10.67	120.83
71	11.65	82.94	0.91	6.00	10.73	120.51
72	11.81	82.62	0.88	6.00	11.01	120.19
73	11.98	83.03	0.84	6.00	11.23	119.95
74	12.14	81.00	0.85	6.00	11.60	119.94
75	12.30	77.89	0.85	6.00	12.17	120.04
76	12.47	75.31	0.93	6.00	12.95	120.32
77	12.63	73.52	0.97	5.00	13.55	120.63
78	12.80	73.84	1.05	5.00	13.84	120.90
79	12.96	76.70	1.07	5.00	13.92	121.03
80	13.12	79.49	1.03	6.00	13.74	121.05
81	13.29	78.11	1.01	6.00	13.34	120.96
82	13.45	78.81	0.96	6.00	12.91	120.66
83	13.62	81.65	0.95	6.00	12.83	120.43
84	13.78	80.69	0.85	6.00	12.98	120.34
85	13.94	77.88	0.89	6.00	13.45	120.55
86	14.11	74.47	0.97	5.00	13.75	120.92
87	14.27	75.07	1.11	5.00	13.55	121.62
88	14.44	84.64	1.18	5.00	12.85	122.34
89	14.60	101.90	1.26	6.00	11.77	122.98
90	14.76	112.39	1.29	6.00	10.49	123.44
91	14.93	120.70	1.30	6.00	9.43	123.82
92	15.09	128.55	1.29	6.00	8.89	124.04
93	15.26	135.27	1.32	6.00	8.87	124.18
94	15.42	132.38	1.35	6.00	9.25	124.30
95	15.58	120.13	1.39	6.00	9.96	124.40
96	15.75	111.52	1.44	6.00	10.84	124.41

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	107.19	1.46	6.00	11.63	124.46
98	16.08	106.80	1.45	6.00	12.02	124.56
99	16.24	110.43	1.49	6.00	11.82	124.79
100	16.40	113.47	1.52	6.00	11.00	125.11
101	16.57	126.11	1.60	6.00	9.87	125.50
102	16.73	146.66	1.63	6.00	8.52	125.72
103	16.90	163.99	1.63	6.00	7.50	125.87
104	17.06	178.98	1.46	6.00	6.99	125.91
105	17.22	173.78	1.48	6.00	7.08	125.88
106	17.39	158.75	1.54	6.00	7.58	125.85
107	17.55	141.40	1.61	6.00	8.61	125.99
108	17.72	137.21	1.68	6.00	9.93	126.23
109	17.88	135.59	1.77	6.00	11.12	126.56
110	18.04	127.22	1.93	6.00	11.72	126.92
111	18.21	126.77	2.07	6.00	11.85	127.17
112	18.37	135.16	2.10	6.00	11.64	127.16
113	18.54	144.27	1.97	6.00	11.07	127.03
114	18.70	144.72	1.72	6.00	10.58	126.77
115	18.86	145.09	1.67	6.00	10.45	126.58
116	19.03	137.35	1.69	6.00	10.66	126.60
117	19.19	134.59	1.87	6.00	10.83	126.83
118	19.36	138.61	2.02	6.00	10.42	127.09
119	19.52	148.93	1.99	6.00	9.45	127.38
120	19.69	174.10	1.87	6.00	8.37	127.58
121	19.85	195.20	1.83	6.00	7.55	127.76
122	20.01	201.17	1.87	6.00	6.95	127.87
123	20.18	197.14	2.05	6.00	6.80	128.17
124	20.34	194.17	1.97	6.00	6.95	128.47
125	20.51	203.09	2.18	6.00	6.90	128.80
126	20.67	203.44	2.22	6.00	6.44	129.10
127	20.83	225.15	2.25	6.00	5.96	129.37
128	21.00	251.13	2.32	6.00	5.69	129.50
129	21.16	250.53	2.18	6.00	5.77	129.60
130	21.33	236.44	2.28	6.00	6.36	129.65
131	21.49	204.69	2.37	6.00	7.39	129.59
132	21.65	180.63	2.47	6.00	8.54	129.55
133	21.82	171.43	2.51	6.00	9.33	129.46
134	21.98	174.75	2.41	6.00	9.06	129.49
135	22.15	187.63	2.35	6.00	8.13	129.53
136	22.31	222.79	2.34	6.00	6.72	129.38
137	22.47	239.51	2.29	6.00	5.48	129.34
138	22.64	260.56	1.94	6.00	4.70	129.52
139	22.80	274.92	2.02	6.00	4.74	129.89
140	22.97	276.73	2.36	6.00	5.30	130.45
141	23.13	247.56	2.83	6.00	6.18	130.83
142	23.29	227.84	3.24	6.00	7.17	131.09
143	23.46	208.42	2.78	6.00	7.38	131.11
144	23.62	212.20	2.73	6.00	6.89	130.79

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	263.28	2.46	6.00	5.90	130.32
146	23.95	264.99	2.17	6.00	4.92	130.26
147	24.11	279.09	2.22	6.00	4.20	130.33
148	24.28	299.39	2.39	6.00	3.78	130.53
149	24.44	298.90	2.60	6.00	3.36	131.05
150	24.61	333.36	2.59	6.00	3.05	131.38
151	24.77	369.80	2.76	6.00	2.98	131.36
152	24.93	359.80	2.58	6.00	2.96	130.98
153	25.10	308.75	2.33	6.00	3.16	130.39
154	25.26	266.52	2.03	6.00	3.52	129.69
155	25.43	248.08	1.84	6.00	3.90	129.25
156	25.59	261.61	1.97	6.00	3.86	129.09
157	25.75	279.04	2.14	6.00	3.48	129.09
158	25.92	301.27	2.13	6.00	3.06	129.24
159	26.08	314.47	1.92	6.00	2.65	129.06
160	26.25	316.72	1.88	6.00	2.33	128.60
161	26.41	305.71	1.63	6.00	2.10	127.84
162	26.57	288.90	1.53	6.00	1.96	126.82
163	26.74	273.96	1.28	6.00	2.32	126.27
164	26.90	254.04	0.95	6.00	3.24	126.13
165	27.07	225.72	1.50	6.00	4.80	126.14
166	27.23	182.80	1.72	6.00	7.21	126.32
167	27.40	137.66	1.85	6.00	10.74	126.67
168	27.56	110.96	1.89	5.00	14.74	126.52
169	27.72	94.76	1.88	5.00	18.73	126.22
170	27.89	85.16	1.94	5.00	21.55	125.90
171	28.05	78.94	1.92	5.00	23.05	125.71
172	28.22	78.20	1.83	5.00	22.68	125.56
173	28.38	83.35	1.84	5.00	19.44	125.62
174	28.54	97.31	1.67	5.00	14.67	125.80
175	28.71	141.76	1.64	6.00	10.74	125.95
176	28.87	192.64	1.51	6.00	8.17	126.01
177	29.04	213.97	1.43	6.00	7.01	126.60
178	29.20	204.96	1.50	6.00	7.35	127.96
179	29.36	195.15	2.02	6.00	8.84	130.02
180	29.53	194.71	3.12	6.00	11.58	132.36
181	29.69	219.94	4.52	6.00	13.40	134.14
182	29.86	203.00	6.24	5.00	14.70	135.48
183	30.02	225.75	6.13	5.00	14.39	135.44
184	30.18	221.46	6.23	5.00	13.53	134.98
185	30.35	208.38	2.86	6.00	11.44	133.84
186	30.51	233.27	2.84	6.00	9.60	132.60
187	30.68	240.22	2.51	6.00	7.90	131.98
188	30.84	253.95	2.79	6.00	7.51	134.00
189	31.00	298.61	4.48	6.00	8.77	136.81
190	31.17	408.50	6.79	6.00	10.38	137.28
191	31.33	387.37	10.98	8.00	12.50	137.28
192	31.50	357.13	12.52	8.00	14.35	137.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	275.23	13.12	9.00	16.10	137.28
194	31.82	278.30	12.50	9.00	17.55	137.28
195	31.99	340.28	11.86	8.00	19.42	137.28
196	32.15	297.70	12.68	8.00	20.68	137.28
197	32.32	244.47	13.94	9.00	22.58	137.28
198	32.48	202.75	13.69	9.00	25.46	137.28
199	32.64	184.55	13.71	9.00	27.56	137.28
200	32.81	215.45	13.44	9.00	29.51	137.28
201	32.97	208.99	12.60	9.00	30.66	137.28
202	33.14	164.83	13.10	9.00	28.63	137.28
203	33.30	164.57	13.64	9.00	26.18	137.28
204	33.46	262.78	14.32	9.00	23.36	137.28
205	33.63	332.30	15.13	9.00	21.39	137.28
206	33.79	391.87	16.55	8.00	20.22	137.28
207	33.96	340.12	17.86	9.00	20.37	137.28
208	34.12	298.26	17.65	9.00	21.78	137.28
209	34.28	287.43	17.12	9.00	100.00	137.28
210	34.45	250.14	16.67	9.00	100.00	137.28
211	34.61	276.15	-273363.27	0.00	100.00	137.28
212	34.78	289.97	-273363.27	0.00	100.00	137.28
213	34.94	406.33	-273363.27	0.00	100.00	137.28

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.16	0.01	0.00	0.01	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
2	0.33	0.02	0.00	0.02	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
3	0.49	0.03	0.00	0.03	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
4	0.66	0.04	0.00	0.04	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
5	0.82	0.05	0.00	0.05	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
6	0.98	0.06	0.00	0.06	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
7	1.15	0.07	0.00	0.07	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
8	1.31	0.08	0.00	0.08	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
9	1.48	0.09	0.00	0.09	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
10	1.64	0.10	0.00	0.10	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
11	1.80	0.11	0.00	0.11	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
12	1.97	0.12	0.00	0.12	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
13	2.13	0.13	0.00	0.13	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
14	2.30	0.14	0.00	0.14	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
15	2.46	0.14	0.00	0.14	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
16	2.62	0.15	0.00	0.15	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
17	2.79	0.16	0.00	0.16	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
18	2.95	0.17	0.00	0.17	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
19	3.12	0.18	0.00	0.18	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
20	3.28	0.19	0.00	0.19	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
21	3.44	0.20	0.00	0.20	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
22	3.61	0.20	0.00	0.20	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
23	3.77	0.21	0.00	0.21	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
24	3.94	0.22	0.00	0.22	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
25	4.10	0.23	0.00	0.23	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
26	4.27	0.24	0.00	0.24	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
27	4.43	0.25	0.00	0.25	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
28	4.59	0.26	0.00	0.26	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
29	4.76	0.27	0.00	0.27	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
30	4.92	0.28	0.00	0.28	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
31	5.09	0.29	0.00	0.29	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
32	5.25	0.29	0.00	0.29	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
33	5.41	0.30	0.00	0.30	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
34	5.58	0.31	0.00	0.31	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
35	5.74	0.32	0.00	0.32	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
36	5.91	0.33	0.00	0.33	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
37	6.07	0.34	0.00	0.34	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
38	6.23	0.35	0.00	0.35	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
39	6.40	0.36	0.00	0.36	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
40	6.56	0.37	0.00	0.37	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
41	6.73	0.38	0.00	0.38	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
42	6.89	0.39	0.00	0.39	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
43	7.05	0.40	0.00	0.40	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
44	7.22	0.41	0.00	0.41	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
45	7.38	0.42	0.00	0.42	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
46	7.55	0.43	0.00	0.43	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
47	7.71	0.44	0.00	0.44	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**
48	7.87	0.45	0.00	0.45	1.00	0.773	0.67	1.156	1.10	1.00	2.000	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.04	0.46	0.00	0.46	1.00	0.776	0.67	1.159	1.10	1.00	0.901	**No**
50	8.20	0.47	0.01	0.47	1.00	0.784	0.67	1.171	1.10	1.00	0.881	**No**
51	8.37	0.48	0.01	0.47	1.00	0.792	0.67	1.184	1.10	1.00	0.887	**No**
52	8.53	0.49	0.02	0.48	1.00	0.800	0.67	1.196	1.10	1.00	0.890	**No**
53	8.69	0.50	0.02	0.48	1.00	0.808	0.67	1.207	1.10	1.00	0.893	**No**
54	8.86	0.51	0.03	0.49	1.00	0.816	0.67	1.220	1.10	1.00	0.898	**No**
55	9.02	0.52	0.03	0.49	1.00	0.824	0.67	1.231	1.10	1.00	0.917	**No**
56	9.19	0.53	0.04	0.50	1.00	0.831	0.67	1.242	1.10	1.00	0.931	**No**
57	9.35	0.54	0.04	0.50	1.00	0.839	0.67	1.253	1.10	1.00	0.948	**No**
58	9.51	0.55	0.05	0.50	1.00	0.846	0.67	1.264	1.10	1.00	0.960	**No**
59	9.68	0.56	0.05	0.51	1.00	0.853	0.67	1.275	1.10	1.00	0.961	**No**
60	9.84	0.57	0.06	0.51	1.00	0.860	0.67	1.285	1.10	1.00	0.966	**No**
61	10.01	0.58	0.06	0.52	1.00	0.867	0.67	1.295	1.10	1.00	0.998	**No**
62	10.17	0.59	0.07	0.52	1.00	0.873	0.67	1.305	1.10	1.00	1.005	**No**
63	10.33	0.60	0.07	0.53	1.00	0.880	0.67	1.315	1.10	1.00	1.010	**No**
64	10.50	0.61	0.08	0.53	1.00	0.887	0.67	1.325	1.09	1.00	1.019	**No**
65	10.66	0.62	0.08	0.54	1.00	0.893	0.67	1.334	1.09	1.00	1.010	**No**
66	10.83	0.63	0.09	0.54	1.00	0.899	0.67	1.344	1.09	1.00	1.017	**No**
67	10.99	0.64	0.09	0.55	1.00	0.905	0.67	1.352	1.09	1.00	1.021	**No**
68	11.15	0.65	0.10	0.55	1.00	0.911	0.67	1.361	1.09	1.00	1.043	**No**
69	11.32	0.66	0.10	0.56	1.00	0.917	0.67	1.370	1.09	1.00	1.066	**No**
70	11.48	0.67	0.11	0.56	1.00	0.923	0.67	1.379	1.08	1.00	1.040	**No**
71	11.65	0.68	0.11	0.57	1.00	0.929	0.67	1.388	1.08	1.00	1.032	**No**
72	11.81	0.69	0.12	0.57	1.00	0.934	0.67	1.396	1.08	1.00	1.044	**No**
73	11.98	0.70	0.12	0.58	1.00	0.940	0.67	1.405	1.08	1.00	1.057	**No**
74	12.14	0.71	0.13	0.58	1.00	0.945	0.67	1.413	1.08	1.00	1.064	**No**
75	12.30	0.72	0.13	0.59	1.00	0.951	0.67	1.420	1.08	1.00	1.069	**No**
76	12.47	0.73	0.14	0.59	1.00	0.956	0.67	1.428	1.08	1.00	1.080	**No**
77	12.63	0.74	0.14	0.60	1.00	0.961	0.67	1.436	1.07	1.00	1.088	**No**
78	12.80	0.75	0.15	0.60	1.00	0.966	0.67	1.444	1.07	1.00	1.099	**No**
79	12.96	0.76	0.15	0.61	1.00	0.971	0.67	1.451	1.08	1.00	1.120	**No**
80	13.12	0.77	0.16	0.61	1.00	0.976	0.67	1.458	1.08	1.00	1.136	**No**
81	13.29	0.78	0.17	0.62	1.00	0.981	0.67	1.466	1.07	1.00	1.124	**No**
82	13.45	0.79	0.17	0.62	1.00	0.986	0.67	1.473	1.07	1.00	1.123	**No**
83	13.62	0.80	0.18	0.62	1.00	0.991	0.67	1.480	1.07	1.00	1.139	**No**
84	13.78	0.81	0.18	0.63	1.00	0.995	0.67	1.487	1.07	1.00	1.142	**No**
85	13.94	0.82	0.19	0.63	1.00	1.000	0.67	1.494	1.07	1.00	1.142	**No**
86	14.11	0.83	0.19	0.64	1.00	1.004	0.67	1.501	1.06	1.00	1.136	**No**
87	14.27	0.84	0.20	0.64	1.00	1.009	0.67	1.507	1.06	1.00	1.140	**No**
88	14.44	0.85	0.20	0.65	1.00	1.013	0.67	1.514	1.07	1.00	1.175	**No**
89	14.60	0.86	0.21	0.65	1.00	1.017	0.67	1.520	1.07	1.00	1.245	**No**
90	14.76	0.87	0.21	0.66	1.00	1.021	0.67	1.526	1.07	1.00	1.248	**No**
91	14.93	0.88	0.22	0.66	1.00	1.026	0.67	1.532	1.07	1.00	1.234	**No**
92	15.09	0.89	0.22	0.67	1.00	1.029	0.67	1.538	1.07	1.00	1.249	**No**
93	15.26	0.90	0.23	0.67	1.00	1.034	0.67	1.544	1.07	1.00	1.293	**No**
94	15.42	0.91	0.23	0.68	1.00	1.037	0.67	1.550	1.07	1.00	1.304	**No**
95	15.58	0.92	0.24	0.68	1.00	1.041	0.67	1.556	1.06	1.00	1.276	**No**
96	15.75	0.93	0.24	0.69	1.00	1.045	0.67	1.561	1.06	1.00	1.280	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	15.91	0.94	0.25	0.69	1.00	1.049	0.67	1.567	1.06	1.00	1.297	**No**
98	16.08	0.95	0.25	0.70	1.00	1.052	0.67	1.572	1.06	1.00	1.317	**No**
99	16.24	0.96	0.26	0.70	1.00	1.056	0.67	1.578	1.06	1.00	1.337	**No**
100	16.40	0.97	0.26	0.71	1.00	1.059	0.67	1.583	1.06	1.00	1.312	**No**
101	16.57	0.98	0.27	0.71	1.00	1.063	0.67	1.588	1.06	1.00	1.322	**No**
102	16.73	0.99	0.27	0.72	1.00	1.066	0.67	1.593	1.06	1.00	1.364	**No**
103	16.90	1.00	0.28	0.73	1.00	1.070	0.67	1.598	1.07	1.00	1.476	**No**
104	17.06	1.01	0.28	0.73	1.00	1.073	0.67	1.603	1.07	1.00	1.662	**No**
105	17.22	1.02	0.29	0.74	1.00	1.076	0.67	1.608	1.07	1.00	1.586	**No**
106	17.39	1.03	0.29	0.74	1.00	1.079	0.67	1.613	1.06	1.00	1.427	**No**
107	17.55	1.04	0.30	0.75	1.00	1.083	0.67	1.618	1.05	1.00	1.339	**No**
108	17.72	1.05	0.30	0.75	1.00	1.086	0.67	1.622	1.05	1.00	1.424	**No**
109	17.88	1.06	0.31	0.76	1.00	1.089	0.67	1.627	1.06	1.00	1.543	**No**
110	18.04	1.07	0.31	0.76	1.00	1.092	0.67	1.631	1.06	1.00	1.506	**No**
111	18.21	1.09	0.32	0.77	1.00	1.095	0.67	1.636	1.05	1.00	1.512	**No**
112	18.37	1.10	0.32	0.77	1.00	1.098	0.67	1.640	1.06	1.00	1.597	**No**
113	18.54	1.11	0.33	0.78	1.00	1.101	0.67	1.645	1.06	1.00	1.653	**No**
114	18.70	1.12	0.33	0.78	1.00	1.103	0.67	1.649	1.05	1.00	1.585	**No**
115	18.86	1.13	0.34	0.79	1.00	1.106	0.67	1.653	1.05	1.00	1.570	**No**
116	19.03	1.14	0.34	0.79	1.00	1.109	0.67	1.657	1.05	1.00	1.508	**No**
117	19.19	1.15	0.35	0.80	1.00	1.112	0.67	1.661	1.05	1.00	1.499	**No**
118	19.36	1.16	0.35	0.80	1.00	1.114	0.67	1.665	1.04	1.00	1.495	**No**
119	19.52	1.17	0.36	0.81	1.00	1.117	0.67	1.669	1.04	1.00	1.481	**No**
120	19.69	1.18	0.36	0.81	1.00	1.120	0.67	1.673	1.05	1.00	1.611	**No**
121	19.85	1.19	0.37	0.82	1.00	1.122	0.67	1.677	1.05	1.00	1.874	**No**
122	20.01	1.20	0.37	0.83	1.00	1.125	0.67	1.681	1.05	1.00	1.993	**No**
123	20.18	1.21	0.38	0.83	1.00	1.127	0.67	1.684	1.05	1.00	1.905	**No**
124	20.34	1.22	0.39	0.84	1.00	1.130	0.67	1.688	1.05	1.00	1.848	**No**
125	20.51	1.23	0.39	0.84	1.00	1.132	0.67	1.692	1.05	1.00	2.038	**No**
126	20.67	1.24	0.40	0.85	1.00	1.134	0.67	1.695	1.05	1.00	2.045	**No**
127	20.83	1.25	0.40	0.85	1.00	1.137	0.67	1.698	1.06	1.00	2.136	**No**
128	21.00	1.26	0.41	0.86	1.00	1.139	0.67	1.702	1.06	1.00	2.132	**No**
129	21.16	1.27	0.41	0.86	1.00	1.141	0.67	1.705	1.06	1.00	2.140	**No**
130	21.33	1.29	0.42	0.87	1.00	1.144	0.67	1.709	1.06	1.00	2.148	**No**
131	21.49	1.30	0.42	0.87	1.00	1.146	0.67	1.712	1.04	1.00	2.072	**No**
132	21.65	1.31	0.43	0.88	1.00	1.148	0.67	1.715	1.03	1.00	1.728	**No**
133	21.82	1.32	0.43	0.89	1.00	1.150	0.67	1.718	1.03	1.00	1.740	**No**
134	21.98	1.33	0.44	0.89	1.00	1.152	0.67	1.722	1.03	1.00	1.734	**No**
135	22.15	1.34	0.44	0.90	1.00	1.154	0.67	1.725	1.03	1.00	1.780	**No**
136	22.31	1.35	0.45	0.90	1.00	1.156	0.67	1.728	1.04	1.00	2.210	**No**
137	22.47	1.36	0.45	0.91	1.00	1.158	0.67	1.731	1.05	1.00	2.202	**No**
138	22.64	1.37	0.46	0.91	1.00	1.160	0.67	1.734	1.04	1.00	2.210	**No**
139	22.80	1.38	0.46	0.92	1.00	1.162	0.67	1.737	1.04	1.00	2.218	**No**
140	22.97	1.39	0.47	0.92	1.00	1.164	0.67	1.740	1.04	1.00	2.226	**No**
141	23.13	1.40	0.47	0.93	1.00	1.166	0.67	1.743	1.04	1.00	2.233	**No**
142	23.29	1.41	0.48	0.94	1.00	1.168	0.67	1.745	1.03	1.00	2.250	**No**
143	23.46	1.42	0.48	0.94	1.00	1.170	0.67	1.748	1.03	1.00	2.146	**No**
144	23.62	1.43	0.49	0.95	1.00	1.172	0.67	1.751	1.02	1.00	2.247	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.79	1.45	0.49	0.95	1.00	1.174	0.67	1.754	1.03	1.00	2.263	**No**
146	23.95	1.46	0.50	0.96	1.00	1.175	0.67	1.756	1.03	1.00	2.270	**No**
147	24.11	1.47	0.50	0.96	1.00	1.177	0.67	1.759	1.03	1.00	2.277	**No**
148	24.28	1.48	0.51	0.97	1.00	1.179	0.67	1.762	1.03	1.00	2.285	**No**
149	24.44	1.49	0.51	0.97	1.00	1.181	0.67	1.764	1.02	1.00	2.292	**No**
150	24.61	1.50	0.52	0.98	1.00	1.182	0.67	1.767	1.02	1.00	2.299	**No**
151	24.77	1.51	0.52	0.99	1.00	1.184	0.67	1.769	1.02	1.00	2.306	**No**
152	24.93	1.52	0.53	0.99	1.00	1.186	0.67	1.772	1.02	1.00	2.313	**No**
153	25.10	1.53	0.53	1.00	1.00	1.187	0.67	1.774	1.02	1.00	2.320	**No**
154	25.26	1.54	0.54	1.00	1.00	1.189	0.67	1.777	1.02	1.00	2.327	**No**
155	25.43	1.55	0.54	1.01	1.00	1.191	0.67	1.779	1.01	1.00	2.334	**No**
156	25.59	1.56	0.55	1.01	1.00	1.192	0.67	1.782	1.01	1.00	2.341	**No**
157	25.75	1.57	0.55	1.02	1.00	1.194	0.67	1.784	1.01	1.00	2.348	**No**
158	25.92	1.58	0.56	1.02	1.00	1.196	0.67	1.786	1.01	1.00	2.355	**No**
159	26.08	1.59	0.56	1.03	1.00	1.197	0.67	1.789	1.01	1.00	2.362	**No**
160	26.25	1.60	0.57	1.04	1.00	1.199	0.67	1.791	1.01	1.00	2.369	**No**
161	26.41	1.62	0.57	1.04	1.00	1.200	0.67	1.794	1.00	1.00	2.376	**No**
162	26.57	1.63	0.58	1.05	1.00	1.202	0.67	1.796	1.00	1.00	2.382	**No**
163	26.74	1.64	0.58	1.05	1.00	1.204	0.67	1.798	1.00	1.00	2.389	**No**
164	26.90	1.65	0.59	1.06	1.00	1.205	0.67	1.801	1.00	1.00	2.396	**No**
165	27.07	1.66	0.59	1.06	1.00	1.207	0.67	1.803	1.00	1.00	2.403	**No**
166	27.23	1.67	0.60	1.07	1.00	1.208	0.67	1.806	1.00	1.00	1.705	**No**
167	27.40	1.68	0.61	1.07	1.00	1.210	0.67	1.808	1.00	1.00	1.598	**No**
168	27.56	1.69	0.61	1.08	1.00	1.212	0.67	1.810	1.00	1.00	1.611	**No**
169	27.72	1.70	0.62	1.08	1.00	1.213	0.67	1.813	1.00	1.00	1.566	**No**
170	27.89	1.71	0.62	1.09	1.00	1.215	0.67	1.815	1.00	1.00	1.524	**No**
171	28.05	1.72	0.63	1.09	1.00	1.216	0.67	1.817	1.00	1.00	1.493	**No**
172	28.22	1.73	0.63	1.10	1.00	1.218	0.67	1.819	1.00	1.00	1.488	**No**
173	28.38	1.74	0.64	1.10	1.00	1.219	0.67	1.822	0.99	1.00	1.495	**No**
174	28.54	1.75	0.64	1.11	1.00	1.221	0.67	1.824	0.99	1.00	1.508	**No**
175	28.71	1.76	0.65	1.11	1.00	1.222	0.67	1.826	0.99	1.00	1.646	**No**
176	28.87	1.77	0.65	1.12	1.00	1.224	0.67	1.828	0.99	1.00	1.864	**No**
177	29.04	1.78	0.66	1.12	1.00	1.225	0.67	1.830	0.99	1.00	2.219	**No**
178	29.20	1.79	0.66	1.13	1.00	1.226	0.67	1.832	0.99	1.00	2.023	**No**
179	29.36	1.80	0.67	1.14	1.00	1.228	0.67	1.834	0.99	1.00	2.024	**No**
180	29.53	1.81	0.67	1.14	1.00	1.229	0.67	1.836	0.98	1.00	2.497	**No**
181	29.69	1.82	0.68	1.15	1.00	1.230	0.67	1.838	0.98	1.00	2.507	**No**
182	29.86	1.84	0.68	1.15	1.00	1.231	0.67	1.839	0.97	1.00	2.513	**No**
183	30.02	1.85	0.69	1.16	1.00	1.232	0.67	1.841	0.97	1.00	2.519	**No**
184	30.18	1.86	0.69	1.16	1.00	1.233	0.67	1.842	0.97	1.00	2.525	**No**
185	30.35	1.87	0.70	1.17	1.00	1.234	0.67	1.844	0.97	1.00	2.532	**No**
186	30.51	1.88	0.70	1.18	1.00	1.235	0.67	1.846	0.97	1.00	2.538	**No**
187	30.68	1.89	0.71	1.18	1.00	1.236	0.67	1.847	0.97	1.00	2.534	**No**
188	30.84	1.90	0.71	1.19	1.00	1.237	0.67	1.849	0.97	1.00	2.550	**No**
189	31.00	1.91	0.72	1.19	1.00	1.238	0.67	1.850	0.96	1.00	2.556	**No**
190	31.17	1.92	0.72	1.20	1.00	1.239	0.67	1.852	0.96	1.00	2.562	**No**
191	31.33	1.93	0.73	1.21	1.00	1.240	0.67	1.853	0.96	1.00	2.568	**No**
192	31.50	1.95	0.73	1.21	1.00	1.241	0.67	1.854	0.96	1.00	2.574	**No**

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.66	1.96	0.74	1.22	1.00	1.242	0.67	1.856	0.96	1.00	2.580	**No**
194	31.82	1.97	0.74	1.22	1.00	1.243	0.67	1.857	0.96	1.00	2.585	**No**
195	31.99	1.98	0.75	1.23	1.00	1.244	0.67	1.858	0.95	1.00	2.592	**No**
196	32.15	1.99	0.75	1.24	1.00	1.245	0.67	1.860	0.95	1.00	2.597	**No**
197	32.32	2.00	0.76	1.24	1.00	1.245	0.67	1.861	0.95	1.00	2.603	**No**
198	32.48	2.01	0.76	1.25	1.00	1.246	0.67	1.862	0.95	1.00	2.609	**No**
199	32.64	2.02	0.77	1.26	1.00	1.247	0.67	1.863	0.95	1.00	2.615	**No**
200	32.81	2.04	0.77	1.26	1.00	1.248	0.67	1.865	0.95	1.00	2.621	**No**
201	32.97	2.05	0.78	1.27	1.00	1.249	0.67	1.866	0.95	1.00	2.626	**No**
202	33.14	2.06	0.78	1.27	1.00	1.250	0.67	1.867	0.94	1.00	2.632	**No**
203	33.30	2.07	0.79	1.28	1.00	1.250	0.67	1.868	0.94	1.00	2.638	**No**
204	33.46	2.08	0.79	1.29	1.00	1.251	0.67	1.870	0.94	1.00	2.643	**No**
205	33.63	2.09	0.80	1.29	1.00	1.252	0.67	1.871	0.94	1.00	2.649	**No**
206	33.79	2.10	0.80	1.30	1.00	1.253	0.67	1.872	0.94	1.00	2.655	**No**
207	33.96	2.11	0.81	1.30	1.00	1.254	0.67	1.873	0.94	1.00	2.661	**No**
208	34.12	2.13	0.81	1.31	1.00	1.254	0.67	1.874	0.94	1.00	2.666	**No**
209	34.28	2.14	0.82	1.32	1.00	1.255	0.67	1.875	0.93	1.00	2.672	**No**
210	34.45	2.15	0.83	1.32	1.00	1.256	0.67	1.877	0.93	1.00	2.678	**No**
211	34.61	2.16	0.83	1.33	1.00	1.257	0.67	1.878	0.93	1.00	2.683	**No**
212	34.78	2.17	0.84	1.34	1.00	1.257	0.67	1.879	0.93	1.00	2.689	**No**
213	34.94	2.18	0.84	1.34	1.00	1.258	0.67	1.880	0.93	1.00	2.694	**No**

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	**0.16**	405.93	0.00	1.06	0.26	1.70	830.34	0.00	254.00	4.000	**No**	**No**	**2.00**
2	**0.33**	277.00	0.00	1.33	0.26	1.70	436.24	0.00	254.00	4.000	**No**	**No**	**2.00**
3	**0.49**	234.89	0.00	1.43	0.26	1.70	332.83	0.00	254.00	4.000	**No**	**No**	**2.00**
4	**0.66**	138.83	1.63	1.73	0.34	1.70	188.72	0.00	188.72	4.000	**No**	**No**	**2.00**
5	**0.82**	88.51	20.27	1.97	0.43	1.70	97.92	37.37	135.29	4.000	**No**	**No**	**2.00**
6	**0.98**	50.31	43.07	2.25	0.46	1.70	58.71	58.04	116.74	4.000	**No**	**No**	**2.00**
7	**1.15**	29.63	62.05	2.49	0.52	1.70	31.94	58.19	90.13	4.000	**No**	**No**	**2.00**
8	**1.31**	19.93	74.73	2.65	0.53	1.70	25.92	0.00	25.92	4.000	**No**	**Yes**	**2.00**
9	**1.48**	15.29	84.13	2.76	0.54	1.70	22.59	0.00	22.59	4.000	**No**	**Yes**	**2.00**
10	**1.64**	13.83	87.00	2.80	0.55	1.70	20.03	0.00	20.03	4.000	**No**	**Yes**	**2.00**
11	**1.80**	12.54	89.42	2.83	0.54	1.70	21.53	0.00	21.53	4.000	**No**	**Yes**	**2.00**
12	**1.97**	11.09	92.62	2.87	0.55	1.70	20.34	0.00	20.34	4.000	**No**	**Yes**	**2.00**
13	**2.13**	9.79	95.86	2.91	0.56	1.70	15.65	0.00	15.65	4.000	**No**	**Yes**	**2.00**
14	**2.30**	9.09	96.46	2.92	0.58	1.70	11.05	0.00	11.05	4.000	**No**	**Yes**	**2.00**
15	**2.46**	7.78	100.00	2.97	0.58	1.70	9.59	0.00	9.59	4.000	**No**	**Yes**	**2.00**
16	**2.62**	6.64	100.00	3.03	0.56	1.70	15.91	0.00	15.91	4.000	**No**	**Yes**	**2.00**
17	**2.79**	5.90	100.00	3.07	0.58	1.70	9.83	0.00	9.83	4.000	**No**	**Yes**	**2.00**
18	**2.95**	5.37	100.00	3.12	0.60	1.70	6.52	0.00	6.52	4.000	**No**	**Yes**	**2.00**
19	**3.12**	4.13	100.00	3.27	0.60	1.70	5.13	0.00	5.13	4.000	**No**	**Yes**	**2.00**
20	**3.28**	3.91	100.00	3.34	0.60	1.70	5.33	0.00	5.33	4.000	**No**	**Yes**	**2.00**
21	**3.44**	3.93	100.00	3.37	0.60	1.70	6.02	0.00	6.02	4.000	**No**	**Yes**	**2.00**
22	**3.61**	3.96	100.00	3.48	0.59	1.70	8.05	0.00	8.05	4.000	**No**	**Yes**	**2.00**
23	**3.77**	12.32	90.80	2.85	0.60	1.70	6.70	0.00	6.70	4.000	**No**	**Yes**	**2.00**
24	**3.94**	19.42	73.09	2.63	0.61	1.70	5.32	0.00	5.32	4.000	**No**	**Yes**	**2.00**
25	**4.10**	20.86	70.55	2.59	0.41	1.70	72.46	0.00	72.46	4.000	**No**	**Yes**	**2.00**
26	**4.27**	21.46	68.38	2.57	0.43	1.70	63.04	0.00	63.04	4.000	**No**	**Yes**	**2.00**
27	**4.43**	21.94	62.15	2.49	0.56	1.70	19.55	54.71	74.26	4.000	**No**	**No**	**2.00**
28	**4.59**	14.10	77.19	2.68	0.58	1.70	11.57	0.00	11.57	4.000	**No**	**Yes**	**2.00**
29	**4.76**	7.54	100.00	2.97	0.59	1.70	9.11	0.00	9.11	4.000	**No**	**Yes**	**2.00**
30	**4.92**	6.89	100.00	2.99	0.58	1.70	9.50	0.00	9.50	4.000	**No**	**Yes**	**2.00**
31	**5.09**	7.77	99.97	2.96	0.58	1.70	10.38	0.00	10.38	4.000	**No**	**Yes**	**2.00**
32	**5.25**	9.74	93.94	2.89	0.57	1.70	14.36	0.00	14.36	4.000	**No**	**Yes**	**2.00**
33	**5.41**	11.25	91.93	2.86	0.55	1.70	18.65	0.00	18.65	4.000	**No**	**Yes**	**2.00**
34	**5.58**	13.33	87.43	2.81	0.53	1.70	24.95	0.00	24.95	4.000	**No**	**Yes**	**2.00**
35	**5.74**	15.06	85.05	2.78	0.54	1.70	21.59	0.00	21.59	4.000	**No**	**Yes**	**2.00**
36	**5.91**	16.18	85.77	2.78	0.53	1.70	27.02	0.00	27.02	4.000	**No**	**Yes**	**2.00**
37	**6.07**	17.99	84.41	2.77	0.52	1.70	28.29	0.00	28.29	4.000	**No**	**Yes**	**2.00**
38	**6.23**	19.91	85.38	2.78	0.52	1.70	27.70	0.00	27.70	4.000	**No**	**Yes**	**2.00**
39	**6.40**	26.77	77.50	2.68	0.49	1.70	39.37	0.00	39.37	4.000	**No**	**Yes**	**2.00**
40	**6.56**	38.14	66.48	2.54	0.50	1.70	36.98	0.00	36.98	4.000	**No**	**Yes**	**2.00**
41	**6.73**	48.98	59.20	2.45	0.41	1.53	73.66	69.11	142.78	4.000	**No**	**No**	**2.00**
42	**6.89**	57.07	54.07	2.39	0.36	1.43	100.77	74.63	175.41	4.000	**No**	**No**	**2.00**
43	**7.05**	63.41	49.30	2.33	0.37	1.44	96.84	71.29	168.13	4.000	**No**	**No**	**2.00**
44	**7.22**	65.29	46.52	2.29	0.39	1.45	88.80	67.68	156.47	4.000	**No**	**No**	**2.00**
45	**7.38**	62.85	45.03	2.28	0.42	1.47	76.06	63.56	139.62	4.000	**No**	**No**	**2.00**
46	**7.55**	61.12	41.91	2.24	0.41	1.44	82.49	63.20	145.69	4.000	**No**	**No**	**2.00**
47	**7.71**	60.06	39.71	2.21	0.41	1.43	83.96	61.97	145.92	4.000	**No**	**No**	**2.00**
48	**7.87**	60.30	36.33	2.17	0.41	1.42	84.26	59.21	143.48	4.000	**No**	**No**	**2.00**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	**8.04**	59.46	34.27	2.14	0.43	1.42	80.14	56.31	136.45	0.220	**No**	**No**	**0.24**
50	**8.20**	58.34	33.08	2.13	0.44	1.42	75.37	54.06	129.43	0.196	**No**	**No**	**0.22**
51	**8.37**	57.30	32.32	2.12	0.44	1.41	75.26	53.23	128.48	0.193	**No**	**No**	**0.22**
52	**8.53**	57.06	31.14	2.10	0.44	1.40	75.09	51.86	126.95	0.189	**No**	**No**	**0.21**
53	**8.69**	58.27	29.14	2.08	0.45	1.39	75.90	49.57	125.47	0.185	**No**	**No**	**0.21**
54	**8.86**	59.88	27.68	2.06	0.45	1.38	76.52	47.70	124.23	0.181	**No**	**No**	**0.20**
55	**9.02**	61.93	26.68	2.05	0.44	1.37	80.19	46.90	127.09	0.189	**No**	**No**	**0.21**
56	**9.19**	63.97	25.97	2.04	0.44	1.35	82.36	46.19	128.55	0.193	**No**	**No**	**0.21**
57	**9.35**	65.73	25.56	2.03	0.44	1.34	84.65	45.93	130.58	0.199	**No**	**No**	**0.21**
58	**9.51**	66.83	25.94	2.04	0.44	1.33	85.06	46.62	131.68	0.203	**No**	**No**	**0.21**
59	**9.68**	68.77	25.48	2.03	0.44	1.32	83.96	45.68	129.64	0.197	**No**	**No**	**0.20**
60	**9.84**	70.63	24.91	2.02	0.44	1.31	83.75	44.66	128.40	0.193	**No**	**No**	**0.20**
61	**10.01**	72.84	23.93	2.01	0.43	1.29	90.53	44.04	134.57	0.213	**No**	**No**	**0.21**
62	**10.17**	75.63	22.58	1.99	0.43	1.28	92.46	41.70	134.16	0.211	**No**	**No**	**0.21**
63	**10.33**	78.21	20.75	1.97	0.43	1.28	95.14	38.11	133.26	0.208	**No**	**No**	**0.21**
64	**10.50**	80.06	19.79	1.96	0.43	1.27	97.24	36.12	133.36	0.209	**No**	**No**	**0.20**
65	**10.66**	82.05	18.58	1.94	0.44	1.26	96.09	32.89	128.98	0.195	**No**	**No**	**0.19**
66	**10.83**	84.35	17.27	1.93	0.44	1.26	98.84	29.66	128.51	0.193	**No**	**No**	**0.19**
67	**10.99**	86.88	15.86	1.91	0.44	1.25	101.63	25.82	127.44	0.190	**No**	**No**	**0.19**
68	**11.15**	88.13	15.64	1.91	0.44	1.24	105.53	25.50	131.03	0.201	**No**	**No**	**0.19**
69	**11.32**	88.06	15.73	1.91	0.43	1.22	108.51	26.06	134.57	0.213	**No**	**No**	**0.20**
70	**11.48**	87.36	15.91	1.91	0.45	1.22	100.36	25.86	126.22	0.187	**No**	**No**	**0.18**
71	**11.65**	85.90	16.10	1.91	0.45	1.22	95.73	25.97	121.70	0.175	**No**	**No**	**0.17**
72	**11.81**	83.34	17.02	1.93	0.45	1.21	94.64	28.49	123.13	0.179	**No**	**No**	**0.17**
73	**11.98**	81.58	17.71	1.93	0.45	1.20	94.36	30.38	124.74	0.183	**No**	**No**	**0.17**
74	**12.14**	80.06	18.91	1.95	0.45	1.20	91.50	33.18	124.68	0.183	**No**	**No**	**0.17**
75	**12.30**	78.23	20.65	1.97	0.45	1.19	87.48	36.80	124.28	0.182	**No**	**No**	**0.17**
76	**12.47**	76.39	23.00	2.00	0.45	1.18	84.00	41.21	125.20	0.184	**No**	**No**	**0.17**
77	**12.63**	75.53	24.76	2.02	0.45	1.17	81.50	44.02	125.52	0.185	**No**	**No**	**0.17**
78	**12.80**	75.85	25.59	2.03	0.44	1.16	81.30	45.38	126.68	0.188	**No**	**No**	**0.17**
79	**12.96**	76.41	25.80	2.04	0.44	1.16	83.80	46.17	129.97	0.198	**No**	**No**	**0.18**
80	**13.12**	77.47	25.31	2.03	0.43	1.15	86.26	45.79	132.05	0.204	**No**	**No**	**0.18**
81	**13.29**	79.04	24.15	2.01	0.44	1.14	84.47	43.43	127.90	0.191	**No**	**No**	**0.17**
82	**13.45**	79.84	22.89	2.00	0.45	1.14	84.85	41.12	125.97	0.186	**No**	**No**	**0.17**
83	**13.62**	79.51	22.65	2.00	0.44	1.13	87.30	41.03	128.33	0.193	**No**	**No**	**0.17**
84	**13.78**	78.78	23.10	2.00	0.44	1.13	85.85	41.70	127.55	0.190	**No**	**No**	**0.17**
85	**13.94**	78.03	24.46	2.02	0.45	1.12	82.48	43.66	126.14	0.186	**No**	**No**	**0.16**
86	**14.11**	78.63	25.34	2.03	0.45	1.12	78.55	44.48	123.03	0.178	**No**	**No**	**0.16**
87	**14.27**	82.87	24.76	2.02	0.45	1.11	78.79	43.55	122.34	0.177	**No**	**No**	**0.16**
88	**14.44**	89.77	22.72	2.00	0.44	1.10	88.08	41.30	129.39	0.196	**No**	**No**	**0.17**
89	**14.60**	99.02	19.43	1.96	0.42	1.09	105.05	36.25	141.30	0.240	**No**	**No**	**0.19**
90	**14.76**	109.72	15.32	1.90	0.42	1.09	115.34	25.38	140.72	0.238	**No**	**No**	**0.19**
91	**14.93**	119.85	11.74	1.86	0.43	1.08	123.38	13.89	137.27	0.223	**No**	**No**	**0.18**
92	**15.09**	125.94	9.83	1.84	0.42	1.08	130.72	8.04	138.76	0.229	**No**	**No**	**0.18**
93	**15.26**	127.49	9.76	1.83	0.41	1.07	136.64	8.00	144.64	0.257	**No**	**No**	**0.20**
94	**15.42**	125.66	11.11	1.85	0.41	1.06	133.10	12.20	145.30	0.261	**No**	**No**	**0.20**
95	**15.58**	121.38	13.53	1.88	0.42	1.06	120.39	19.83	140.21	0.236	**No**	**No**	**0.18**
96	**15.75**	115.69	16.49	1.92	0.42	1.06	111.23	28.65	139.88	0.234	**No**	**No**	**0.18**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	**15.91**	111.30	19.00	1.95	0.42	1.05	106.40	35.29	141.68	0.242	**No**	**No**	**0.19**
98	**16.08**	109.97	20.19	1.96	0.41	1.04	105.48	38.22	143.70	0.252	**No**	**No**	**0.19**
99	**16.24**	112.89	19.59	1.96	0.41	1.04	108.56	37.10	145.66	0.263	**No**	**No**	**0.20**
100	**16.40**	120.78	16.97	1.92	0.42	1.04	111.14	30.12	141.26	0.240	**No**	**No**	**0.18**
101	**16.57**	132.22	13.26	1.88	0.42	1.03	122.95	19.05	142.00	0.244	**No**	**No**	**0.18**
102	**16.73**	145.93	8.48	1.82	0.41	1.03	142.30	4.65	146.95	0.270	**No**	**No**	**0.20**
103	**16.90**	157.99	4.62	1.77	0.39	1.02	158.26	0.10	158.36	0.355	**No**	**No**	**0.24**
104	**17.06**	164.52	2.59	1.74	0.37	1.02	171.90	0.00	171.90	0.538	**No**	**No**	**0.32**
105	**17.22**	163.47	2.99	1.75	0.38	1.01	166.35	0.00	166.35	0.448	**No**	**No**	**0.28**
106	**17.39**	158.11	4.94	1.77	0.40	1.01	151.45	0.17	151.61	0.300	**No**	**No**	**0.21**
107	**17.55**	149.43	8.80	1.82	0.42	1.01	134.41	5.30	139.71	0.233	**No**	**No**	**0.17**
108	**17.72**	140.12	13.44	1.88	0.40	1.00	129.86	20.14	150.00	0.289	**No**	**No**	**0.20**
109	**17.88**	133.72	17.37	1.93	0.39	1.00	127.84	33.13	160.98	0.382	**No**	**No**	**0.25**
110	**18.04**	132.48	19.28	1.95	0.39	0.99	119.50	37.71	157.22	0.345	**No**	**No**	**0.23**
111	**18.21**	133.89	19.66	1.96	0.39	0.99	118.61	38.61	157.23	0.345	**No**	**No**	**0.23**
112	**18.37**	135.71	19.01	1.95	0.38	0.99	126.05	37.79	163.84	0.415	**No**	**No**	**0.26**
113	**18.54**	139.29	17.21	1.93	0.38	0.98	134.08	33.31	167.38	0.463	**No**	**No**	**0.28**
114	**18.70**	141.40	15.61	1.91	0.38	0.98	133.97	28.01	161.98	0.393	**No**	**No**	**0.25**
115	**18.86**	141.29	15.17	1.90	0.39	0.98	133.83	26.50	160.33	0.375	**No**	**No**	**0.24**
116	**19.03**	140.16	15.87	1.91	0.40	0.97	126.14	28.15	154.28	0.320	**No**	**No**	**0.21**
117	**19.19**	141.00	16.44	1.92	0.40	0.97	123.15	29.71	152.85	0.309	**No**	**No**	**0.21**
118	**19.36**	146.80	15.10	1.90	0.40	0.96	126.33	25.61	151.95	0.302	**No**	**No**	**0.20**
119	**19.52**	158.37	11.81	1.86	0.40	0.96	135.22	14.68	149.90	0.288	**No**	**No**	**0.19**
120	**19.69**	171.69	7.91	1.81	0.39	0.96	157.80	3.53	161.33	0.386	**No**	**No**	**0.24**
121	**19.85**	183.39	4.81	1.77	0.36	0.96	176.82	0.14	176.97	0.646	**No**	**No**	**0.34**
122	**20.01**	192.44	2.47	1.74	0.35	0.96	181.84	0.00	181.84	0.783	**No**	**No**	**0.39**
123	**20.18**	198.24	1.84	1.74	0.36	0.95	177.77	0.00	177.77	0.666	**No**	**No**	**0.35**
124	**20.34**	199.89	2.45	1.74	0.37	0.95	174.71	0.00	174.71	0.594	**No**	**No**	**0.32**
125	**20.51**	204.68	2.24	1.74	0.35	0.95	182.72	0.00	182.72	0.813	**No**	**No**	**0.40**
126	**20.67**	215.48	0.35	1.72	0.35	0.95	182.75	0.00	182.75	0.814	**No**	**No**	**0.40**
127	**20.83**	226.75	0.00	1.69	0.33	0.95	202.76	0.00	202.76	2.218	**No**	**No**	**1.04**
128	**21.00**	233.42	0.00	1.68	0.30	0.96	226.87	0.00	226.87	4.000	**No**	**No**	**1.88**
129	**21.16**	233.67	0.00	1.68	0.30	0.95	225.99	0.00	225.99	4.000	**No**	**No**	**1.87**
130	**21.33**	224.77	0.02	1.71	0.31	0.95	212.41	0.00	212.41	4.000	**No**	**No**	**1.86**
131	**21.49**	208.83	4.21	1.77	0.35	0.94	182.42	0.04	182.46	0.804	**No**	**No**	**0.39**
132	**21.65**	193.67	8.56	1.82	0.38	0.94	160.04	5.11	165.15	0.432	**No**	**No**	**0.25**
133	**21.82**	183.91	11.39	1.85	0.38	0.94	151.64	13.95	165.59	0.438	**No**	**No**	**0.25**
134	**21.98**	187.53	10.41	1.84	0.38	0.93	154.30	10.60	164.90	0.428	**No**	**No**	**0.25**
135	**22.15**	199.31	7.02	1.80	0.38	0.93	165.51	1.96	167.47	0.464	**No**	**No**	**0.26**
136	**22.31**	217.13	1.51	1.73	0.33	0.94	197.81	0.00	197.81	1.675	**No**	**No**	**0.76**
137	**22.47**	237.17	0.00	1.67	0.31	0.94	213.17	0.00	213.17	4.000	**No**	**No**	**1.82**
138	**22.64**	254.99	0.00	1.62	0.29	0.94	232.70	0.00	232.70	4.000	**No**	**No**	**1.81**
139	**22.80**	259.94	0.00	1.62	0.27	0.95	245.99	0.00	245.99	4.000	**No**	**No**	**1.80**
140	**22.97**	257.61	0.00	1.66	0.27	0.95	247.39	0.00	247.39	4.000	**No**	**No**	**1.80**
141	**23.13**	247.18	0.00	1.70	0.30	0.94	219.53	0.00	219.53	4.000	**No**	**No**	**1.79**
142	**23.29**	234.64	3.34	1.75	0.33	0.93	200.73	0.00	200.73	1.972	**No**	**No**	**0.88**
143	**23.46**	231.95	4.17	1.76	0.35	0.93	182.35	0.04	182.39	0.802	**No**	**No**	**0.37**
144	**23.62**	235.43	2.21	1.74	0.35	0.93	185.57	0.00	185.57	0.919	**No**	**No**	**0.41**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	**23.79**	245.68	0.00	1.69	0.29	0.94	233.13	0.00	233.13	4.000	**No**	**No**	**1.77**
146	**23.95**	263.88	0.00	1.63	0.29	0.94	234.45	0.00	234.45	4.000	**No**	**No**	**1.76**
147	**24.11**	281.22	0.00	1.59	0.27	0.94	247.51	0.00	247.51	4.000	**No**	**No**	**1.76**
148	**24.28**	295.23	0.00	1.56	0.26	0.94	265.66	0.00	254.00	4.000	**No**	**No**	**1.75**
149	**24.44**	316.19	0.00	1.54	0.26	0.94	264.94	0.00	254.00	4.000	**No**	**No**	**1.75**
150	**24.61**	332.34	0.00	1.51	0.26	0.94	295.15	0.00	254.00	4.000	**No**	**No**	**1.74**
151	**24.77**	334.21	0.00	1.51	0.26	0.94	327.06	0.00	254.00	4.000	**No**	**No**	**1.73**
152	**24.93**	327.73	0.00	1.51	0.26	0.93	317.88	0.00	254.00	4.000	**No**	**No**	**1.73**
153	**25.10**	310.68	0.00	1.52	0.26	0.93	272.47	0.00	254.00	4.000	**No**	**No**	**1.72**
154	**25.26**	289.04	0.00	1.55	0.29	0.93	233.51	0.00	233.51	4.000	**No**	**No**	**1.72**
155	**25.43**	272.89	0.00	1.57	0.31	0.92	215.85	0.00	215.85	4.000	**No**	**No**	**1.71**
156	**25.59**	271.39	0.00	1.57	0.29	0.92	228.30	0.00	228.30	4.000	**No**	**No**	**1.71**
157	**25.75**	280.98	0.00	1.54	0.27	0.93	244.52	0.00	244.52	4.000	**No**	**No**	**1.70**
158	**25.92**	294.71	0.00	1.52	0.26	0.93	264.49	0.00	254.00	4.000	**No**	**No**	**1.70**
159	**26.08**	303.53	0.00	1.49	0.26	0.93	275.80	0.00	254.00	4.000	**No**	**No**	**1.69**
160	**26.25**	305.50	0.00	1.46	0.26	0.93	277.48	0.00	254.00	4.000	**No**	**No**	**1.69**
161	**26.41**	300.04	0.00	1.45	0.26	0.93	267.57	0.00	254.00	4.000	**No**	**No**	**1.68**
162	**26.57**	287.95	0.00	1.44	0.27	0.92	252.49	0.00	252.49	4.000	**No**	**No**	**1.68**
163	**26.74**	269.75	0.00	1.46	0.28	0.92	238.01	0.00	238.01	4.000	**No**	**No**	**1.67**
164	**26.90**	245.17	0.00	1.53	0.31	0.91	218.96	0.00	218.96	4.000	**No**	**No**	**1.67**
165	**27.07**	214.92	0.00	1.63	0.34	0.90	192.27	0.00	192.27	1.257	**No**	**No**	**0.52**
166	**27.23**	182.32	3.50	1.76	0.40	0.88	152.69	0.01	152.70	0.308	**No**	**No**	**0.18**
167	**27.40**	150.46	16.15	1.91	0.42	0.88	114.19	27.92	142.11	0.244	**No**	**No**	**0.15**
168	**27.56**	122.35	28.11	2.06	0.41	0.88	91.96	51.28	143.24	0.250	**No**	**No**	**0.16**
169	**27.72**	101.57	38.36	2.19	0.42	0.87	78.19	59.53	137.71	0.225	**No**	**No**	**0.14**
170	**27.89**	89.68	44.87	2.27	0.43	0.87	69.92	61.90	131.82	0.203	**No**	**No**	**0.13**
171	**28.05**	84.15	48.13	2.31	0.44	0.86	64.52	62.23	126.74	0.188	**No**	**No**	**0.13**
172	**28.22**	84.66	47.35	2.30	0.45	0.86	63.76	61.64	125.40	0.184	**No**	**No**	**0.12**
173	**28.38**	95.99	40.07	2.21	0.45	0.86	67.89	58.35	126.24	0.187	**No**	**No**	**0.12**
174	**28.54**	118.73	27.92	2.06	0.44	0.86	79.21	48.56	127.77	0.191	**No**	**No**	**0.13**
175	**28.71**	145.89	16.14	1.91	0.41	0.87	116.36	28.09	144.45	0.256	**No**	**No**	**0.16**
176	**28.87**	170.21	7.19	1.80	0.39	0.88	159.41	2.19	161.59	0.389	**No**	**No**	**0.21**
177	**29.04**	189.78	2.68	1.75	0.36	0.88	178.41	0.00	178.41	0.683	**No**	**No**	**0.31**
178	**29.20**	200.37	4.02	1.76	0.37	0.88	169.94	0.03	169.97	0.503	**No**	**No**	**0.25**
179	**29.36**	205.83	9.63	1.83	0.37	0.88	161.58	8.22	169.80	0.501	**No**	**No**	**0.25**
180	**29.53**	203.64	18.82	1.95	0.32	0.89	163.92	41.96	205.88	2.679	**No**	**No**	**1.07**
181	**29.69**	207.79	24.32	2.02	0.27	0.91	188.55	61.38	249.93	4.000	**No**	**No**	**1.60**
182	**29.86**	213.05	28.01	2.06	0.28	0.90	173.10	66.75	239.85	4.000	**No**	**No**	**1.59**
183	**30.02**	215.78	27.14	2.05	0.26	0.91	193.45	68.84	254.00	4.000	**No**	**No**	**1.59**
184	**30.18**	218.45	24.69	2.02	0.27	0.90	189.41	62.46	251.87	4.000	**No**	**No**	**1.58**
185	**30.35**	225.90	18.39	1.94	0.31	0.89	175.29	41.92	217.21	4.000	**No**	**No**	**1.58**
186	**30.51**	231.54	12.33	1.87	0.31	0.89	195.86	19.75	215.61	4.000	**No**	**No**	**1.58**
187	**30.68**	246.97	6.17	1.79	0.33	0.88	199.99	0.99	200.98	2.000	**No**	**No**	**0.79**
188	**30.84**	287.00	4.65	1.77	0.31	0.88	212.40	0.12	212.52	4.000	**No**	**No**	**1.57**
189	**31.00**	317.82	9.40	1.83	0.26	0.90	254.36	9.59	254.00	4.000	**No**	**No**	**1.57**
190	**31.17**	341.21	14.94	1.90	0.26	0.90	347.59	43.57	254.00	4.000	**No**	**No**	**1.56**
191	**31.33**	345.47	21.67	1.98	0.26	0.90	329.28	75.16	254.00	4.000	**No**	**No**	**1.56**
192	**31.50**	341.42	27.02	2.05	0.26	0.90	303.25	89.08	254.00	4.000	**No**	**No**	**1.55**

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	**31.66**	327.78	31.77	2.11	0.26	0.90	233.47	86.05	254.00	4.000	**No**	**No**	**1.55**
194	**31.82**	309.85	35.48	2.16	0.26	0.90	235.85	92.74	254.00	4.000	**No**	**No**	**1.55**
195	**31.99**	287.32	40.00	2.21	0.26	0.90	288.07	111.43	254.00	4.000	**No**	**No**	**1.54**
196	**32.15**	272.82	42.92	2.25	0.26	0.89	251.77	106.08	254.00	4.000	**No**	**No**	**1.54**
197	**32.32**	254.07	47.13	2.30	0.26	0.89	206.54	98.53	254.00	4.000	**No**	**No**	**1.54**
198	**32.48**	229.11	53.12	2.38	0.26	0.89	171.13	93.23	254.00	4.000	**No**	**No**	**1.53**
199	**32.64**	211.37	57.22	2.43	0.27	0.89	155.00	90.94	245.94	4.000	**No**	**No**	**1.53**
200	**32.81**	195.44	60.88	2.47	0.26	0.89	181.48	100.00	254.00	4.000	**No**	**No**	**1.53**
201	**32.97**	187.81	62.95	2.50	0.26	0.89	175.87	99.29	254.00	4.000	**No**	**No**	**1.52**
202	**33.14**	203.45	59.24	2.45	0.30	0.88	136.36	86.64	222.99	4.000	**No**	**No**	**1.52**
203	**33.30**	226.82	54.55	2.39	0.30	0.87	135.78	84.39	220.17	4.000	**No**	**No**	**1.52**
204	**33.46**	263.40	48.78	2.32	0.26	0.89	220.49	103.47	254.00	4.000	**No**	**No**	**1.51**
205	**33.63**	298.45	44.53	2.27	0.26	0.89	278.54	114.54	254.00	4.000	**No**	**No**	**1.51**
206	**33.79**	325.19	41.86	2.24	0.26	0.89	328.16	123.73	254.00	4.000	**No**	**No**	**1.51**
207	**33.96**	330.12	42.22	2.24	0.26	0.89	284.54	113.42	254.00	4.000	**No**	**No**	**1.50**
208	**34.12**	313.69	45.39	2.28	0.26	0.88	249.28	107.98	254.00	4.000	**No**	**No**	**1.50**
209	**34.28**	290.52	100.00	4.06	0.26	0.88	240.01	0.00	240.01	4.000	**No**	**Yes**	**1.50**
210	**34.45**	280.47	100.00	4.06	0.26	0.88	208.66	0.00	208.66	4.000	**No**	**Yes**	**1.49**
211	**34.61**	302.06	100.00	4.06	0.26	0.88	230.15	0.00	230.15	4.000	**No**	**Yes**	**1.49**
212	**34.78**	302.54	100.00	4.06	0.26	0.88	241.43	0.00	241.43	4.000	**No**	**Yes**	**1.49**
213	**34.94**	357.02	100.00	4.06	0.26	0.88	337.99	0.00	337.99	4.000	**No**	**Yes**	**1.48**

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

'T name: CPT-03 - Basic

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.16	2.00	0.00	9.98	0.17	0.00	0.33	2.00	0.00	9.95	0.17	0.00
0.49	2.00	0.00	9.93	0.16	0.00	0.66	2.00	0.00	9.90	0.17	0.00
0.82	2.00	0.00	9.88	0.16	0.00	0.98	2.00	0.00	9.85	0.16	0.00
1.15	2.00	0.00	9.82	0.17	0.00	1.31	2.00	0.00	9.80	0.16	0.00
1.48	2.00	0.00	9.77	0.17	0.00	1.64	2.00	0.00	9.75	0.16	0.00
1.80	2.00	0.00	9.73	0.16	0.00	1.97	2.00	0.00	9.70	0.17	0.00
2.13	2.00	0.00	9.68	0.16	0.00	2.30	2.00	0.00	9.65	0.17	0.00
2.46	2.00	0.00	9.63	0.16	0.00	2.62	2.00	0.00	9.60	0.16	0.00
2.79	2.00	0.00	9.57	0.17	0.00	2.95	2.00	0.00	9.55	0.16	0.00
3.12	2.00	0.00	9.52	0.17	0.00	3.28	2.00	0.00	9.50	0.16	0.00
3.44	2.00	0.00	9.48	0.16	0.00	3.61	2.00	0.00	9.45	0.17	0.00
3.77	2.00	0.00	9.43	0.16	0.00	3.94	2.00	0.00	9.40	0.17	0.00
4.10	2.00	0.00	9.38	0.16	0.00	4.27	2.00	0.00	9.35	0.17	0.00
4.43	2.00	0.00	9.32	0.16	0.00	4.59	2.00	0.00	9.30	0.16	0.00
4.76	2.00	0.00	9.27	0.17	0.00	4.92	2.00	0.00	9.25	0.16	0.00
5.09	2.00	0.00	9.22	0.17	0.00	5.25	2.00	0.00	9.20	0.16	0.00
5.41	2.00	0.00	9.18	0.16	0.00	5.58	2.00	0.00	9.15	0.17	0.00
5.74	2.00	0.00	9.13	0.16	0.00	5.91	2.00	0.00	9.10	0.17	0.00
6.07	2.00	0.00	9.07	0.16	0.00	6.23	2.00	0.00	9.05	0.16	0.00
6.40	2.00	0.00	9.02	0.17	0.00	6.56	2.00	0.00	9.00	0.16	0.00
6.73	2.00	0.00	8.97	0.17	0.00	6.89	2.00	0.00	8.95	0.16	0.00
7.05	2.00	0.00	8.93	0.16	0.00	7.22	2.00	0.00	8.90	0.17	0.00
7.38	2.00	0.00	8.88	0.16	0.00	7.55	2.00	0.00	8.85	0.17	0.00
7.71	2.00	0.00	8.82	0.16	0.00	7.87	2.00	0.00	8.80	0.16	0.00
8.04	0.24	0.76	8.77	0.17	0.34	8.20	0.22	0.78	8.75	0.16	0.33
8.37	0.22	0.78	8.72	0.17	0.35	8.53	0.21	0.79	8.70	0.16	0.33
8.69	0.21	0.79	8.68	0.16	0.34	8.86	0.20	0.80	8.65	0.17	0.36
9.02	0.21	0.79	8.63	0.16	0.33	9.19	0.21	0.79	8.60	0.17	0.35
9.35	0.21	0.79	8.58	0.16	0.33	9.51	0.21	0.79	8.55	0.16	0.33
9.68	0.20	0.80	8.52	0.17	0.35	9.84	0.20	0.80	8.50	0.16	0.33
10.01	0.21	0.79	8.47	0.17	0.35	10.17	0.21	0.79	8.45	0.16	0.33
10.33	0.21	0.79	8.43	0.16	0.33	10.50	0.20	0.80	8.40	0.17	0.35
10.66	0.19	0.81	8.38	0.16	0.33	10.83	0.19	0.81	8.35	0.17	0.35
10.99	0.19	0.81	8.33	0.16	0.33	11.15	0.19	0.81	8.30	0.16	0.33
11.32	0.20	0.80	8.27	0.17	0.34	11.48	0.18	0.82	8.25	0.16	0.33
11.65	0.17	0.83	8.22	0.17	0.35	11.81	0.17	0.83	8.20	0.16	0.33
11.98	0.17	0.83	8.17	0.17	0.35	12.14	0.17	0.83	8.15	0.16	0.33
12.30	0.17	0.83	8.13	0.16	0.33	12.47	0.17	0.83	8.10	0.17	0.35
12.63	0.17	0.83	8.08	0.16	0.33	12.80	0.17	0.83	8.05	0.17	0.35
12.96	0.18	0.82	8.02	0.16	0.32	13.12	0.18	0.82	8.00	0.16	0.32
13.29	0.17	0.83	7.97	0.17	0.34	13.45	0.17	0.83	7.95	0.16	0.32
13.62	0.17	0.83	7.92	0.17	0.34	13.78	0.17	0.83	7.90	0.16	0.32
13.94	0.16	0.84	7.88	0.16	0.32	14.11	0.16	0.84	7.85	0.17	0.34
14.27	0.16	0.84	7.83	0.16	0.32	14.44	0.17	0.83	7.80	0.17	0.34
14.60	0.19	0.81	7.77	0.16	0.31	14.76	0.19	0.81	7.75	0.16	0.31
14.93	0.18	0.82	7.72	0.17	0.33	15.09	0.18	0.82	7.70	0.16	0.31
15.26	0.20	0.80	7.67	0.17	0.32	15.42	0.20	0.80	7.65	0.16	0.30
15.58	0.18	0.82	7.63	0.16	0.30	15.75	0.18	0.82	7.60	0.17	0.32

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
15.91	0.19	0.81	7.58	0.16	0.30	16.08	0.19	0.81	7.55	0.17	0.32
16.24	0.20	0.80	7.53	0.16	0.29	16.40	0.18	0.82	7.50	0.16	0.30
16.57	0.18	0.82	7.47	0.17	0.32	16.73	0.20	0.80	7.45	0.16	0.29
16.90	0.24	0.76	7.42	0.17	0.29	17.06	0.32	0.68	7.40	0.16	0.24
17.22	0.28	0.72	7.38	0.16	0.26	17.39	0.21	0.79	7.35	0.17	0.30
17.55	0.17	0.83	7.33	0.16	0.30	17.72	0.20	0.80	7.30	0.17	0.30
17.88	0.25	0.75	7.28	0.16	0.27	18.04	0.23	0.77	7.25	0.16	0.27
18.21	0.23	0.77	7.22	0.17	0.29	18.37	0.26	0.74	7.20	0.16	0.26
18.54	0.28	0.72	7.17	0.17	0.27	18.70	0.25	0.75	7.15	0.16	0.26
18.86	0.24	0.76	7.13	0.16	0.26	19.03	0.21	0.79	7.10	0.17	0.29
19.19	0.21	0.79	7.08	0.16	0.27	19.36	0.20	0.80	7.05	0.17	0.29
19.52	0.19	0.81	7.03	0.16	0.28	19.69	0.24	0.76	7.00	0.17	0.28
19.85	0.34	0.66	6.97	0.16	0.22	20.01	0.39	0.61	6.95	0.16	0.21
20.18	0.35	0.65	6.92	0.17	0.23	20.34	0.32	0.68	6.90	0.16	0.23
20.51	0.40	0.60	6.87	0.17	0.21	20.67	0.40	0.60	6.85	0.16	0.20
20.83	1.04	0.00	6.83	0.16	0.00	21.00	1.88	0.00	6.80	0.17	0.00
21.16	1.87	0.00	6.78	0.16	0.00	21.33	1.86	0.00	6.75	0.17	0.00
21.49	0.39	0.61	6.72	0.16	0.20	21.65	0.25	0.75	6.70	0.16	0.25
21.82	0.25	0.75	6.67	0.17	0.26	21.98	0.25	0.75	6.65	0.16	0.24
22.15	0.26	0.74	6.62	0.17	0.25	22.31	0.76	0.24	6.60	0.16	0.08
22.47	1.82	0.00	6.58	0.16	0.00	22.64	1.81	0.00	6.55	0.17	0.00
22.80	1.80	0.00	6.53	0.16	0.00	22.97	1.80	0.00	6.50	0.17	0.00
23.13	1.79	0.00	6.47	0.16	0.00	23.29	0.88	0.12	6.45	0.16	0.04
23.46	0.37	0.63	6.42	0.17	0.21	23.62	0.41	0.59	6.40	0.16	0.18
23.79	1.77	0.00	6.37	0.17	0.00	23.95	1.76	0.00	6.35	0.16	0.00
24.11	1.76	0.00	6.33	0.16	0.00	24.28	1.75	0.00	6.30	0.17	0.00
24.44	1.75	0.00	6.28	0.16	0.00	24.61	1.74	0.00	6.25	0.17	0.00
24.77	1.73	0.00	6.23	0.16	0.00	24.93	1.73	0.00	6.20	0.16	0.00
25.10	1.72	0.00	6.17	0.17	0.00	25.26	1.72	0.00	6.15	0.16	0.00
25.43	1.71	0.00	6.12	0.17	0.00	25.59	1.71	0.00	6.10	0.16	0.00
25.75	1.70	0.00	6.08	0.16	0.00	25.92	1.70	0.00	6.05	0.17	0.00
26.08	1.69	0.00	6.03	0.16	0.00	26.25	1.69	0.00	6.00	0.17	0.00
26.41	1.68	0.00	5.98	0.16	0.00	26.57	1.68	0.00	5.95	0.16	0.00
26.74	1.67	0.00	5.92	0.17	0.00	26.90	1.67	0.00	5.90	0.16	0.00
27.07	0.52	0.48	5.87	0.17	0.15	27.23	0.18	0.82	5.85	0.16	0.23
27.40	0.15	0.85	5.82	0.17	0.26	27.56	0.16	0.84	5.80	0.16	0.24
27.72	0.14	0.86	5.78	0.16	0.24	27.89	0.13	0.87	5.75	0.17	0.26
28.05	0.13	0.87	5.73	0.16	0.24	28.22	0.12	0.88	5.70	0.17	0.26
28.38	0.12	0.88	5.67	0.16	0.24	28.54	0.13	0.87	5.65	0.16	0.24
28.71	0.16	0.84	5.62	0.17	0.25	28.87	0.21	0.79	5.60	0.16	0.22
29.04	0.31	0.69	5.57	0.17	0.20	29.20	0.25	0.75	5.55	0.16	0.20
29.36	0.25	0.75	5.53	0.16	0.20	29.53	1.07	0.00	5.50	0.17	0.00
29.69	1.60	0.00	5.48	0.16	0.00	29.86	1.59	0.00	5.45	0.17	0.00
30.02	1.59	0.00	5.42	0.16	0.00	30.18	1.58	0.00	5.40	0.16	0.00
30.35	1.58	0.00	5.37	0.17	0.00	30.51	1.58	0.00	5.35	0.16	0.00
30.68	0.79	0.21	5.32	0.17	0.06	30.84	1.57	0.00	5.30	0.16	0.00
31.00	1.57	0.00	5.28	0.16	0.00	31.17	1.56	0.00	5.25	0.17	0.00
31.33	1.56	0.00	5.23	0.16	0.00	31.50	1.55	0.00	5.20	0.17	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
31.66	1.55	0.00	5.18	0.16	0.00	31.82	1.55	0.00	5.15	0.16	0.00
31.99	1.54	0.00	5.12	0.17	0.00	32.15	1.54	0.00	5.10	0.16	0.00
32.32	1.54	0.00	5.07	0.17	0.00	32.48	1.53	0.00	5.05	0.16	0.00
32.64	1.53	0.00	5.03	0.16	0.00	32.81	1.53	0.00	5.00	0.17	0.00
32.97	1.52	0.00	4.98	0.16	0.00	33.14	1.52	0.00	4.95	0.17	0.00
33.30	1.52	0.00	4.93	0.16	0.00	33.46	1.51	0.00	4.90	0.16	0.00
33.63	1.51	0.00	4.87	0.17	0.00	33.79	1.51	0.00	4.85	0.16	0.00
33.96	1.50	0.00	4.82	0.17	0.00	34.12	1.50	0.00	4.80	0.16	0.00
34.28	1.50	0.00	4.78	0.16	0.00	34.45	1.49	0.00	4.75	0.17	0.00
34.61	1.49	0.00	4.73	0.16	0.00	34.78	1.49	0.00	4.70	0.17	0.00
34.94	1.48	0.00	4.68	0.16	0.00						

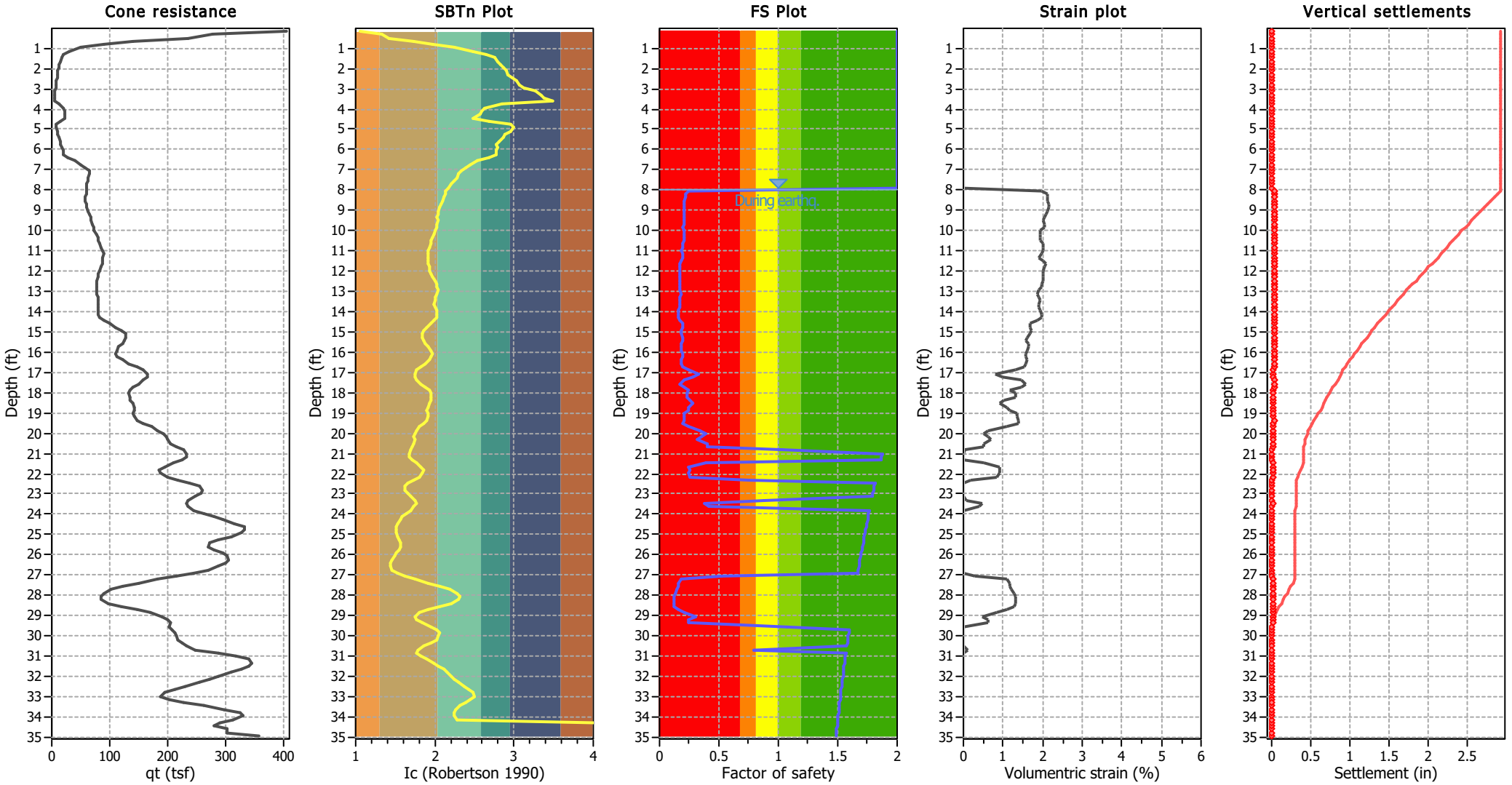
Overall liquefaction potential: 29.24

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

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

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
8.04	136.45	0.24	1.99	0.86	0.04	8.20	129.43	0.22	2.11	0.86	0.04
8.37	128.48	0.22	2.12	0.86	0.04	8.53	126.95	0.21	2.14	0.86	0.04
8.69	125.47	0.21	2.16	0.85	0.04	8.86	124.23	0.20	2.17	0.85	0.04
9.02	127.09	0.21	2.11	0.85	0.04	9.19	128.55	0.21	2.08	0.84	0.04
9.35	130.58	0.21	2.04	0.84	0.04	9.51	131.68	0.21	2.01	0.84	0.04
9.68	129.64	0.20	2.04	0.84	0.04	9.84	128.40	0.20	2.06	0.83	0.04
10.01	134.57	0.21	1.95	0.83	0.04	10.17	134.16	0.21	1.95	0.83	0.04
10.33	133.26	0.21	1.95	0.82	0.04	10.50	133.36	0.20	1.95	0.82	0.04
10.66	128.98	0.19	2.01	0.82	0.04	10.83	128.51	0.19	2.01	0.82	0.04
10.99	127.44	0.19	2.02	0.81	0.04	11.15	131.03	0.19	1.96	0.81	0.04
11.32	134.57	0.20	1.89	0.81	0.04	11.48	126.22	0.18	2.02	0.81	0.04
11.65	121.70	0.17	2.10	0.80	0.04	11.81	123.13	0.17	2.07	0.80	0.04
11.98	124.74	0.17	2.03	0.80	0.04	12.14	124.68	0.17	2.02	0.79	0.04
12.30	124.28	0.17	2.02	0.79	0.04	12.47	125.20	0.17	2.00	0.79	0.04
12.63	125.52	0.17	1.99	0.79	0.04	12.80	126.68	0.17	1.96	0.78	0.04
12.96	129.97	0.18	1.90	0.78	0.04	13.12	132.05	0.18	1.86	0.78	0.04
13.29	127.90	0.17	1.92	0.77	0.04	13.45	125.97	0.17	1.95	0.77	0.04
13.62	128.33	0.17	1.90	0.77	0.04	13.78	127.55	0.17	1.91	0.77	0.04
13.94	126.14	0.16	1.92	0.76	0.04	14.11	123.03	0.16	1.97	0.76	0.04
14.27	122.34	0.16	1.97	0.76	0.04	14.44	129.39	0.17	1.85	0.76	0.04
14.60	141.30	0.19	1.67	0.75	0.03	14.76	140.72	0.19	1.67	0.75	0.03
14.93	137.27	0.18	1.71	0.75	0.03	15.09	138.76	0.18	1.69	0.74	0.03
15.26	144.64	0.20	1.60	0.74	0.03	15.42	145.30	0.20	1.59	0.74	0.03
15.58	140.21	0.18	1.65	0.74	0.03	15.75	139.88	0.18	1.65	0.73	0.03
15.91	141.68	0.19	1.62	0.73	0.03	16.08	143.70	0.19	1.58	0.73	0.03
16.24	145.66	0.20	1.55	0.72	0.03	16.40	141.26	0.18	1.60	0.72	0.03
16.57	142.00	0.18	1.59	0.72	0.03	16.73	146.95	0.20	1.52	0.72	0.03
16.90	158.36	0.24	1.30	0.71	0.03	17.06	171.90	0.32	0.81	0.71	0.02
17.22	166.35	0.28	0.98	0.71	0.02	17.39	151.61	0.21	1.45	0.71	0.03
17.55	139.71	0.17	1.58	0.70	0.03	17.72	150.00	0.20	1.45	0.70	0.03
17.88	160.98	0.25	1.16	0.70	0.02	18.04	157.22	0.23	1.32	0.69	0.03
18.21	157.23	0.23	1.31	0.69	0.03	18.37	163.84	0.26	1.04	0.69	0.02
18.54	167.38	0.28	0.92	0.69	0.02	18.70	161.98	0.25	1.10	0.68	0.02
18.86	160.33	0.24	1.16	0.68	0.02	19.03	154.28	0.21	1.36	0.68	0.03
19.19	152.85	0.21	1.37	0.67	0.03	19.36	151.95	0.20	1.37	0.67	0.03
19.52	149.90	0.19	1.39	0.67	0.03	19.69	161.33	0.24	1.10	0.67	0.02
19.85	176.97	0.34	0.63	0.66	0.01	20.01	181.84	0.39	0.53	0.66	0.01
20.18	177.77	0.35	0.61	0.66	0.01	20.34	174.71	0.32	0.68	0.66	0.01
20.51	182.72	0.40	0.51	0.65	0.01	20.67	182.75	0.40	0.50	0.65	0.01
20.83	202.76	1.04	0.03	0.65	0.00	21.00	226.87	1.88	0.00	0.64	0.00
21.16	225.99	1.87	0.00	0.64	0.00	21.33	212.41	1.86	0.00	0.64	0.00
21.49	182.46	0.39	0.50	0.64	0.01	21.65	165.15	0.25	0.92	0.63	0.02
21.82	165.59	0.25	0.90	0.63	0.02	21.98	164.90	0.25	0.92	0.63	0.02
22.15	167.47	0.26	0.83	0.62	0.02	22.31	197.81	0.76	0.18	0.62	0.00
22.47	213.17	1.82	0.00	0.62	0.00	22.64	232.70	1.81	0.00	0.62	0.00
22.80	245.99	1.80	0.00	0.61	0.00	22.97	247.39	1.80	0.00	0.61	0.00
23.13	219.53	1.79	0.00	0.61	0.00	23.29	200.73	0.88	0.09	0.61	0.00
23.46	182.39	0.37	0.47	0.60	0.01	23.62	185.57	0.41	0.42	0.60	0.01

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

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
23.79	233.13	1.77	0.00	0.60	0.00	23.95	234.45	1.76	0.00	0.59	0.00
24.11	247.51	1.76	0.00	0.59	0.00	24.28	254.00	1.75	0.00	0.59	0.00
24.44	254.00	1.75	0.00	0.59	0.00	24.61	254.00	1.74	0.00	0.58	0.00
24.77	254.00	1.73	0.00	0.58	0.00	24.93	254.00	1.73	0.00	0.58	0.00
25.10	254.00	1.72	0.00	0.57	0.00	25.26	233.51	1.72	0.00	0.57	0.00
25.43	215.85	1.71	0.00	0.57	0.00	25.59	228.30	1.71	0.00	0.57	0.00
25.75	244.52	1.70	0.00	0.56	0.00	25.92	254.00	1.70	0.00	0.56	0.00
26.08	254.00	1.69	0.00	0.56	0.00	26.25	254.00	1.69	0.00	0.56	0.00
26.41	254.00	1.68	0.00	0.55	0.00	26.57	252.49	1.68	0.00	0.55	0.00
26.74	238.01	1.67	0.00	0.55	0.00	26.90	218.96	1.67	0.00	0.54	0.00
27.07	192.27	0.52	0.29	0.54	0.01	27.23	152.70	0.18	1.10	0.54	0.02
27.40	142.11	0.15	1.18	0.54	0.02	27.56	143.24	0.16	1.17	0.53	0.02
27.72	137.71	0.14	1.21	0.53	0.02	27.89	131.82	0.13	1.26	0.53	0.03
28.05	126.74	0.13	1.31	0.52	0.03	28.22	125.40	0.12	1.32	0.52	0.03
28.38	126.24	0.12	1.30	0.52	0.03	28.54	127.77	0.13	1.28	0.52	0.02
28.71	144.45	0.16	1.11	0.51	0.02	28.87	161.59	0.21	0.83	0.51	0.02
29.04	178.41	0.31	0.46	0.51	0.01	29.20	169.97	0.25	0.62	0.51	0.01
29.36	169.80	0.25	0.62	0.50	0.01	29.53	205.88	1.07	0.01	0.50	0.00
29.69	249.93	1.60	0.00	0.50	0.00	29.86	239.85	1.59	0.00	0.49	0.00
30.02	254.00	1.59	0.00	0.49	0.00	30.18	251.87	1.58	0.00	0.49	0.00
30.35	217.21	1.58	0.00	0.49	0.00	30.51	215.61	1.58	0.00	0.48	0.00
30.68	200.98	0.79	0.11	0.48	0.00	30.84	212.52	1.57	0.00	0.48	0.00
31.00	254.00	1.57	0.00	0.47	0.00	31.17	254.00	1.56	0.00	0.47	0.00
31.33	254.00	1.56	0.00	0.47	0.00	31.50	254.00	1.55	0.00	0.47	0.00
31.66	254.00	1.55	0.00	0.46	0.00	31.82	254.00	1.55	0.00	0.46	0.00
31.99	254.00	1.54	0.00	0.46	0.00	32.15	254.00	1.54	0.00	0.46	0.00
32.32	254.00	1.54	0.00	0.45	0.00	32.48	254.00	1.53	0.00	0.45	0.00
32.64	245.94	1.53	0.00	0.45	0.00	32.81	254.00	1.53	0.00	0.44	0.00
32.97	254.00	1.52	0.00	0.44	0.00	33.14	222.99	1.52	0.00	0.44	0.00
33.30	220.17	1.52	0.00	0.44	0.00	33.46	254.00	1.51	0.00	0.43	0.00
33.63	254.00	1.51	0.00	0.43	0.00	33.79	254.00	1.51	0.00	0.43	0.00
33.96	254.00	1.50	0.00	0.42	0.00	34.12	254.00	1.50	0.00	0.42	0.00
34.28	240.01	1.50	0.00	0.42	0.00	34.45	208.66	1.49	0.00	0.42	0.00
34.61	230.15	1.49	0.00	0.41	0.00	34.78	241.43	1.49	0.00	0.41	0.00
34.94	337.99	1.48	0.00	0.41	0.00						

Total estimated settlement: 2.93

Abbreviations

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

:: Strength loss calculation Idriss & Boulanger (2008) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	405.93	690.52	1.00	690.52	1.06	N/A	N/A
0.33	277.00	471.18	1.00	471.18	1.33	N/A	N/A
0.49	234.89	399.52	1.00	399.52	1.43	N/A	N/A
0.66	138.83	236.10	1.06	250.27	1.73	N/A	N/A
0.82	88.51	150.48	1.26	189.27	1.97	N/A	N/A
0.98	50.31	85.48	1.80	153.93	2.25	N/A	N/A
1.15	29.63	50.29	2.71	136.23	2.49	N/A	N/A
1.31	19.93	33.76	3.62	122.36	2.65	N/A	N/A
1.48	15.29	25.85	4.49	116.00	2.76	N/A	N/A
1.64	13.83	23.36	4.78	111.75	2.80	N/A	N/A
1.80	12.54	21.14	5.05	106.71	2.83	N/A	N/A
1.97	11.09	18.66	5.41	101.00	2.87	N/A	N/A
2.13	9.79	16.43	5.80	95.38	2.91	N/A	N/A
2.30	9.09	15.23	5.88	89.52	2.92	N/A	N/A
2.46	7.78	12.99	6.42	83.39	2.97	N/A	N/A
2.62	6.64	11.04	7.03	77.58	3.03	N/A	N/A
2.79	5.90	9.76	7.60	74.22	3.07	N/A	N/A
2.95	5.37	8.84	8.15	72.04	3.12	N/A	N/A
3.12	4.13	6.73	10.24	68.87	3.27	N/A	N/A
3.28	3.91	6.33	11.29	71.50	3.34	N/A	N/A
3.44	3.93	6.36	11.82	75.11	3.37	N/A	N/A
3.61	3.96	6.38	13.72	87.51	3.48	N/A	N/A
3.77	12.32	20.59	5.20	107.12	2.85	N/A	N/A
3.94	19.42	32.66	3.49	114.00	2.63	N/A	N/A
4.10	20.86	35.08	3.29	115.51	2.59	N/A	N/A
4.27	21.46	36.10	3.13	113.09	2.57	N/A	N/A
4.43	21.94	36.89	2.72	100.17	2.49	N/A	N/A
4.59	14.10	23.54	3.83	90.28	2.68	N/A	N/A
4.76	7.54	12.36	6.38	78.86	2.97	N/A	N/A
4.92	6.89	11.25	6.68	75.17	2.99	N/A	N/A
5.09	7.77	12.74	6.33	80.64	2.96	N/A	N/A
5.25	9.74	16.08	5.57	89.53	2.89	N/A	N/A
5.41	11.25	18.62	5.33	99.30	2.86	N/A	N/A
5.58	13.33	22.14	4.83	106.91	2.81	N/A	N/A
5.74	15.06	25.07	4.58	114.84	2.78	N/A	N/A
5.91	16.18	26.96	4.65	125.51	2.78	N/A	N/A
6.07	17.99	30.02	4.52	135.56	2.77	N/A	N/A
6.23	19.91	33.28	4.62	153.58	2.78	N/A	N/A
6.40	26.77	44.93	3.86	173.53	2.68	N/A	N/A
6.56	38.14	64.25	3.00	192.63	2.54	N/A	N/A
6.73	48.98	82.67	2.54	209.97	2.45	N/A	N/A
6.89	57.07	96.43	2.27	218.48	2.39	N/A	N/A
7.05	63.41	107.19	2.04	219.11	2.33	N/A	N/A
7.22	65.29	110.37	1.93	212.97	2.29	N/A	N/A
7.38	62.85	106.20	1.87	198.85	2.28	N/A	N/A
7.55	61.12	103.24	1.76	181.79	2.24	N/A	N/A
7.71	60.06	101.41	1.69	171.27	2.21	N/A	N/A
7.87	60.30	101.81	1.59	161.77	2.17	N/A	N/A

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	59.46	98.35	1.53	150.84	2.14	0.14	0.82
8.20	58.34	94.72	1.50	142.44	2.13	0.13	0.82
8.37	57.30	91.44	1.49	135.83	2.12	0.13	0.81
8.53	57.06	89.49	1.46	130.46	2.10	0.13	0.81
8.69	58.27	89.55	1.41	126.64	2.08	0.13	0.81
8.86	59.88	90.38	1.38	125.13	2.06	0.13	0.81
9.02	61.93	92.08	1.36	125.67	2.05	0.13	0.82
9.19	63.97	93.74	1.35	126.71	2.04	0.13	0.82
9.35	65.73	95.12	1.34	127.86	2.03	0.14	0.82
9.51	66.83	95.75	1.35	129.37	2.04	0.14	0.82
9.68	68.77	97.26	1.34	130.59	2.03	0.14	0.82
9.84	70.63	98.66	1.33	131.45	2.02	0.13	0.83
10.01	72.84	100.34	1.32	131.99	2.01	0.14	0.83
10.17	75.63	102.73	1.29	132.84	1.99	0.15	0.83
10.33	78.21	104.67	1.26	132.40	1.97	0.15	0.83
10.50	80.06	105.78	1.25	132.32	1.96	0.15	0.84
10.66	82.05	107.06	1.23	132.12	1.94	0.14	0.84
10.83	84.35	108.63	1.22	132.18	1.93	0.15	0.84
10.99	86.88	110.51	1.20	132.51	1.91	0.15	0.84
11.15	88.13	111.05	1.20	132.87	1.91	0.16	0.84
11.32	88.06	109.95	1.20	131.67	1.91	0.17	0.84
11.48	87.36	108.16	1.20	129.77	1.91	0.15	0.84
11.65	85.90	105.41	1.20	126.71	1.91	0.14	0.83
11.81	83.34	101.57	1.21	123.26	1.93	0.14	0.83
11.98	81.58	98.66	1.22	120.61	1.93	0.14	0.83
12.14	80.06	96.21	1.24	119.17	1.95	0.14	0.82
12.30	78.23	93.52	1.26	118.15	1.97	0.13	0.82
12.47	76.39	90.86	1.30	118.12	2.00	0.13	0.81
12.63	75.53	89.34	1.33	118.81	2.02	0.13	0.81
12.80	75.85	89.04	1.34	119.73	2.03	0.13	0.81
12.96	76.41	88.98	1.35	119.99	2.04	0.14	0.81
13.12	77.47	89.41	1.34	119.78	2.03	0.14	0.81
13.29	79.04	90.29	1.32	119.10	2.01	0.13	0.81
13.45	79.84	90.32	1.30	117.25	2.00	0.13	0.81
13.62	79.51	89.18	1.29	115.42	2.00	0.14	0.81
13.78	78.78	87.72	1.30	114.18	2.00	0.13	0.81
13.94	78.03	86.35	1.32	114.37	2.02	0.13	0.81
14.11	78.63	86.39	1.34	115.78	2.03	0.13	0.81
14.27	82.87	90.35	1.33	120.15	2.02	0.13	0.81
14.44	89.77	96.95	1.30	125.59	2.00	0.14	0.82
14.60	99.02	105.88	1.25	131.92	1.96	0.17	0.84
14.76	109.72	116.13	1.19	138.50	1.90	0.18	0.85
14.93	119.85	125.60	1.15	144.78	1.86	0.20	0.86
15.09	125.94	130.94	1.13	148.40	1.84	0.21	0.87
15.26	127.49	131.63	1.13	149.10	1.83	0.24	0.87
15.42	125.66	129.01	1.15	147.87	1.85	0.23	0.86
15.58	121.38	123.98	1.17	145.31	1.88	0.19	0.86
15.75	115.69	117.50	1.21	141.81	1.92	0.17	0.85

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	111.30	112.41	1.24	139.38	1.95	0.17	0.84
16.08	109.97	110.33	1.26	138.66	1.96	0.17	0.84
16.24	112.89	112.49	1.25	140.40	1.96	0.18	0.84
16.40	120.78	119.49	1.21	144.94	1.92	0.18	0.85
16.57	132.22	129.83	1.17	151.77	1.88	0.20	0.86
16.73	145.93	142.28	1.12	159.41	1.82	0.26	0.88
16.90	157.99	152.99	1.09	166.08	1.77	0.34	0.89
17.06	164.52	158.38	1.07	169.17	1.74	0.47	0.89
17.22	163.47	156.49	1.07	167.68	1.75	0.41	0.89
17.39	158.11	150.46	1.09	163.75	1.77	0.30	0.89
17.55	149.43	141.39	1.12	158.83	1.82	0.23	0.88
17.72	140.12	131.71	1.17	154.24	1.88	0.22	0.87
17.88	133.72	124.89	1.22	152.13	1.93	0.23	0.86
18.04	132.48	122.95	1.24	152.92	1.95	0.21	0.86
18.21	133.89	123.45	1.25	154.20	1.96	0.21	0.86
18.37	135.71	124.40	1.24	154.25	1.95	0.23	0.86
18.54	139.29	126.93	1.22	154.35	1.93	0.26	0.86
18.70	141.40	128.17	1.20	153.30	1.91	0.25	0.86
18.86	141.29	127.34	1.19	151.65	1.90	0.25	0.86
19.03	140.16	125.52	1.20	150.52	1.91	0.22	0.86
19.19	141.00	125.53	1.21	151.42	1.92	0.21	0.86
19.36	146.80	130.02	1.19	154.73	1.90	0.22	0.86
19.52	158.37	139.78	1.15	161.22	1.86	0.24	0.88
19.69	171.69	151.05	1.12	168.42	1.81	0.35	0.89
19.85	183.39	160.85	1.09	174.87	1.77	0.55	0.90
20.01	192.44	168.24	1.07	179.52	1.74	0.63	0.90
20.18	198.24	172.93	1.06	183.61	1.74	0.55	0.91
20.34	199.89	173.86	1.07	185.50	1.74	0.51	0.91
20.51	204.68	177.59	1.07	189.16	1.74	0.64	0.91
20.67	215.48	186.78	1.05	195.97	1.72	0.64	0.92
20.83	226.75	196.39	1.03	202.71	1.69	0.93	0.93
21.00	233.42	201.83	1.02	206.32	1.68	0.93	0.93
21.16	233.67	201.50	1.03	206.58	1.68	0.93	0.93
21.33	224.77	192.90	1.05	201.86	1.71	0.92	0.92
21.49	208.83	178.10	1.08	192.69	1.77	0.65	0.91
21.65	193.67	164.08	1.12	183.97	1.82	0.38	0.90
21.82	183.91	154.95	1.15	178.06	1.85	0.33	0.89
21.98	187.53	157.72	1.14	179.67	1.84	0.34	0.89
22.15	199.31	167.72	1.11	185.64	1.80	0.42	0.90
22.31	217.13	183.24	1.06	194.04	1.73	0.92	0.92
22.47	237.17	200.73	1.01	203.55	1.67	0.93	0.93
22.64	254.99	216.08	1.00	216.08	1.62	0.94	0.94
22.80	259.94	219.75	1.00	219.75	1.62	0.94	0.94
22.97	257.61	216.69	1.01	218.21	1.66	0.94	0.94
23.13	247.18	206.58	1.04	214.87	1.70	0.93	0.93
23.29	234.64	194.74	1.07	209.24	1.75	0.93	0.93
23.46	231.95	191.81	1.08	207.48	1.76	0.65	0.92
23.62	235.43	194.63	1.06	207.27	1.74	0.70	0.93

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	245.68	203.54	1.03	209.61	1.69	0.93	0.93
23.95	263.88	219.24	1.00	219.24	1.63	0.94	0.94
24.11	281.22	234.09	1.00	234.09	1.59	0.95	0.95
24.28	295.23	245.84	1.00	245.84	1.56	0.96	0.96
24.44	316.19	263.48	1.00	263.48	1.54	0.97	0.97
24.61	332.34	276.93	1.00	276.93	1.51	0.98	0.98
24.77	334.21	278.03	1.00	278.03	1.51	0.98	0.98
24.93	327.73	272.10	1.00	272.10	1.51	0.98	0.98
25.10	310.68	256.95	1.00	256.95	1.52	0.97	0.97
25.26	289.04	237.90	1.00	237.90	1.55	0.96	0.96
25.43	272.89	223.50	1.00	223.50	1.57	0.95	0.95
25.59	271.39	221.84	1.00	221.84	1.57	0.95	0.95
25.75	280.98	229.85	1.00	229.85	1.54	0.95	0.95
25.92	294.71	241.36	1.00	241.36	1.52	0.96	0.96
26.08	303.53	248.90	1.00	248.90	1.49	0.96	0.96
26.25	305.50	250.66	1.00	250.66	1.46	0.97	0.97
26.41	300.04	246.18	1.00	246.18	1.45	0.96	0.96
26.57	287.95	236.05	1.00	236.05	1.44	0.96	0.96
26.74	269.75	219.95	1.00	219.95	1.46	0.94	0.94
26.90	245.17	197.93	1.00	197.93	1.53	0.93	0.93
27.07	214.92	171.03	1.00	171.03	1.63	0.87	0.91
27.23	182.32	142.39	1.08	153.19	1.76	0.30	0.88
27.40	150.46	114.81	1.20	138.09	1.91	0.18	0.85
27.56	122.35	91.23	1.39	127.07	2.06	0.16	0.81
27.72	101.57	74.15	1.65	122.15	2.19	0.15	0.79
27.89	89.68	64.47	1.87	120.31	2.27	0.14	0.77
28.05	84.15	59.94	2.00	119.59	2.31	0.13	0.76
28.22	84.66	60.20	1.96	118.16	2.30	0.13	0.76
28.38	95.99	69.01	1.70	117.32	2.21	0.13	0.78
28.54	118.73	87.12	1.39	121.03	2.06	0.13	0.81
28.71	145.89	109.12	1.20	131.23	1.91	0.19	0.84
28.87	170.21	129.12	1.11	143.12	1.80	0.36	0.86
29.04	189.78	144.87	1.07	154.84	1.75	0.57	0.88
29.20	200.37	152.35	1.08	164.59	1.76	0.45	0.89
29.36	205.83	154.71	1.13	175.04	1.83	0.40	0.89
29.53	203.64	150.26	1.24	185.94	1.95	0.54	0.89
29.69	207.79	151.50	1.32	200.31	2.02	0.89	0.89
29.86	213.05	153.91	1.39	214.08	2.06	0.89	0.89
30.02	215.78	155.70	1.37	213.90	2.05	0.89	0.89
30.18	218.45	157.88	1.33	209.77	2.02	0.89	0.89
30.35	225.90	164.70	1.23	202.84	1.94	0.76	0.90
30.51	231.54	170.29	1.16	197.35	1.87	0.90	0.90
30.68	246.97	183.33	1.10	201.51	1.79	0.92	0.92
30.84	287.00	213.37	1.09	231.67	1.77	0.94	0.94
31.00	317.82	233.78	1.13	263.98	1.83	0.95	0.95
31.17	341.21	247.80	1.19	294.43	1.90	0.96	0.96
31.33	345.47	247.07	1.28	315.95	1.98	0.96	0.96
31.50	341.42	240.94	1.37	330.44	2.05	0.96	0.96

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

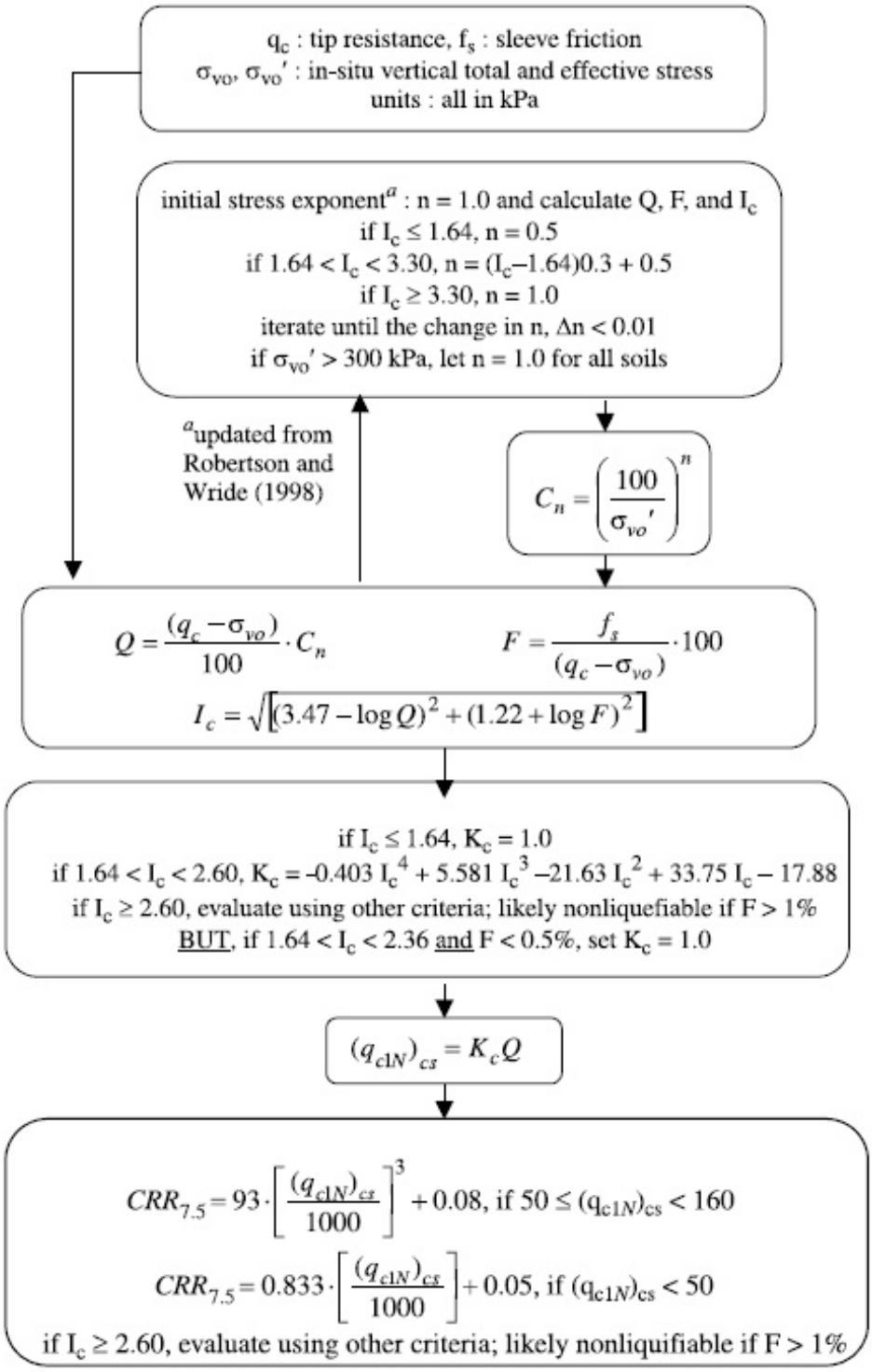
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	327.78	228.46	1.47	336.39	2.11	0.95	0.95
31.82	309.85	213.70	1.57	334.54	2.16	0.94	0.94
31.99	287.32	195.68	1.70	332.24	2.21	0.93	0.93
32.15	272.82	184.09	1.80	330.56	2.25	0.92	0.92
32.32	254.07	169.35	1.95	330.90	2.30	0.90	0.90
32.48	229.11	150.25	2.22	333.41	2.38	0.89	0.89
32.64	211.37	136.91	2.43	332.59	2.43	0.87	0.87
32.81	195.44	125.09	2.64	330.02	2.47	0.86	0.86
32.97	187.81	119.23	2.77	329.74	2.50	0.85	0.85
33.14	203.45	129.83	2.54	330.01	2.45	0.60	0.86
33.30	226.82	145.86	2.29	333.98	2.39	0.55	0.88
33.46	263.40	171.16	2.02	346.12	2.32	0.91	0.91
33.63	298.45	195.27	1.85	361.90	2.27	0.93	0.93
33.79	325.19	213.48	1.76	375.51	2.24	0.94	0.94
33.96	330.12	215.89	1.77	382.39	2.24	0.94	0.94
34.12	313.69	203.04	1.89	382.86	2.28	0.93	0.93
34.28	290.52	170.51	26.61	4536.50	4.06	0.91	12.18
34.45	280.47	163.94	26.61	4361.71	4.06	0.90	11.71
34.61	302.06	176.03	26.61	4683.34	4.06	0.91	12.57
34.78	302.54	175.65	26.61	4673.22	4.06	0.91	12.55
34.94	357.02	206.78	26.61	5501.46	4.06	0.93	14.77

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

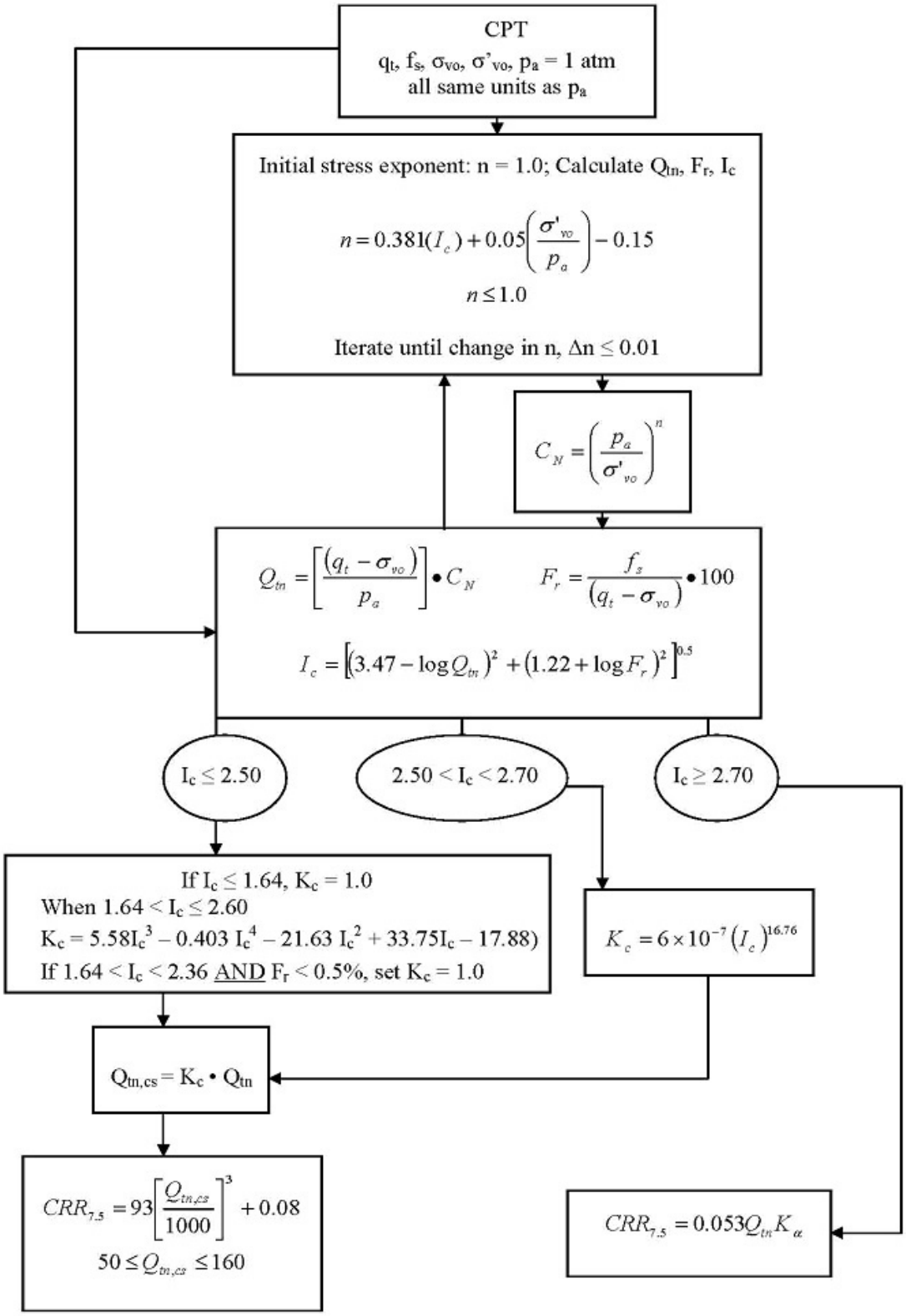
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

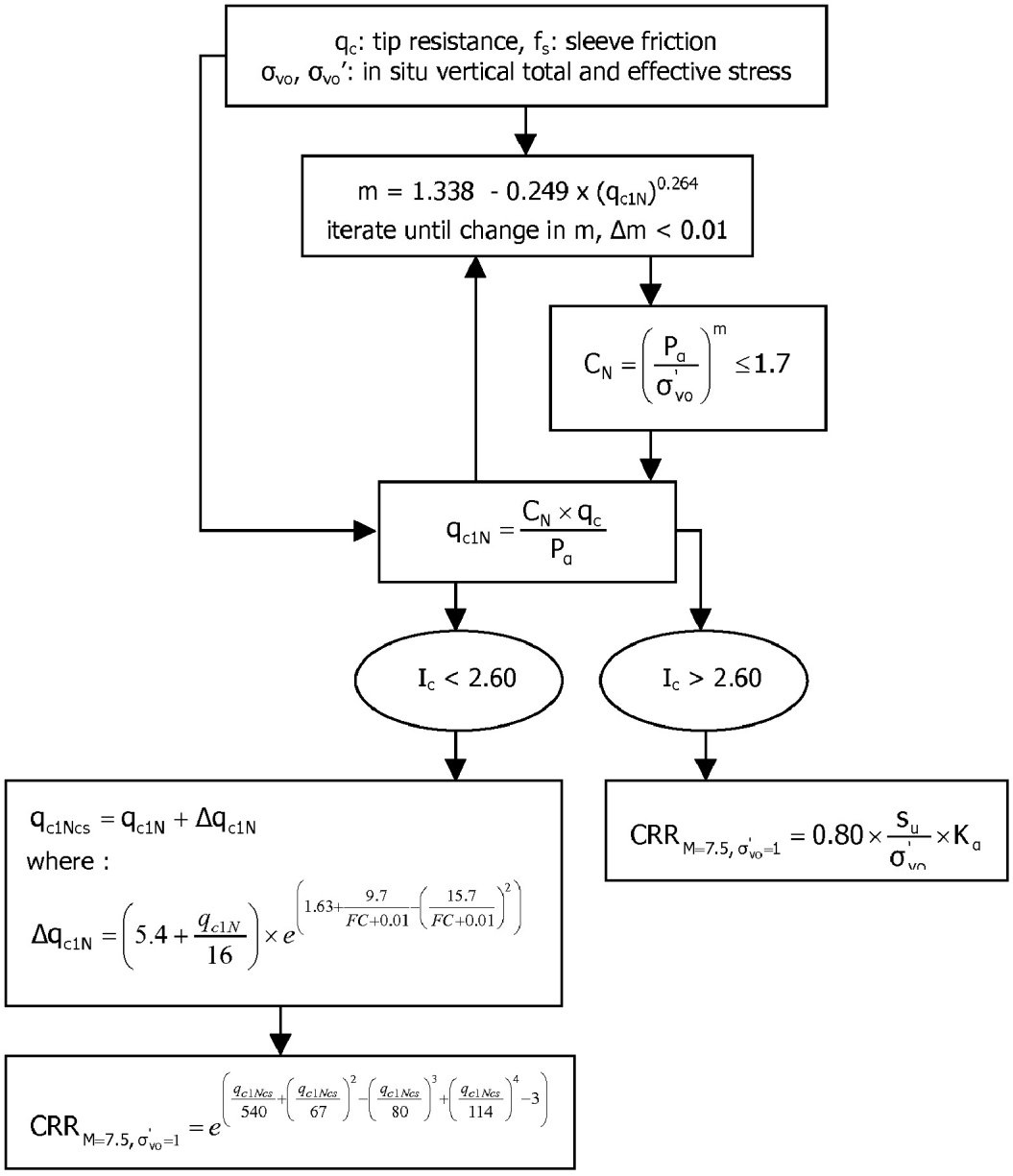
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

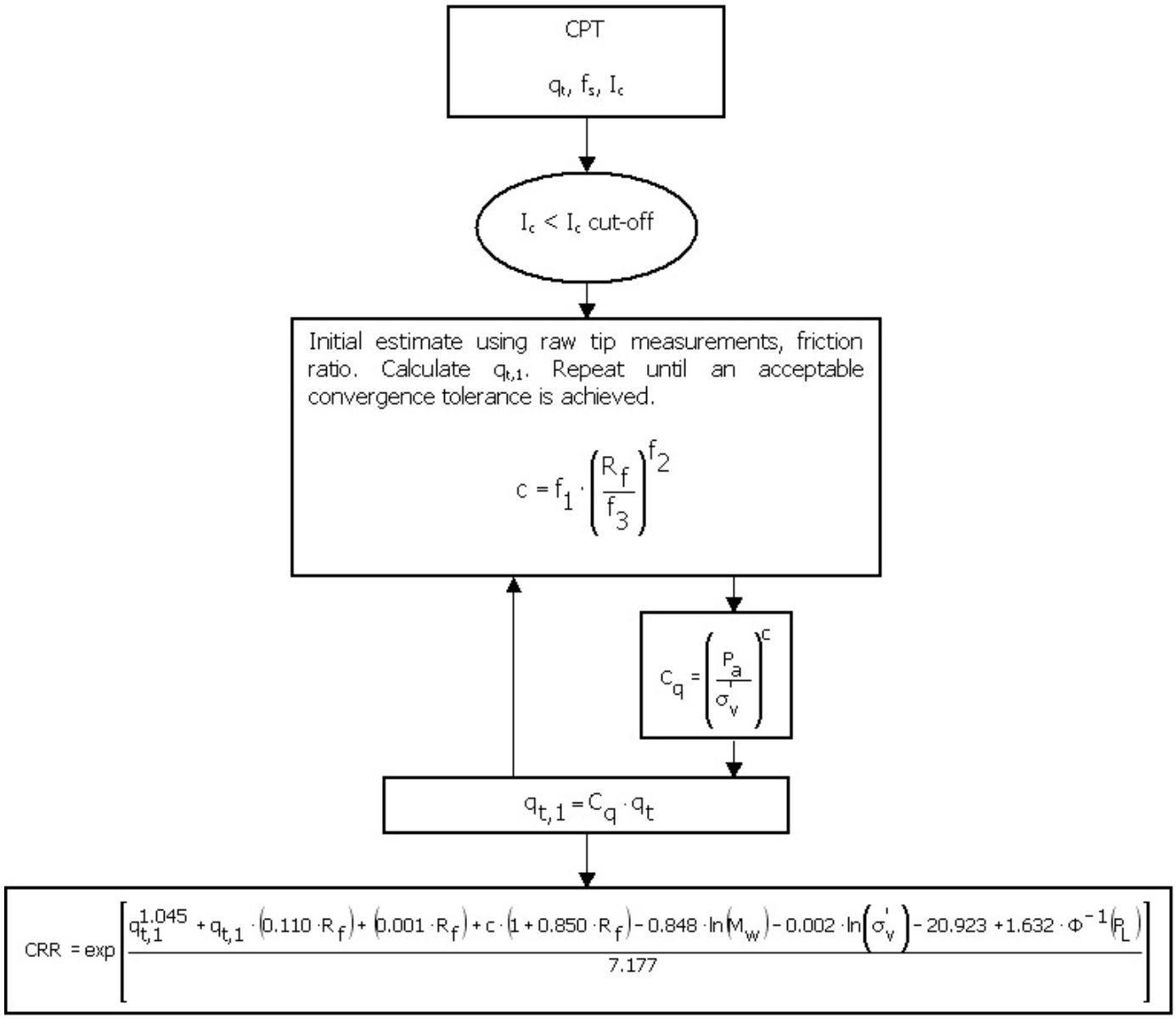


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \leq 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \leq 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \leq 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \leq 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \leq m \leq 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \leq FC \leq 100\%$$

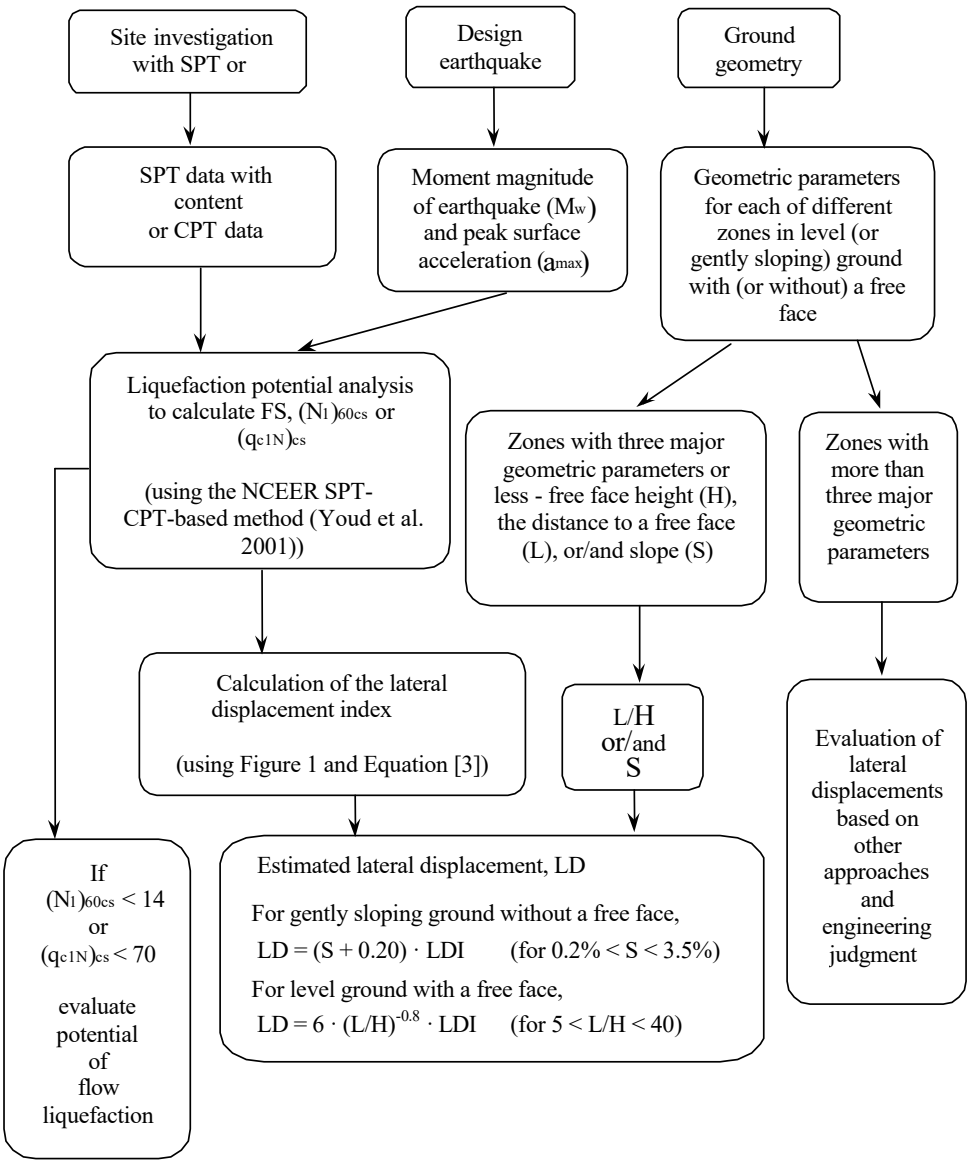
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \leq n \leq 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

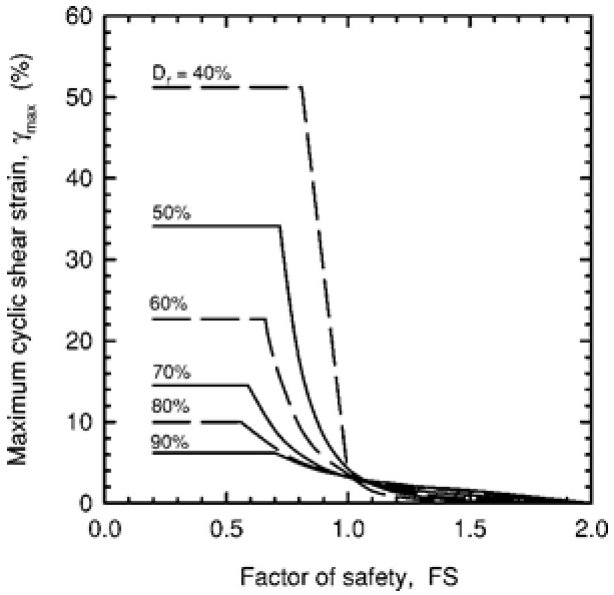
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ'_v *at time of CPT sounding*

Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



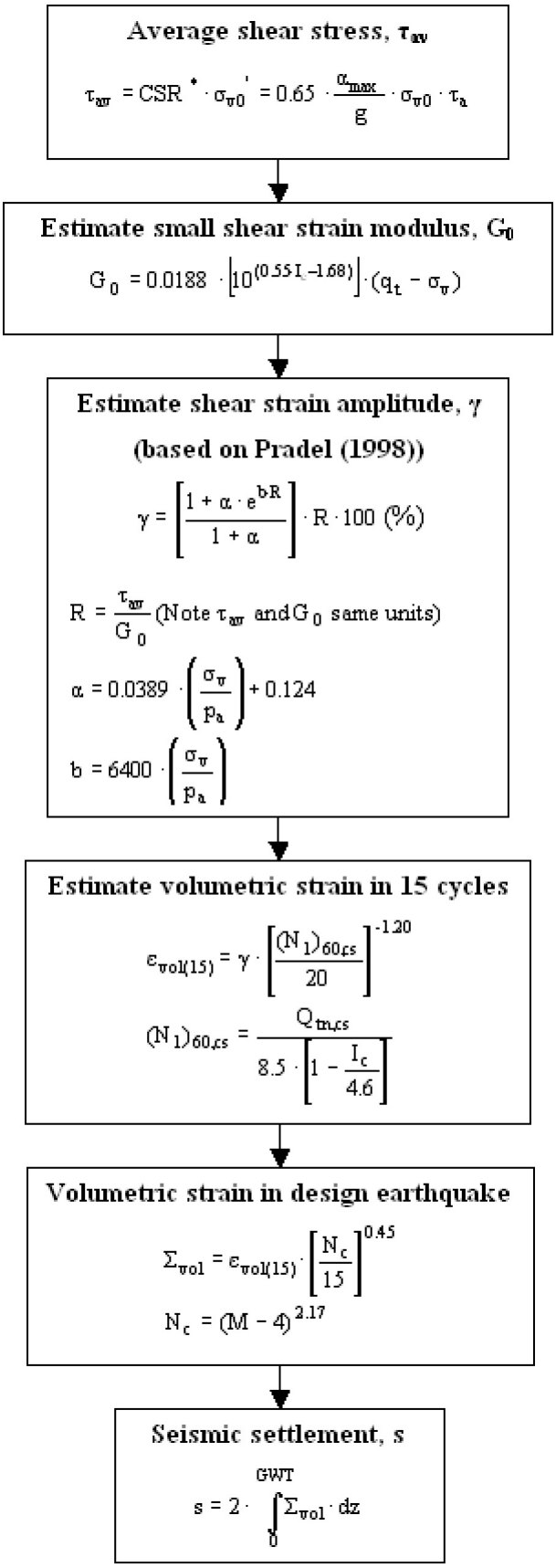
[1] Figure 1

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] Equation [3]

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

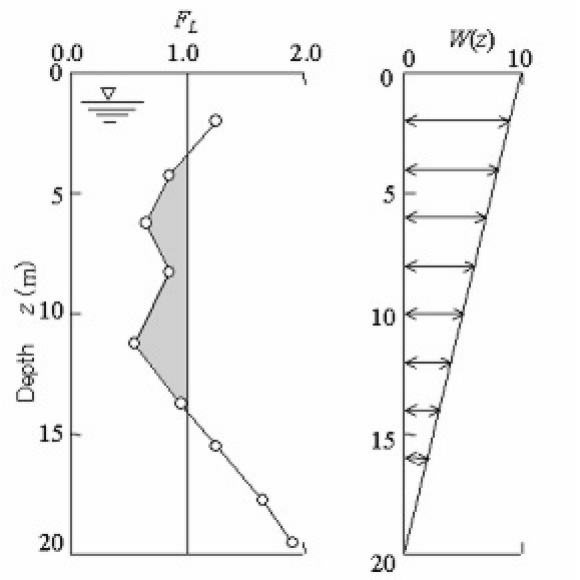
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\text{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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APPENDIX 4

ASFE Brochure

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

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